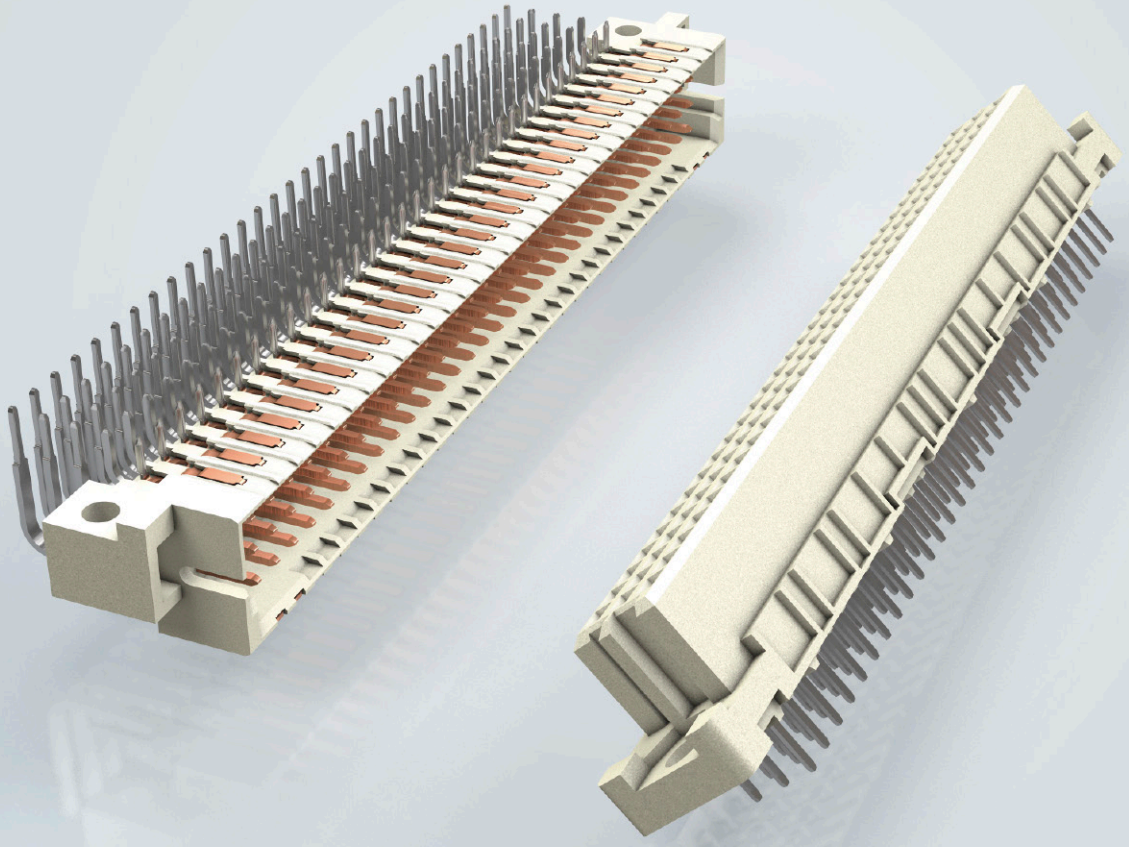
Pushing Performance



People | Power | Partnership

HARTING
Connectors DIN 41 612

	Type	Termination								
		Solder termination	Reflow soldering (THR)	Solder lug connection	Press-in connection	Crimp connection	Wire wrap connection	IDC connection	Faston connection	Cage clamp connection
DIN Signal	B	Page 01.11	Page 01.11							
		Pages 01.12 f		Pages 01.12 f	Pages 01.12 f	Page 01.15	Pages 01.12 f	Page 01.14		
	2B	Page 01.16	Page 01.16							
		Page 01.17	Page 01.17		Page 01.17					
	3B	Page 01.18	Page 01.18							
		Page 01.19	Page 01.19		Page 01.19					
	C	Pages 01.20 f	Pages 01.20 f							
		Pages 01.22 f		Page 01.26	Pages 01.24 f	Page 01.28	Page 01.26	Page 01.27		
	2C	Pages 01.29 f	Pages 01.29 f							
		Pages 01.31 f	Pages 01.31 f	Pages 01.31 f	Pages 01.32 f	Page 01.32	Pages 01.31 f			
	3C	Pages 01.34 f	Pages 01.34 f							
		Pages 01.36 f	Pages 01.36 f		Pages 01.36 f	Page 01.36				
	M	Page 01.43								
		Pages 01.44 f			Pages 01.44 f					
	M-flat	Pages 01.46 f			Pages 01.46 f					
	M invers	Pages 01.48 f			Pages 01.48 f		Pages 01.48 f			
		Page 01.50								
	R	Pages 01.60 f	Pages 01.60 f		Pages 01.60 f		Pages 01.60 f			
		Page 01.62	Page 01.62							
	R (HE 11), RM	Page 01.63			Page 01.59		Page 01.63			
		Page 01.64								
	Q	Page 01.52			Page 01.52		Page 01.52			
		Page 01.53								
	2Q	Page 01.54			Page 01.54		Page 01.54			
		Page 01.55								
	3Q	Pages 01.56 f	Pages 01.56 f		Pages 01.56 f		Pages 01.56 f			
		Page 01.58	Page 01.58							
	2R	Pages 01.66 f	Pages 01.66 f		Pages 01.66 f		Pages 01.66 f			
		Page 01.65	Page 01.65							
	3R	Pages 01.68 f	Pages 01.68 f		Pages 01.68 f		Pages 01.68 f			
		Page 01.70	Seite 01.70							
	harbus® 64	Page 02.11	Page 02.11							
		Pages 02.12, 02.14			Pages 02.12 f	Page 02.15				
DIN Power	D	Page 03.11	Page 03.11							
		Pages 03.12 f		Page 03.12		Pages 03.14, 03.23	Page 03.12			
	E	Page 03.15	Page 03.15							
		Page 03.18 f		Page 03.18	Page 03.18	Pages 03.17, 03.23	Page 03.18			
	I	Page 03.16								
	F	Page 03.27	Page 03.27							
		Pages 03.30, 03.32, 03.34 f		Page 03.31	Page 03.34	Page 03.33	Page 03.31			
	I	Page 03.28				Page 03.29	Page 03.28			
	F9					Page 03.41				
						Page 03.41				
	FM	Page 03.42				Page 03.42				
		Page 03.43				Page 03.43	Page 03.43			
	2F					Page 03.45				
	I					Page 03.44				
	H15	Page 04.11							Page 04.11	
		Page 04.14			Page 04.15				Page 04.12	Page 04.13
	H16	Page 04.16								
									Page 04.16	
	H 3	Page 04.17								
		Page 04.17								
	MH 24 + 7	Page 04.21							Page 04.21	
		Page 04.22				Page 04.22	Page 04.22			
	MH 21 + 5	Page 04.23								
		Page 04.24								

male ☐ female Interface connector

HARTING eCatalogue

The **HARTING eCatalogue** is an electronic catalogue with a part configuration and 3D components library.

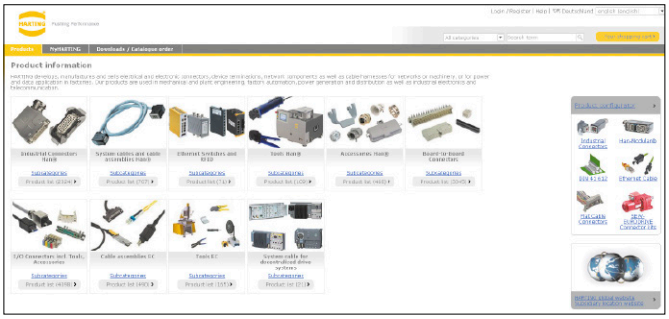
Here you can choose a connector according to your requirements. Afterwards you are able to send your inquiry directly to a HARTING sales partner.

The drawings to every single part are available in PDF-format.

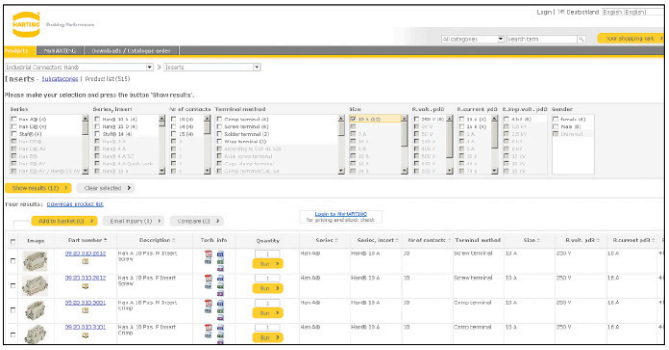
The parts are downloadable in 2D-format (DXF) and 3D-format (IGES, STEP).

The 3D-models can be viewed with a VRML-viewer.

You can find the **HARTING eCatalogue** at **www.HARTING.com**.

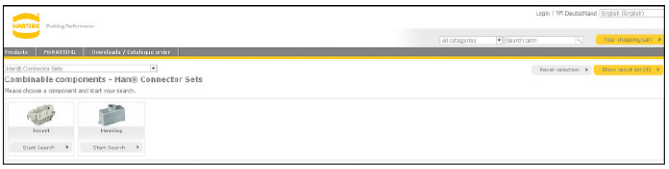


Product overview



Product selection

Product configuration



Product combination

Product samples: Fast-track delivery to your desk, free of charge

The new free express sample service in the HARTING eCatalogue allows customers to order samples immediately, easily and completely free of charge. A broad selection from the device connectivity product portfolio is now available. If a product is unavailable, the system offers alternative products with similar features that can be requested at a mouse click.

The free samples are shipped within 24 hours at no cost to you. This service enables tremendous flexibility, especially in the design phase of projects.

General information

It is the customer's responsibility to check whether the components illustrated in this catalogue also comply with different regulations from those stated in special fields of applications.

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

No part of this catalogue may be reproduced in any form (print, photocopy, microfilm or any other process) or processed, duplicated or distributed by means of electronic systems without the prior written consent of HARTING Electronics GmbH, Espelkamp. We are bound by the German version only.

Transforming customer wishes into concrete solutions

The HARTING Technology Group is skilled in the fields of electrical, electronic and optical connection, transmission and networking technology, as well as in manufacturing, mechatronics and software creation. The Group uses these skills to develop customized solutions and products such as connectors for energy and data-transmission/data-networking applications, including, for example, mechanical engineering, rail technology, wind energy plants, factory automation and the telecommunications sector. In addition, HARTING also produces electro-magnetic components for the automobile industry and offers solutions in the field of housing technology and shop systems.

The HARTING Group currently comprises 53 sales companies and production plants worldwide employing a total of about 4,200 staff.

HARTING Subsidiary

HARTING Representation

We aspire to top performance.

Connectors ensure functionality. As core elements of electrical and optical termination, connection and infrastructure technologies, they are essential in enabling the modular construction of devices, machines and systems across an extremely wide range of industrial applications. Their reliability is a crucial factor guaranteeing smooth functioning in the manufacturing area, telecommunications, applications in medical technology – in short, connectors are at work in virtually every conceivable application area. Thanks to the ongoing development of our technologies, our customers enjoy investment security and benefit from durable, long-term functionality.

Wherever our customers are, we're there.

Increasing industrialization is creating growing markets that are characterized by widely diverging demands and requirements. What these markets all share in common is the quest for perfection, increasingly efficient processes and reliable technologies. **HARTING** is providing these technologies – in Europe, the Americas and Asia. In order to implement customer requirements in the best possible manner, the **HARTING** professionals at our international subsidiaries engage in up-close, partnership-based interaction with our customers, right from the very early product development phase.

Our on-site staff form the interface to the centrally coordinated development and production departments. In this way, our customers can rely on consistently high, superior product quality – worldwide.

Our claim: Pushing Performance.

HARTING provides more than optimally attuned components. In order to offer our customers the best possible solutions, on request **HARTING** contributes a great deal more and is tightly integrated into the value-creation process.

From ready-assembled cables through to control racks or ready-to-go control desks. Our aim is to generate maximum benefit for our customers – with no compromises!

Quality creates reliability – and warrants trust.

The **HARTING** brand stands for superior quality and reliability – worldwide. The standards we set are the result of consistent, stringent quality management that is subject to regular certifications and audits.

EN ISO 9001, the EU Eco-Audit and ISO 14001:2004 are key elements here. We take a proactive stance towards new requirements, which is why **HARTING** is the first company worldwide to have obtained the new IRIS quality certificate for rail vehicles.

HARTING technology creates added value for customers.

Technologies by **HARTING** are at work worldwide. **HARTING's** presence stands for smoothly functioning systems powered by intelligent connectors, smart infrastructure solutions and sophisticated network systems. Over the course of many years of close, trust-based cooperation with its customers, the **HARTING** Technology Group has become one of the leading specialists globally for connector technology. We offer individual customers specific and innovative solutions that go beyond the basic standard functionalities. These tailored solutions deliver sustained results, ensure investment security and enable customers to achieve significant added value.

Opting for HARTING opens up an innovative, complex world of concepts and ideas.

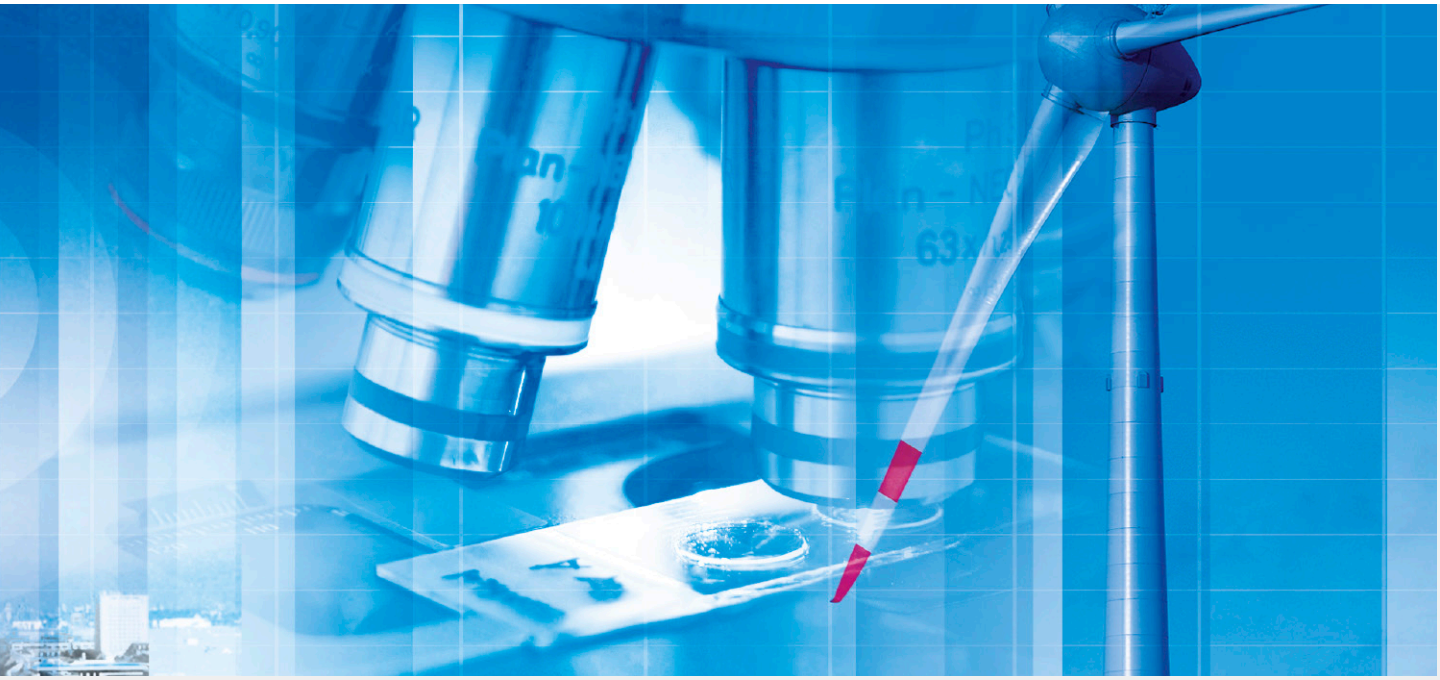
In order to develop and produce connectivity and network solutions serving an exceptionally wide range of connector applications in a professional and cost-effective manner, **HARTING** not only commands the full array of conventional tools and basic technologies. Above and beyond these capabilities, **HARTING** is constantly harnessing and refining its broad base of knowledge and experience to create new solutions that also ensure continuity. To secure its lead in know-how, HARTING draws on a wealth of sources from its in-house research and applications.

Salient examples of these sources of innovative knowledge include microstructure technologies, 3D design and connection technology, high-temperature and ultrahigh-frequency applications that are finding use in telecommunications and automation networks, in the automotive industry, or in industrial sensor and actuator applications, RFID and wireless technologies, in addition to packaging and housing made of plastics, aluminum and stainless steel.

HARTING overcomes technological limitations.

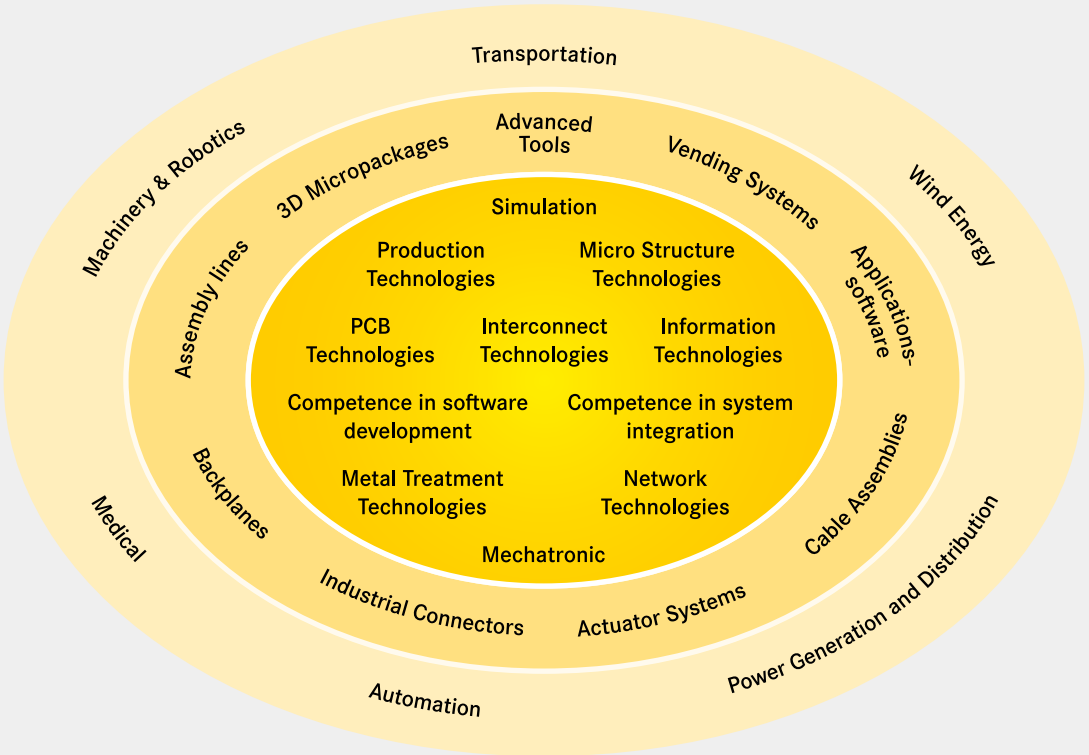
Drawing on the comprehensive resources of the group's technology pool, **HARTING** devises practical solutions for its customers. Whether this involves industrial networks for manufacturing automation, or hybrid interface solutions for wireless telecommunication infrastructures, 3D circuit carriers with microstructures, or cable assemblies for high-temperature applications in the automotive industry – **HARTING** technologies offer not only components, but comprehensive solutions attuned to individual customer requirements and preferences. The range of cost-effective solutions covers ready-to-use cable configurations, completely assembled backplanes and board system carriers, as well as fully wired and tested control panels.

In order to ensure the future-proof design of RF and EMC-compatible interface solutions, the central **HARTING** laboratory (certified to EN 45001) employs simulation tools, as well as experimental, testing and diagnostics facilities all the way to scanning electron microscopes. In addition to product and process suitability considerations, lifecycle and environmental aspects play a key role in the selection of materials and processes.



HARTING's knowledge is practical know-how that generates synergy effects.

HARTING commands decades of experience with regard to the applications conditions involved in connections in telecommunications, computer, network and medical technologies, as well as industrial automation technologies, e.g. in the mechanical engineering and plant engineering areas, in addition to the power generation industry and the transportation sector. **HARTING** is highly conversant with the specific application areas in all of these technology fields. In every solution approach, the key focus is on the application. In this context, uncompromising, superior quality is our hallmark. Every new solution found invariably flows back into the **HARTING** technology pool, thereby enriching our resources. And every new solution we go on to create will draw on this wealth of resources in order to optimize each and every individual solution. **HARTING** is synergy in action.

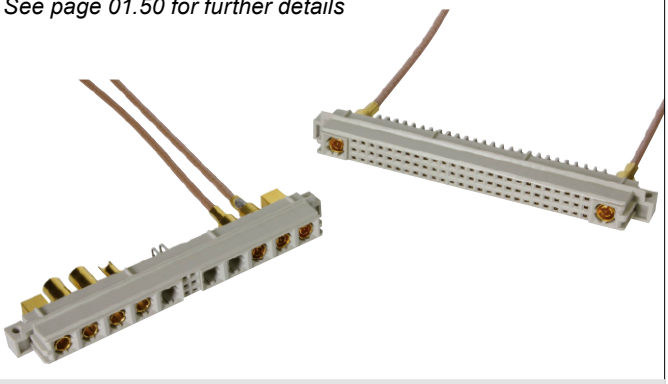


DIN 41612 connectors now also as the M invers type – Suitable for combined connections / Increased flexibility for users

The new M invers type connectors are especially suitable for combined connections between circuit boards. The users profit from an increased flexibility when a mix of signal, coaxial, high current (up to 40 A) or FO contacts in one connector is required.

The new connector types are available with 78+2, 60+4, 42+6, 24+8 and 6+10 poles, where the first figure indicates the number of signal contacts and the second the number of special contacts. The 6+10 connector in particular is completely novel and allows an integration of up to 10 special contacts in one connector.

See page 01.50 for further details



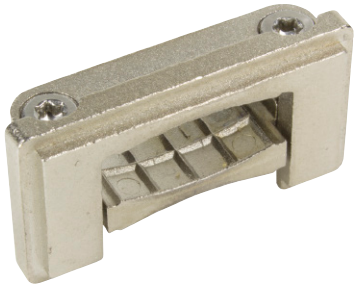
DIN 41612 M invers type

Small cable clamp for the D20 metal housing

The new small cable clamp for the D20 metal housing saves space outside the housing, especially if the top entries are used and the cables have to be bent.

The cable clamp fits in all four cable entries of the D20 metal housing and the clamp opening is adjustable between 1.8 mm and 9.6 mm.

See page 20.31 for further details



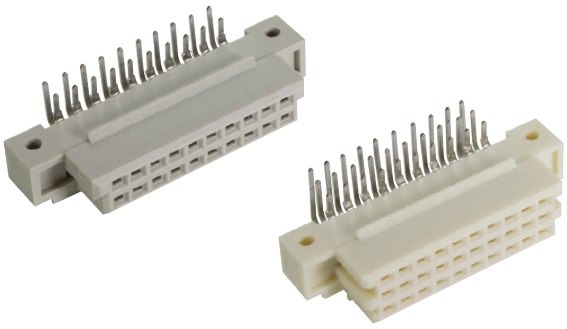
Small cable clamp

DIN 41612 types 3Q / 3R – Even smaller, and just as rugged

The density of electronic components on PCBs is constantly increasing, while the PCBs and components themselves are getting smaller and smaller. Therefore, this trend results in a need for smaller and smaller connectors.

The new 3Q and 3R type female connectors are available with or without fixing clips. The clips make an assembly on the PCBs easier, as connectors with clips do not require a separate fastening with rivets or screws. The connectors are available for solder or THR (Through Hole Reflow) terminations and therefore especially suitable for the connection of two PCBs arranged vertically or side by side. The THR versions are also available in tape & reel packaging.

See pages 01.58 and 01.70 for further details



DIN 41612 types 3Q/3R

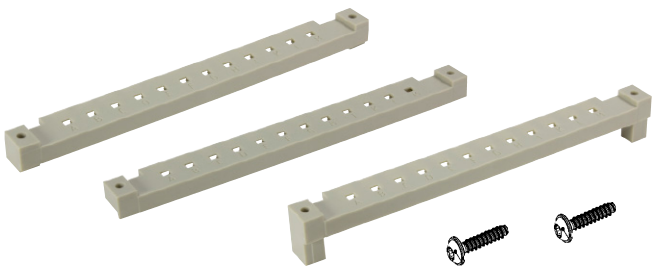
DIN coding bar with a screw fixing

A coding is necessary to make sure that each daughter card can only be inserted into the correct slot in a system with multiple slots. Traditionally, connectors with attached coding bars are used when a coding system without contact loss is required. These coding bars are either moulded or welded to the connectors.

Additionally, we are now offering separate coding bars to be screwed to the connectors. This is recommended in the cases where the required coded connector is not available at all (e. g. for the R or Q female types) or not in the required lot size or contact loading.

This new coding bars are compatible with the welded or moulded coding bars and can be used with the same coding pins (part number 09 02 000 9928). These coding bars can be screwed to the standard angled connectors which have no clips or coding.

See page 00.14 for further details



DIN 41612 coding bar with a screw fixing

Directory

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 60297-3).

Connectors according to

IEC	60603-2
DIN	41 612
(replaced by IEC 60603-2)	
UL-listed	E 102079 (M)
CECC	75101-801
IEC	61076-4-113

Developed for economical assembly of electronic plant and equipment.

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

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

UL-listed E 102079 (M)

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

DIN 41 612 connectors are in conformity with the
Directive 2011/65/EU
EC Directive on the Restriction and Use of Certain Hazardous Substances in Electrical and Electronic Devices
RoHS

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.

Printed Board Connectors – general information

Creepage and clearance distances, CTI

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.

Rated impulse withstand 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.

Degree of pollution

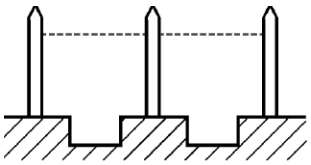
Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

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.

Clearance

The clearance is defined as shortest distance through the air between two conductive elements.



Clearance ----------

To identify the clearance distance

- 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

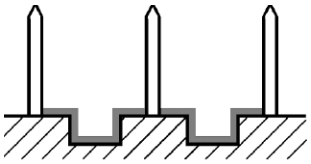
Exemplary calculation

What voltage can be used, if the clearance, the installation category and the degree of pollution are known:

Clearance	Installation category	Degree of pollution	Voltage phase-to-earth
1.2 mm	II	2	150 V
3.0 mm	II	2	600 V
4.5 mm	II	2	600 V

Creepage

The creepage is defined as shortest distance on the surface of an insulating material between two conductive elements.



Creepage

To identify the creepage distance

- Define the installation category
- Define the degree of pollution expected
- 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 and CTI group of the connector required in table 00.04

For the dimensioning of the creepage distance the tracking formation of the insulating material has to be considered. If not indicated contrary, the CTI value of the insulating material is <400 and the isolation group is III a/b.

CTI (Comparative Tracking Index)

This figure gives an indication of the conductivity of insulating materials and affects the specified creepage distances. The influence of the CTI value on the creepage distance is as follows: the higher the index value, the shorter the creepage distance. The CTI is used to divide plastics into insulation groups.

Breakdown of insulation groups:

I	600 ≤ CTI
II	400 ≤ CTI < 600
IIIa	175 ≤ CTI < 400
IIIb	100 ≤ CTI < 175

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

Creepage and clearance distances, CTI

Exemplary calculation
What voltage can be used, if the creepage, the installation category and the degree of pollution are known:

Creepage	1.2 mm		3.0 mm		8.0 mm	
Installation category	II		II		II	
Degree of pollution	2		2		2	
CTI-Value	< 400	> 400	< 400	> 400	< 400	> 400
Isolation group	III a/b	II	III a/b	II	III a/b	II
Rated voltage	50 V	160 V	250V	400 V	800 V	1,000 V
Nominal voltage of supply system	50 V	150 V	220 V	380 V	720 V	1,000 V

How to identify the maximum voltage

1. Define the installation category
2. Define the degree of pollution expected
3. Select the rated impulse withstand voltage in kV from table 00.02
4. Select the voltage phase to earth derived from rated system voltages from table 00.01
5. Select the rated voltage from table 00.04
6. Define the number of phases and whether table 00.03 a or table 00.03 b is relevant for the application
7. Select the nominal voltage of supply system from table 00.03 a or 00.03 b
8. Select the lower voltage from point 4 and 7

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 IEC 60060-1)			
	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
1000	4.0	6.0	8.0	12.0

Table 00.02

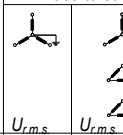
Rated impulse withstand voltage in kV	Minimum clearances in mm up to 2000 m above sea level[1]			
	Case A (Inhomogeneous field[3])		Case B (Homogeneous field[2])	
	Pollution degree		Pollution degree	
	1	2	1	2
0.33 0.50	0.01 0.04	0.2	0.01 0.04	0.2
0.80	0.1		0.1	
1.5	0.5	0.5	0.3	0.3
2.5 4.0	1.5 3	1.5 3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

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	–
480/960	1000	500
1000[2]	1000	–

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  $U_{r.m.s.}$	$U_{r.m.s.}$
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
720 830	800	500	800
960	1000	630	1000
1000[2]	1000	–	1000

[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.
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 (V) $U\sim_{r.m.s.}$ or $U_{\_}$	12.5	25	32	50	63	80	100	125	160	200	250	320	400	500	630	800	1000
Minimum creepage distance (mm) Degree of pollution 1:																	
CTI group II + III a/b	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:																	
CTI group III a/b	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
CTI group II	0.42	0.5	0.53	0.85	0.9	0.95	1	1.05	1.1	1.4	1.8	2.2	2.8	3.5	4.5	5.6	7.1

Performance level 3 as per IEC 60 603-2

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

Part number explanation: 09 . . . . . 7 . . .

Performance level 2 as per IEC 60 603-2

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 number explanation: 09 . . . . . 6 . . .

Performance level 1 as per IEC 60 603-2

500 mating cycles.
250 mating cycles — then 10 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 number explanation: 09 . . . . . 2 . . .

Performance level 2 as per IEC 61 076-4-113

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

Part number explanation: 02 . . . . . 2 . . .

Performance level 1 as per IEC 61 076-4-113

500 mating cycles.
250 mating cycles — then 10 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 number explanation: 02 . . . . . 1 . . .

In the industry DIN connectors in performance level 2 are specified most frequently. Connectors in performance level 1 are used for higher requirements, e.g. in railway applications.

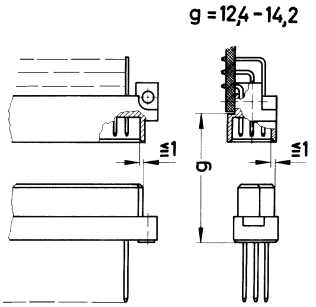
Other plating finishes available on request.

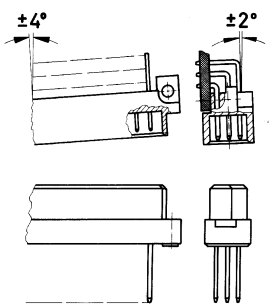
Mating conditions

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

These recommendations are set out in IEC 60 603-2.

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





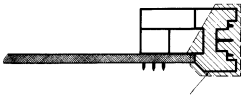
Soldering the male connectors into pcb´s

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.

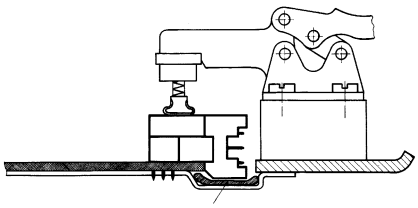
① For prototypes and short runs protect the connectors with an industrial adhesive tape, e.g. Tesaband 4331 (www.tesa.de). Cover the underside of the connector moulding and the adjacent parts of the pcb as well as the open sides of the connector. This will prevent heat and gases of the soldering apparatus from damaging the connector. About 140 + 5 mm of the tape should suffice.

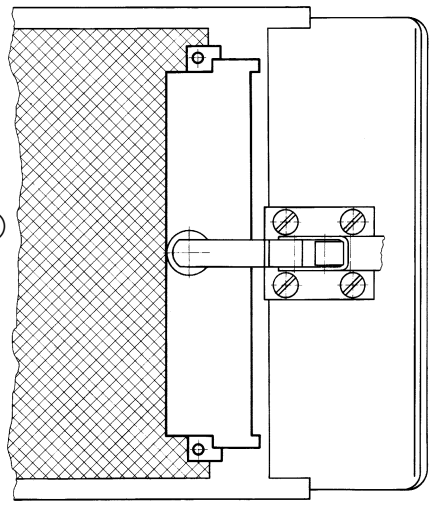
② For large series a jig is recommended. Its protective cover with a fast action mechanical locking device shields the connectors from gas and heat generated by the soldering apparatus. As an additional protection a foil can be used for covering the parts that should not be soldered.

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.



① + ③

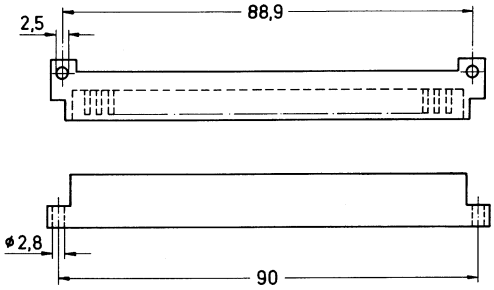


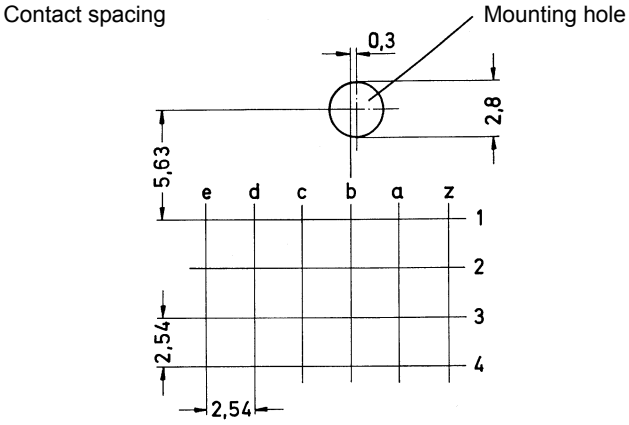


②

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.

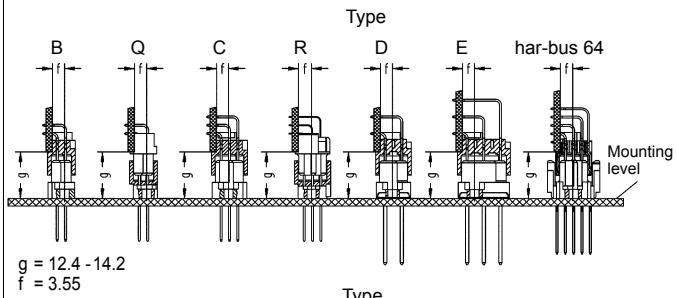




Building up card frame systems

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:

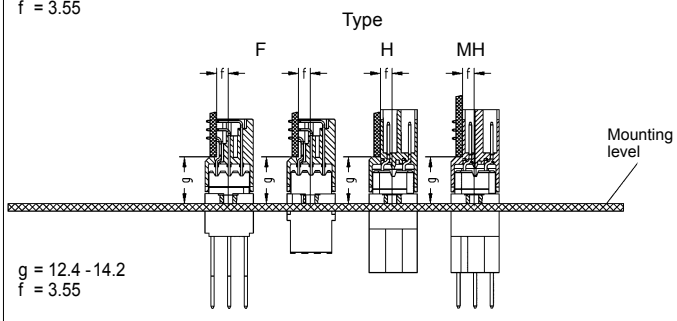
- When using conventional connectors on the back of the card frames, space is left above, below and in the middle along the horizontal line of the frame which can be used to fit extra connectors for cross connection or making plug connections by means of flying lead connectors.
- Using the HARTING system 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.

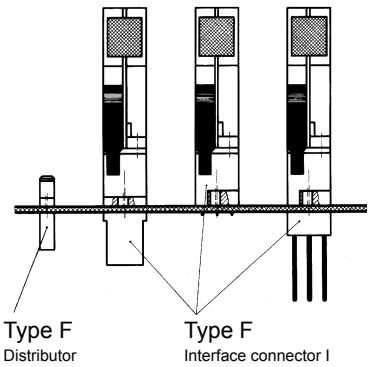


Complementary components

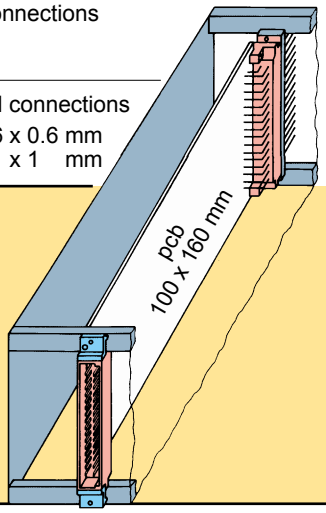
All connectors can be supplied with a complete range of accessories. These can be fitted above or below the wiring plane on the back of the card frame or on the front of the card frame. These connectors and accessories provide a complete connector system suitable for commonly used wiring techniques.

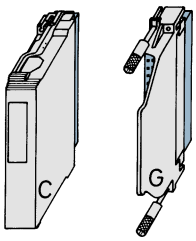
- The flying lead connector consists of a connector with crimp or solder contacts and a shell housing. The flying lead connector is latched or retained in position using screw fixings and is compatible with a corresponding male connector and interface connector I.
- Fixing brackets prohibit the withdrawal 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.





Type	B, Q	C, R	D
Wiring side (Rear side)	Input access from the front side via a female connector	Input access via a female connector Pin shroud	Input access from the front side via a female connector Piggyback connector
Soldering technique for a flexible wiring			
Soldering technique for pcb Press-in technique for pcb			
Crimp connections			
Wrapped connections posts 0.6 x 0.6 mm 1 x 1 mm	0.6 x 0.6 mm	0.6 x 0.6 mm	1 x 1 mm
Middle section			
Front side			





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

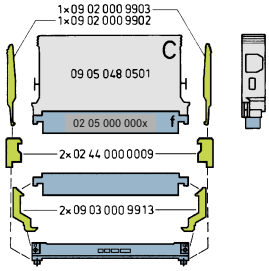
2) 2 x screw fixing
(cylindric screw M 2.5 x 25 DIN EN ISO 1207 + nut M 2.5 DIN EN ISO 4032)

3) Fixing brackets for latching and screw fixing

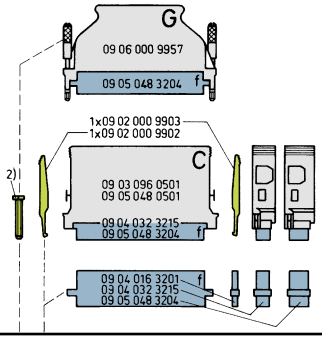
4) Screw length depends on the pcb thickness

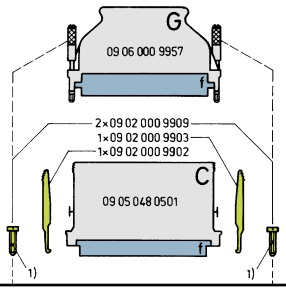
f = female connector
m = male connector
R = right hand
L = left hand

harbus® 64	E	H
Input access from the front side via a female connector	Input access via a female connector	Input access from the front side via a female connector

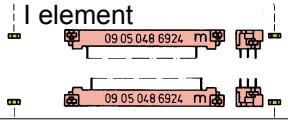


Piggyback connector

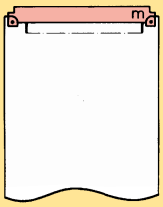


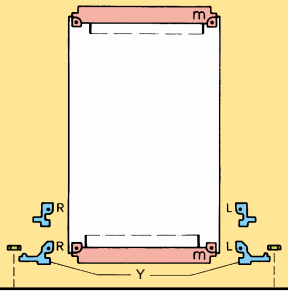


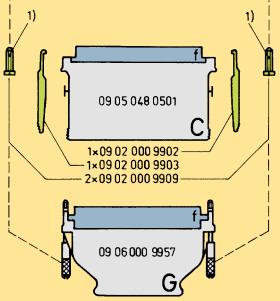
I element

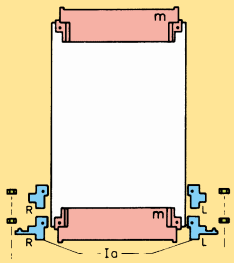


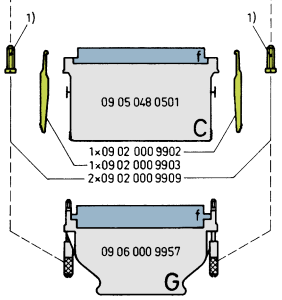
1 x 1 mm

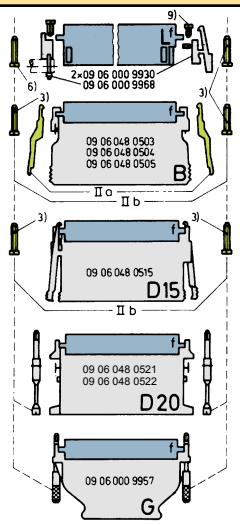








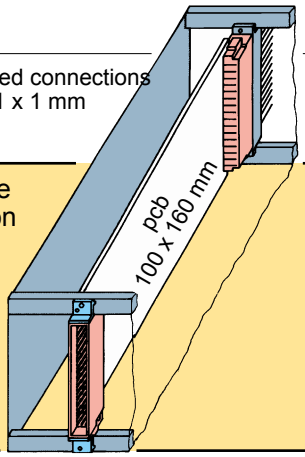


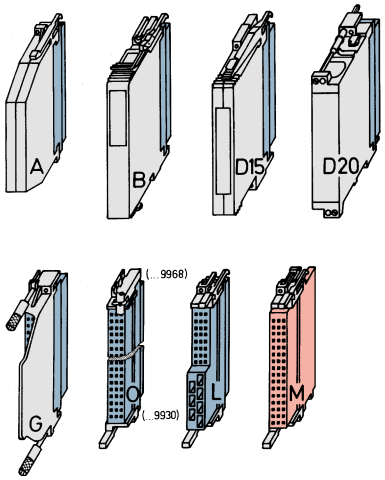


Y =

Combi-nations	Fixing bracket c for male connectors		I 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

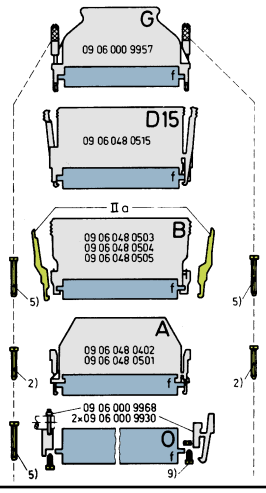
Type	F	
Wiring side (Rear side)	Input access via a female connector	Output from the front side via a male connector
	Piggyback connector	Piggyback connector
Soldering technique for a flexible wiring		
Soldering technique for pcb Press-in technique for pcb	I element	
Crimp connections	I element	
Wrapped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



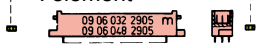


F

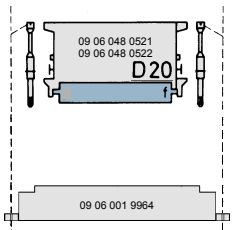
Input acess from the wiring side via a female connector



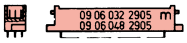
I element

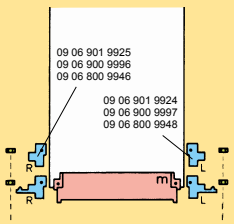


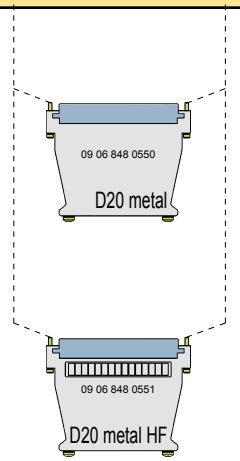
F, H, MH 24 + 7



I element

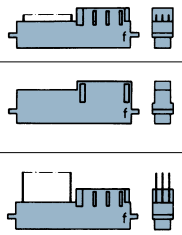


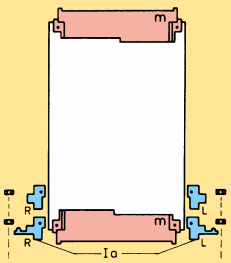


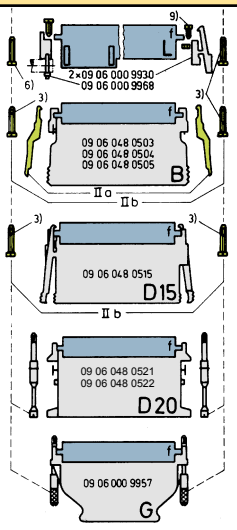


MH 24 + 7

Input access from the front side via a female connector







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
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 don't belong to scope of supply

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

Male and female connectors with pcb fixings

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

To meet this market demand, HARTING has developed connectors 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

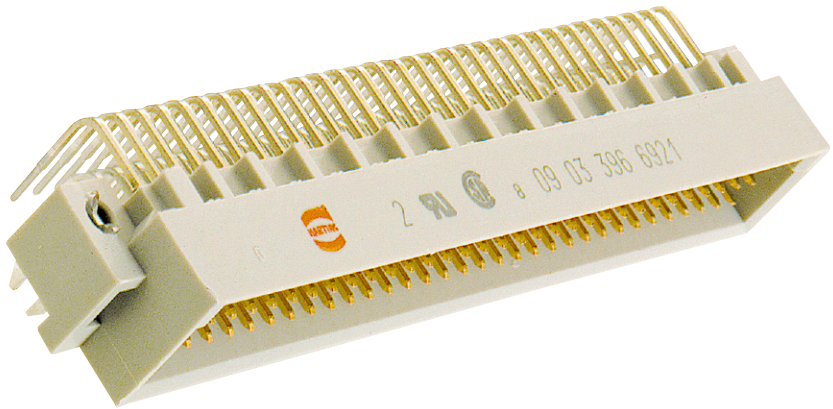
In the soldering process, all component terminations including the snap-in clips are soldered and therefore mechanically secured. This provides mechanical protection for the soldered contacts during mating and unmating of the connector.

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 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.

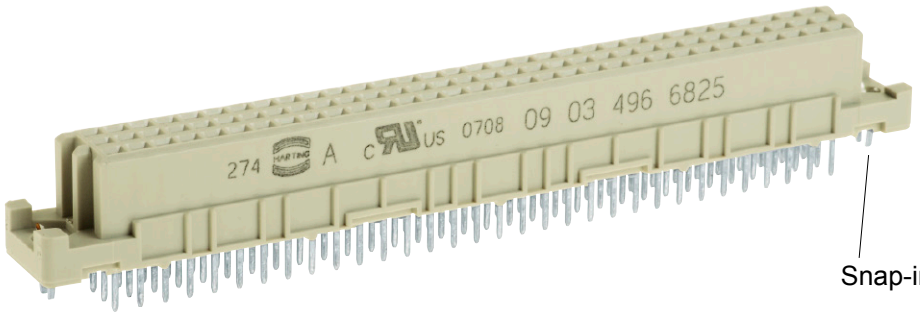
It is possible to supply the majority of male and female connectors with solder termination with snap-in clips (existing articles see product pages).

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



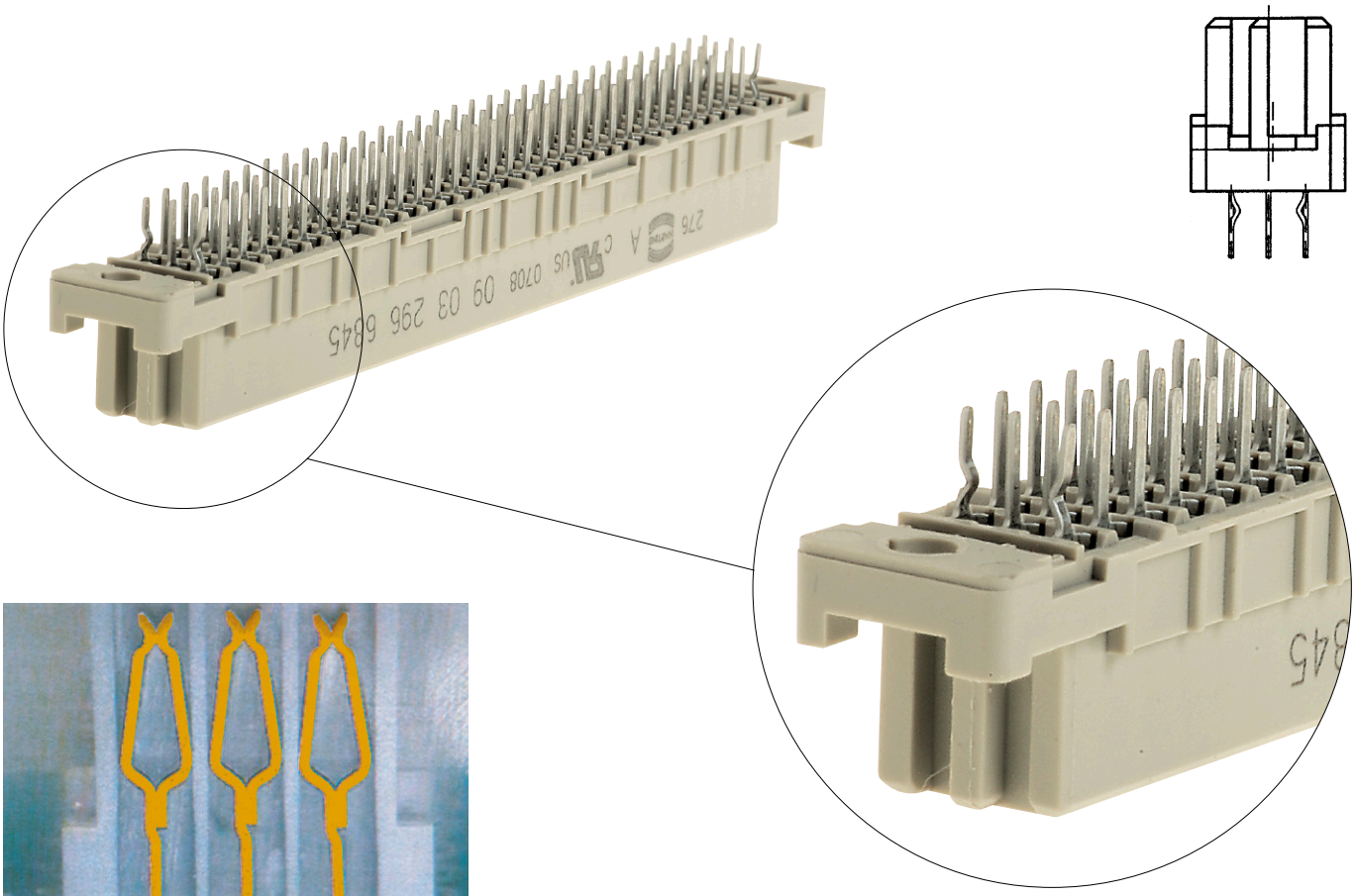
Snap-in clip

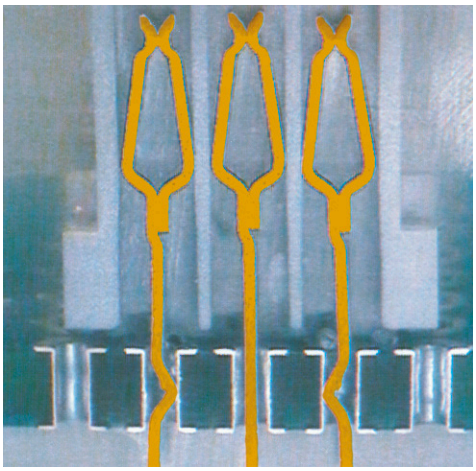
Kinked pins

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.

Connectors see chapter 01, type C.

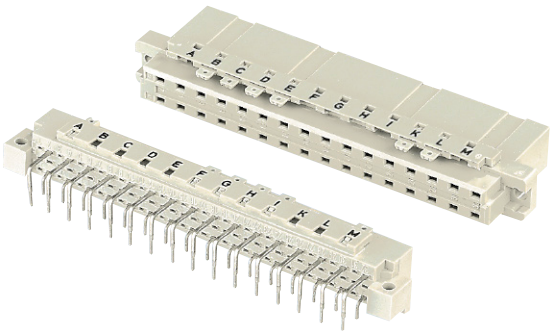
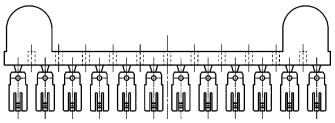
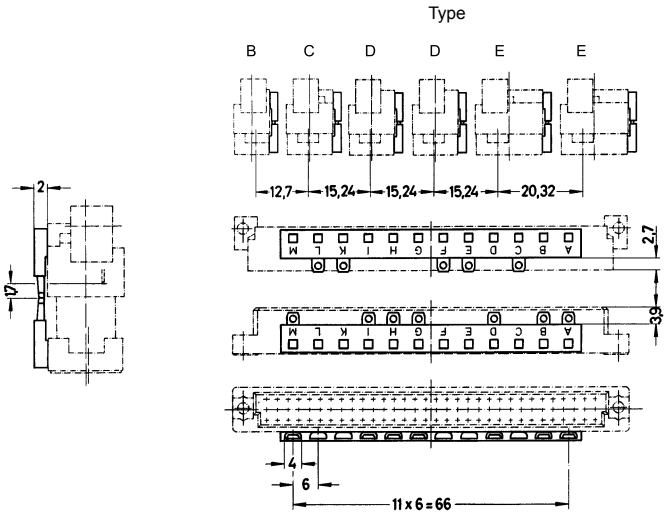


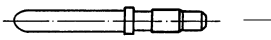
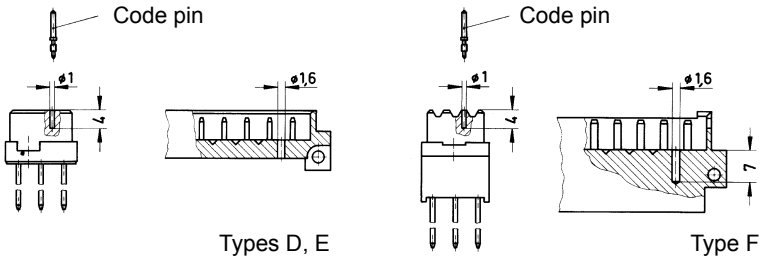
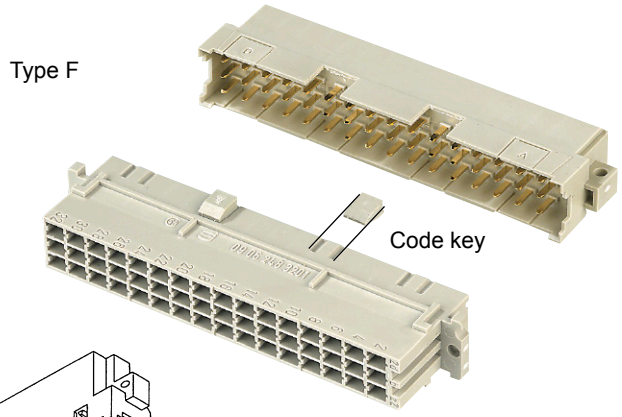
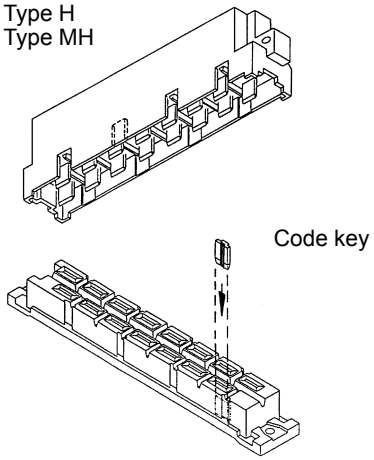


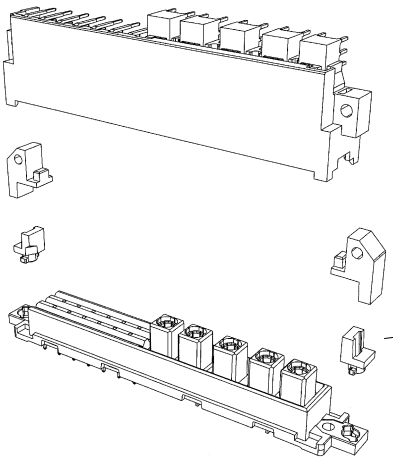
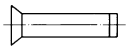
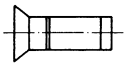
Cross section of a connector with kinked contacts assembled to a pcb

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

Typical measurements for a pcb of 2.4 mm thickness.

Identification	Part number	Drawing	Dimensions in mm
Coding system <u>without</u> contact loss – side coding	Male and female connectors Types B, C, D, E and R see product pages or 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 connectors. 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, E and R and are available for all variants. Please contact us. 	
Coding system <u>without</u> contact loss – side coding Coding bar for screw fixing		These coding bars can be screwed on the top side of angled male and female connectors. They are alternatives to the male and female connectors with pre-assembled or splashed coding bars. As far as available we recommend the connectors with pre-assembled or splashed coding bar. 	
for types C and D male connectors for type R female connectors	09 73 000 9903		
for type B male connectors for type Q female connectors	09 72 000 9903		
for type E male connectors	09 05 000 9903		
Coding pins	12 pins on a comb 09 02 000 9928		
Mounting example			

Identification	Part number	Drawing	Dimensions in mm
Coding system <u>without</u> 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	  Mounting example 	
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. 	
shroud coding Types H, MH 24 + 7	Code key 09 06 001 9918	Type H Type MH 	
Tool for breaking out the coding area of the male shroud	09 99 000 0242		

Identification	Part number	Drawing	Dimensions in mm
Coding system <u>without</u> contact loss 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		
Coding system <u>with</u> contact loss	Code pin for types B, 2B, 3B, C, 2C, 3C, M, M-flat, Q, 2Q, R, R (HE 11), 2R, har-bus 64 09 02 000 9901 Removal tool for male contacts 09 99 000 0133 Code pin for types D, E, F, FM, 2F, 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. It's recommended to use a number of code pins in relation to the total number of contacts per connector: 3 pins for 64 contacts, 7 pins for 160 contacts.  Plastic, grey   Plastic, black 	

Railway specific products with NFF Classification: F1 and I2

In addition to the standard demands of connectors, as defined in IEC 60 603-2, for example, market and application specific demands and requirements are gaining increasing significance.

In the railway engineering area the demands made on reliability and safety are particularly high, in order to ensure utmost passenger safety in all instances. Especially in the case of routes involving a high share of tunnels that only offer limited escape route possibilities in the event of fire, the technical demands made on the materials employed are very stringent.

In addition to the fire load, and/or the flammability of a material, the so-called smoke gas density is a key characteristic, which is determined based on the opacity and toxicity of the smoke gas emissions. The risk posed by the two characteristics can not be defined in relationship to each other, which means that both minimal inflammability as well as minimal smoke gas density must be fulfilled. Materials that meet both requirements are very rare and in many instances it is only possible to fully meet one of the two criteria.

The French NFF 16-101 railway standard defines these requirements precisely and presents a structure of application groups by way of a matrix.

NFF 16-101 classifies non-metallic materials used in rail vehicles in terms of fire behavior, opacity and toxicity of smoke gas emissions in the event that the materials should burn.

In order to enable the classification with regard to the deployment of connectors, the following values must be applied:

1. Fire behavior class

Classification:

I0	for I.O. ≥ 70	and no inflammation at 960 °C
I1	for I.O. 45 - 69	and no inflammation at 960 °C
I2	for I.O. 32 - 44	and no inflammation at 850 °C
I3	for I.O. 28 - 31	and no afterburning at 850 °C
I4	for I.O. ≥ 20	
NC	not classified	

Note: The values are derived from specified test methods determining the oxygen value (I.O.) and testing inflammability by way of a filament.

2. Smoke development classification

Classification:

F0	for I.F. ≤ 5
F1	for I.F. 6 - 20
F2	for I.F. 21 - 40
F3	for I.F. 41 - 80
F4	for I.F. 81 - 120
F5	for I.F. > 120

Note: The values of the smoke index (I.F.) are derived from specified test methods by determining opacity (specific optical density, opacity values), toxicity (critical gas concentration of CO, CO_2, HCl, HBr, HCN, HF, SO_2 in smoke).

The matrix from NFF 16-102 shows how the combination of both characteristics results in a classification. This matrix is defined by the contractor in each project put up for bidding. The matrix is geared to the type of train and course of the route, whereby special attention is given to the number of tunnels. By complying with the high classifications I2 and F1, the designated standards supplementing connectors according to IEC 60603-2 can be used in all four defined groups and for all railway applications. According to NFF 16-102 the standard DIN connectors (I3, F4) are only permissible for Group 1.

Group 1

	I0	I1	I2	I3	I4	NC
F0						
F1			X			
F2						
F3						
F4						
F5						

Group 2

	I0	I1	I2	I3	I4	NC
F0						
F1			X			
F2						
F3						
F4						
F5						

Group 3

	I0	I1	I2	I3	I4	NC
F0						
F1			X			
F2						
F3						
F4						
F5						

Group 4

	I0	I1	I2	I3	I4	NC
F0						
F1			X			
F2						
F3						
F4						
F5						

Diagram: Classification from NFF 16-102, April 1992

The HARTING DIN Power and DIN Signal portfolio looks back on a highly successful track record in the railroad engineering industry. Typical application areas include – among many others – control, steering, monitoring components and modules on board trains, as well as signal technology components or the power supply of electronic components.

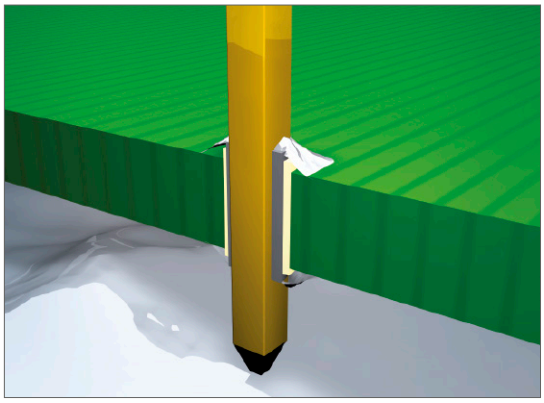
The extended range of connectors complying with the highest classification according to NFF 16-101 and 16-102 considerably reduces our customers' development times: as the selected connectors are suitable for every stipulated hazard or risk class, they are ideal for realizing product platforms, and therefore find use in every conceivable rail vehicle or railroad engineering project. This dispenses with the need for complex, product specific development work, at least in terms of selecting passive PCB interfaces, while the technical approval process is streamlined considerably.

In order to facilitate rapid identification, the additional railway specific articles are designated accordingly on the product pages of this catalogue.

Since 2013 the current European flammability directive is EN 45545:2013. After a transition period, this will replace the national standards, for example NFF 16-101 / 102.

Small electronic components are listed in the standard under "EL10". This includes the DIN 41612 connectors according to IEC 60603-2 shown in this catalogue. For these components it's required to provide evidence that the criterion "V0" in compliance with EN 60695-11-10 or UL 94 has been met to comply with the defined requirement paragraph R26.

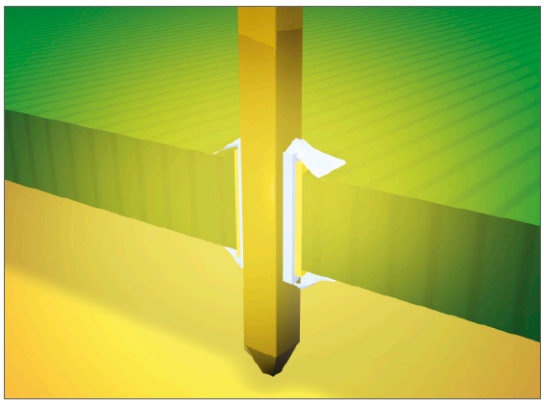
For flammable materials with the mass under 10 g no evidence must be provided. The so-called grouping rule encompasses flammable and non-tested materials which lie closer than 20 mm in the vertical direction and 200 mm in the horizontal direction to each other. Due to this rule, the limit value can be increased to 100 g for the internal area and 400 g for the external area of the vehicle.



THT soldering technology

THT soldering technology

Proven over decades, standard soldering technologies deliver maximum stability and process reliability. The soldering pins of the connectors are inserted into the through-plated PCB holes and can then be soldered simultaneously with other components in a wave soldering process.

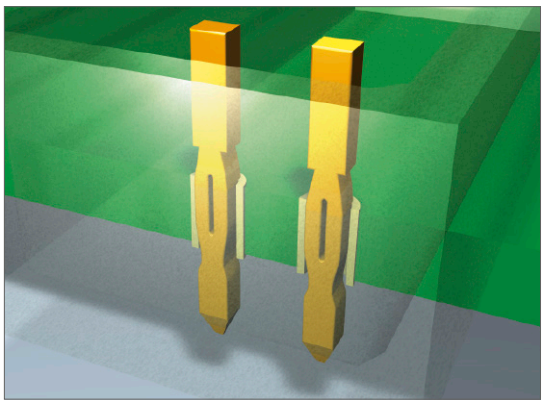


THR soldering technology

THR soldering technology

The connector is inserted into through-plated PCB holes similar to standard component assembly for processing with THR (Through Hole Reflow) soldering technology. Insertion of these SMT components can be automated by means of Pick & Place assembly in preparation for a reflow soldering process together with the surface-mounted component.

This connection technology is characterized by high mechanical strength and is facilitated by a design that is specially adapted to the reflow soldering process (high-temperature materials).

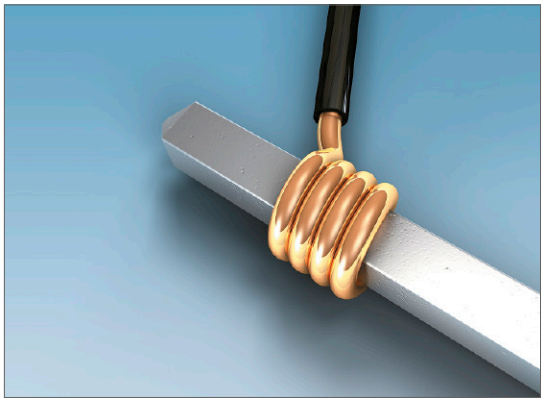


Press-in technology

Press-in technology

This solder-free connection technology is based on press-in mounting of a pin in a throughplated PCB hole. The implementation of a state-of-the-art, flexible press-fit zone allows for the compensation of tolerances of PCB holes and meets high electrical and mechanical requirements for properties such as low press-in forces and high holding forces.

Press-in technology supports unlimited cost efficient processing, especially of pins with selective gold plating for backplane bus systems.



Wire wrap terminals

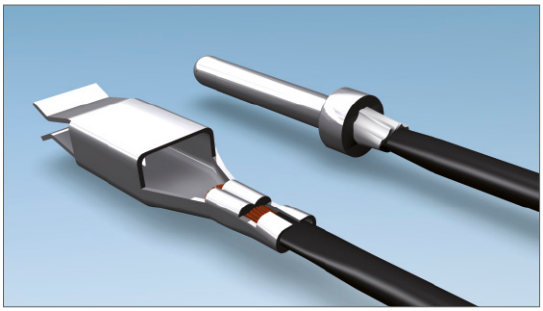
Wire wrap terminals

This solder-free connection technology is based on a wire, which is wrapped with several turns onto a rectangular post. When wires are correctly wrapped the connection performs with low resistance, mechanical strength and high reliability, unaffected by normal climatic or temperature change.

You will find more detailed information on the following pages.

Crimp terminals

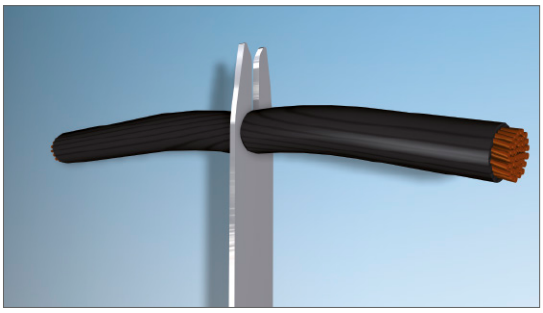
Gas-proof and the miniaturized contact technology are synonymous with crimp technology. The flexible conductor is inserted into the crimp contact and is retained by controlled deformation. This technology is similar to a cold welding process and provides maximum aging resistance and mechanical resistance to shock and vibration. Crimp machines facilitate the efficient, streamlined production of system cable assemblies, and crimp technology can also be deployed for field assemblies using the corresponding hand crimp tools. The technical requirements for crimp technology are standardized in IEC 60 352-2.



Crimp terminal

IDC insulation displacement terminals

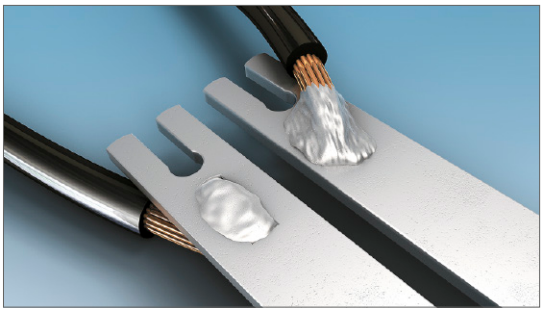
IDC (insulation displacement contact) technology facilitates the simple and safe termination of solid and flexible conductors. With IDC technology, a blade cuts through the wire insulation and produces an elastic termination in a single pass. This gas-proof connection provides maximum safety even for the lowest currents and voltages. Technical requirements for IDC technology are standardized in IEC 60 352-3.



IDC insulation displacement terminals

Solder lug terminals

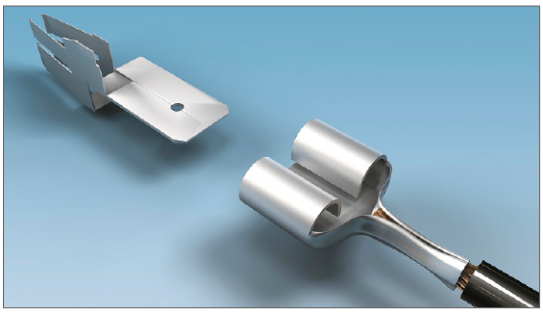
The solder lug termination is the optimized solution for production of small lot sizes and prototypes. Even without any special tooling a big variety of cables can be terminated to the cable connectors. The stripped wire is soldered individually by hand to the solder lug. This termination should however only be manufactured by experienced specialists.



Solder lug terminals

Faston blades terminals

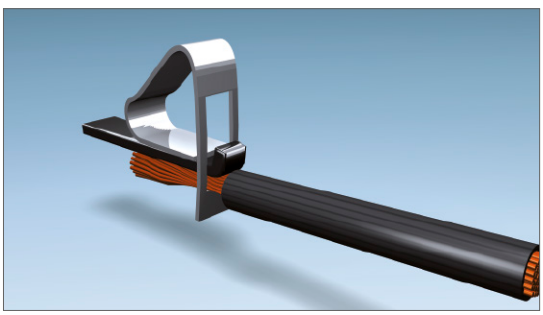
The faston blade termination is used for free wiring. Benefits are the high current carrying capacity (up to 15 A) and the easy possibility for variations.



Faston blades terminals

Cage clamp terminals

The cage clamp terminal technology is used to terminate flexible and solid conductors by means of spring force. After the spring has been opened by an actuator element, the stripped conductor is simply inserted into the contact chamber. This connection technology requires minimum operating expense and is characterized by its high functional safety. The springloaded connection also allows the termination of more than one wire per contact and excels with high vibration and shock resistance.



Cage clamp terminals

You will find more detailed information on the following pages.

THT soldering technology

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. Todays lead free solders have a melting range between 217 °C and 227 °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 00.06.

THR soldering technology

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.

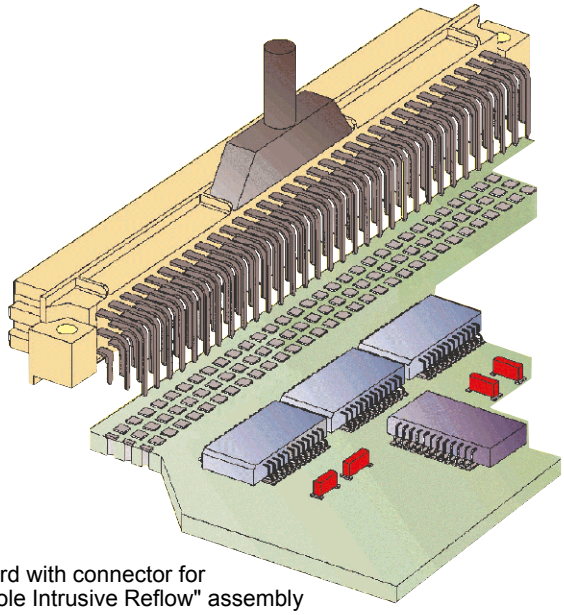


Fig. 1:
SMT board with connector for
"Pin in Hole Intrusive Reflow" assembly

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.

"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 THR 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

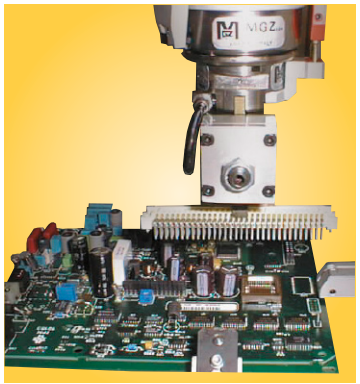


Fig. 2:
Pick-and-place machine for odd form components
(Courtesy of JOT Automation GmbH)

Solder requirements

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.

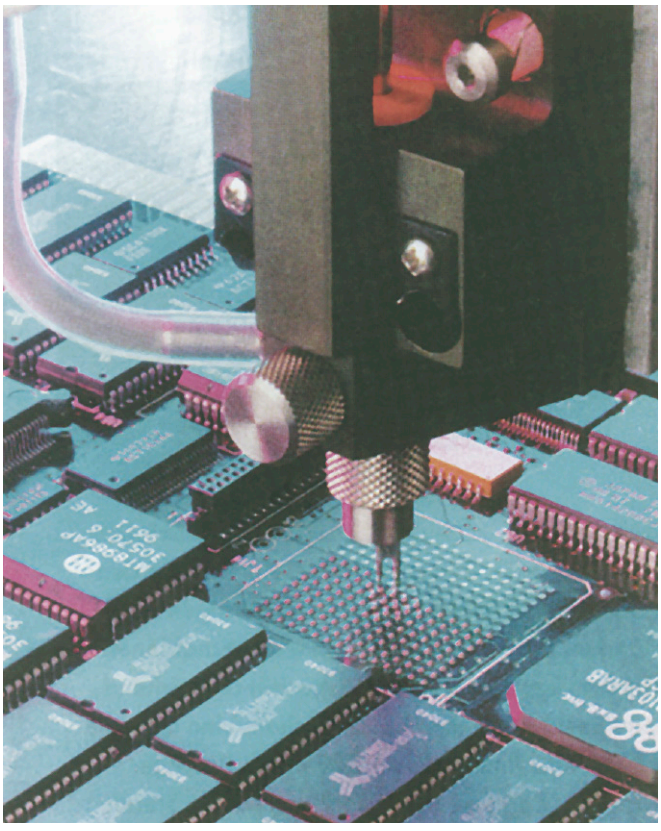


Fig. 3: Dispenser in operation

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 %.

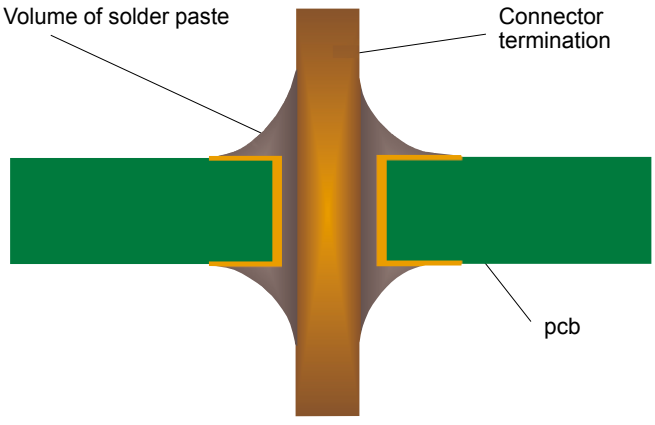


Fig. 4: Plated through hole with connector termination

Requirements for THR connectors

THR (Through Hole Reflow) connectors have to withstand temperatures of up to 240 °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.

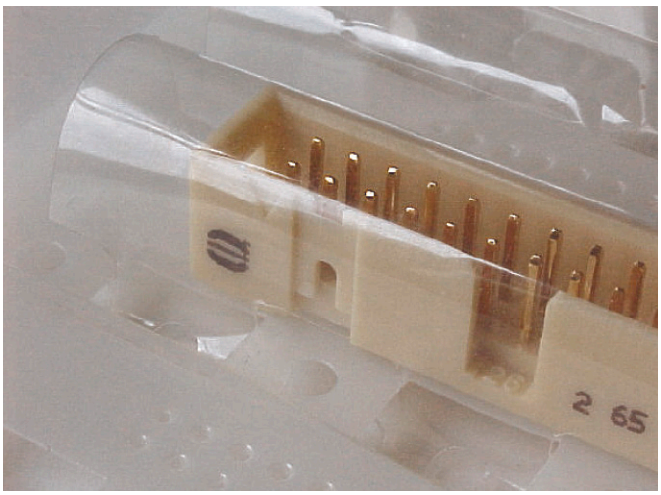


Fig. 5: HARTING connector mounted in a tape ready for placement using an odd form assembly station.

HARTING THR technology

HARTING offers its customers a complete system concept for integrating THR technology into existing production lines. We manufacture a wide range of THR connectors (3 and 5 row) in compliance with IEC 60603-2 and D-Sub connectors in compliance with IEC 60807. In addition, HARTING supports the market with packaging and processing concepts, which have been developed in collaboration with renowned manufacturers of THR soldering and assembly plants.

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

har:press Press-in technology

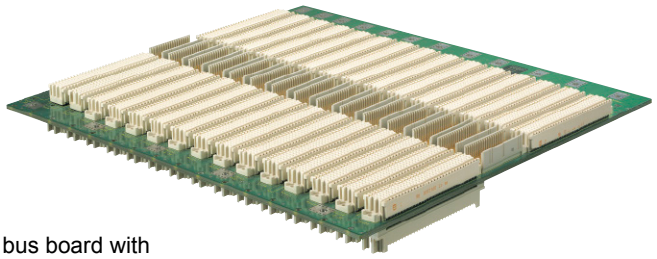
Solderless termination for connectors has proven to be reliable for decades. Today the use of press-in connectors encompasses all fields of electrical and electronical applications.

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.

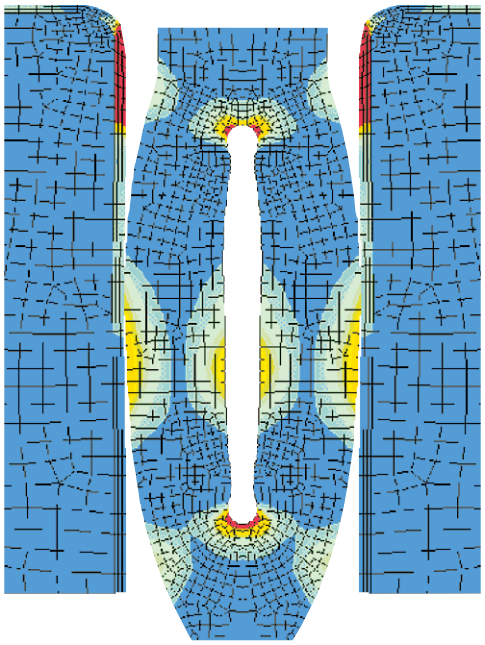
Although the scope of requirements at the press-in process is generally defined in time-tested specifications, the novel press-in zones should offer an optimal handling and a reliable termination. Essentially, this is guaranteed through the design of the press-in zone and the meticulous observance of 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.

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!



bus board with
press-in connectors



FEM simulation
of the needle eye
press-in zone

har:press Press-in technology

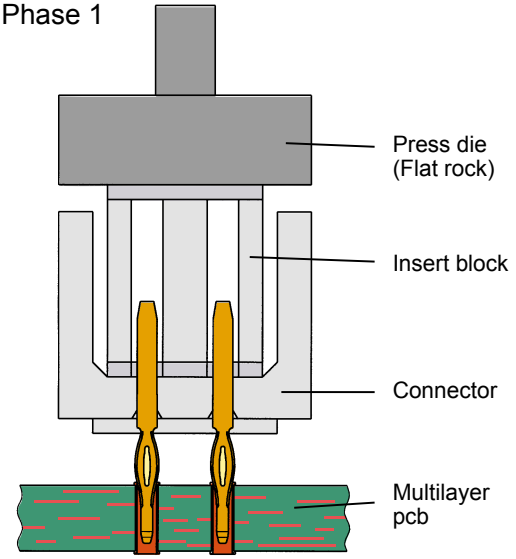
The processing of press-in connectors can be divided into 3 phases, containing both mechanical and metallurgical operations:

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.

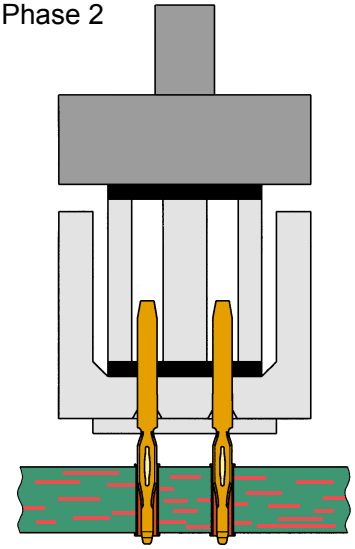
Phase 1



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.

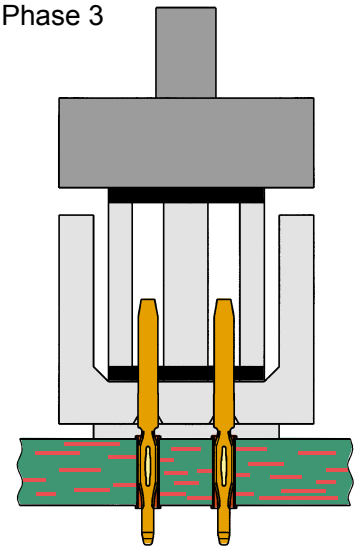
Phase 2



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.

Phase 3



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.

Recommended configuration of plated through holes

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

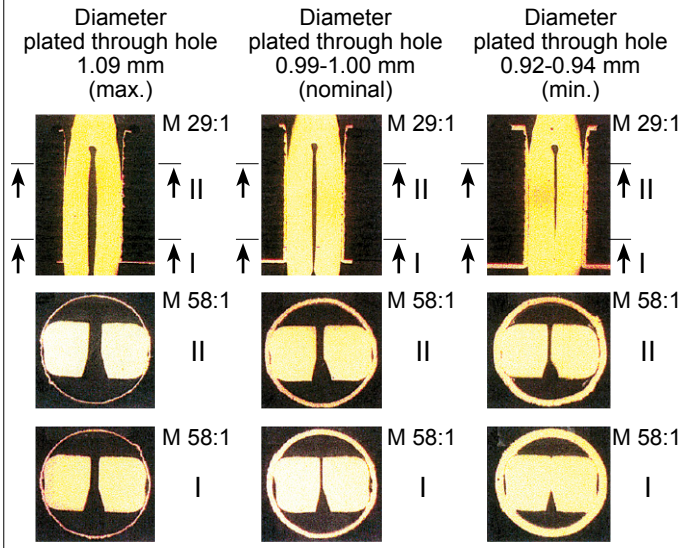
harpress is extremely versatile and offers a reliable electrical contact, therefore it is especially well suited for applications with these surfaces.

Please contact us for detailed test reports.

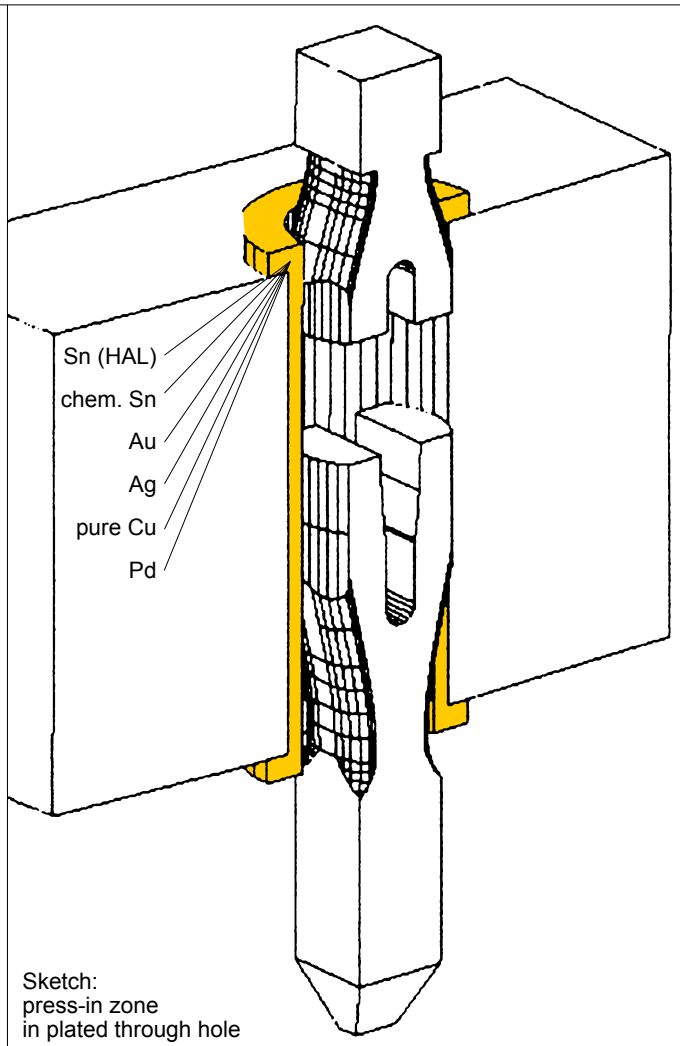
In addition to the hot-air-level (HAL) other pcb surfaces are getting more important. Due to their different properties, such as mechanical strength and coefficient of friction we recommend the following configuration of pcb through holes.

