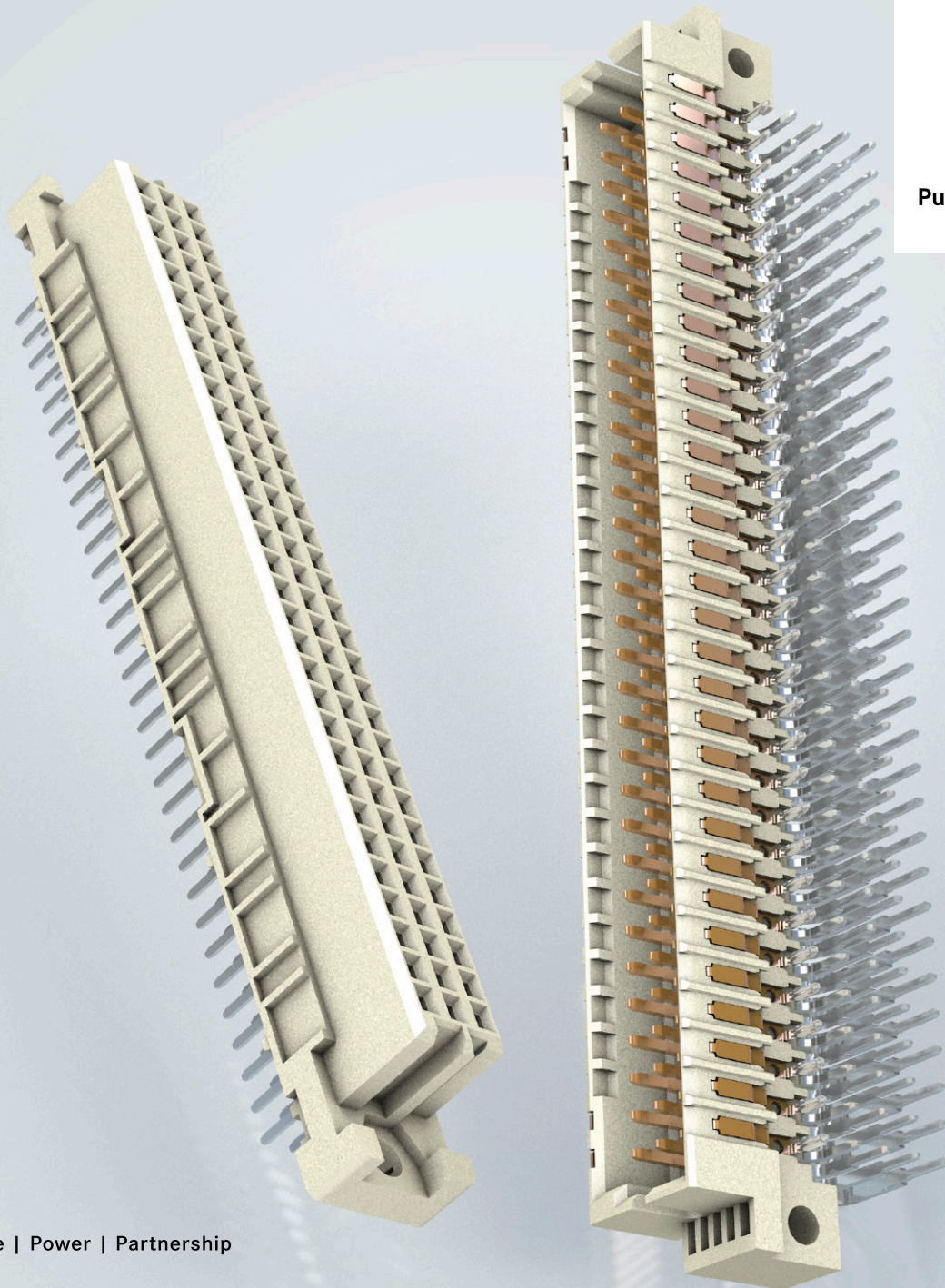




Pushing Performance




People | Power | Partnership

# HARTING

## Connectors DIN 41 612

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		Termination								
		Solder termination	Reflow soldering (THR)	Solder lug connection	Press-in connection	Crimp connection	Wire wrap connection	IDC connection	Faston connection	Cage clamp connection
Type										
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								
<i>harbus</i> <sup>®</sup> 64	Page 02.11	Page 02.11								
	Pages 02.12, 02.14			Pages 02.12 f	Page 02.15					
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