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

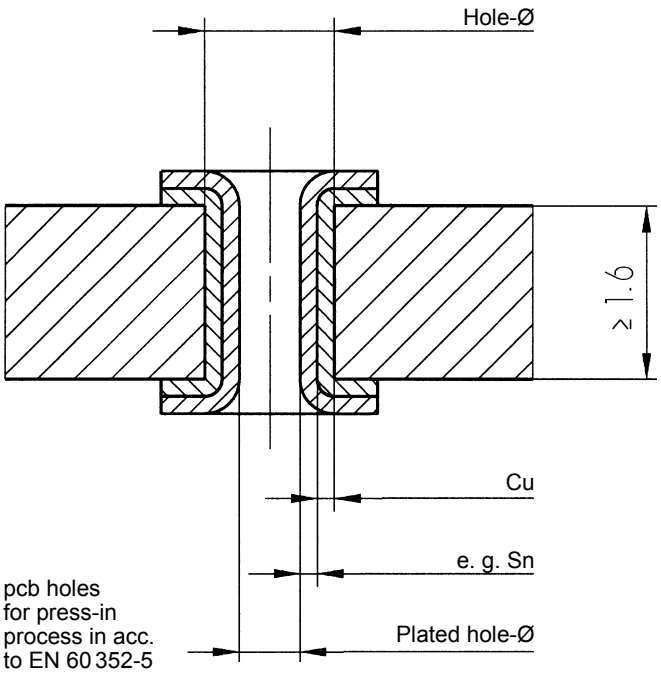
PCB board thickness: ≥ 1.6 mm



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



Sketch:
press-in zone
in plated through hole



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

Crimp terminals

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.

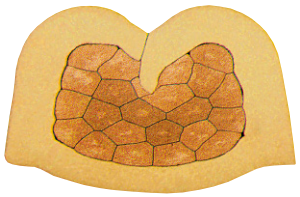
The economical and technical advantages are:

- 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 IEC 60 352-2.

Pull out force of stranded wire

The main criterion by which to judge the quality of a crimp connection is the retention force achieved by the wire conductor in the terminal section of the contact. DIN IEC 60 352, part 2, defines the extraction force in relation to the cross-section of the conductor. When fitted using HARTING crimping tools and subject to their utilization in an approved manner, our crimp connectors comply with the required extraction forces.



Crimp cross-section

Tensile strength of crimped connections

Conductor cross-section		Tensile strength
mm²	AWG	N
0.05	30	6
0.08	28	11
0.12	26	15
0.14		18
0.22	24	28
0.25		32
0.32	22	40
0.5	20	60
0.75		85
0.82	18	90
1.0		108
1.3	16	135
1.5		150
2.1	14	200
2.5		230
3.3	12	275
4.0		310
5.3	10	355
6.0		360
8.4	8	370
10.0		380

Extract from DIN IEC 60 352-2, Amend. 2, table IV

Crimping tools

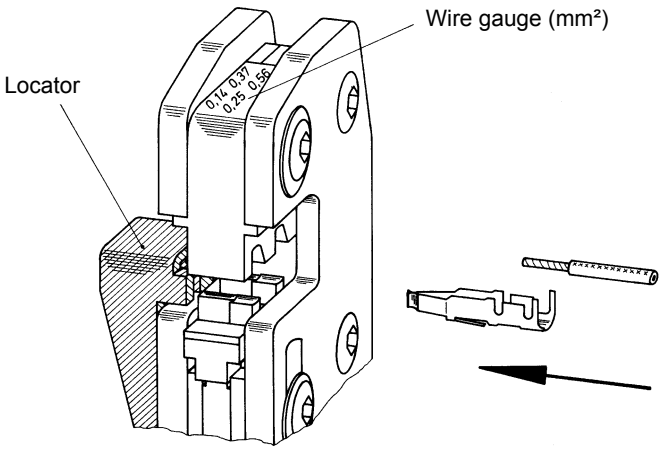
Crimping tools (hand operated or automatic) are carefully designed to guarantee a symmetrical deformation of the crimping area of the contact and the wire through the high pressure forming parts of the tool. The locator automatically engages the crimp contact and the wire at the correct point in the 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.



Wire wrap terminals

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.

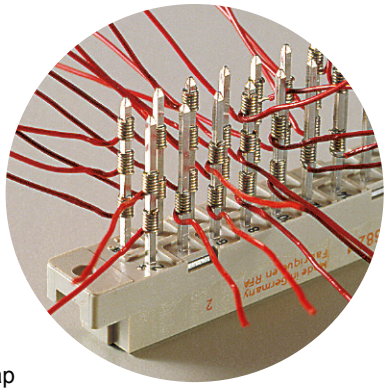
Wrapping techniques

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

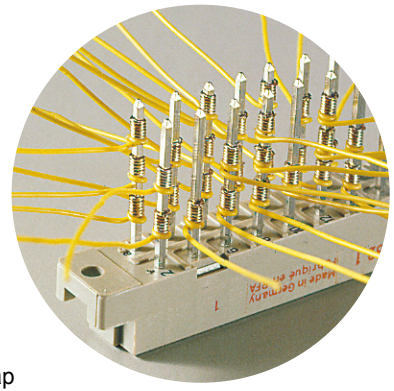
The top part of the wrapped connection is made using the cable conductor as stated above but an extra turn is made at the bottom. For this turn insulation is also wrapped around the post to give a great mechanical strength to the joint and also to provide insulation between adjacent posts.



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

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.

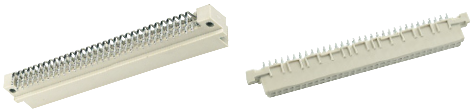
The adjacent tables show the maximum amount of wrapped connections that can be placed on the wire wrap post (in acc. to IEC 60352-1).

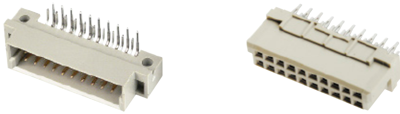
Notes

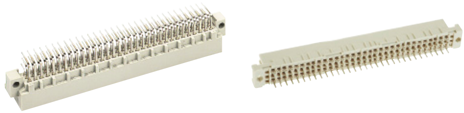
Directory chapter 01 – DIN Signal (up to 2 A)

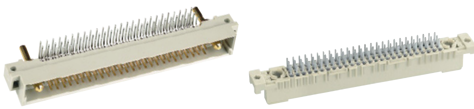
Types B, 2B, 3B, C, 2C, 3C, M, M invers, Q, 2Q, 3Q, R, 2R, 3R

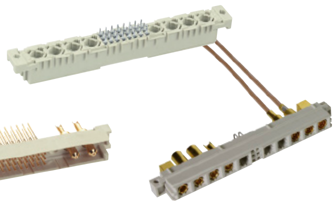
Page

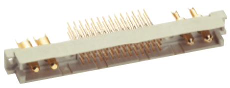


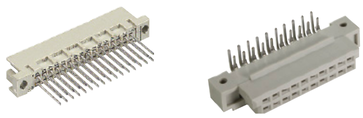


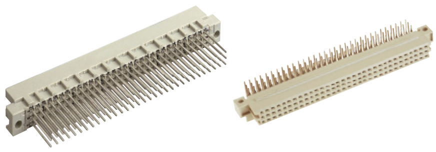












Number of contacts	16-96
Contact spacing (mm)	2.54
Working current see current carrying capacity chart	2 A max. 1 A with insulation displacement 40 A max. type M
Clearance	≥ 1.2 mm
Creepage	≥ 1.2 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions of the pcb itself, 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	≤ 20 mΩ
Insulation resistance	≥ 10^{12} Ω for standard articles ≥ 10^{11} Ω for special NFF articles (with part-no. ending 222)
Temperature range	– 55 °C … + 125 °C
The higher temperature limit includes the local ambient and heating effects of the contacts under load	– 40 °C … + 105 °C for press-in connector
During reflow soldering	max. + 240 °C for 15 s for THR connectors
Degree of protection for crimp terminal according to DIN 40 050	IP20

Electrical termination

Male and female connector	Solder pins for pcb connections Ø 1.0 ± 0.1 mm according to IEC 60 326-3 wrap posts 0.6 x 0.6 mm diagonal 0.79-0.86 mm Crimp terminal 0.09-0.5 mm² Insulation displacement connection AWG 28/7
Compliant press-in terminations	
PCB thickness	≥ 1.6 mm
Recommended PCB holes for press-in technology	See recommendation page 00.25 in acc. to EN 60 352-5

Insertion and withdrawal force	16way ≤ 15 N 20way ≤ 20 N 30way ≤ 30 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)]

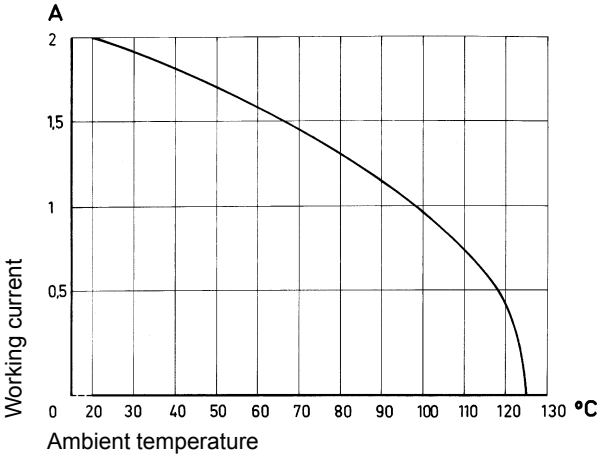
[1)] Explanation performance levels see chapter 00

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 male and female connectors with 0.6 x 0.6 mm pins

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 (screw fixing) or can be pressed onto the pins (press-in fixing).

After assembly the rear ends of the wire wrap posts become the mating areas of a type C resp. type 2C male connector.

This system can now accept:

- female connectors type C
- female connectors type 2C
- female connectors type R
- female connectors type 2R

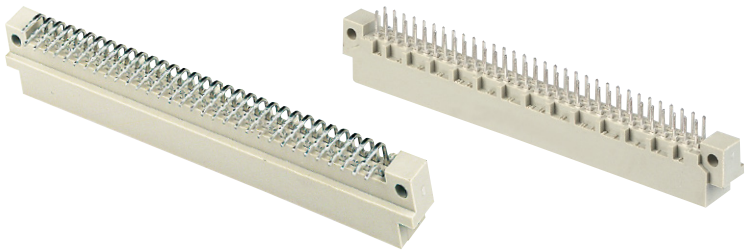
The locking levers provide security for the mated connectors. Fast and simple disconnection is possible (see application examples, pages 01.76 ff).

Fitting and removing crimp contacts

see technical characteristics chapter 03

Number of contacts

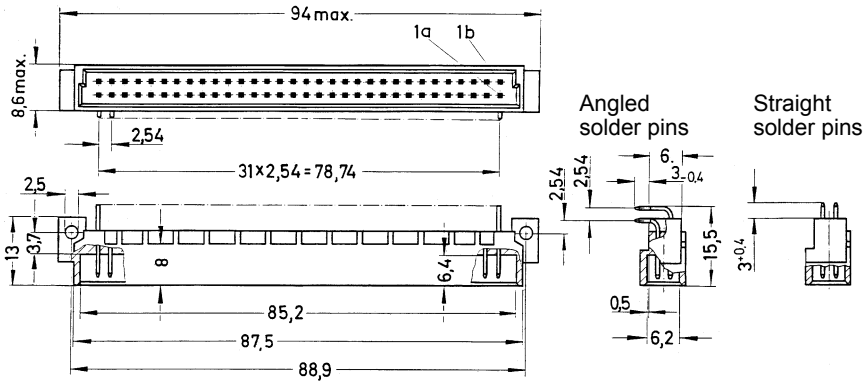
64, 32



Male connectors

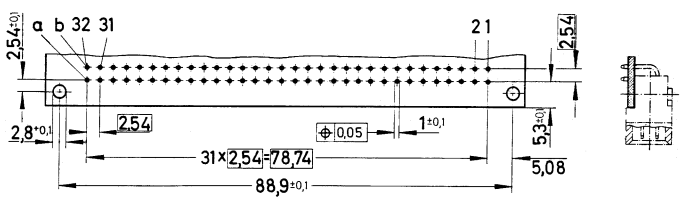
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins	64	1 2 3 4 b a	09 02 164 7921	09 02 164 6921 09 02 164 6921 222[f] 09 02 364 6921[b] 09 02 664 6921[c]	09 02 164 2921
	32	1 2 3 4 b a	09 02 132 7921	09 02 132 6921 09 02 632 6921[c]	09 02 132 2921
	32	1 2 3 4 b a	09 02 132 7931	09 02 132 6931 09 02 332 6931[b]	09 02 132 2931
	62 + 2▲	1 2 3 4 b a		09 02 164 6951	09 02 164 2951
THR	64	1 2 3 4 b a	09 02 164 7919[d]	09 02 164 6919[d]	
Male connector with straight solder pins	64	1 2 3 4 b a	09 02 164 7922	09 02 164 6922	09 02 164 2922
	32	1 2 3 4 b a	09 02 132 7922	09 02 132 6922	
	32	1 2 3 4 b a		09 02 132 6932	
	62 + 2▲	1 2 3 4 b a		09 02 164 6952	09 02 164 2952
THR	64	1 2 3 4 b a		09 02 164 6920[d]	

Dimensions

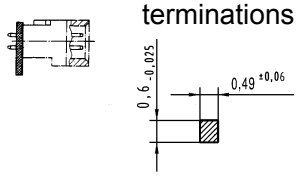


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b:
A = 0.25 - 0.33 mm²

Dimensions in mm

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

[b] Connectors with snap-in clips see chapter 00

[c] Connectors with coding see chapter 00

[d] CTI > 400

[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

64

Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm	64	1 2 3 4 a b	Performance level 3 on request	09 02 264 6824 09 02 464 6824[b] 09 02 764 6824[c]	09 02 264 2824
	64	1 2 3 4 a b		09 02 264 6841[d]	
Female connector with solder pins 4.5 mm	64	1 2 3 4 a b		09 02 264 6825 09 02 264 6825 222[f] 09 02 464 6825[b] 09 02 764 6825[c]	09 02 264 2825
	64	1 2 3 4 a b		09 02 264 6829[d]	
Female connector with solder pins 13 mm	64	1 2 3 4 a b		09 02 264 6421	
Female connector with press-in pins 4.5 mm	64	1 2 3 4 a b		09 02 264 6850 09 02 264 6850 222[f]	09 02 264 2850
Female connector with press-in pins 13 mm	64	1 2 3 4 a b		09 02 264 6861[a]	
Female connector with wrap posts[1] 13 mm	64	1 2 3 4 a b		09 02 264 6821	
Female connector with solder lugs 5.5 mm	64	1 2 3 4 a b		09 02 264 6823	

[1] To be used only for wire wrap termination
[a] Contacts for rear interfacing selectively gold plated (performance level 3)
[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00
[d] CTI > 400
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2
Other contact arrangements on request

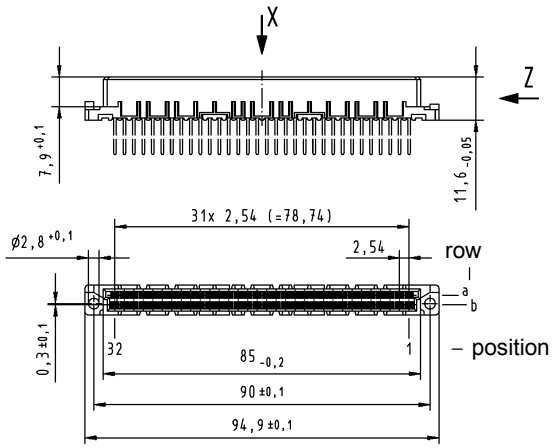
Number of contacts

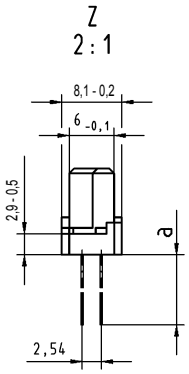
64

Female connectors

Identification	Drawing	Dimensions in mm

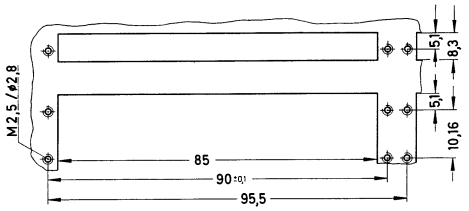
Dimensions





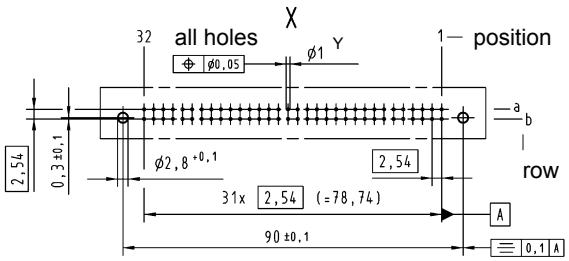
a	
2.9	
4.5	Solder pins
13	
4.5	Press-in pins
13	
13	Wrap posts
5.5	Solder lugs

Panel cut out



Board drillings

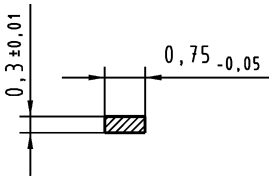
Mounting side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Identification strips for female connectors with wrap posts 09 02 000 9939

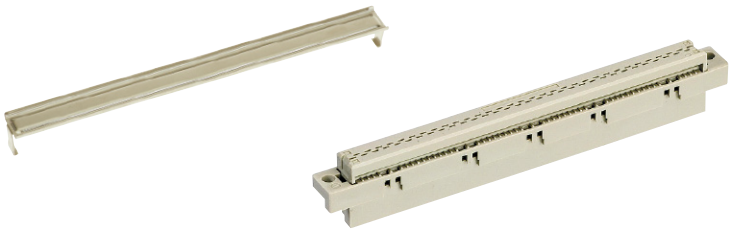
Cross section of solder terminations



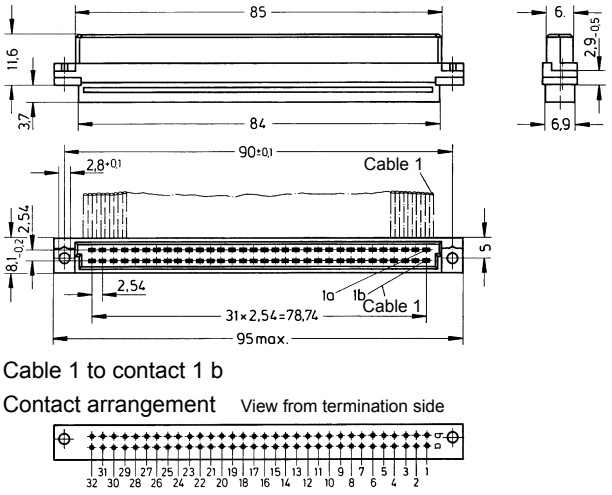
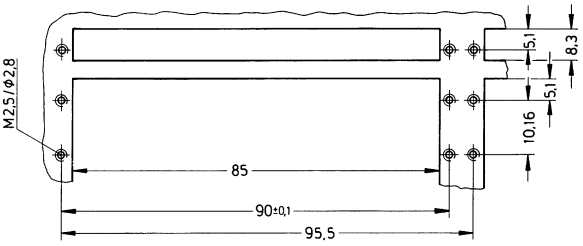
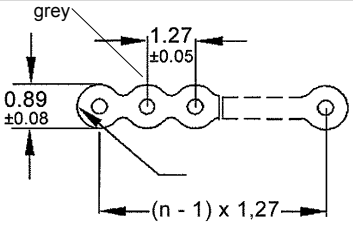
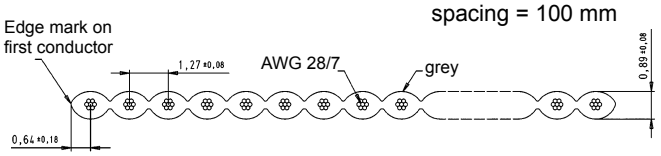
Cross area (A) of contacts
row a, b: A = 0.20 - 0.23 mm²

Number of contacts

64



Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for insulation displacement				
	64	Performance level 2[1] 09 02 264 6828		
		Performance level 3[1] 09 02 264 7828		
Strain relief (metal)		09 03 000 9940		
Panel cut out				
Flat cable AWG 28/7				[2] Termination area spacing = 508 mm
grey 30.48 m	64	09 18 064 7001		
grey 100.00 m	64	09 18 064 7004		
colour coded 30.48 m	64	09 18 064 7005		
twisted pair[2] 30.48 m	64	09 18 064 7006		
				Important: always store reels vertically
			Wire (tinned) Gauge Insulation material as per UL style	Cu AWG 28/7 0.089 mm² PVC
Round flat cable[3]				[3] Termination area spacing = 100 mm
with screening 30.48 m	64	09 18 064 7007		
100.00 m	64	09 18 064 7010		
without screening 30.48 m	64	09 18 064 7008		
Bench press		09 99 000 0114		
Base plate		09 99 000 0150		
Cable cutter		09 99 000 0116		
Spare parts				
Blade		09 99 000 0179		
Cutting plate		09 99 000 0180		

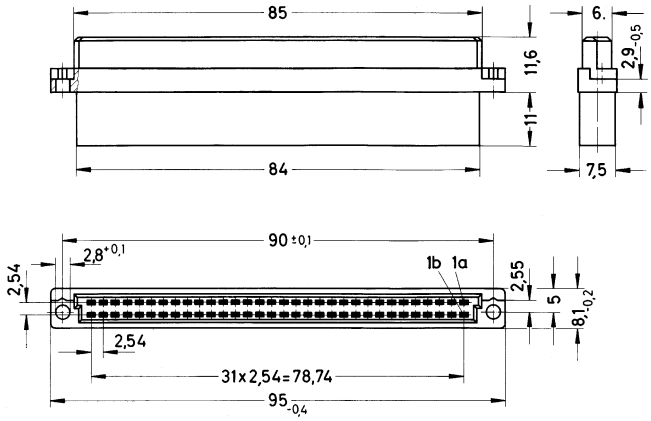
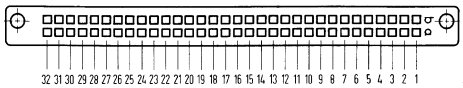
Further components and accessories for insulation displacement see interface catalogue, chapter 32

[1] acc. to IEC 60 603-2

Number of contacts

max. 64

Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	64	09 02 064 3214[f]	 Contact arrangement View from termination side  Shell housing 09 02 064 0501 / 09 02 064 0502 see chapter 20	

Identification	Part number	Performance levels according to IEC 60603-2. 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]		09 02 000 8484	09 02 000 8474

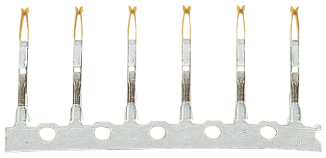
Wire gauge mm²	AWG	Insulation ø mm
0.09 - 0.5	28 - 20	0.7 - 1.5

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

For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)

Insertion, removal and crimping tools see chapter 30

Bandoliered contacts

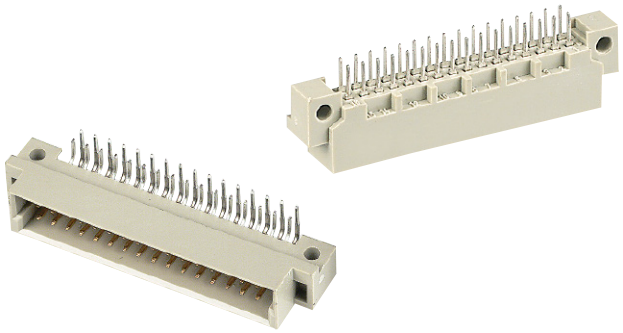


Individual contacts

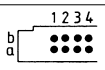
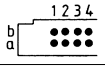
[1] Packaging unit 1,000 pieces
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

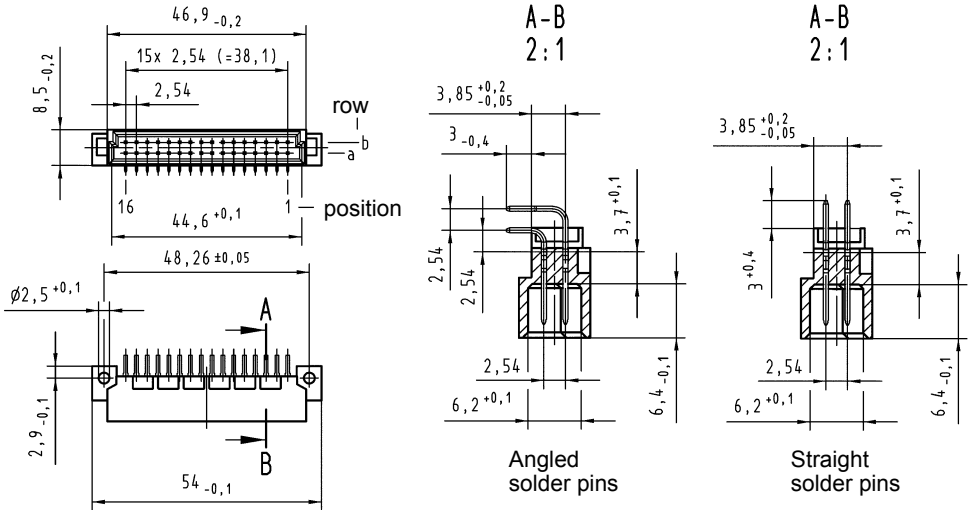
32, 16



Male connectors

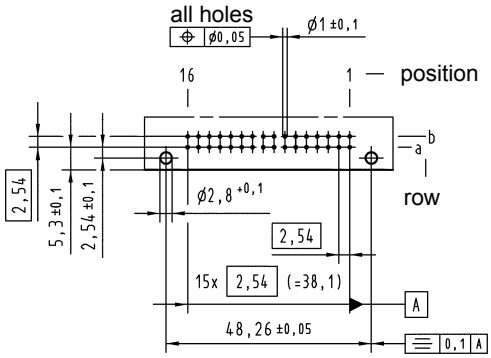
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins	32		09 22 132 7921	09 22 132 6921 09 22 132 6921 222[f] 09 22 332 6921[b]	09 22 132 2921
THR	32			09 22 132 6919[d] 09 22 332 6919[b][d]	
	16			09 22 116 6921	
	16			09 22 116 6931	
	30 + 2▲			09 22 132 6951	
Male connector with straight solder pins	32		09 22 132 7922	09 22 132 6922	09 22 132 2922
THR	32			09 22 132 6920[d]	
THR	30 + 2▲			09 22 132 6918[d]	

Dimensions

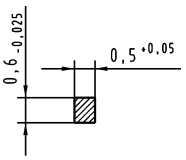


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b: A = 0.29 - 0.33 mm²

Dimensions in mm

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

[b] Connectors with snap-in clips see chapter 00

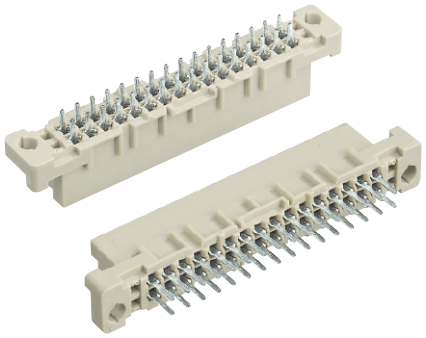
[d] CTI > 400

[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Other contact arrangements on request

Number of contacts

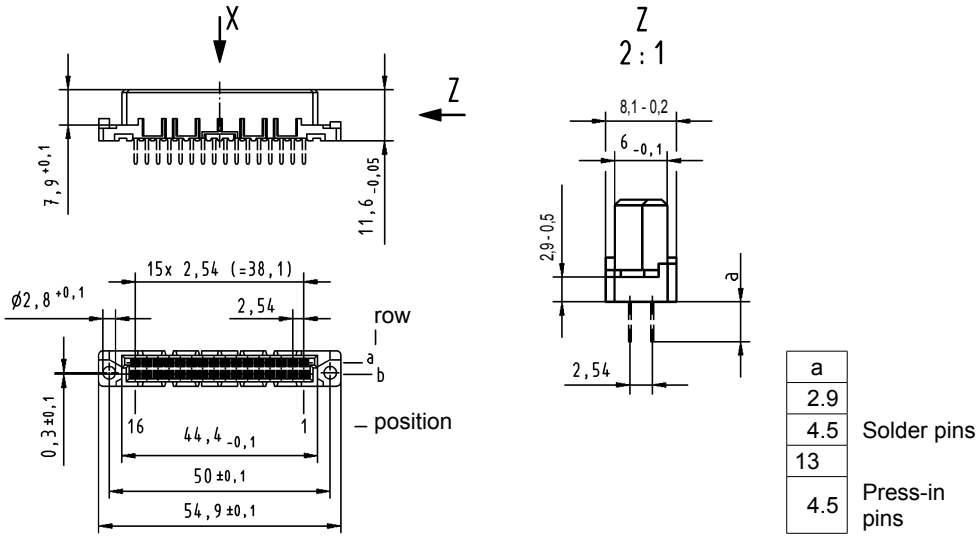
32



Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	 1
Female connector with solder pins 2.9 mm	32		Performance level 3 on request	09 22 232 6824 09 22 232 6824 222[f] 09 22 432 6824[b] 09 22 232 6841[d]	Performance level 1 on request
THR	32				
4.5 mm	32			09 22 232 6825 09 22 232 6825 222[f] 09 22 432 6825[b] 09 22 232 6829[d]	
THR	32				
13 mm	32			09 22 232 6421	
Female connector with press-in pins 4.5 mm	32			09 22 232 6850	

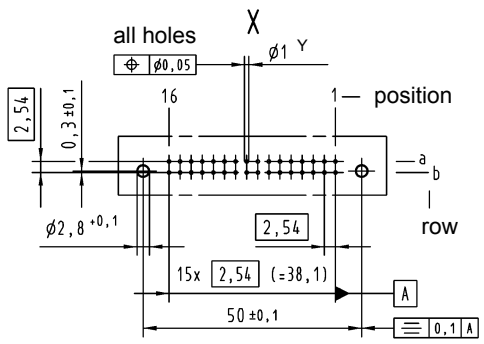
Dimensions



a	
2.9	Solder pins
4.5	
13	
4.5	Press-in pins

Board drillings

Mounting side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Cross section of solder terminations

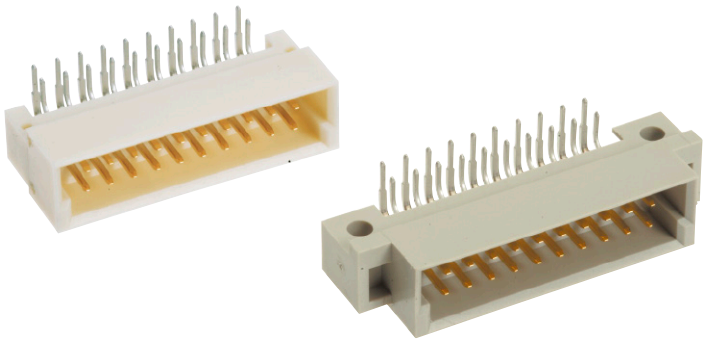
see page 01.13

Dimensions in mm

[b] Connectors with snap-in clips see chapter 00
[d] CTI > 400
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2
Other contact arrangements on request

Number of contacts

20

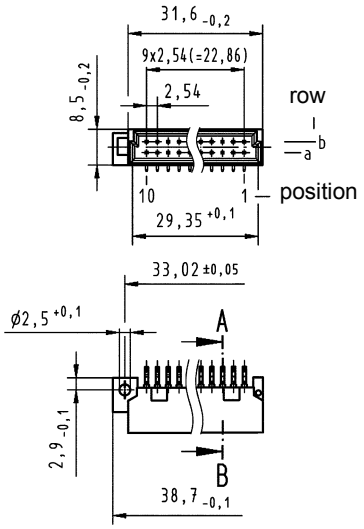


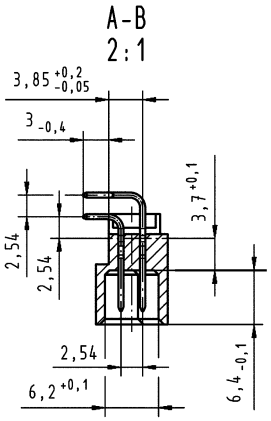
Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. 2	1
Male connector with angled solder pins					
with fixing flange	20		Performance level 3 on request	09 24 120 6921 09 24 320 6921[b)]	Performance level 1 on request
with fixing flange, THR	20			09 24 120 6919[d)]	
without fixing flange	20			09 24 120 6571	
without fixing flange, THR	20			09 24 120 6579[d)]	
Male connector with straight solder pins					
with fixing flange	20			09 24 120 6922	

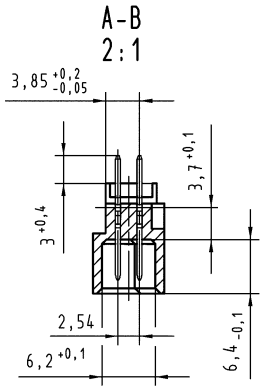
Dimensions

with fixing flange without fixing flange





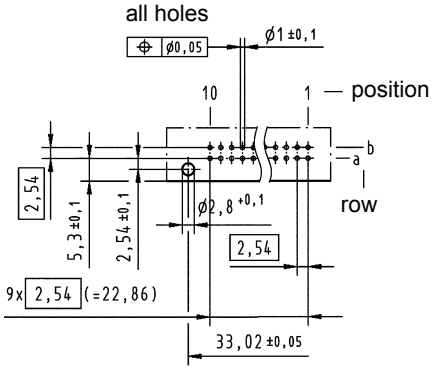
Angled solder pins



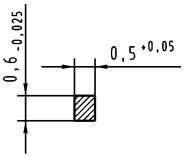
Straight solder pins

Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts
row a, b: A = 0.29 - 0.33 mm²

Dimensions in mm

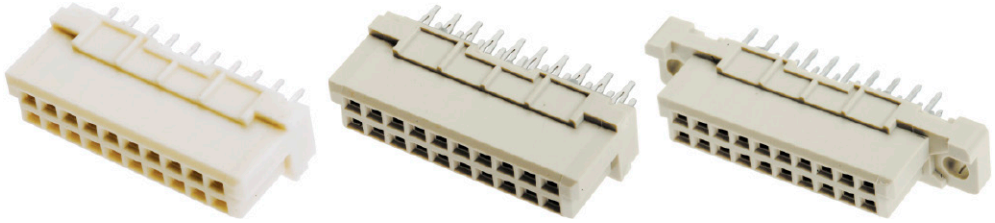
Other contact arrangements as well with lagging/leading pins on request

[b)] Connectors with snap-in clips see chapter 00

[d)] CTI > 400

Number of contacts

20

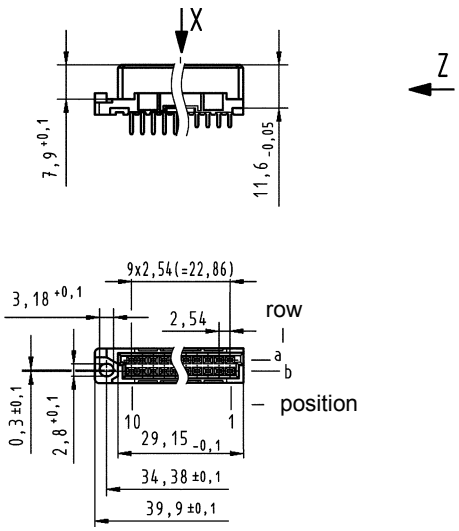


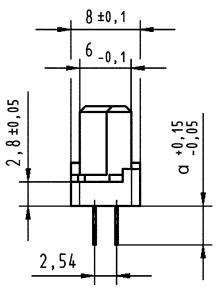
Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. 2	1
Female connector with solder pins 2.9 mm			Performance level 3 on request		Performance level 1 on request
with fixing flange	20			09 24 220 6824	
with fixing flange, THR	20			09 24 220 6841[d)]	
without fixing flange, THR	20			09 24 220 6414[d)]	
Female connector with solder pins 4.5 mm					
with fixing flange	20			09 24 220 6825	
Female connector with press-in pins 4.5 mm					
with fixing flange	20			09 24 220 6850	
without fixing flange	20			09 24 220 6870	

Dimensions

with fixing flange without fixing flange

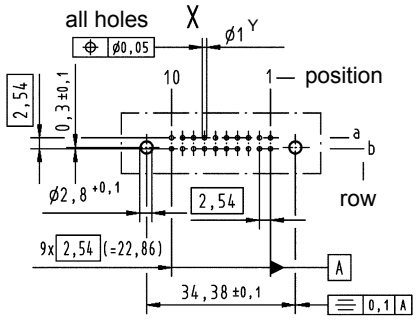




a	
2.9	solder pins
4.5	
4.5	press-in pins

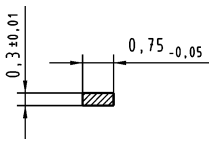
Board drillings

Mounting side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Cross section of solder terminations



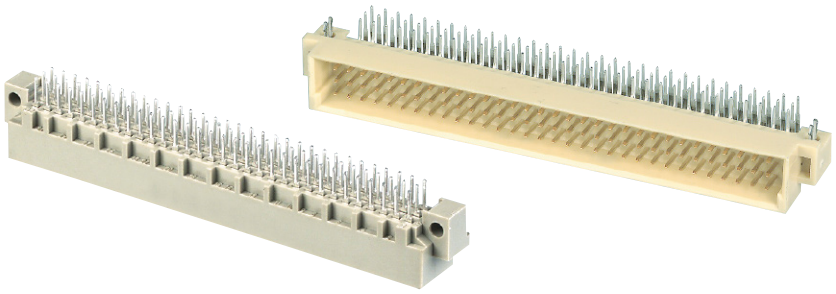
Cross area (A) of contacts row a, b: A = 0.20 - 0.23 mm²

Dimensions in mm

d) CTI > 400

Number of contacts

96, 64, 32



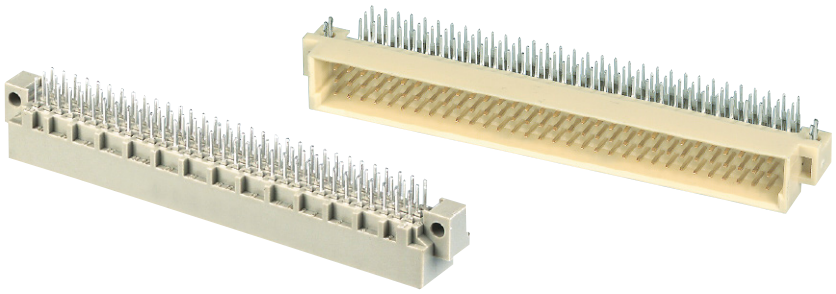
Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins Length 3 mm	96		09 03 196 7921 09 03 396 7921[b]	09 03 196 6921 09 03 196 6921 222[f] 09 03 396 6921[b] 09 03 696 6921[c] 09 03 696 6921 222[c][f] 09 03 896 6921[b][c]	09 03 196 2921 09 03 196 2921 222[f] 09 03 396 2921[b] 09 03 696 2921[c]
THR	96			09 03 196 6919[d] 09 03 396 6919[b][d] 09 03 696 6919[c][d]	09 03 196 2919[d] 09 03 396 2919[b][d]
	64		09 03 164 7921 09 03 364 7921[b]	09 03 164 6921 09 03 164 6921 222[f] 09 03 364 6921[b] 09 03 664 6921[c] 09 03 864 6921[b][c]	09 03 164 2921 09 03 164 2921 222[f] 09 03 364 2921[b] 09 03 664 2921[c]
THR	64			09 03 164 6919[d] 09 03 364 6919[b][d]	09 03 164 2919[d]
	32		09 03 132 7921 09 03 332 7921[b]	09 03 132 6921 09 03 332 6921[b] 09 03 632 6921[c]	09 03 132 2921 09 03 332 2921[b]
	94 + 2▲		09 03 196 7951	09 03 196 6951 09 03 396 6951[b] 09 03 696 6951[c]	09 03 196 2951
THR	94 + 2▲			09 03 396 6918[b][d]	
	62 + 2▲		09 03 164 7951 09 03 364 7951[b]	09 03 164 6951 09 03 364 6951[b] 09 03 664 6951[c]	09 03 164 2951
THR	62 + 2▲			09 03 164 6918[d]	
Length 4.4 mm	96			09 03 196 6569 09 03 396 6569[b]	
Male connector with straight solder pins	96		09 03 196 7922	09 03 196 6922	09 03 196 2922
THR	96			09 03 196 6920[d]	
	64		09 03 164 7922	09 03 164 6922	09 03 164 2922

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]. Lagging pins on request.
[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00
[d] CTI > 400
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

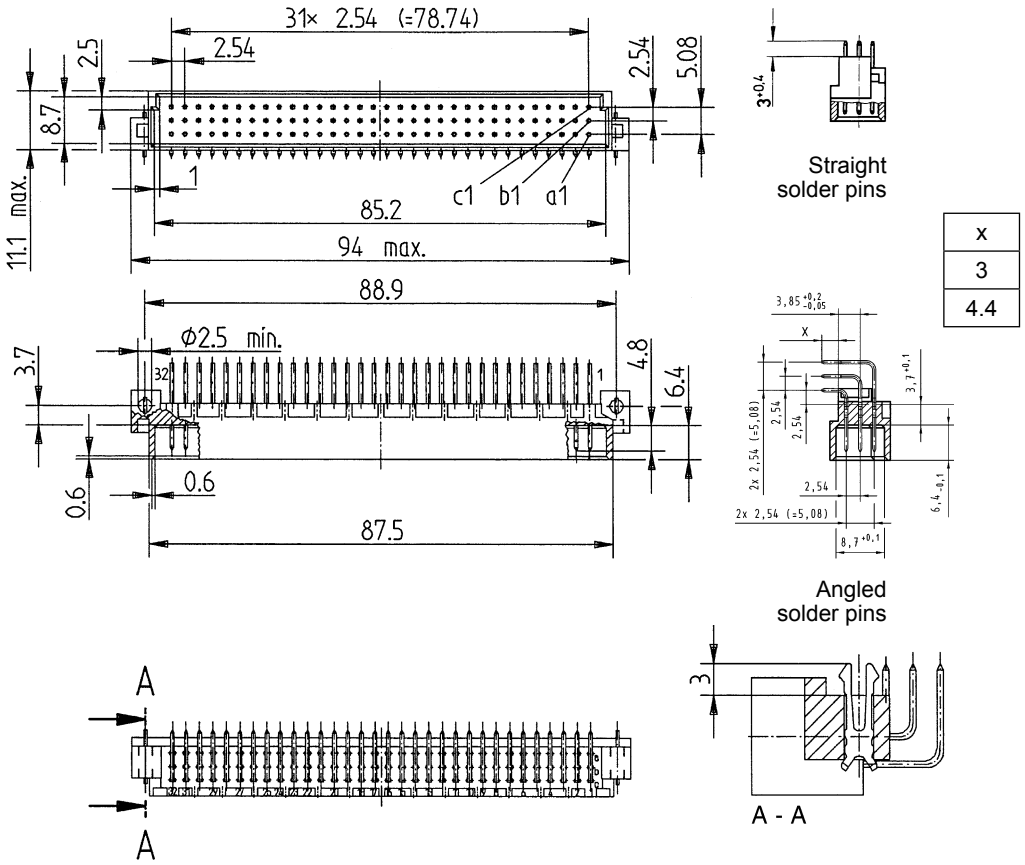
96, 64, 32



Male connectors

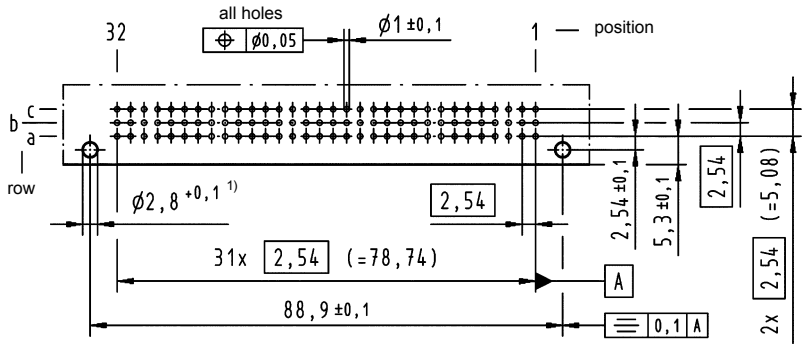
Identification	Drawing	Dimensions in mm

Dimensions

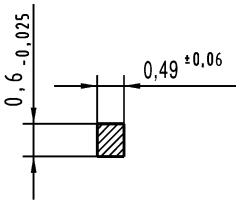


Board drillings

Mounting side



Cross section of solder terminations



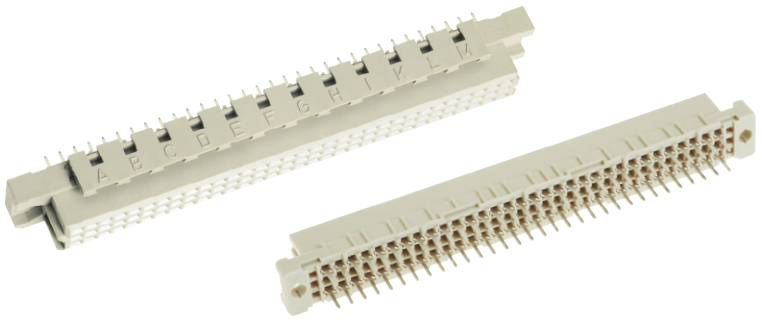
Cross area (A) of contacts row a, b, c: A = 0.25 - 0.33 mm²

Dimensions in mm

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

Number of contacts

96, 64, 32



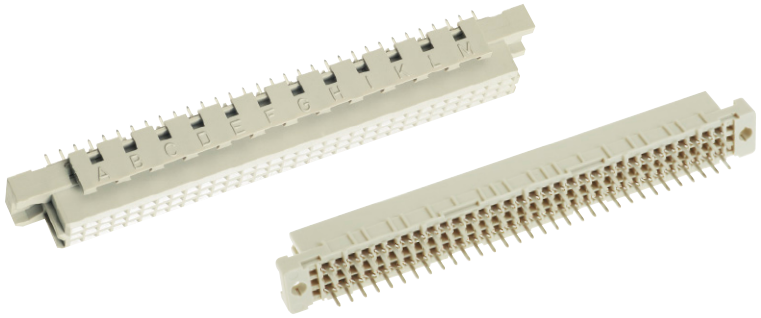
Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm	96		09 03 296 7824	09 03 296 6824 09 03 296 6824 222[f] 09 03 496 6824[b] 09 03 796 6824[c]	09 03 296 2824 09 03 296 2824 222[f] 09 03 496 2824[b]
	96			09 03 296 6841[d]	
	64		09 03 264 7824 09 03 464 7824[b]	09 03 264 6824 09 03 264 6824 222[f] 09 03 464 6824[b] 09 03 764 6824[c]	09 03 264 2824 09 03 264 2824 222[f] 09 03 464 2824[b]
	64			09 03 264 6841[d]	
	32		09 03 232 7824	09 03 232 6824 09 03 432 6824[b]	09 03 232 2824 09 03 432 2824[b]
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	
	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 03 496 7825[b]	09 03 296 6825 09 03 296 6825 222[f] 09 03 496 6825[b] 09 03 796 6825[c] 09 03 796 6825 222[c][f]	09 03 296 2825 09 03 296 2825 222[f] 09 03 496 2825[b] 09 03 796 2825[c]
	96			09 03 296 6829[d]	
	64		09 03 264 7825 09 03 464 7825[b]	09 03 264 6825 09 03 464 6825[b] 09 03 764 6825[c]	09 03 264 2825 09 03 464 2825[b] 09 03 764 2825[c]
	64			09 03 264 6829[d]	
	32		09 03 232 7825	09 03 232 6825 09 03 432 6825[b]	09 03 232 2825
Female connector with kinked solder pins[1] 4.5 mm	96		09 03 296 7845	09 03 296 6845 09 03 296 6845 222[f]	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 solder pins 13 mm	96			09 03 296 6421 09 03 796 6421[c]	
	64			09 03 264 6421 09 03 764 6421[c]	
	32			09 03 232 6421 09 03 732 6421[c]	

[1] Kinked pins for fixing the connector onto the pcb see chapter 00
[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00
[d] CTI > 400
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

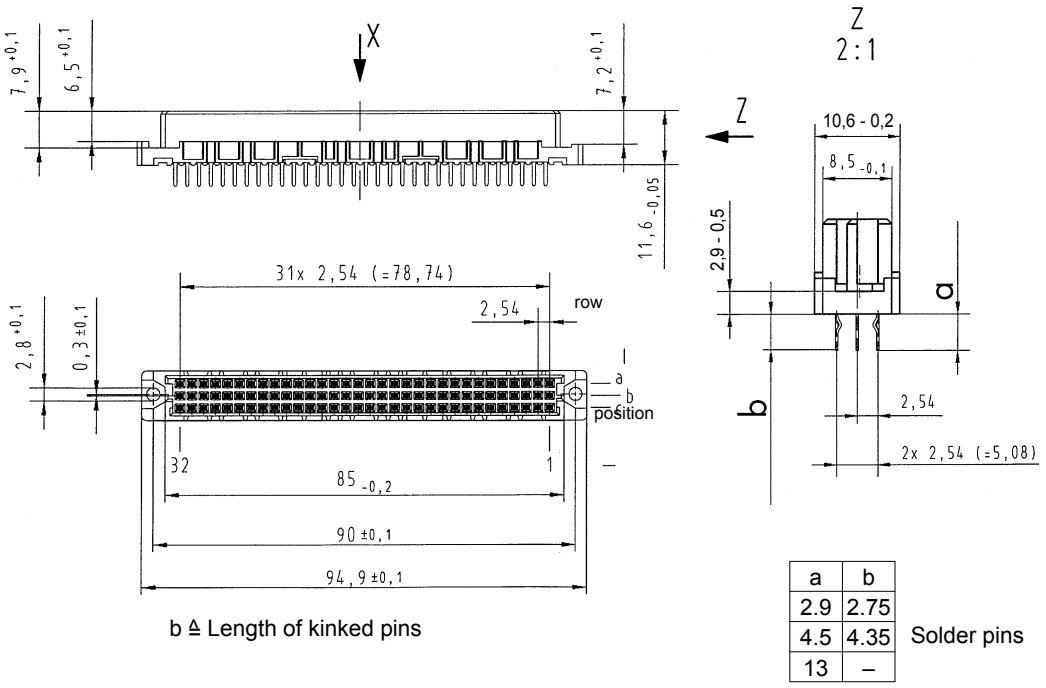
96, 64, 32



Female connectors

Identification	Drawing	Dimensions in mm

Dimensions



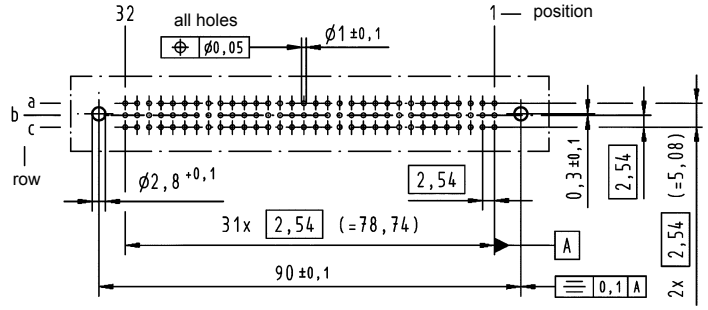
b ≙ Length of kinked pins

a	b
2.9	2.75
4.5	4.35
13	–

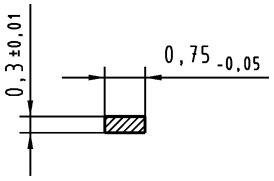
Solder pins

Board drillings

Mounting side



Cross section of solder terminations

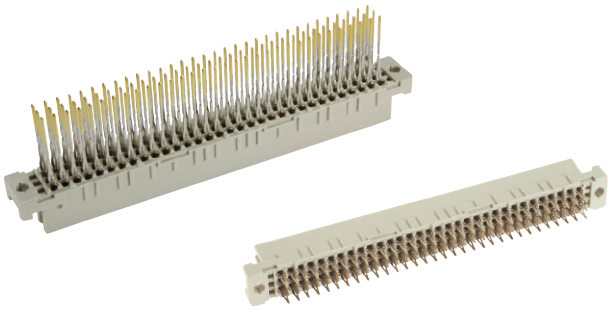


Cross area (A) of contacts
row a, b, c: A = 0.20 - 0.23 mm²

Dimensions in mm

Number of contacts

96, 64, 32



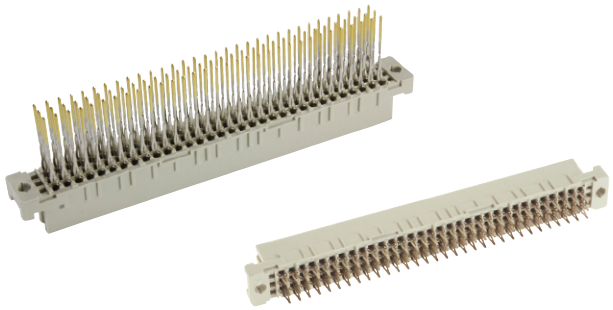
Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector Type C					
with press-in terminations	96		09 03 296 7850	09 03 296 6850 09 03 296 6850 222[f] 09 03 796 6850[c] 09 03 796 6850 222[c][f]	09 03 296 2850 09 03 296 2850 222[f]
4.5 mm	64		09 03 264 7850	09 03 264 6850 09 03 264 6850 222[f] 09 03 764 6850[c]	09 03 264 2850
	32			09 03 232 6850	09 03 232 2850
with press-in terminations for rear interfacing Usage of HARTING shroud recommended: contacts for rear interfacing selectively gold plated (performance level 3)					
13 mm	96			09 03 296 6861 09 03 796 6861[c]	
	64			09 03 264 6861	
16.2 mm	96			09 03 296 6411 09 03 296 6416[2]	
	64			09 03 264 6411	
	32			09 03 232 6411	
17 mm	96			09 03 296 6862 09 03 796 6862[c]	
	64			09 03 264 6862	
with press-in terminations for wire wrapping (wrap posts not for interfacing, no performance level)					
13 mm	96			09 03 296 6851 252	
	64			09 03 264 6851 252	
17 mm	96				09 03 296 2852 252

[2] Contacts for rear interfacing gold plated (performance level 2)
[c] Connectors with coding see chapter 00
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

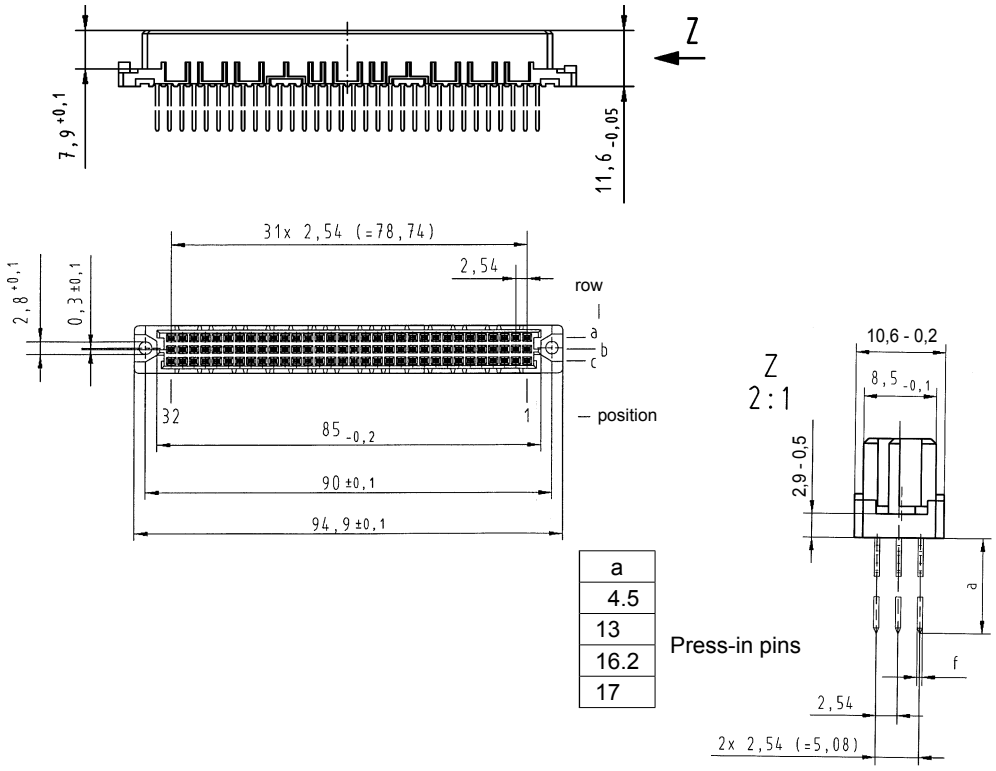
96, 64, 32



Female connectors

Identification	Drawing	Dimensions in mm

Dimensions

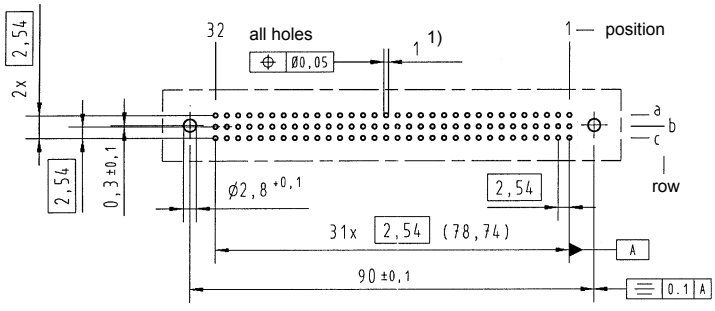


a
4.5
13
16.2
17

Press-in pins

Board drillings

Mounting side



Dimensions in mm

[1] refer to recommended configuration of pcb holes, see page 00.25

Number of contacts

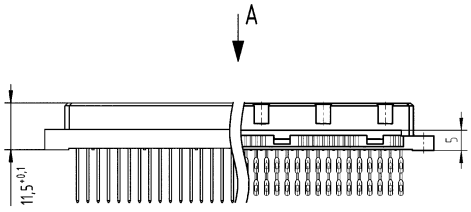
96, 64

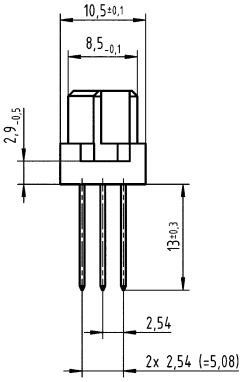
Female connectors

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00 2
Female connector with wrap posts[2] 13 mm	96		09 03 296 6821 09 03 296 6878[1]	
	64		09 03 264 6821 09 03 264 6878[1]	
Female connector with solder lugs a + c 5.5 mm b 11 mm	96		09 03 296 6823	
	64		09 03 264 6823	

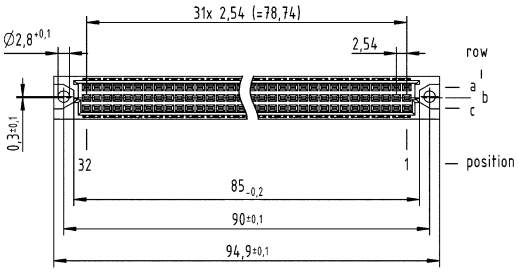
Dimensions

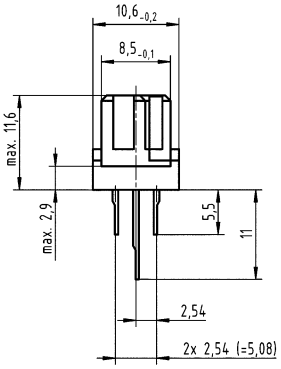
wrap posts solder lugs





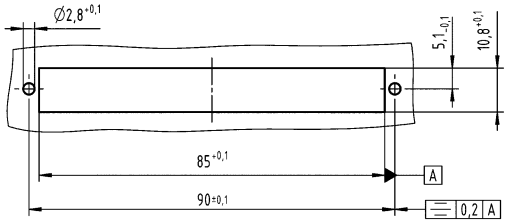
wrap posts





solder lugs

Panel cut out



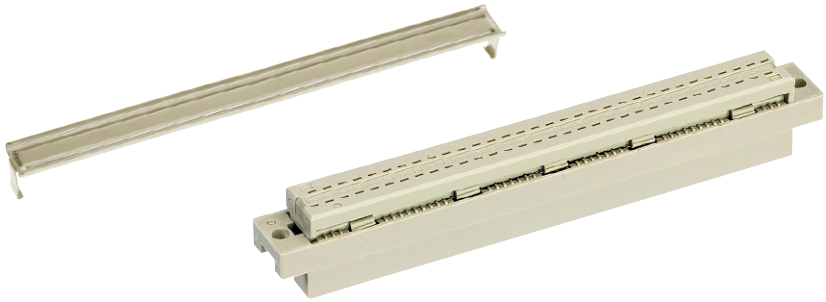
Identification strips for female connectors with wrap posts
09 03 000 9939

Dimensions in mm

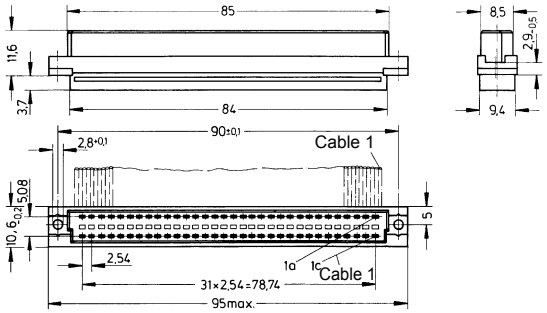
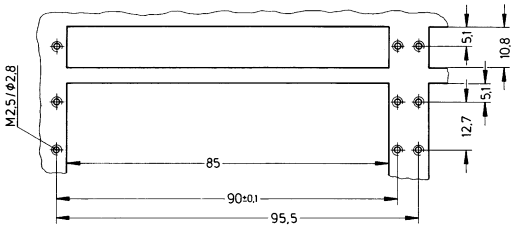
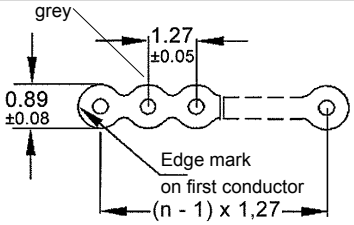
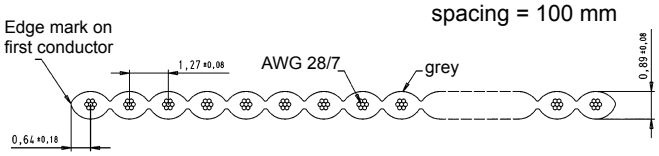
[1] Wrap posts for interfacing, selectively gold-plated (performance level 3)
[2] To be used only for wire wrap termination. Solder versions see page 01.22

Number of contacts

64



Female connectors

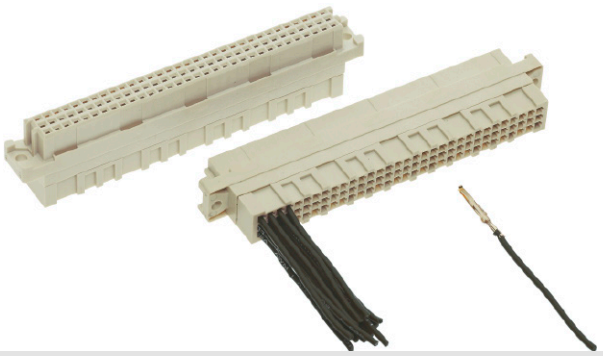
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for insulation displacement	64	Performance level 2[1] 09 03 264 6828 Performance level 3[1] 09 03 264 7828	 Cable 1 to contact 1 c Contact arrangement View from termination side 	
Strain relief (metal)		09 03 000 9940		
Panel cut out			 Mateable with 3 row male connector type C, no female contacts in the middle row	
Flat cable AWG 28/7 grey 30.48 m grey 100.00 m colour coded 30.48 m twisted pair[2] 30.48 m	 64 64 64 64	 09 18 064 7001 09 18 064 7004 09 18 064 7005 09 18 064 7006	 Wire (tinned) Cu Gauge AWG 28/7 0.089 mm² Insulation material as per UL style PVC	[2] Termination area spacing = 508 mm **Important: always store reels vertically**
Round flat cable[3] with screening 30.48 m 100.00 m without screening 30.48 m	 64 64 64	 09 18 064 7007 09 18 064 7010 09 18 064 7008		[3] Termination area spacing = 100 mm
Bench press Base plate		09 99 000 0114 09 99 000 0150		
Cable cutter		09 99 000 0116		
Spare parts Blade Cutting plate		 09 99 000 0179 09 99 000 0180		

Further components and accessories for insulation displacement see interface catalogue, chapter 32

[1] acc. to IEC 60 603-2

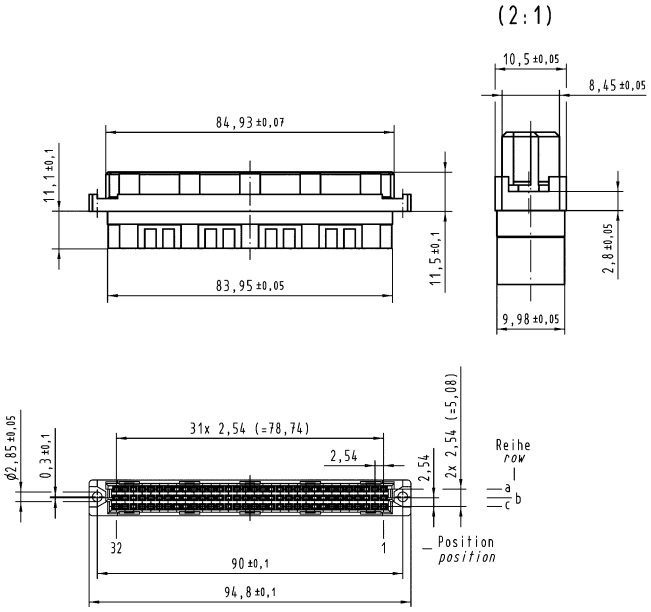
Number of contacts

max. 96, 48



Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts				
Order contacts separately				
Type C	96	09 03 096 3214[f)] 09 03 596 3214[c)f)]		
Type C	96	09 03 096 3217[f)]		
Position marking turned for mating type R male				



Identification	Part number	Performance levels according to IEC 60603-2. 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)]		09 02 000 8484	09 02 000 8474

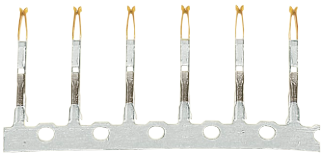
Wire gauge mm²	AWG	Insulation ø mm
0.09 - 0.5	28 - 20	0.7 - 1.5

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

For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)

Insertion, removal and crimping tools see chapter 30

Bandoliered contacts

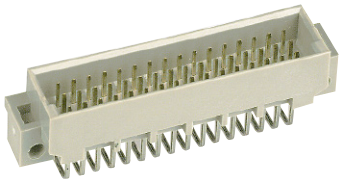


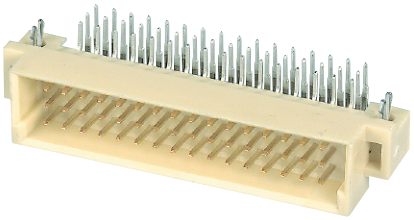
Individual contacts

[c)] Connectors with coding see chapter 00
[1)] Packaging unit 1,000 pieces
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

48, 32, 16





Male connectors

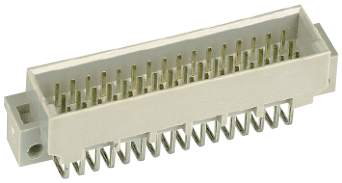
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins	48		09 23 148 7921 09 23 348 7921[b]	09 23 148 6921 09 23 148 6921 222[f] 09 23 348 6921[b]	09 23 148 2921 09 23 348 2921[b]
THR THR on a reel	48		09 23 148 7919	09 23 148 6919[d] 09 23 348 6919[b][d] 09 23 148 6919 791[d]	
	32		09 23 132 7921 09 23 332 7921[b]	09 23 132 6921 09 23 332 6921[b]	09 23 132 2921 09 23 332 2921[b]
THR	32			09 23 132 6919[d] 09 23 332 6919[b][d]	
	16			09 23 116 6931 09 23 316 6931[b]	09 23 116 2931
	46 + 2▲		09 23 148 7951	09 23 148 6951 09 23 348 6951[b]	
Male connector with straight solder pins	48		09 23 148 7922	09 23 148 6922	09 23 148 2922
THR	48			09 23 148 6920[d]	
	32		09 23 132 7922	09 23 132 6922	09 23 132 2922
THR	32			09 23 132 6920[d]	

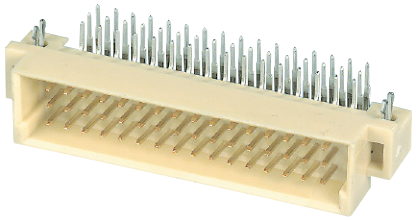
▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a16]. Lagging pins on request.
Other contact arrangements on request

[b] Connectors with snap-in clips see chapter 00
[d] CTI > 400
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

48, 32, 16

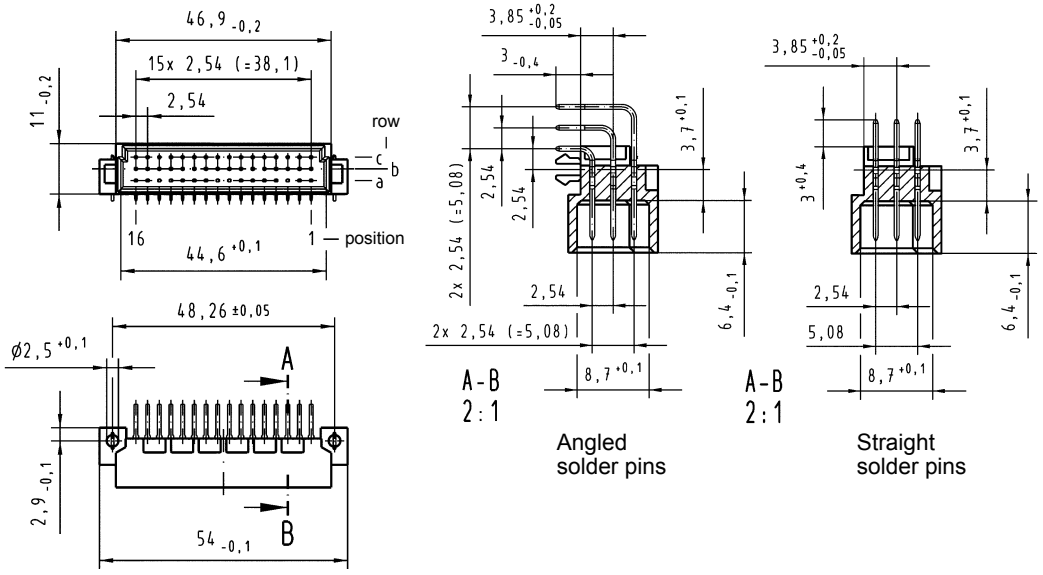




Male connectors

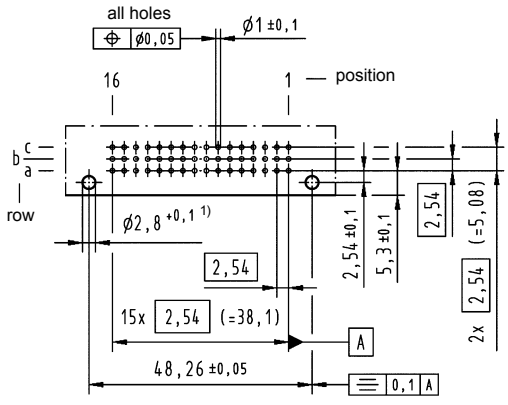
Identification	Drawing	Dimensions in mm

Dimensions

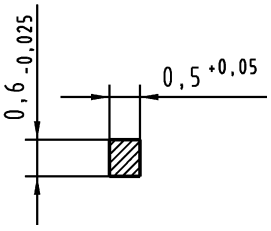


Board drillings

Mounting side



Cross section of solder terminations

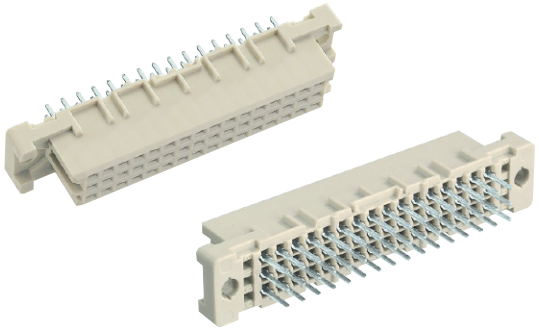


Cross area (A) of contacts row a, b, c: A = 0.29 - 0.33 mm²

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

Number of contacts

48, 32



Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm	48			09 23 248 6824 09 23 448 6824[b)]	09 23 248 2824
THR	48			09 23 248 6841[d)]	
	32			09 23 232 6824 09 23 432 6824[b)]	
THR	32			09 23 232 6841[d)]	
Female connector with solder pins 4.5 mm	48			09 23 248 6825 09 23 248 6825 222[f)] 09 23 448 6825[b)]	09 23 248 2825
THR	48			09 23 248 6829[d)]	
	32		09 23 232 7825	09 23 232 6825	
THR	32			09 23 232 6829[d)]	
Female connector with solder pins 13 mm	48			09 23 248 6421	
Female connector with wrap posts[1)] 13 mm	48			09 23 248 6821	
Female connector with solder lugs 5.5 / 11 mm	48			09 23 248 6823	
	32			09 23 232 6823	

Other contact arrangements on request

[1)] To be used only for wire wrap termination

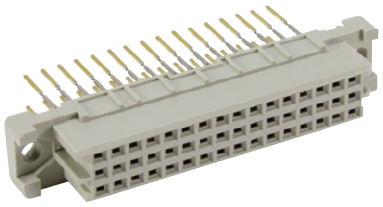
[b)] Connectors with snap-in clips see chapter 00

[d)] CTI > 400

[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

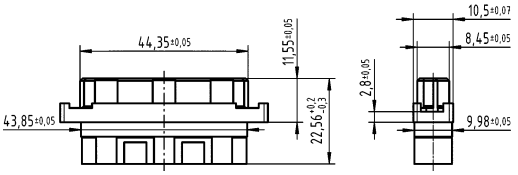
Number of contacts

48, 32



Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with press-in pins 3.7 mm	48			09 23 248 6866	
Female connector with press-in pins 4.5 mm	48			09 23 248 6850 09 23 248 6850 222[f)]	09 23 248 2850
	32			09 23 232 6850	
Female connector with press-in pins 13 mm	48			09 23 248 6861	
	32			09 23 232 6861	
Female connector with press-in pins 17 mm	48			09 23 248 6862	
with press-in terminations for rear interfacing Usage of HARTING shroud recommended: contacts for rear interfacing selectively gold plated (performance level 3)					

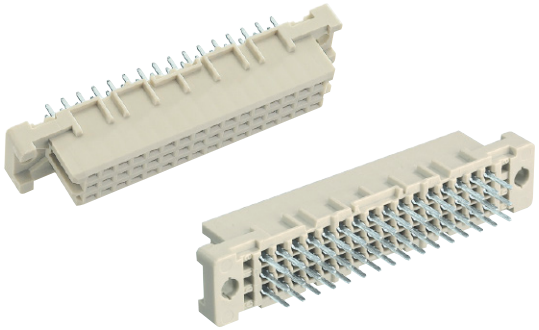
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately see page 01.28				
Type 2C	48	09 23 048 3214[f)]		
Type 2C	48	09 23 048 3217[f)]		
Position marking turned for mating type 2R male				

Other contact arrangements on request

[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

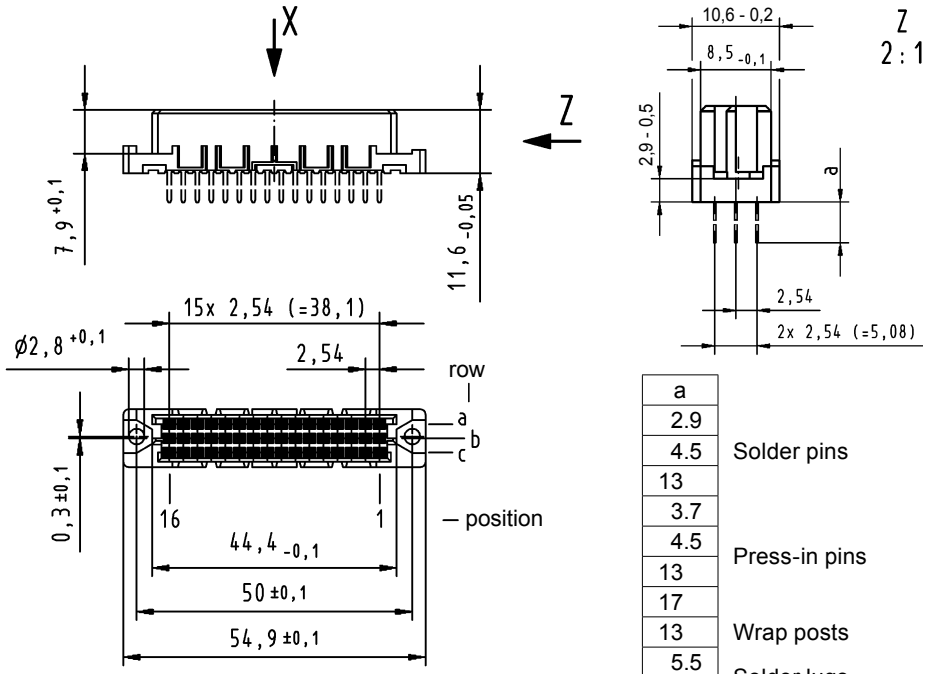
48, 32



Female connectors

Identification	Drawing	Dimensions in mm

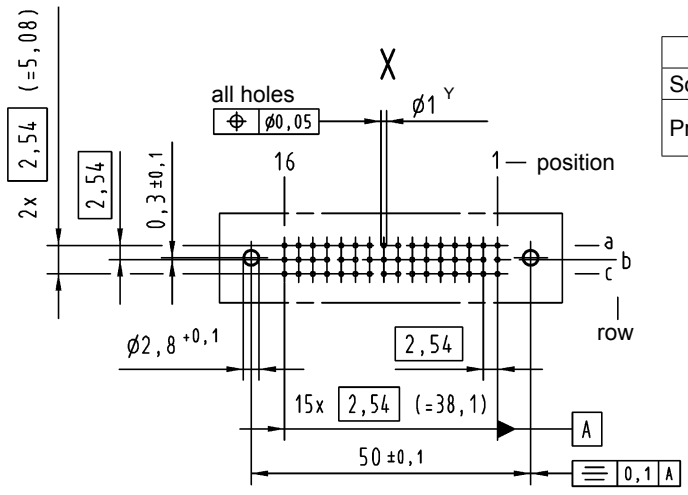
Dimensions



a	
2.9	Solder pins
4.5	
13	
3.7	Press-in pins
4.5	
13	
17	
13	Wrap posts
5.5	Solder lugs
11	

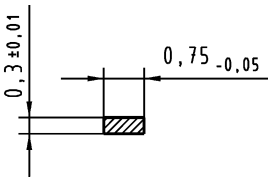
Board drillings

Mounting side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Cross section of solder terminations

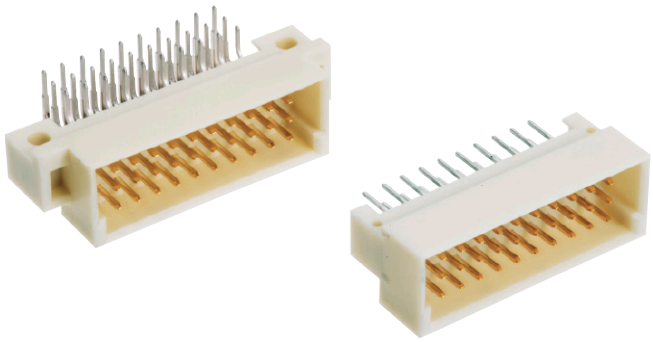


Cross area (A) of contacts
row a, b, c: A = 0.20 - 0.23 mm²

Dimensions in mm

Number of contacts

30, 20



Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. 2	1
Male connector with angled solder pins					
with fixing flange	30			09 25 130 6921 09 25 330 6921[b)]	
	20			09 25 120 6921	
with fixing flange, THR	30			09 25 130 6919[d)]	
without fixing flange	30			09 25 130 6571	
without fixing flange, THR	30			09 25 130 6579[d)]	
			Performance level 3 on request		Performance level 1 on request
Male connector with straight solder pins					
with fixing flange	30			09 25 130 6922	
	20			09 25 120 6922	
without fixing flange	30			09 25 130 6572	
without fixing flange, THR	30			09 25 130 6590[d)]	

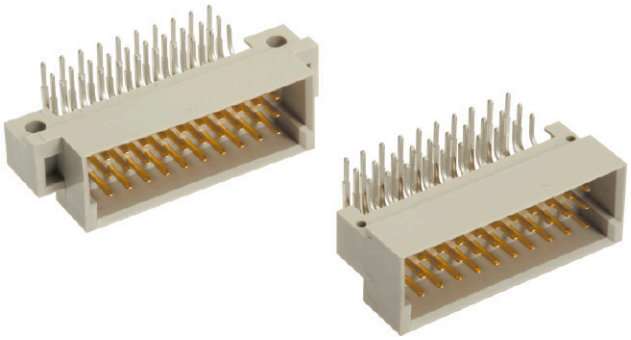
Other contact arrangements as well with lagging/leading pins on request

[b)] Connectors with snap-in clips see chapter 00

[d)] CTI > 400

Number of contacts

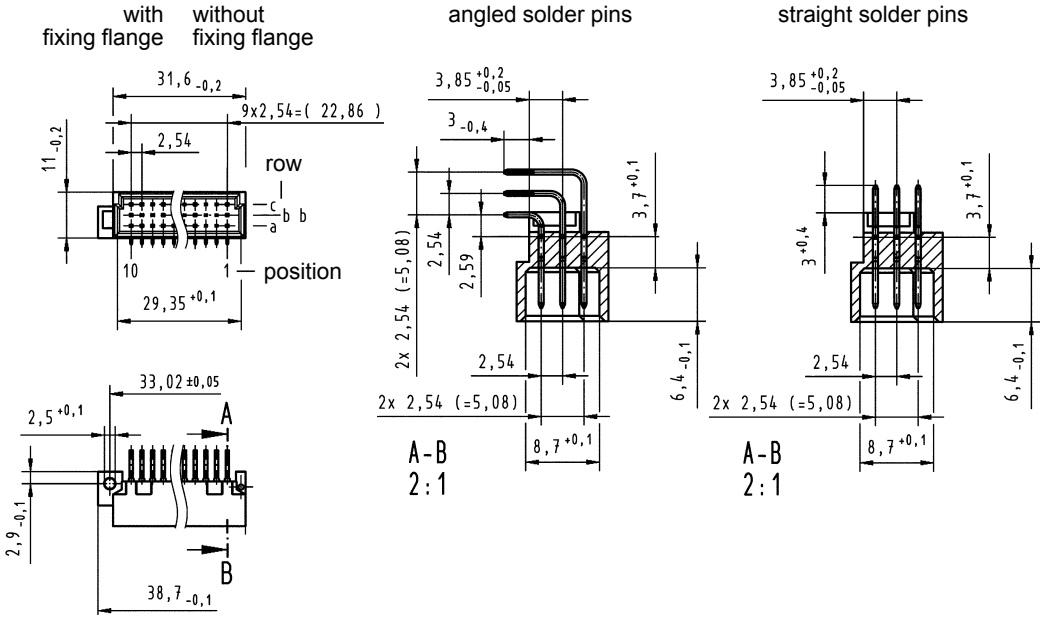
30, 20



Male connectors

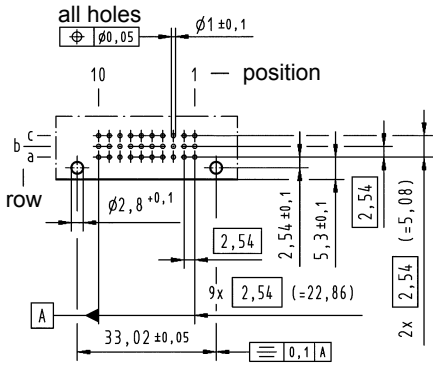
Identification	Drawing	Dimensions in mm

Dimensions

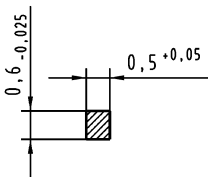


Board drillings

Mounting side



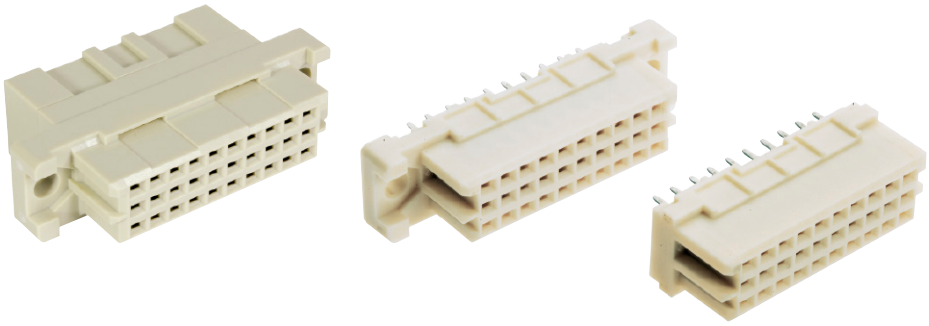
Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.29 - 0.33 mm²

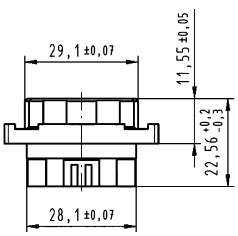
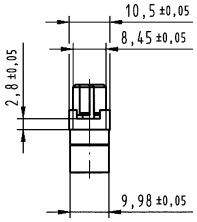
Number of contacts

30, 20



Female connectors

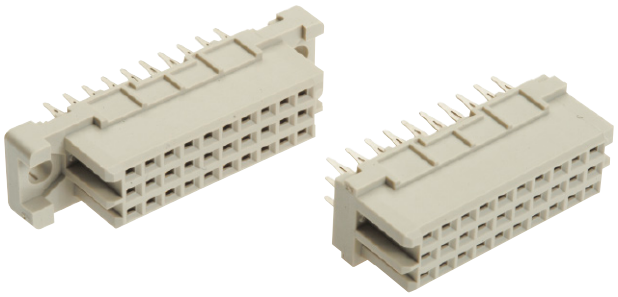
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. 2	1
Female connector with solder pins 2.9 mm					
with fixing flange	30			09 25 230 6824	
	20			09 25 220 6824	
with fixing flange, THR	30			09 25 230 6841[d]	
without fixing flange, THR	30			09 25 230 6414[d]	
Female connector with solder pins 4.5 mm					
with fixing flange	30		Performance level 3 on request	09 25 230 6825	Performance level 1 on request
	20			09 25 220 6825	
Female connector with solder pins 13 mm					
with fixing flange	30			09 25 230 6421	
Female connector with press-in pins 4.5 mm					
with fixing flange	30			09 25 230 6850	
without fixing flange	30			09 25 230 6870	

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts				
Order contacts separately see page 01.28				
Type 3C	30	09 25 030 3214[f]		
Type 3C	30	09 25 030 3217[f]		
Position marking turned for mating type 3R male				

[d] CTI > 400
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

30, 20

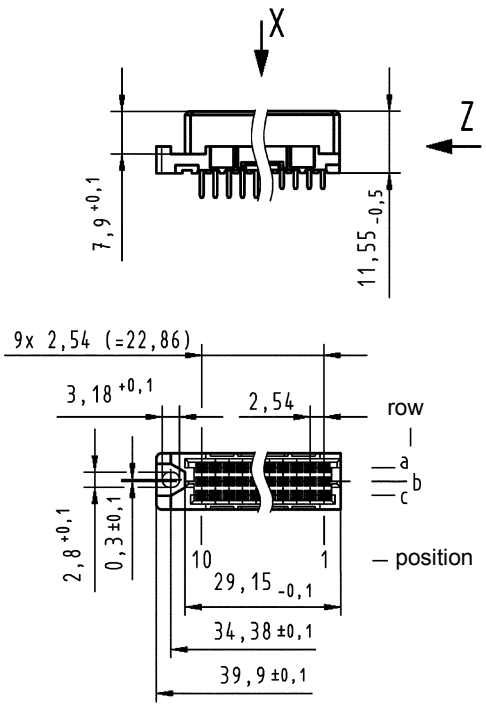


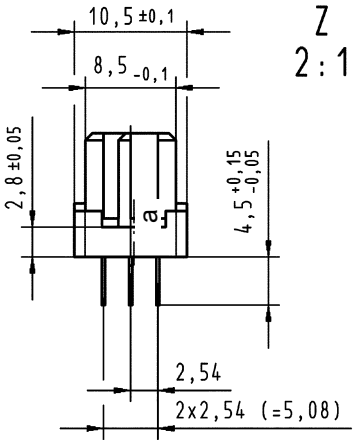
Female connectors

Identification	Drawing	Dimensions in mm

Dimensions

with fixing flange without fixing flange

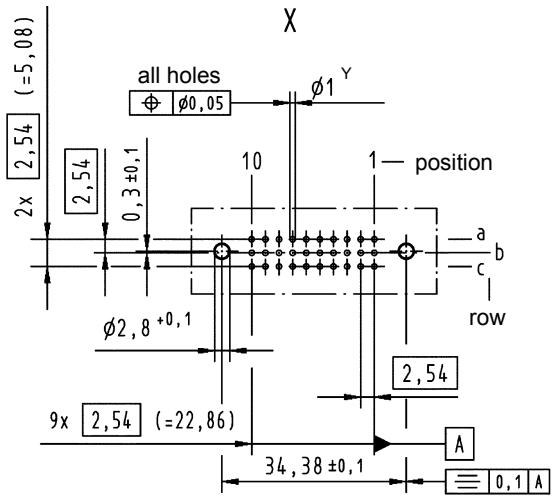




a	
2.9	solder pins
4.5	
13	press-in pins
4.5	

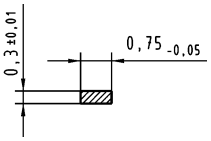
Board drillings

Mounting side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.20 - 0.23 mm²

HARTING

Application matrix

- Coax Contacts
- High Voltage Contacts
- High Power Contacts
- FOC- Contacts

Application		Male	Female	Male connector type M angled 09 03 1XX X901	Male connector type M invers 09 73 1XX 6902 / 6903 / 6904 / 09 73 1XX 6907 / 6974 / 6991	Female connector type M straight 09 03 2XX 6804 / 6805 / 6850	Female connector type M flat 09 03 2XX 6864 / 6865 / 6830	Female connector type M invers 09 73 2XX 6801	Female connector type M crimp 09 03 2XX 3214	Male connector type MH 21+5 09 06 X21 6883	Female connector type MH 21+5 09 06 121 6981	Male connector type M0+2 09 29 002 3201	Female connector type M0+2 09 29 002 3401
Board to Backplane	1.	M	M	○		◇							
Board to Backplane	2.	M	M flat	○			◇						
Board to Backplane	3.	M invers	M invers		○			◇					
Board to Backplane	4.	MH 21+ 5	MH 21+ 5							○	◇		
Board to Backplane	5.	M0+2	M0+2									○	◇
Mezzanine	6.	M invers	M		○	◇							
Mezzanine	7.	M invers	M flat		○		◇						
pcb to pcb	8.	M	M invers	○				◇					

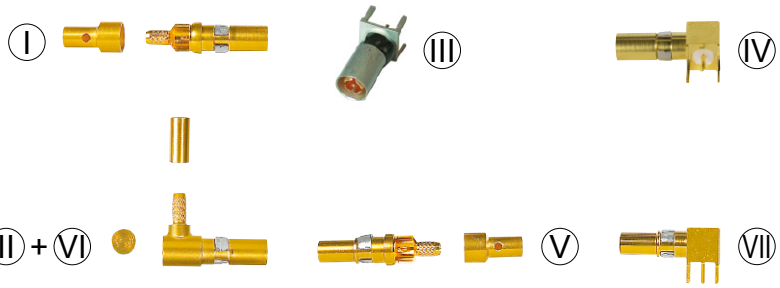
Application		Part number	09 03 000 6160	09 03 000 6161	09 03 000 6165	09 03 000 6162	09 03 000 6182	09 03 000 6260	09 03 000 6261	09 03 000 6262	09 03 000 6263	09 03 000 6265	09 03 000 6274	09 03 000 6181	09 03 000 6269	09 03 000 6281	09 03 000 6140	09 03 000 6240
		Impedance	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	75 Ω	75 Ω	75 Ω	High voltage 2.8 KV	
		Termination	solder/crimp	solder/crimp	solder	solder	solder	solder/crimp	solder/crimp	solder	solder	solder	solder/crimp	solder/crimp	solder	solder/crimp		
			cable	cable	pcb	pcb	pcb	cable	cable	pcb	pcb	pcb	cable	cable	pcb	cable		
			s	a	s	a	s	s	a	a	a	s	s	s	a	s		
Board to Backplane	1.		◆	◆	◆			●	●	●	●		●	◆	●	●	●	◆
Board to Backplane	2.						◆	●	●	●	●		●					
Board to Backplane	3.		◆	◆		◆		●	●			●	●	◆		●	●	◆
Board to Backplane	4.		◆	◆				●	●	●	●		●	◆	●	●	●	◆
Board to Backplane	5.		◆		◆			●	●	●	●		●	◆	●	●	●	◆
Mezzanine	6.		◆	◆	◆			●	●			●	●	◆		●	●	◆
Mezzanine	7.						◆	●	●			●	●					
pcb to pcb	8.		◆	◆				●	●	●	●	◆	●	◆	●	●	●	◆

● = can be used in ○ male connector
○ = male connector for ● contacts
* details see catalogue Industrial Connectors Han®

◆ = can be used in ◇ female connector
◇ = female connector for ◆ contacts

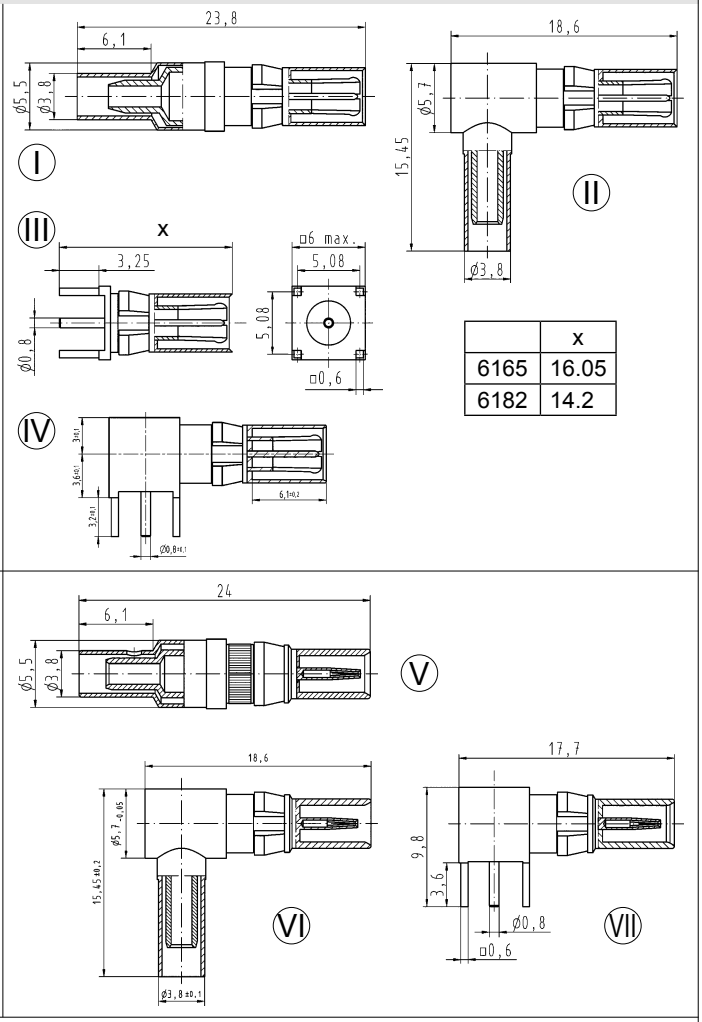
Part number	Currency	Termination		Preleading
09 03 000 6101	10 A	solder	cable	–
09 03 000 6102	20 A	solder	cable	–
09 03 000 6103	40 A	solder	cable	–
09 03 000 6104	40 A	solder	pcb	–
09 03 000 6110	40 A	solder	pcb	–
09 03 000 6113	10 A	crimp	cable	–
09 03 000 6114	20 A	crimp	cable	–
09 03 000 6115	40 A	crimp	cable	–
09 03 000 6127	40 A	solder	pcb	–
09 03 000 6128	40 A	solder	pcb	1.8
09 03 000 6133	40 A	solder	cable	0.8
09 03 000 6134	40 A	solder	pcb	0.6
09 03 000 6135	40 A	solder	pcb	–
09 03 000 6201	10 A	solder	cable	–
09 03 000 6202	20 A	solder	cable	–
09 03 000 6203	40 A	solder	cable	–
09 03 000 6207	40 A	solder	pcb	–
09 03 000 6213	10 A	crimp	cable	–
09 03 000 6214	20 A	crimp	cable	–
09 03 000 6215	40 A	crimp	cable	–
09 03 000 6220	20 A	crimp	cable	–
09 03 000 6225	40 A	solder	pcb	–
09 03 000 6245	40 A	screw	busbar	–
09 03 000 6250	40 A	press-in	pcb	–
20 10 125 4212		FOC ceramic ferrule*		
20 10 125 4222				
20 10 230 4211		FOC for SI-fibre (HCS)*		
20 10 230 4221				
20 10 001 4211		FOC for 1 mm (POF)*		
20 10 001 4221				

● = can be used in ○ male connector
○ = male connector for ● contacts
◆ = can be used in ◇ female connector
◇ = female connector for ◆ contacts
* see also chapter 04



Coaxial contacts

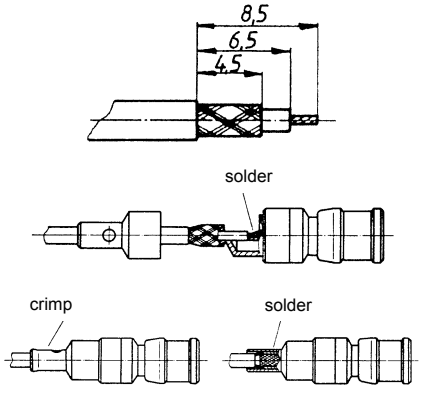
Identification	Part number Performance level 1	Drawing	Dimensions in mm
Male coaxial contacts for female connectors	acc. to DIN 41626		
I for straight solder and/or crimp termination	09 03 000 6160 09 03 000 6181[1]		
II for angled solder and/or crimp termination	09 03 000 6161		
III for straight pcb termination for type M-flat	09 03 000 6182		
for type M	09 03 000 6165		
IV for angled pcb termination for type M invers	09 03 000 6162		
Female coaxial contacts for male connectors			
V for straight solder and/or crimp termination	09 03 000 6260 09 03 000 6281[1] 09 03 000 6274[2]		
VI for angled solder and/or crimp termination	09 03 000 6261		
VII angled for pcb termination	09 03 000 6262 09 03 000 6269[1] 09 03 000 6263[2]		
straight for pcb termination for type M invers	09 03 000 6265		



	x
6165	16.05
6182	14.2

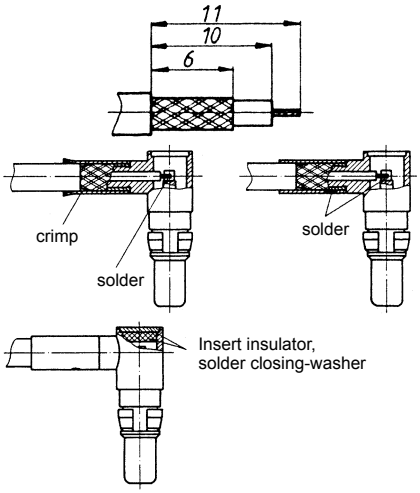
Assembly instruction for contacts

I and V



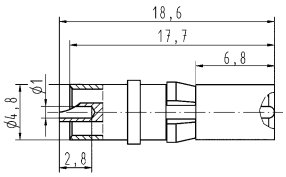
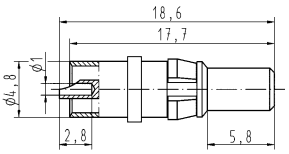
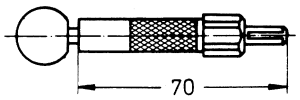
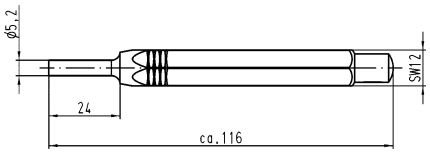
for contacts

II and VI



[1] Coaxial contact 75 Ω
[2] With knurled area for permanent fixing, not removable
Fibre optic contacts on request

High voltage contacts

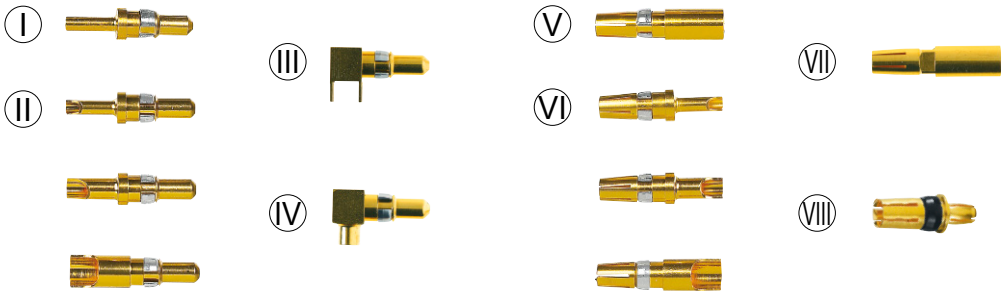
Identification	Part number Performance level 1	Drawing	Dimensions in mm
High voltage male contact for male connectors[1)] (I) for straight solder termination 2.8 kV	acc. to DIN 41 626 09 03 000 6140		
High voltage female contact for female connectors[1)] (II) for straight solder termination 2.8 kV	09 03 000 6240		
Crimping tool for coaxial contacts	09 99 000 0194		
Crimping tool for high current contacts	09 99 000 0196		
Removal tool (III) incl. removal jacket for contact replacement in male and female connectors	09 99 000 0174		
Replacement removal jacket	09 99 000 0243		
Removal tool (IV) for contact replacement in male connectors	09 99 000 0328		

Electrical characteristics of coaxial contacts and wires

Impedance	50 Ω	75 Ω
Max. working frequency	0 up to 10 GHz	0 up to 1.5 GHz
Return loss	≥ 20 dB up to 6 GHz	≥ 20 dB
RF-leakage	≥ 80 dB up to 0.5 GHz ≥ 68 dB up to 1.5 GHz	
Test voltage	750 V_{rms}	
Working voltage	250 $V_{max.}$	
Insulation resistance	≥ 1 GΩ	≥ 200 MΩ
Contacts resistance – Center contact	≤ 10 mΩ	
– Outer contact	≤ 3 mΩ	
Contact current max.	1.5 A	
Admissible power (depends on: frequency, application, return loss, environmental characteristics)	Data on request	

Cable group 2 flexible wires	Impedance	Shell ø	Screening ø	Dielectric ø	Internal wire ø	Hexagonal crimp Spanner width
RG 174 A/U	50 Ω	2.5	2.0	1.5	0.48	3.25
RG 188 A/U	50 Ω	2.6	2.0	1.5	0.54	3.25
RG 316 U	50 Ω	2.5	2.0	1.5	0.54	3.25
RG 179 B/U	75 Ω	2.54	2.0	1.6	0.3	3.25

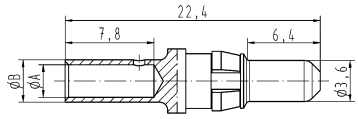
[1)] Contact resistance internal wire max. 3 mΩ



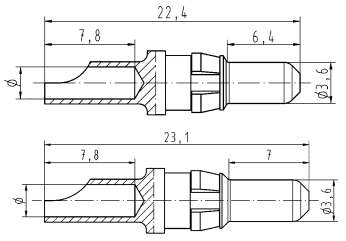
High current contacts

Identification			Part number Performance level 1
High current male contacts for male connectors[1]			acc. to DIN 41626
(I) for straight crimp termination		10 A	09 03 000 6113
		20 A	09 03 000 6114
		40 A	09 03 000 6115
(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		40 A	09 03 000 6133
(III) for angled pcb termination		max. 40 A*	09 03 000 6104
Leading contact		max. 40 A*	09 03 000 6134
(IV) for straight pcb termination		max. 40 A*	09 03 000 6110
		max. 40 A*	09 03 000 6135
* depending on the pcb design			
High current female contacts for female connectors[1]			
(V) for straight crimp termination		10 A	09 03 000 6213
		20 A	09 03 000 6214
		40 A	09 03 000 6215
(VI) for straight solder termination		10 A	09 03 000 6201
		20 A	09 03 000 6202
		40 A	09 03 000 6203
(VII) for screw fixing on busbar		40 A	09 03 000 6245
for type M invers for solder termination		40 A	09 03 000 6207
(VIII) **for type M-flat** for press-in termination		40 A	09 03 000 6250
for solder termination		40 A	09 03 000 6225

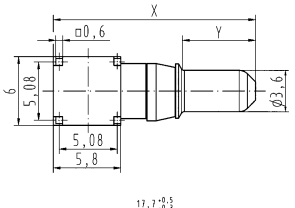
Drawing / Dimensions in mm



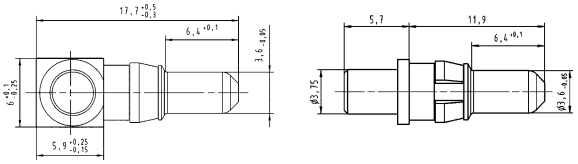
	ø A	ø B	wire gauge [mm²]	AWG
10 A	1.85	2.55	1.5	16
20 A	2.85	3.70	4	12
40 A	4.40	5.60	10	8

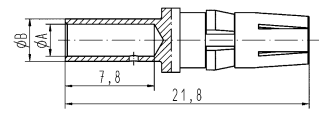


	ø
10 A	1.7
20 A	2.8
40 A	4.8

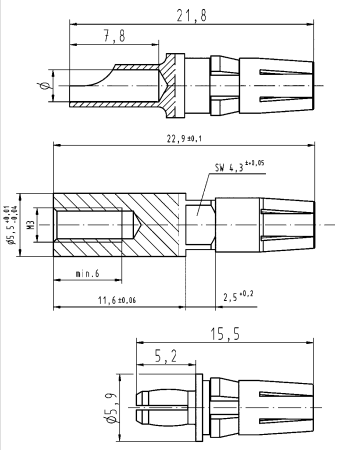


	x	y
… 6104	17.7	6.4
… 6134	18.4	7.0

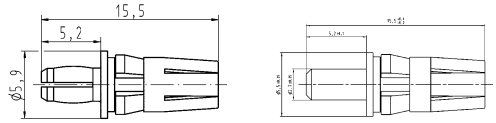




	ø A	ø B	wire gauge [mm²]	AWG
10 A	1.85	2.55	1.5	16
20 A	2.80	3.70	4	12
40 A	4.40	5.60	10	8



	ø
10 A	1.7
20 A	2.8
40 A	4.8

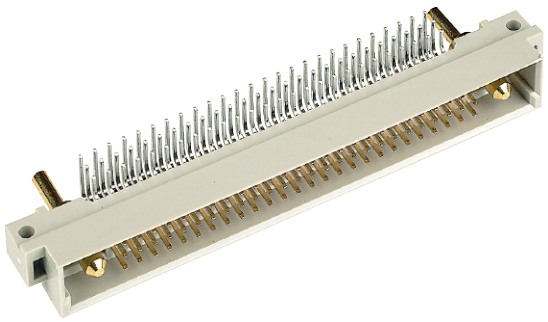


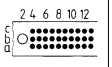
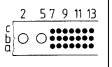
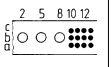
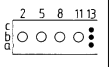
[1] Contact resistance max. 1.5 mΩ
[2] Contact resistance internal wire max. 3 mΩ

Number of contacts

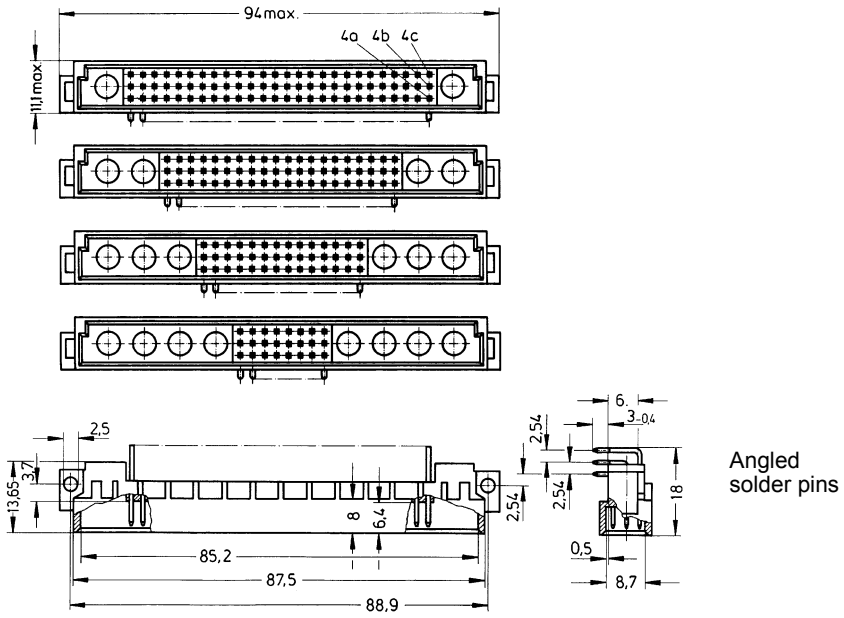
78+2, 60+4, 42+6, 24+8

Male connectors



Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins (without special contacts)*	78 + 2		09 03 178 7901	09 03 178 6901 09 03 378 6901[b)]	09 03 178 2901 09 03 378 2901[b)]
	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

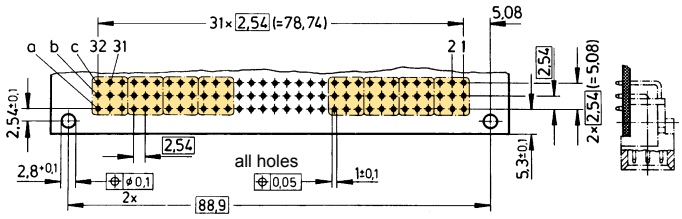


Angled solder pins

Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff

Board drillings

Mounting side



Board drillings depend on type and special contact loading

Dimensions in mm

Other contact arrangements as well with lagging/leading pins on request

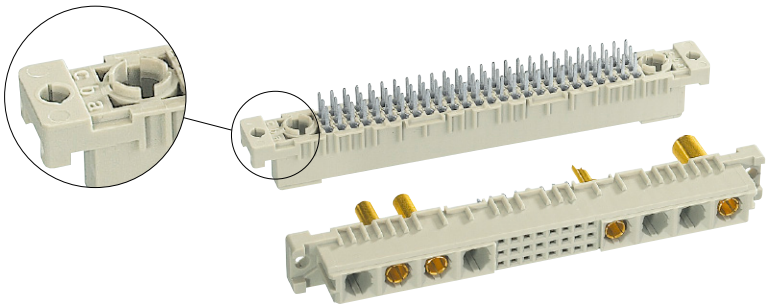
* Pre-loaded with special contacts on request

[b)] Connectors with snap-in clips see chapter 00

Number of contacts

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

Female connectors



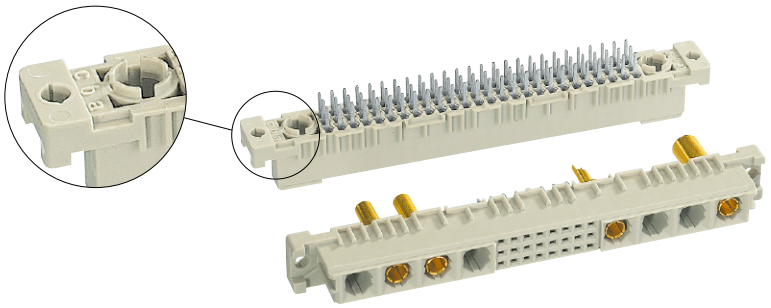
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm (without special contacts)	78 + 2		Performance level 3 on request	09 03 278 6804	09 03 278 2850
	60 + 4			09 03 260 6804	
	42 + 6			09 03 242 6804	
	24 + 8			09 03 224 6804	
Female connector with solder pins 4.5 mm (without special contacts)	78 + 2			09 03 278 6805	
	60 + 4			09 03 260 6805	
	42 + 6			09 03 242 6805	
	24 + 8			09 03 224 6805	
Female connector with solder pins 13 mm (without special contacts)	78 + 2			09 03 278 6401	
	60 + 4			09 03 260 6401	
	42 + 6			09 03 242 6401	
	24 + 8			09 03 224 6401	
Female connector with press-in pins 4.5 mm (without special contacts)	78 + 2			09 03 278 6850	
	60 + 4			09 03 260 6850	
	42 + 6			09 03 242 6850	
	24 + 8			09 03 224 6850	

Other contact arrangements as well with lagging/leading pins on request

Number of contacts

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

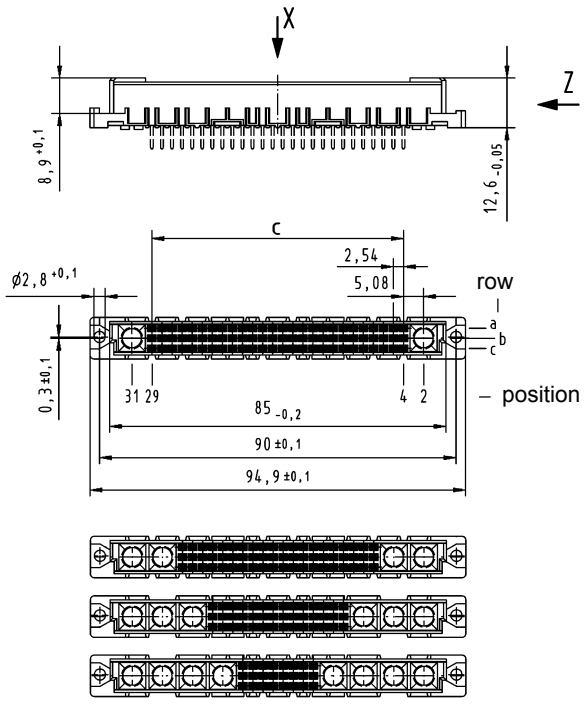
Female connectors

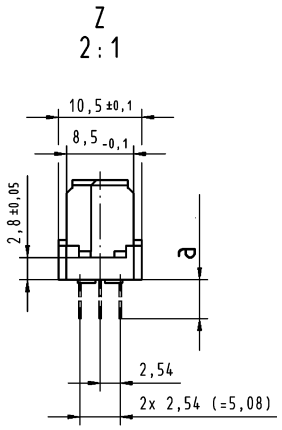


Identification | Drawing | Dimensions in mm

Dimensions

Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff



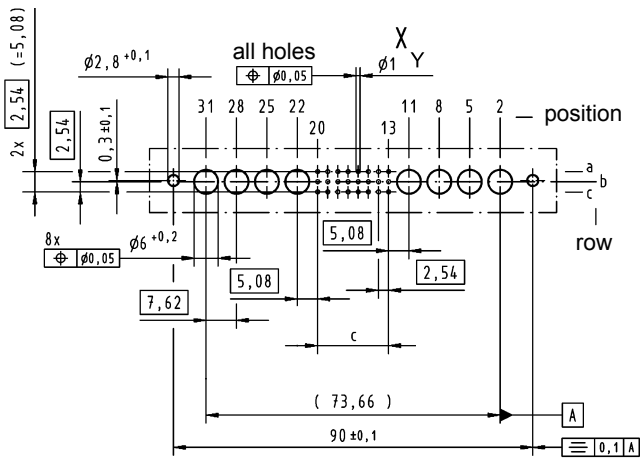


a	
2.9	
4.5	solder pins
13	
4.5	press-in pins

Board drillings

Mounting side

Board drillings depend on type and special contact loading



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

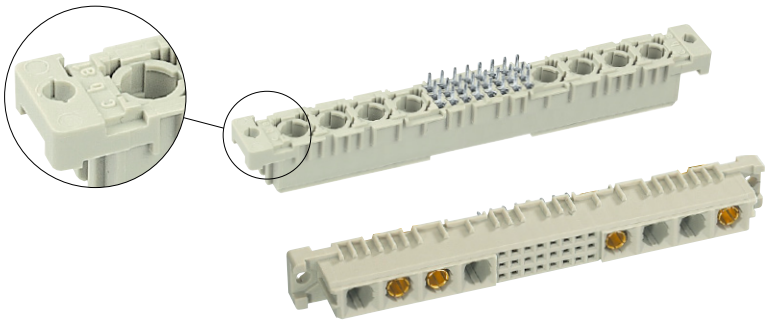
Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78

Dimensions in mm

Number of contacts

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

Female connectors



Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm (without special contacts)*	78 + 2		Performance level 3 on request	09 03 278 6864 09 03 478 6864[b)]	
	60 + 4			09 03 260 6864	
	42 + 6			09 03 242 6864	
	24 + 8			09 03 224 6864	
Female connector with solder pins 4.5 mm (without special contacts)*	78 + 2			09 03 278 6865	
	60 + 4			09 03 260 6865	
	42 + 6			09 03 242 6865	
	24 + 8			09 03 224 6865	
Female connector with press-in pins 4.5 mm (without special contacts)*	78 + 2			09 03 278 6830	
	60 + 4			09 03 260 6830	
	42 + 6			09 03 242 6830	
	24 + 8			09 03 224 6830	09 03 224 2830
Female connector with press-in pins 13 mm (without special contacts)*	78 + 2			09 03 278 6840	
	60 + 4			09 03 260 6840	09 03 260 2840
	42 + 6			09 03 242 6840	
	24 + 8			09 03 224 6840	
with press-in terminations for rear interfacing Usage of HARTING shroud recommended: contacts for rear interfacing selectively gold plated (performance level 3)					

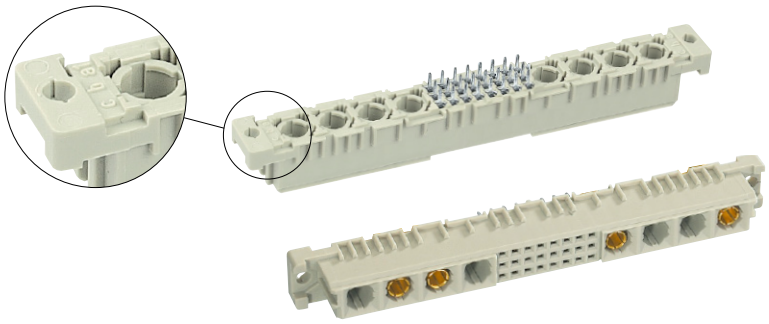
* Pre-loaded with special contacts on request

[b)] Connectors with snap-in clips see chapter 00

Number of contacts

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

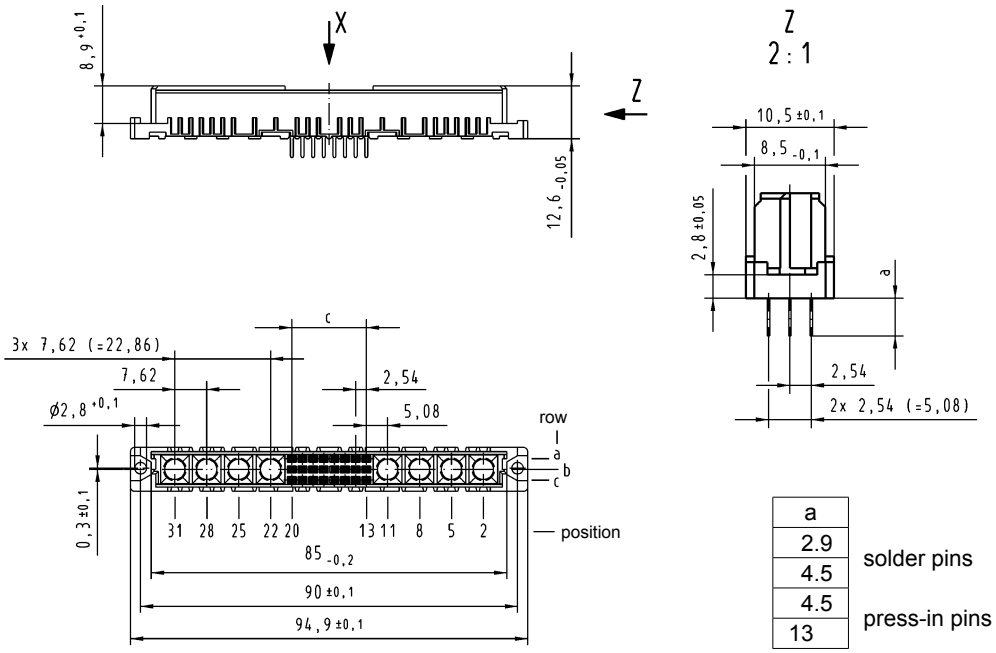
Female connectors



Identification	Drawing	Dimensions in mm

Dimensions

Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff

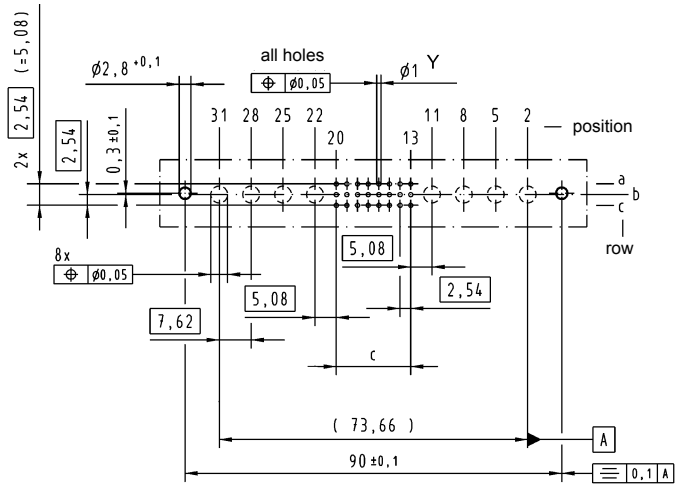


a	
2.9	solder pins
4.5	
4.5	press-in pins
13	

Board drillings

Mounting side

Board drillings depend on type and special contact loading



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

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

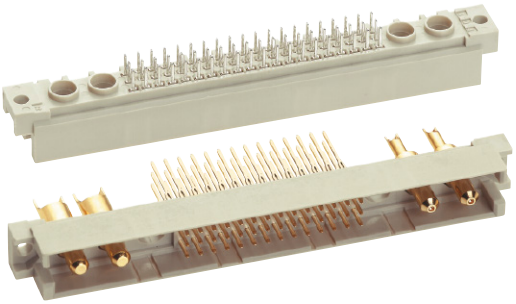
Dimensions in mm

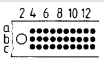
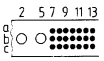
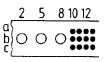
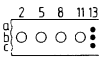
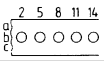
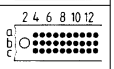
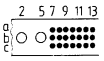
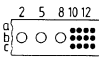
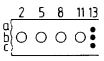
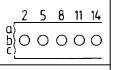
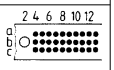
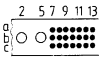
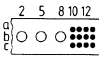
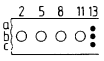
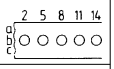
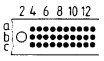
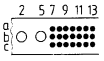
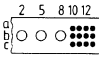
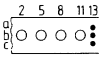
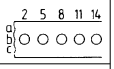
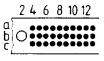
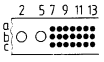
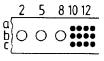
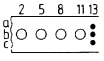
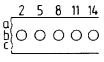
Other contact arrangements as well with lagging/leading pins on request

Number of contacts

78+2, 60+4, 42+6, 24+8, 6+10

Male connectors



Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm	78 + 2		Performance level 3 on request	09 73 178 6902	Performance level 1 on request
	60 + 4			09 73 160 6902	
	42 + 6			09 73 142 6902	
	24 + 8			09 73 124 6902	
	6 + 10			09 73 106 6902	
Male connector with solder pins 4.0 mm	78 + 2			09 73 178 6903	
	60 + 4			09 73 160 6903	
	42 + 6			09 73 142 6903	
	24 + 8			09 73 124 6903	
	6 + 10			09 73 106 6903	
Male connector with solder pins 6.0 mm	78 + 2			09 73 178 6991	
	60 + 4			09 73 160 6991	
	42 + 6			09 73 142 6991	
	24 + 8			09 73 124 6991	
	6 + 10			09 73 106 6991	
Male connector with wrap posts 13 mm	78 + 2			09 73 178 6907	
	60 + 4			09 73 160 6907	
	42 + 6			09 73 142 6907	
	24 + 8			09 73 124 6907	
	6 + 10			09 73 106 6907	
Male connector with press-in pins 13 mm (5.0 mm on request)	78 + 2			09 73 178 6974●	
	60 + 4			09 73 160 6974●	
	42 + 6			09 73 142 6974●	
	24 + 8			09 73 124 6974●	
	6 + 10			09 73 106 6974●	

Male connectors with 17 mm wrap posts on request

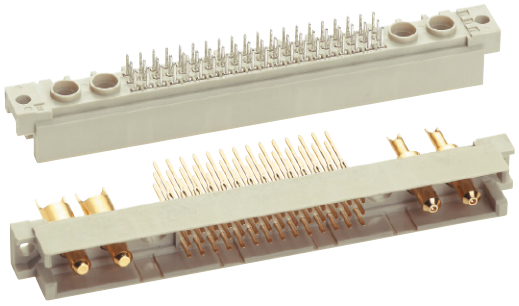
● Wrap posts for interfacing selectively gold plated (performance level 3)

Other contact arrangements on request

Number of contacts

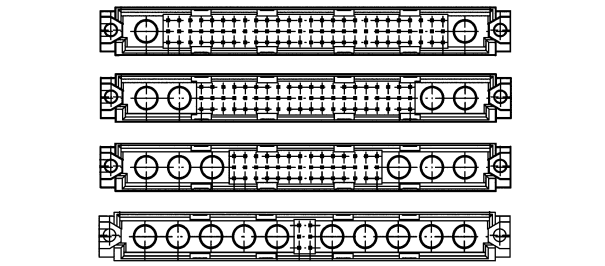
78+2, 60+4, 42+6, 24+8, 6+10

Male connectors

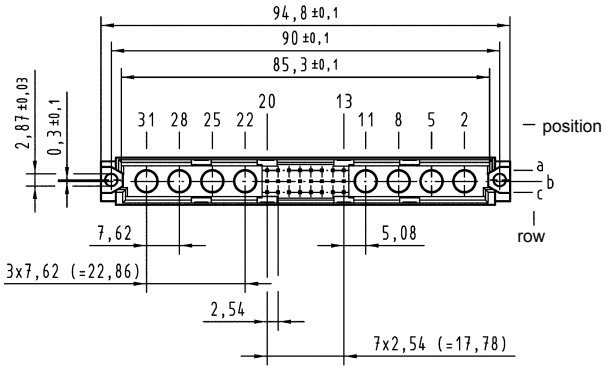


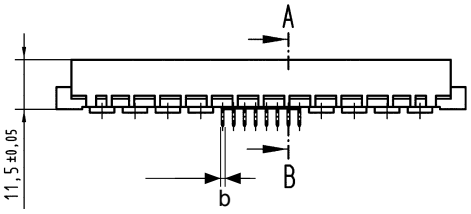
Identification | Drawing | Dimensions in mm

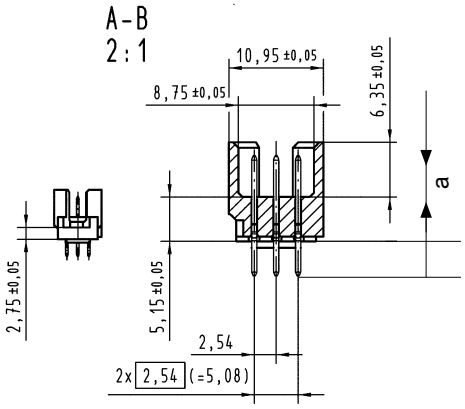
Dimensions



a	b	
2.5	ø 0.7	Solder pins
4.0		
6.0		
13	□0.6	Wrap posts
5.0	–	Press-in pins
13	–	



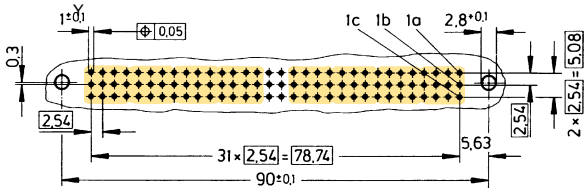




Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff

Board drillings

Mounting side

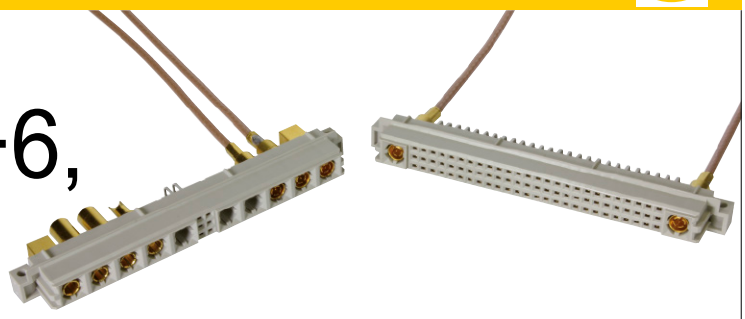


	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Board drillings depend on type and special contact loading

Number of contacts

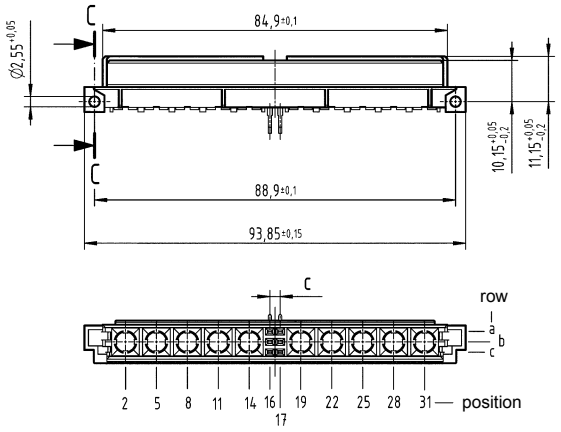
78+2, 60+4, 42+6, 24+8, 6+10

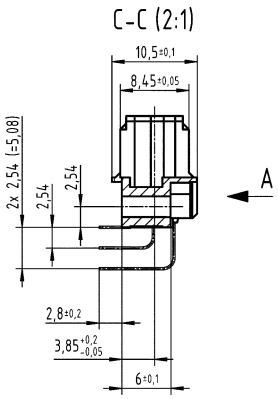


Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Female connector with angled solder pins (without special contacts)*	78 + 2		Performance level 3 on request	09 73 278 6801	Performance level 1 on request
	60 + 4			09 73 260 6801	
	42 + 6			09 73 242 6801	
	24 + 8			09 73 224 6801	
	6 + 10			09 73 206 6801	

Dimensions

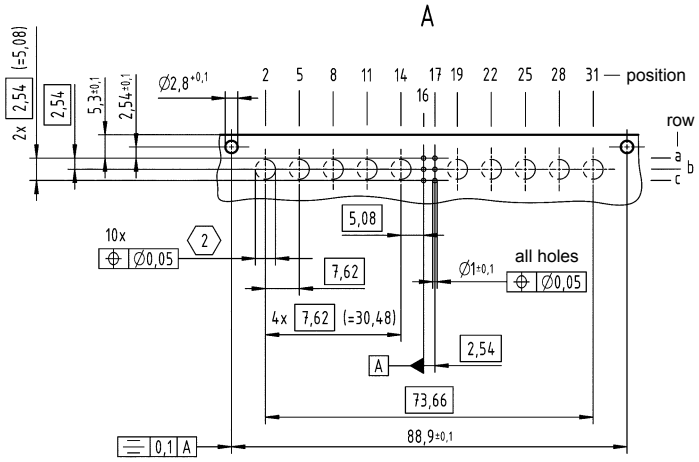




Order high current, high voltage, coaxial and fibre optic contacts separately

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
6 + 10	1 x 2.54 = 2.54

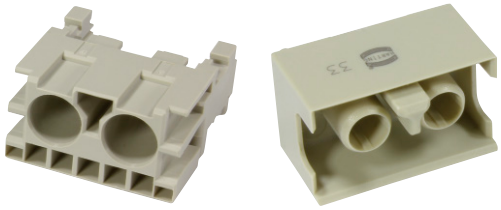
Board drillings depend on type and special contact loading

Dimensions in mm

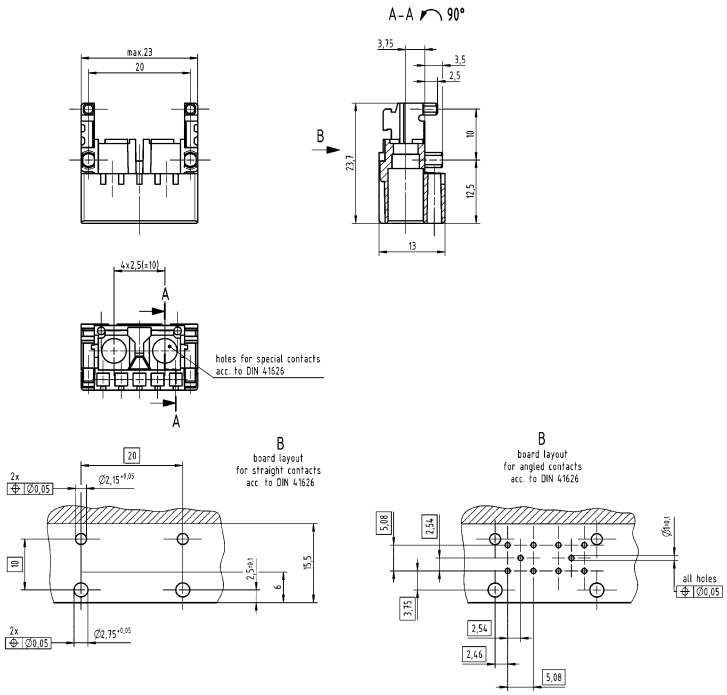
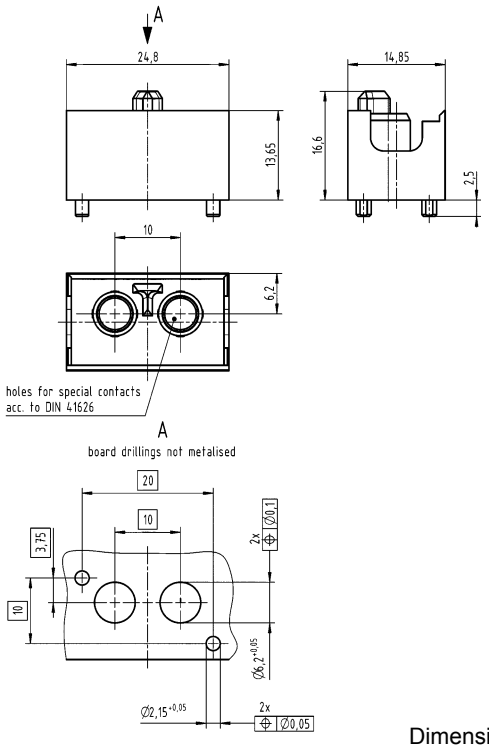
* Pre-loaded with special contacts on request

Number of contacts

0+2



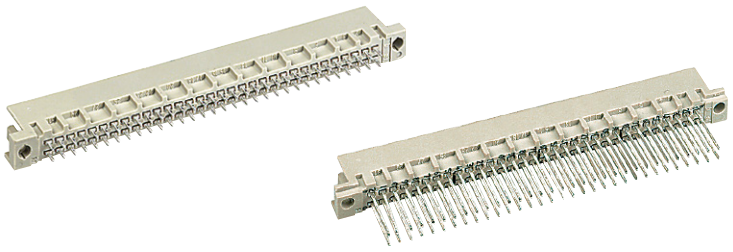
Male and female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Male connector, angled (without special contacts) Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff	0 + 2	09 29 002 3201		
Female connector, straight (without special contacts) Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff	0 + 2	09 29 002 3401		

Dimensions in mm

Number of contacts

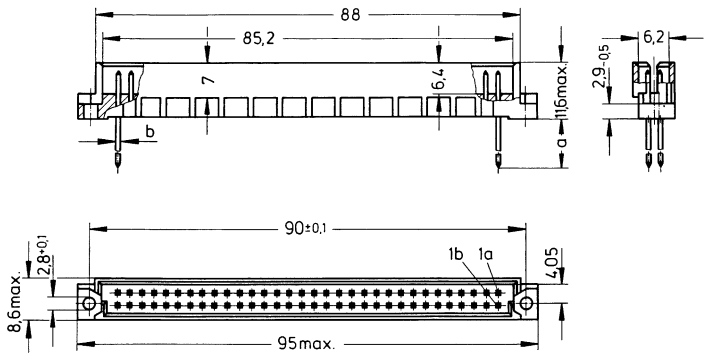
64



Male connectors

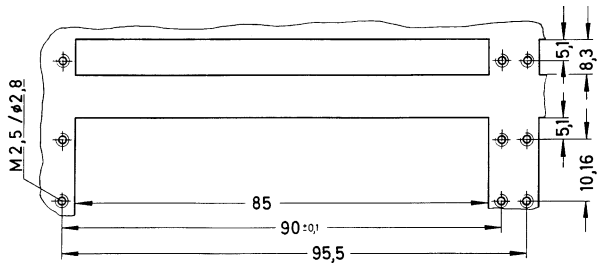
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm	64		09 72 164 7902	09 72 164 6902 09 72 364 6902[b)]	Performance level 1 on request
4.0 mm	64		09 72 164 7903	09 72 164 6903	
13 mm	64			09 72 164 6577	
Male connector with wrap posts[1)] 13 mm	64		09 72 164 7907	09 72 164 6907	
17 mm	64			09 72 164 6909	
Male connector with press-in pins 5.0 mm	64 62 + 2▲			09 72 164 6904 09 72 164 6954	
13 mm	64 62 + 2▲			09 72 164 6985[w)] 09 72 164 6974• 09 72 164 6995[w)]	

Dimensions



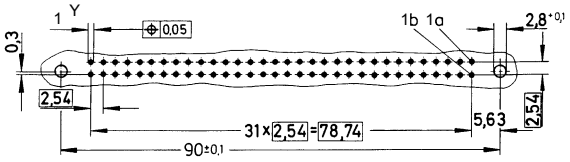
a	b	
2.5	ø 0.7	Solder pins
4		
13	□0.6	
13	□0.6	Wrap posts
17		
5	–	Press-in pins
13	–	

Panel cut out



Board drillings

Mounting side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

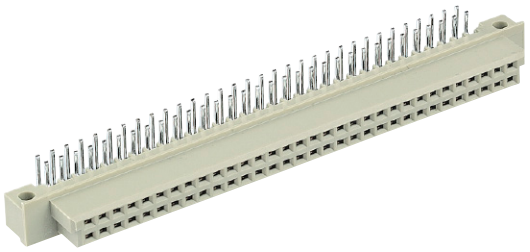
Dimensions in mm

Other contact arrangements as well with lagging/leading pins on request
▲ 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)] To be used only for wire wrap termination
[b)] Connectors with snap-in clips see chapter 00
[w)] Wrap posts not for interfacing, no performance level

Number of contacts

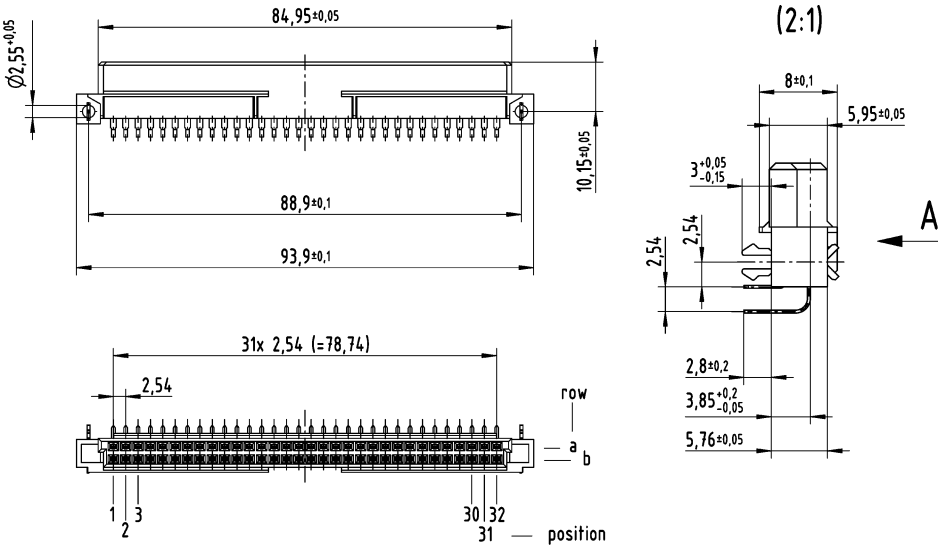
64



Female connectors

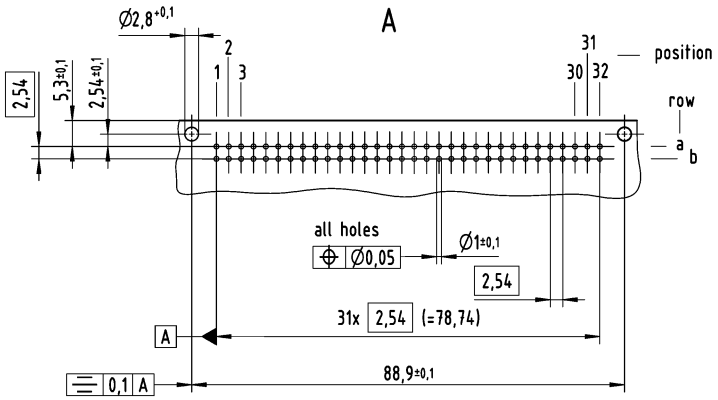
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with angled solder pins	64	1 2 3 4	Performance level 3 on request	09 72 264 6801 09 72 464 6801[b]	Performance level 1 on request
THR	64	1 2 3 4		09 72 264 6804[d]	

Dimensions

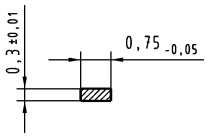


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b:
A = 0.20 - 0.23 mm²

Dimensions in mm

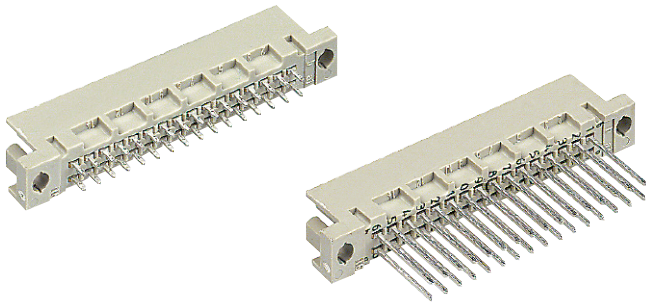
Other contact arrangements as well with lagging/leading pins on request

[b] Connectors with snap-in clips see chapter 00

[d] CTI > 400

Number of contacts

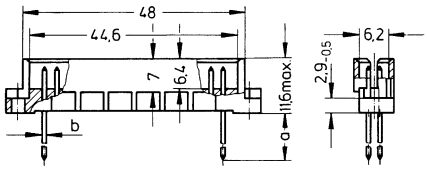
32



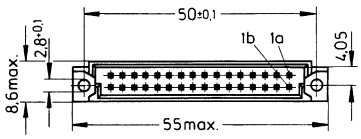
Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm	32		09 27 132 7902 09 27 332 7902	09 27 132 6902	
4.0 mm	32		09 27 132 7903	09 27 132 6903	09 27 132 2903
13 mm	32			09 27 132 6577	
Male connector with wrap posts[1] 13 mm	32		09 27 132 7907	09 27 132 6907	
Male connector with press-in pins 5.0 mm	32 30 + 2▲			09 27 132 6904 09 27 132 6954	

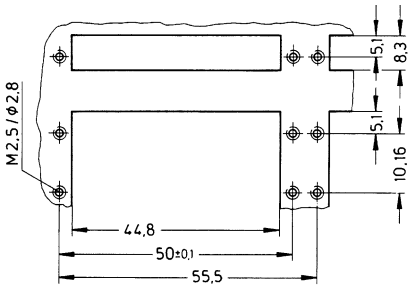
Dimensions



a	b	
2.5	ø 0.7	Solder pins
4		
13	□0.6	Wrap posts
13	□0.6	Press-in pins
5	–	

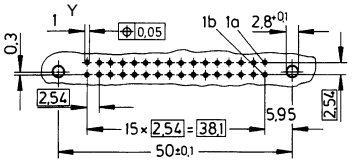


Panel cut out



Board drillings

Mounting side



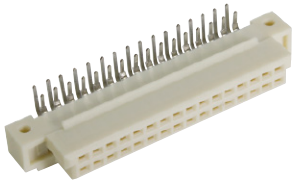
	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Dimensions in mm

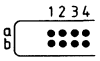
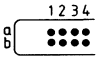
Other contact arrangements as well with lagging/leading pins on request
▲ Male connectors with 2 leading contacts (0.8 mm) pos. a1 and a32/a16
[1] To be used only for wire wrap termination

Number of contacts

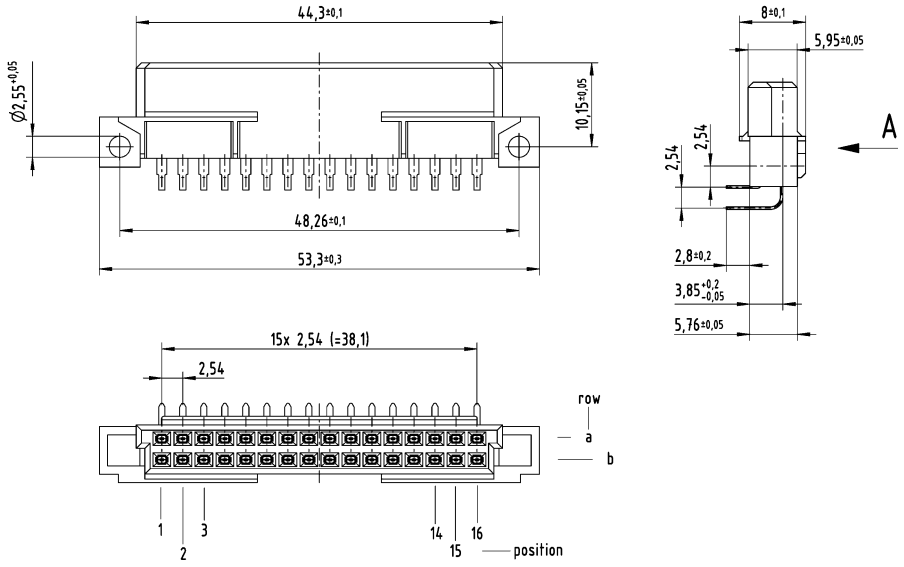
32



Female connectors

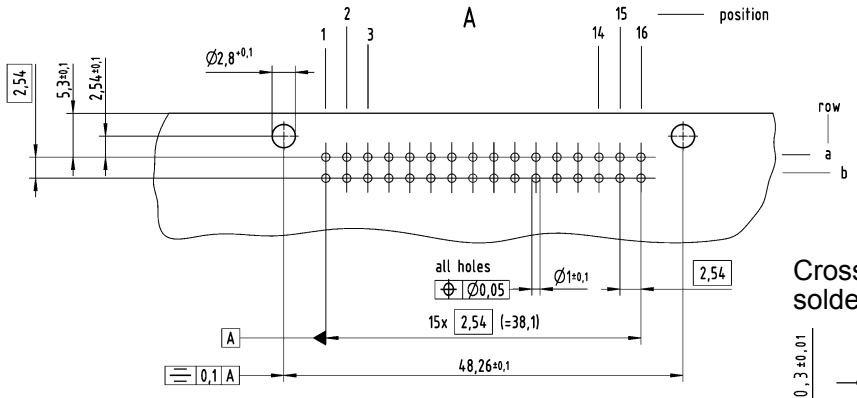
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with angled solder pins	32		Performance level 3 on request	09 27 232 6801	Performance level 1 on request
THR	32			09 27 232 6804[d]	
THR, 150 pieces on a reel				09 27 232 6804 791[d]	

Dimensions

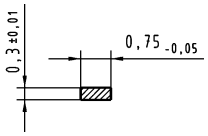


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A)
of contacts row a, b:
A = 0.20 - 0.23 mm²

Dimensions in mm

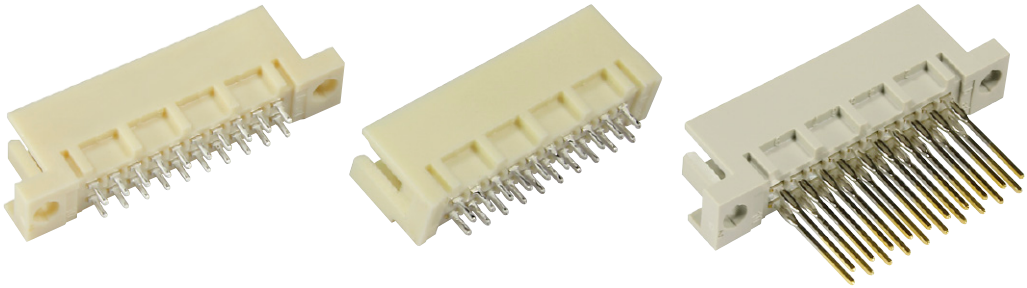
DIN Signal up to 2 A

Other contact arrangements as well with lagging/leading pins on request

[d] CTI > 400

Number of contacts

20



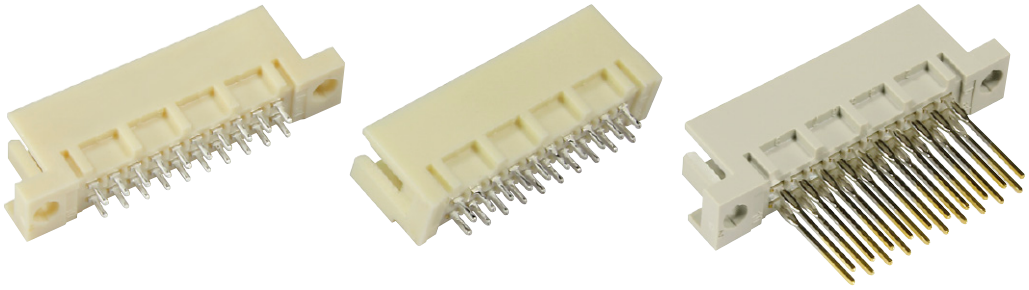
Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm					
with fixing flange	20			09 75 120 6902	
with fixing flange, THR	20			09 75 120 6519[d)]	
with fixing flange, THR, 240 pieces on a reel				09 75 120 6519 792[d)]	
without fixing flange	20			09 75 120 6592	
without fixing flange, THR	20			09 75 120 6569[d)]	
without fixing flange, THR, 240 pieces on a reel				09 75 120 6569 792[d)]	
Male connector with solder pins 4.0 mm					
with fixing flange	20			09 75 120 6903	
with fixing flange, THR	20			09 75 120 6520[d)]	
without fixing flange	20		Performance level 3 on request	09 75 120 6593	Performance level 1 on request
without fixing flange, THR	20			09 75 120 6570[d)]	
Male connector with solder pins 13 mm					
with fixing flange	20			09 75 120 6577	
with fixing flange, THR	20			09 75 120 6521[d)]	
Male connector with wrap posts[1)] 13 mm					
with fixing flange	20			09 75 120 6907	
Male connector with press-in pins 5.0 mm					
with fixing flange	20			09 75 120 6904	
without fixing flange	20			09 75 120 6504	

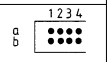
[1)] To be used only for wire wrap termination
[d)] CTI > 400

Number of contacts

20

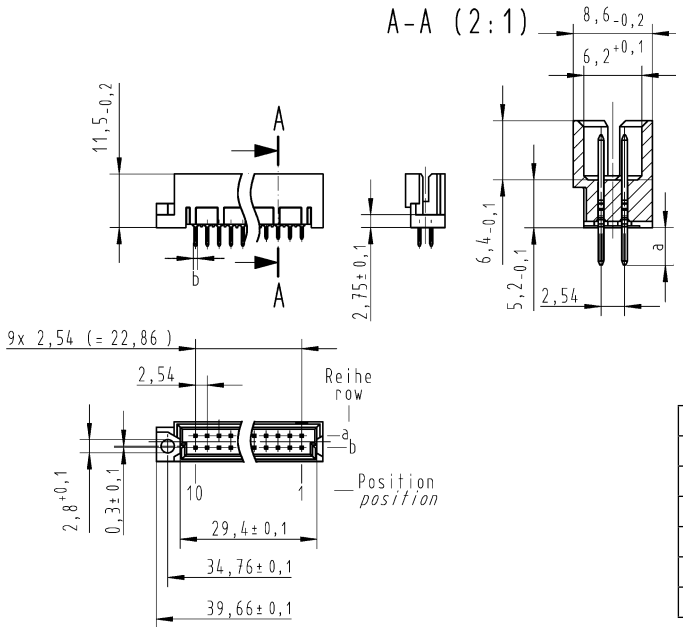


Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with press-in pins 13 mm			Performance level 3 on request		Performance level 1 on request
with fixing flange	20			09 75 120 6985[w)] 09 75 120 6974•	
without fixing flange	20			09 75 120 6574•	

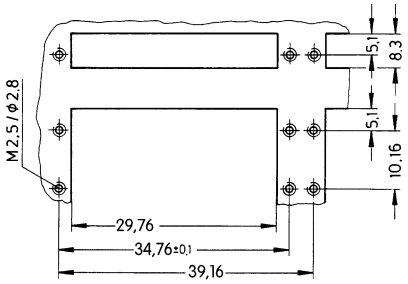
Identification	Drawing	Dimensions in mm

Dimensions



a	b	
2.5	ø 0.7	Solder pins
4		
13	□ 0.6	Wrap posts
13	□ 0.6	
5	–	Press-in pins
13	–	

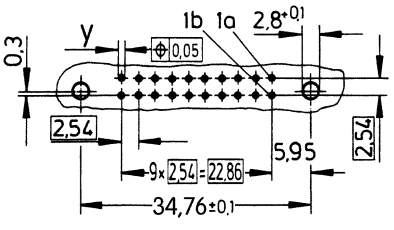
Panel cut out



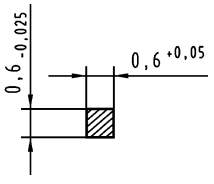
	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b: A = 0.35 - 0.39 mm²

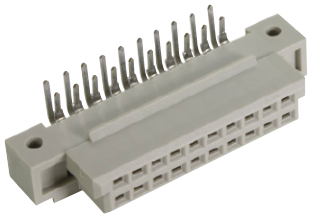
Other contact arrangements as well with lagging/leading pins on request

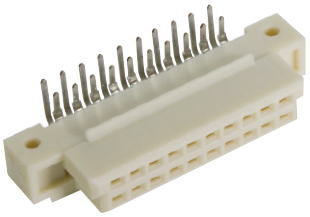
• Wrap posts for interfacing selectively gold plated (performance level 3)

w) Wrap posts not for interfacing, no performance level

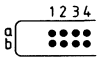
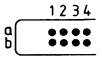
Number of contacts

32

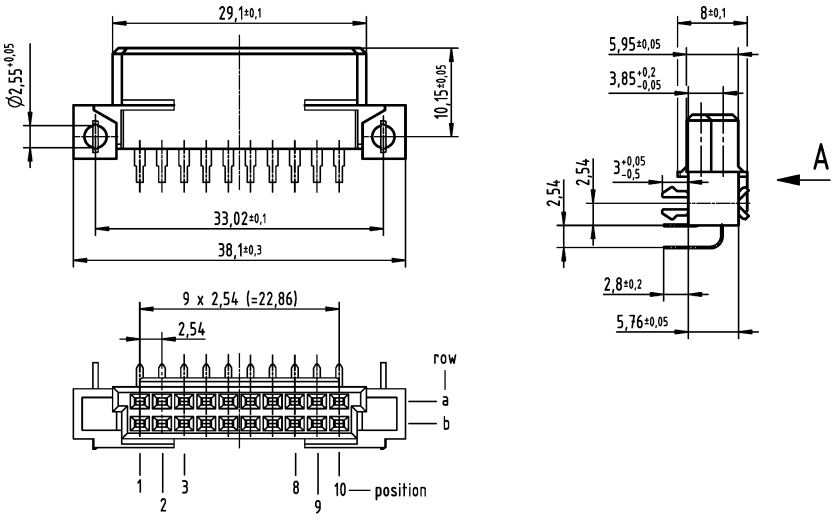




Female connectors

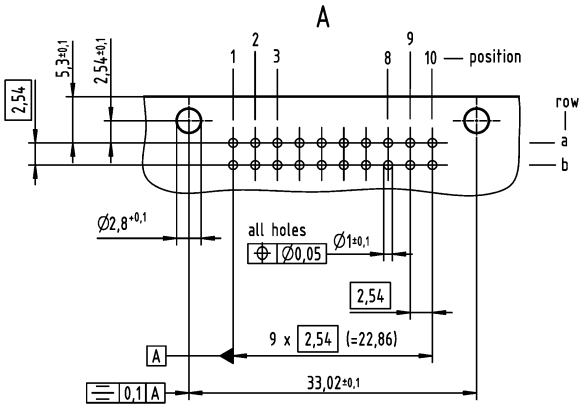
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with angled solder pins	20		Performance level 3 on request	09 75 220 6801 09 75 420 6801[b]	Performance level 1 on request
THR	20			09 75 220 6804[d] 09 75 420 6804[b][d]	
THR on a reel				09 75 220 6804 791[d]	

Dimensions

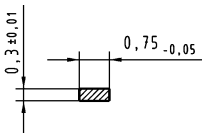


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b:
A = 0.20 - 0.23 mm²

Dimensions in mm

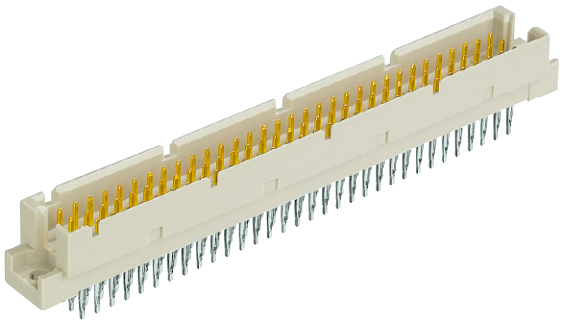
Other contact arrangements as well with lagging/leading pins on request

[b] Connectors with snap-in clips see chapter 00

[d] CTI > 400

Number of contacts

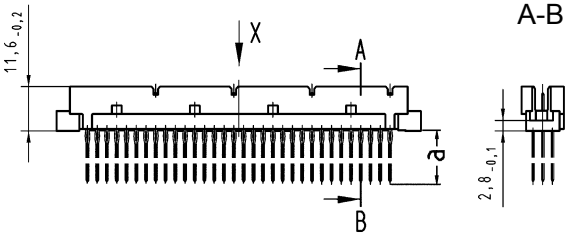
96, 64



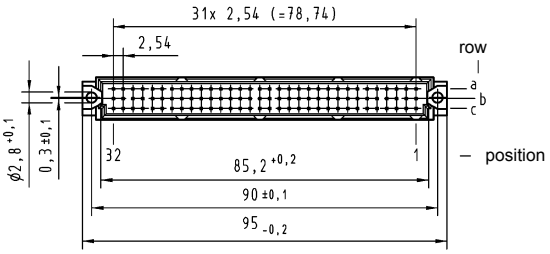
Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Male connector with press-in terminations 5.0 mm	96		Performance level 3 on request	Performance level 2 on request	09 79 196 2950
	64				09 79 164 2950
13 mm	96				09 79 196 2961*

Dimensions

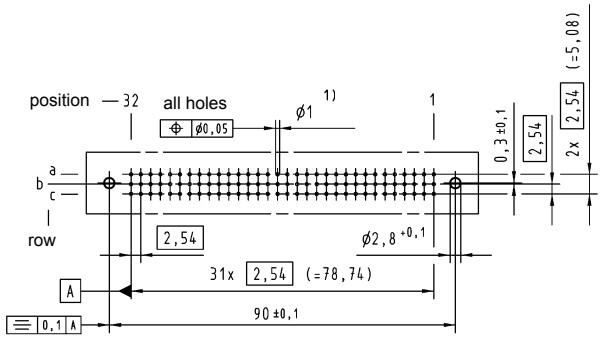


a
5
13



Board drillings

Mounting side



Dimensions in mm

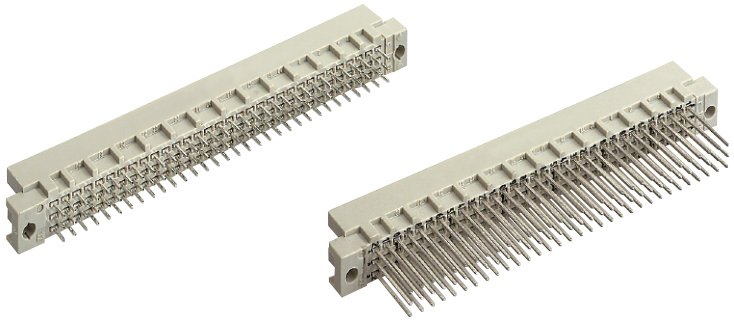
* Wrap posts for interfacing selectively gold plated (performance level 1)

[1)] refer to recommended configuration of pcb holes, see page 00.25

Other contact arrangements as well with lagging/leading pins on request

Number of contacts

96, 64



Male connectors

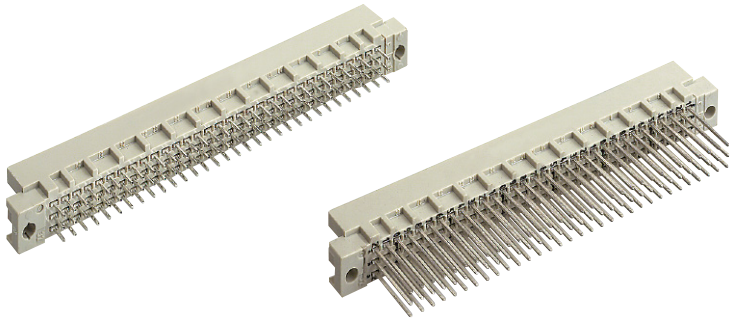
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm	96		09 73 196 7902	09 73 196 6902 09 73 396 6902[b] 09 73 696 6902[c]	09 73 196 2902
THR	96			09 73 196 6519[d]	
	64		09 73 164 7902	09 73 164 6902 09 73 364 6902[b]	09 73 164 2902 09 73 364 2902[b]
Male connector with solder pins 4.0 mm	96 94 + 2▲		09 73 196 7903	09 73 196 6903 09 73 196 6903 222[f] 09 73 396 6903[b] 09 73 196 6953	09 73 196 2903
THR	96			09 73 196 6520[d]	
	64		09 73 164 7903	09 73 164 6903 09 73 364 6903[b]	09 73 164 2903
THR	64			09 73 164 6520[d]	
Male connector with solder pins 13 mm	96			09 73 196 6577	09 73 196 2577
THR	96			09 73 196 6521[d]	
	64			09 73 164 6577	
Male connector with wrap posts[1] 13 mm	96		09 73 196 7907	09 73 196 6907 09 73 696 6947●[c]	09 73 196 2907
	64		09 73 164 7907	09 73 164 6907 09 73 164 6947● 09 73 664 6947●[c]	09 73 164 2907
Male connector with press-in pins 5.0 mm	96 94 + 2▲		09 73 196 7904	09 73 196 6904 09 73 696 6904[c] 09 73 196 6954	09 73 196 2904
	64		09 73 164 7904	09 73 164 6904	09 73 164 2904
Male connector with press-in pins 13 mm	96 94 + 2▲		09 73 196 7974●	09 73 196 6985[w] 09 73 196 6974● 09 73 196 6995[w]	Performance level 1 on request
	64			09 73 164 6985[w] 09 73 164 6974●	

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]
● Wrap posts for interfacing selectively gold plated (performance level 3)
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2
[1] To be used only for wire wrap termination

[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00
[d] CTI > 400
[w] Wrap posts not for interfacing, no performance level

Number of contacts

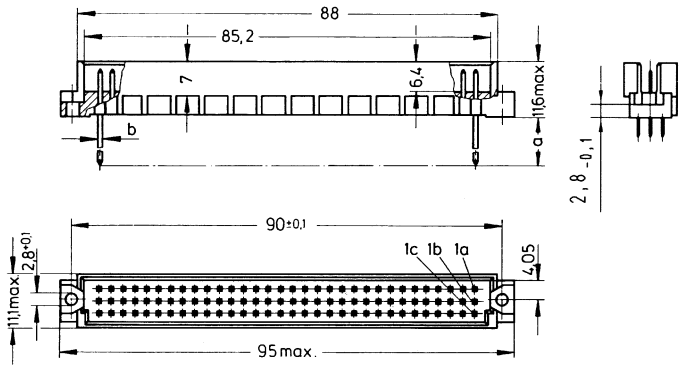
96, 64



Male connectors

Identification	Drawing	Dimensions in mm

Dimensions

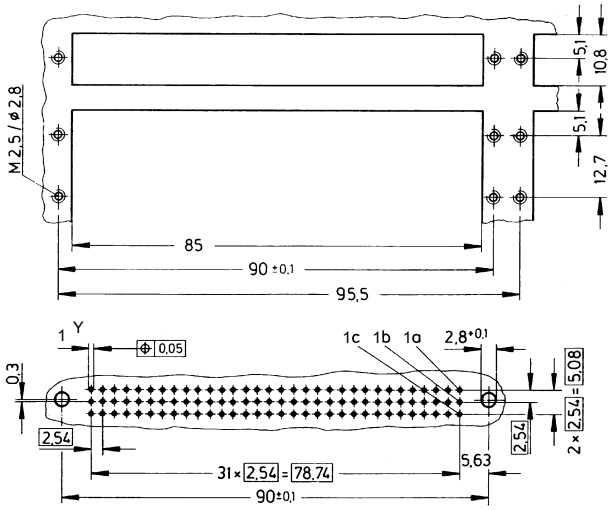


a	b	
2.5	ø 0.7	Solder pins
4		
13	□0.6	
13	□0.6	Wrap posts
5	–	
13	–	Press-in pins

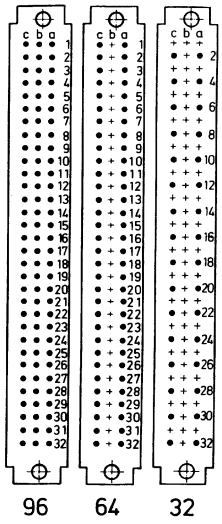
Panel cut out

Board drillings

Mounting side

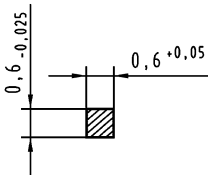


	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25



Contact arrangement
View from termination side

Cross section of solder terminations

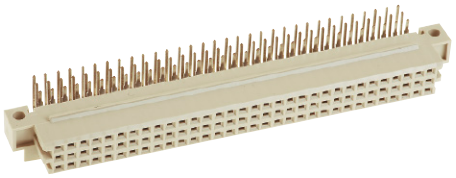


Cross area (A) of contacts row a, b, c: A = 0.35 - 0.39 mm²

Other contact arrangements as well with lagging/leading pins on request

Number of contacts

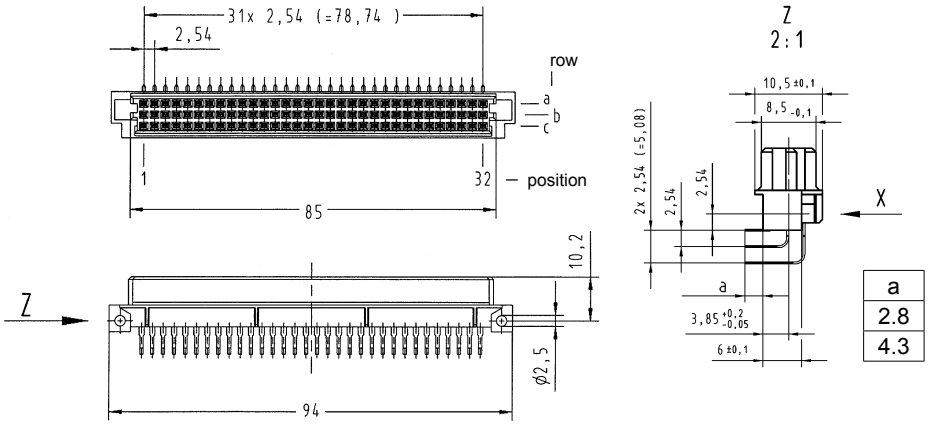
96, 64, 32



Female connectors

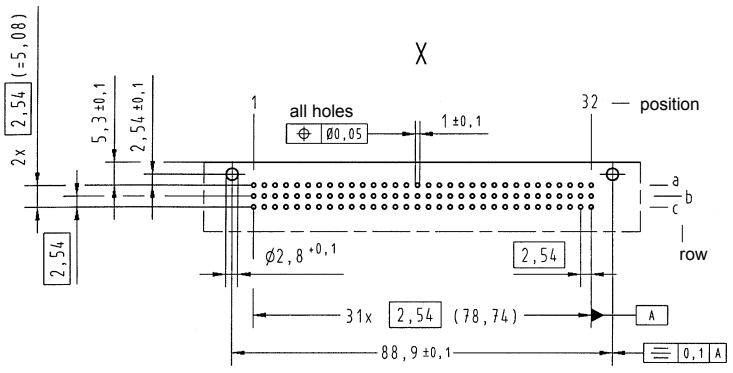
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with angled solder pins	96		09 73 296 7801 09 73 496 7801[b]	09 73 296 6801 09 73 496 6801[b] 09 73 796 6801[c]	09 73 296 2801
Length 2.8 mm THR	96			09 73 296 6804[d] 09 73 496 6804[b][d]	09 73 496 2804[b][d]
	64		09 73 264 7801 09 73 464 7801[b]	09 73 264 6801 09 73 464 6801[b]	09 73 264 2801
THR	64			09 73 264 6804[d] 09 73 464 6804[b][d]	09 73 264 2804[d] 09 73 464 2804[b][d]
	32		09 73 232 7801	09 73 232 6801	09 73 232 2801
	32			09 73 232 6811	
Length 4.3 mm	96			09 73 496 6855[b]	

Dimensions

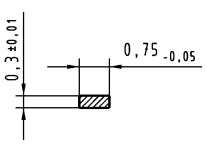


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.20 - 0.23 mm²

Dimensions in mm

Other contact arrangements on request

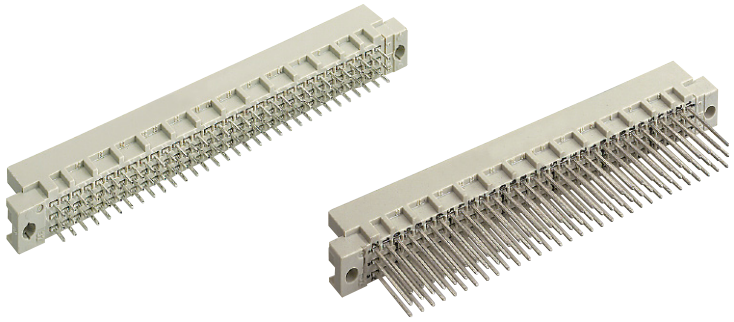
[b] Connectors with snap-in clips see chapter 00