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

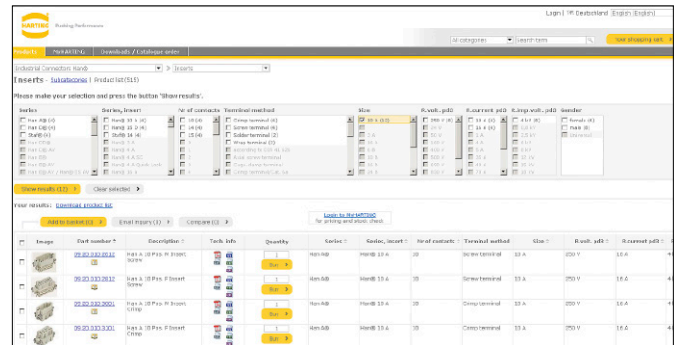
Here you can choose a connector according to your requirements. Afterwards you are able to send your inquiry directly to a HARTING sales partner.

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

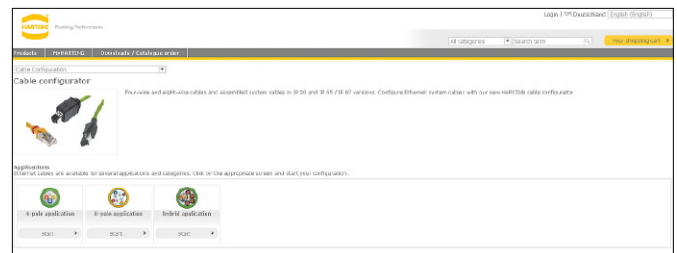
The parts are downloadable in 2D-format (DXF) and 3D-format (IGES, STEP).

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

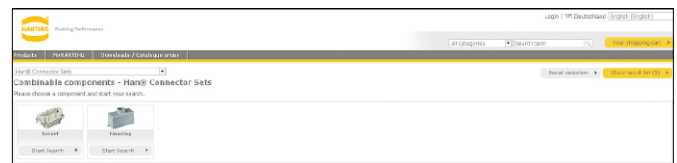
You can find the **HARTING eCatalogue** at [www.HARTING.com](http://www.HARTING.com).