[c] Connectors with coding see chapter 00

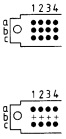
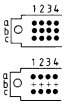
[d] CTI > 400

Number of contacts

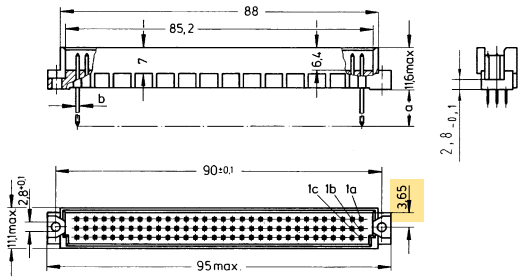
96, 64



Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm	96		Performance level 3 on request	09 79 196 6902	Performance level 1 on request
Male connector with solder pins 4.0 mm	96 64			09 79 196 6903 09 79 396 6903[b] 09 79 164 6903 09 79 364 6903[b]	
Male connector with wrap posts[1] 13 mm	96 64			09 79 196 6907 09 79 164 6907	

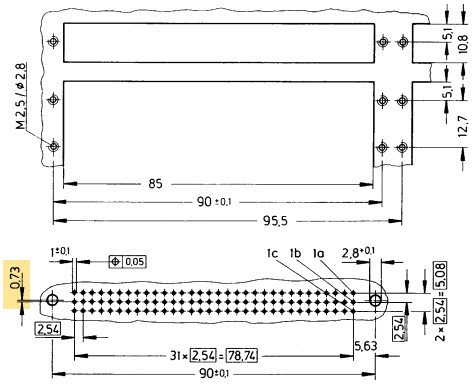
Dimensions



a	b	
2.5 4	ø 0.7	Solder pins

a	b	
13	□0.6	Wrap posts

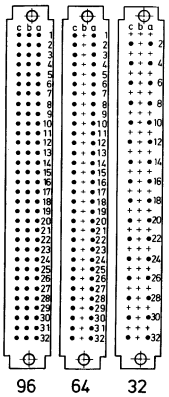
Panel cut out



Board drillings

Mounting side

Contact arrangement
View from termination side



Dimensions in mm

Other contact arrangements on request

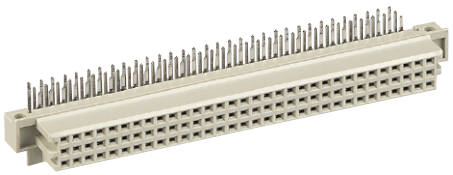
= deviating dimensions from standard male connectors (see page 01.60f)

[b] Connectors with snap-in clips see chapter 00

[1] To be used only for wire wrap termination

Number of contacts

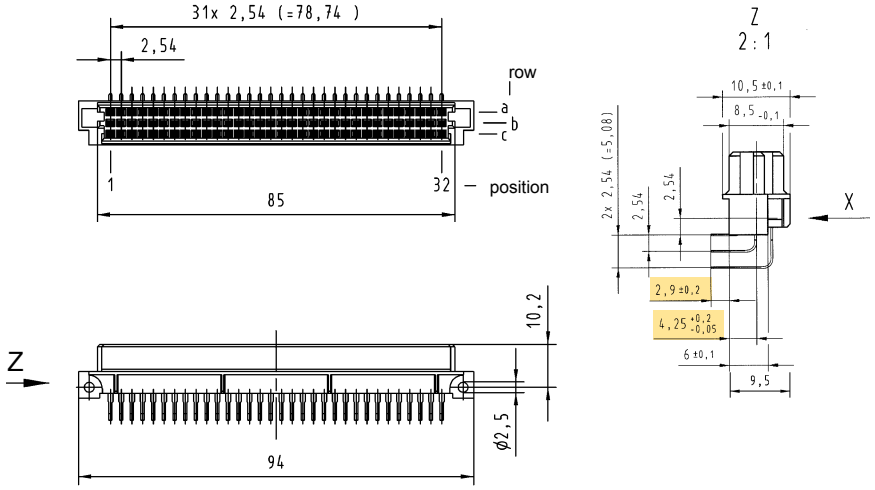
96, 64



Female connectors

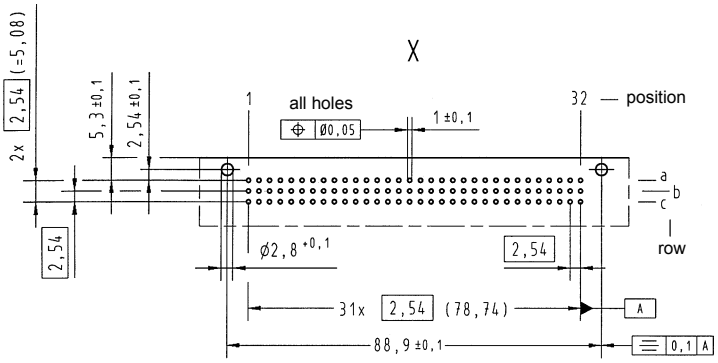
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with angled solder pins	96		09 79 296 7801	09 79 296 6801 09 79 496 6801[b)]	Performance level 1 on request
	64		09 79 264 7801	09 79 264 6801 09 79 464 6801[b)]	

Dimensions



Board drillings

Mounting side



Dimensions in mm

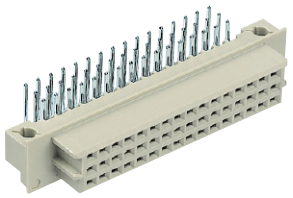
Other contact arrangements on request

b) Connectors with snap-in clips see chapter 00

= deviating dimensions from standard female connectors (see page 01.62)

Number of contacts

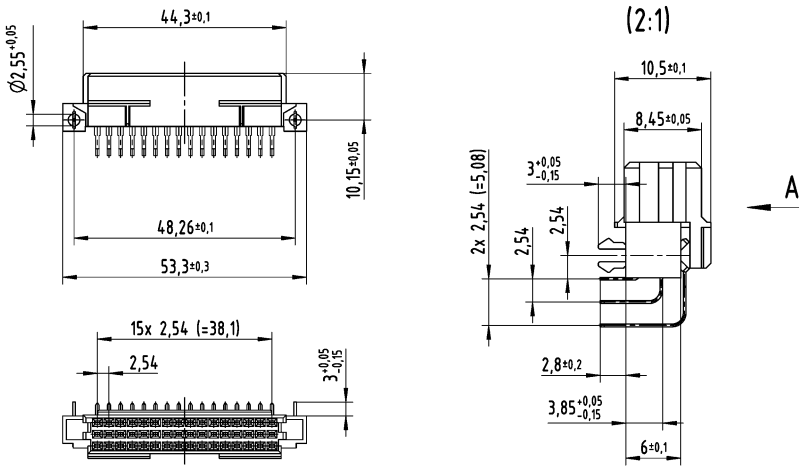
48, 32



Female connectors

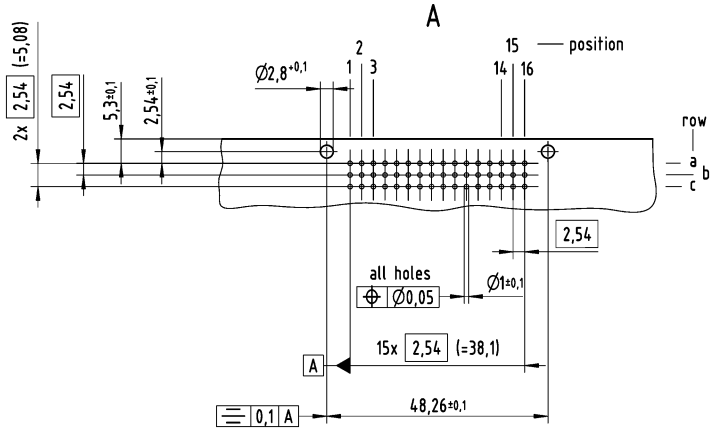
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with angled solder pins	48		Performance level 3 on request	09 28 248 6801 09 28 448 6801[b)]	Performance level 1 on request
THR THR on a reel	48			09 28 248 6804[d)] 09 28 248 6804 791[d)]	
	32			09 28 232 6801 09 28 432 6801[b)]	

Dimensions

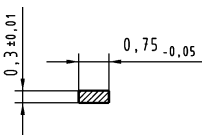


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A)
of contacts row a, b, c:
A = 0.20 - 0.23 mm²

Dimensions in mm

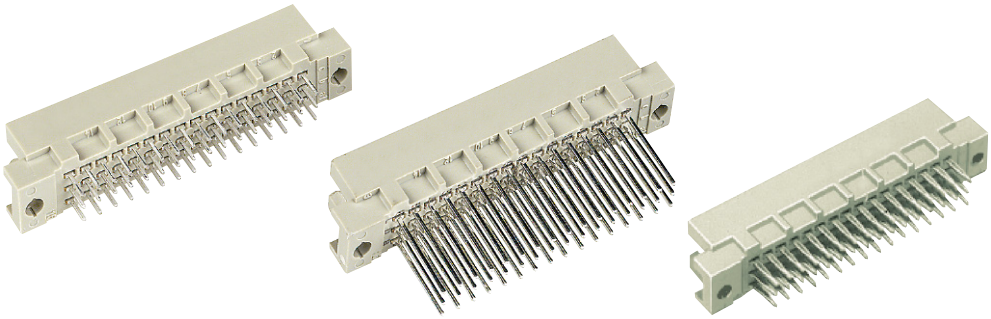
Other contact arrangements as well with lagging/leading pins on request

[b)] Connectors with snap-in clips see chapter 00

[d)] CTI > 400

Number of contacts

48, 32



Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm	48		09 28 148 7902 09 28 348 7902[b)]	09 28 148 6902 09 28 348 6902[b)]	09 28 148 2902
THR	48			09 28 148 6519[d)]	
	32		09 28 132 7902	09 28 132 6902	09 28 132 2902
THR	32			09 28 132 6519[d)]	
Male connector with solder pins 4.0 mm	48		09 28 148 7903	09 28 148 6903 09 28 148 6903 222[f)] 09 28 348 6903[b)]	09 28 148 2903
THR	48			09 28 148 6520[d)]	
	32		09 28 132 7903	09 28 132 6903	
THR	32			09 28 132 6520[d)]	
Male connector with solder pins 13 mm	48			09 28 148 6577	
THR	48			09 28 148 6521[d)]	
Male connector with wrap posts[1)] 13 mm	48		09 28 148 7907	09 28 148 6907	09 28 148 2907
	32		09 28 132 7907	09 28 132 6907	09 28 132 2907
Male connector with press-in pins 5.0 mm	48		09 28 148 7904	09 28 148 6904	
	32			09 28 132 6904	
Male connector with press-in pins 13 mm	48		09 28 148 7985	09 28 148 6985[w)] 09 28 148 6974•	
	32			09 28 132 6985[w)]	

• Wrap posts for interfacing selectively gold plated (performance level 3)

[1)] To be used only for wire wrap termination

[b)] Connectors with snap-in clips see chapter 00

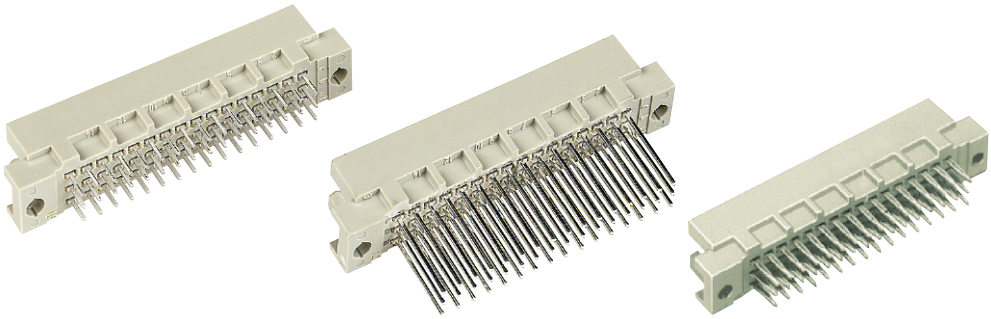
[d)] CTI > 400

[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

[w)] Wrap posts not for interfacing, no performance level

Number of contacts

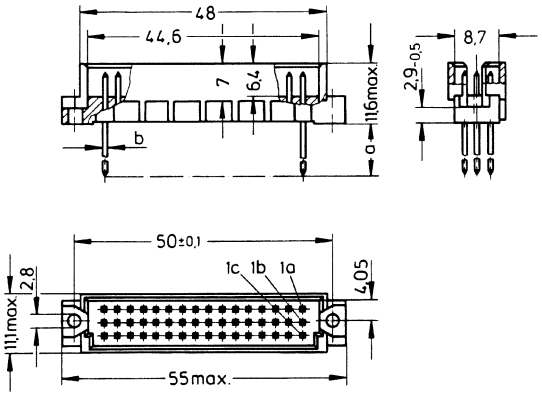
48, 32



Male connectors

Identification	Drawing	Dimensions in mm

Dimensions

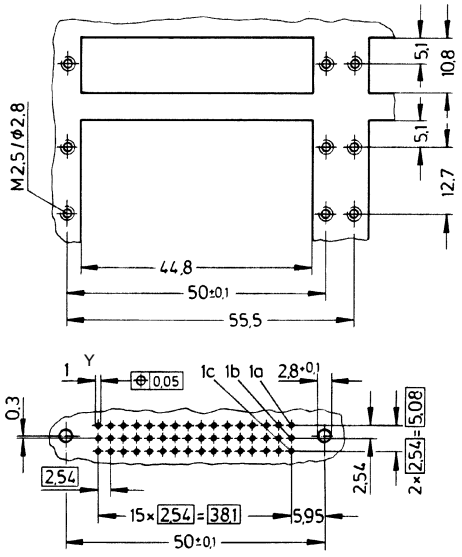


a	b	
2.5	ø 0.7	Solder pins
4		
13	□0.6	
13	□0.6	Wrap posts
5	–	Press-in pins
13	–	

Panel cut out

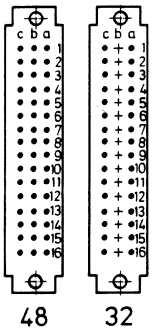
Board drillings

Mounting side



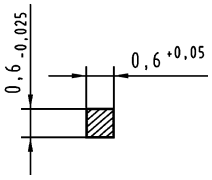
Contact arrangement

View from termination side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Cross section of solder terminations

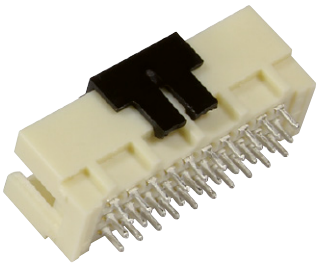


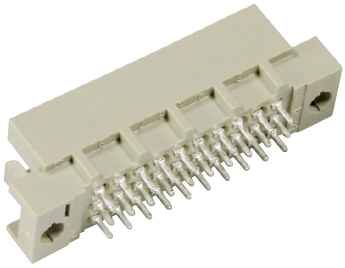
Cross area (A) of contacts row a, b, c: A = 0.35 - 0.39 mm²

Other contact arrangements as well with lagging/leading pins on request

Number of contacts

30, 20





Male connectors

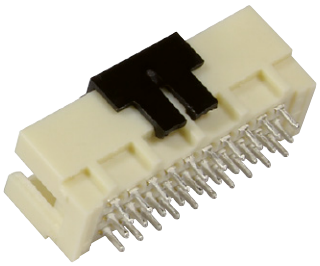
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with solder pins 2.5 mm					
with fixing flange	30			09 29 130 6902	
	20			09 29 120 6902	
with fixing flange, THR	30			09 29 130 6519[d)]	
with fixing flange, THR, on a reel	30			09 29 130 6519 792[d)]	
without fixing flange	30			09 29 130 6592	
without fixing flange, THR	30			09 29 130 6569[d)]	
without fixing flange, THR, on a reel	30			09 29 130 6569 792[d)]	
Male connector with solder pins 4.0 mm					
with fixing flange	30			09 29 130 6903	
	20			09 29 120 6903	
with fixing flange, THR	30			09 29 130 6520[d)]	
without fixing flange	30			09 29 130 6593	
without fixing flange, THR	30		Performance level 3 on request	09 29 130 6570[d)]	Performance level 1 on request
Male connector with solder pins 13 mm					
with fixing flange	30			09 29 130 6577	
	20			09 29 120 6577	
with fixing flange, THR	30			09 29 130 6521[d)]	
Male connector with wrap posts[1)] 13 mm					
with fixing flange	30			09 29 130 6907	
Male connector with press-in pins 5.0 mm					
with fixing flange	30			09 29 130 6904	
	20			09 29 120 6904	
without fixing flange	30			09 29 130 6504	

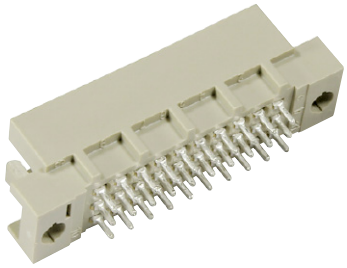
[1)] To be used only for wire wrap termination

[d)] CTI > 400

Number of contacts

30, 20



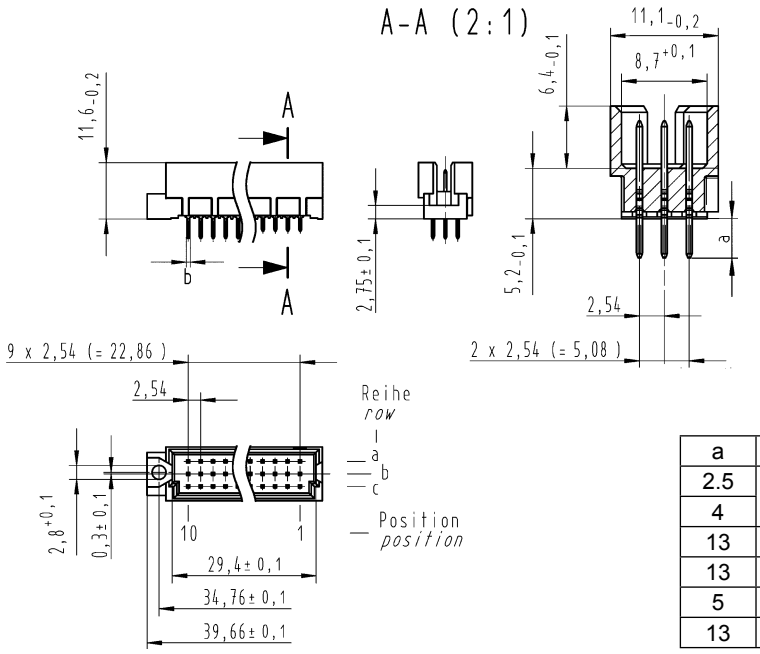


Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with press-in pins 13 mm			Performance level 3 on request	09 29 130 6985[w)] 09 29 130 6974•	Performance level 1 on request
with fixing flange	30				
	20			09 29 120 6974•	
without fixing flange	30			09 29 130 6574•	

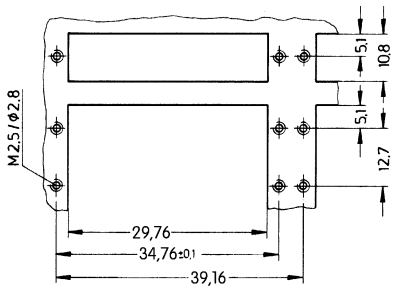
Identification	Drawing	Dimensions in mm

Dimensions



a	b	
2.5	ø 0.7	Solder pins
4		
13	□ 0.6	
13	□ 0.6	Wrap posts
5	–	
13	–	Press-in pins

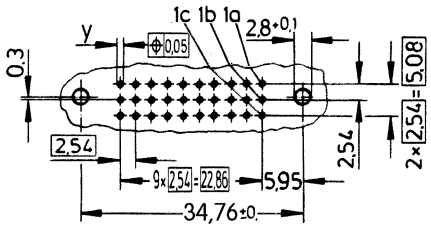
Panel cut out



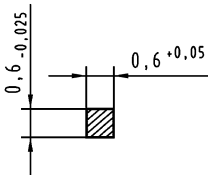
	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.35 - 0.39 mm²

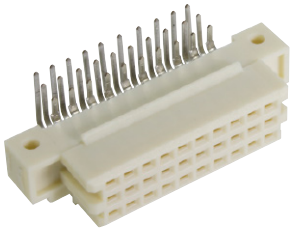
Other contact arrangements as well with lagging/leading pins on request

• Wrap posts for interfacing selectively gold plated (performance level 3)

w) Wrap posts not for interfacing, no performance level

Number of contacts

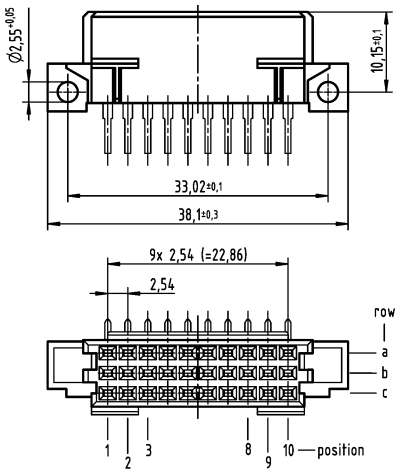
30

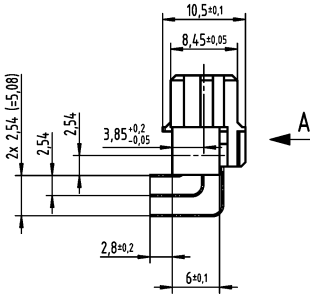


Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with angled solder pins	30		Performance level 3 on request	09 29 230 6801 09 29 430 6801[b]	Performance level 1 on request
THR	30			09 29 230 6804[d] 09 29 430 6804[b][d]	
THR on a reel				09 29 230 6804 791[d]	

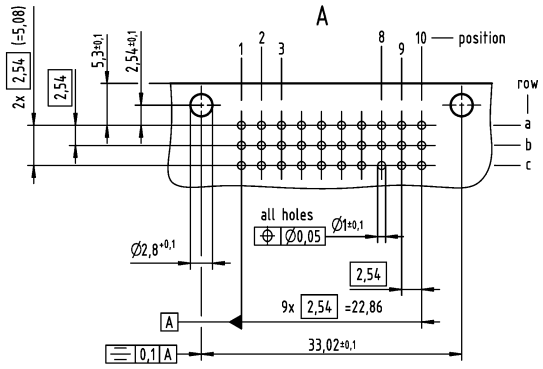
Dimensions



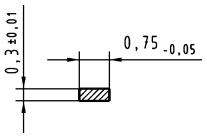


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A)
of contacts row a, b, c:
A = 0.20 - 0.23 mm²

Dimensions in mm

Other contact arrangements as well with lagging/leading pins on request

[b] Connectors with snap-in clips see chapter 00

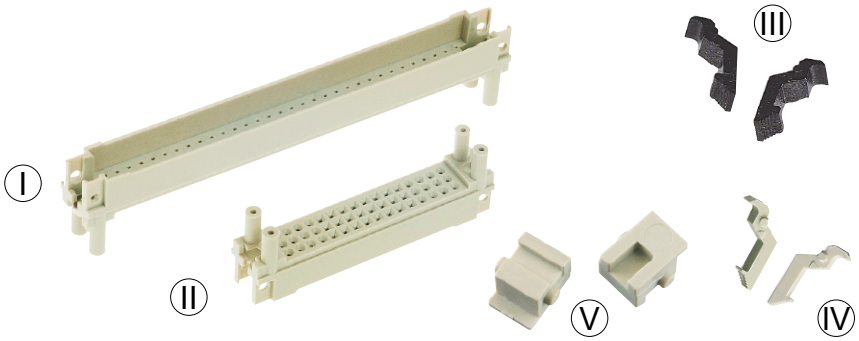
[d] CTI > 400

Notes

Pin shroud

Number of contacts

96, 48



Pin shrouds
for types C, 2C, R, 2R

Identification	Termination length ± 0.3	pcb-thickness ± 0.4	Dimension a ± 0.1	Part number – Pin shrouds with press-in fixing[1)]	Part number – Pin shrouds with screw fixing
Pin shrouds for female connectors type C and for male connectors type R Ⓘ	13.0/ 13.2	1.6	6.7	09 03 000 9956	09 03 000 9966
		2.4	5.9	09 03 000 9957	09 03 000 9967
		3.2	5.1	09 03 000 9958	09 03 000 9968
		4.0	4.3	09 03 000 9959	09 03 000 9969
	17.0	1,6	10,7	09 03 000 9951	09 03 000 9961
		2,4	9,9	09 03 000 9952	09 03 000 9962
		3,2	9,1	09 03 000 9953	09 03 000 9963
		4,0	8,3	09 03 000 9954	09 03 000 9964
		4,8	7,5	09 03 000 9955	09 03 000 9965
		5,6	6,7	09 03 000 9956	09 03 000 9966
		6,4	5,9	09 03 000 9957	09 03 000 9967
Pin shrouds with side coding on request	20.0	4,0	11,75	09 03 000 9950	09 03 000 9960
		4,8	10,7	09 03 000 9951	09 03 000 9961
		5,6	9,9	09 03 000 9952	09 03 000 9962
		6,4	9,1	09 03 000 9953	09 03 000 9963
		7,2	8,3	09 03 000 9954	09 03 000 9964
Pin shrouds for female connectors type 2C and for male connectors type 2R Ⓘ	13.0/ 13.2	1.6	6.7	09 23 000 9956	09 23 000 9966
		2.4	5.9	09 23 000 9957	09 23 000 9967
		3.2	5.1	09 23 000 9958	09 23 000 9968
		4.0	4.3	09 23 000 9959	09 23 000 9969
	17.0	1,6	10,7	09 23 000 9951	09 23 000 9961
		2,4	9,9	09 23 000 9952	09 23 000 9962
		3,2	9,1	09 23 000 9953	09 23 000 9963
		4,0	8,3	09 23 000 9954	09 23 000 9964
		4,8	7,5	09 23 000 9955	09 23 000 9965
		5,6	6,7	09 23 000 9956	09 23 000 9966
		6,4	5,9	09 23 000 9957	09 23 000 9967
	20.0	4,0	11,75	09 23 000 9950	09 23 000 9960
		4,8	10,7	09 23 000 9951	09 23 000 9961
		5,6	9,9	09 23 000 9952	09 23 000 9962
		6,4	9,1	09 23 000 9953	09 23 000 9963
		7,2	8,3	09 23 000 9954	09 23 000 9964

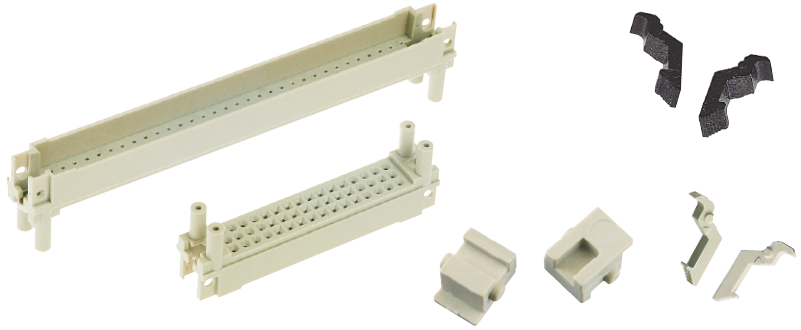
Identification		Part number
Locking lever for female connectors type C, 2C*	Ⓘ	09 03 000 9914
Locking lever for female connectors type R, 2R*	Ⓘ	09 03 000 9913
Fixing bracket for shell housing C*	Ⓘ	09 03 000 9921

* order 2 pieces per connector
[1)] Processing only with press-in tools, see chapter 30

Pin shroud

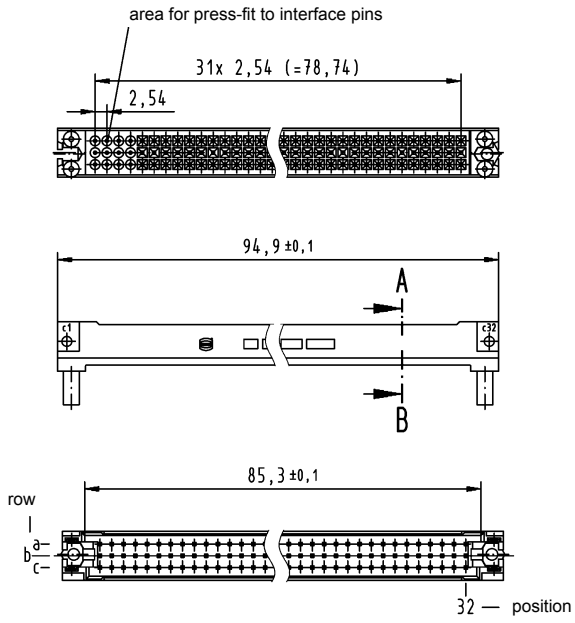
Number of contacts

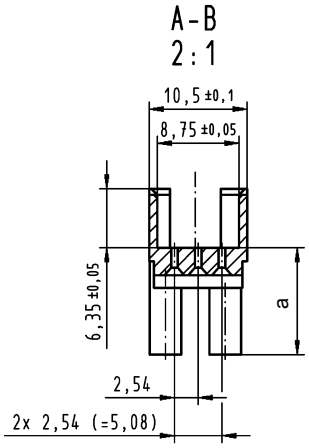
96, 48

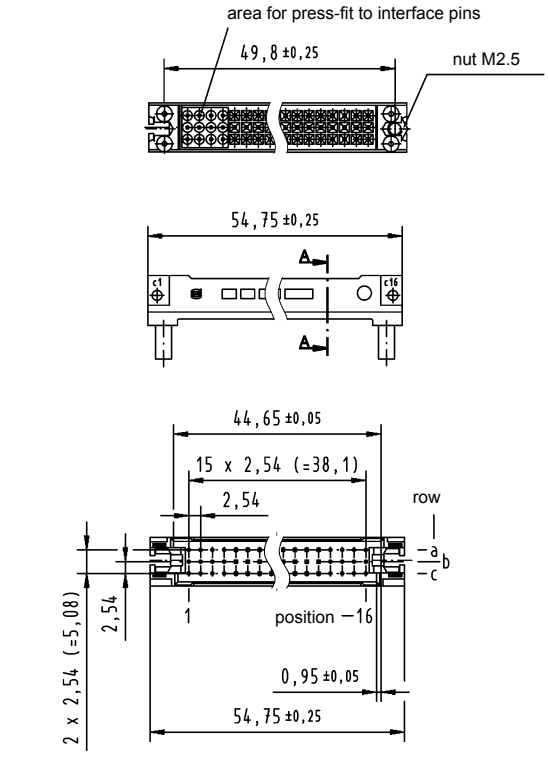


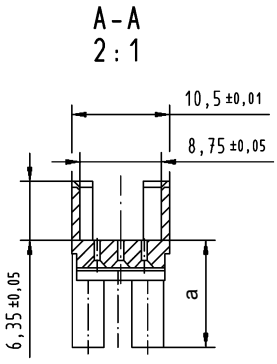
Pin shrouds
for types C, 2C, R, 2R

Identification	Drawing	Dimensions in mm
Pin shrouds for female connectors type C, R	press-in fixing[1)] / screw fixing	
Pin shrouds for female connectors type 2C, 2R		







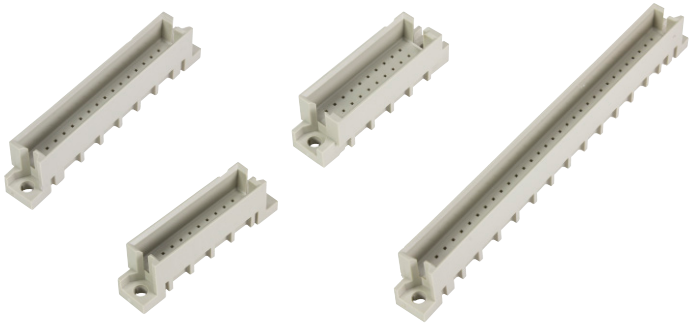


1) Tooling see chapter 30

Pin shroud

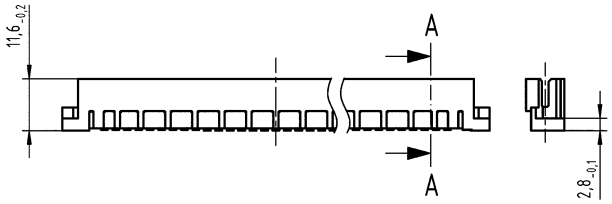
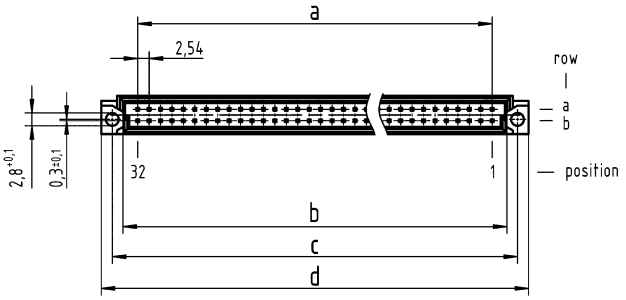
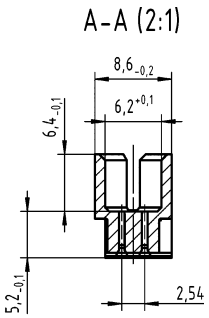
Number of contacts

64, 32, 30, 20

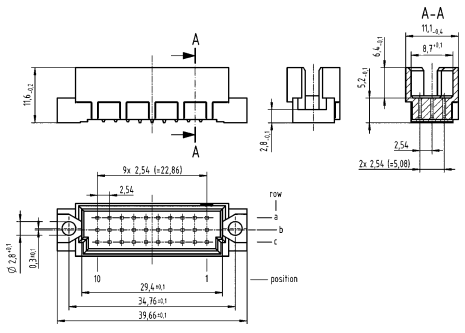


Pin shrouds
for types B, 2B, 3B, 3C, Q, 2Q, 3Q and 3R

DIN Signal up to 2 A

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Pin shrouds for female connectors type B for male connectors type Q	64	09 72 164 3101		
Pin shrouds for female connectors type 2B for male connectors type 2Q	32	09 27 132 3101		
Pin shrouds for female connectors type 3B for male connectors type 3Q	20	09 75 120 3101		

	a	b	c	d
B / Q	78.74	85.2	90.00	95.00
2B / 2Q	38.10	44.1	50.00	55.00
3B / 3Q	22.86	29.4	34.76	39.66

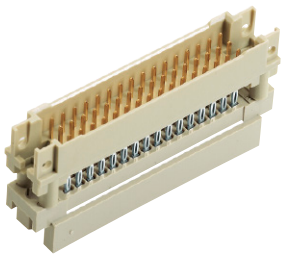
Pin shrouds for female connectors type 3C for male connectors type 3R	30	09 29 130 3101		

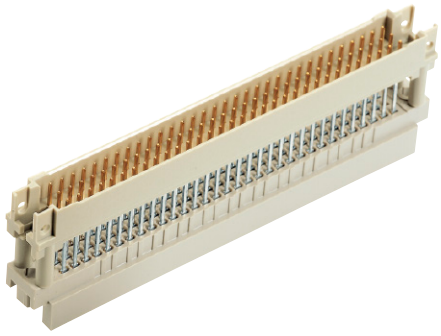
These pin shrouds must be pressed on the interfacing contacts.

After the assembly the interfacing contacts should have a contact length of appr. 4.8 mm.

Number of contacts

96, 48

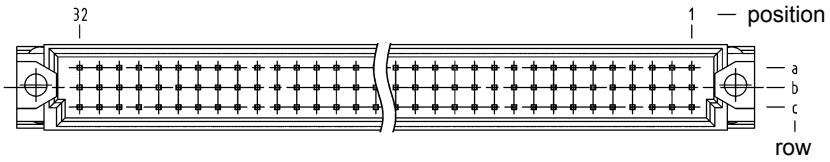


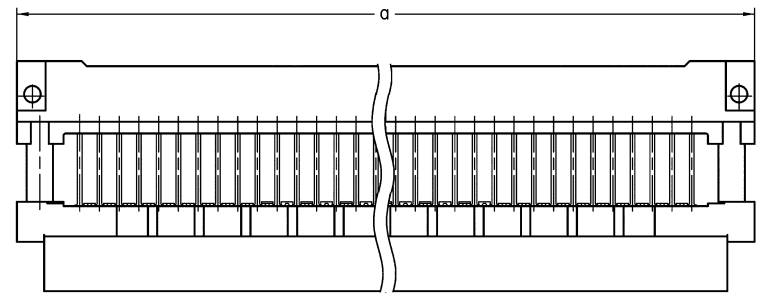


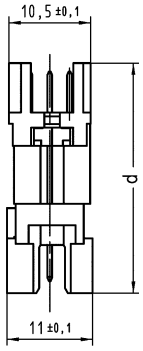
Mezzanine Adapter

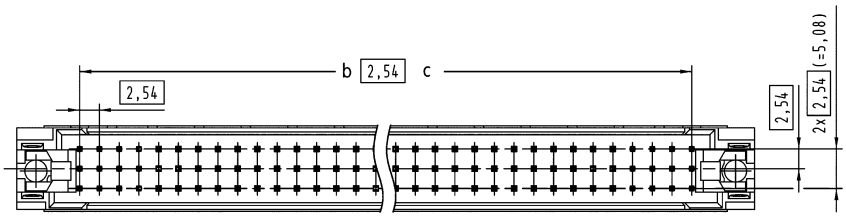
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. 2	1
Male connector type R with pin shroud for pcb distance 41 mm	96		Performance level 3 on request		09 73 196 5531
Male connector type 2R with pin shroud for pcb distance 41 mm / 37.5 mm	48			09 28 148 6532	09 28 148 5531

Dimensions







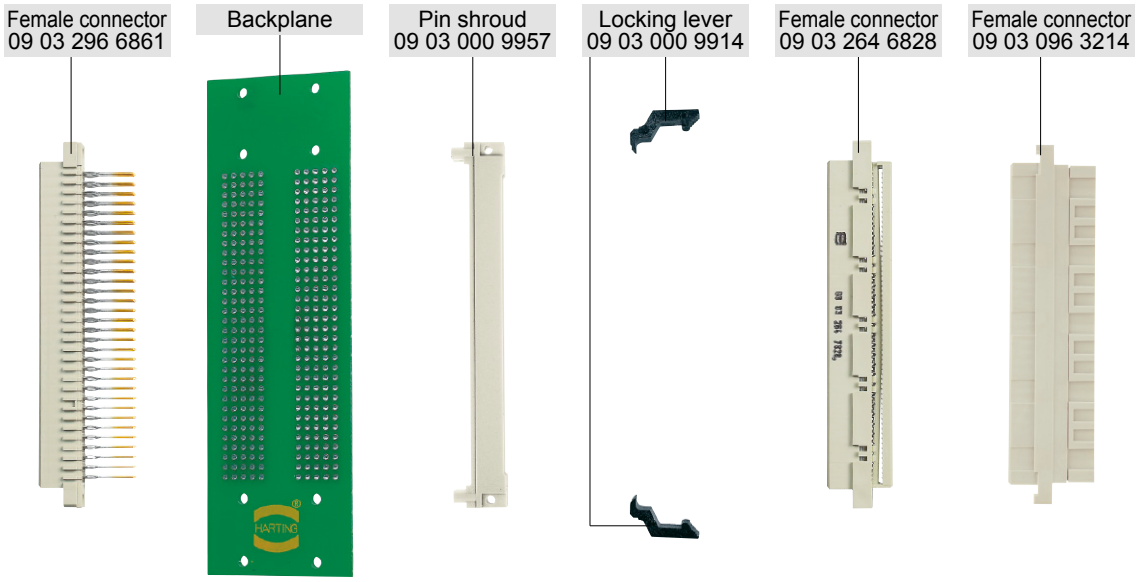


	a	b	c	d
09 73 196 5531	94.9 ± 0.1	31	78.74	29.6 ± 0.3
09 28 148 5531	54.9 ± 0.1	15	38.1	29.6 ± 0.3
09 28 148 6532	54.9 ± 0.1	15	38.1	26.15 ± 0.3

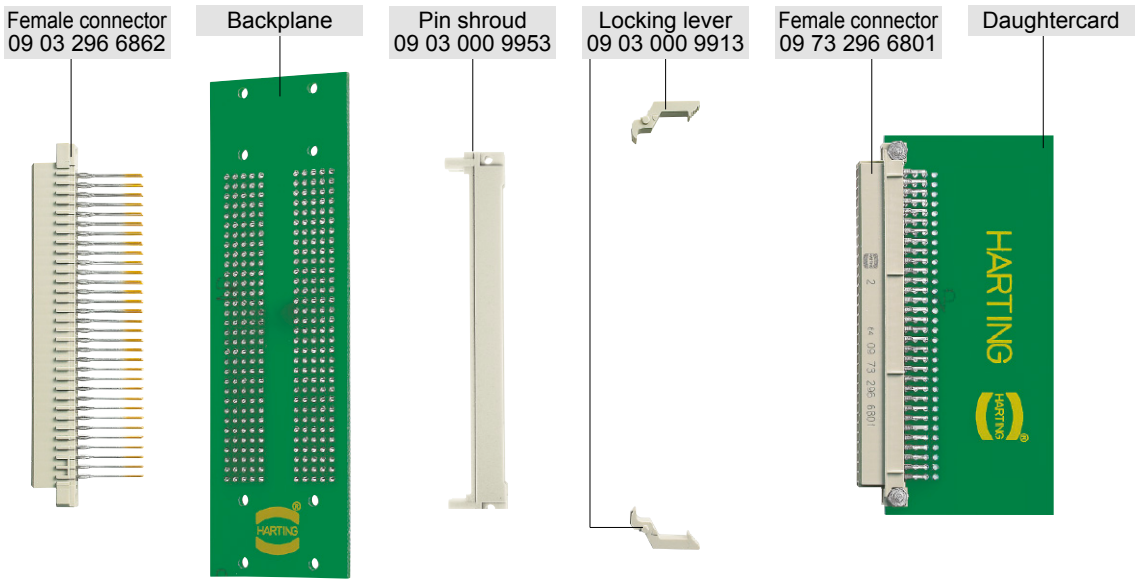
Dimensions in mm

Application examples

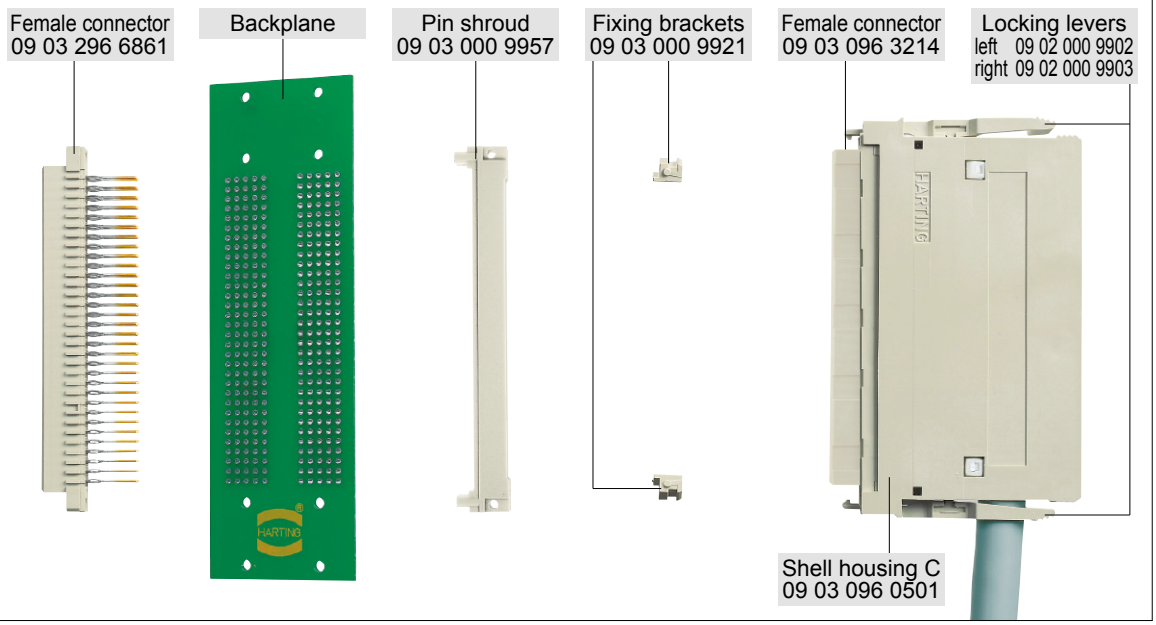
Application 1



Application 2

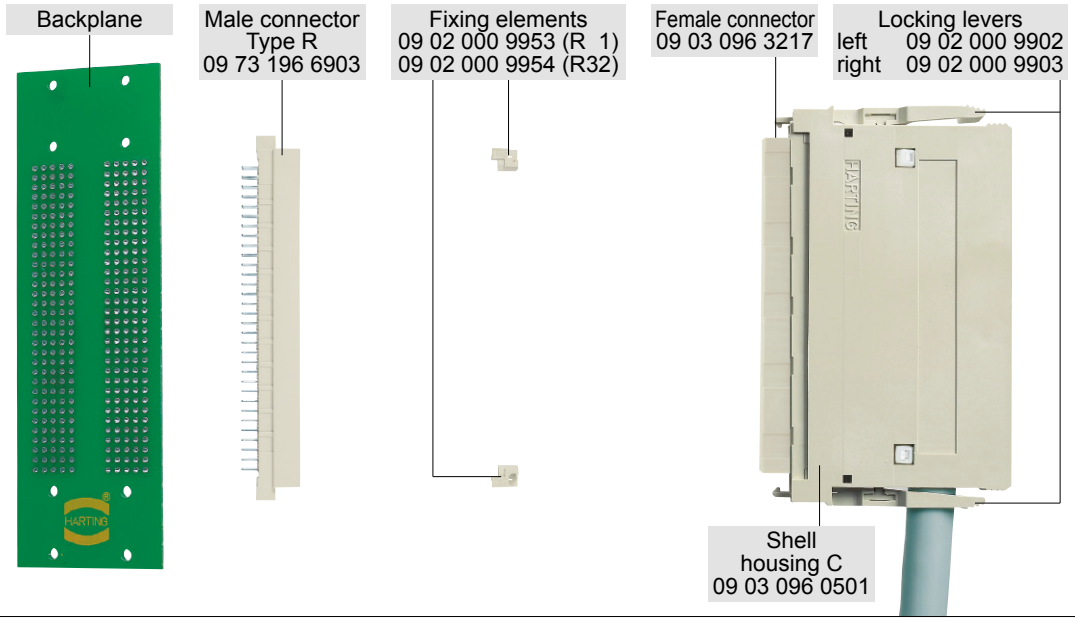


Application 3

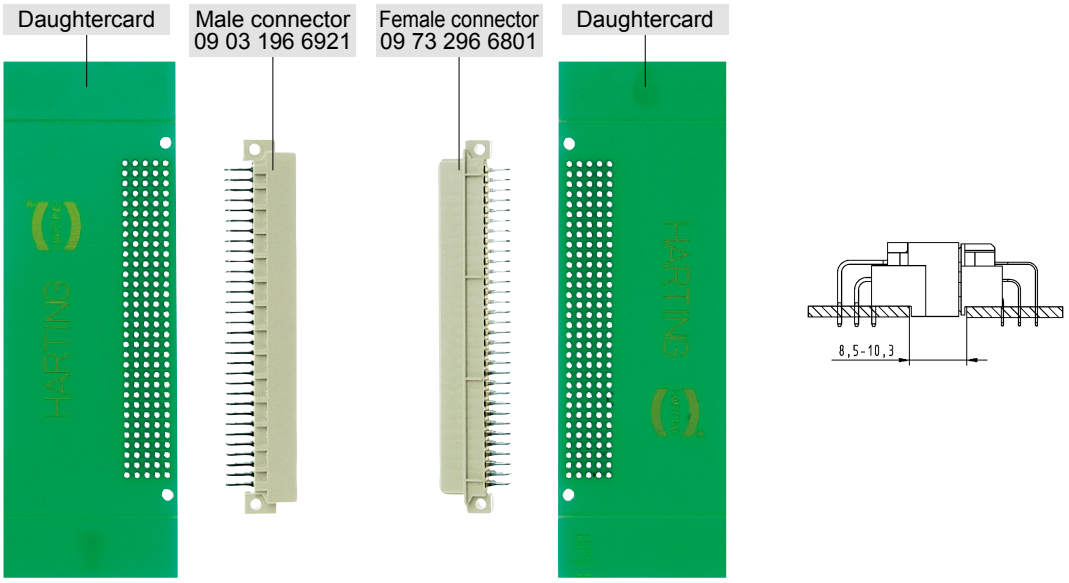


Application examples

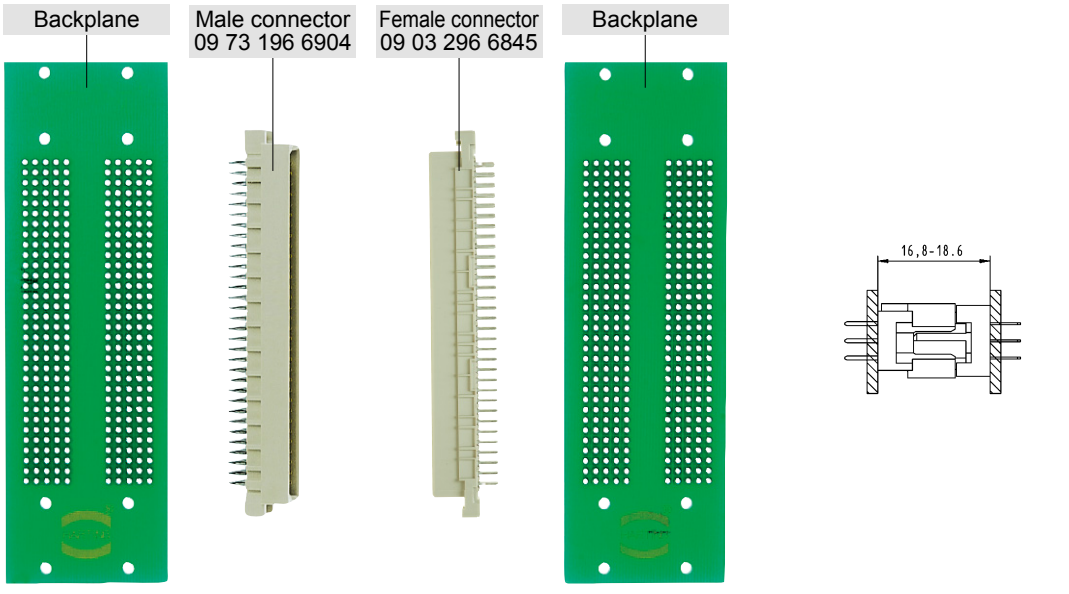
Application 4



Application 5*

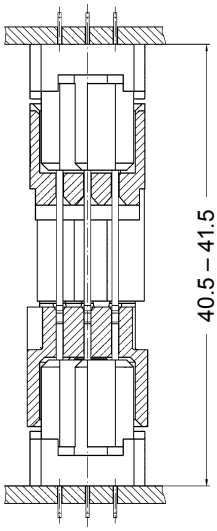


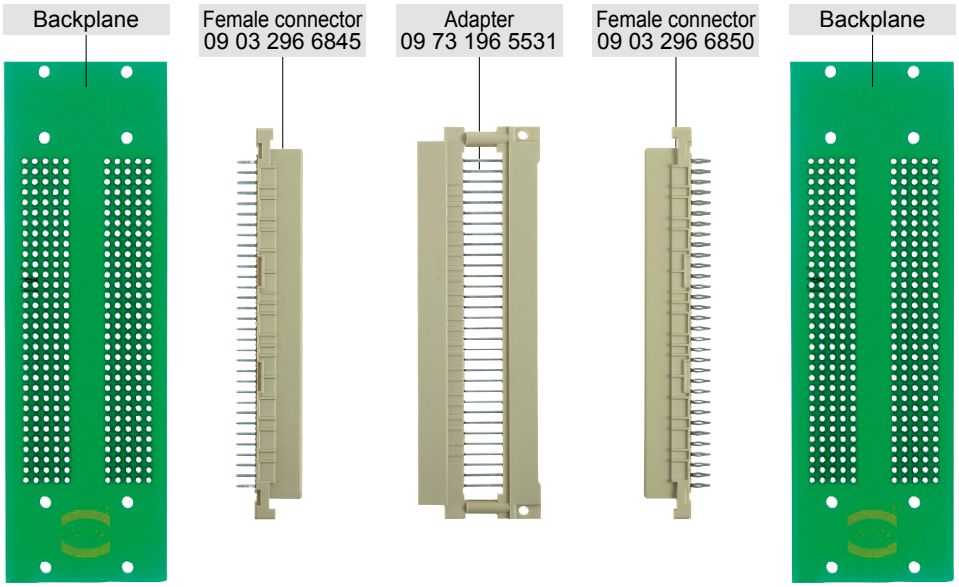
Application 6*



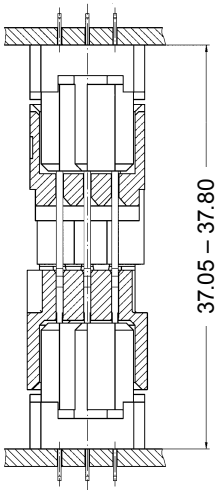
* Position marking turned: a1 contacts a32, a2 contacts a31, …

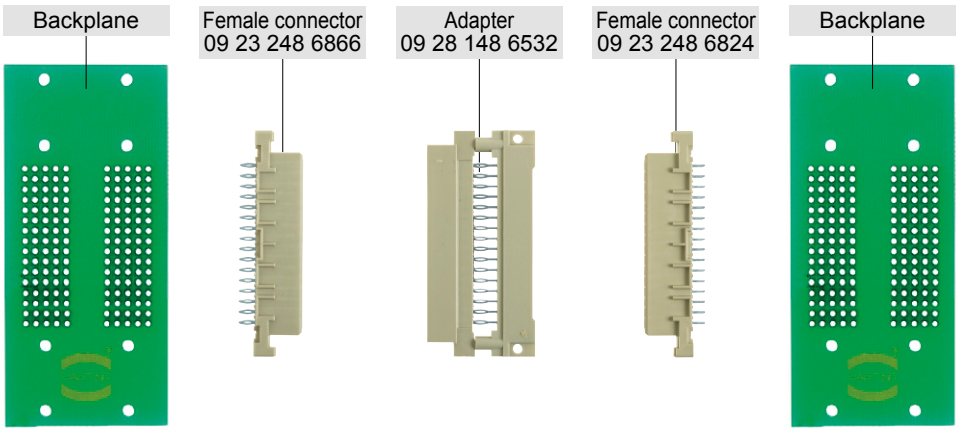
Application 7



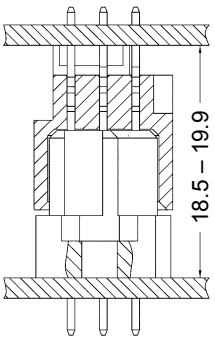


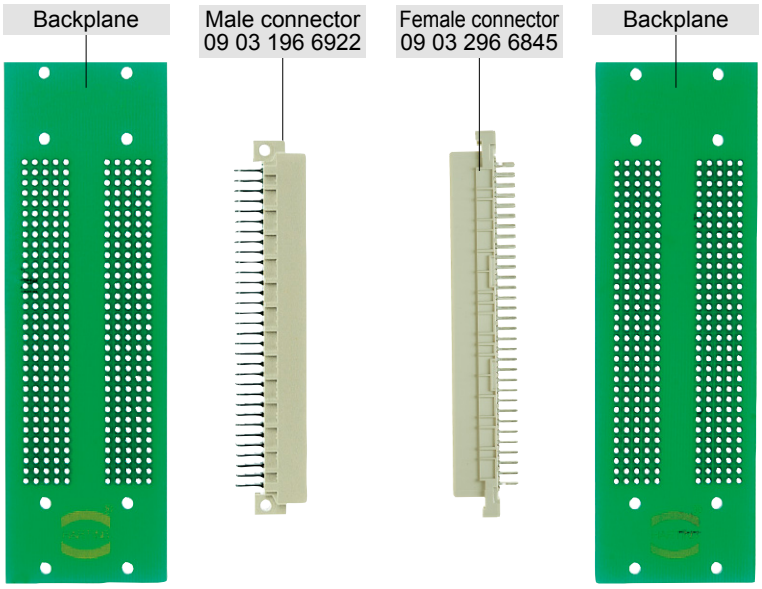
Application 8





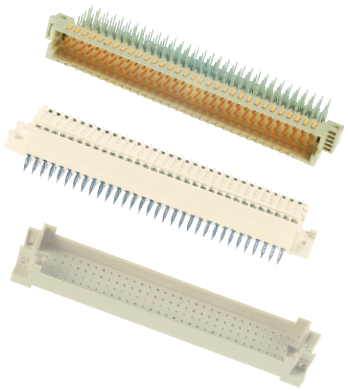
Application 9



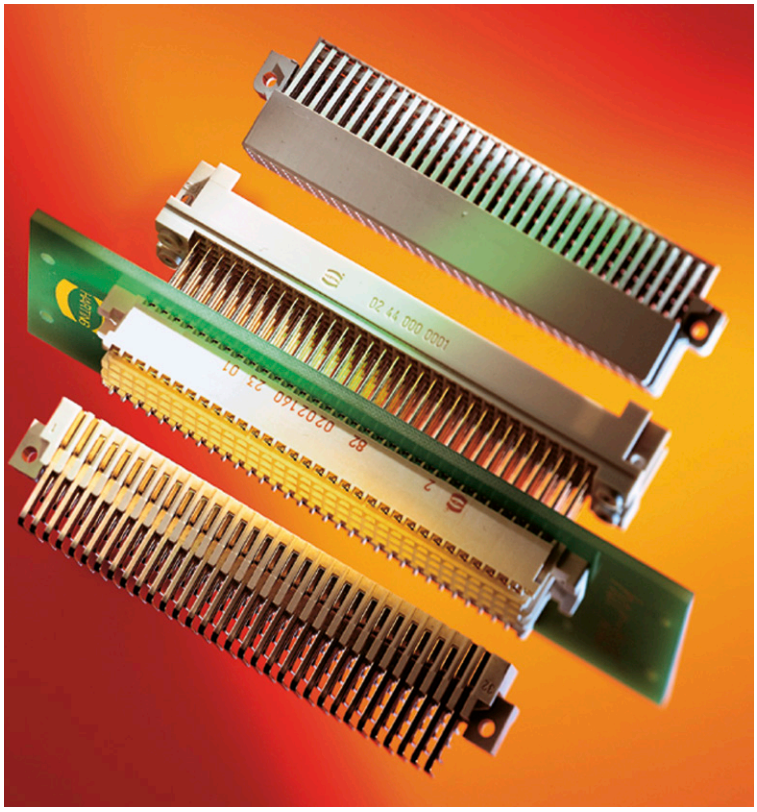


har:bus® 64

har:bus® 64



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



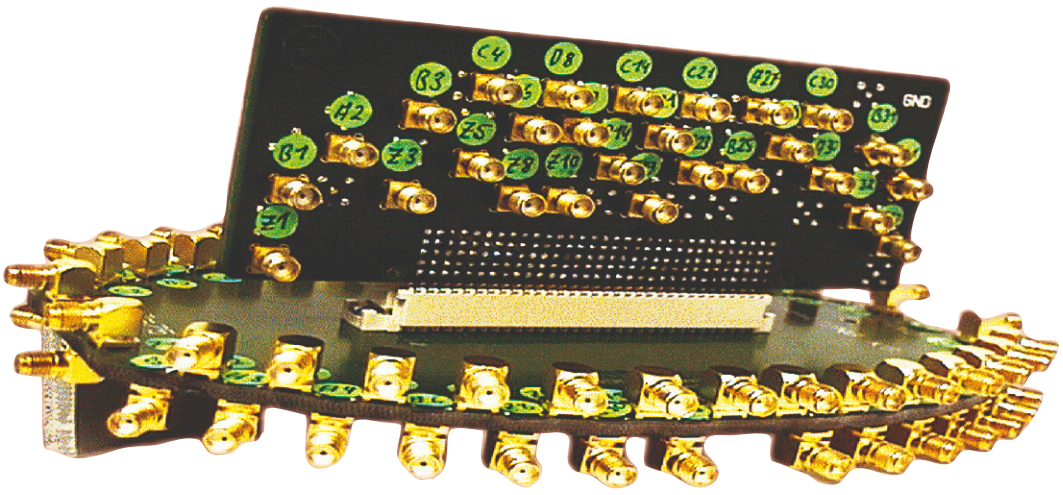
Despite numerous new bus systems based on the rapid changes in chip technology, VMEbus systems offer significant advantages such as their robustness, reliability and increased availability of processor, memory and I/O cards.

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.

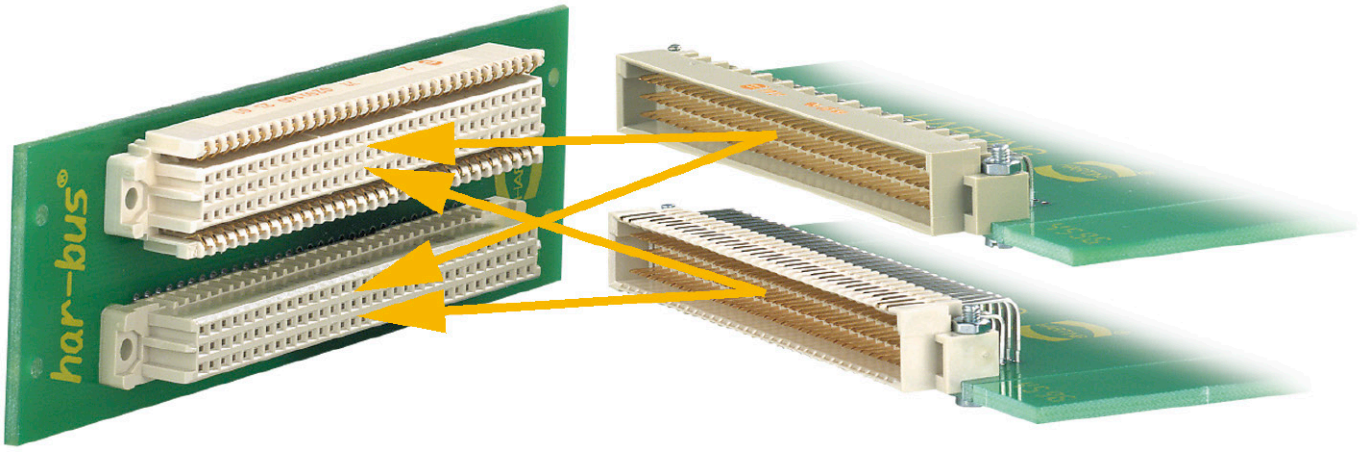
With the increase in processing speeds and data transmission rates, 3 row DIN 41612 connectors have reached their limit, so the VME standard needs to be enhanced further.

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.

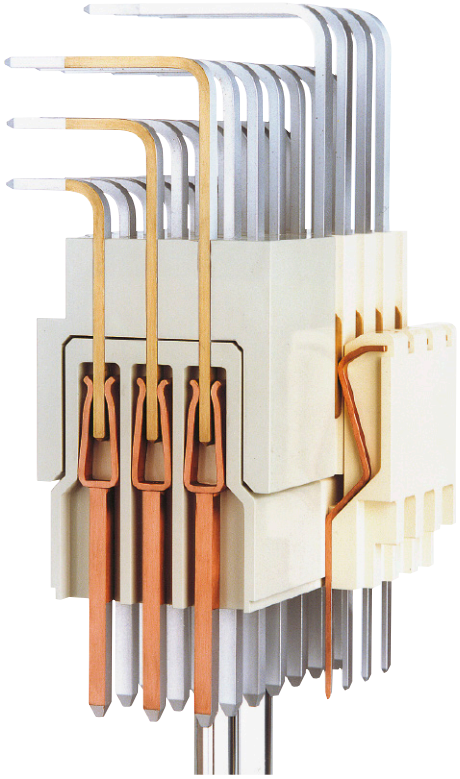
To offer the best design possible from the start, HARTING developed spice models that were later certified via signal integrity measurements of the connector.



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:

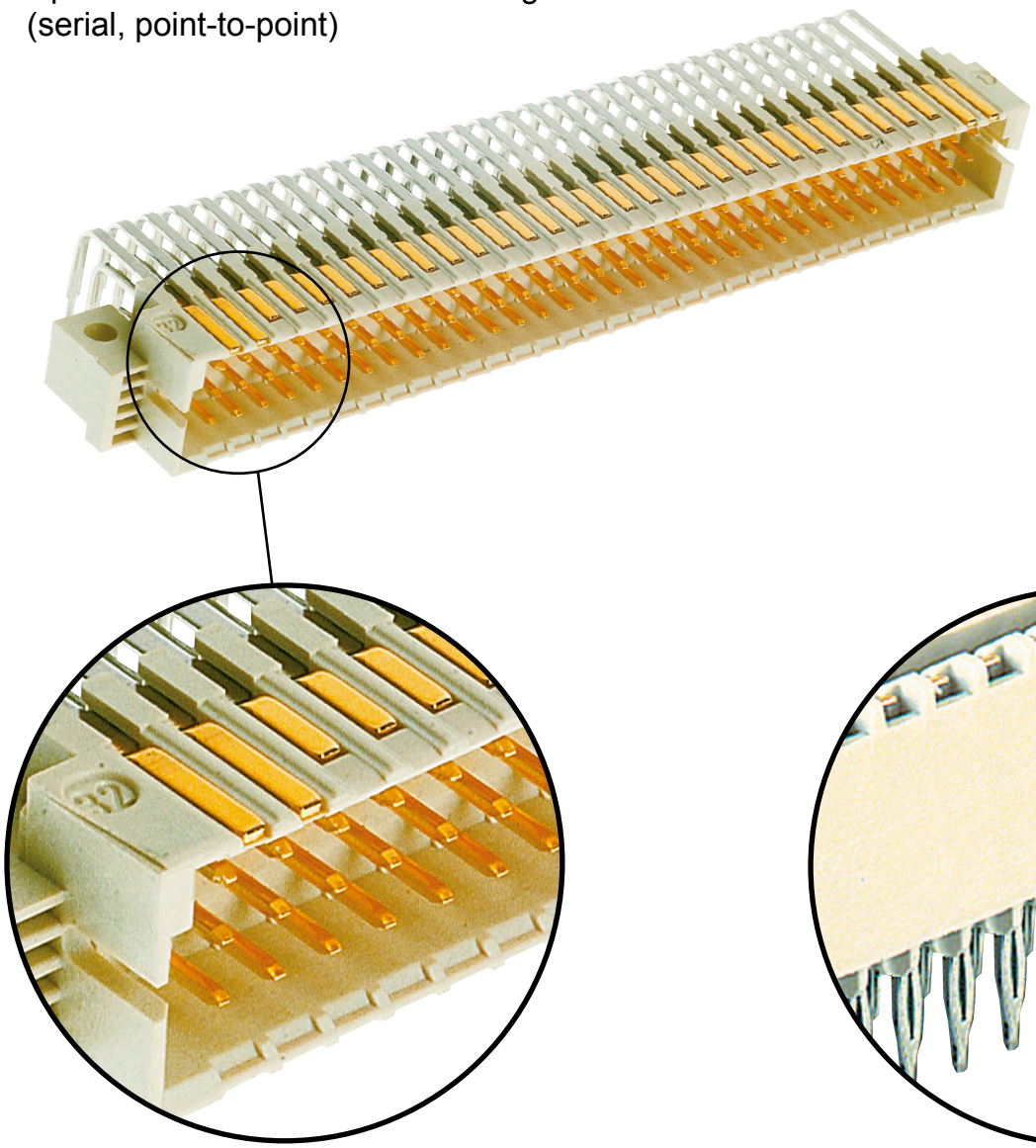
- Additional contacts for I/O and system upgrade
- New voltage supplies for 3.3 V and 48 V system components
- Identifying locations of system components and the bus length. “Plug & Play“
- Improved signal/ground ratio for reliable signal data transfer at rates up to 320 MByte/s (VMEbus) resp. 1.25 Gb/s (Gigabit Ethernet) or 3.125 Gb/s (serial point-to-point)
- Live Insertion for replacing processor or memory cards without closing down the system
- User defined pins for test and maintenance bus lines

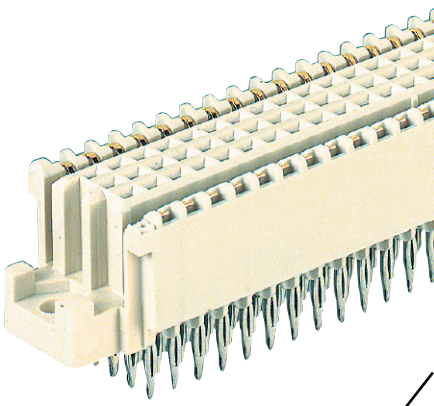
The advantages of har:bus® 64 in detail

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 higher **data transfer rates**:

- Up to 320 MByte/s for asynchronous signals (VMEbus)
- Up to 1.25 GB/s for Gigabit Ethernet
- Up to 3.125 GB/s for differential signals (serial, point-to-point)

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

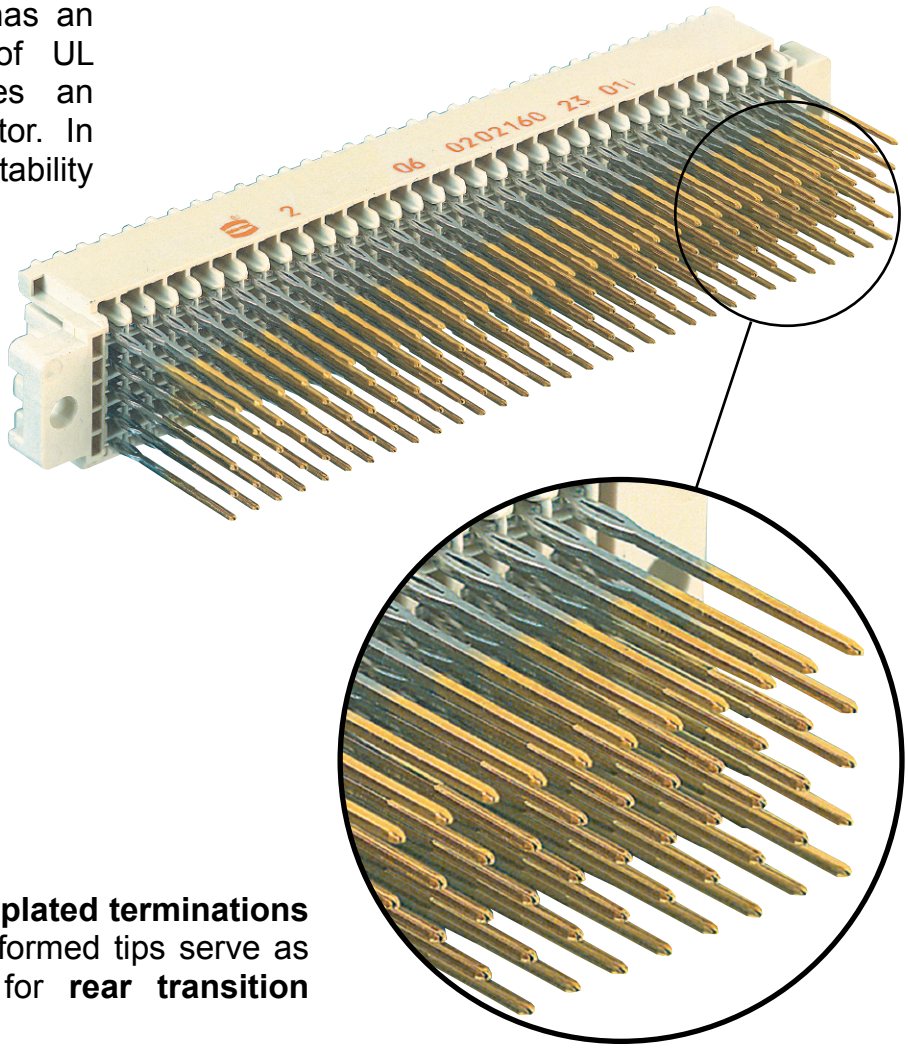


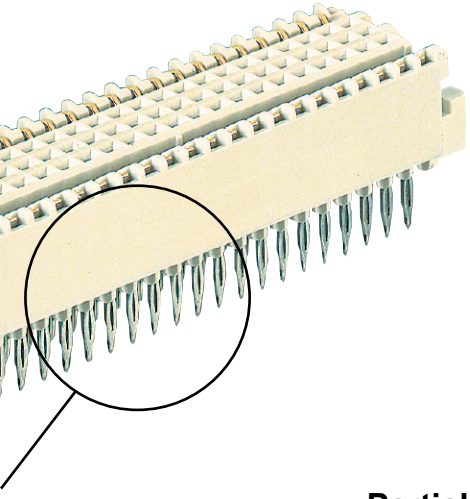


Four preleading contacts (1.5 mm) serve to pre-load the transmit and receive logic so that the bus will not experience glitches during **live insertion** of new cards into the backplane.

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.

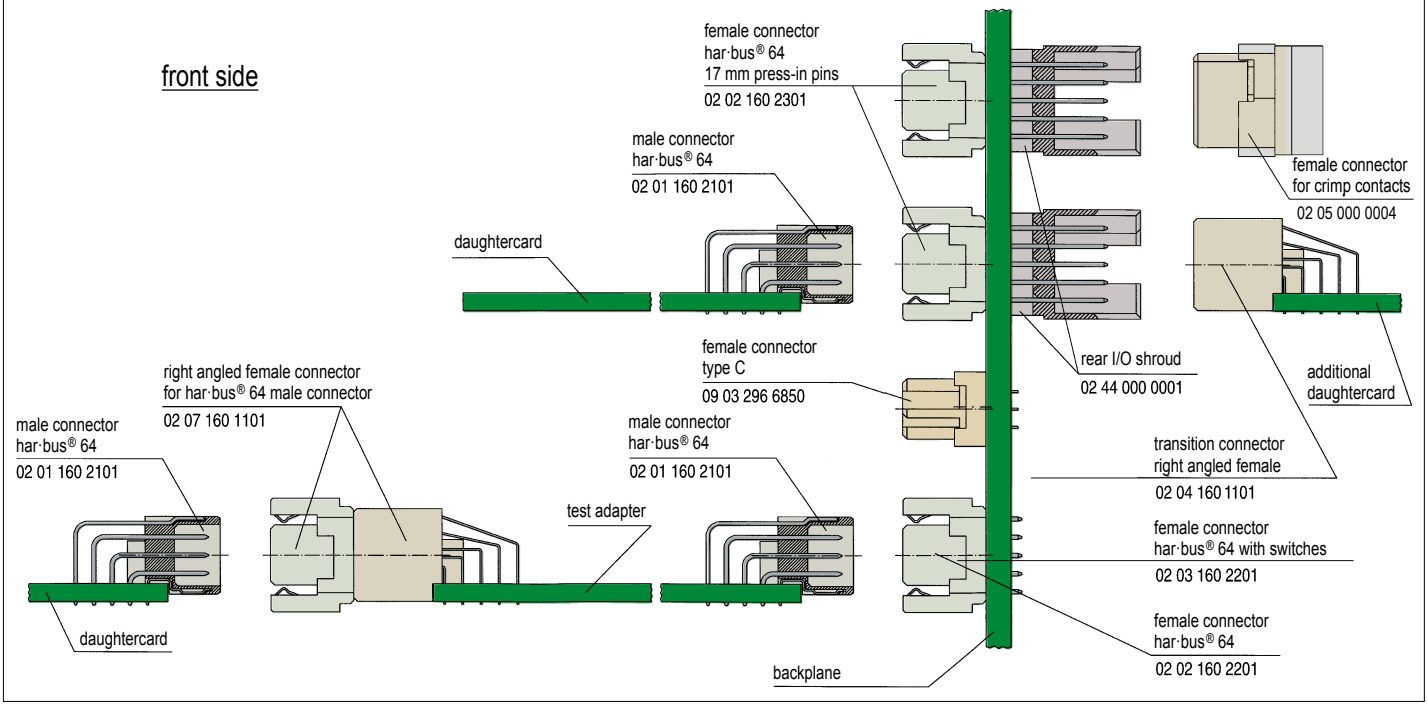
The insulator, made of LCP, has an inherent flammability rating of UL 94-V0 and therefore provides an **environment friendly** connector. In addition, the heat deformation stability of LCP makes the connector **surface-mount compatible** (see chapter 00).

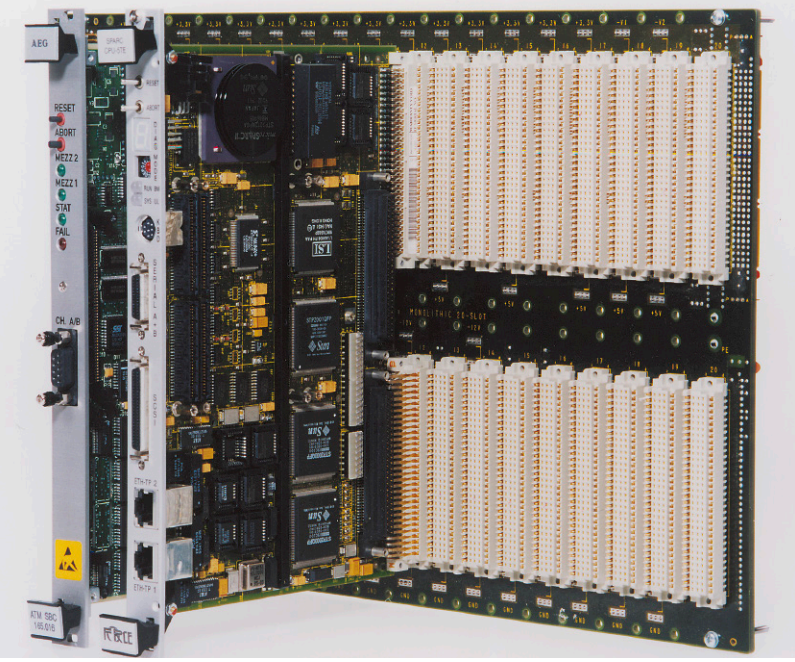




Partially gold plated terminations with precisely formed tips serve as contact area for **rear transition boards.**

system description





As a typical multiprocessor bus, VME has to distribute processor information continuously according to the right priorities.

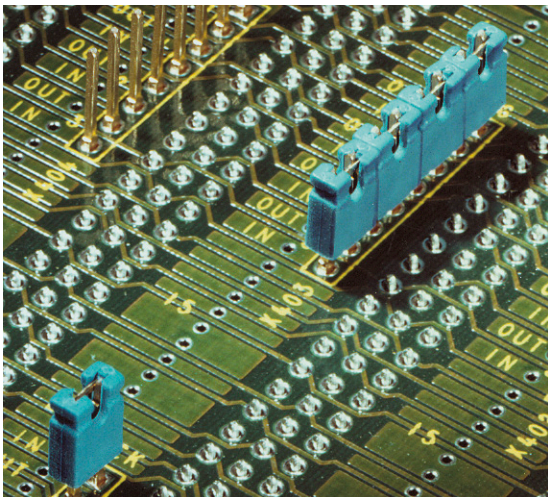
This is done through the well known daisy-chain lines.

The VME protocol requests 5 daisy-chains on position 1 of every backplane.

These lines are defined to go through every daughter card.

Therefore, in case of unloaded card slots the signal have to be bridged across the connector.

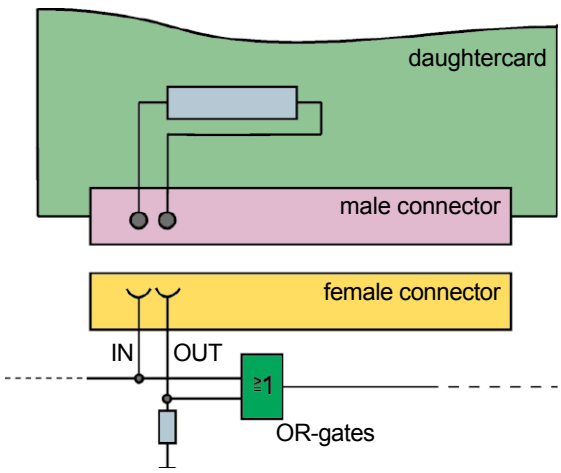
Bridging variants:



1. The empty card slots may be assembled with dummy cards, that bridge the daisy-chain lines.

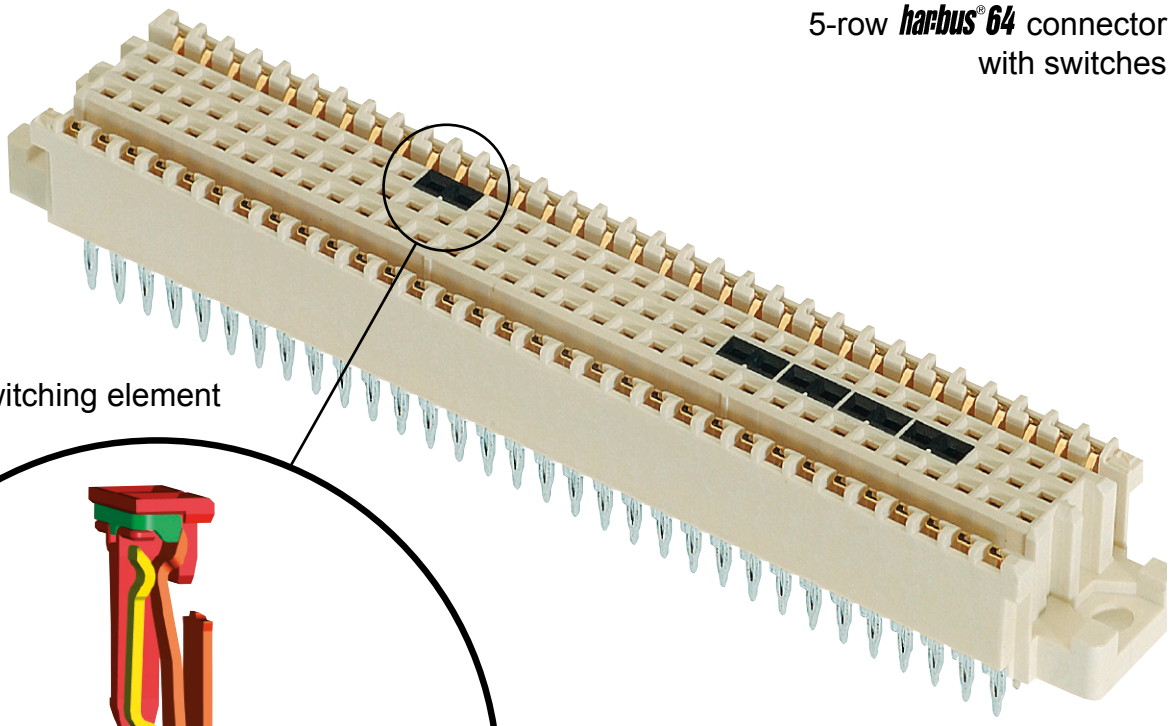
2. Bridging can be achieved by inserting 5 jumpers on the backplane manually.

3. Bridging by using IC's with internal integration OR the function may accept automatic daisy-chaining.

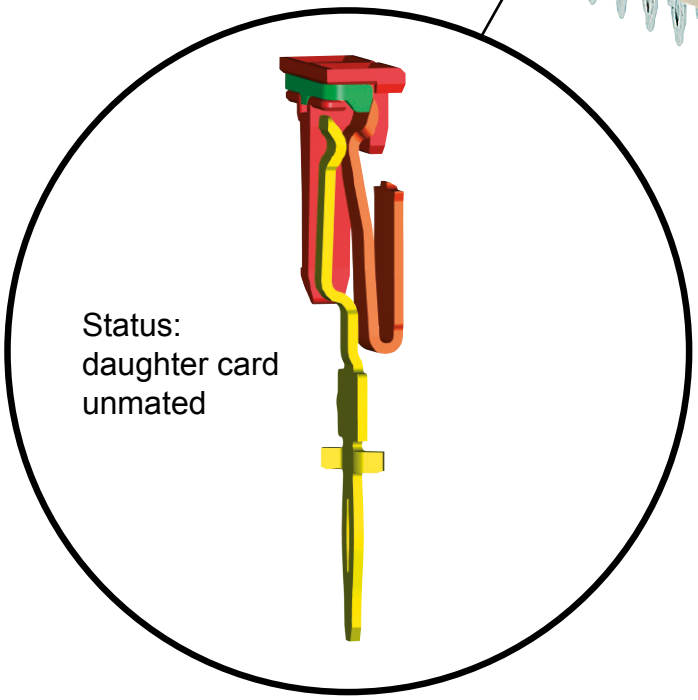


4. The 5-row har-bus® 64 connector with switches allows an automatic switching. In the case of an unmated daughter card the connector bridges the signals at positions a21-22, b4-5, b6-7, b8-9 and b10-11. The switch elements open automatically when the daughter card is mated, so that the daughter card accepts the ongoing signal daisy-chain.

5-row **har-bus® 64** connector
with switches



Integrated switching element



Advantages:

- Passive backplane; no active components assembled
- No additional space required, due to integrated switching function inside the connector
- No jumpers on the backplane
- User friendly regarding maintenance and repairing
- Automatically daisy-chaining through mating/unmating the daughter card
- High MTBF value
- No additional, manual bridging necessary
- Less assembly cost, no special tooling required

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VMEbus Technology ™

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		distance in mm rows a, b, c	rows z, d	female angled
between two rows	clearance	1.2	1.2	0.6
	creepage	1.2	1.2	0.6
between two contacts (in a row)	clearance	1.2	1.0	0.8
	creepage	1.2	1.0	0.8

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
for press-in termination — – 40 °C … + 105 °C acc. to IEC 60 512-11
During reflow soldering — max. + 240 °C for 20 s for THR connectors

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

Electrical termination

Solder pins for pcb termination Ø 1.0 ± 0.1 mm according to IEC 60 326-3
Crimp terminal 0.09 - 0.50 mm²
Compliant press-in terminations

pcb thickness — ≥ 1.6 mm
Recommended pcb holes for press-in technology — See recommendation page 00.25 in acc. to EN 60 352-5

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

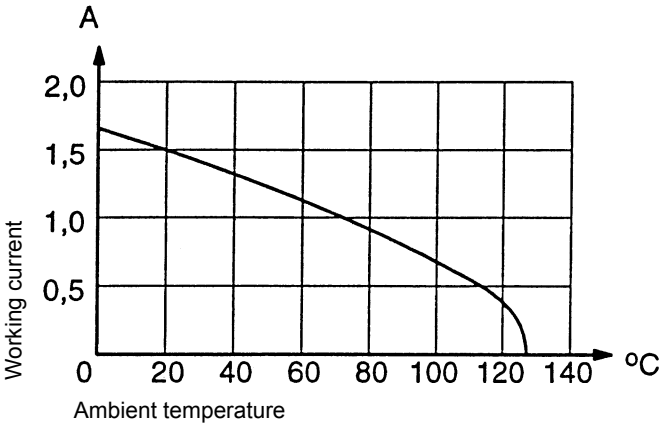
Contact surface

Contact zone — Plated acc. to performance level[1)]

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



With selective loading higher currents can be transmitted. The requirements according to VITA 1.7 are fulfilled.

har-bus® 64 with switches

Deviating technical characteristics for the switching elements.

minimal clearance and creepage distance		distance in mm switching positions
between two rows	clearance	0.5
	creepage	0.7
between two contacts (in a row)	clearance	0.5
	creepage	0.7

Contact resistance

Switching elements — ≤ 60 mΩ

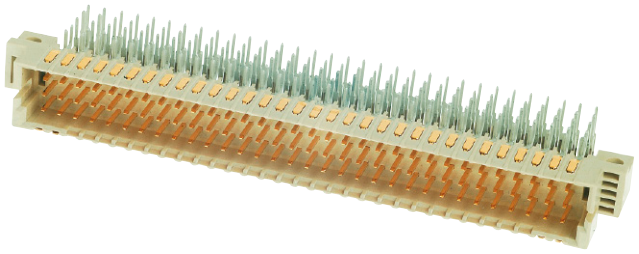
Insertion and withdrawal force

Complete connector — ≤ 180 N

1) Explanation performance levels see chapter 00

Number of contacts

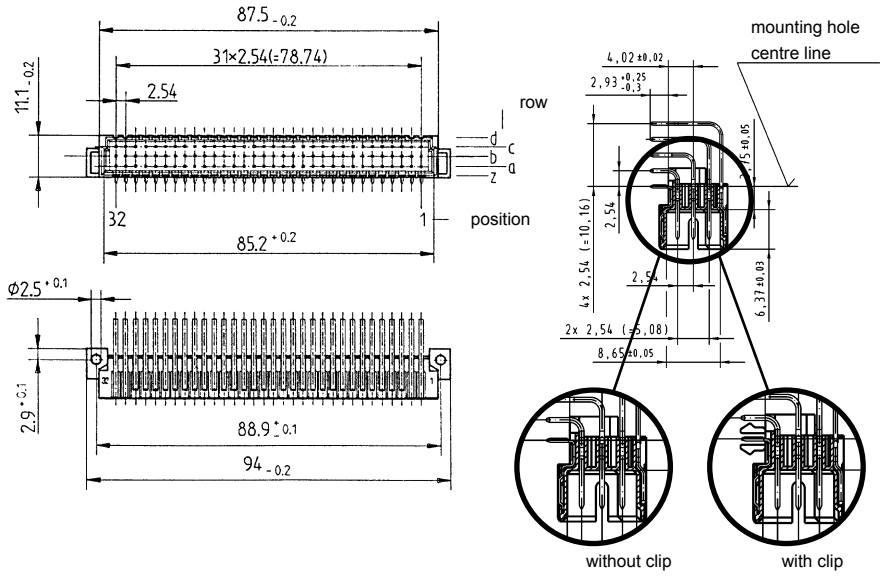
160



Male connectors, angled, THR compatible

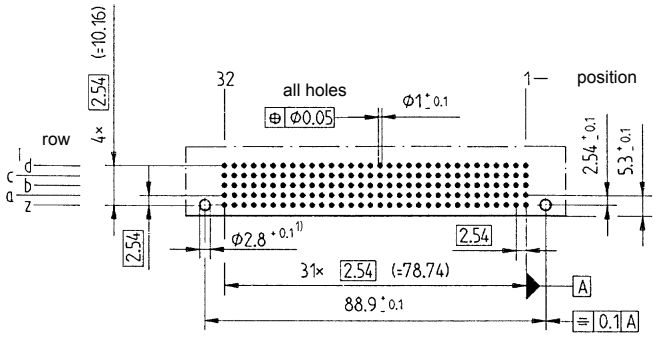
Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 61 076-4-113 Explanation chapter 00
			2	1
Male connector* without retention clip	160	z, a, b, c, d	02 01 160 2101	02 01 160 1101 02 01 160 1105[2)]
with retention clip	160	z, a, b, c, d	02 01 160 2102	02 01 160 1102 02 01 160 1106[2)]

Dimensions



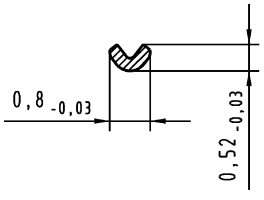
Board drillings

Mounting side

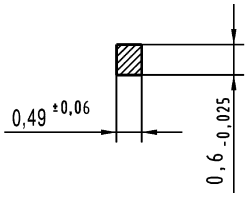


Cross section of solder terminations

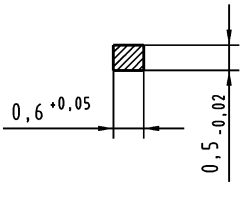
Row z:
A = 0.21 - 0.25 mm²



Rows a, b, c:
A = 0.25 - 0.33 mm²



Row d:
A = 0.29 - 0.32 mm²



A = cross area of contacts

Dimensions in mm

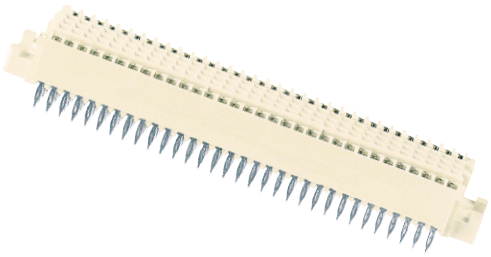
* Pre-leading contacts at positions d1, d2, d31 and d32

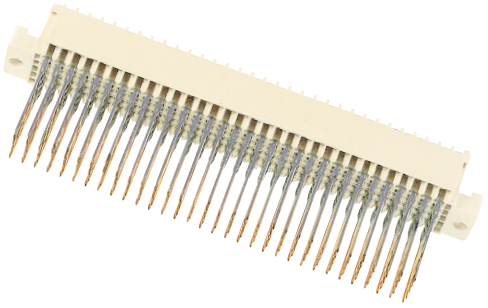
[1)] Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm ø to reduce standard mounting force (see chapter 00)

[2)] Special variant with min. 1.27 µm (50 µinch) Au and SnPb on termination

Number of contacts

160

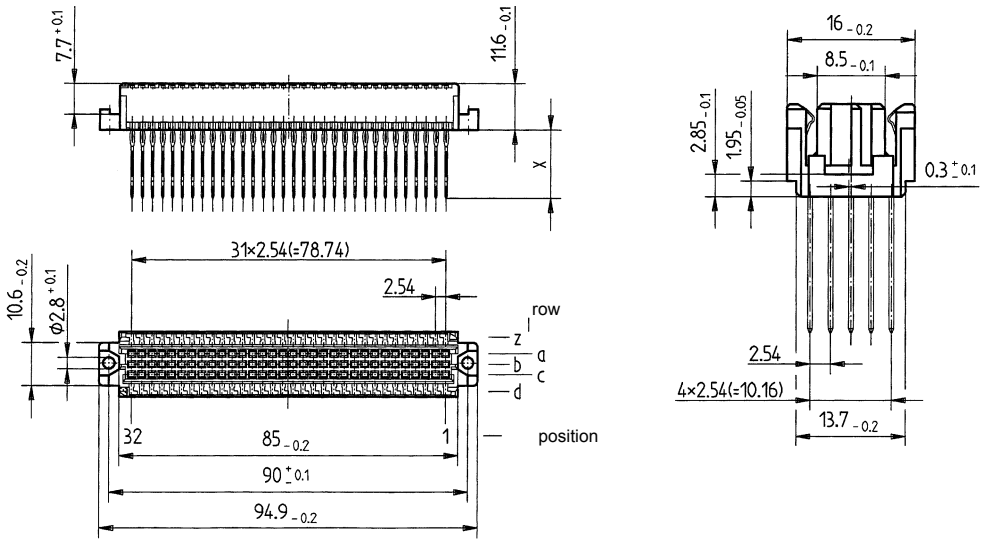




Female connectors

Identification	No. of contacts	Contact arrangement	Part number Performance levels according to IEC 61 076-4-113 Explanation chapter 00 2	1
Female connectors, straight[2]				
with press-in terminations				
with 3.7 mm	160	z, a, b, c, d		02 02 160 1601
fixing flange 4.5 / 5 mm	160	z, a, b, c, d	02 02 160 2201	02 02 160 1201
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
with solder pins				
2.9 mm	160	z, a, b, c, d	02 02 160 2804	

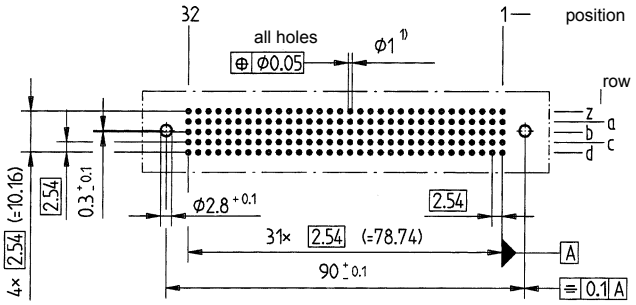
Dimensions



Part number	Dimension "X" for row z	a	b	c	d
02 02 160 1601	3.7	3.7	3.7	3.7	3.7
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 1301	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
02 02 160 2804	2.9	2.9	2.9	2.9	2.9

Board drillings

Mounting side



Dimensions in mm

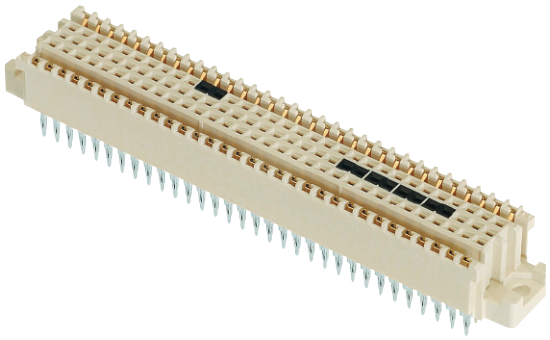
Tooling see chapter 30

[1] Press-in technology and refer to recommended configuration of pcb holes, see page 00.25

* selectively gold-plated

Number of contacts

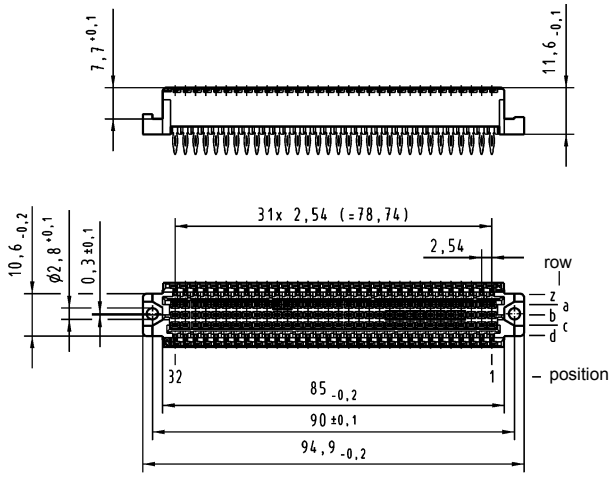
160

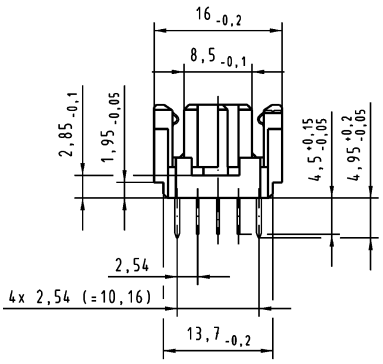


Female connectors

Identification	No. of contacts	Contact arrangement	Part number Performance level 2 according to IEC 61 076-4-113 Explanation chapter 00
Female connectors, straight with switches[2] with press-in terminations with flange 4.5 / 5 mm	160	z, a, b, c, d	02 03 160 2201

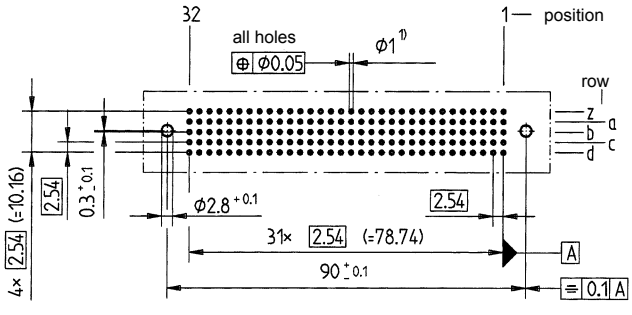
Dimensions





Board drillings

Mounting side



Dimensions in mm

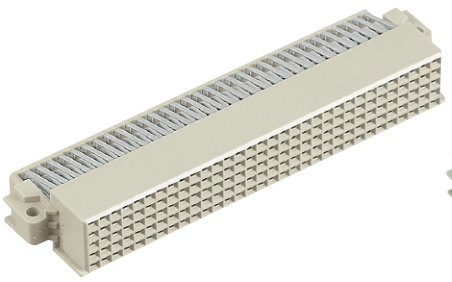
Tooling see chapter 30

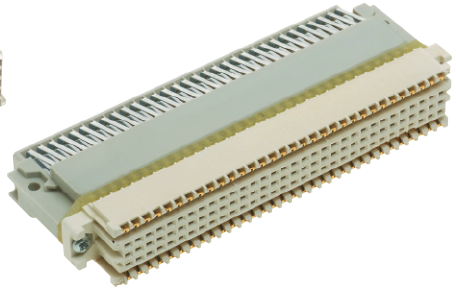
1) Press-in technology see page 00.25

2) Switching elements at positions a21-22, b4-5, b6-7, b8-9 and b10-11

Number of contacts

160

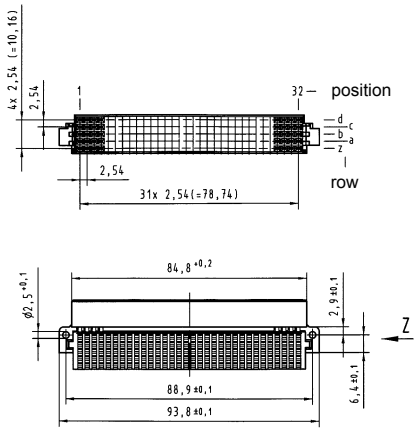


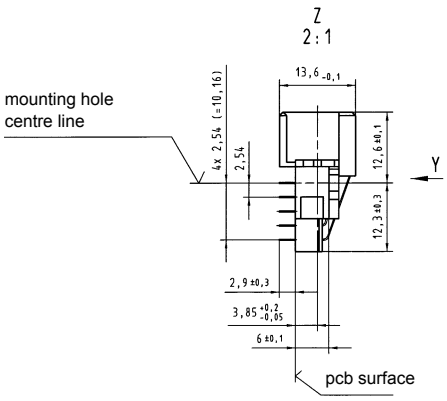


Female connectors

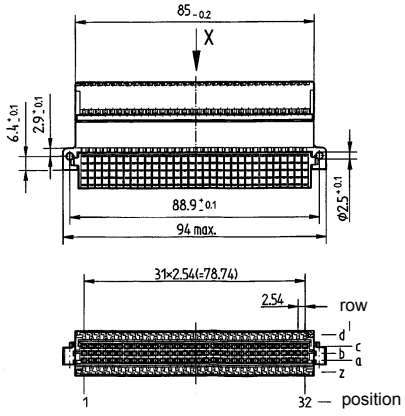
Identification	No. of contacts	Contact arrangement	Part number Performance level 1 according to IEC 61 076-4-113 Explanation chapter 00
Female connectors, angled with solder pins			
for rear access	160	z, a, b, c, d	02 04 160 1101
for har-bus® 64 male connector	160	z, a, b, c, d	02 07 160 1101

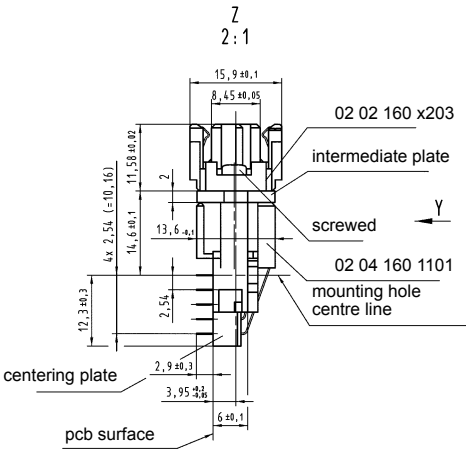
Dimensions
02 04 160 1101



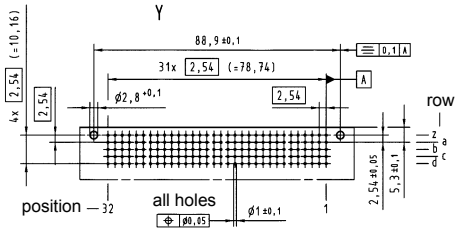


Dimensions
02 07 160 1101





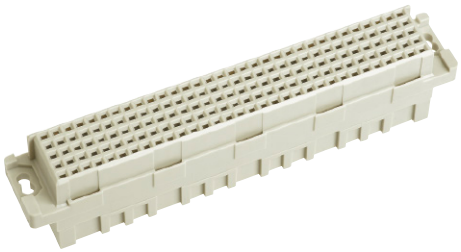
Board drillings
Mounting side



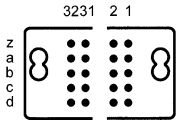
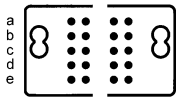
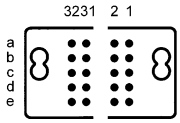
Dimensions in mm

Number of contacts

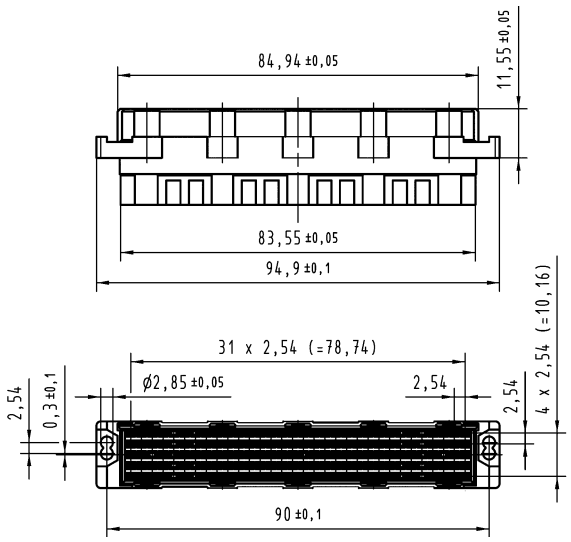
max. 160

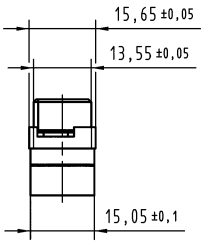


Female connectors

Identification	No. of contacts	Contact-arrangement	Suitable for	Part number
Female connector for crimp contacts order contacts separately fits into shell housing C see chapter 20	160		har-bus® 64 shroud	02 05 000 0004
	160		Male connector type R with 5 rows	02 05 000 0005
	160		Male connector type C with 5 rows	02 05 000 0003

Dimensions



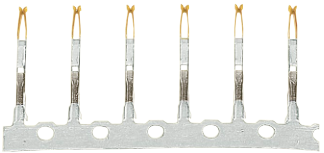


Identification	Part number	Performance levels according to IEC 61076-4-113. Explanation chapter 00	
		2	1
Female crimp contacts har-bus® 64			
Bandoliered contacts (approx. 5 ,000 pieces)		02 05 000 2511	02 05 000 1511
Bandoliered contacts (approx. 500 pieces)		02 05 000 2512	02 05 000 1512
Individual contacts[1)]		02 05 000 2513	02 05 000 1513

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

3.5 + 0.5 mm of insulation is stripped
For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)
Insertion, removal and crimping tools see chapter 30

Bandoliered contacts

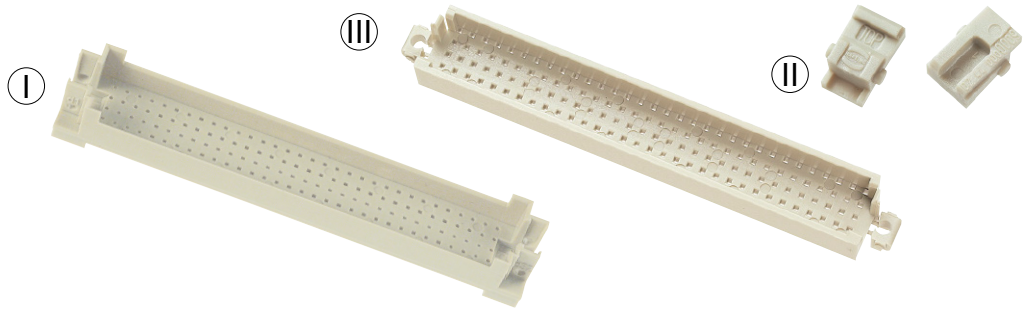


Individual contacts

[1)] Packaging unit 1,000 pieces

Number of contacts

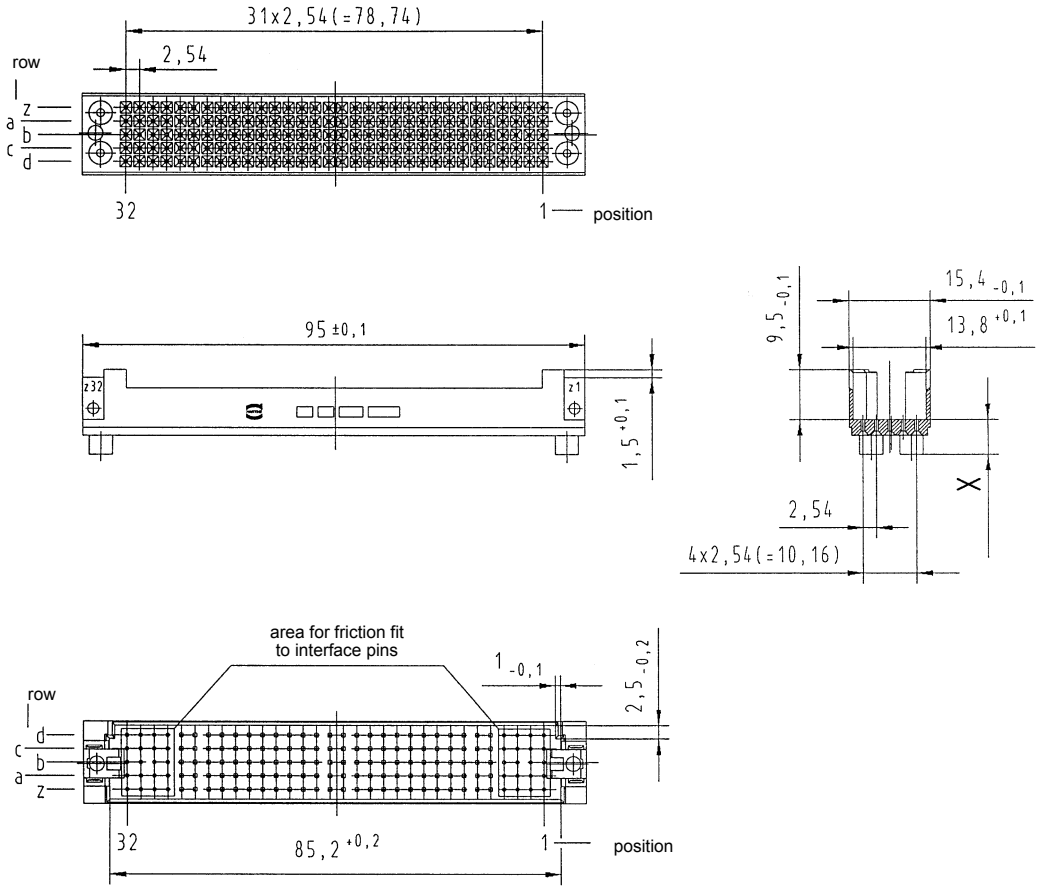
160



Pin shrouds

Identification	pcb-thickness ± 0.3	Dimension X - 0.1	Part number
Pin shrouds[1]			
(I)	1.6	7.8	02 44 000 0012
	2.2	7.2	02 44 000 0011
	2.8	6.6	02 44 000 0007
	3.4	6.0	02 44 000 0001
	4.0	5.4	02 44 000 0002
	4.6	4.8	02 44 000 0003
	5.2	4.2	02 44 000 0004
	5.8	3.6	02 44 000 0005
	6.4	3.0	02 44 000 0006
(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



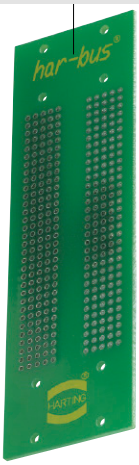
Dimensions in mm

[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

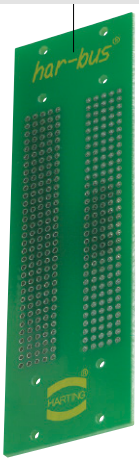
Female connector
with crimp contacts
02 05 000 0004

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

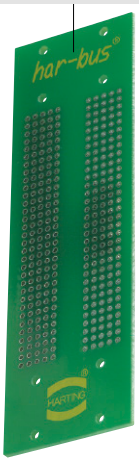
Locking lever
09 03 000 9913

Female connector
for crimp contacts
02 05 000 0004

Application 3

Female connector
02 02 160 2301

Backplane



Pin shroud
02 44 000 0007

Shroud insert
02 44 000 0008

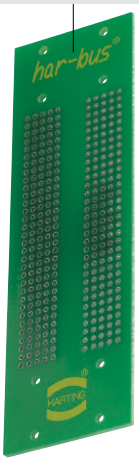
Female connector
09 73 296 6801

* Only for applications without rear P0-connector

Application 4

Female connector
02 02 160 2301

Backplane



Pin shroud
02 44 000 0007

Screw
M 2.5 x 30

Female connector
for crimp contacts
02 05 000 0004

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

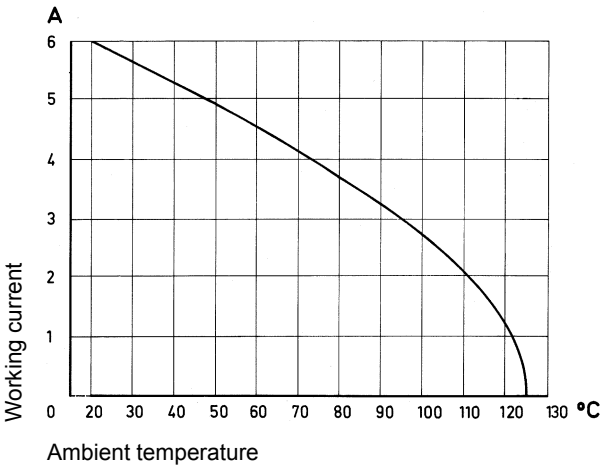
Number of contacts	
Type D	32
Type E	48
Contact spacing (mm)	
Type D	5,08
Type E	male connector 5.08 x 5.08 male connector 2.54 x 5.08 female connector 5.08 x 5.08
Working current see current carrying capacity chart	6 A max. 1 A max. for female connector type E angled
Clearance	
Types D and E	≥ 3.0 mm
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 ≤ 20 mΩ for female connector type E angled
Insulation resistance	≥ 10^{12} Ω for standard articles ≥ 10^{11} Ω for special NFF articles (with part-no. ending 222)
Temperature range The higher temperature limit includes the local ambient and heating effects of the contacts under load	– 55 °C … + 125 °C – 40 °C … + 105 °C for press-in connectors
Degree of protection for crimp terminal according to DIN 40 050	IP20
Electrical termination	Solder pins for pcb connections Ø 1.0 ± 0.1 mm according to IEC 60 326-3 Wrap posts 1 x 1 mm diagonal 1.34-1.45 mm 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 Compliant press-in terminations
PCB thickness	≥ 1.6 mm
Recommended PCB holes for press-in technology	see recommendation page 00.25 in acc. to EN 60 352-5
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)]

[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

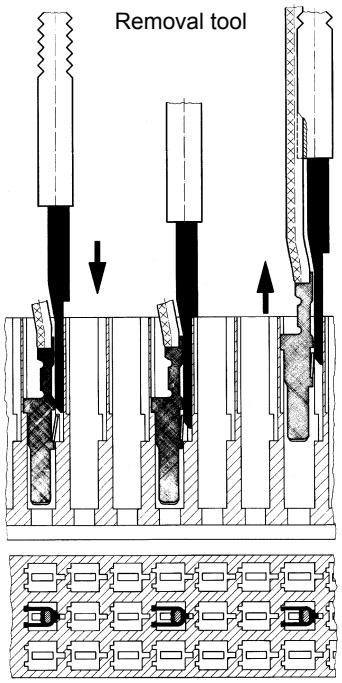


Fitting the crimp contacts

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

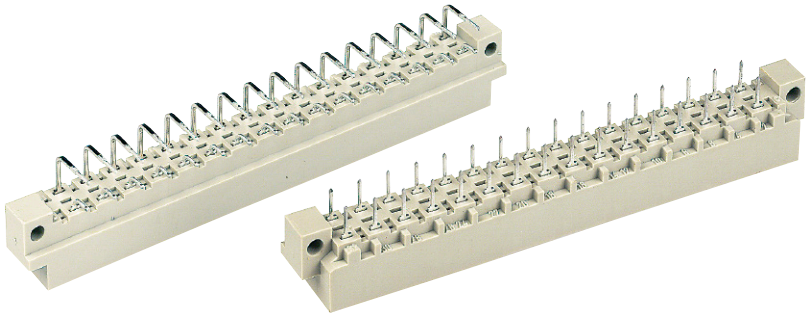
The removal tool is inserted into a slot on the termination side of the respective crimp cavity. This action compresses the contact retaining spring therefore the contact can then be easily withdrawn using a light pull on the wire. This action will cause no damage to the contact/wire which can be repositioned/refitted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



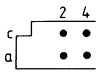
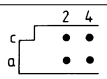
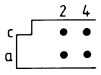
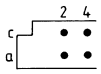
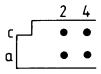
Mating conditions	see chapter 00
Coding systems	see chapter 00
Mounting clips	see chapter 00

Number of contacts

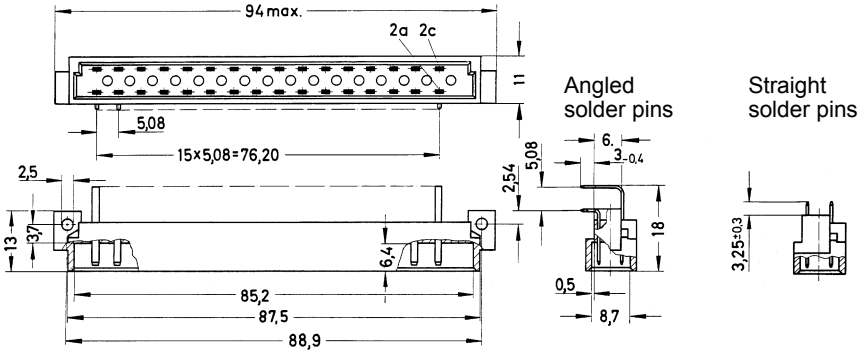
32



Male connectors

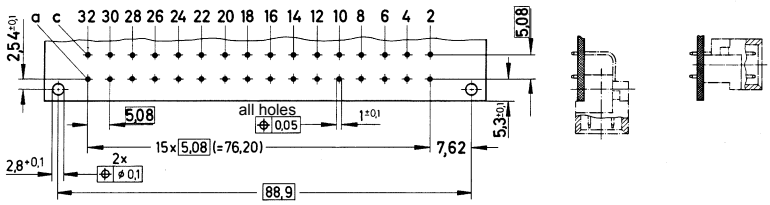
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins	32		09 04 132 7921	09 04 132 6921 09 04 332 6921[b] 09 04 632 6921[c]	09 04 132 2921
THR	32			09 04 332 6919[b][d]	
	30 + 2▲			09 04 132 6951 09 04 632 6951[c]	09 04 632 2951[c]
Male connector with straight solder pins	32			09 04 132 6922	
	30 + 2▲			09 04 132 6952	

Dimensions



Board drillings

Mounting side



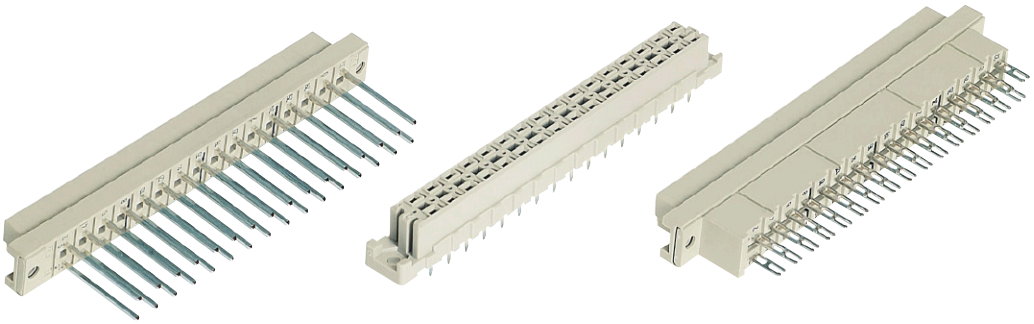
Dimensions in mm

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

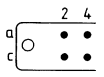
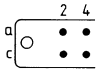
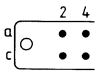
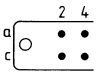
[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00
[d] CTI > 400

Number of contacts

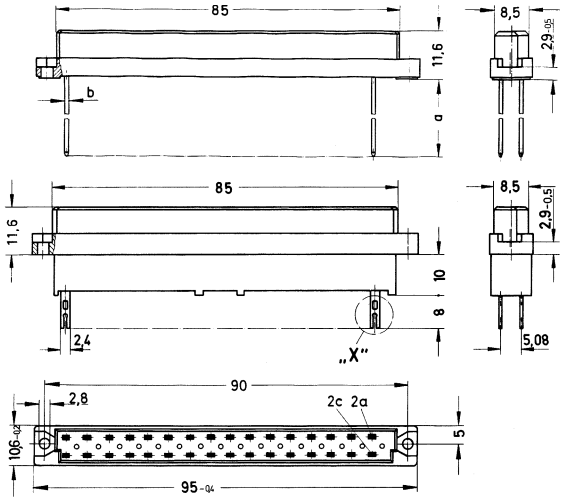
32



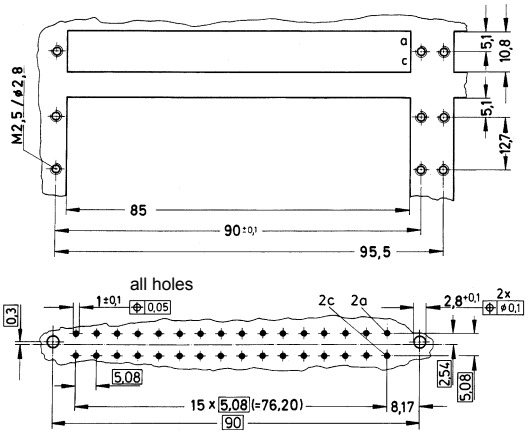
Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm	32		09 04 232 7832	09 04 232 6832 09 04 732 6832[c]	09 04 232 2832
Female connector with solder pins 4.5 mm	32		09 04 232 7831	09 04 232 6831 09 04 332 6831[b] 09 04 732 6831[c]	09 04 232 2831
Female connector with wrap posts 20 mm	32		09 04 232 7821	09 04 232 6821 09 04 732 6821[c]	09 04 232 2821
Female connector with solder lugs	32		09 04 232 7823	09 04 232 6823	09 04 232 2823

Dimensions



Panel cut out

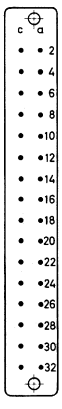


Board drillings

Mounting side

Contact arrangement

View from termination side



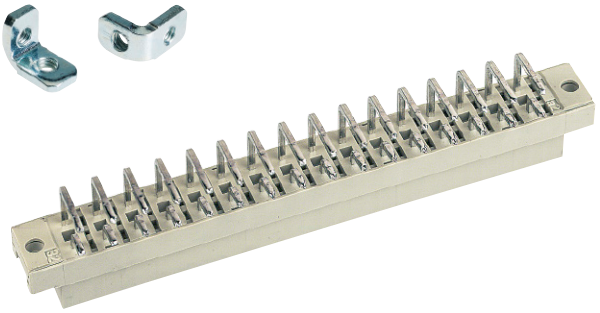
32

Dimensions in mm

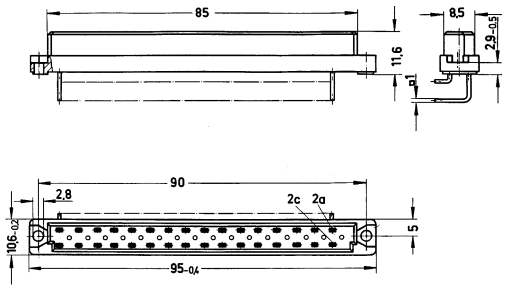
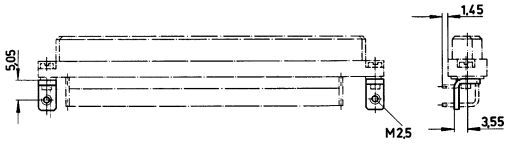
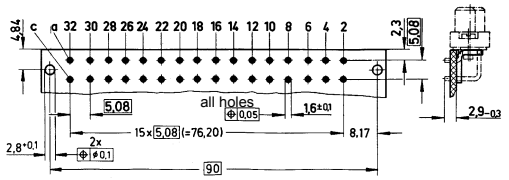
[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00

Number of contacts

32



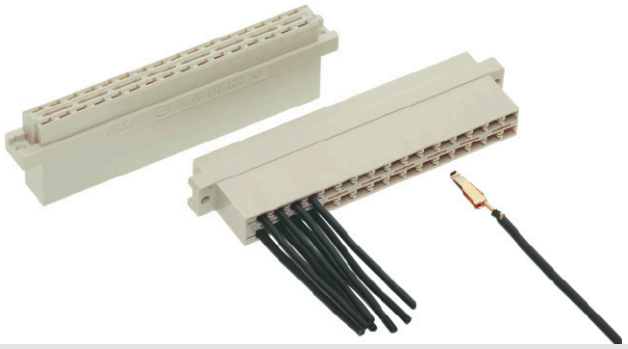
Female connectors

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00	
				2	1
Female connector with angled solder pins 1 x 1 mm	32			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					

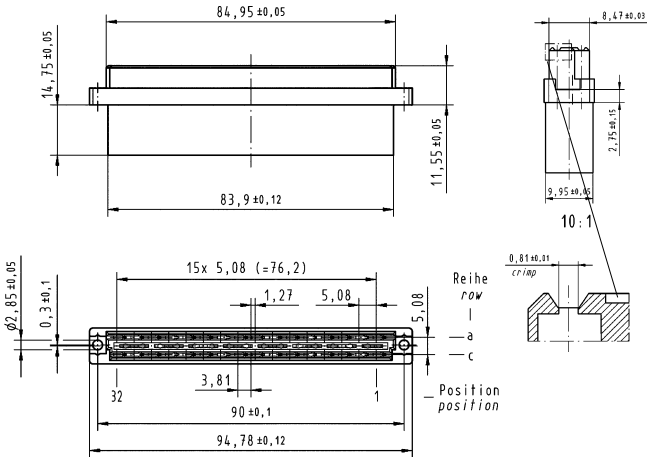
Dimensions in mm

Number of contacts

max. 32



Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts				
Order contacts separately				
	32	09 04 032 3213[f)]		
	32	09 04 532 3213[c)f)]		
Shell housing 09 03 096 0501 see chapter 20				

Identification	Identification Wire gauge	Part number	Performance levels according to IEC 60603-2. 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)]	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
Female contacts with solder lugs[2)] (lockable)				09 06 000 6420

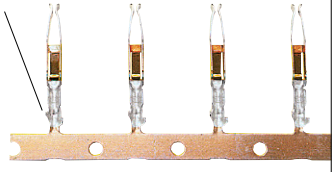
	Wire gauge mm²	AWG	Insulation ø mm
FC 1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	0.5 - 1.5	20 - 16	1.6 - 2.8

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

For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)

Insertion, removal and crimping tools see chapter 30

Identification



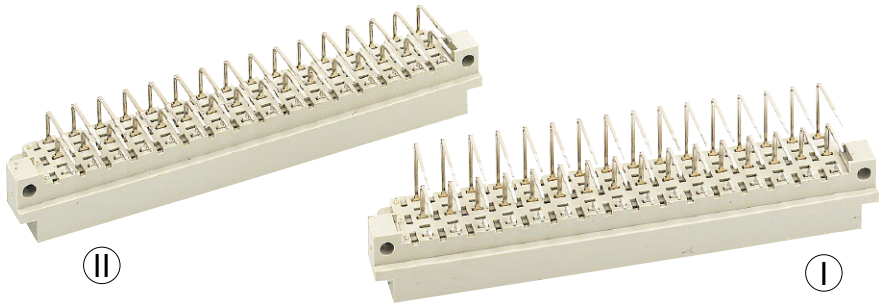
Bandoliered contacts

Individual contacts

[1)] Packaging unit 1,000 pieces
[2)] Solder contacts must not be used together with shell housing A. Special contact surface: 2 µm gold.
[c)] Connectors with coding see chapter 00
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

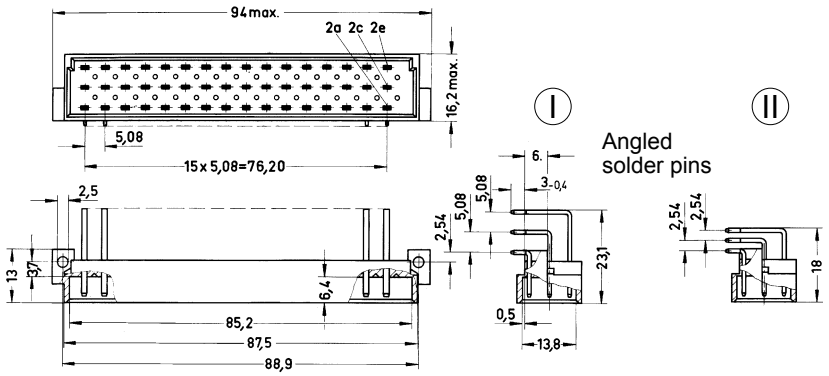
48



Male connectors

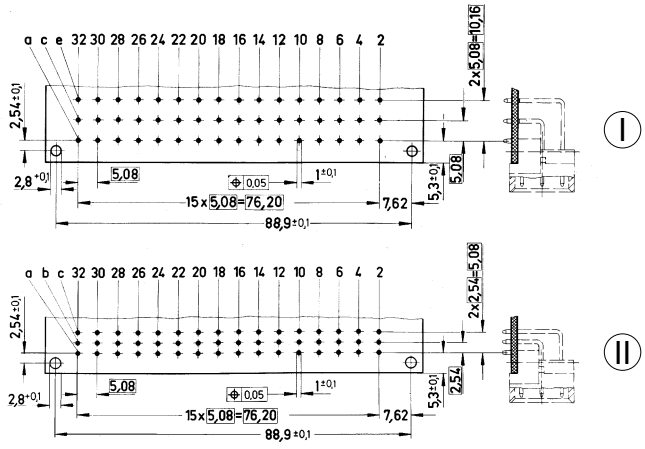
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins					
Row separation termination side 5.08 mm (I)	48		09 05 148 7921	09 05 148 6921 09 05 348 6921[b] 09 05 648 6921[c] 09 05 848 6921[b][c]	09 05 148 2921 09 05 648 2921[c]
	46 + 2▲			09 05 148 6951	
Row separation termination side 2.54 mm (II)	48		09 05 148 7931	09 05 148 6931 09 05 348 6931[b] 09 05 648 6931[c]	09 05 148 2931
THR	48			09 05 148 6920[d] 09 05 348 6920[b][d]	
	46 + 2▲			09 05 148 6961	

Dimensions



Board drillings

Mounting side



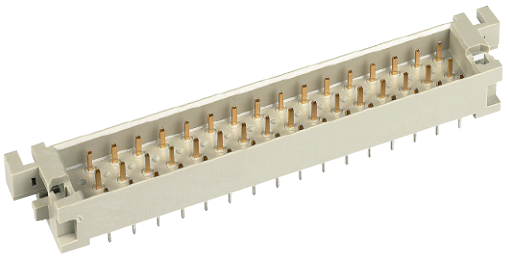
Dimensions in mm

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

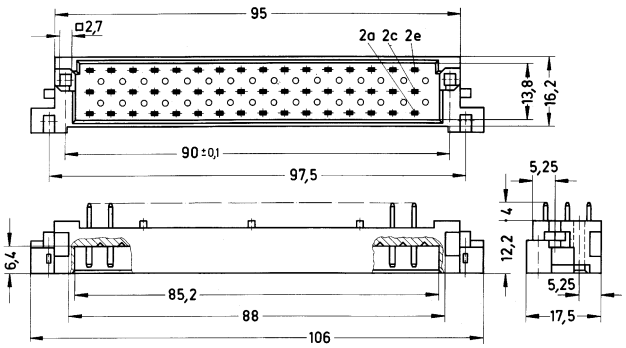
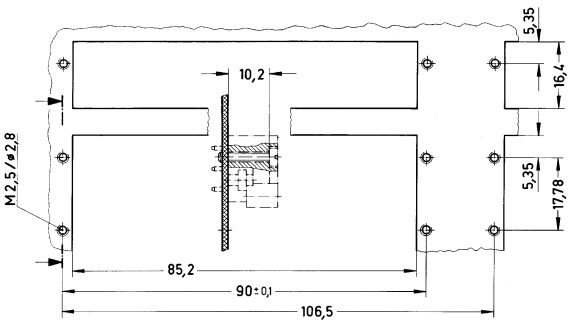
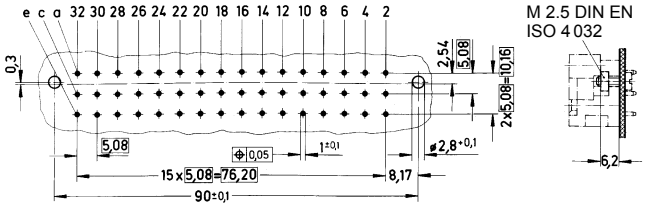
[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00
[d] CTI > 400

Number of contacts

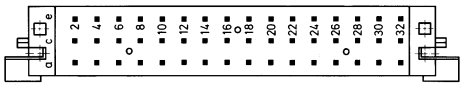
48



Interface connector I

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Interface connector I with solder pins 0.6 x 0.6 mm	48	Performance level 2 acc. to IEC 60 603-2 09 05 048 6924[f]		
Panel cut out				
Board drillings Mounting side				

Contact arrangement View from termination side

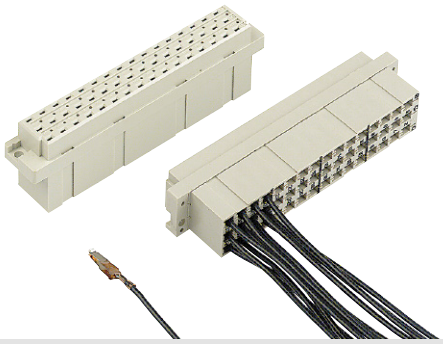


[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

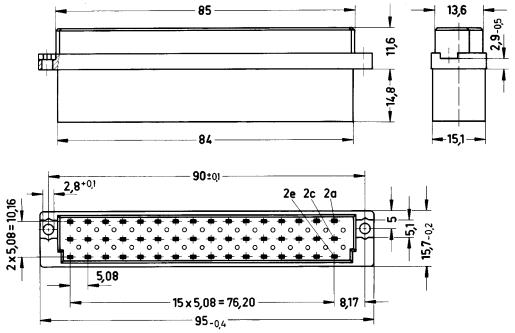
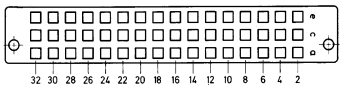
DIN Power up to 6 A

Number of contacts

max. 48



Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	48	09 05 048 3202[f] 09 05 548 3202[c]	 Contact arrangement View from termination side  Shell housing 09 05 048 0501 see chapter 20	

Identification	Identification Wire gauge	Part number Performance levels according to IEC 60603-2. 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]	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
Female contacts with solder lugs[2] (lockable)			09 06 000 6420

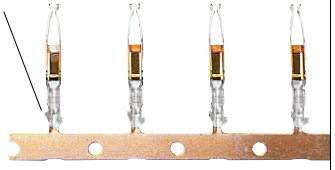
		Wire gauge mm²	AWG	Insulation ø mm
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8

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

For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)

Insertion, removal and crimping tools see chapter 30

Identification



Bandoliered contacts

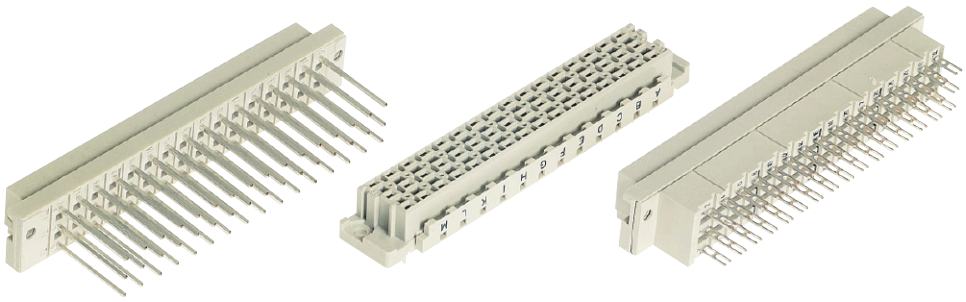
Individual contacts

[c] Connectors with coding see chapter 00
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

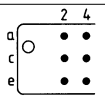
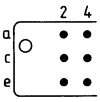
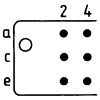
[1] Packaging unit 1,000 pieces
[2] Solder contacts must not be used together with shell housing A. Special contact surface: 2 µm gold.

Number of contacts

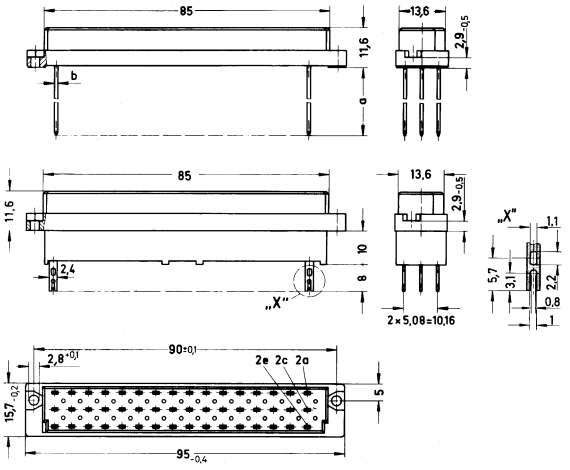
48



Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm	48		09 05 248 7832	09 05 248 6832	09 05 248 2832
4.5 mm	48			09 05 248 6831 09 05 348 6831[b] 09 05 748 6831[c] 09 05 848 6831[b][c]	09 05 248 2831 09 05 748 2831[c]
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 4.5 mm	48				09 05 248 2854
11.5 mm	48			09 05 248 6851•	09 05 248 2851•

Dimensions

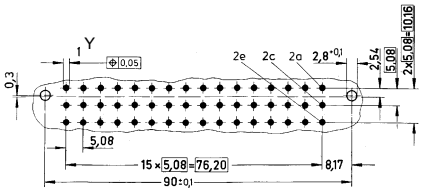


a	b	
2.9	0.8 x 0.53	Solder pins
4.5	0.8 x 0.53	
20	□1	Wrap posts
4.5	0.6 x 0.6	Press-in pins
11.5	0.6 x 0.6	

Solder lugs

Board drillings

Mounting side



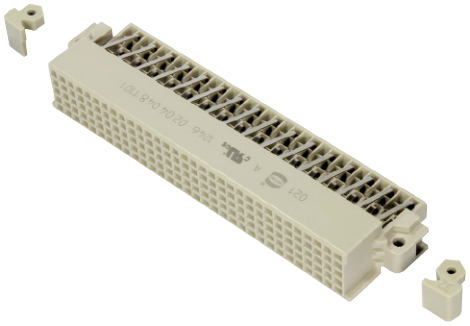
	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Dimensions in mm

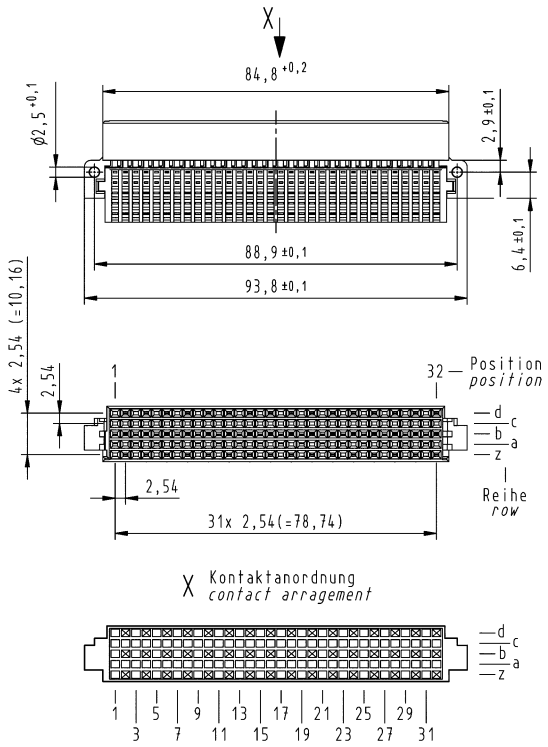
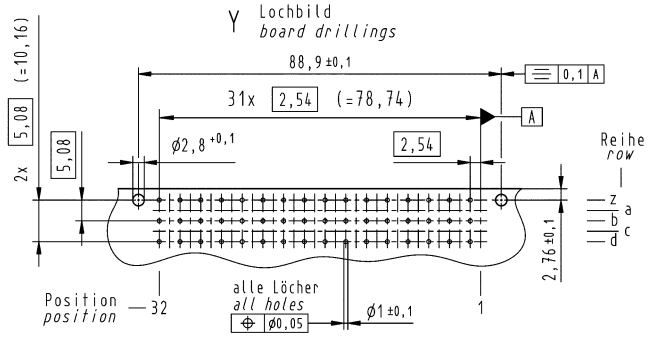
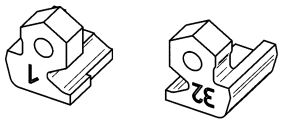
• Wrap posts for interfacing selectively gold plated (performance level 2)
[b] Connectors with snap-in clips see chapter 00
[c] Connectors with coding see chapter 00

Number of contacts

48



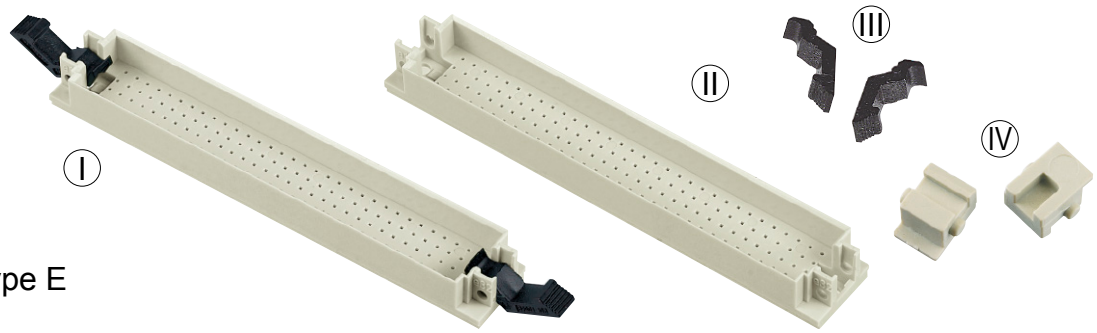
Female connectors

Identification	Part number	Drawing	Dimensions in mm
Female connector with angled solder pins	Performance level 1 02 04 048 1101		
Board drillings Mounting side			
Fixing bracket Position 1 Position 32	02 09 000 0018 02 09 000 0017		Dimensions in mm

Pin shroud

Number of contacts

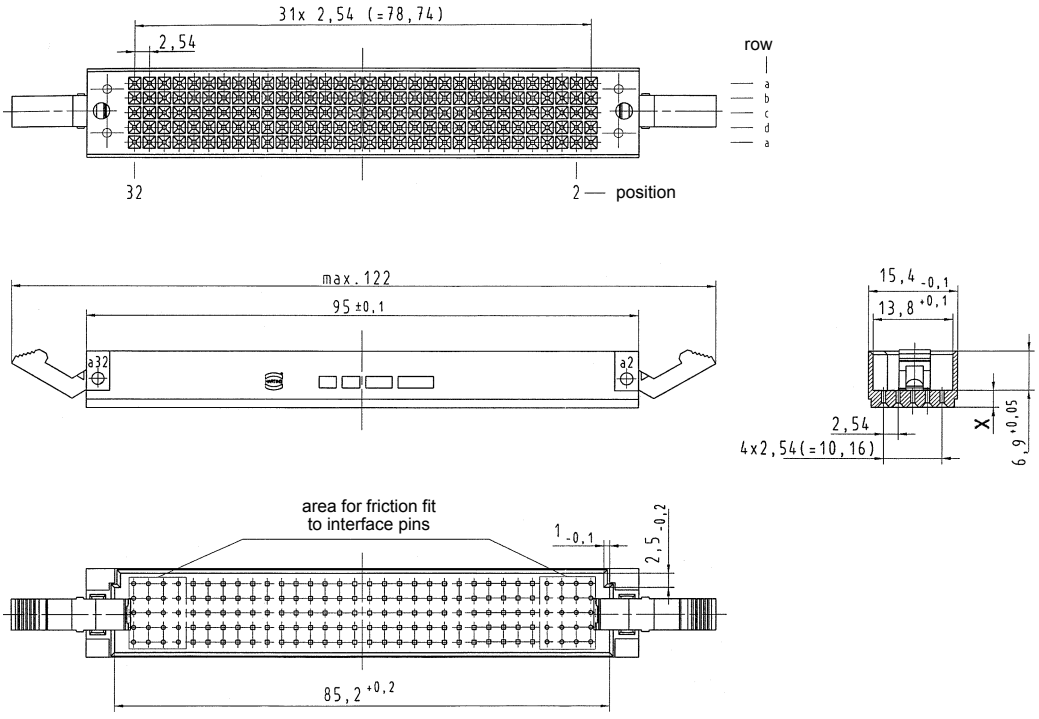
48



Pin shrouds for type E with press-in pins

Identification	pcb-thickness + 0.2 / - 0.3	Dimension X - 0.1	Part number
Pin shrouds			
(I) with locking levers	2.8	3.6	09 05 000 9924
(II) without locking levers	2.8	3.6	09 05 000 9914[f]
(I) with locking levers	3.4	3.0	09 05 000 9922
(II) without locking levers	3.4	3.0	09 05 000 9912[f]
(III) Locking lever for female connector type E[1]			09 03 000 9914
(IV) Fixing brackets for shell housing C[1]			09 03 000 9921[f]

Dimensions



Dimensions in mm

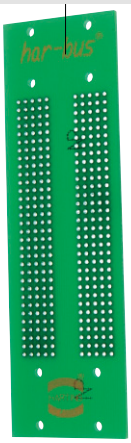
[1] order 2 pieces per connector
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Application examples type E

Application 1

Female connector
09 05 248 6851

Backplane



Pin shroud
09 05 000 9912

Fixing brackets
09 03 000 9921

Shell housing C
09 05 048 0501

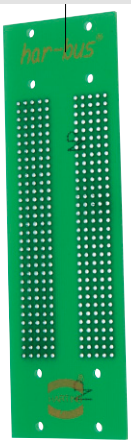
Female connector
with crimp contacts
09 05 048 3202

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

Application 2

Female connector
09 05 248 6851

Backplane



Pin shroud
09 05 000 9912

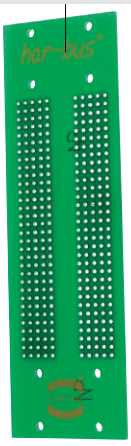
Locking lever
09 03 000 9914

Female connector
for crimp contacts
09 05 048 3202

Application 3

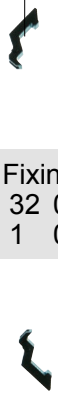
Female connector
09 05 248 6851

Backplane



Pin shroud
09 05 000 9912

Locking lever
09 03 000 9914



Female connector
02 04 048 1101

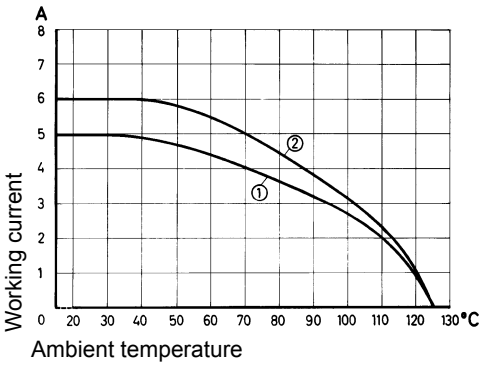
Fixing brackets
Pos. 32 02 09 000 0017
Pos. 1 02 09 000 0018

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 for standard articles
Termination	Crimp terminal 0.09-1.5 mm²
Materials	
Mouldings and hoods	Thermoplastic resin, glass-fibre filled
Contacts	Copper alloy

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 female connectors with wrap posts 1 x 1 mm

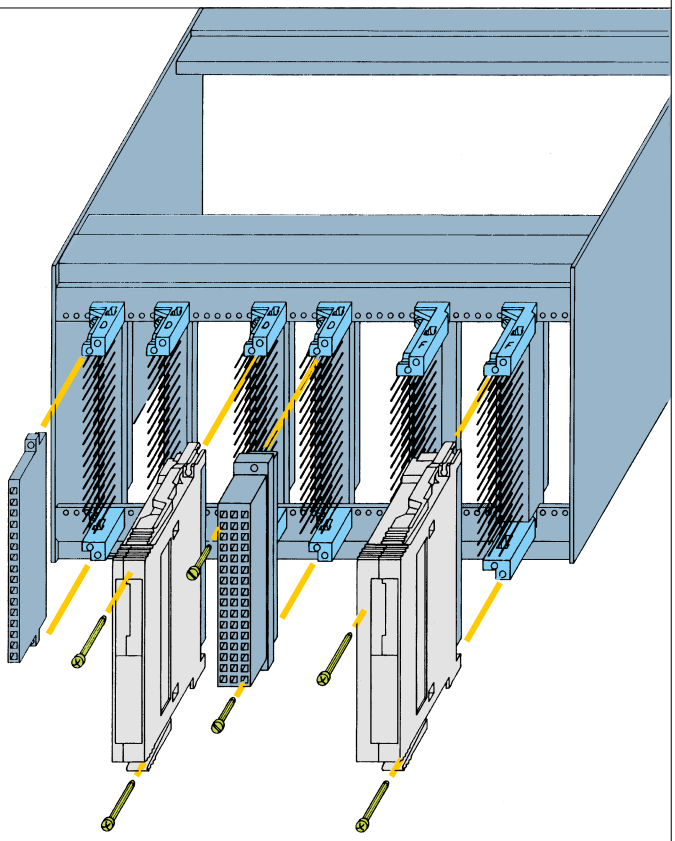
The problem of interfacing systems designed for the distribution or collection of electronic signals can be overcome by the use of piggyback connectors. Designed to be mounted on the rear of DIN 41 612 type wire wrap female connectors (1 x 1 mm posts) these piggyback elements can be used to terminate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

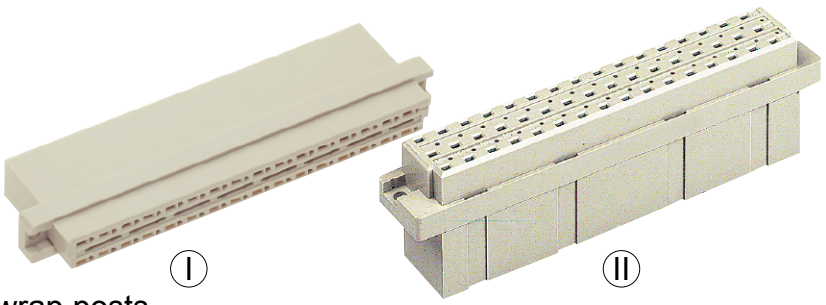
After crimping they can be easily inserted into the chambers of the connector body with the aid of an insertion tool. Insertion errors can be simply rectified with the use of a removal tool.

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.

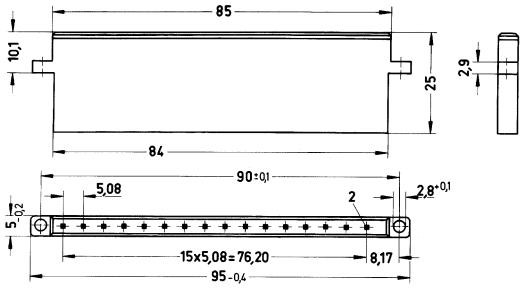
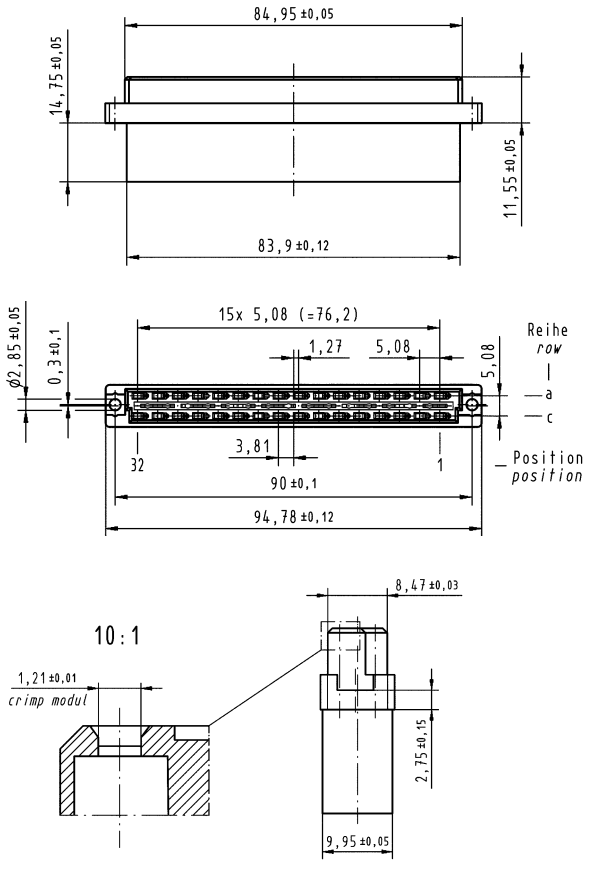
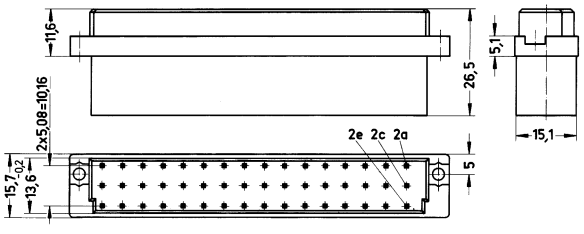


Number of contacts

max. 48



Piggyback connectors for 1 x 1 mm wrap posts

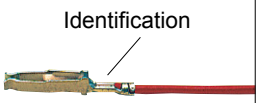
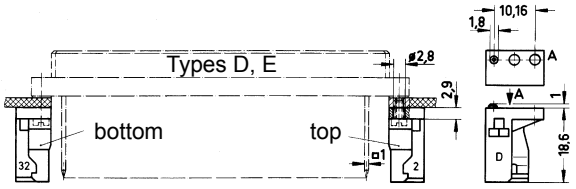
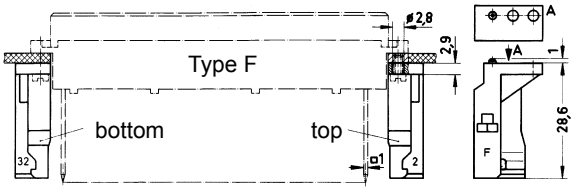
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Piggyback connector for crimp contacts Order contacts separately	16	09 04 016 3201[f]		
I	32	09 04 032 3215[f]		
II	48	09 05 048 3204[f]		

[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

max. 48

Accessories

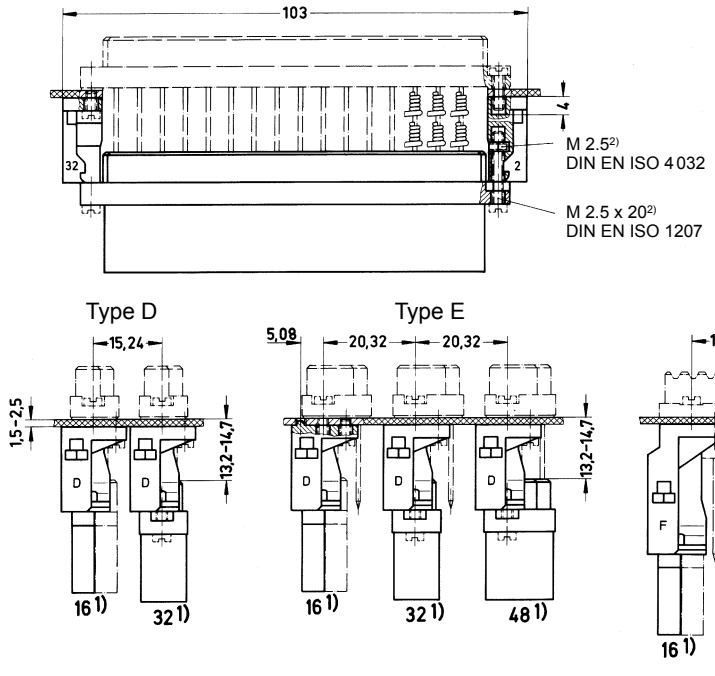
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female FC crimp contacts individual contacts[1] FC1 FC2 FC3 Bandoliered contacts (approx. 2,500 pcs.) FC1 FC2 FC3 **Mateable with 1 x 1 mm wrap posts**		09 06 000 6464 09 06 000 6461 09 06 000 6462 09 06 000 6454 09 06 000 6451 09 06 000 6452	Identification 1: Wire gauge 0.09-0.25 mm², AWG 28-24, Insulations ø 0.7-1.5 mm Identification 2: Wire gauge 0.14-0.56 mm², AWG 26-20, Insulations ø 0.8-2.0 mm Identification 3: Wire gauge 0.50-1.50 mm², AWG 20-16, Insulations ø 1.6-2.8 mm Identification 1: Wire gauge 0.09-0.25 mm², AWG 28-34, Insulations ø 0.7-1.5 mm Identification 2: Wire gauge 0.14-0.56 mm², AWG 26-20, Insulations ø 0.8-2.0 mm Identification 3: Wire gauge 0.50-1.50 mm², AWG 20-16, Insulations ø 1.6-2.8 mm 3.5 + 0.5 mm of insulation is stripped from the wires to be crimped. For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2) Crimping tools see chapter 30 	
Distance fixing brackets for female connectors Type D Type E		top (pos. 2) 09 04 000 9907[f] bottom (pos. 32) 09 04 000 9906[f]		
Type F I II		top (pos. 2) 09 06 000 9936[f] bottom (pos. 32) 09 06 000 9937[f]		

[1] Packaging unit 1,000 pieces
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

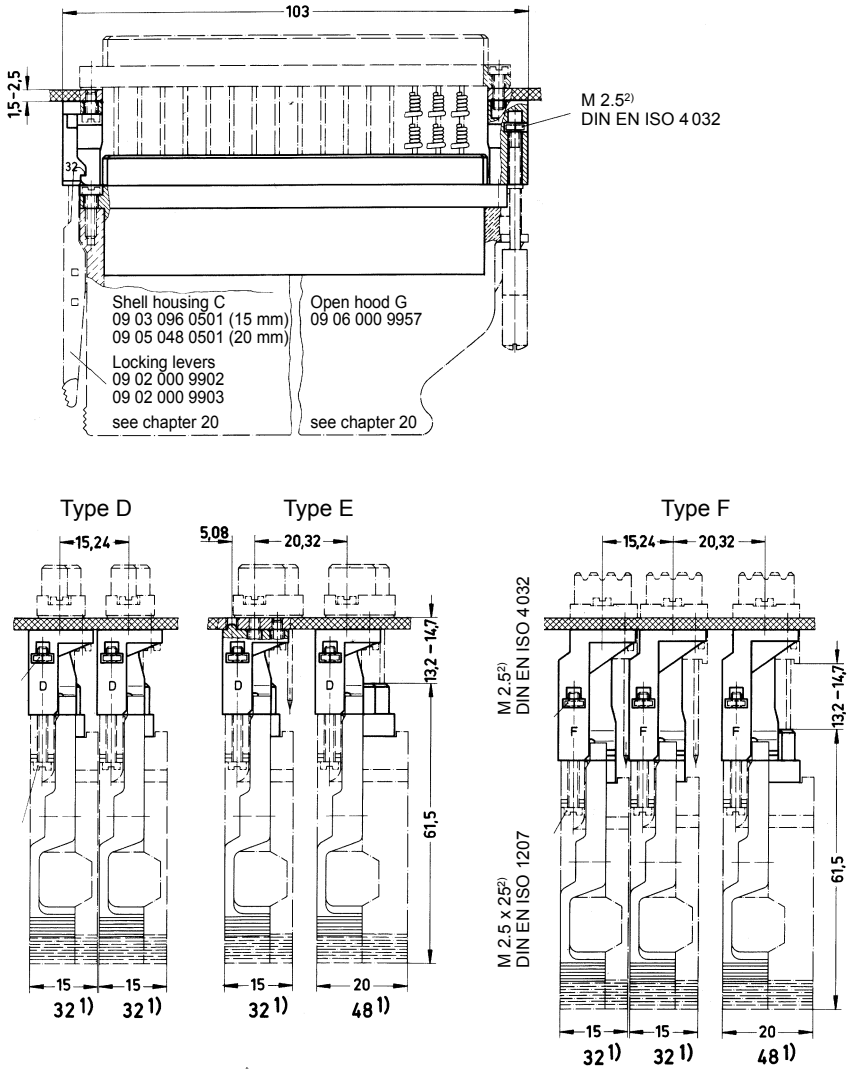
Identification	Drawing	Dimensions in mm

Mounting examples of piggyback connectors

without housings



with housings



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

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

Insulation resistance

≥ 10^{12} Ω for standard articles
≥ 10^{11} Ω for special NFF articles (with part-no. ending 222)

Temperature range

– 55 °C … + 125 °C

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

– 40 °C … + 105 °C for press-in connector

During reflow soldering

max. + 240 °C for 15 s for THR connectors

Electrical termination

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
Angled solder pins 1 x 1 mm for pcb connections Ø 1.6 ± 0.1 mm
Solder lugs
Compliant press-in terminations

pcb thickness ≥ 1.6 mm

Recommended pcb holes for press-in technology

See recommendation page 00.25 in acc. to EN 60 352-5

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

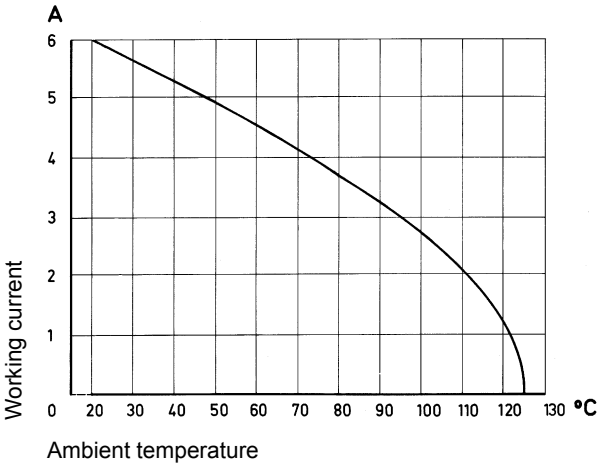
Selectively plated according to performance level[1)]

[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

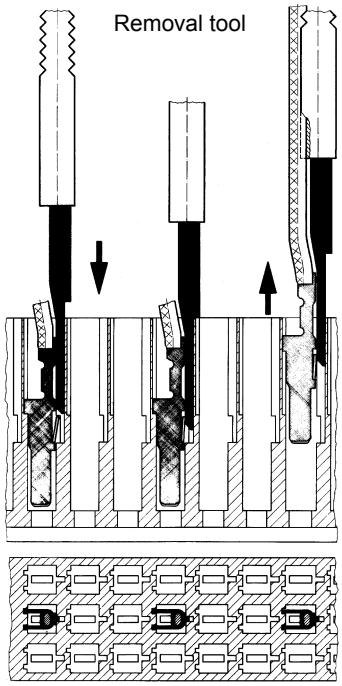


Fitting the crimp contacts

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

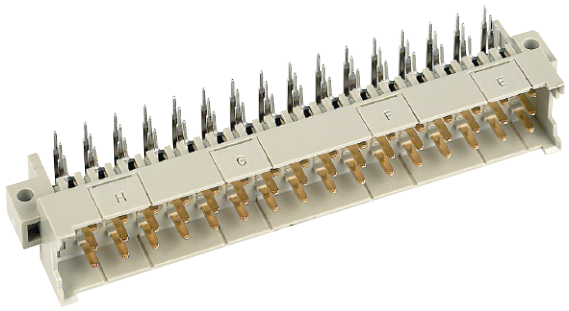
The removal tool is inserted into a slot on the termination side of the respective crimp cavity. This action compresses the contact retaining spring therefore the contact can then be easily withdrawn using a light pull on the wire. This action will cause no damage to the contact/wire which can be repositioned/refitted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



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

Number of contacts

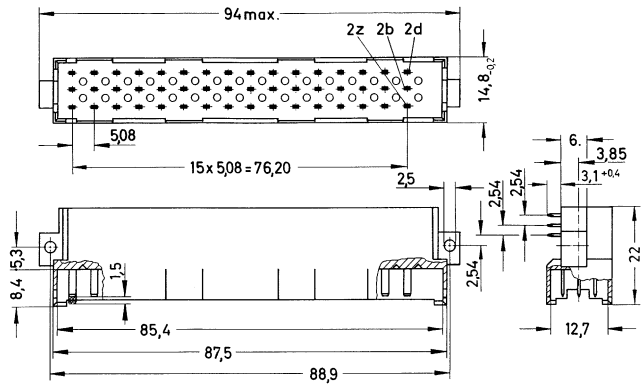
48, 32



Male connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Male connector with angled solder pins[1)]	48		09 06 148 7901	09 06 148 6901 09 06 148 6901 222[f)] 09 06 348 6901[b)] 09 06 348 6901 222[b)f)]	09 06 148 2901 09 06 148 2901 222[f)]
THR	48			09 06 148 6951[d)] 09 06 348 6951[b)d)]	09 06 348 2951[b)d)]
	32		09 06 132 7901 09 06 332 7901[b)]	09 06 132 6901 09 06 132 6901 222[f)]	09 06 132 2901
	32		09 06 132 7931	09 06 132 6931 09 06 132 6931 222[f)] 09 06 332 6931[b)]	09 06 132 2931 09 06 332 2931[b)]
1 leading contact (position z 32)	47 + 1			09 06 148 6921 09 06 348 6921[b)]	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 6925 222[f)]	09 06 148 2925

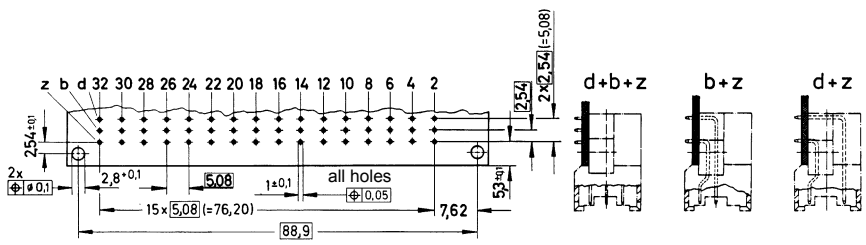
Dimensions



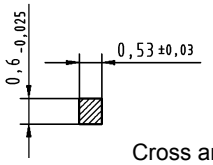
Angled solder pins

Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row z, b, d: A = 0.29 - 0.34 mm²

Dimensions in mm

Other contact arrangements on request

[1)] With shroud coding, see also chapter 00

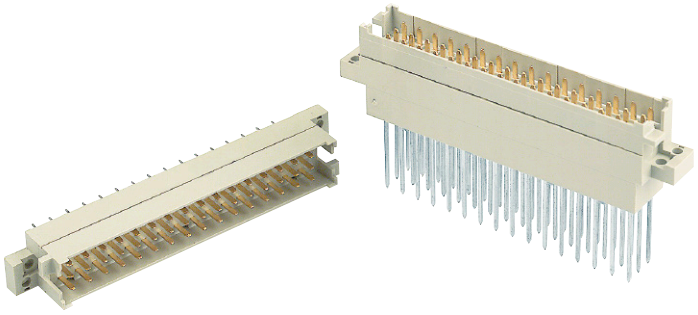
[b)] Connectors with snap-in clips see chapter 00

[d)] CTI > 400

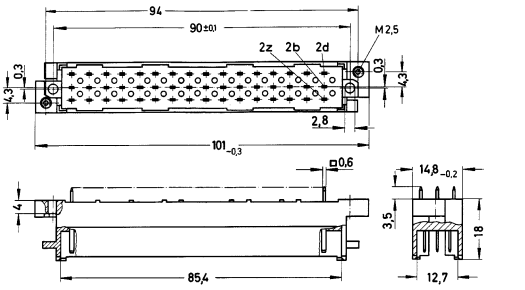
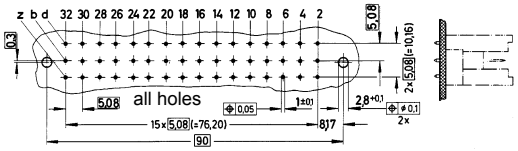
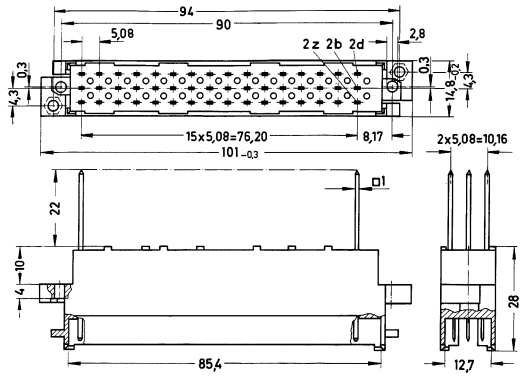
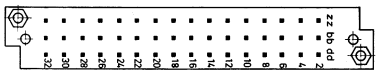
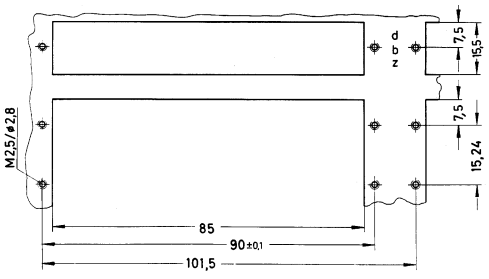
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

48, 32



Interface connectors I

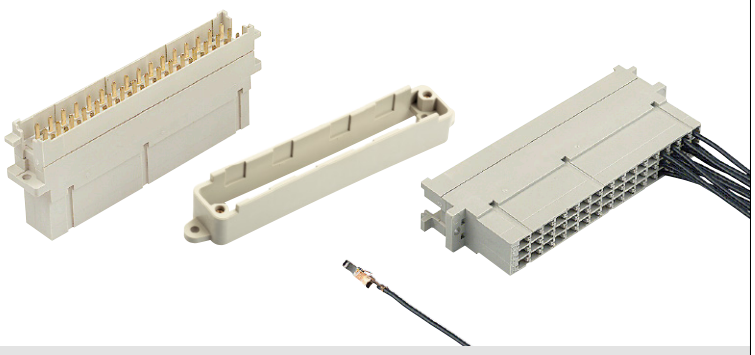
Identification	No. of contacts	Contact arrangement	Part number	Drawing	Dimensions in mm
Interface connector I with solder pins[1] 0.6 x 0.6 mm			Performance level 1*		
	48		09 06 048 2905[f]		
	32		09 06 032 2905[f]		
	32		09 06 032 2941[f]		
Board drillings Mounting side					
Interface connector I with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