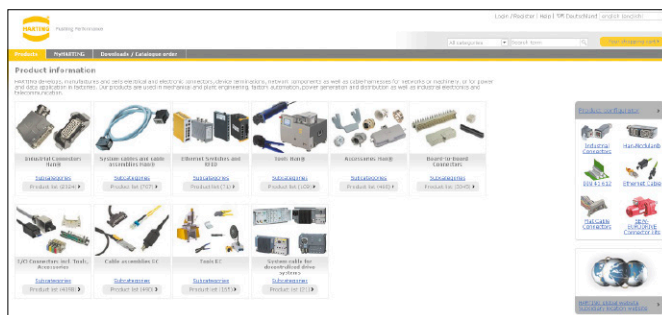
Product selection



Product configuration



Product combination



Product overview

## 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.



### 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.

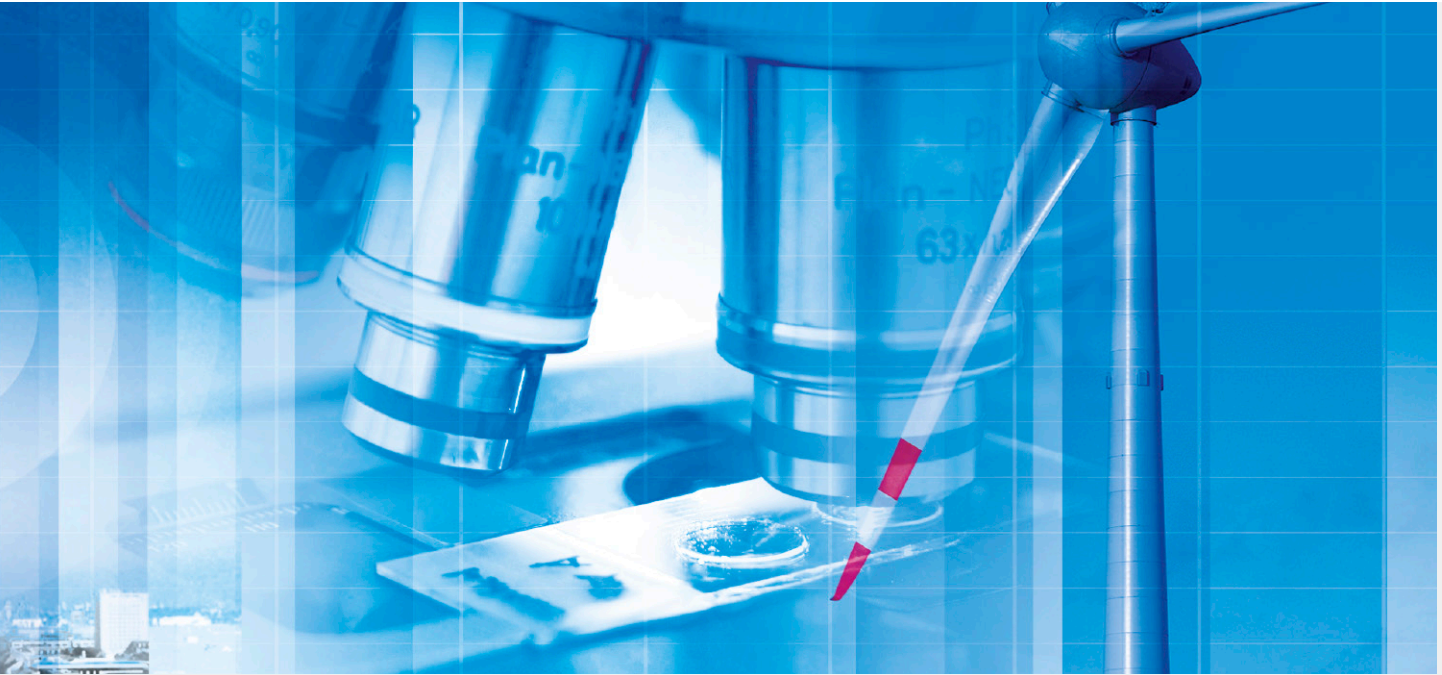
Salient examples of these sources of innovative knowledge include microstructure technologies, 3D design and connection technolo-

gy, 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.