DIN Power up to 6 A

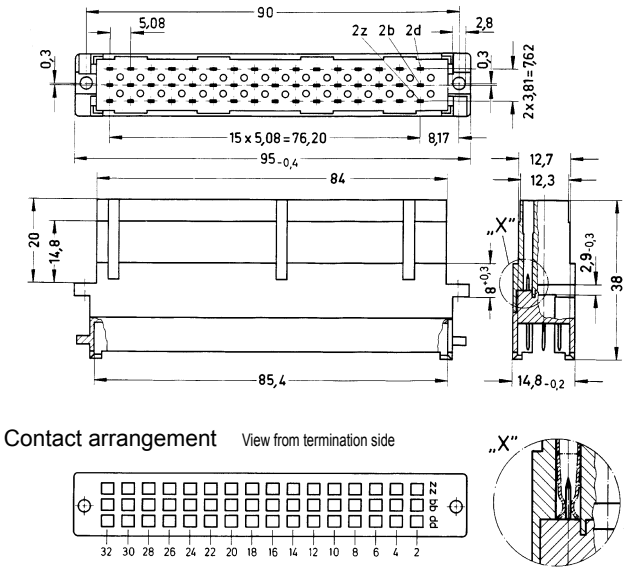
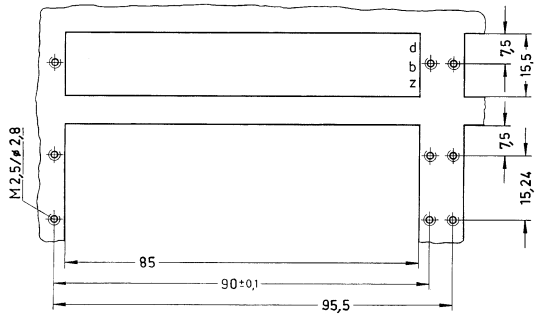
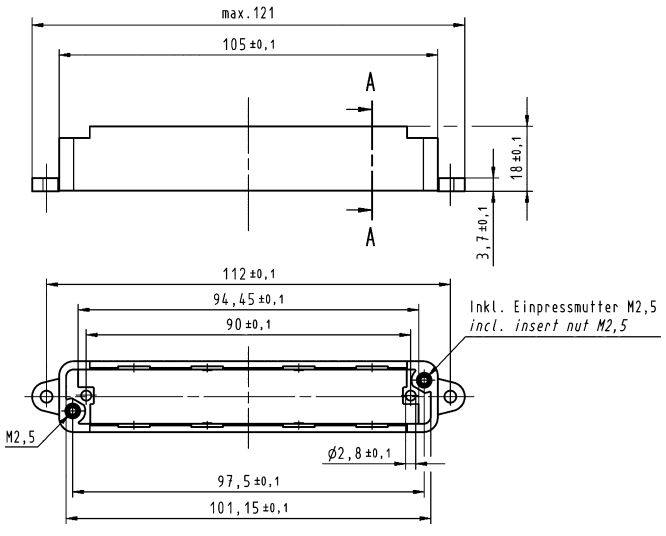
* Acc. to IEC 60 603-2, performance level 2 on request
[1] With shroud coding, see also chapter 00
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

48



Interface connector I

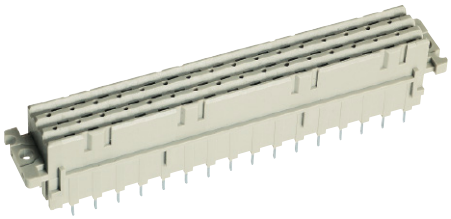
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Interface connector I utilising female crimp contacts[1)] Order crimp contacts separately see page 03.33 Shell housing see chapter 20	48	Performance level 1 acc. to IEC 60 603-2 09 06 048 2906[f)]		
Panel cut out				
Shroud[1)] for screw-fixing of shell housing D20 plastic or D20 metallised . The shroud is assembled onto the Interface connector I and is screwfixed onto the pcb or to the rack.		09 06 001 9964		

DIN Power up to 6 A

[1)] With shroud coding, see also chapter 00
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

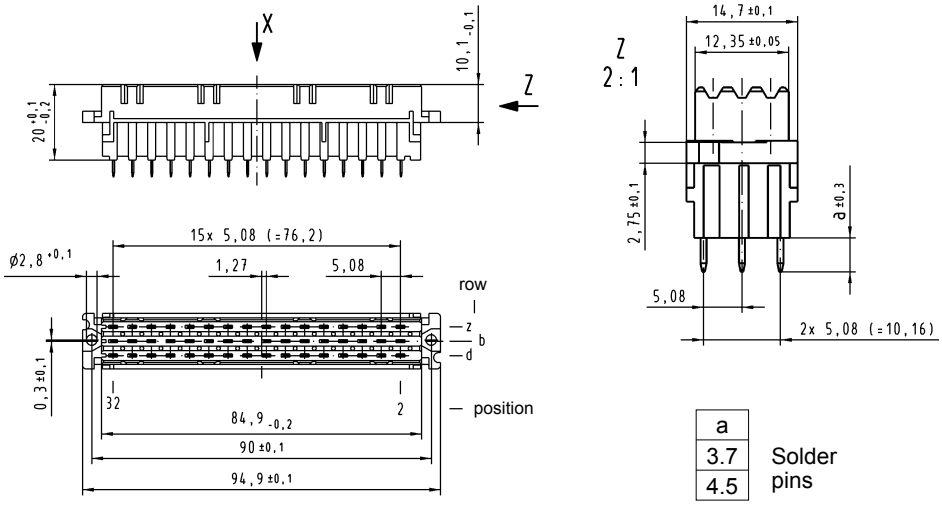
48, 32



Female connectors

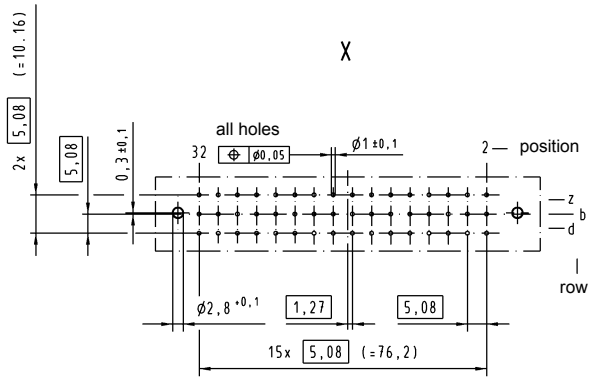
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60603-2. Explanation chapter 00 2	1
Female connector with solder pins 3.7 mm[1)]	48			09 06 248 6848	09 06 248 2848
	32			09 06 232 6848	09 06 232 2848
	32			09 06 232 6858	
Female connector with solder pins 4.5 mm[1)]	48		09 06 248 7835	09 06 248 6835	09 06 248 2835
	32			09 06 232 6835	09 06 232 2835
	32			09 06 232 6845	09 06 232 2845

Dimensions



Board drillings

Mounting side

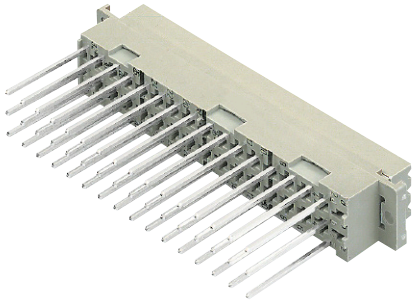


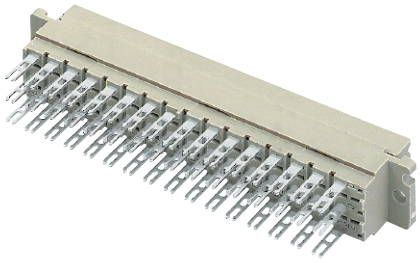
Dimensions in mm

[1)] With shroud coding, see also chapter 00

Number of contacts

48, 32

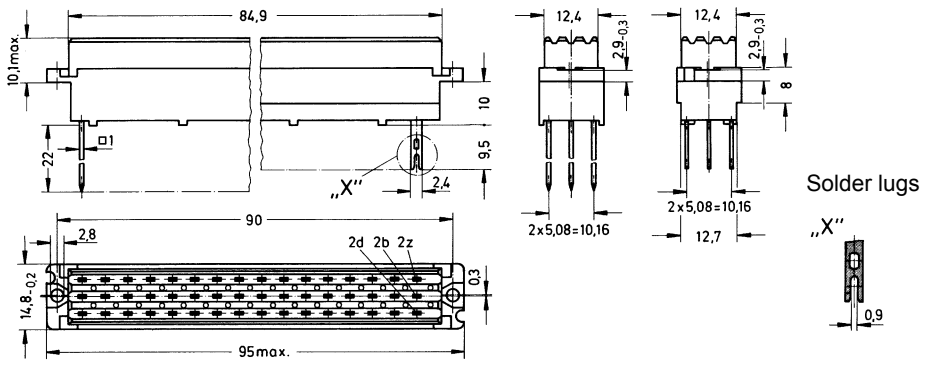




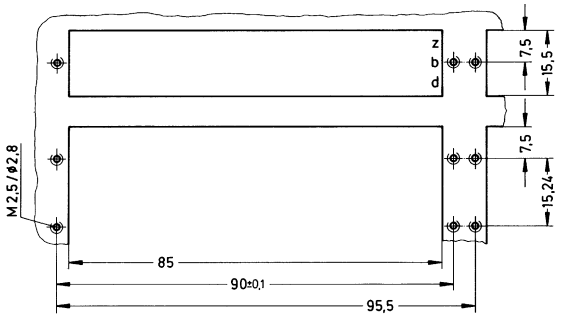
Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Female connector with wrap posts 22 mm	48		09 06 248 7821	09 06 248 6821	09 06 248 2821 09 06 248 2821 222[f]
	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

Dimensions

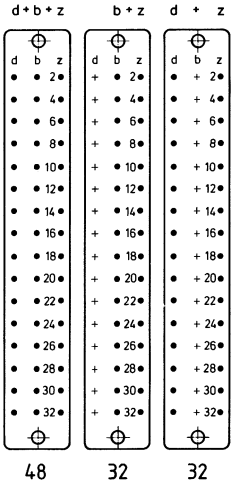


Panel cut out



Contact arrangement

View from termination side



Dimensions in mm

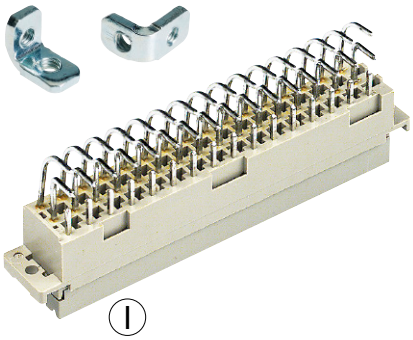
Identification strips for female connectors with wrap posts 09 06 000 9939

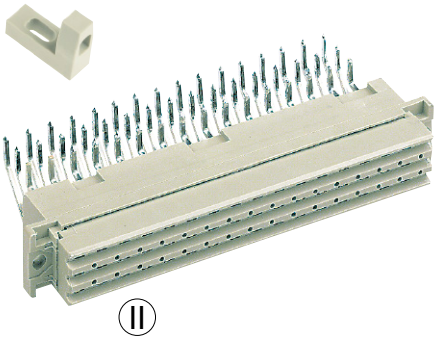
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

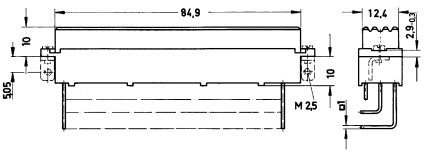
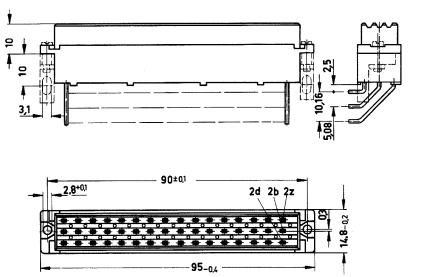
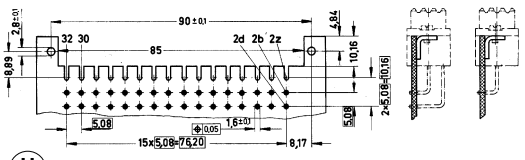
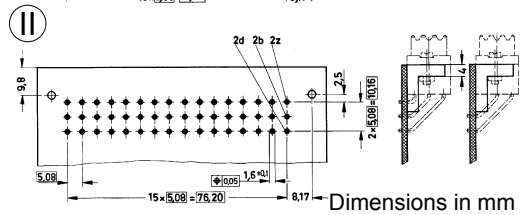
Number of contacts

48, 32

Female connectors

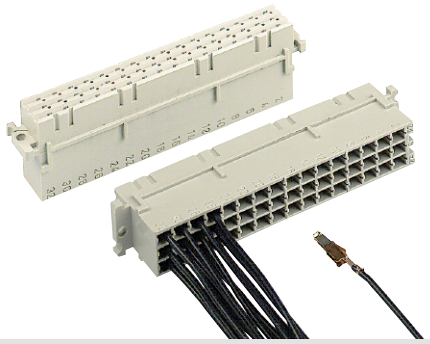




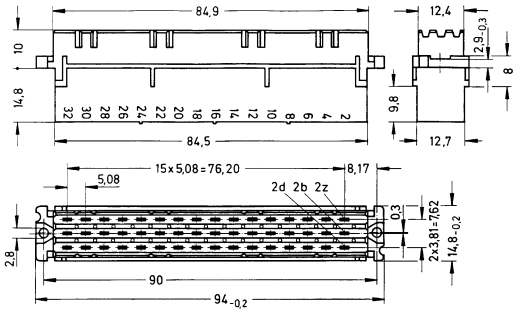
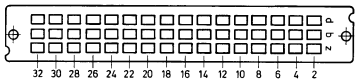
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Female connector with angled solder pins 1 x 1 mm	48	I		09 06 248 6826	
	32	I		09 06 232 6826	
	48	II	Performance level 3 on request	09 06 248 6836	Performance level 1 on request
	32	II		09 06 232 6846	
	32	II		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

max. 48



Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts[1)] Order contacts separately	48	09 06 248 3201 09 06 248 3201 222[f)]	 Contact arrangement View from termination side  Shell housing see chapter 20	

Identification	Identification Wire gauge	Part number Performance levels according to IEC 60603-2. 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[2)]	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
Female contacts with solder lugs[3)] (lockable)			09 06 000 6420

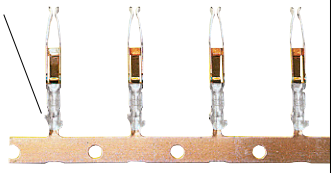
		Wire gauge mm²	AWG	Insulation ø mm
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8

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

For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)

Insertion, removal and crimping tools see chapter 30

Identification



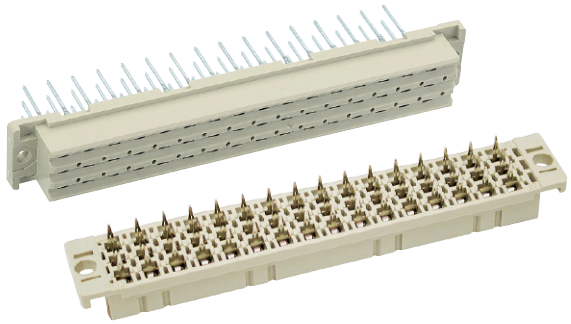
Bandoliered contacts

Individual contacts

[1)] With shroud coding, see also chapter 00
[2)] Packaging unit 1,000 pieces
[3)] Solder contacts must not be used together with shell housing A. Special contact surface: 2 µm gold.
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

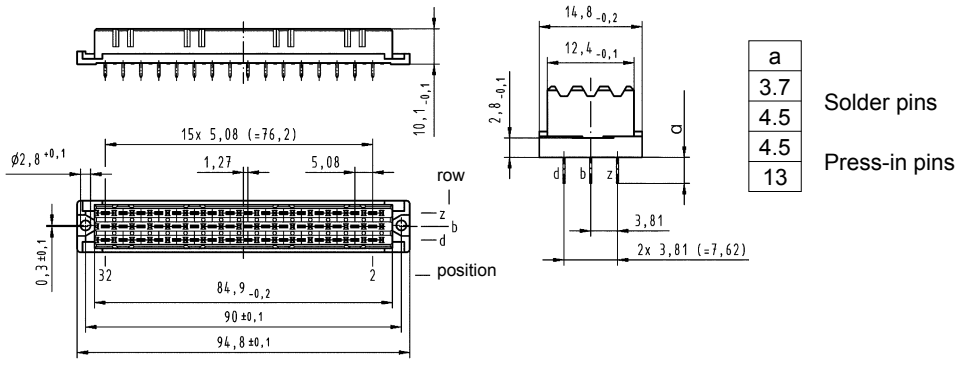
48, 32



Female connectors

Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Female connector[1)] "low profile" with solder pins 3.7 mm	48		09 06 248 7833	09 06 248 6833 09 06 248 6833 222[f)]	09 06 248 2833 09 06 248 2833 222[f)]
	32			09 06 232 6833	
	32			09 06 232 6893	
Female connector[1)] "low profile" with solder pins 4.5 mm	48			09 06 248 6834 09 06 248 6834 222[f)]	09 06 248 2834
	32			09 06 232 6834	
	32		09 06 232 7894	09 06 232 6894	09 06 232 2894
Female connector[1)] "low profile" with press-in pins 4.5 mm	48		09 06 248 7832	09 06 248 6832	09 06 248 2832 09 06 248 2832 222[f)]
	32			09 06 232 6832	09 06 232 2832
	32			09 06 232 6892	
Female connector "low profile" with press-in pins 13 mm	48			09 06 248 6837[w)] 09 06 248 6838*	
	32			09 06 232 6897[w)]	

Dimensions



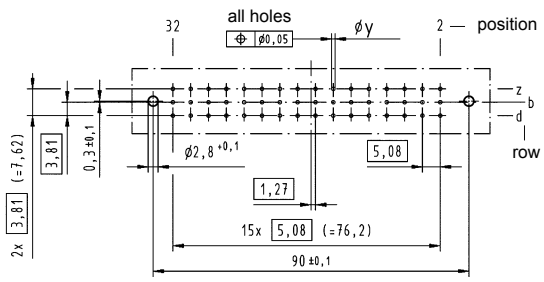
a
3.7
4.5
4.5
13

Solder pins

Press-in pins

Board drillings

Mounting side



	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Dimensions in mm

* Wrap posts for interfacing selectively gold plated (performance level 2)
[1)] With shroud coding, see also chapter 00
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2
[w)] Wrap posts not for interfacing, no performance level

Notes

Pin shroud

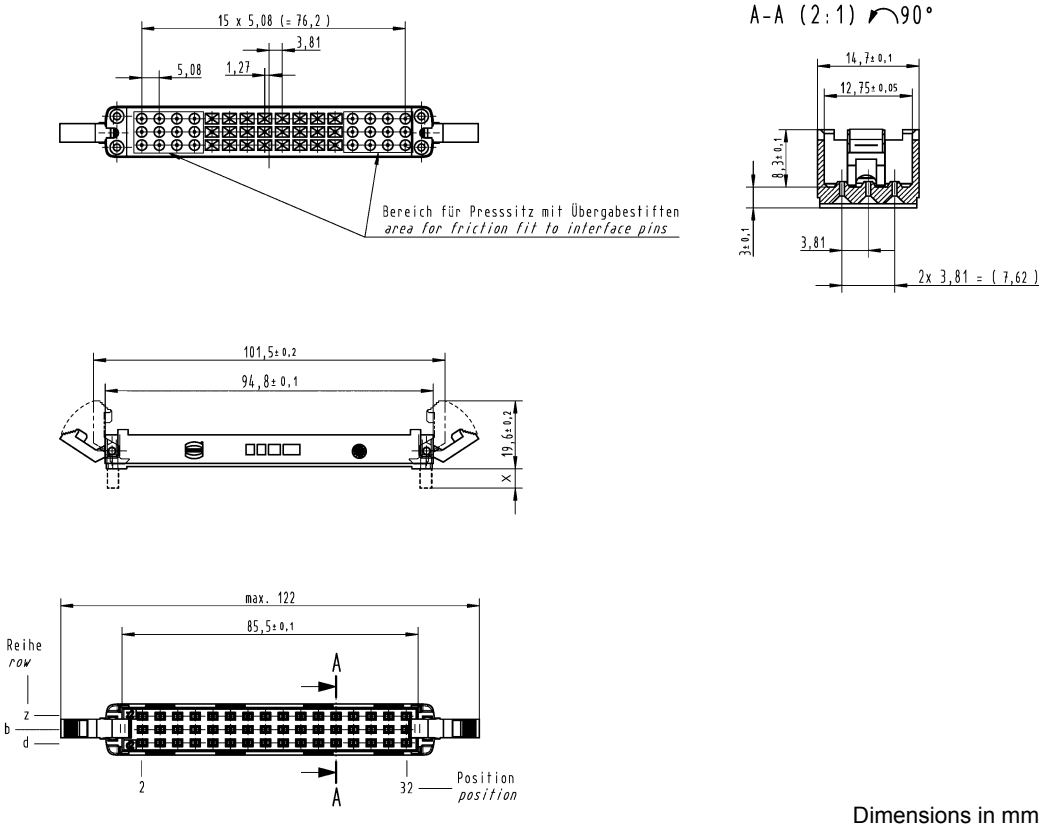
Number of contacts

48

Pin shrouds
for type F “low profile”
with press-in pins 13 mm

Identification	pcb-thickness ± 10 %	Dimension X ± 0.1	Part number
Pin shrouds			
(I) with locking levers[2] and press-in fixing	1.6 - 2.4	1.6	09 06 002 9902
(I) without locking levers for screw fixing	1.6 - 2.4	1.6	09 06 002 9912
(I) with locking levers[2] and press-in fixing	3.2 - 4.0	0	09 06 002 9901
(I) without locking levers for screw fixing	3.2 - 4.0	0	09 06 002 9911
(II) Locking lever for female connector type F[1]			09 06 001 9946

Dimensions



Dimensions in mm

[1] order 2 pieces per connector
[2] Press-in tools see chapter 30

DIN Power up to 6 A

Pin shroud

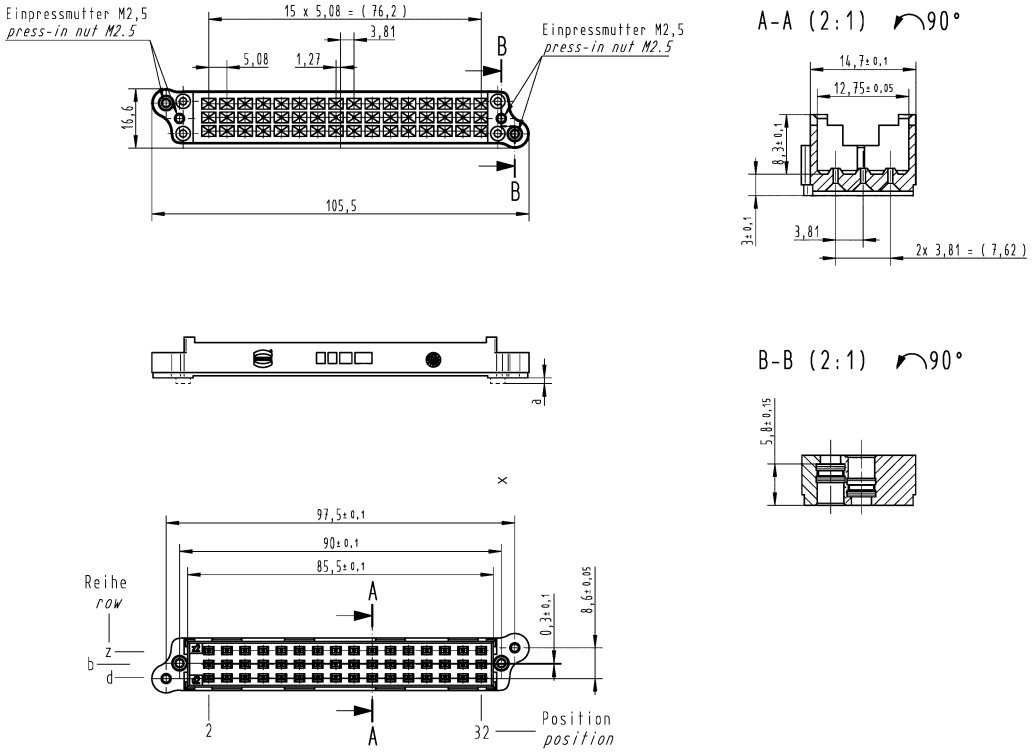
Number of contacts

48

Pin shrouds
for type F “low profile”
with press-in pins 13 mm

Identification	pcb-thickness ± 10 %	Dimension X ± 0.1	Part number
Pin shrouds suitable for shell housing D20			
without locking levers with press-in nuts	1.6 - 2.4	1.6	09 06 002 9922
without locking levers with press-in nuts	3.2 - 4.0	0	09 06 002 9921

Dimensions

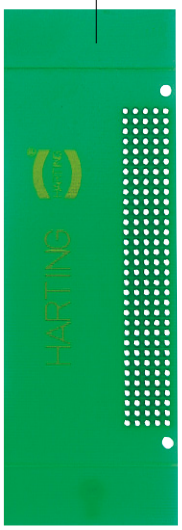


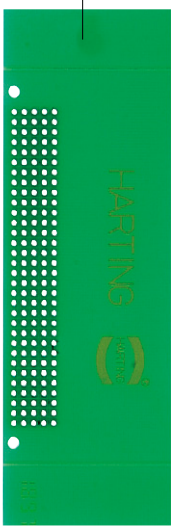
Dimensions in mm

DIN Power up to 6 A

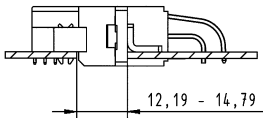
Application 1

Daughtercard	Male connector 09 06 148 6901	Female connector 09 06 248 6826 09 06 248 6836	Daughtercard

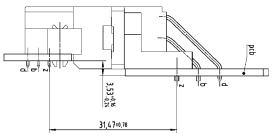




… 6826

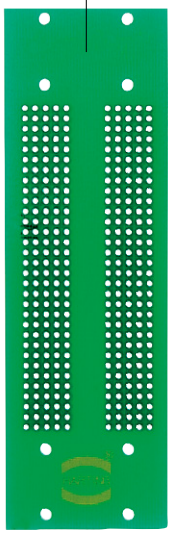


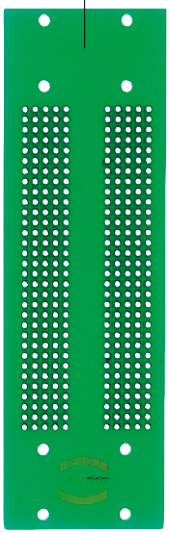
… 6836

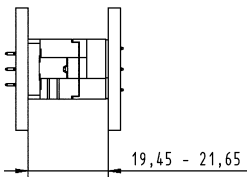


Application 2

Backplane	Male connector 09 06 048 2905	Female connector 09 06 248 2833	Backplane





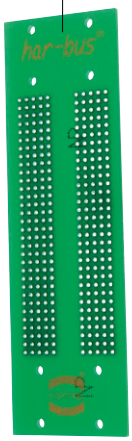


Application examples type F

Application 3

Female connector
09 06 248 6838

Backplane



Pin shroud
09 06 002 9921

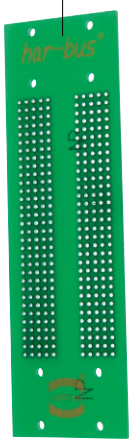
Shell housing D20
09 06 048 0521

Female connector
with crimp contacts
09 06 248 3201

Application 4

Female connector
09 06 248 6838

Backplane

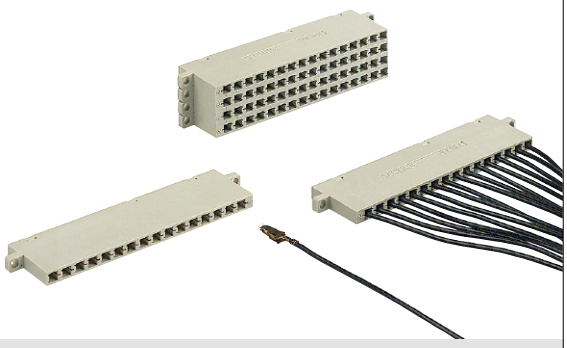


Pin shroud
+ Locking lever
09 06 002 9901

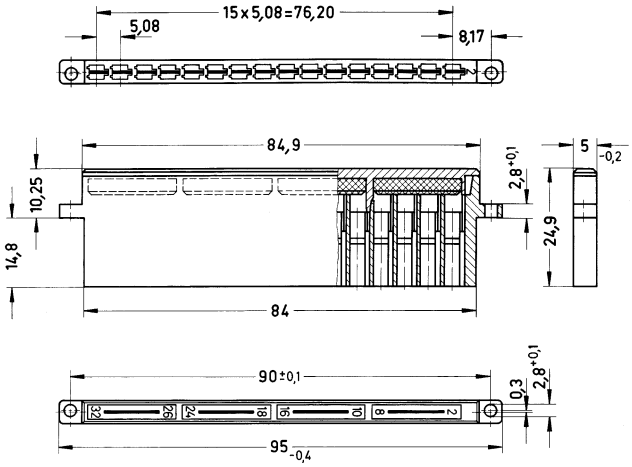
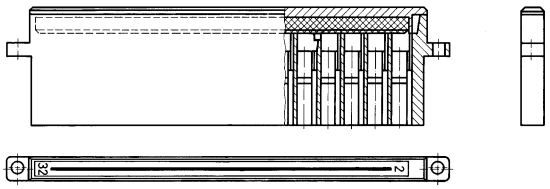
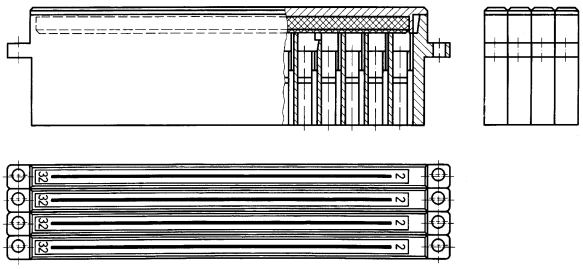
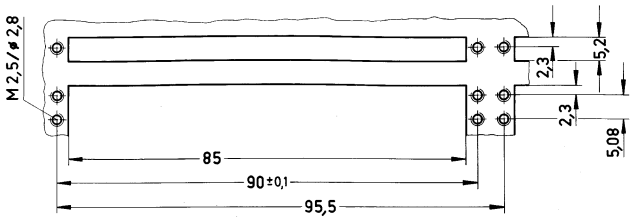
Female connector
for crimp contacts
09 06 248 3201

Number of contacts

64, 16



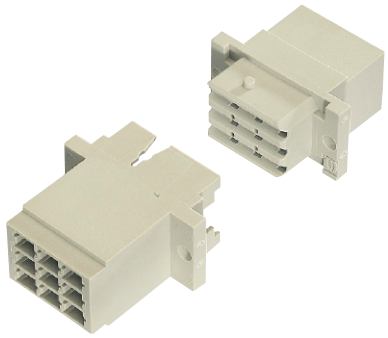
Universal adaptors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Universal adaptor utilising crimp contacts crimp contacts see page 03.33	4 x 4	09 06 016 3301[f]		
	16 x 1	09 06 016 3302[f]		
	16 x 4	09 06 064 3302[f]		
Panel cut out				

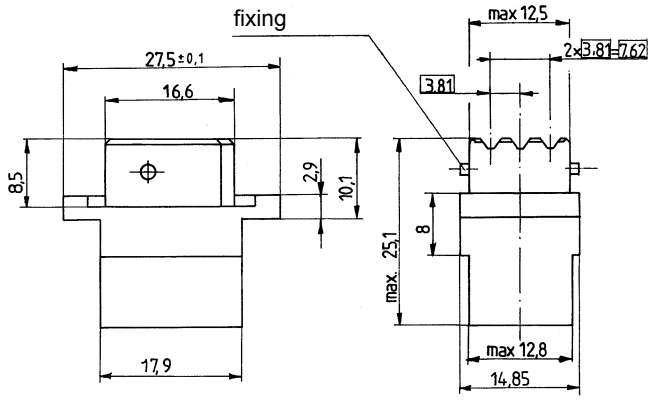
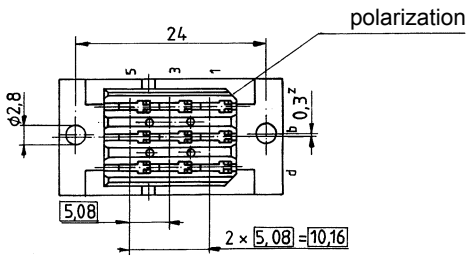
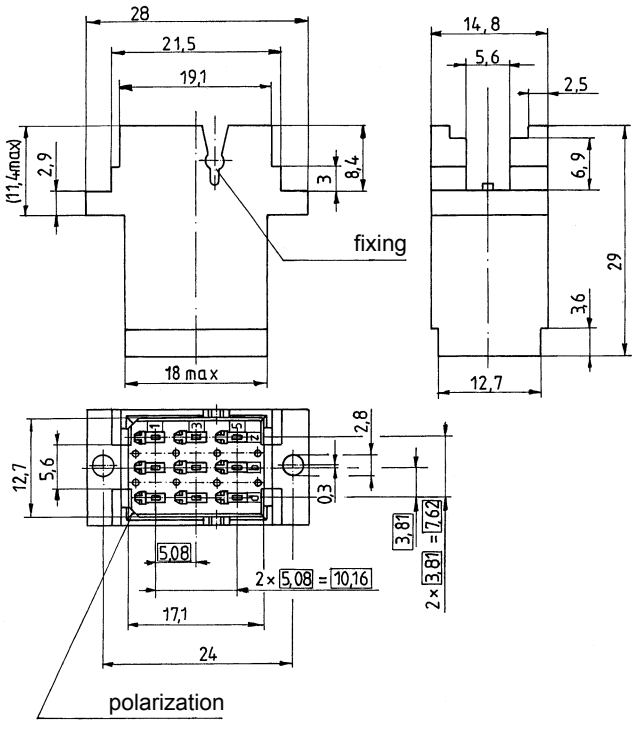
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

max. 9

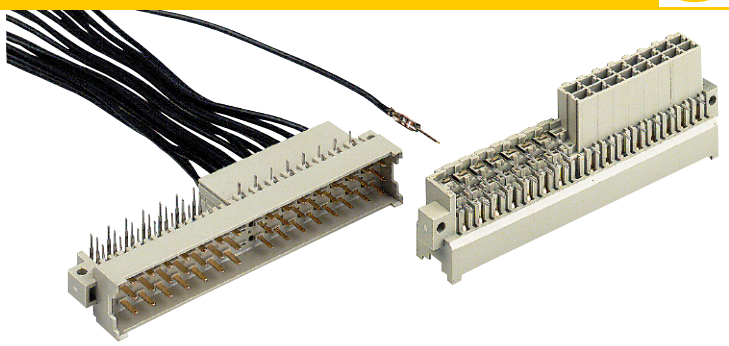


Female and male connectors

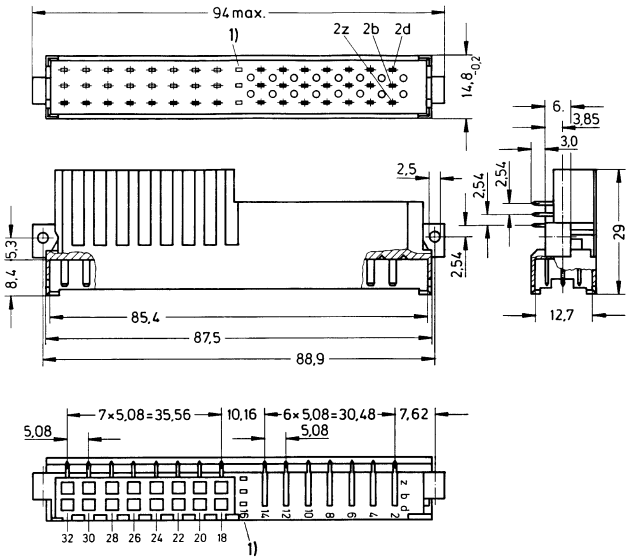
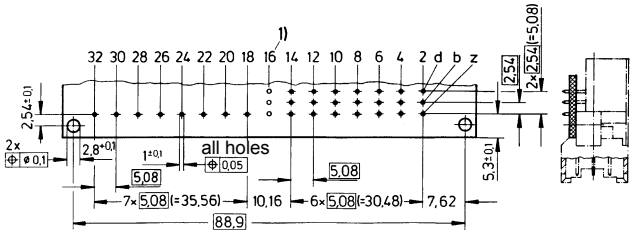
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	9	09 06 209 3201		
Female crimp contacts		see page 03.33		
Male connector for crimp contacts Order contacts separately	9	09 06 109 3401		
Male crimp contacts		see page 03.44		

Number of contacts

45



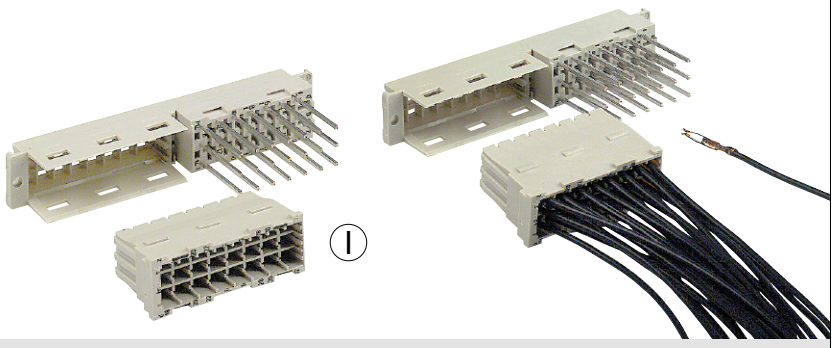
Male connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Male connector 29 angled solder pins 16 cavities for male crimp contacts crimp contacts see page 03.44	45	Performance level 1 acc. to IEC 60 603-2 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

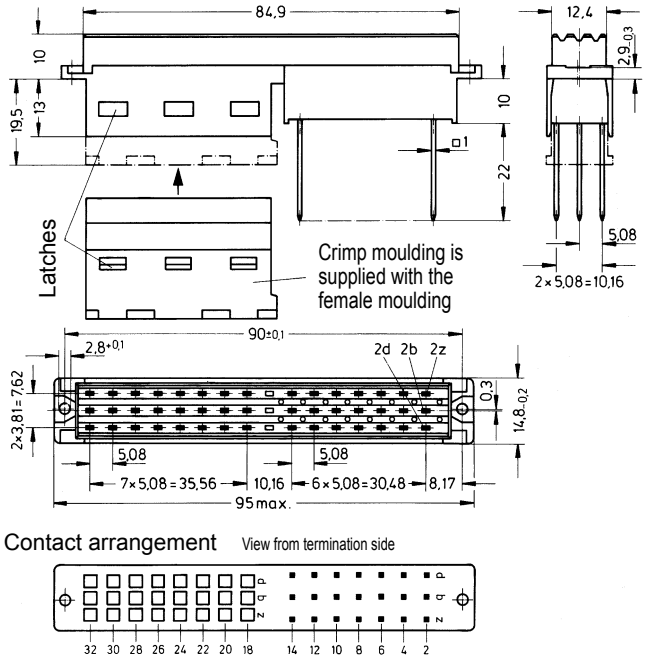
Number of contacts

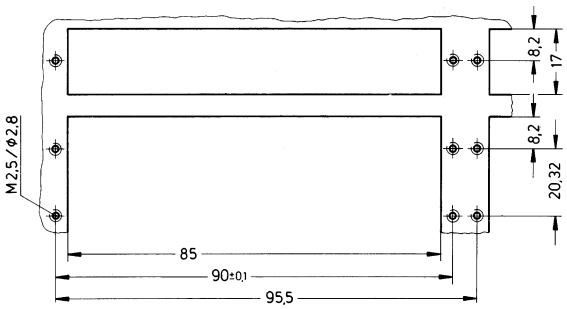
45

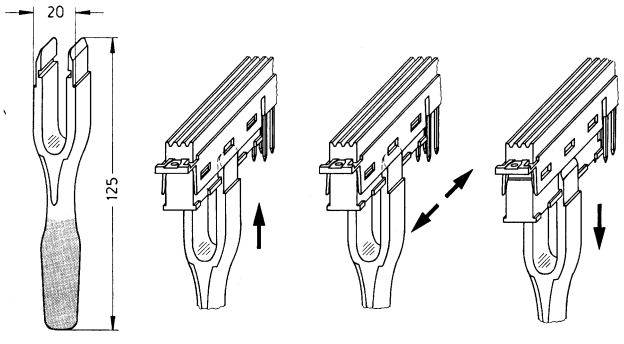


Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector		Performance level 1 acc. to IEC 60 603-2		
Female moulding with 21 wrap posts 22 mm	45	09 06 045 2871[f]		
with 21 solder pins 4.5 mm	45	09 06 045 2875[f]		
Crimp moulding for 24 female crimp contacts Ⓘ		09 06 024 3202[f]		
crimp contacts see page 03.33				
Panel cut out				
Removal tool for the crimp moulding		09 99 000 0172		





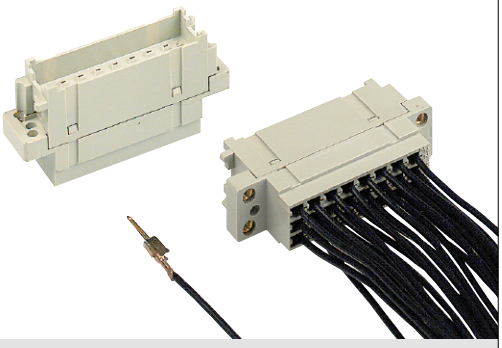


The crimp moulding can be extracted with the help of the removal tool.

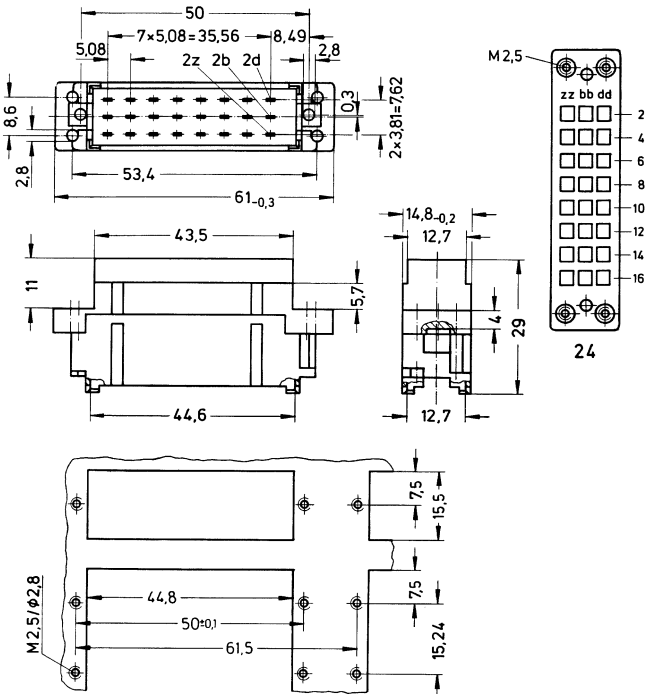
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

max. 24



Interface connector I

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

Identification	Identification Wire gauge	Part number Performance levels according to IEC 60603-2. 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
Bandoliered contacts (approx. 250 pieces)	2		09 06 000 5541
	3		09 06 000 5542
Individual contacts[1)]	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

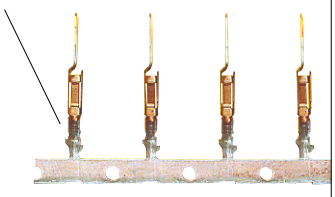
		Wire gauge mm²	AWG	Insulation ø mm
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8

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

For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)

Insertion, removal and crimping tools see chapter 30

Identification



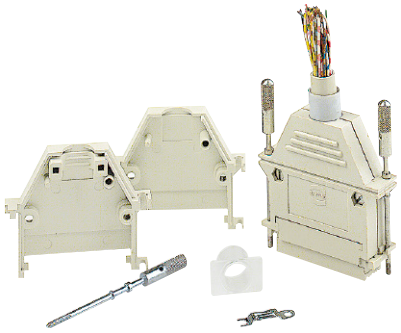
Bandoliered contacts

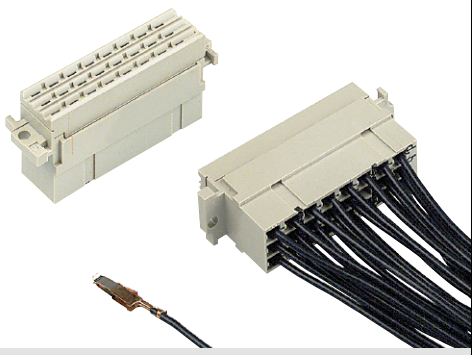
Individual contacts

[1)] Packaging unit 1,000 pieces

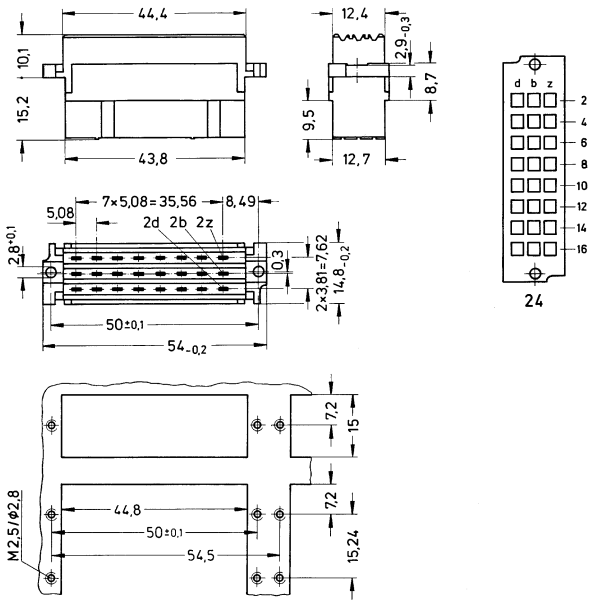
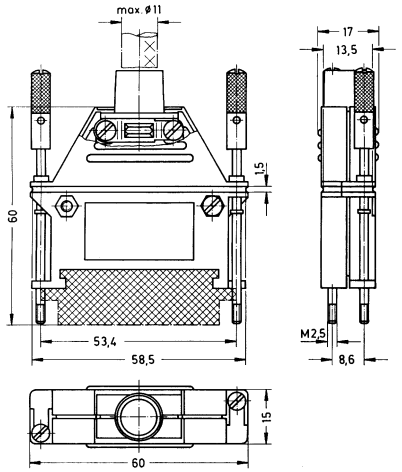
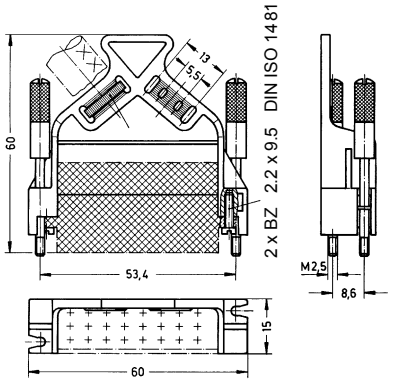
Number of contacts

max. 24





Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately see page 03.33	24	09 26 024 3201[f]		
Shell housing A with integrated fixing screws Supplied with: Shell 2x Locking screw 2x Screw M3x10 2x Nut M3 2x Screw BZ 2.9x9.5 2x Cable clamp 1x Tension relief 1x		09 26 024 0401[f]		
Open hood Supplied with: Open hood 1x Locking screw 2x Screw BZ 2.2x9.5 2x Cable tie 1x		09 26 000 9901[f]		

DIN Power up to 6 A

[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Notes

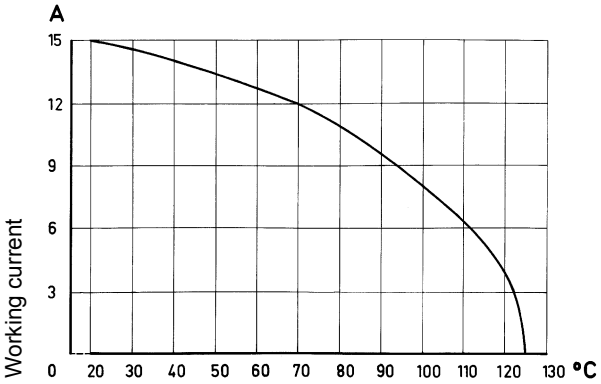
Types H, H15, H16, H3, MH 24 + 7, MH 21 + 5

Number of contacts		15, 16 14 + 1 leading contact (position z 32) 13 + 2 leading contacts (position z 4 und z 32) 3
Working current see current carrying capacity chart		15 A max.
Clearance	Type H15: Type H3:	≥ 4.5 mm ≥ 4.0 mm
Creepage	Type H15: Type H3:	≥ 8.0 mm ≥ 3.7 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 $U_{r.m.s.}$	Type H15: Type H3:	≥ 3.1 kV ≥ 2.5 kV
Contact resistance		≤ 8 mΩ
Insulation resistance		≥ 10^{12} Ω for standard articles ≥ 10^{11} Ω for special NFF articles (with part-no. ending 222)
Temperature range The higher temperature limit includes the local ambient and heating effects of the contacts under load		– 55 °C … + 125 °C
Electrical termination		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 Cage clamp terminal 0.14-1.5 mm²
Insertion and withdrawal force	Type H15: Type H3:	≤ 90 N ≤ 20 N
Materials		
Mouldings		Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts		Copper alloy
Contact surface		
Contact zone		Hard silver plated or gold plated
Mating conditions	see chapter 00	
Coding systems	see chapter 00	

Current carrying capacity

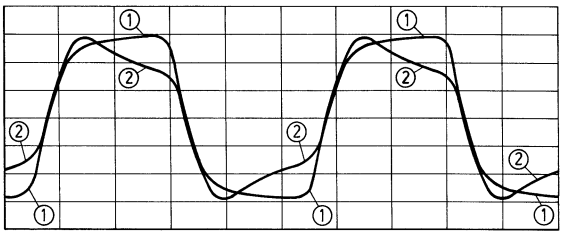
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the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

Control and test procedures according to DIN IEC 60 512



Low currents and voltages

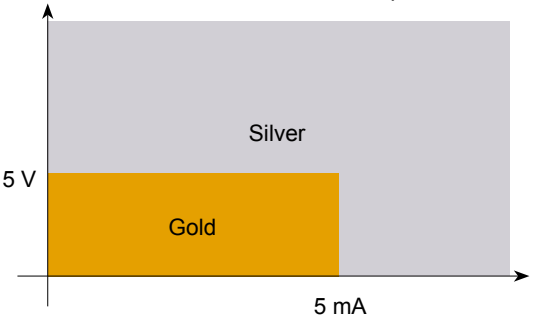
Type H standard contacts have a silver plated surface. This precious metal has excellent conductive properties. In the course of a contact's lifetime, the silver surface generates a black oxide layer due to its affinity to sulphur. This layer is smooth and very thin and is partly interrupted when the 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.



Changes to the transmitted signal after artifical ageing
① new contact ② after ageing

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.

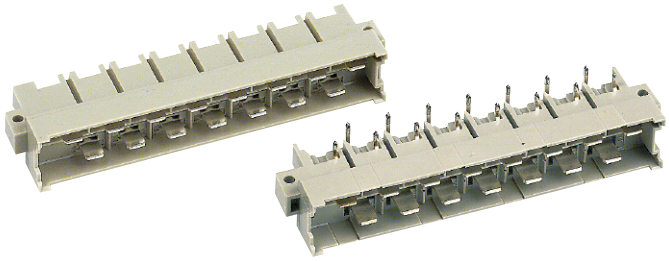
Below is a table derived from actual experiences.



Recommendation

Number of contacts

15



Male connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Male connector for faston 6.3 x 2.5		Performance level 1 acc. to IEC 60603-2		
	15	09 06 015 2912[1)f)]		
1 leading contact (position z 32)	14 + 1	09 06 015 2931[1)f)]		
2 leading contacts (position z 4 + z 32)	13 + 2	09 06 015 2922[1)f)]		
Male connector with angled solder pins[3)]				
	15	09 06 115 2911[1)] 09 06 115 2911 222[1)f)]		
1 leading contact (position z 32)	14 + 1	09 06 115 2932[1)] 09 06 115 2932 222[1)f)]		
2 leading contacts (position z 4 + z 32)	13 + 2	09 06 115 2921[1)] 09 06 115 2991[2)]		
Male connector with straight solder pins				
	15	09 06 015 2913[1)f)]		
1 leading contact (position z 32)	14 + 1	09 06 015 2914[1)f)]		

Other contact arrangements on request

[1)] Variant with silver plated contacts

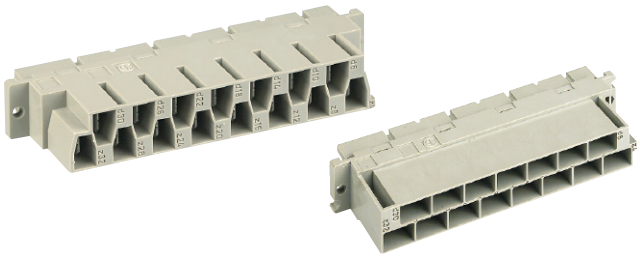
[2)] Variant with gold plated contacts

[3)] With shroud coding, see chapter 00

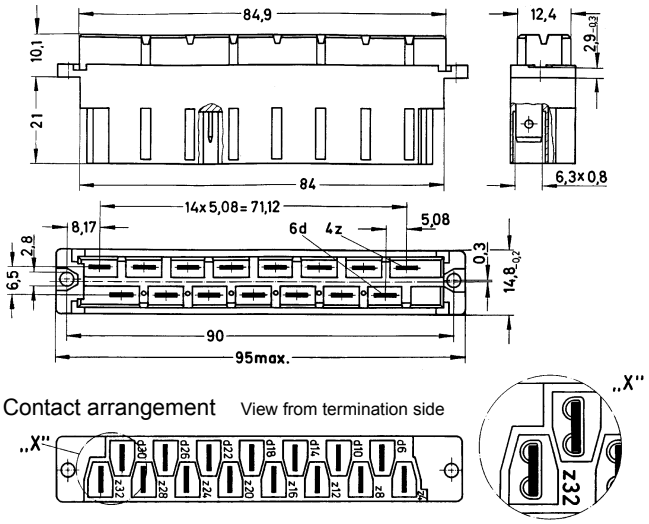
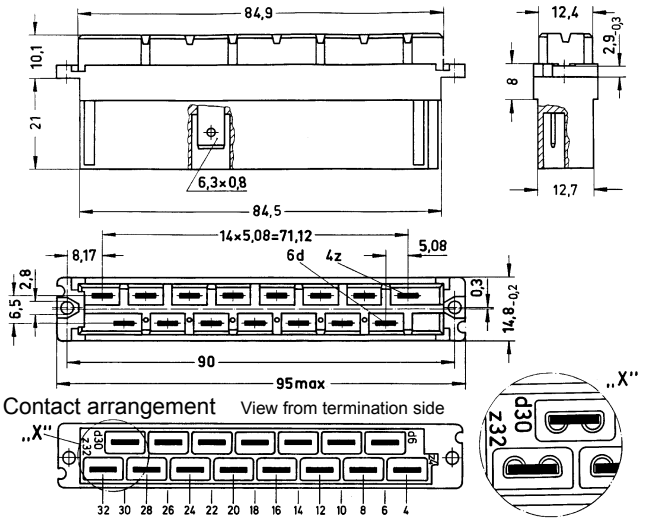
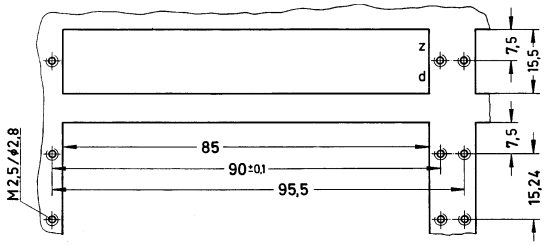
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

15



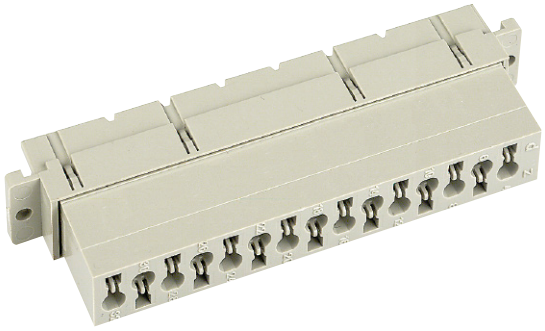
Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for faston 6.3 x 2.5[1)] Cannot be used in a shell housing	15	Performance level 1 acc. to IEC 60603-2 09 06 215 2811		
Female connector for faston 6.3 x 2.5[1)] May be used in a shell housing	15 15	09 06 215 2871 09 06 215 2871 222[f)]	 Shell housing see chapter 20	
Panel cut out				

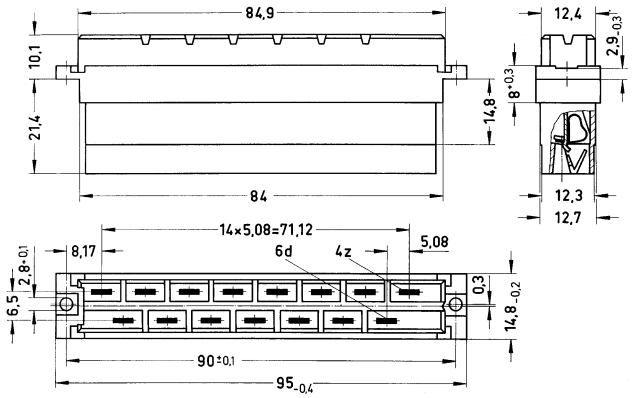
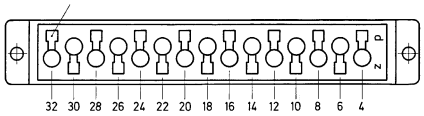
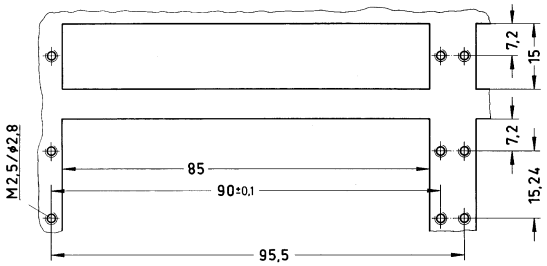
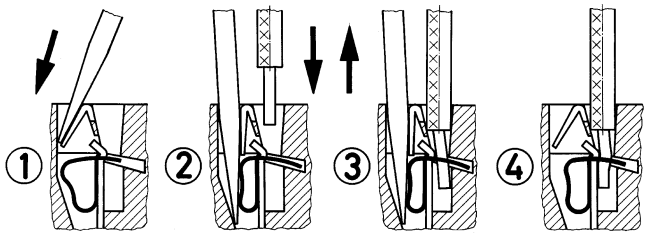
[1)] With shroud coding, see chapter 00
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

15



Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector with cage clamp May be used in a shell housing	15	Performance level 1 acc. to IEC 60603-2 09 06 015 2813[f]	 Contact arrangement View from termination side Slot for screw driver  Shell housing see chapter 20	
Panel cut out				
Termination instructions			 Screw driver width: 2.5 x 0.4 mm Stripping length: 4 - 10 mm Wire gauge: 0.14 - 1.5 mm² (AWG 26 - 16)	

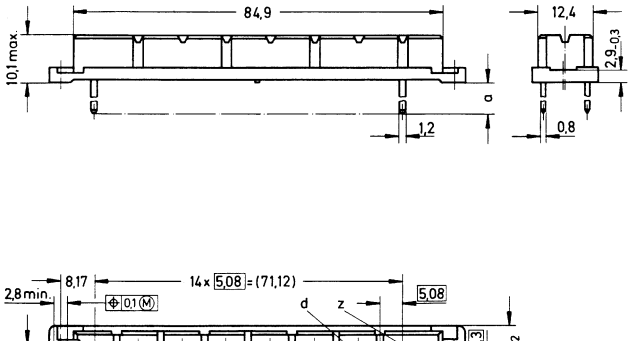
[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

15

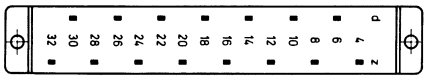
Female connectors

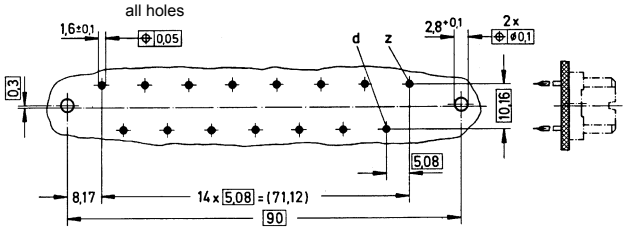
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector “low profile“ with solder pins[3]		Performance level 1 acc. to IEC 60 603-2		
2.7 mm	15	09 06 215 2812[1]		
4 mm	15	09 06 215 2821[1] 09 06 215 2821 222[1)f)] 09 06 215 2892[2] 09 06 215 2892 222[2)f)]		
5.5 mm	15	09 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]		
Board drillings Mounting side				



a
2.7
4
5.5
7
10

Contact arrangement View from termination side





DIN Power up to 15 A

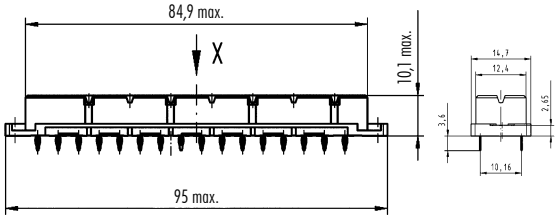
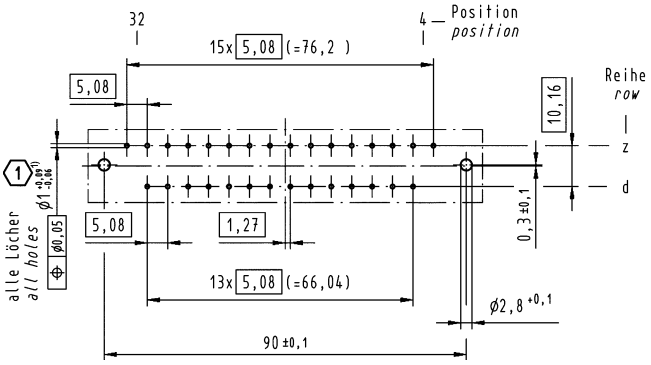
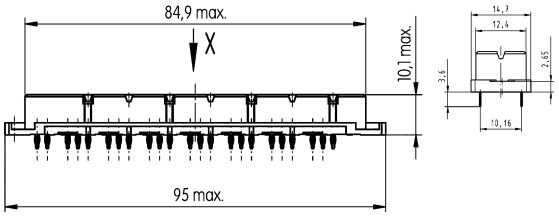
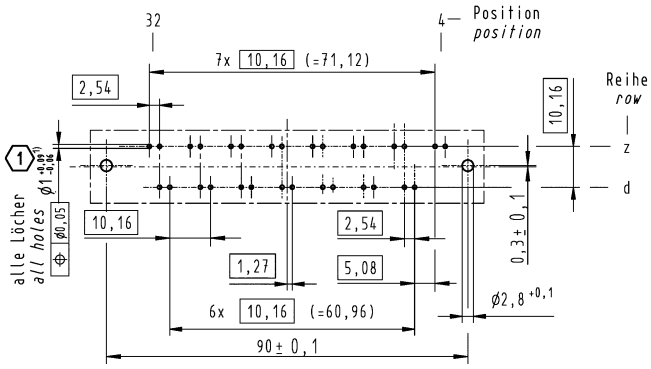
[1)] Variant with silver plated contacts
[2)] Variant with gold plated contacts
[3)] With shroud coding, see chapter 00

[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

15

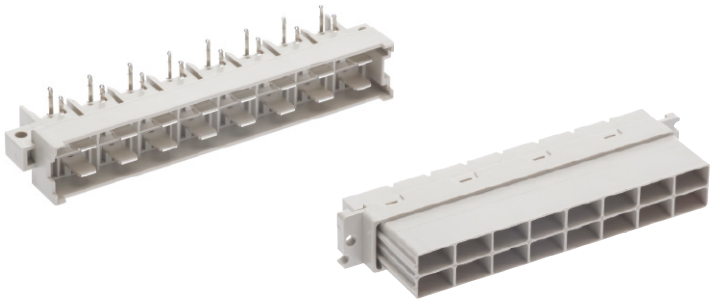
Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector “low profile“ with press-in pins 3.6 mm		Performance level 1 acc. to IEC 60603-2		
Contact space termination side 5.08 mm	15	09 06 215 2854 09 06 215 2854 222[f)]	Board drillings Mounting side 	
Contact space termination side 2.54 mm	15	09 06 215 2856 09 06 215 2856 222[f)]		
			Board drillings Mounting side 	

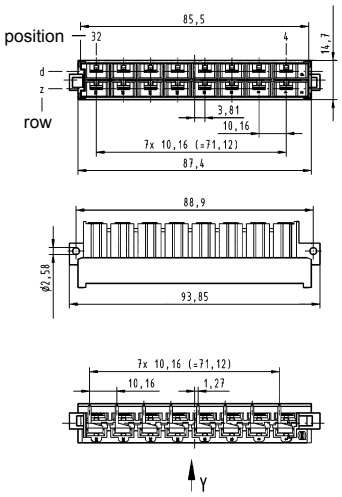
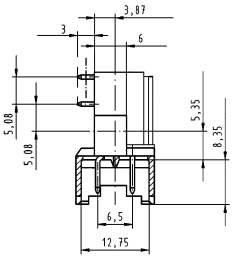
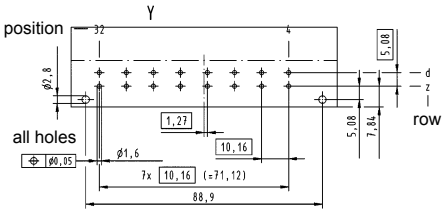
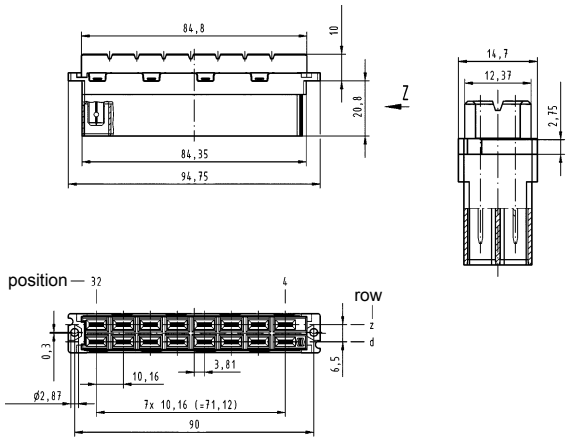
[1)] Refer to recommended configuration of pcb holes, see page 00.25
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

16



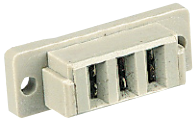
Male connectors

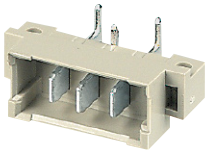
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Male connector with angled solder pins		Performance level 1 acc. to IEC 60603-2		
	16	09 06 116 2511		
	16	09 06 316 2511[b)]		
			Board drillings 	
Female connector for faston 6.3 x 2.5				
	16	09 06 216 2411		

[b)] Connectors with snap-in clips see chapter 00

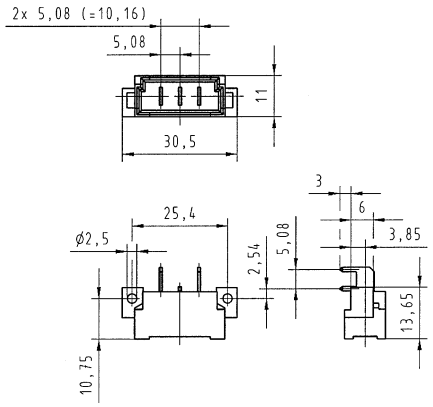
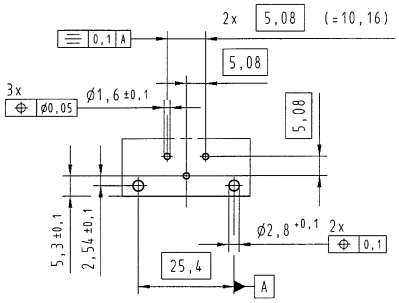
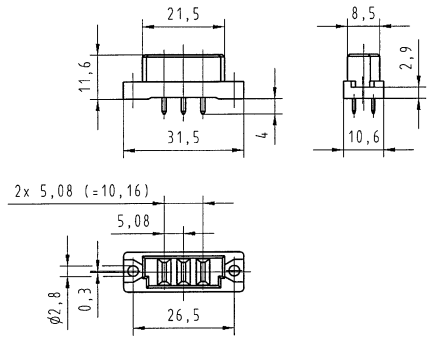
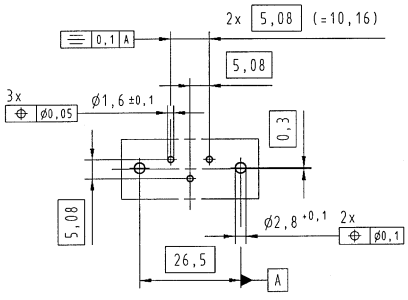
Number of contacts

3





Male and female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Male connector with angled solder pins and preleading middle contact	3	Performance level 1 acc. to IEC 60603-2 09 06 203 2911	 Board drillings 	
Female connector with solder pins	3	09 06 203 2811	 Board drillings 	

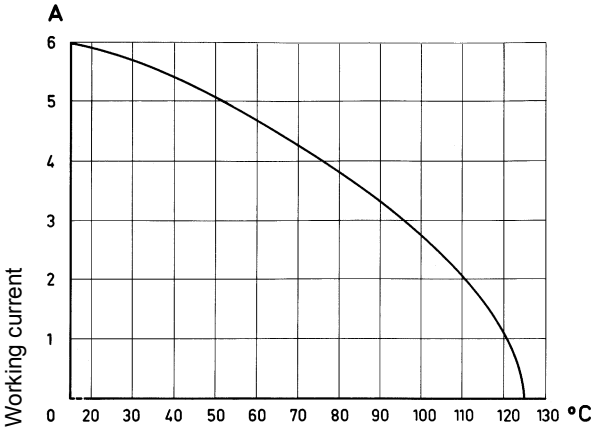
ELECTRONIC SECTION	
Number of contacts	21, 24 + 7
Contact spacing (mm)	
Male connector	2.54 x 5.08
Female connector	5.08
Working current	6 A max.
see current carrying capacity chart	
Clearance	≥ 1.6 mm
Creepage	≥ 3 mm
Working voltage	
The working voltage also depends on the clearance and creepage dimensions 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	Solder pins for pcb connection Ø 1 ± 0.1 mm acc. to IEC 60 326-3 Wrap posts 1 x 1 mm diagonal 1.34-1.45 mm Crimp terminal 0.09-1.5 mm²
Contact surface	
Contact zone	Selectively plated according to performance level[1)]
HEAVY DUTY SECTION*	
Number of contacts	7
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 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	Connector for faston 6.3 x 2.5 (faston width x wire gauge) acc. to DIN 46 245 and DIN 46 247 Solder pins for pcb connection Ø 1.6± 0.1 mm acc. to DIN EN 60 097
Contact surface	
Contact zone	Hard silver plated
BOTH PARTS	
Insulation resistance	≥ 10^{12} Ω for standard articles ≥ 10^{11} Ω for special NFF articles (with part-no. ending 222)
Temperature range	– 55 °C … + 125 °C
The higher temperature limit includes the local ambient and heating effects of the contacts under load	
Insertion and withdrawal force	≤ 85 N
Materials	
Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy

Current carrying capacity

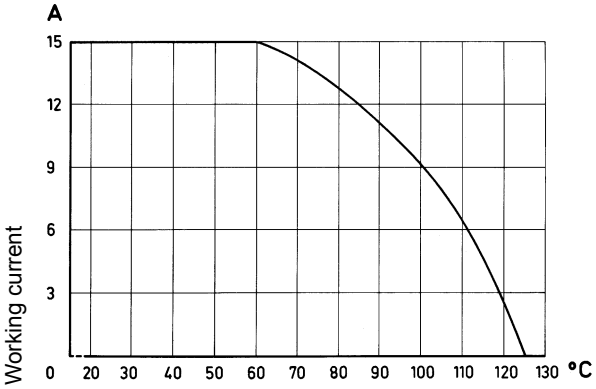
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the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

Control and test procedures according to DIN IEC 60 512

Electronic section



Heavy duty section



* only for type MH 24 + 7

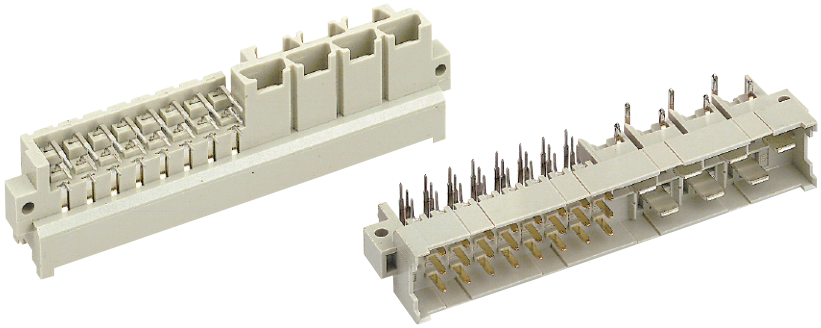
[1)] Explanation of performance levels see chapter 00

Mating conditions see chapter 00
Coding systems see chapter 00

Number of contacts

24 + 7

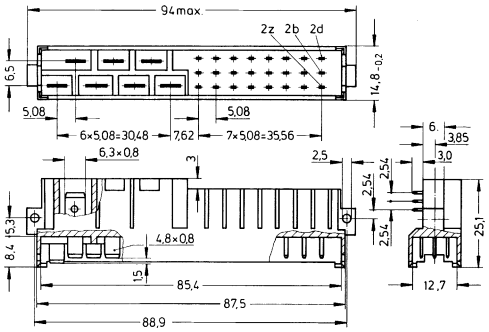
F + H



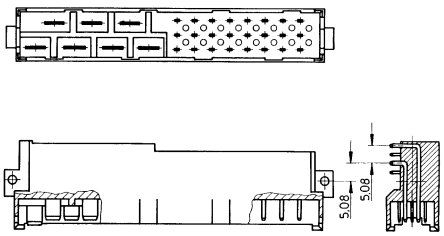
Male connectors

Identification	No. of of contacts	Part number 3	Performance levels according to IEC 60 603-2. 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[f)]	09 06 031 2921[f)]
2 leading contacts (position z 2 + z 32)	24 + 7		09 06 031 6923[f)]	
Male connector with angled solder pins[1)]				
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 09 06 331 6924[b)]	

Faston terminal

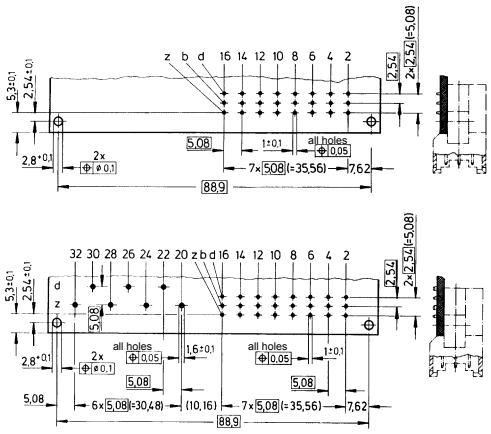


Angled solder pins



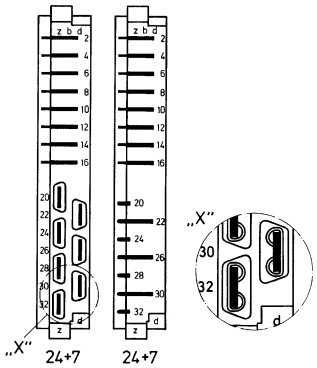
Board drillings

Mounting side



Contact arrangement

View from termination side



Dimensions in mm

[1)] With shroud coding, see chapter 00

[b)] Connector with fixing clip see chapter 00

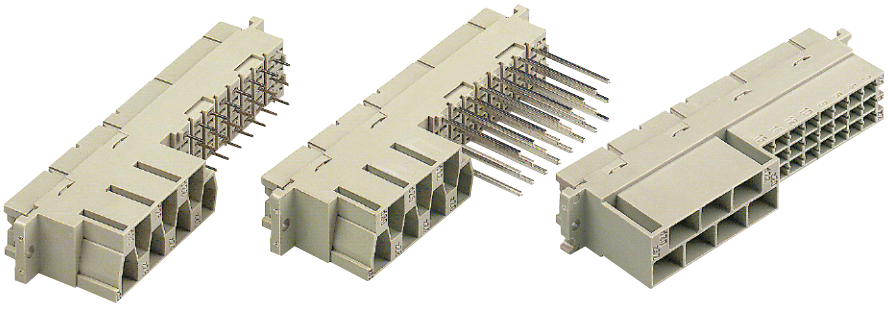
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

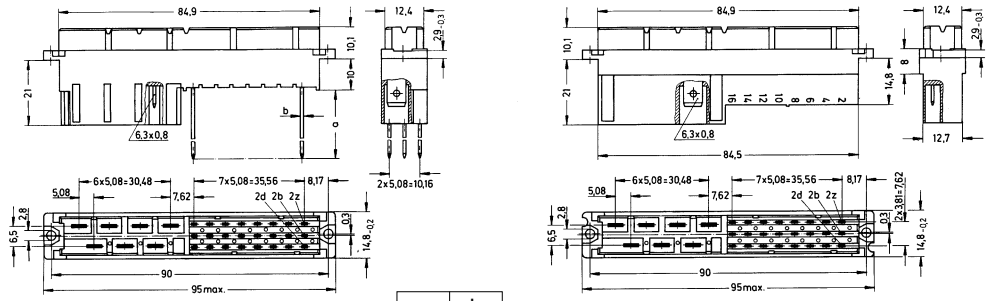
24 + 7

F + H

Female connectors

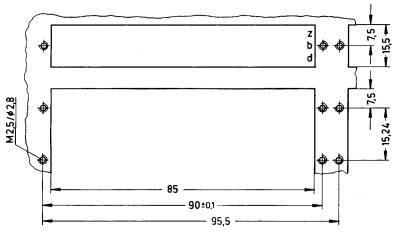


Identification	No. of of contacts	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Female connector with solder pins 4.5 mm[1)]	24 + 7		09 06 231 6822	09 06 231 2822
Female connector with wrap posts 1 x 1 mm[1)]	24 + 7		09 06 231 6821	09 06 231 2821
Female connector for crimp contacts[1)] Order contacts separately, see chapter 03	24 + 7			09 06 231 2881 09 06 231 2881 222[f)]



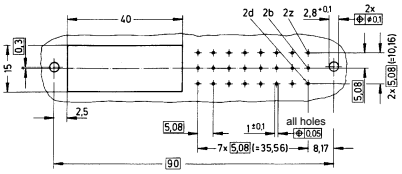
a	b
4.5	□0.6
22	□1

Panel cut out



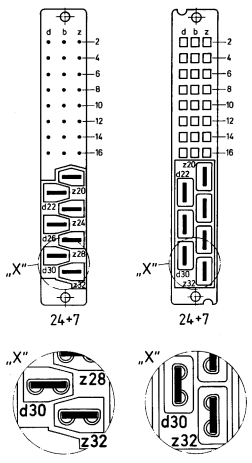
Board drillings

Mounting side



Contact arrangement

View from termination side



Shell housing for female connector with crimp contacts see chapter 20

Dimensions in mm

DIN Power up to 15 A

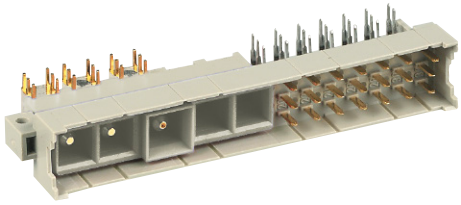
[1)] With shroud coding, see chapter 00

[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

21 + 5

F + M



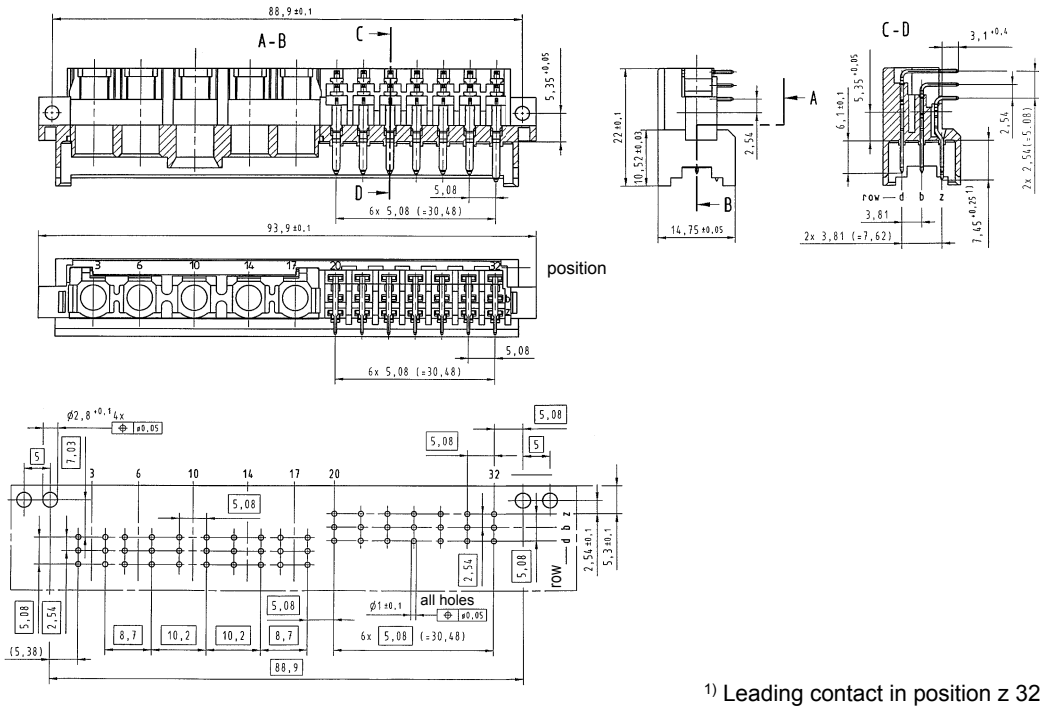
Male connectors

Identification	No. of contacts	Part number 3	Performance levels according to IEC 60603-2. 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 max. 40 A[2)]			09 03 000 6127	
leading contact max. 40 A[2)]			09 03 000 6128	
Removal tool			09 99 000 0328	

Dimensions

Board drillings

Mounting side

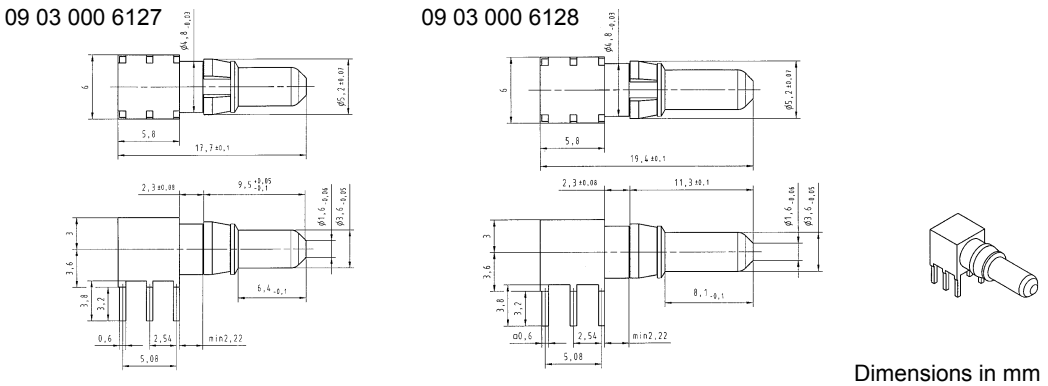


[1)] Leading contact in position z 32

Dimensions

09 03 000 6127

09 03 000 6128



Dimensions in mm

* Pre-loaded with special contacts on request
Code keys see chapter 00

[2)] Depending on the pcb design

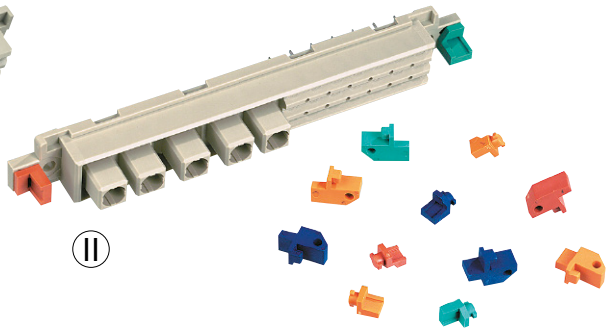
Further special contacts see chapter 01

Number of contacts

21 + 5

F + M

Ⅰ

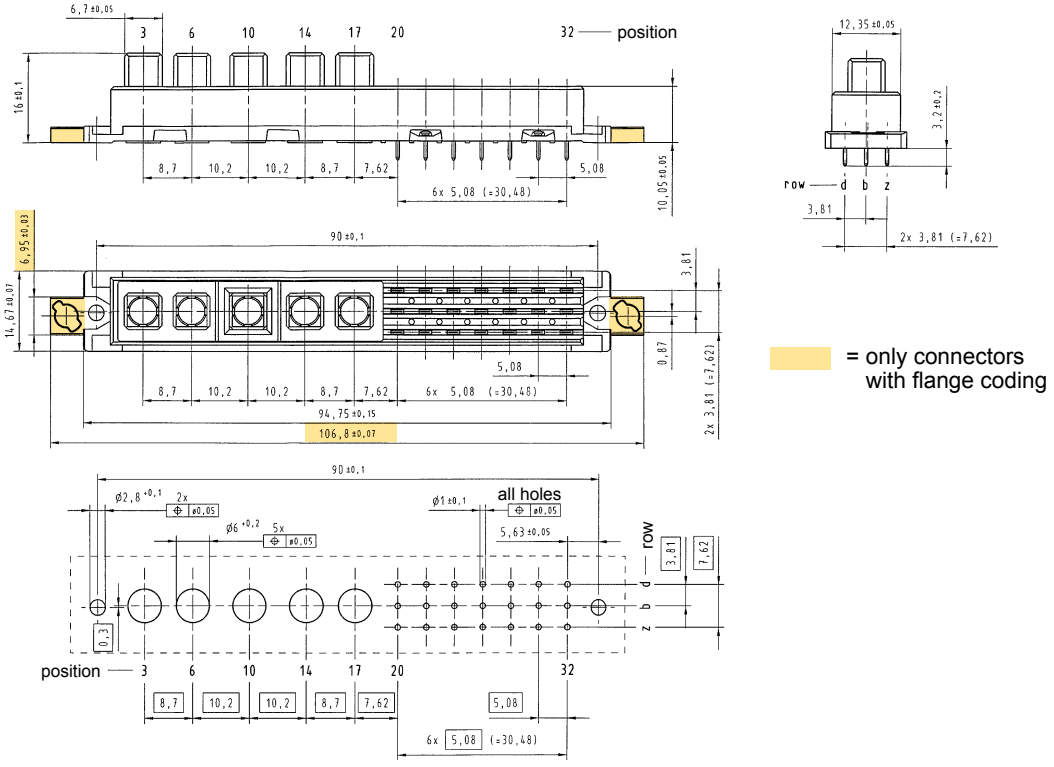


Ⅱ

Female connectors

Identification	No. of of contacts	Part number 3	Performance levels according to IEC 60603-2. 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



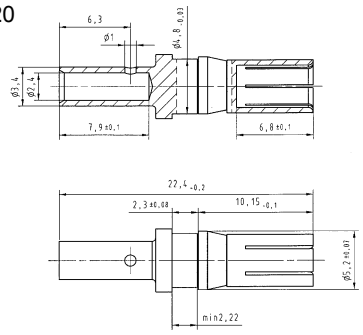
= only connectors with flange coding

Board drillings

Mounting side

Dimensions

09 03 000 6220



Dimensions in mm

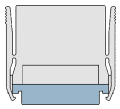
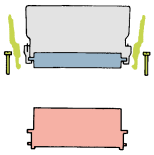
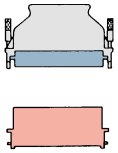
[1] Code keys see chapter 00

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

Further special contacts see chapter 01

Shell housings and accessories

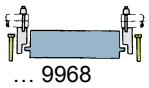
Summary shell housings and accessories

Appropriate connectors in shell housings	Types B, C, D, E, har-bus® 64	Types 2C, 3C	Type F	Types F, H, MH	Types E, F, H, MH
Check list: How to order shell housings and accessories. The Part number is stated.					
Shell housings	C 09 02 064 0501 09 02 064 0502 09 03 096 0501 09 05 048 0501	2C, 3C 09 23 048 0501 09 25 030 0501	A 09 06 048 0501 09 06 048 0402	B 09 06 048 0503 09 06 048 0504 09 06 048 0505	G 09 06 000 9957
Cable insert	09 02 000 9910 09 02 000 9911			09 06 000 9914 09 06 000 9915	
Insert for LED				09 06 000 9917	
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	Supplied with the shell housing	09 06 000 9913 09 06 000 9919	
Locking screws Order 2 sets — for fixing elements with male connectors	09 02 000 9909 M 2.5 x 16 M 2.5	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	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	C	A	B	B
Multiple fixing left	09 02 000 9919	09 02 000 9919	09 06 000 9901	09 06 000 9907 09 06 000 9966 09 06 000 9908 09 06 000 9967	09 06 000 9907 09 06 000 9966 09 06 000 9908 09 06 000 9967
Multiple fixing right	09 02 000 9920	09 02 000 9920	09 06 000 9902		
Single fixing left	09 02 000 9921	09 02 000 9921	09 06 000 9905	09 06 000 9909 09 06 001 9934 09 06 000 9910 09 06 001 9935	09 06 000 9909 09 06 001 9934 09 06 000 9910 09 06 001 9935
Single fixing right	09 02 000 9922	09 02 000 9922	09 06 000 9906		
for female connectors				B	
Multiple fixing left right				09 06 000 9933 09 06 000 9933	
Fixing brackets for angled male connectors on pcb	C	C			
left right	09 02 000 9926 09 02 000 9927	09 02 000 9926 09 02 000 9927			
Fixing brackets for inverse male connectors on pcb	R	R			
R 1 R 32	09 02 000 9953 09 02 000 9954	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	

Female connectors Male connectors

Detailed system description see chapter 00

Summary shell housings and accessories

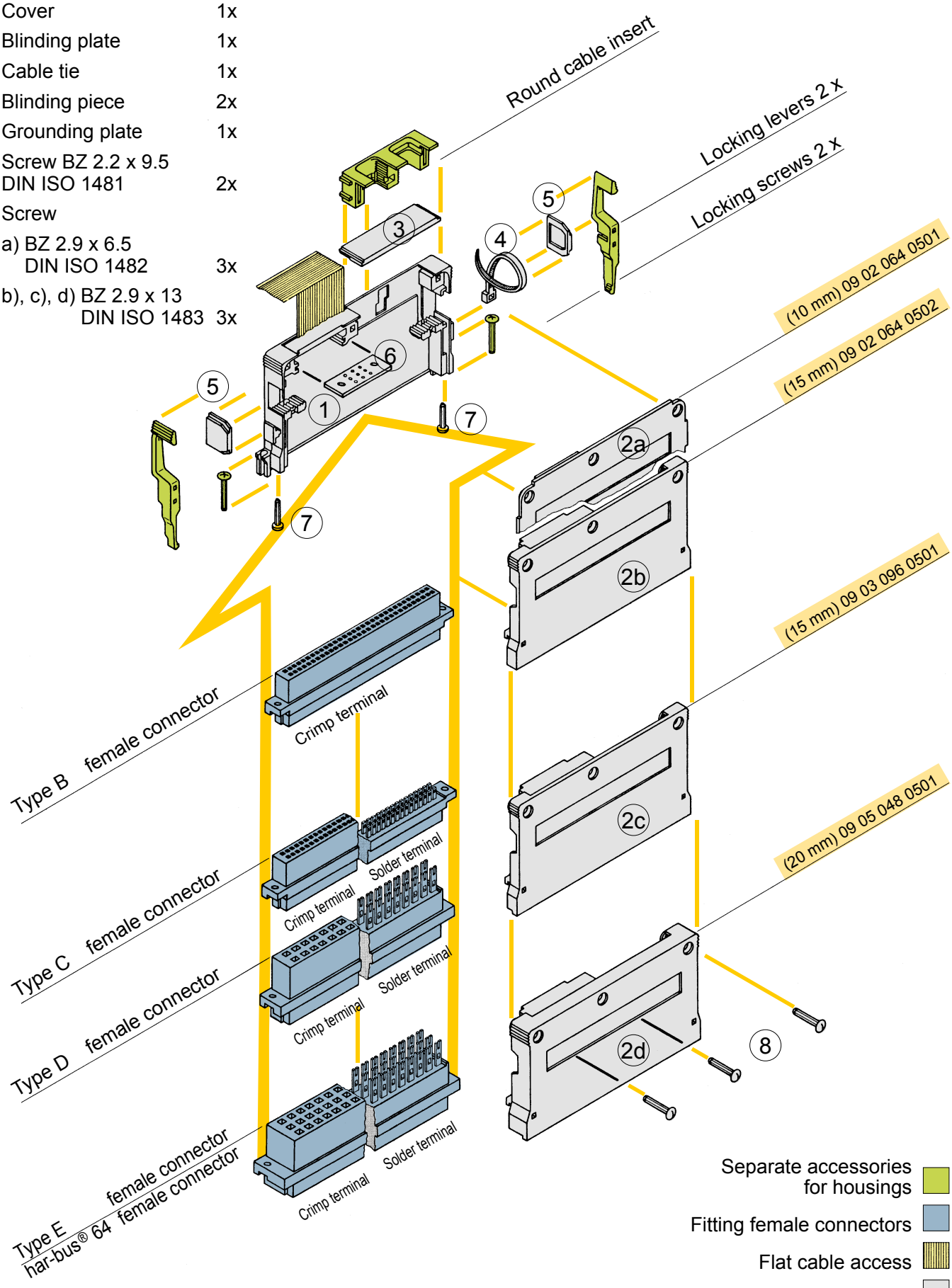
Appropriate connectors in shell housings	Types F, H, MH	Types F, H, MH	Types F, H, MH	Types F, H, MH	Types F, H, MH
Check list: How to order shell housings and accessories. The Part number is stated.	 … 9968  … 9930	 			
Shell housings	O 09 06 000 9968 09 06 000 9930° ° order 2 pieces	D 15 09 06 048 0515	D 20 09 06 048 0521 09 06 048 0522	D 20 metallised 09 06 948 0521 09 06 948 0522	D 20 metal 09 06 848 0550 09 06 848 0551
Cable insert			09 06 000 9988 09 06 000 9989	09 06 900 9988	
Insert for LED			09 06 000 9986 09 06 000 9987	09 06 900 9986 09 06 900 9987	
Locking lever Order 2 pieces, in some cases each with different Part Nos. for left and right hand		Supplied with the shell housing			
Locking screws Order 2 sets — for fixing elements with male connectors	09 06 000 9926 M 2.5 x 20 M 2.5	09 06 000 9926 M 2.5 x 16 M 2.5	Supplied with the shell housing	Supplied with the shell housing	Supplied with the shell housing
— for interface connectors I	——	——	——	——	——
Shroud for screw fixing with interface connector I	——	——	09 06 001 9964	09 06 001 9964	——
Fixing brackets for 19" racks	B	B	B	B	B
for male connectors — Multiple fixing — left	09 06 000 9907 09 06 000 9966	09 06 000 9907 09 06 000 9966	09 06 000 9907 09 06 000 9966 09 06 000 9995 09 06 000 9997	09 06 900 9907 09 06 900 9966 09 06 900 9995 09 06 900 9997	09 06 900 9997
right	09 06 000 9908 09 06 000 9967	09 06 000 9908 09 06 000 9967	09 06 000 9908 09 06 000 9967 09 06 000 9996 09 06 000 9998	09 06 900 9908 09 06 900 9967 09 06 900 9996	09 06 900 9996
Single fixing — left	09 06 000 9909 09 06 001 9934	09 06 000 9909 09 06 001 9934	09 06 000 9909 09 06 001 9934	09 06 900 9909 09 06 901 9934	09 06 800 9943 09 06 901 9924
right	09 06 000 9910 09 06 001 9935	09 06 000 9910 09 06 001 9935	09 06 000 9910 09 06 001 9935	09 06 900 9910 09 06 901 9935	09 06 800 9944 09 06 901 9925
for female connectors	B	B			
Multiple fixing — left / right	only … 9930 09 06 000 9933 09 06 000 9933	09 06 000 9933 09 06 000 9933			
Protection and fixing strip for 20 mm shell housing			09 06 001 9909	09 06 901 9909	

Female connectors Male connectors

Detailed system description see chapter 00

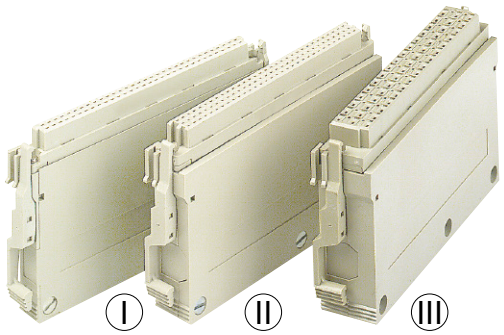
Shell housing C for types B, C, D, E and har-bus® 64

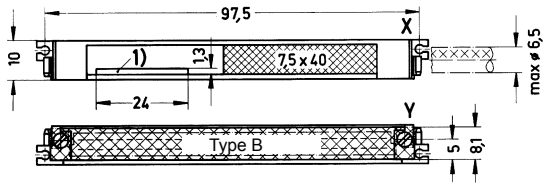
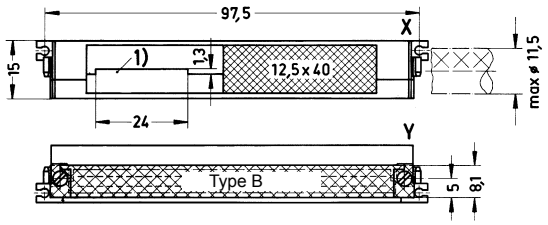
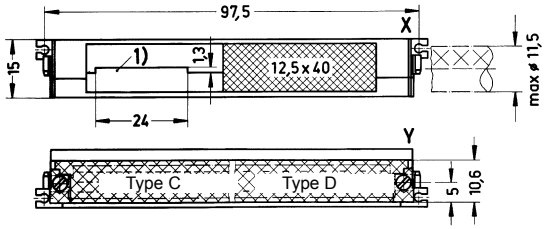
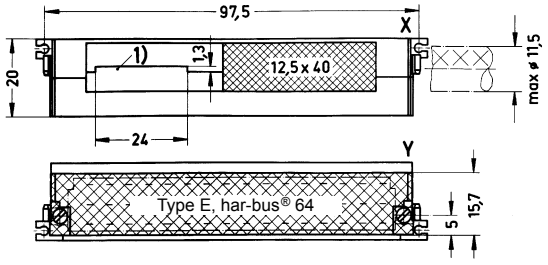
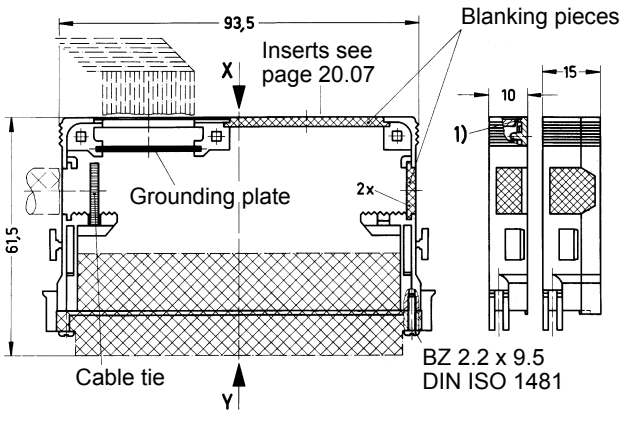
1	Shell	1x
2	Cover	1x
3	Blinding plate	1x
4	Cable tie	1x
5	Blinding piece	2x
6	Grounding plate	1x
7	Screw BZ 2.2 x 9.5 DIN ISO 1481	2x
8	Screw	
	a) BZ 2.9 x 6.5 DIN ISO 1482	3x
	b), c), d) BZ 2.9 x 13 DIN ISO 1483	3x



Moulding material: thermoplastic resin, glass-fibre filled, UL 94-V0

Shell housing C for types B, C, D, E and har-bus® 64

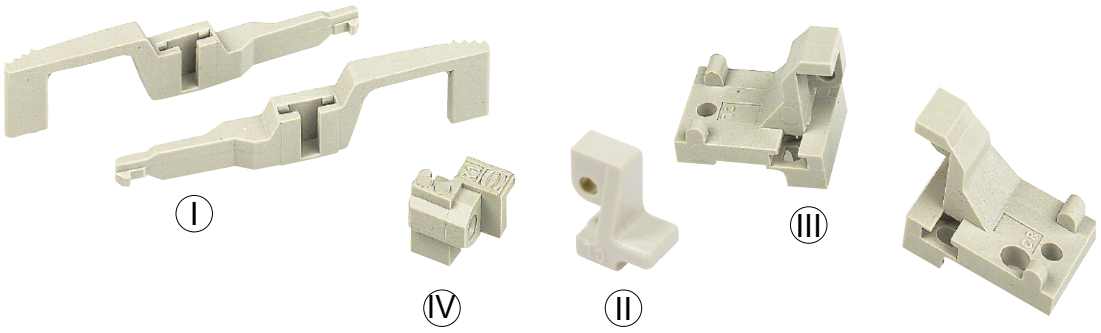


Identification	Part number	Drawing	Dimensions in mm
Shell housing C for female connectors type B I	10 mm 09 02 064 0501		
	15 mm 09 02 064 0502		
Shell housing C for female connectors types C, D II	15 mm 09 03 096 0501		
Shell housing C for female connectors type E, har-bus® 64 III	20 mm 09 05 048 0501		
			

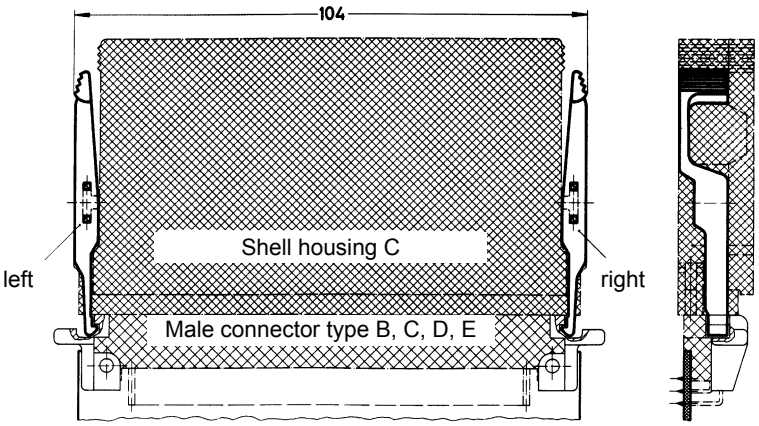
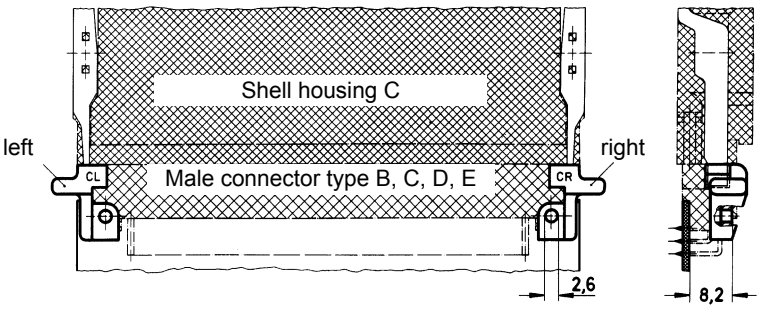
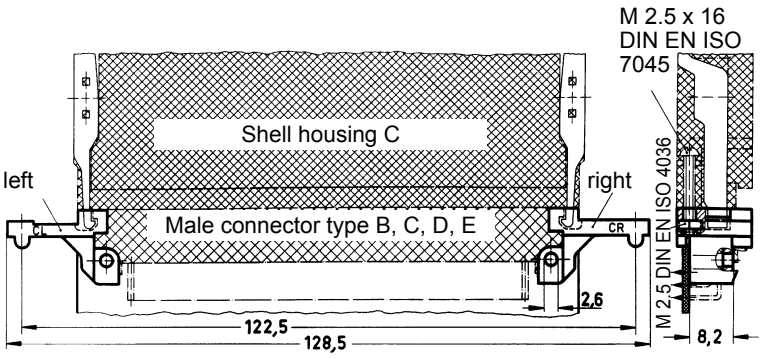
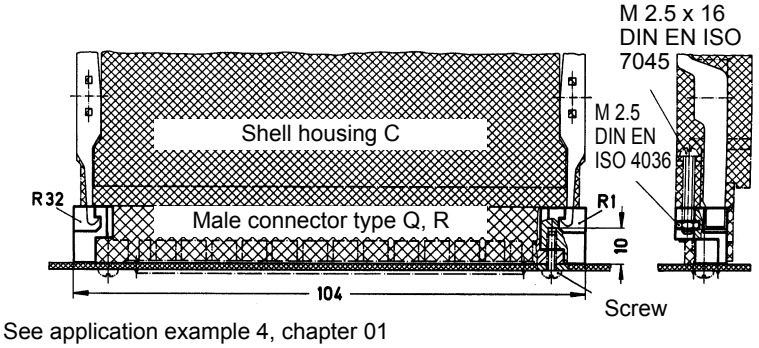
1) Possible access for flat cable (18 x Ø 1.27). Remove the blanking piece.

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

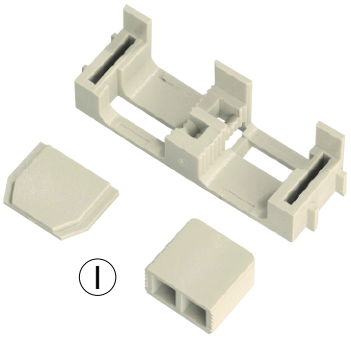
Shell housing C

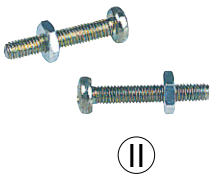


Accessories

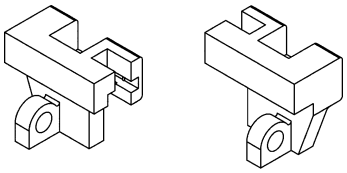
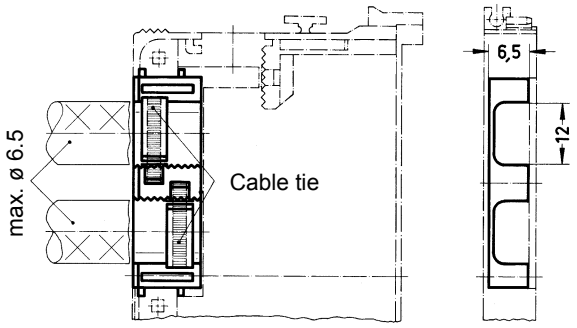
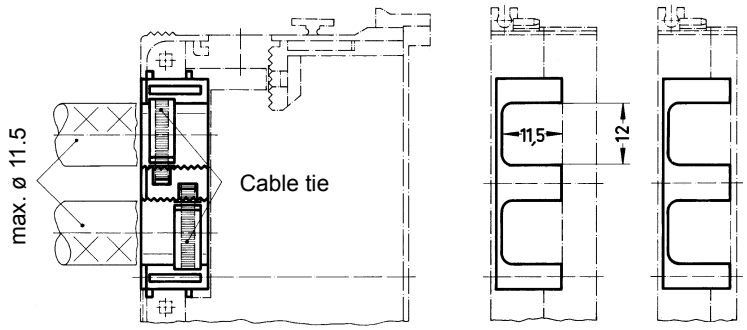
Identification	Part number	Drawing	Dimensions in mm
Locking lever for shell housing C I	left 09 02 000 9902 right 09 02 000 9903		
Fixing brackets C for male connectors for 19“ racks according to DIN EN 60 297, part 3-101 Multiple fixing II	left 09 02 000 9919 right 09 02 000 9920		
Single fixing III	left 09 02 000 9921 right 09 02 000 9922		
Fixing brackets R for inverse male connectors on pcb’s IV Screw DIN ISO 7049 M 2.2 x 9.5	R 1 09 02 000 9953 R 32 09 02 000 9954 09 06 001 9974	 See application example 4, chapter 01	

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2



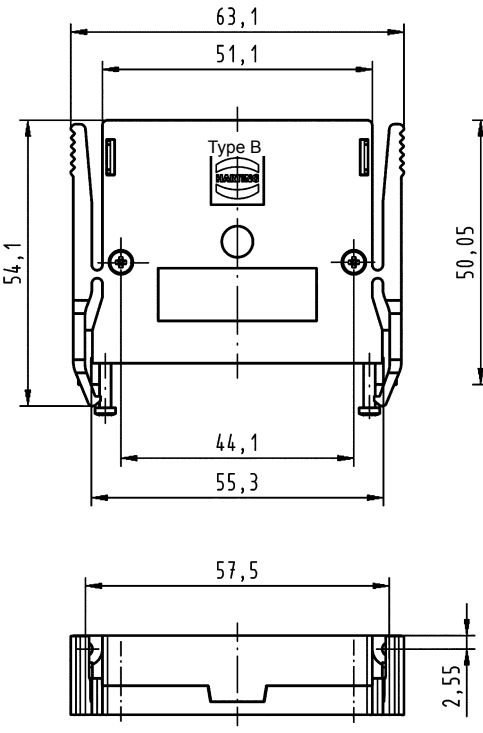
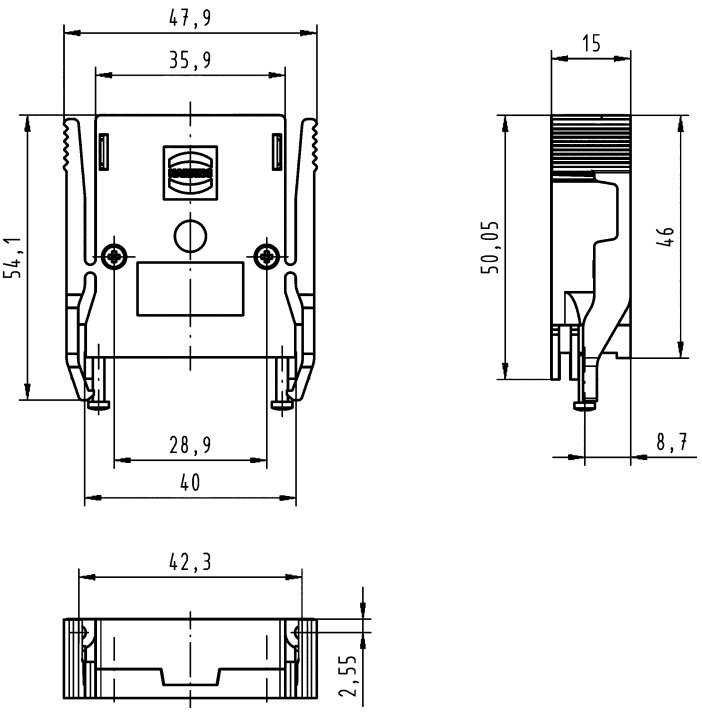


Accessories

Identification	Part number	Drawing	Dimensions in mm
Fixing brackets C for angled male connectors on pcb without fixing possibility in 19" racks	left 09 02 000 9926[f)] right 09 02 000 9927[f)]		
Round cable insert 2 x ø 6.5 for shell housing C 09 02 064 0501 Supplied with: Round cable insert 1x Blinding piece A 1x Blinding piece B 1x Cable tie 1x	09 02 000 9910[f)]		
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 Supplied with: Round cable insert 1x Blinding piece A 1x Blinding piece B 1x Cable tie 1x	09 02 000 9911[f)]		
Locking screws II	09 02 000 9909[1)]		

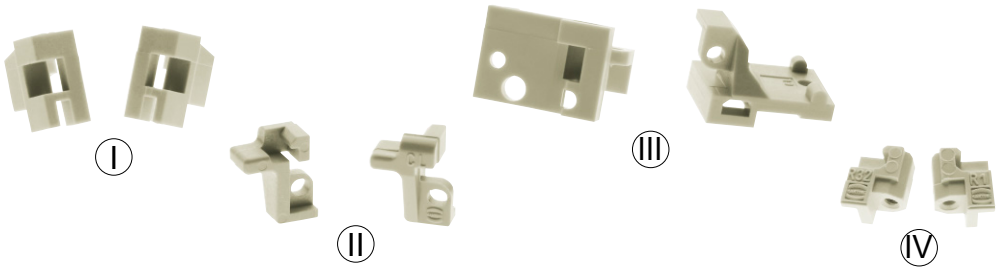
[1)] Order 2 pieces for one shell housing
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

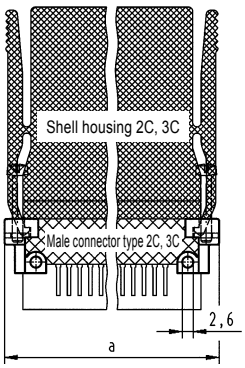
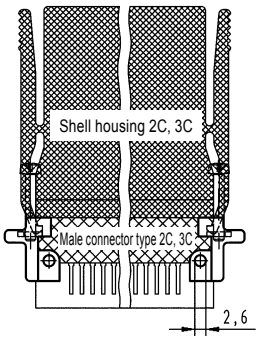
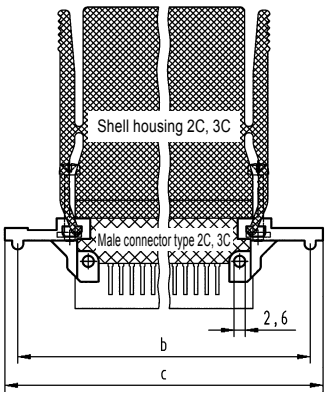
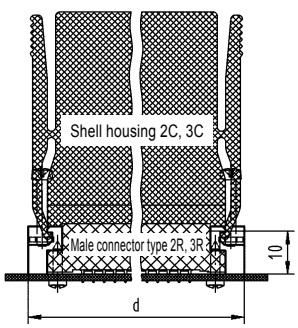
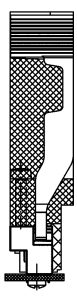
Shell housing 2C, 3C

Identification	Part number	Drawing	Dimensions in mm
Shell housing 2C for female connectors type 2C Supplied with: Shell 1x Cover with 2 locking levers 1x Cable tie 1x Screw 2.2 x 9.5 4x (09 06 001 9974)	09 23 048 0501		
Shell housing 3C for female connectors type 3C Supplied with: Shell 1x Cover with 2 locking levers 1x Cable tie 1x Screw 2.2 x 9.5 4x (09 06 001 9974)	09 25 030 0501		

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

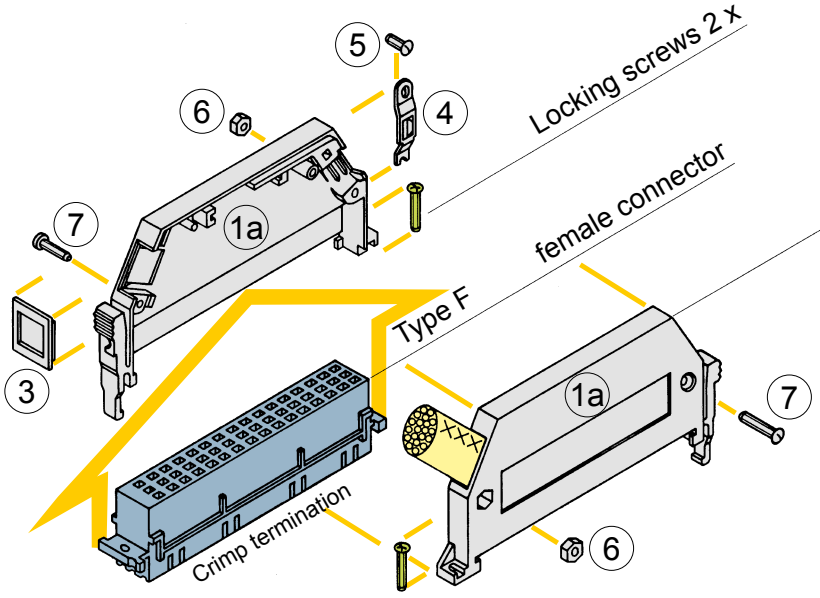
Accessories



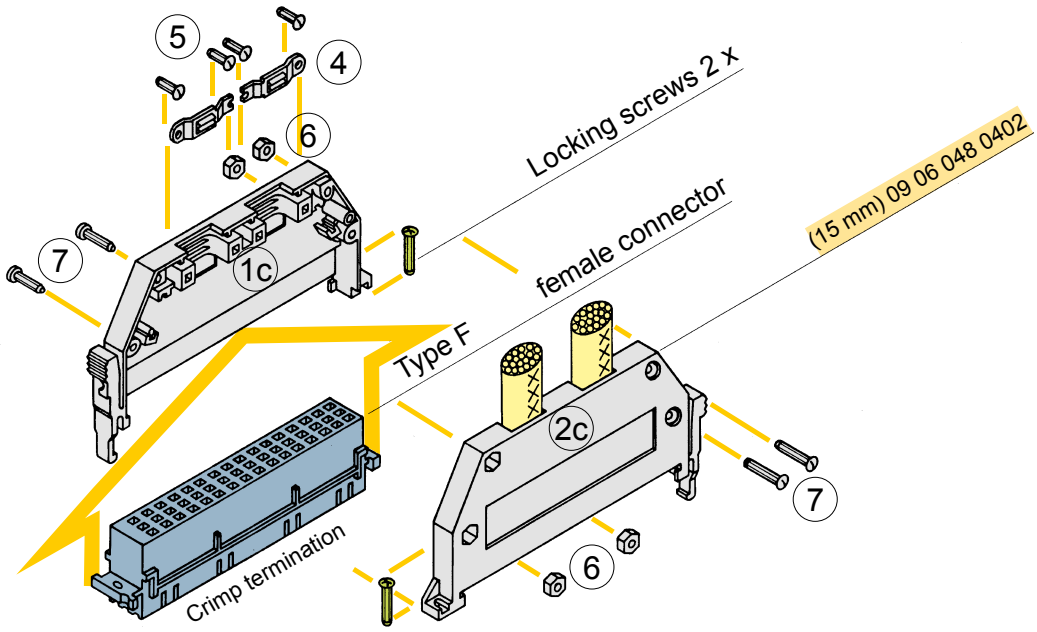
Identification	Part number	Drawing	Dimensions in mm
Fixing brackets C for angled male connectors on pcb without fixing possibility in 19" racks I	left 09 02 000 9926 right 09 02 000 9927	 	| | a | | 2C | 63.7 | | 3C | 48.4 |
Fixing brackets C for male connectors for 19“ racks according to DIN EN 60 297, part 3-101 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	 	| | b | c | | 2C | 82.3 | 88.4 | | 3C | 67.1 | 73.2 |
Fixing brackets R for inverse male connectors on pcb’s IV Screw DIN ISO 7049 M2.2 x 9.5	R 1 09 02 000 9953 R 32 09 02 000 9954 09 06 001 9974	 	| | d | | 2C | 64.1 | | 3C | 48.9 |

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Shell housing A for type F



1a	Casing shell	2x
3	Blinding piece	1x
4	Cable clamp	1x
5	Screw BZ 2.9 x 9.5 DIN ISO 1481	1x
6	Hexagonal nut M3 DIN EN ISO 4032	2x
7	Screw M3 x 12 DIN EN ISO 1207	2x



1c	Shell	1x
2c	Cover	1x
4	Cable clamp	2x
5	Screw BZ 2.9 x 9.5 DIN ISO 1481	4x
6	Hexagonal nut M3 DIN EN ISO 4032	4x
7	Screw M3 x 12 DIN EN ISO 1207	4x

Shell housings

Separate accessories for housings

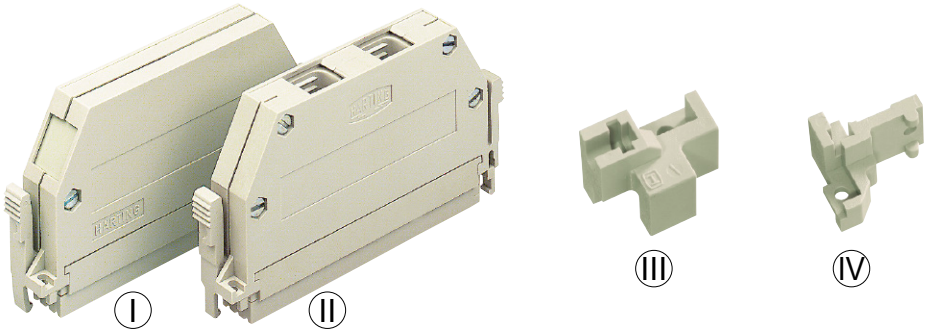
Fitting female connectors

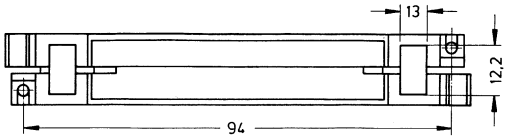
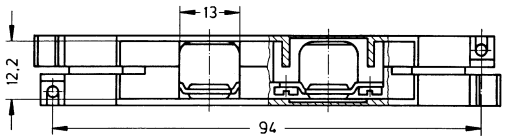
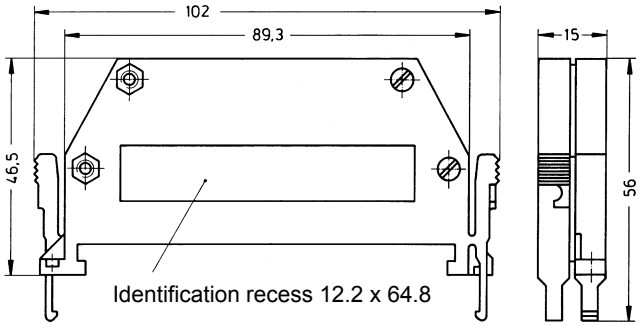
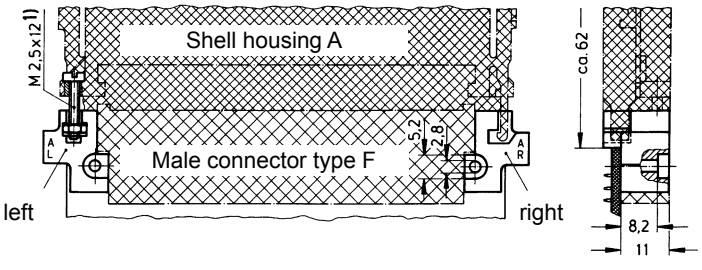
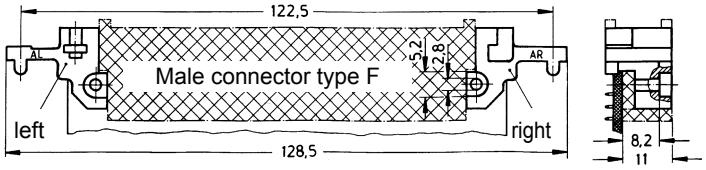
Cable access

Housing parts supplied

Moulding material: thermoplastic resin, glass-fibre filled, UL 94-V0

Shell housing A for type F



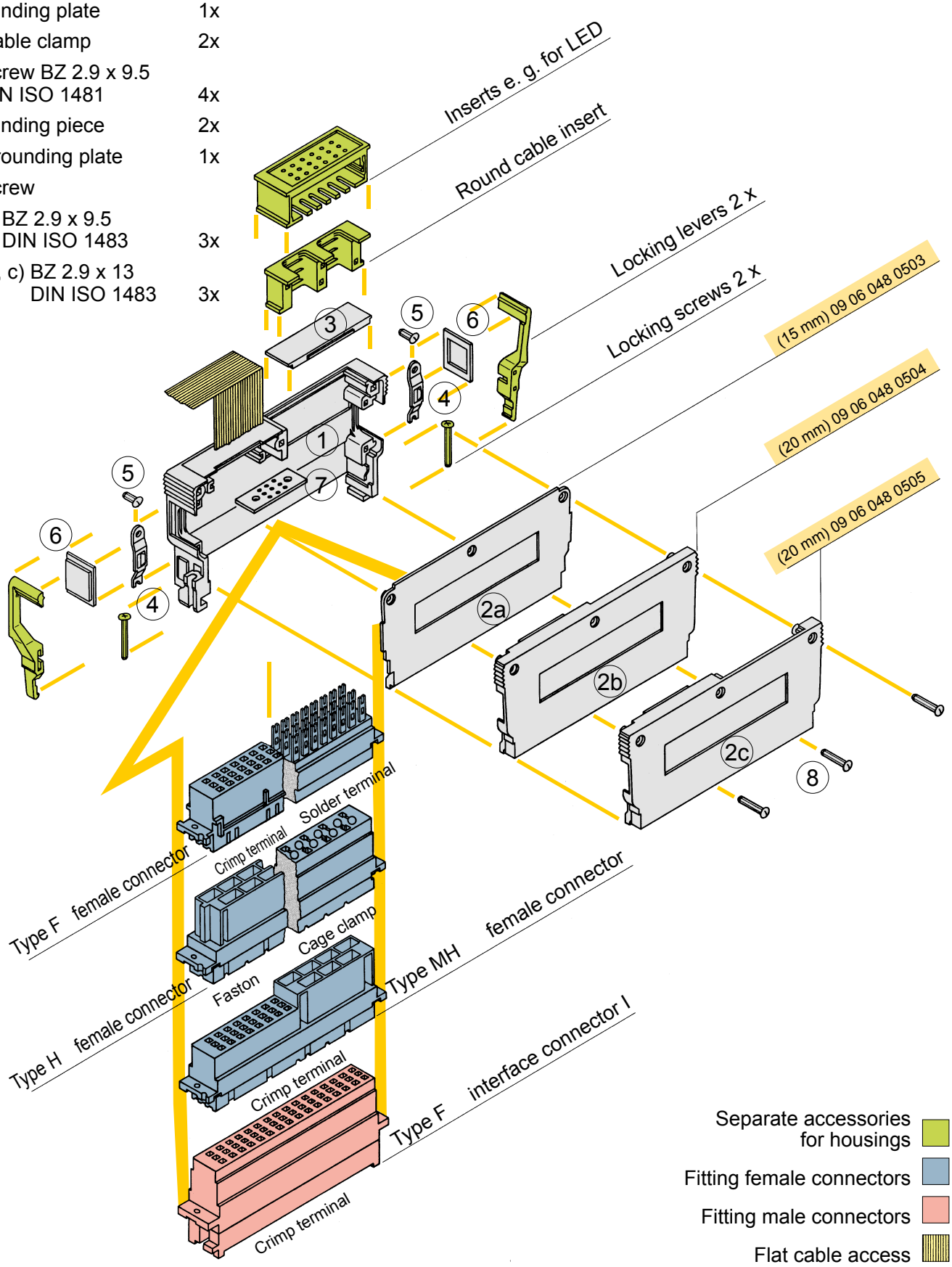
Identification	Part number	Drawing	Dimensions in mm
Shell housing A Side entry I	15 mm 09 06 048 0501[f]		
Top entry II	15 mm 09 06 048 0402[f]		
			
Cable clamp incl. screw	09 06 001 9986	1 x ④ + 2 x ⑤ on page 20.10	
Fixing brackets A for male connectors for 19" racks according to DIN EN 60 297, part 3-101 Multiple fixing III	left 09 06 000 9901[f] right 09 06 000 9902[f]		
Single fixing IV	left 09 06 000 9905[f] right 09 06 000 9906[f]		

[1] nut and screw not supplied with bracket

[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Shell housing B for types F, H and MH

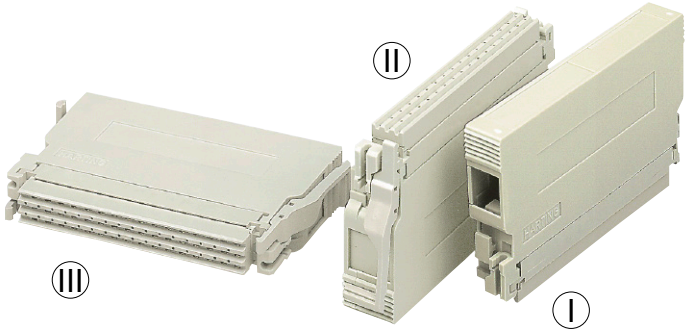
1	Shell	1x
2	Cover	1x
3	Blinding plate	1x
4	Cable clamp	2x
5	Screw BZ 2.9 x 9.5 DIN ISO 1481	4x
6	Blinding piece	2x
7	Grounding plate	1x
8	Screw	
	a) BZ 2.9 x 9.5 DIN ISO 1483	3x
	b), c) BZ 2.9 x 13 DIN ISO 1483	3x

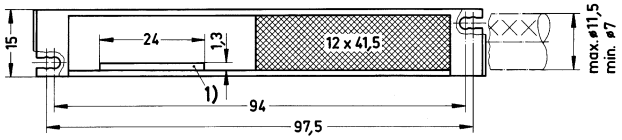
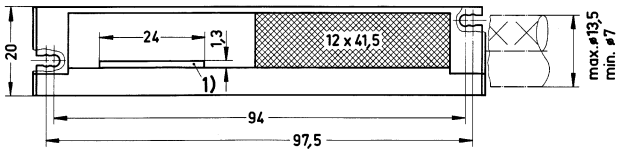
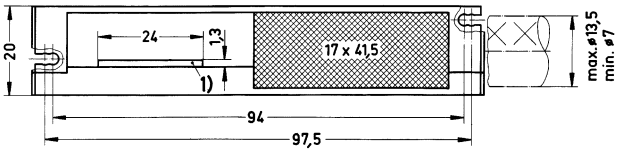
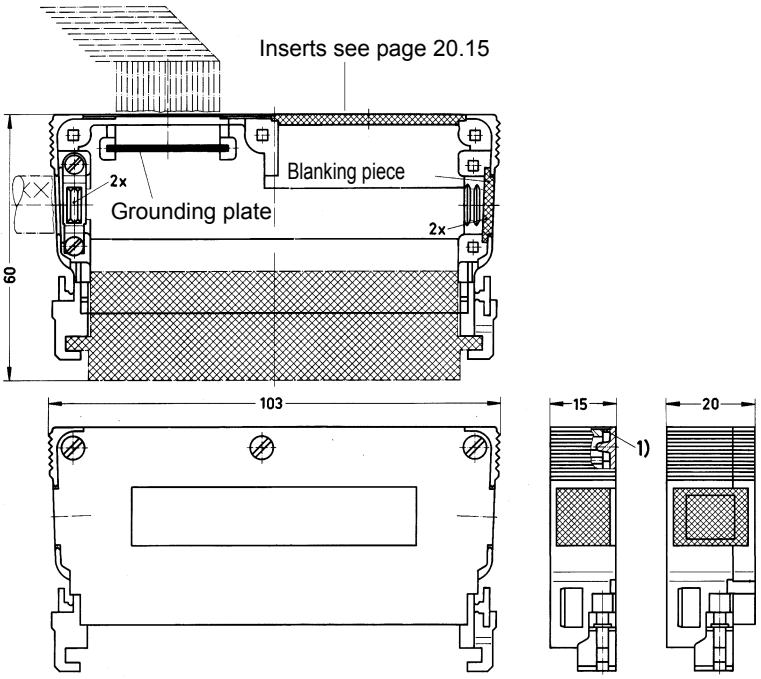


Shell housings

Moulding material: thermoplastic resin, glass-fibre filled, UL 94-V0

Shell housing B for types F, H and MH

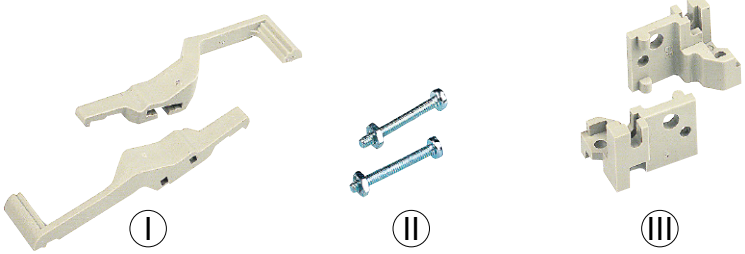


Identification	Part number	Drawing	Dimensions in mm
Shell housing B (I)	15 mm 09 06 048 0503		
(II)	20 mm 09 06 048 0504		
(III)	20 mm 09 06 048 0505		
			

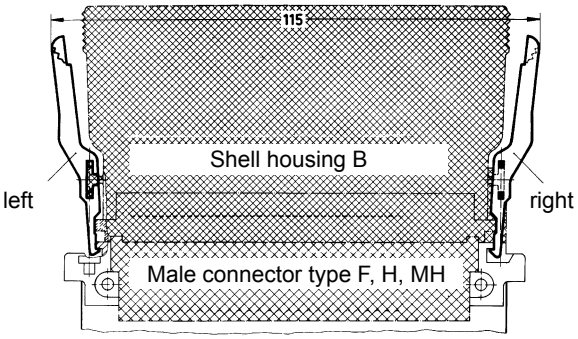
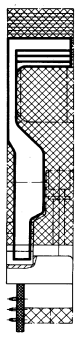
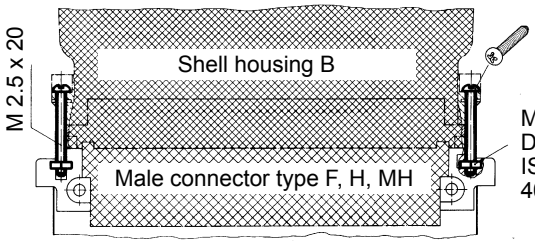
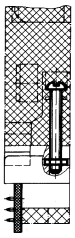
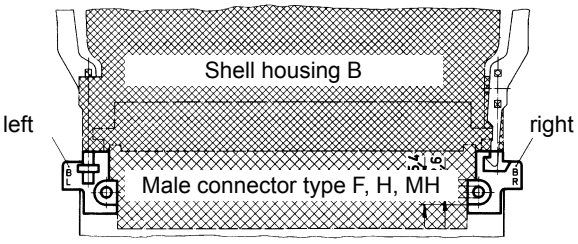
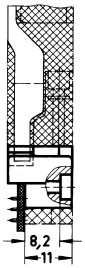
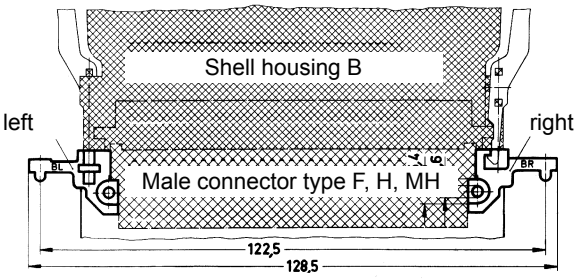
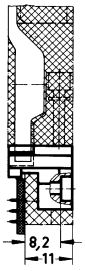
[1] Possible access for flat cable (18 x ø 1.27). Remove the blanking piece

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

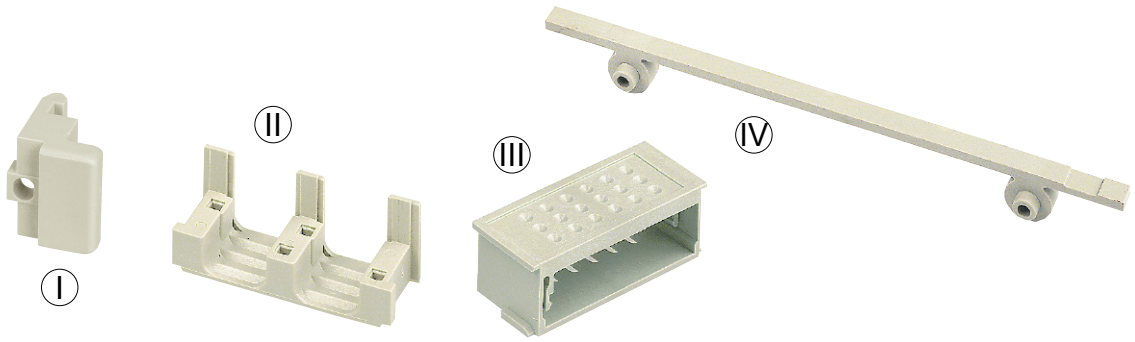
Shell housing B



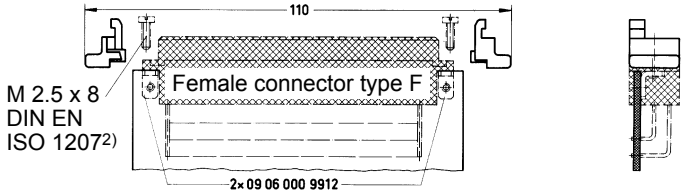
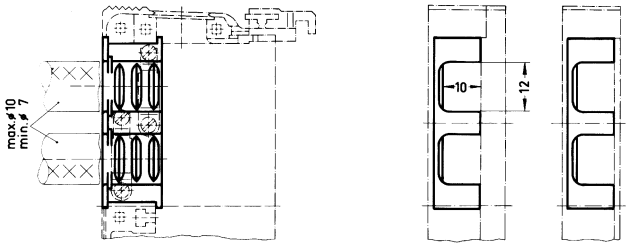
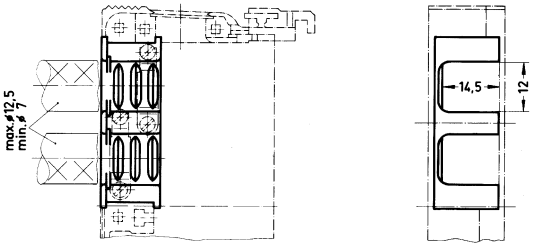
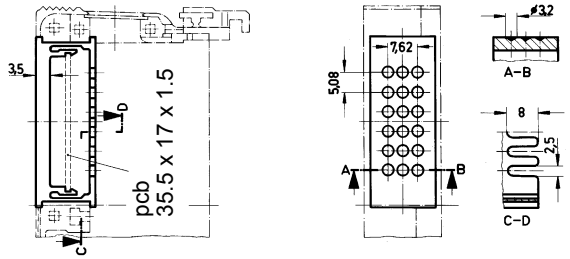
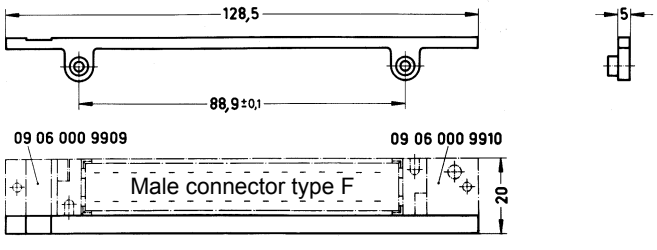
Accessories

Identification	Part number	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)f) left 09 06 000 9913 f) right 09 06 000 9919 f)		
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 EN 60 297, part 3-101 **Multiple fixing** without nut	left 09 06 000 9907 f) right 09 06 000 9908 f)		
with nut M 2.5 DIN 562	left 09 06 000 9966 f) right 09 06 000 9967 f)		
Single fixing without nut (III)	left 09 06 000 9909 f) right 09 06 000 9910 f)		
with nut M 2.5 DIN 562	left 09 06 001 9934 right 09 06 001 9935		

f) Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

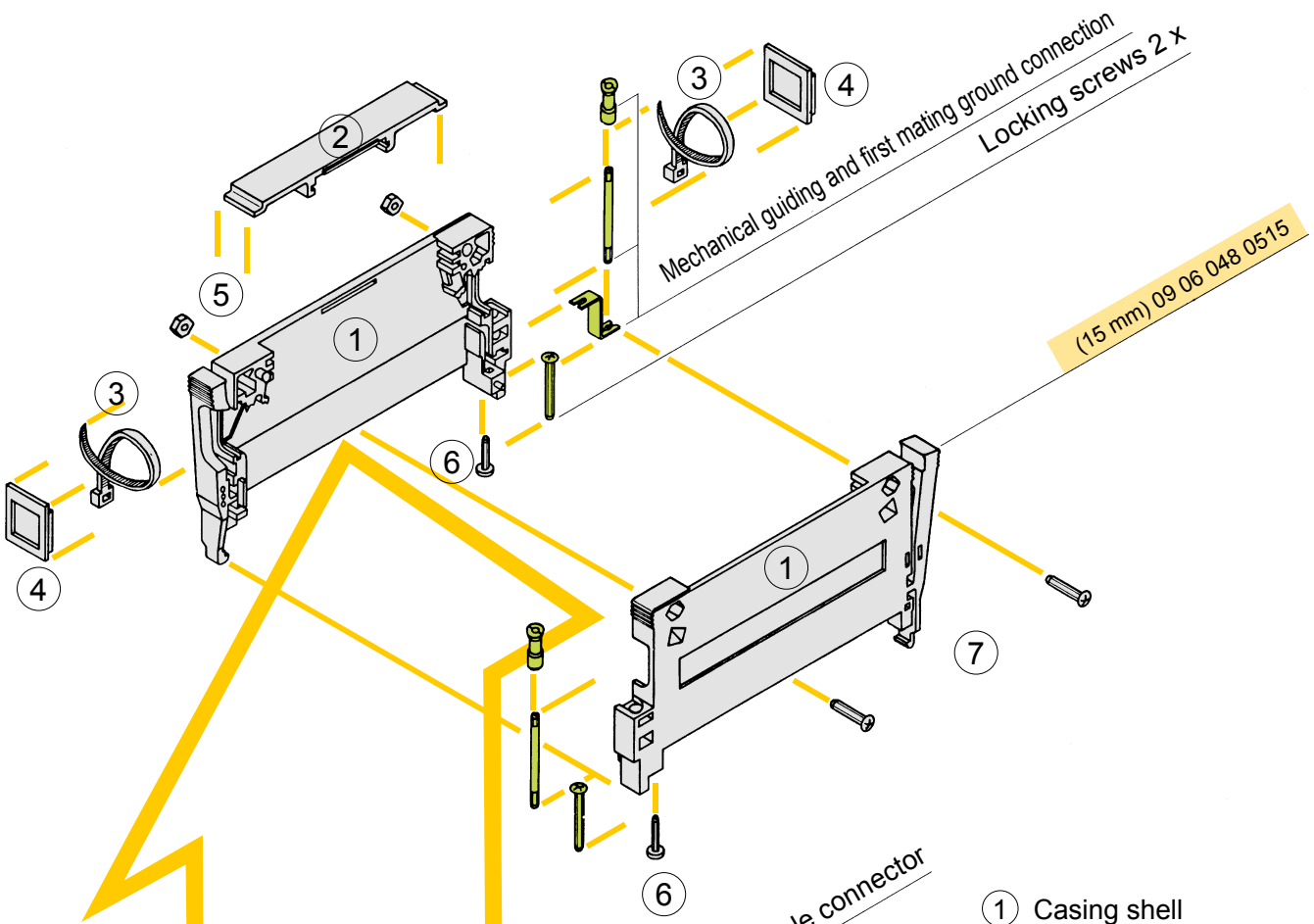


Accessories

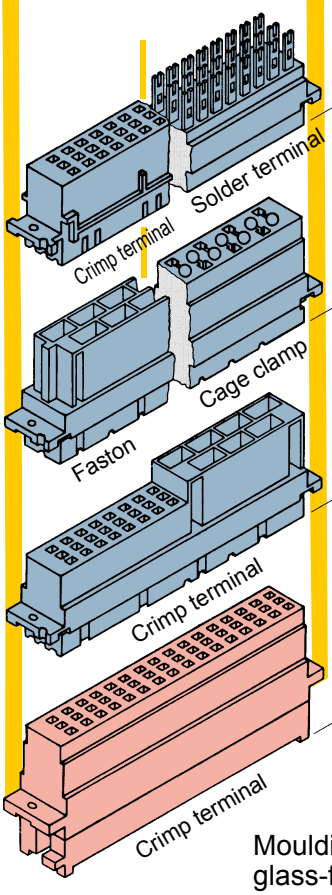
Identification	Part number	Drawing	Dimensions in mm
Fixing brackets B for female connectors for 19" racks according to DIN EN 60 297, part 3-101 Multiple fixing I 1) Order 2 pieces for one female connector	09 06 000 9933 1)	 2) nut and screw not supplied with fixing brackets	
Round cable insert 2 x ø 10 for shell housings B 09 06 048 0503 09 06 048 0504 Supplied with: Round cable insert 1x Blinding piece 1x	09 06 000 9914		
Round cable insert 2 x ø 12.5 II for shell housing B 09 06 048 0505 Supplied with: Round cable insert 1x Blinding piece 1x	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		

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Shell housing D 15 for types F, H and MH



1	Casing shell	2x
2	Blinding plate	1x
3	Cable tie	2x
4	Blinding piece	2x
5	Hexagonal nut M2.5 DIN EN ISO 4035	2x
6	Screw BZ 2.9 x 9.5 DIN ISO 1481	2x
7	Screw M2.5 x 12 DIN EN ISO 7045	2x



Moulding material: thermoplastic resin, glass-fibre filled, UL 94-V0

Separate accessories for housings

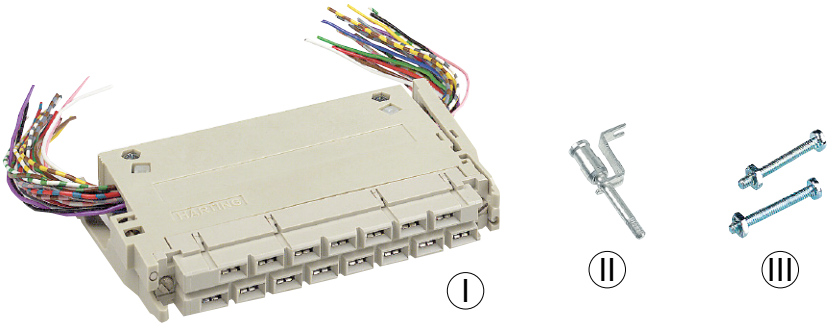
Fitting female connectors

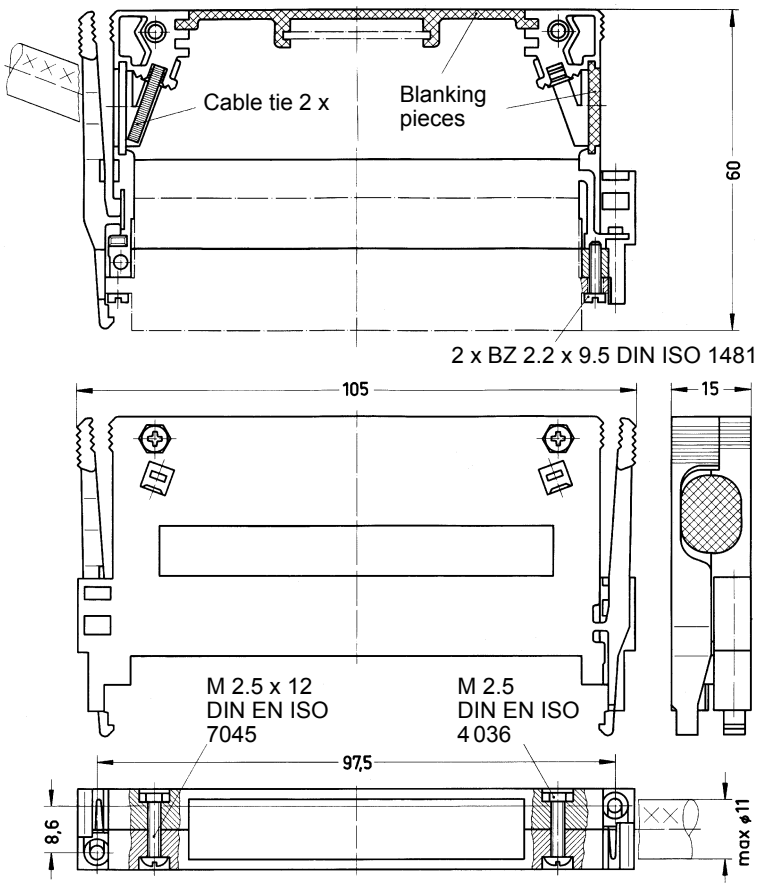
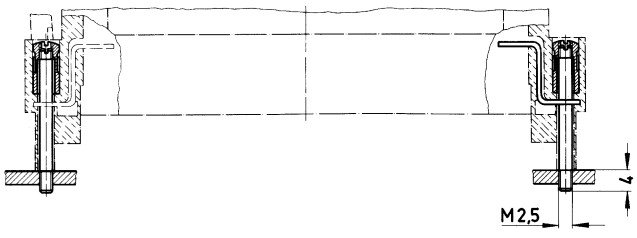
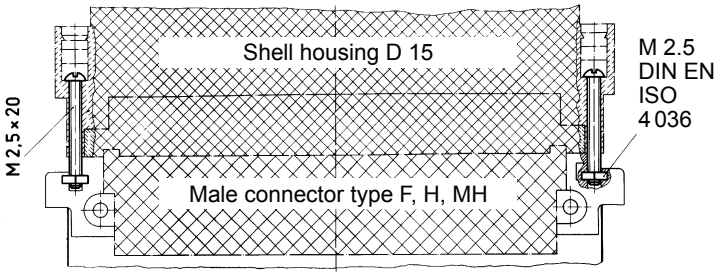
Fitting male connectors

Housing parts supplied

Shell housings

Shell housing D 15 for types F, H and MH

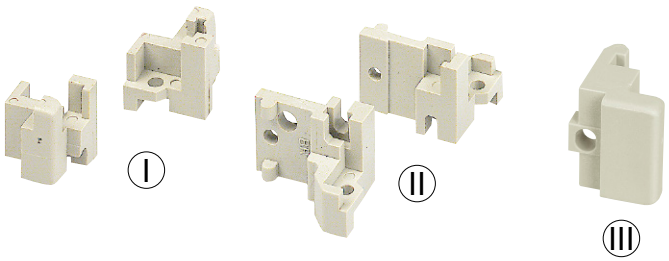


Identification	Part number	Drawing	Dimensions in mm
Shell housing D 15 I	15 mm 09 06 048 0515[f]		
Mechanical guiding and first mating ground connection II	09 06 000 9961		
Locking screws III	09 06 000 9926[1]		

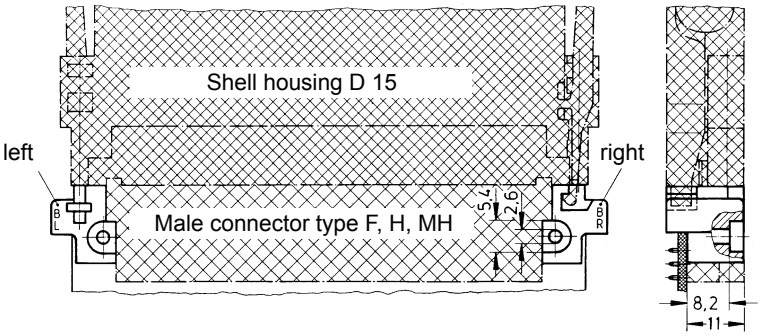
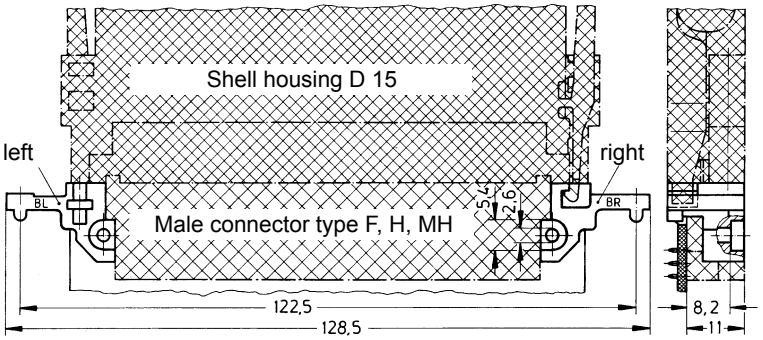
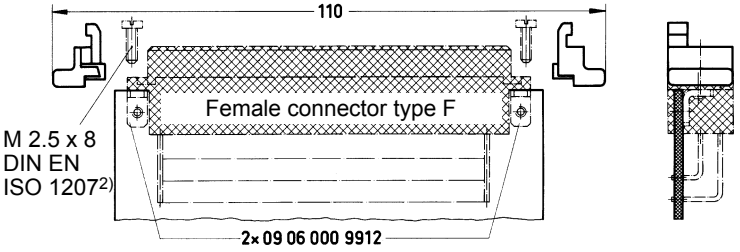
[1] Order 2 pieces for one shell housing

[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Shell housing D 15



Accessories

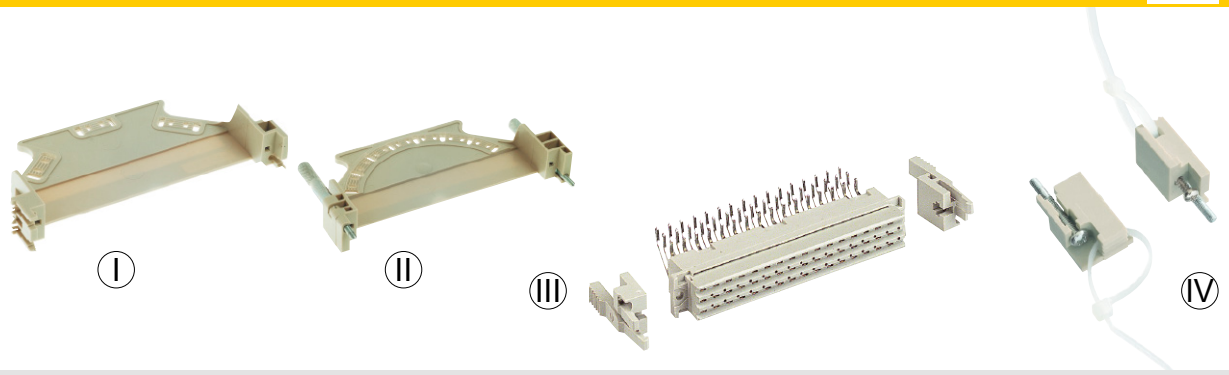
Identification	Part number	Drawing	Dimensions in mm
Fixing brackets B for male connectors for 19" racks according to DIN EN 60 297, part 3-101 **Multiple fixing** without nut I with nut M 2.5 DIN 562	left 09 06 000 9907 right 09 06 000 9908 left 09 06 000 9966 right 09 06 000 9967		
Single fixing without nut II with nut M 2.5 DIN 562	left 09 06 000 9909 right 09 06 000 9910 left 09 06 001 9934 right 09 06 001 9935		
Fixing brackets B for female connectors for 19" racks according to DIN EN 60 297, part 3-101 **Multiple fixing** III	09 06 000 9933[1]		

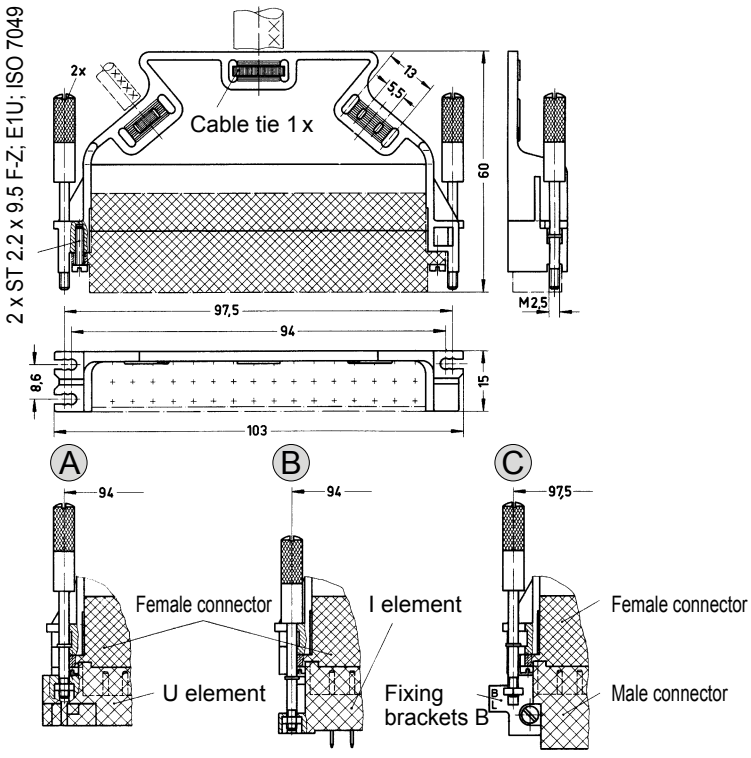
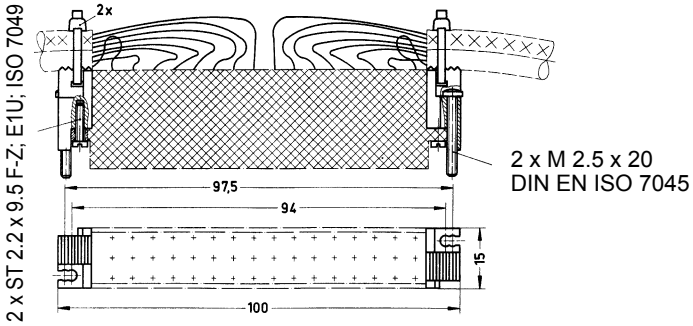
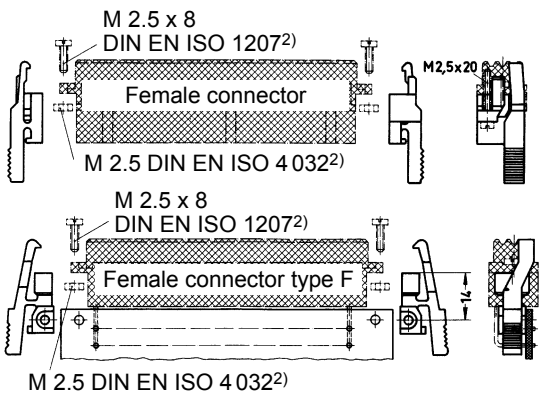
[1] Order 2 pieces for one female connector

[2] nut and screw not supplied with fixing brackets

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Open hood G, junction element O, locking lever



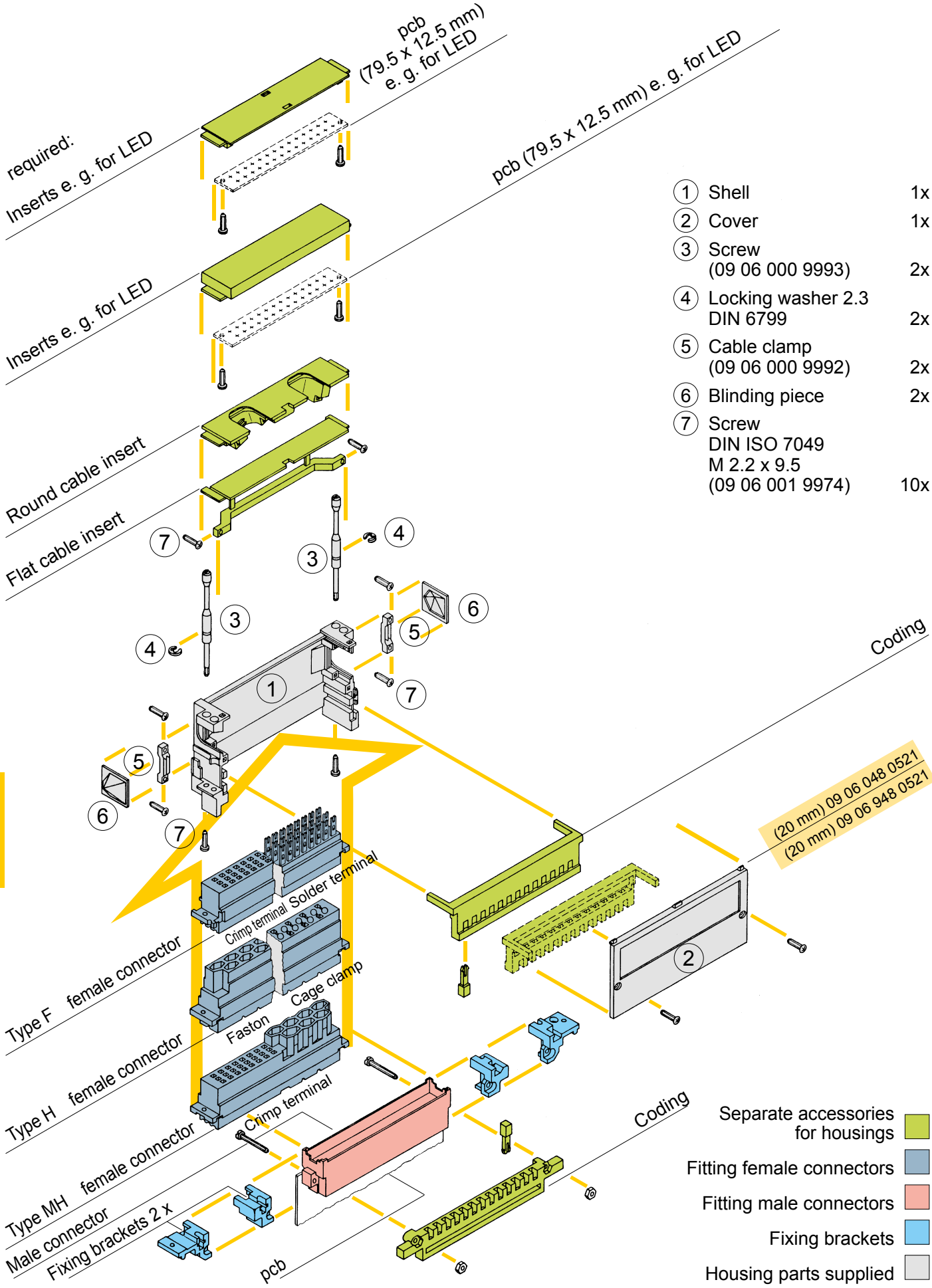
Identification	Part number	Drawing	Dimensions in mm
Open hood G (I) for types E, F, H and MH, for applications (A) (B) (C) Supplied with: Open hood 1x Locking screw 2x (09 06 000 9958) Cable tie 1x Screw 2x	09 06 000 9957		
Open hood G (II) for types E, F, H and MH, for application (C) Supplied with: Open hood 1x Pre-assembled, undetachable locking screw 2x Cable tie 1x Screw 2x	09 06 001 9939		
Junction element O for type F (IV) Supplied with: Junction element 2x Cable tie 2x Screw 2x Screw M2.5 x 20 2x	09 06 000 9968		
Locking lever for type F, H and MH (III)	09 06 000 9930[1)] 09 06 000 9911[1)]		

[1)] Order 2 pieces for one female connector

[2)] nut and screw not supplied with locking levers

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

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



1	Shell	1x
2	Cover	1x
3	Screw (09 06 000 9993)	2x
4	Locking washer 2.3 DIN 6799	2x
5	Cable clamp (09 06 000 9992)	2x
6	Blinding piece	2x
7	Screw DIN ISO 7049 M 2.2 x 9.5 (09 06 001 9974)	10x

Separate accessories for housings

Fitting female connectors

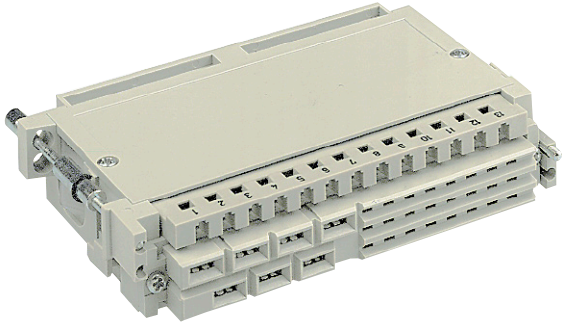
Fitting male connectors

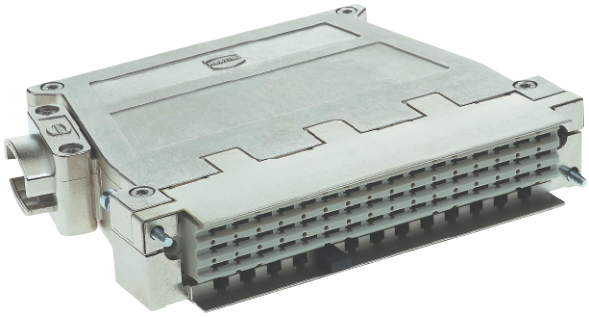
Fixing brackets

Housing parts supplied

Moulding material: thermoplastic resin, glass-fibre filled, UL 94-V0

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:

32 = 32 contacts
48 = 48 contacts

09 06 2__ _853

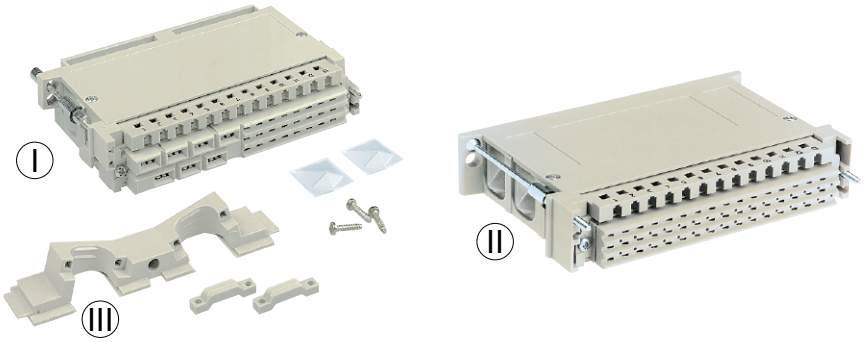
7 = performance level 3
6 = performance level 2
2 = performance level 1

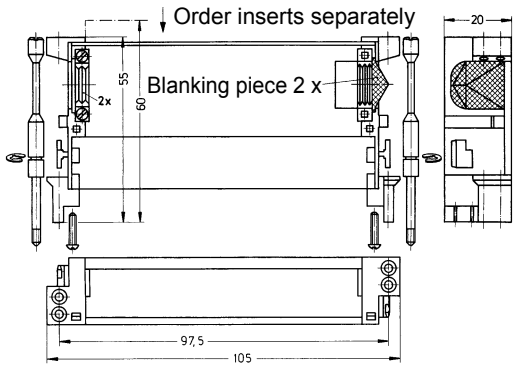
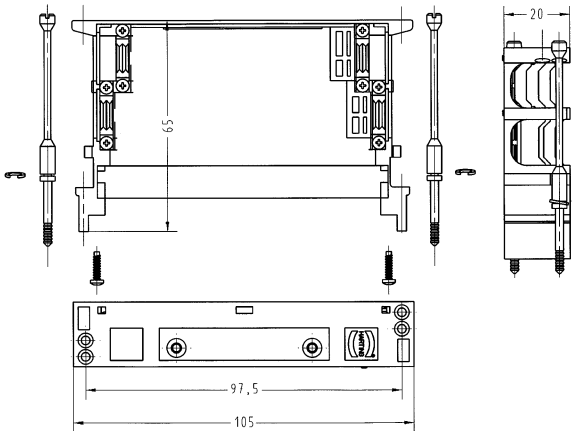
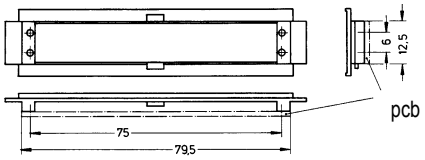
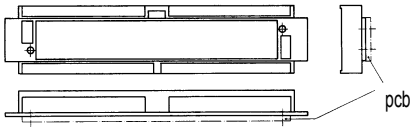
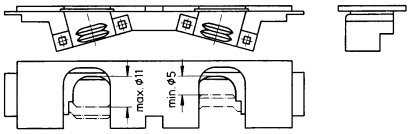
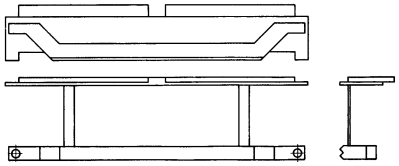
Technical characteristics

	D 20/2	D 20/2 metallised[1)]	D 20/4	D 20/4 metallised[1)]	D 20 metal	D 20 metal HF
Part number	09 06 048 0521	09 06 948 0521	09 06 048 0522	09 06 948 0522	09 06 848 0550	09 06 848 0551
Material	Polycarbonate	Polycarbonate	Polycarbonate	Polycarbonate	Zinc alloy	Zinc alloy
Surface	none	nickel/copper	none	nickel/copper	nickel-plated	nickel-plated
Weight [g]	36	44	43	52	182	188
Cable entries	side (2 x), top (2 x)	side (2 x), top (2 x)	side (4 x)	side (4 x)	side (2 x), top (2 x)	side (2 x) top (2 x)
Protection	IP20	IP20	IP20	IP20	IP20	IP20

[1)] upper temperature limit is +105 °C

Shell housing D 20 for types F, H and MH

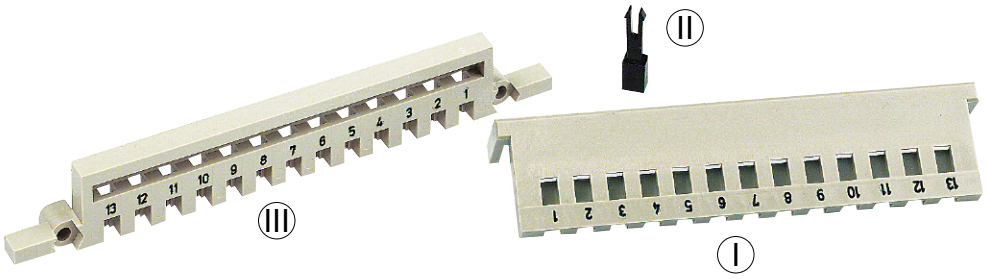


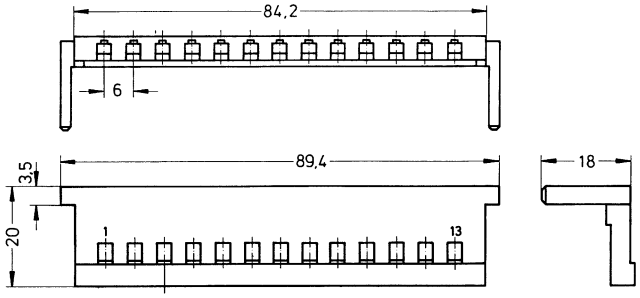
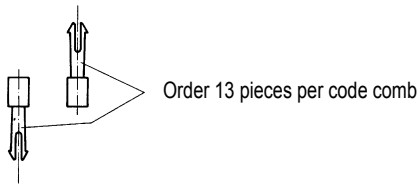
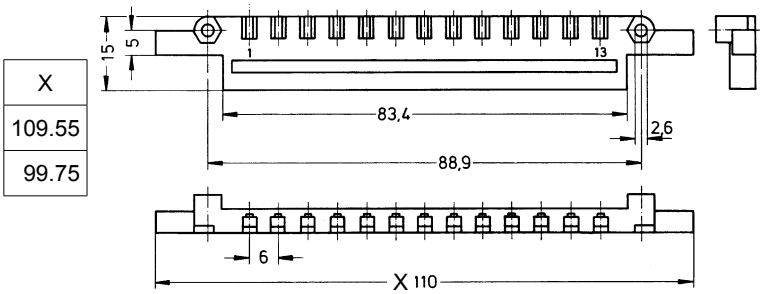
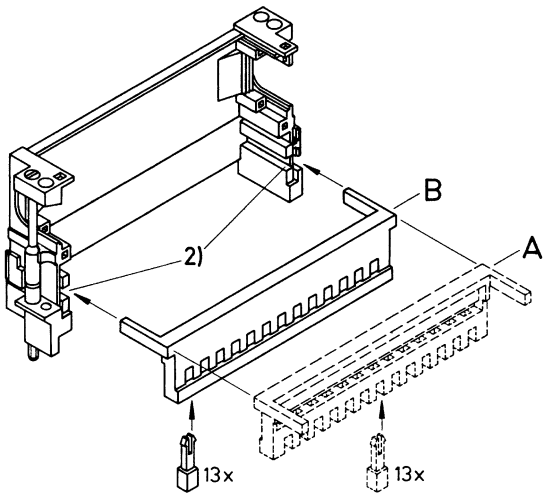
Identification	Part number	Drawing	Dimensions in mm
Shell housing D 20/2 Two side cable entries I	20 mm 09 06 048 0521		
Shell housing D 20/4 Four side cable entries II Supplied with: Shell 1x Cover 1x Locking screw 2x (09 06 000 9920) Locking washer 2.3 2x Screw BZ 2.2x9.5 12x Blinding piece 3x Cable clamp 2x	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
Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Shell housing D 20

Coding



Identification	Part number	Drawing	Dimensions in mm
Code comb for shell housing[3)] (can also be used as a blanking cover) I	09 06 000 9984[f)]		
Coding pin[3)] II [1)] Order 13 pieces per code comb	09 06 001 9905[1)]		
Code comb for male connectors[3)] III			
short version for a full metal locking lever	09 06 000 9985[f)] 09 06 001 9985[f)]		
with nut M2.5	09 06 001 9995[f)]		
Mounting possibilities for the code comb in the shell housing D 20/2			

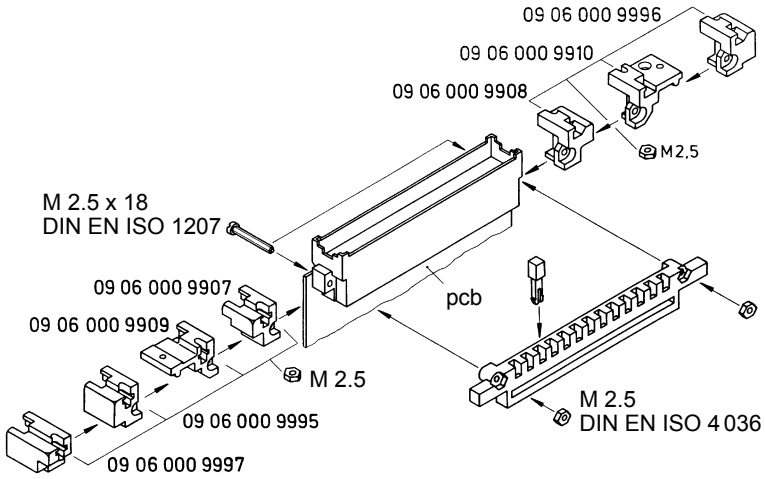
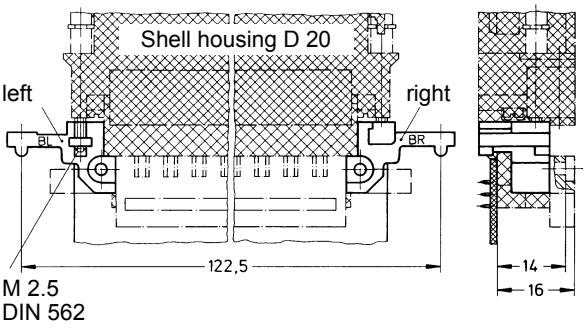
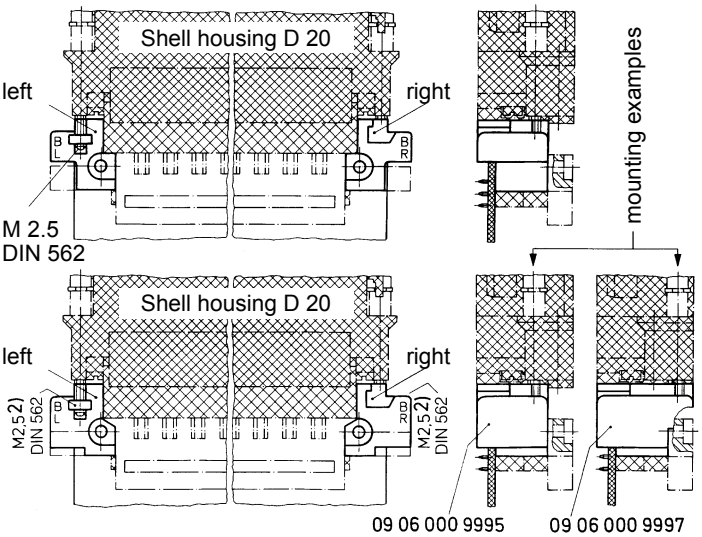
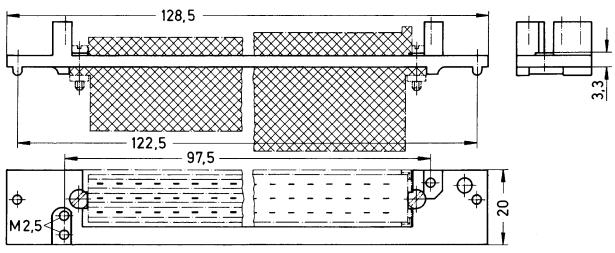
X
109.55
99.75

[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 20.25
Mounting example **B** max. cable entry ø 14 mm to the bottom, see page 20.25

[3)] Fits D 20/2 and D 20/4
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Shell housing D 20

Identification	Part number	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 EN 60 297, part 3-101			
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	left 09 06 000 9995 09 06 000 9997		
with coding at fixing bracket[1] with nut M 2.5 DIN 562 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		

Shell housings

* Fits D 20/2 and D 20/4

[1] Specific coding between the fixing bracket and the pcb guiding rail. The guiding rail and corresponding coding pins are not scope of delivery

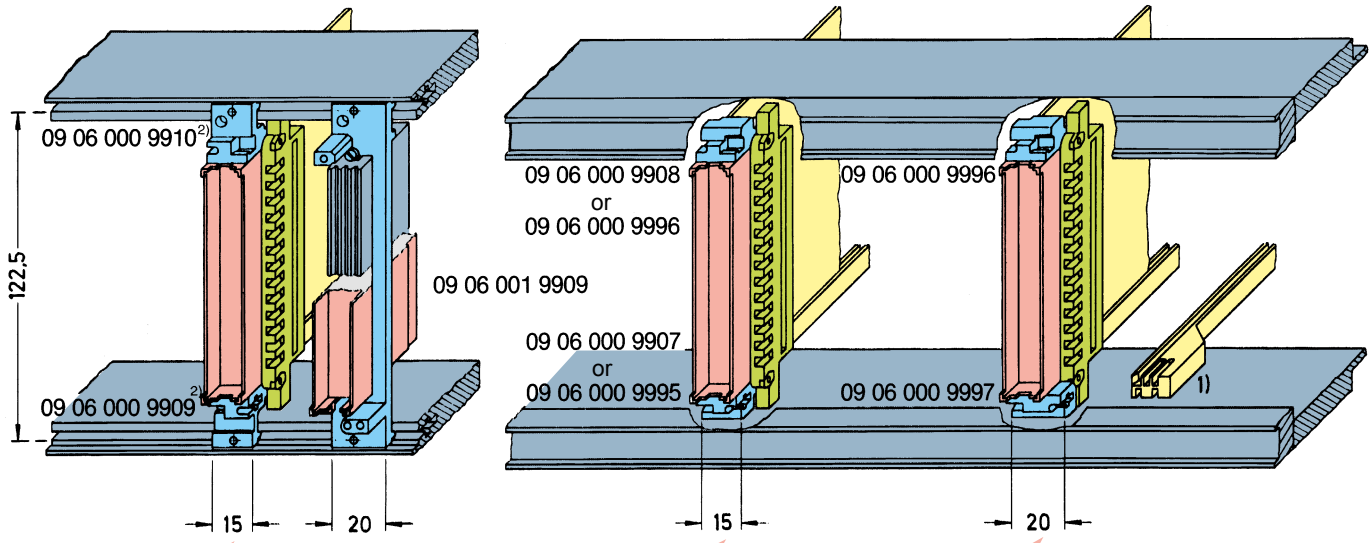
Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

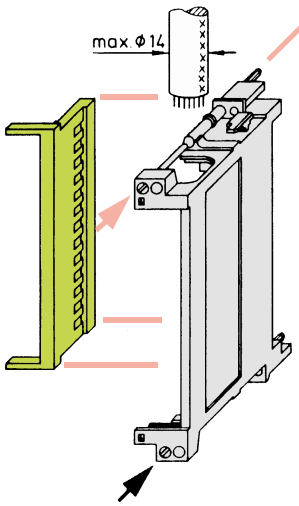
Mounting examples

Dimensions in mm

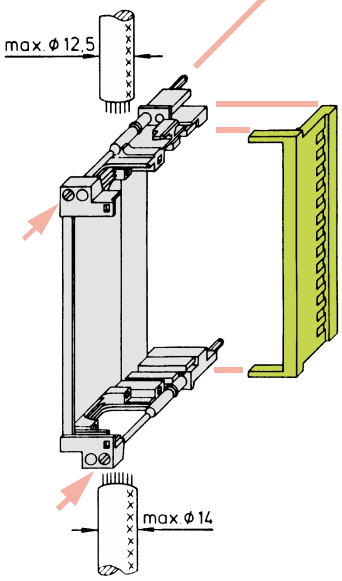
Single fixing

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

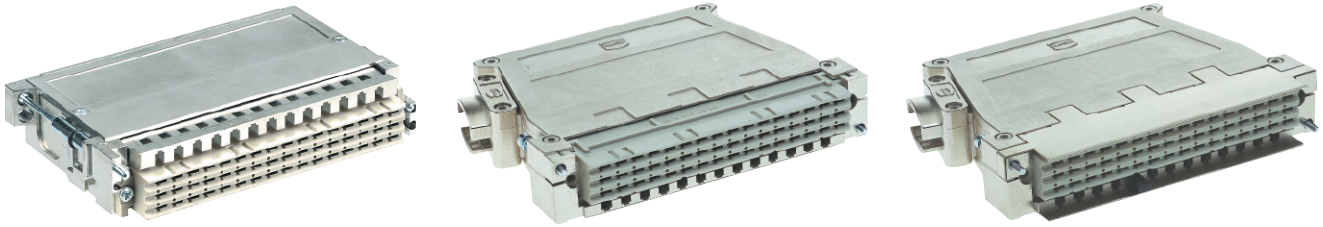
Fitting male connectors

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 20.32.



EMC with HARTING connectors

HARTING offers metallised D 20 housings and full metal housings for EMC connectors according to IEC 60 603-2. 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 D 20 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.

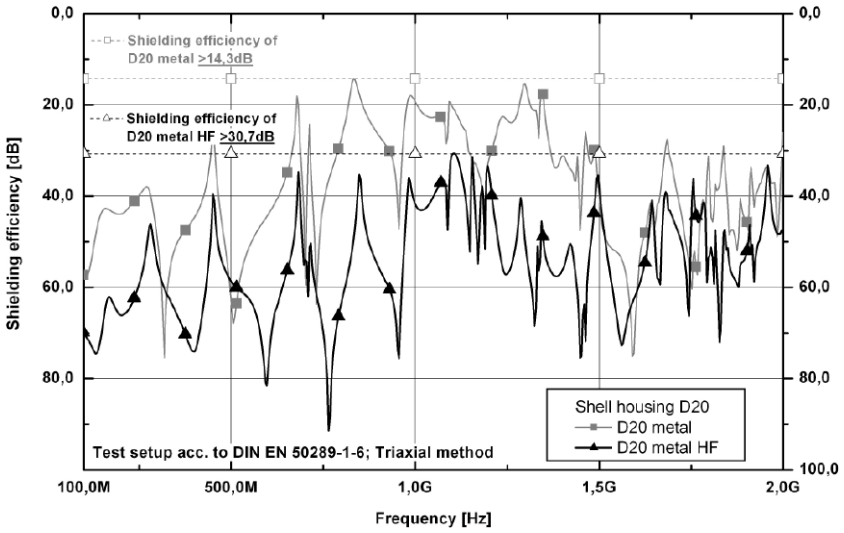
One advantage of metallised housings is their reduced weight (40 grams compared to 180 grams of a full metal housing). Therefore, minimal interference is applied to the pcb in applications where strong vibration is occuring. The HARTING housings are comparatively light through the use of metallised plastic.

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

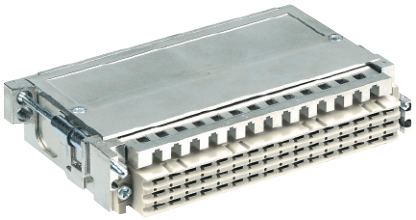
In general, one should keep in mind that an unshielded cable entry leads to loss of the shielding against electromagnetic interference.

“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.”

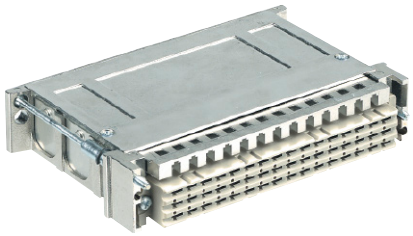
These housings are applied in electronic installations of the railway vehicles of the GERMAN RAILWAY. They are also recommended for stationary installations of the GERMAN RAILWAY (see norm BN 74016, part 1 of December 1989).



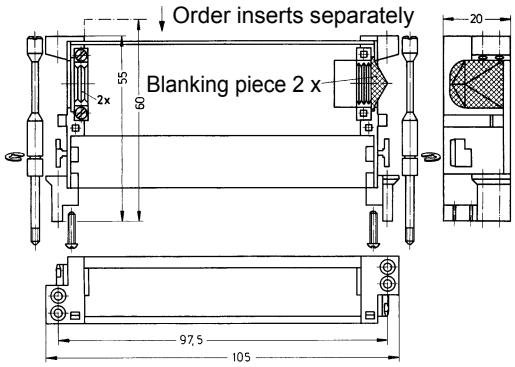
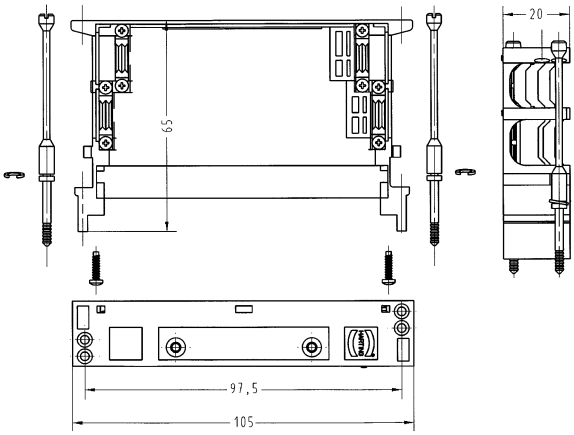
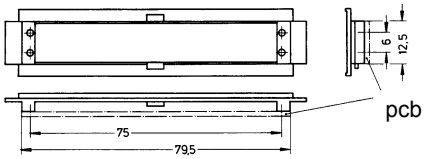
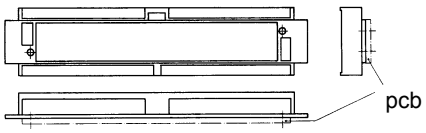
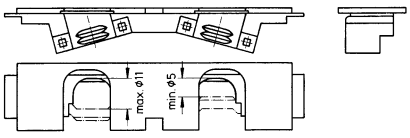
Shell housing D 20 metallised for types F, H and MH



Ⅰ



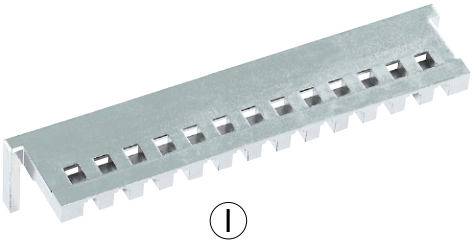
Ⅱ

Identification	Part number	Drawing	Dimensions in mm
Shell housing D 20/2 metallised with two side cable entries Ⅰ Supplied with: see page 20.20	20 mm 09 06 948 0521		
Shell housing D 20/4 metallised with four side cable entries Ⅱ Supplied with: Shell 1x Cover 1x Locking screw 2x (09 06 000 9920) Locking washer 2.3 2x Screw BZ 2.2x7.5 12x Blinding piece 3x Cable clamp 2x	20 mm 09 06 948 0522		
Metallised insert e. g. for LED* for 55 mm height	09 06 900 9986		
for 60 mm height	09 06 900 9987		
Metallised round cable insert* 2 x ø 11	09 06 900 9988		

* Fits D 20/2 metallised

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

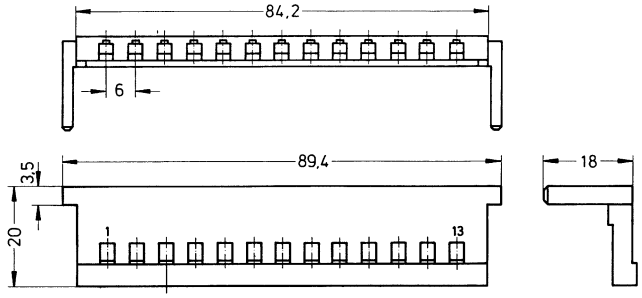
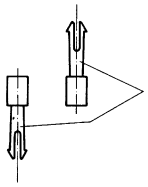
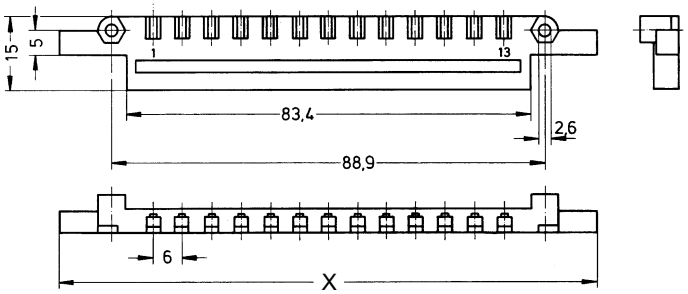
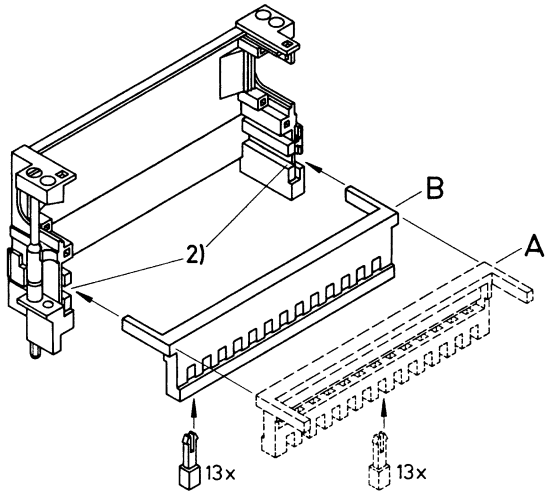
Shell housing D 20 metallised



Ⅰ

Ⅱ

Coding

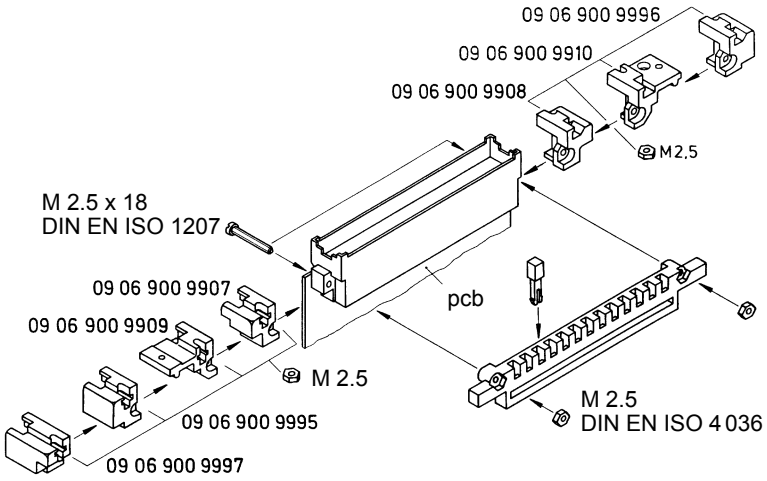
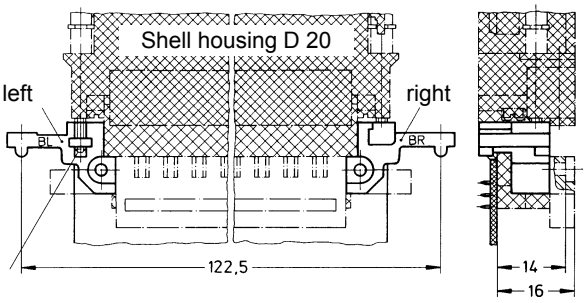
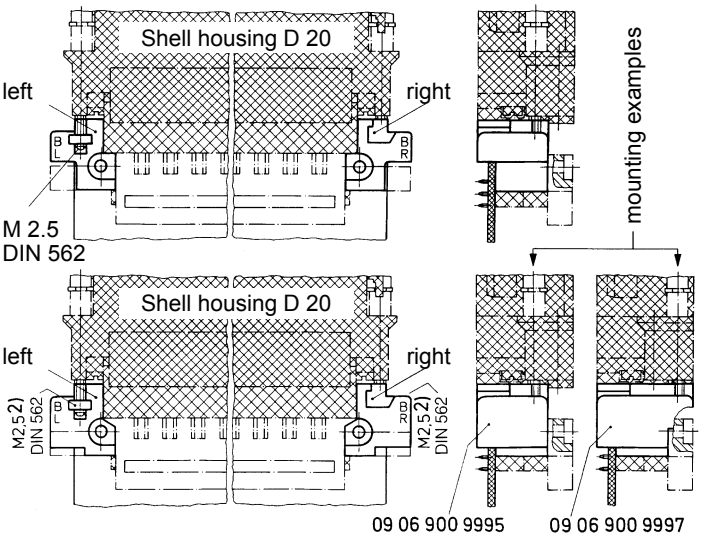
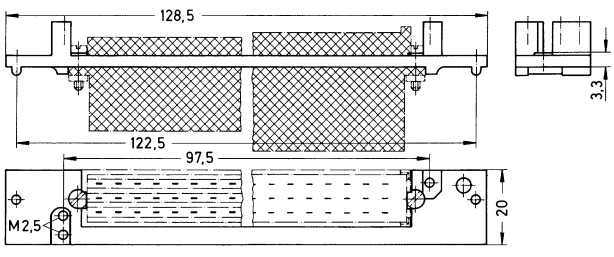
Identification	Part number	Drawing	Dimensions in mm
Metallised code comb for shell housing[3)] (can also be used as blanking cover) Ⅰ	09 06 900 9984[f)]		
Code pin[3)] [1)] Order 13 pieces per code comb	09 06 001 9905[1)]	 Order 13 pieces per code comb	
Metallised code comb for male connector[3)] Ⅱ short version for a full metal locking lever	09 06 900 9985[f)] 09 06 901 9985[f)]		
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 20.25
Mounting example **B** max. cable entry ø 14 mm to the bottom, see page 20.25

[3)] Fits D 20/2 and D 20/4 metallised
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Shell housing D 20 metallised

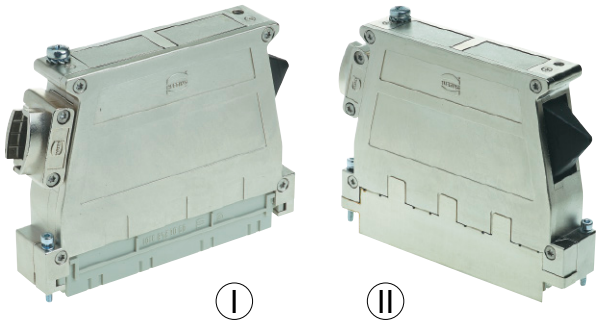
Identification	Part number	Drawing	Dimensions in mm
Mounting possibilities for coding at the male connector with fixing brackets			
Fixing brackets B metallised for male connectors* for 19" racks according to DIN EN 60 297, part 3-101 Single fixing* without nut	left 09 06 900 9909 right 09 06 900 9910		
with nut M 2.5 DIN EN ISO 4 036	left 09 06 901 9934 right 09 06 901 9935	M 2.5 DIN EN ISO 4 036	
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 06 901 9909		

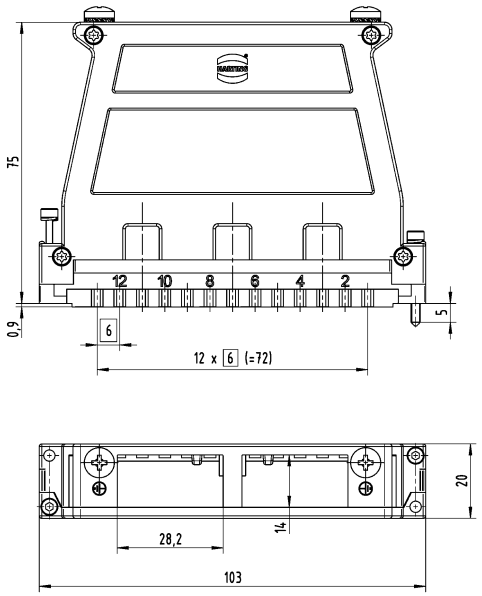
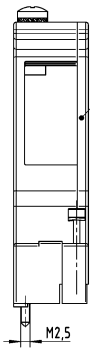
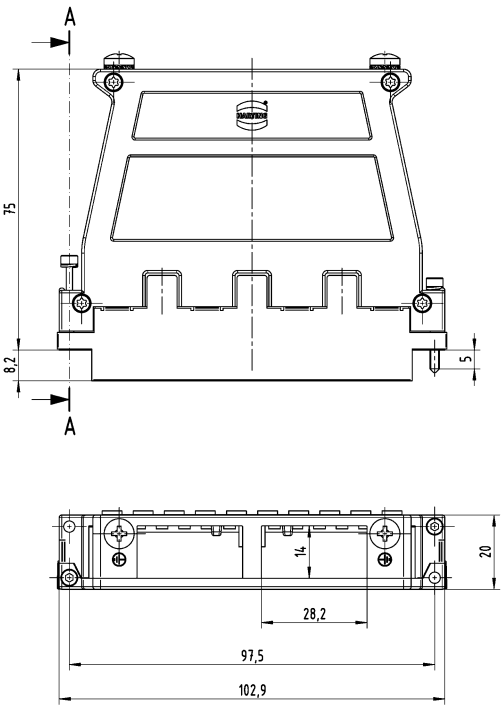
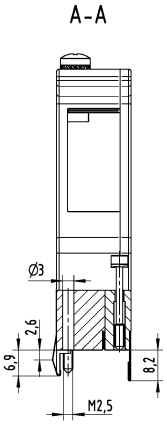
* Fits D 20/2 and D 20/4 metallised

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

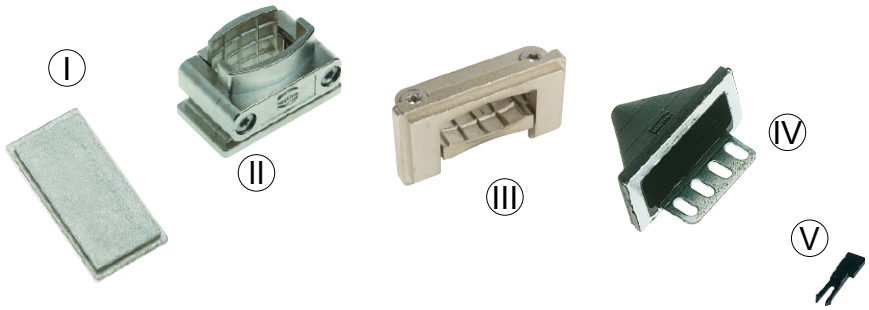
Railway classification NFF 16-101,
Smoke index: F1, Flammability class: I2

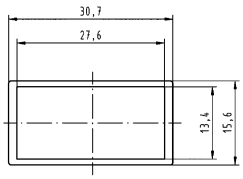
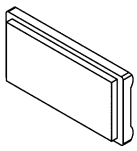
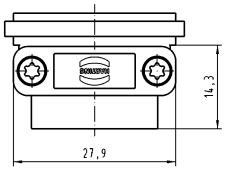
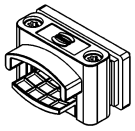
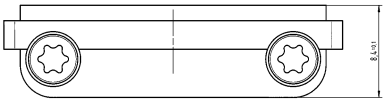
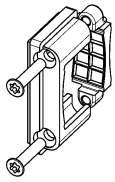
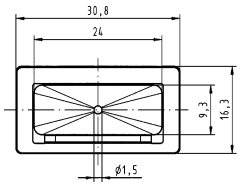
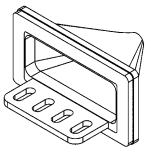
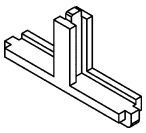
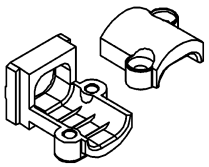
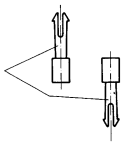
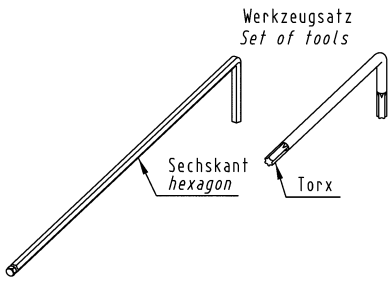
Shell housing D 20 metal for types F, H and MH



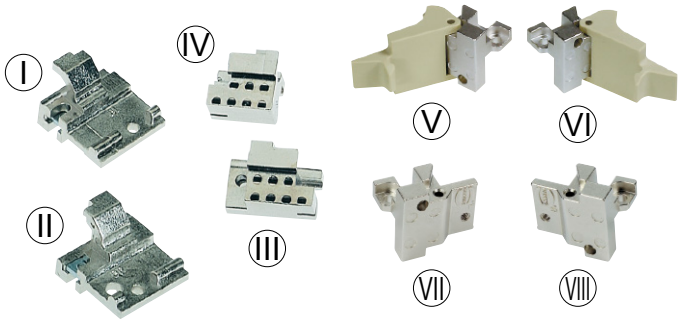
Identification	Part number	Drawing	Dimensions in mm
Shell housing D 20 metal (I) Supplied with: Shell with coding 1x Cover 1x Locking screw (hexagonal) M2.5 x 23 (09 06 800 9953) 2x Screw (torx) M2.5 x 10 (09 06 800 9960) 4x Earth screw M4 x 8 (09 06 800 9958) 2x	09 06 848 0550		
Shell housing D 20 metal HF with nickel-plated surface (II) Supplied with: Shell with coding and HF-sealing spring 1x Cover with shielding plate 1x Locking screw (hexagonal) M2.5 x 23 (09 06 800 9953) 2x Screw (torx) M2.5 x 10 (09 06 800 9960) 4x Earth screw M4 x 8 (09 06 800 9958) 2x	09 06 848 0551		

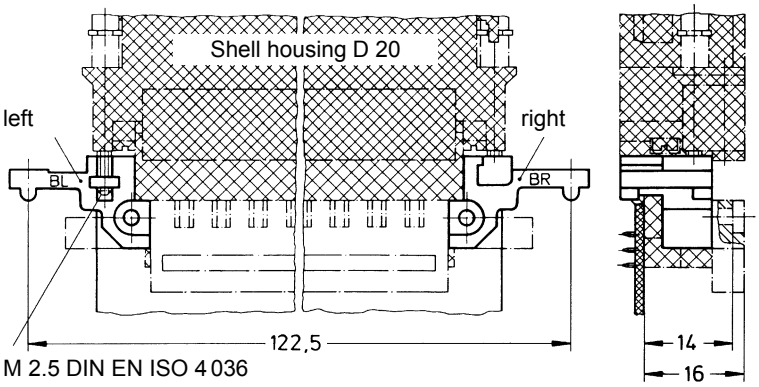
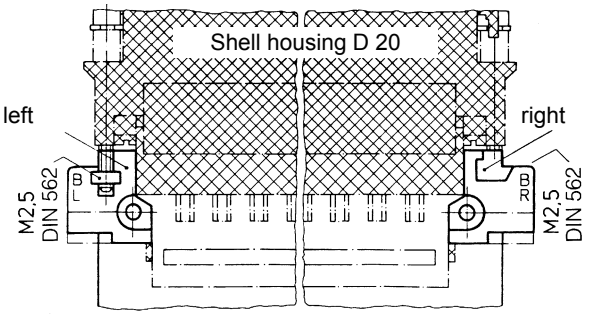
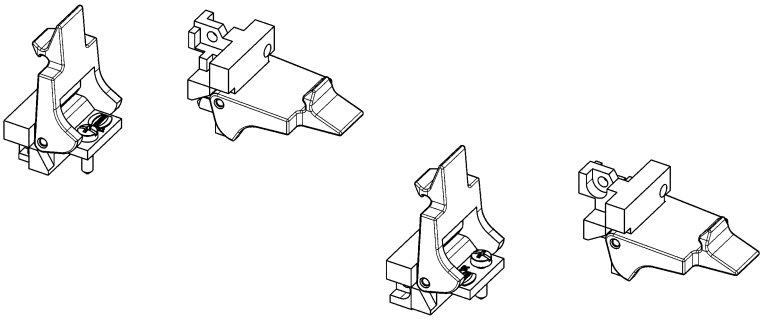
Shell housing D 20 metal for types F, H and MH



Identification	Part number	Drawing	Dimensions in mm
Blinding piece (I)	09 06 800 9951		
Cable clamp wide (II)	09 06 800 9955		
small (III)	09 06 800 9962		
Cable grommet with strain relief (IV)	09 06 800 9950		
Crimp flange insert	09 06 800 9952		
Cable clamp cable-Ø appr. 5- 7 mm cable-Ø appr. 7-10 mm cable-Ø appr. 10-12 mm	 61 03 000 0141 61 03 000 0044 61 03 000 0143		
Blanking piece for hoods	61 03 000 0042		
Code pin (V)	09 06 001 9905	Order 13 pieces per code comb 	
Hexagon ball-head screw driver	09 99 000 0003		

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



Identification	Part number	Drawing	Dimensions in mm
Fixing brackets B metallised for male connectors for 19" racks according to DIN EN 60 297, part 3-101 **Single fixing** with nut M 2.5 DIN EN ISO 4 036 (I, II)	left 20 mm 09 06 901 9924[f)] right 20 mm 09 06 901 9925[f)]		
Multiple fixing with coding at fixing bracket with nut M 2.5 DIN 562 (III, IV)	left 20 mm 09 06 900 9997[f)] right 15 mm 09 06 900 9996[f)]		
Fixing brackets B metal for male connectors for 19" racks according to DIN EN 60 297, part 3-101 **Single fixing** with ejector handle (V, VI)	left 09 06 800 9946 right 09 06 800 9948		
without ejector handle (VII, VIII)	left 09 06 800 9966 right 09 06 800 9968		

[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Electronic connectors in heavy duty housings

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 03
Male	2 x 48 way type F interface connectors I with crimp contact elements see chapter 03

Hoods and housings

see catalogue "Heavy Duty Han® Connectors"

chapter 30
size 24 B

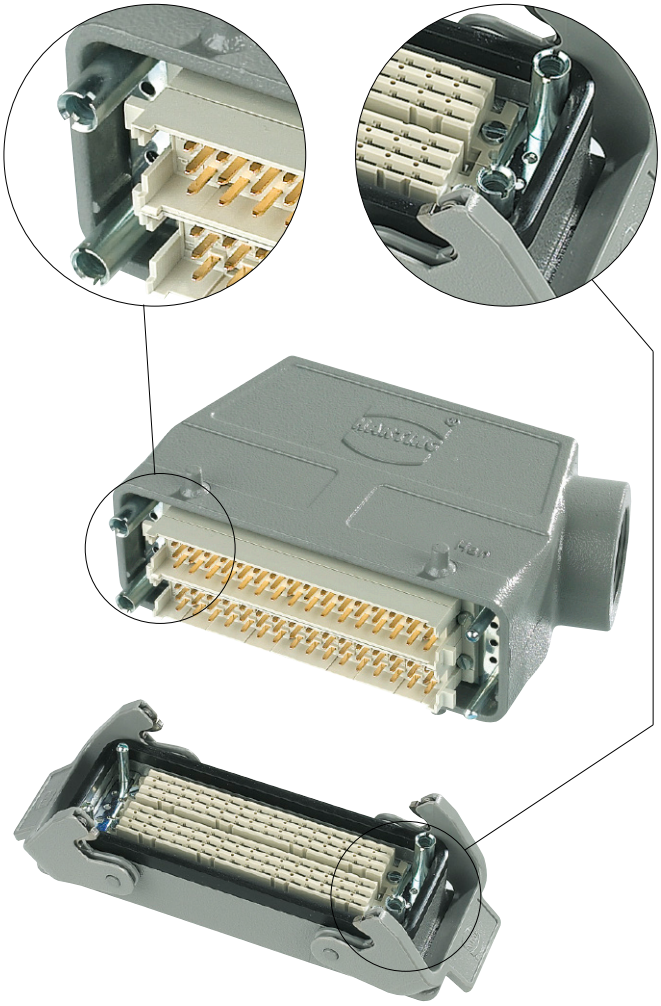
Degree of protection for hoods and housings: IP65

Retaining frames

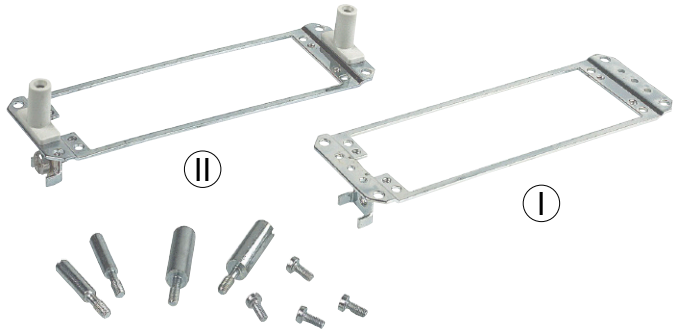
For fixing the inserts into the housing.

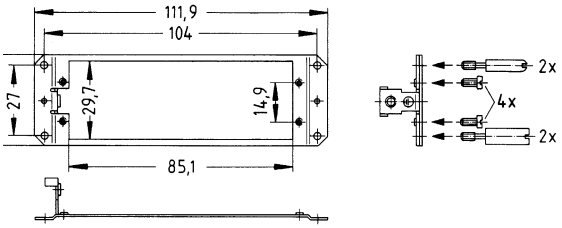
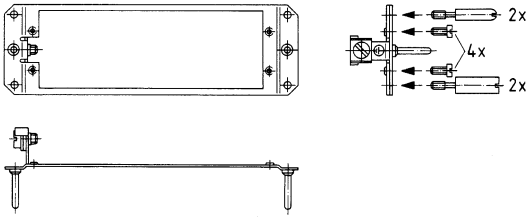
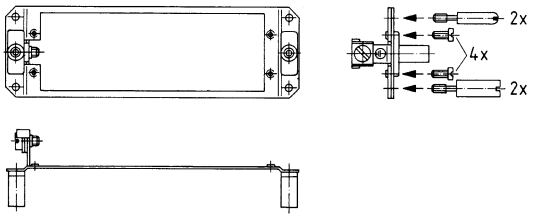
Alternative versions with pre-mating contacts and ground termination.

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

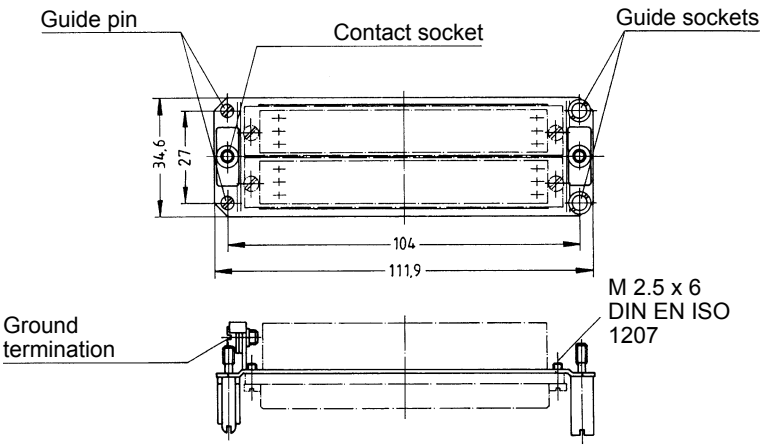


Identification	Part number	Drawing	Dimensions in mm
Retaining frame without contact elements I	09 06 001 9904		
Retaining frame with 2 contact pins and ground termination	09 06 001 9902		
Retaining frame with 2 contact sockets and ground termination II	09 06 001 9903		

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



Shell housings

Tooling

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:

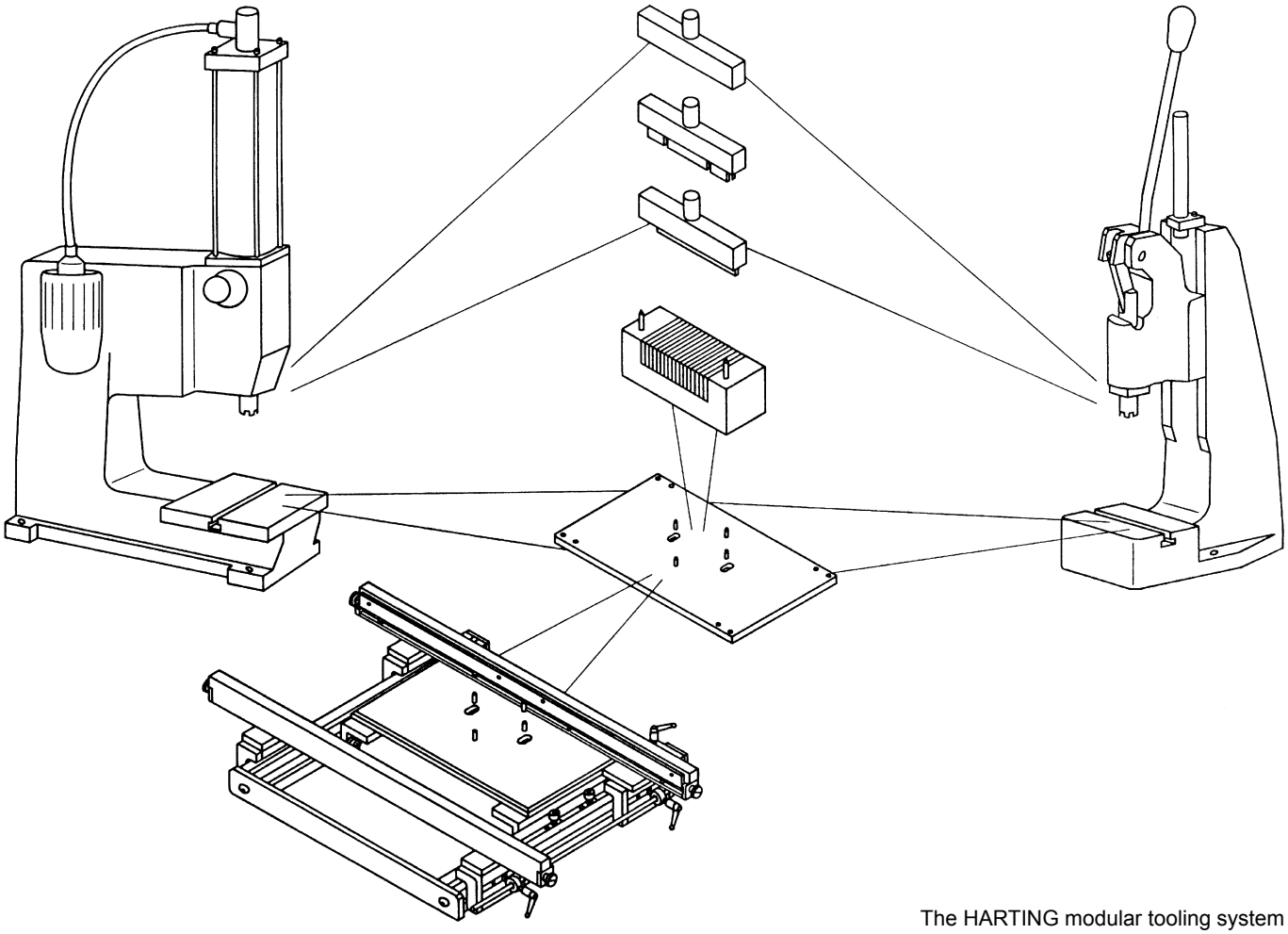
- Press
- Top tool
- Bottom tool
- Base plate

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

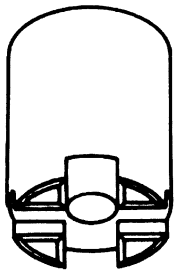
- Guide frame ”Standard“
  for hand bench press and pneumatic press
  and pcb height of 123.5 up to 309.5 mm

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



The HARTING modular tooling system

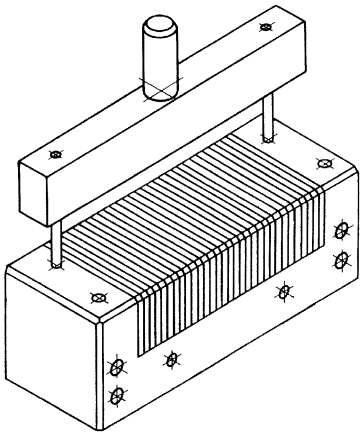
When setting up an assembly machine it is not necessary to set the working height of the press and adjust the base plate more than once. There is no need for further adjustments. All the other adaptations for various applications are performed efficiently and are reliant by various combinations of individual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



Ram with cross-shaped groove

Positioning the bottom tool in relation to the top tool

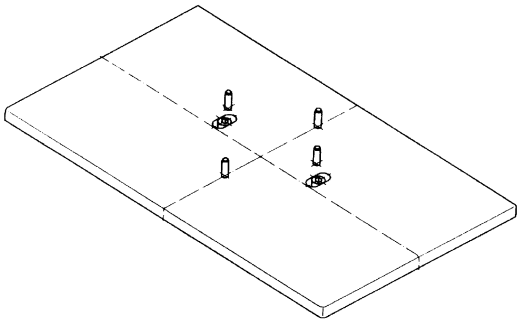
The ram of the HARTING press is generally provided with a cross-shaped groove which accurately positions the top tool in steps of 90°.



Positioning the bottom tool in relation to top tool

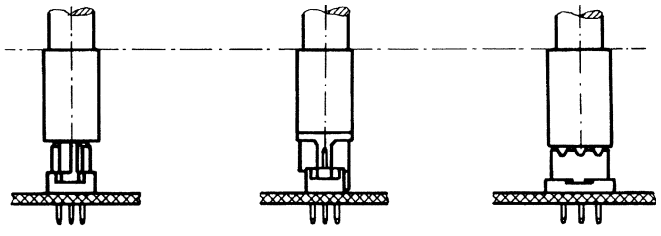
Two guide pins position the bottom tool in relation to the top tool simply and accurately.

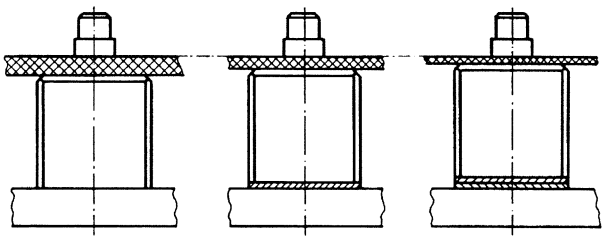
These guide pins cannot be used for positioning the pcb or the connector!



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°.





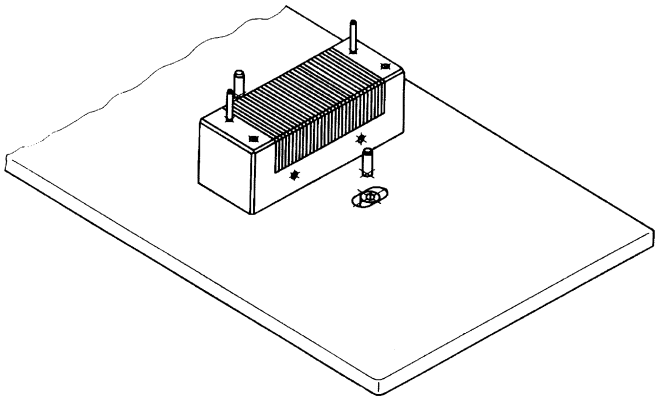
Height compensation

- 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

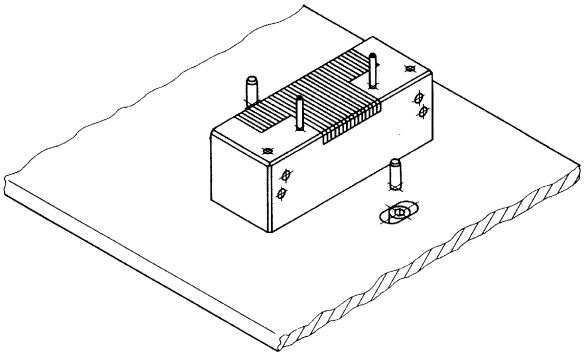
One bottom tool can be used to assemble connectors with straight or angled press-in terminations.

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

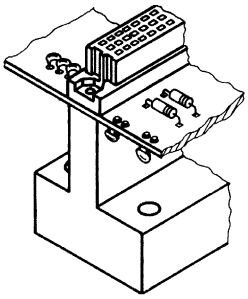
By rotating the bottom tool in steps of 90° and relocating the positioning pins it is possible to assemble half-length connectors with angled press-in terminations.



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.



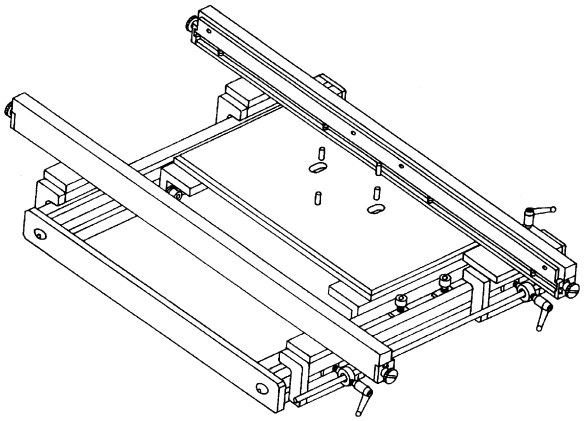
Narrow version of the bottom tool for special applications

Guide frame

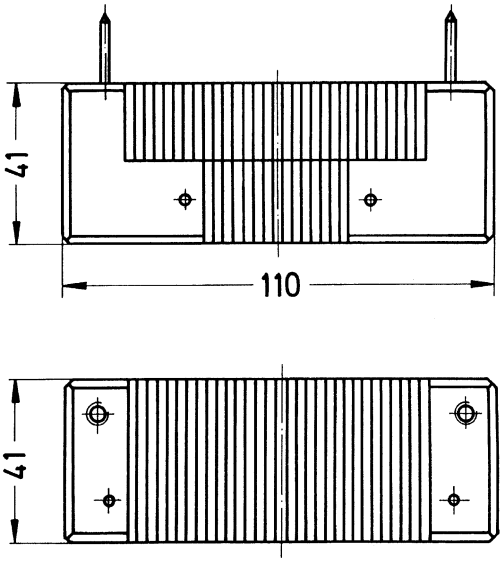
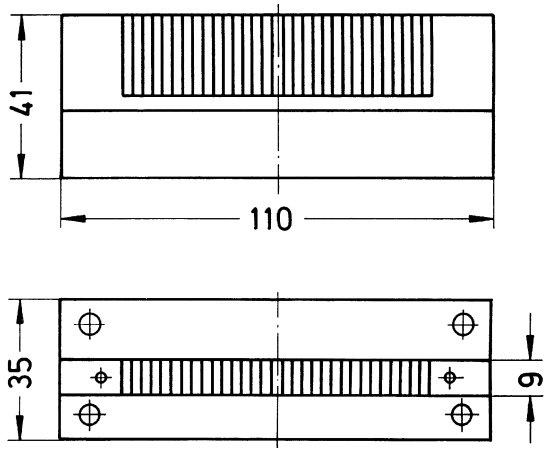
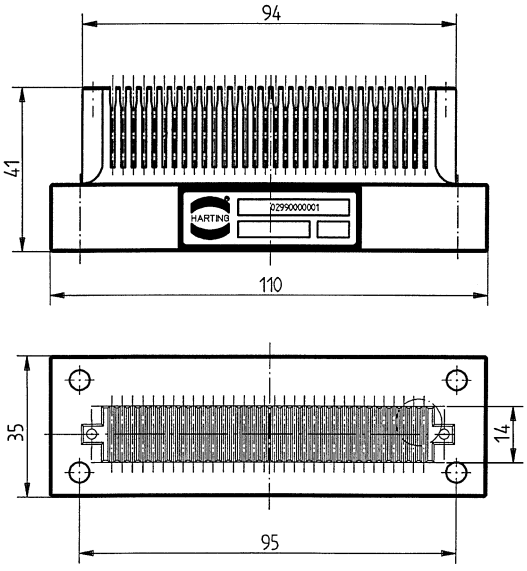
The guide frame screwed to the base plate ensures the correct positioning of the pcb in relation to the top and bottom tools and permits a much higher rate of assembly.

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.

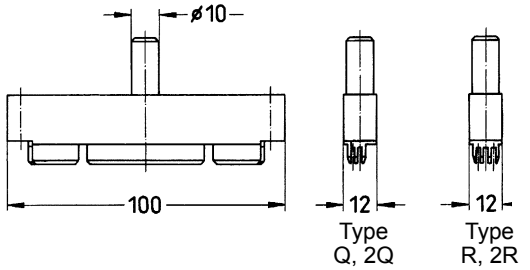
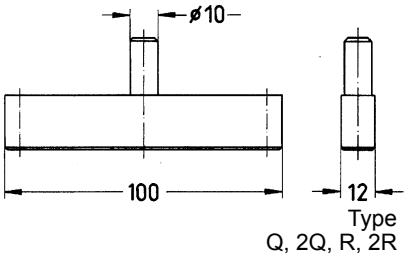
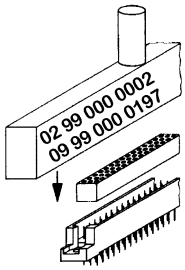
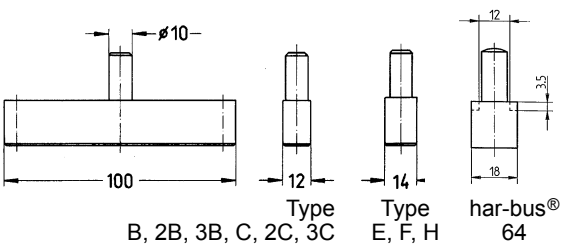
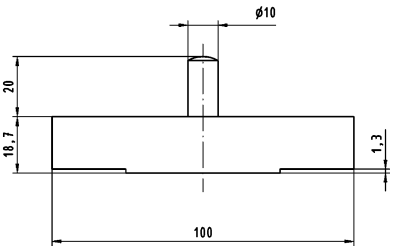
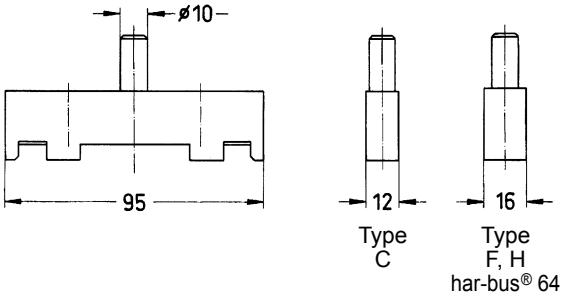


Guide frame for positioning the pcb in relation to the top and bottom tools

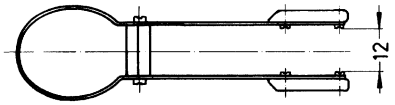
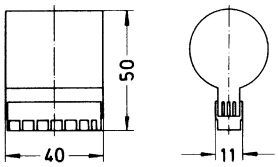
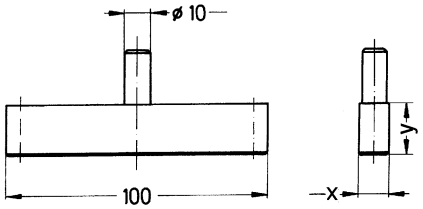
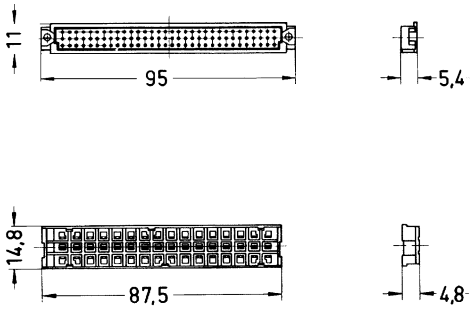
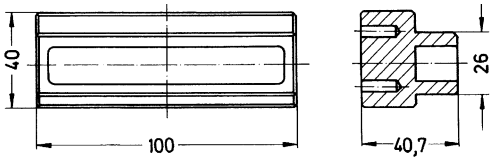
Identification		Part number	Drawing	Dimensions in mm
Bottom tool Universal for use with **male and female connectors**	Type B, 2B, 3B C, 2C, 3C M Q, 2Q, 3Q R, 2R, 3R E F H har-bus® 64 SEK 18*	09 99 000 0185		
Bottom tool Narrow for use with **male connectors** for use with **female connectors**	Type Q, 2Q, 3Q R, 2R, 3R SEK 18* Type B, 2B, 3B C, 2C, 3C M F H	09 99 000 0256 09 99 000 0256		
Bottom tool Narrow har-bus® 64 for use with **female connectors**	har-bus® 64	02 99 000 0001		

* Connectors see separate catalogue

Top tools for male and female connectors

Identification		Part number	Drawing	Dimensions in mm
Top tool				
without insert block				
for use with **male connectors**	Type Q, 2Q	09 99 000 0181		
	R, 2R	09 99 000 0183		
with insert block				
for use with **male connectors**	Type Q, 2Q, 3Q R, 2R, 3R	09 99 000 0197		
Insert blocks				
for use with **male connectors**	Type Q	09 99 000 0275		
	2Q	09 99 000 0274		
	3Q	09 99 000 0263		
	R	09 99 000 0277		
	2R	09 99 000 0276		
	3R	09 99 000 0264		
for use with **shrouds**	har-bus® 64			
	Type E	02 09 000 0012		
	Type C, R	09 99 000 0277		
	Type 2C, 2R	09 99 000 0276		
	Type F	09 06 248 3201		
Top tool				
for use with **female connectors**	Type B, 2B, 3B C, 2C, 3C	09 99 000 0197		
	D-Sub*			
	SEK 18*			
	har·mik*			
	Type E	09 99 000 0221		
	F			
	H			
	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				
only for short posts and pcb thickness > 1.6 mm and without guide frame	Type C	09 99 000 0228		
for use with **female connectors**	Type F	09 99 000 0229		
	H			
	har-bus® 64	02 99 000 0016		

* Connectors see separate catalogues

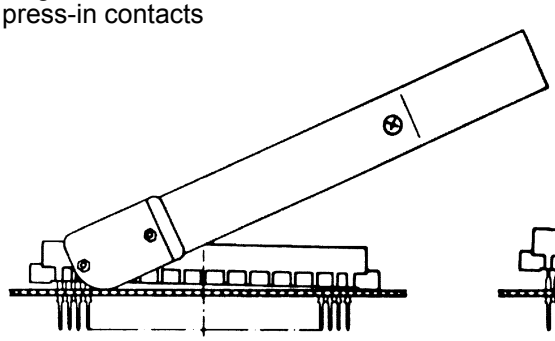
Identification	for use with	Part number	Drawing	Dimensions in mm
Removal tool for moulding	**Male connectors** Type Q, 2Q, 3Q R, 2R, 3R	09 99 000 0198		
Removal tool for single male contacts		09 99 000 0239		
Insertion tool for single male press-in contacts		09 99 000 0200		
Press-out tool	**Termination 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, 3Q R, 2R, 3R **Female connectors** Type B, 2B, 3B C, 2C, 3C **Female connectors** Type F	09 99 000 0240 09 99 000 0241		
Support block for repair and removal	**Male connectors** Type Q, 2Q, 3Q R, 2R, 3R SEK 18* **Female connectors** Type B, 2B, 3B C, 2C, 3C 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.

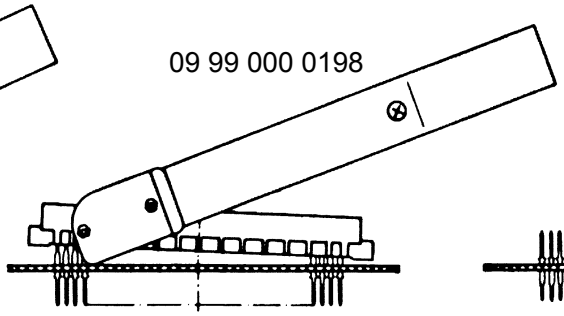
* Connectors see separate catalogue

Replacement of single male press-in contacts

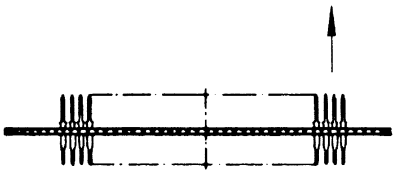


Lever up the moulding

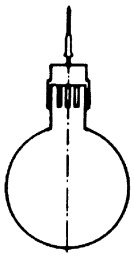
09 99 000 0198



Remove the moulding

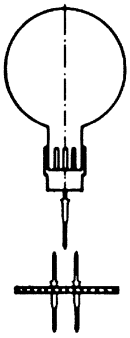


Pull out a single male contact

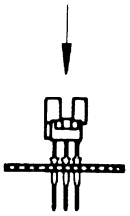


Insert the new contact
into the cavity of the contact
using insertion tool

09 99 000 0200



Correctly position
the new contact
and press-in by hand



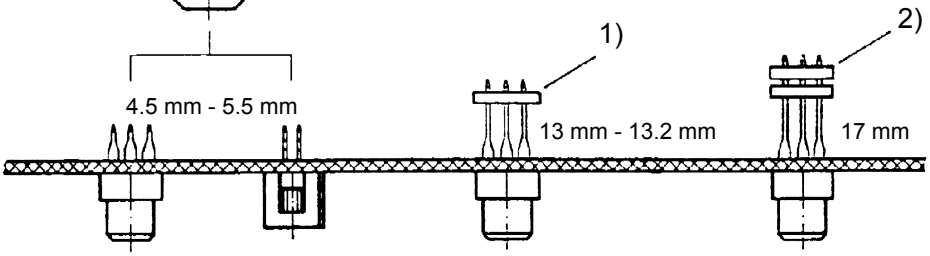
Set up the moulding
with the press

Replacement of complete press-in connectors

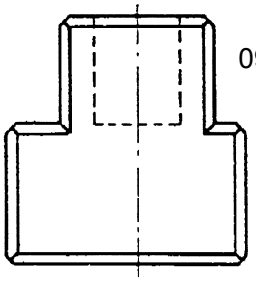
09 99 000 0220

09 99 000 0219

09 99 000 0197

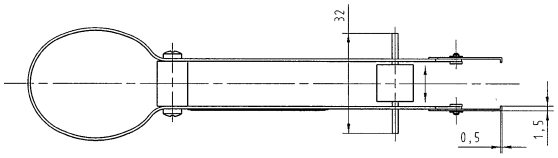
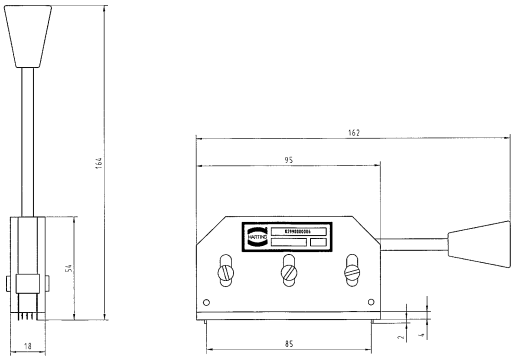
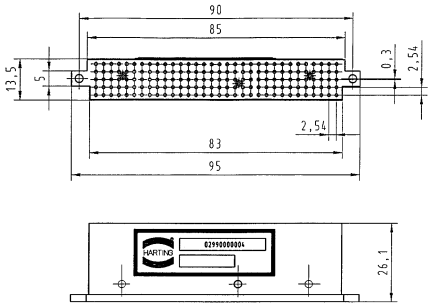
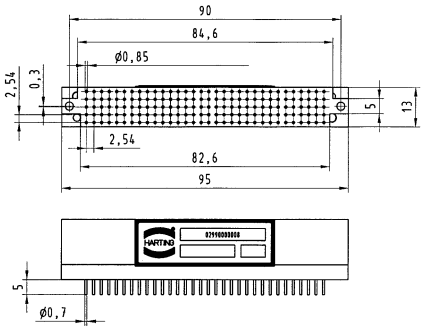
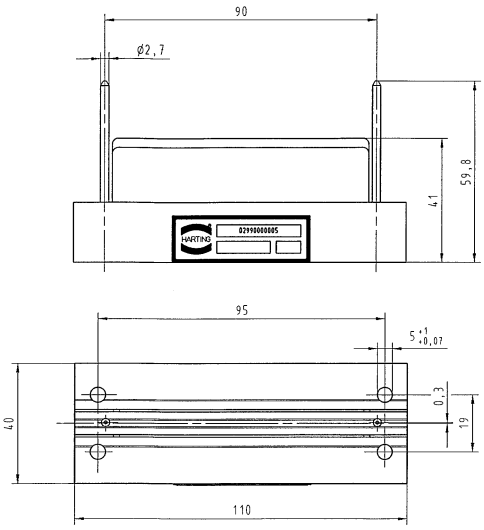


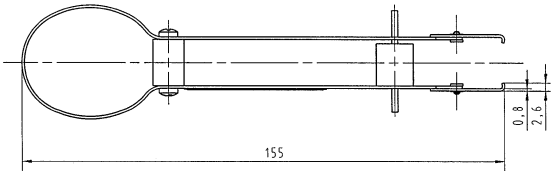
09 99 000 0218



[1] Termination support (see page 30.07)

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

Identification	for use with	Part number	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 number	Drawing	Dimensions in mm
Removal tool for shroud	**rear I/O shroud** har-bus® 64	02 99 000 0007		
	rear I/O shroud Type C, 2C R, 2R	09 99 000 0278		

Replacement of complete ***har-bus*** ® ***64*** press-in connectors

Steps in detail

1. Lever up the moulding by using a removal tool

   a) The removal tool with Part number 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 number 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.

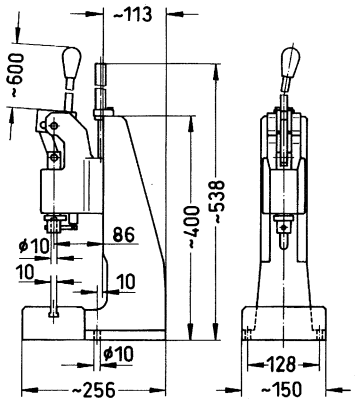
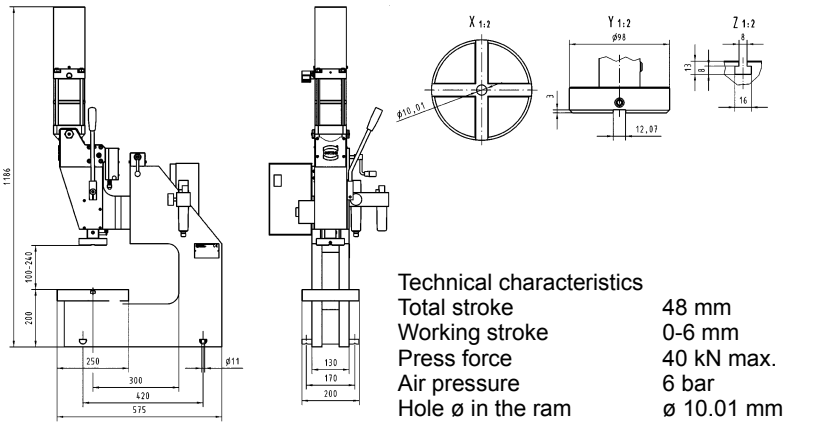
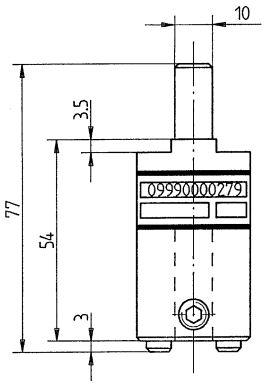
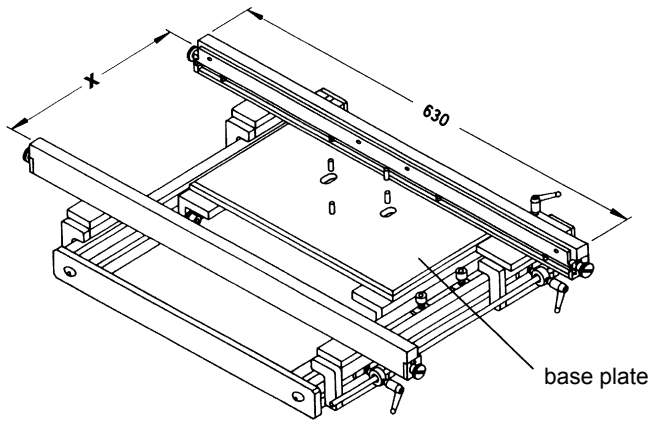
2. Lever up the rear I/O shroud with the removal tool 02 99 000 0007. This step is only required with 17 mm termination length.

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

   a) for 17 mm termination length use Part number 02 99 000 0004 and

   b) for 5 mm termination length use Part number 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 number 02 99 000 0005) from the bottom.

Identification	Part number	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 0282		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 10.01 mm Net weight 136 kg Power supply 110 V / 220 V AC
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 Long type[2)] for pcb size x = 123.5 - 668.5 mm Base plate	09 99 000 0244 09 99 000 0261 09 99 000 0255		

[1)] suitable for 09 99 000 0282 and all CPM machines (see page 30.12 ff.)
[2)] not suitable for hand bench press

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

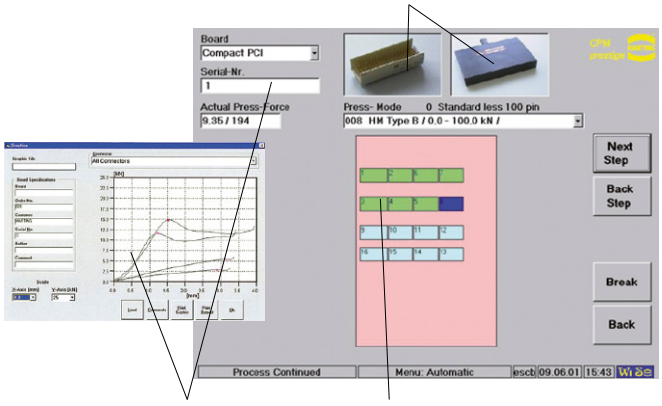
The **CPM *prestige SI*** is a consequential development of the successful CPM 2001 press-in machines. The excellent design, supported by a wide range of tools presents a convenient, easy and comfortable way of processing backplanes and daughtercards. The machine is fully programmable and is supplied 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)[1)] 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.

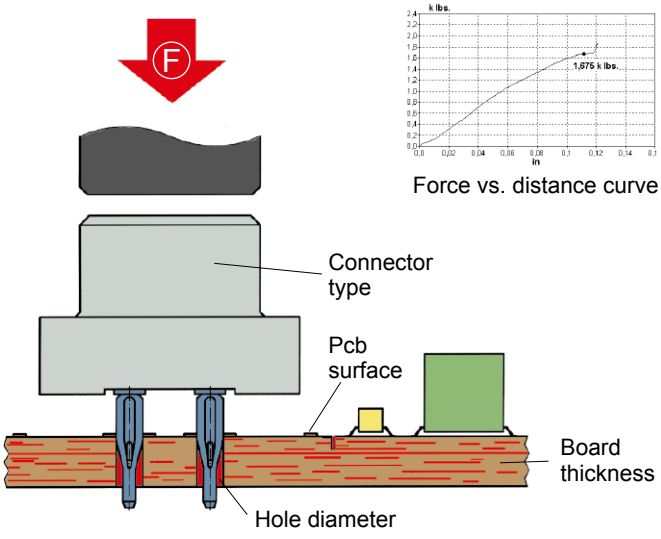
Visual guiding system via touch monitor

Real photos of connectors and tools



Process data

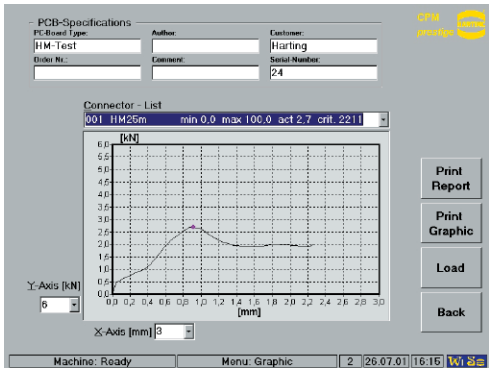
Layout with current position highlighted



Force vs. distance curve

Shown are the four most considerable influences of the press-in process.

1) optional



Quality control of 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.

Part number **09 89 050 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 SI*
(incl. PC, control software, barcode reader, keyboard, touch screen)

Built-in features:

- Guiding rails (carbon/spring-loaded) for the secure positioning of the pcb
- Touch-screen and IPC (WES7)
- 2D-Barcode reader for management ease of press-in programs
- All dimensions allow an easy integration into production lines

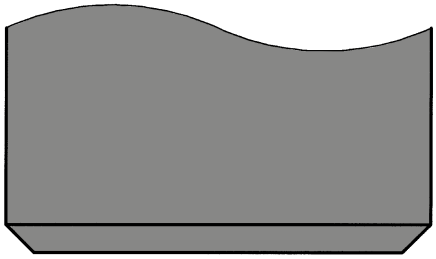
Process monitoring and quality assurance:

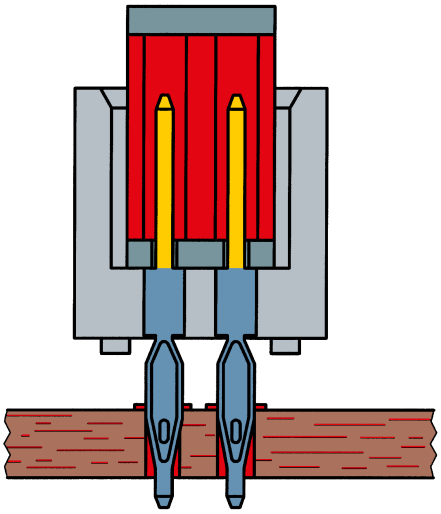
- Touch screen interface with graphical and verbal menus for all machine functions
- Autosense: automated press-in interruption at incorrect press-in forces
- Storage and validation of all press-in parameters via quality assurance software (press-in force tolerances)
- Continuous high-precision measurement 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
- Position plates with “Roll & Drop”

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.



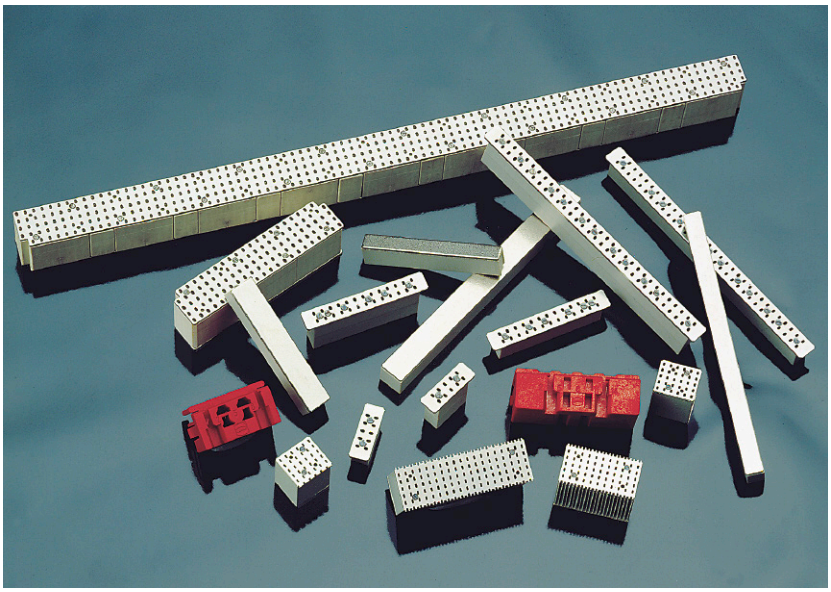


Advantages of press inserts

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 and 2 mm pitches.

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

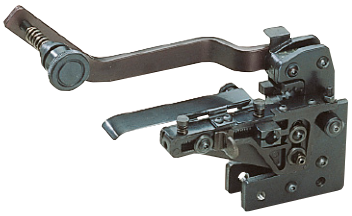
Notes

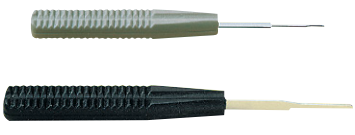
Crimping tools

Identification	Part number	Drawing	Dimensions in mm
HARTING crimping tool for individual contacts		Wire gauge	
BC / FC 1 / har-bus® 64	09 99 000 0075	BC: 0.09 - 0.50 mm² FC 1: 0.09 - 0.25 mm²	
FC 2	09 99 000 0076	FC 2: 0.14 - 0.56 mm²	
FC 3	09 99 000 0077	FC 3: 0.50 - 1.50 mm²	
Locator			
BC / FC 1 / har-bus® 64	09 99 000 0640		
FC 2	09 99 000 0641		
FC 3	09 99 000 0642		
HARTING crimping tool for individual contacts BC / FC and har-bus® 64	09 99 000 0620	Order crimping inserts separately	
Crimping insert set for individual contacts each set contains locator and crimp insert top and bottom part		Wire gauge	
BC / FC 1 / har-bus® 64	09 99 000 0621	BC: 0.09 - 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	
BC / har-bus® 64 solid wire	09 99 000 0629	BC: 0.13 mm² (solid wire)	
Locator			
BC / har-bus® 64	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		
Crimping tool for individual contacts FC 1, FC 2 and FC 3 (Service tool)	09 99 000 0191	Wire gauge FC 1: 0.14 - 0.25 mm² FC 2: 0.25 - 0.56 mm² FC 3: 0.75 - 1.50 mm² Locator (09 99 000 0205) is supplied with the tool.	

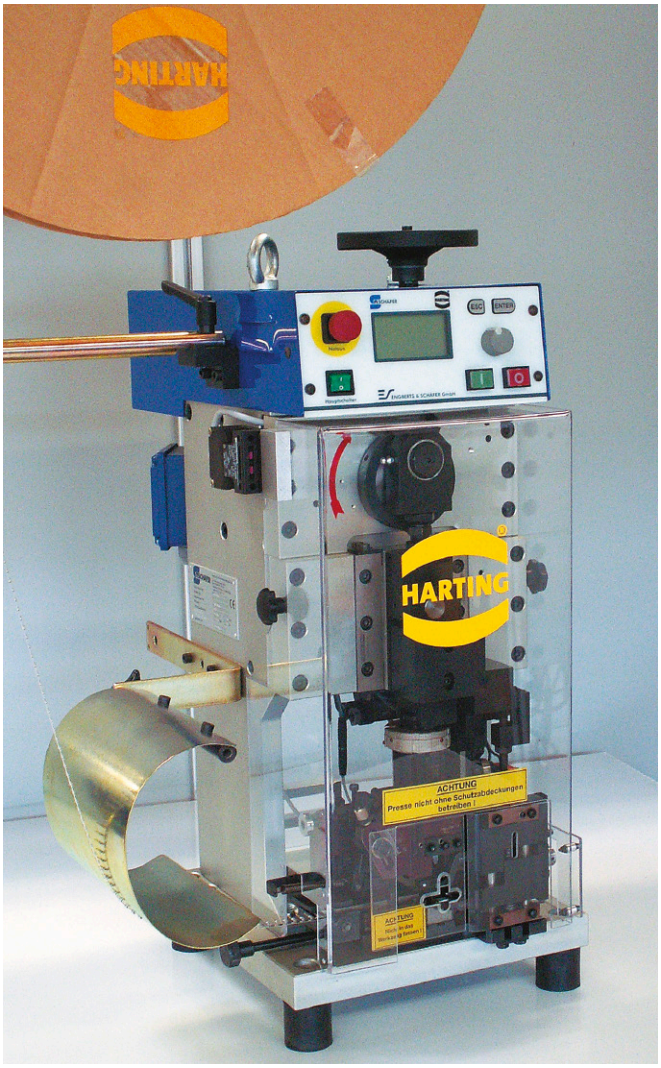
Insertion and removal see page 03.10

Identification	Part number	Drawing	Dimensions in mm
HARTING crimping tool			
for bandoliered contacts (500 pieces) BC / har-bus® 64	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	
BC / har-bus® 64 solid wire	09 99 000 0627	0.13 mm² (solid wire)	
HARTING semi-automatic crimping device			
Main drive, foot-operated 115/230 V – 50 Hz	09 99 000 0246		
Real holder for 2,500 contacts FC 1, FC 2 or FC 3 and for 5,000 contacts BC / har-bus® 64	09 99 000 0158	Locator not necessary	
Crimping head for bandoliered contacts BC / har-bus® 64	09 99 000 0252	Wire gauge 0.09 - 0.5 mm²	
FC 1	09 99 000 0249	0.09 - 0.25 mm²	
FC 2	09 99 000 0250	0.14 - 0.56 mm²	
FC 3	09 99 000 0251	0.5 - 1.5 mm²	
BC/har-bus® 64 solid wire	09 99 000 0628	0.13 mm² (solid wire)	
Insertion tool			
for contacts BC / har-bus® 64	09 99 000 0100		
for contacts FC 1, FC 2 and FC 3	09 99 000 0088		
Removal tool			
for contacts BC / har-bus® 64	09 99 000 0101		
for contacts FC 1, FC 2 and FC 3	09 99 000 0087		





Automated crimping machine type BK



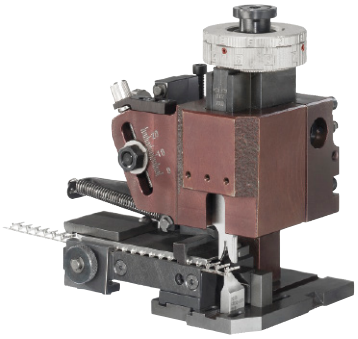
Main characteristics

- Smooth run through electronic brakes
- Hand wheel for manual adjustments
- Maintenance friendly through needle bearing rail
- Simple handling by quick change tool and stripper

Part number	**09 98 000 5000**
Technical Characteristics	
Dimensions	
Height	690 mm (1400 mm with a contact reel)
Width	350 mm
Depth	370 mm
Total weight	72 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	Integrated tool light
Stroke counter	Daywise and fixed
Crimp force monitor	BB07i
Crimping tool	Quick change tool
Adjustable process parameters	Crimping height on wire Crimping height on insulation Depth of insulation stripping Length of insulation stripping Wire retainer position Wire position in the crimp contact Band thrust

Further details you will find in our product flyer.

Automatic crimping tools · Types B, C, D, E, F, FM, 2F and MH



Identification	for use with	Part number	Wire gauge [mm²]	AWG	Insulation [Ø mm]
Crimping tool					
for DIN 41612 connectors[1)]					
	contacts				
	BC / har-bus® 64	09 98 000 3004	0.09 - 0.56	28 - 20	0.7 - 1.6
	contacts				
	FC 1	09 98 000 3005	0.09 - 0.25	28 - 24	0.7 - 1.6
	FC 2	09 98 000 3006	0.14 - 0.56	26 - 20	0.8 - 2.3
	FC 3	09 98 000 3007	0.50 - 1.50	20 - 16	1.6 - 2.8
for D-Sub connectors[2)]					
	standard contacts	09 98 000 3008	0.09 - 0.25	28 - 24	0.7 - 1.4
		09 98 000 3009	0.25 - 0.56	24 - 20	0.9 - 1.7
	high density contacts	09 98 000 3012		26 - 24	0.8 - 1.4

[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

DIN 41 612 Signal crimp contact type			BC crimp contacts 09 02 000						har-bus® 64 crimp contacts 02 05 000					
Part number	Female contacts	PL 1	6474	8444	8474	6474	8444	8474	1511	1512	1513	1511	1512	1513
		PL 2	6484	8434	8484	6484	8434	8484	2511	2512	2513	2511	2512	2513
Bandoliered contacts: 5,000 pieces/reel			X			X			X			X		
Bandoliered contacts: 500 pieces/reel				X			X			X			X	
Individual contacts					X			X			X			X
Cable diameter		mm²	0.09-0.5			0.13 mm² solid wire			0.09-0.5			0.13 mm² solid wire		
		AWG	28-20						28-20					
Hand crimp tool		09 99 000 0075			X						X			
		09 99 000 0248		X						X				
		09 99 000 0627					X						X	
Hand crimp tool 09 99 000 0620 with insert		09 99 000 0621			X						X			
		09 99 000 0629						X						X
Semi automatic crimp tool 09 99 000 0246 with head		09 99 000 0252	X	X					X	X				
		09 99 000 0628				X	X					X	X	
and reel holder		09 99 000 0158	X			X			X			X		
Automatic crimp machine type BK 09 98 000 5000 with tools		09 98 000 3004	X			X			X			X		
Insertion tool		09 99 000 0100	X						X					
Removal tool		09 99 000 0101	X						X					

DIN 41 612 Power crimp contacts			FC crimp contacts 09 06 000								
			FC 1			FC 2			FC 3		
Part number	Female contacts	PL 1	6474	7474	8474	6471	7471	8471	6472	7472	8472
		PL 2	6484	7484	8484	6481	7481	8481	6482	7482	8482
	Male contacts	PL 1	9544	–	9554	9541	5541	9551	9542	5542	9552
		PL 2	9564	–	9574	9561	–	9571	9562	–	9572
	Female contacts for 1 x 1 wire wrap posts	–	6454	–	6464	6451	–	6461	6452	–	6462
Bandoliered contacts: 2,500 pieces/reel			X			X			X		
Bandoliered contacts: 250 pieces/reel				X			X			X	
Individual contacts					X			X			X
Cable diameter		mm²	0.09-0.25			0.14-0.56			0.5-1.5		
		AWG	28-24			26-20			20-16		
Hand crimp tool		09 99 000 0075			X						
		09 99 000 0076						X			
		09 99 000 0077									X
		09 99 000 0191			X			X			X
		09 99 000 0247		X							
		09 99 000 0119					X				
		09 99 000 0120								X	
Hand crimp tool 09 99 000 0620 with insert		09 99 000 0621			X						
		09 99 000 0622						X			
		09 99 000 0623									X
Semi automatic crimp tool 09 99 000 0246 with head		09 99 000 0249	X	X							
		09 99 000 0250				X	X				
		09 99 000 0251							X	X	
and reel holder		09 99 000 0158	X			X			X		
Automatic crimp machine type BK 09 98 000 5000 with tools		09 98 000 3005	X								
		09 98 000 3006				X					
		09 98 000 3007							X		
Insertion tool		09 99 000 0088	X			X			X		
Removal tool		09 99 000 0087	X			X			X		

List of part numbers

List of part numbers

List of part numbers

List of part numbers

List of part numbers

List of part numbers

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Catalogue order information

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Device Connectivity

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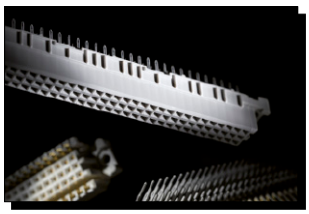
☐ 

Connectors DIN 41 612

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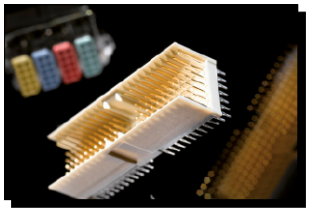
☐ 

Coaxial and Metric Connectors

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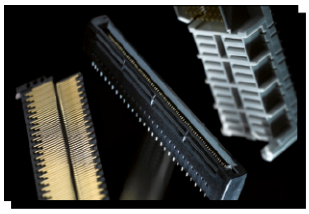
Application brochure

☐ 

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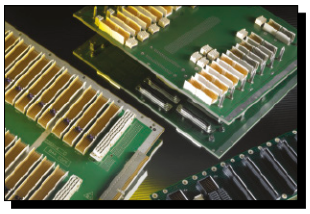
☐ 

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