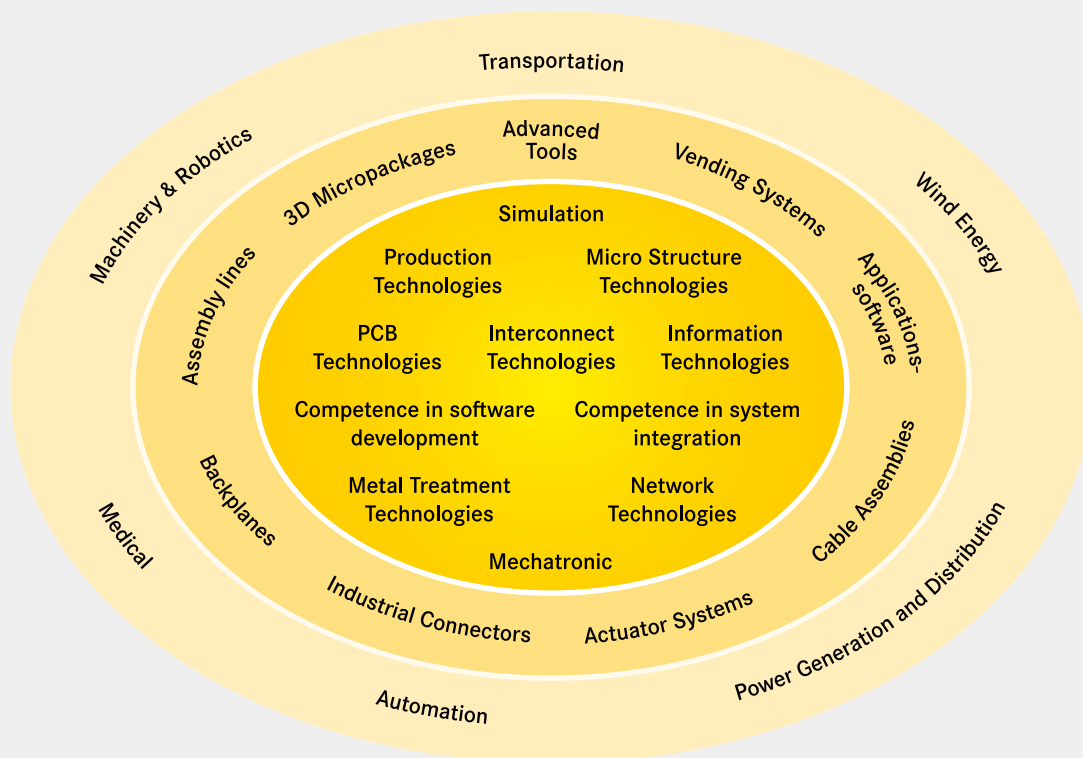
In order to ensure the future-proof design of RF and EMC-compatible interface solutions, the central **HARTING** laboratory (certified to EN 45001) employs simulation tools, as well as experimental, testing and diagnostics facilities all the way to scanning electron microscopes. In addition to product 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.



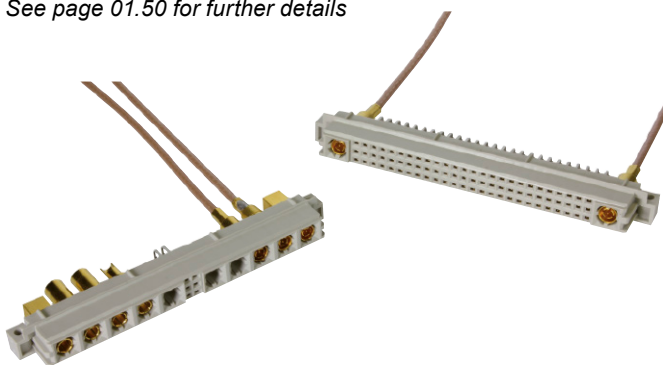


## DIN 41612 connectors now also as the M invers type – Suitable for combined connections / Increased flexibility for users

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



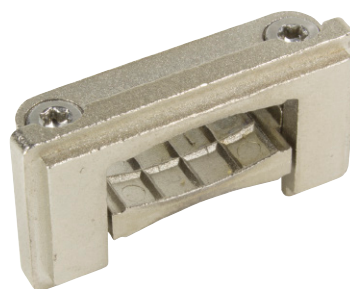
DIN 41612 M invers type

## 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



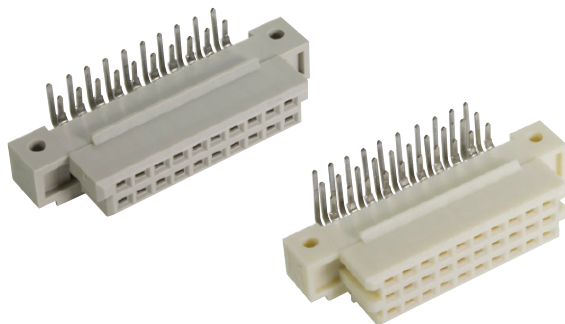
Small cable clamp

## 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

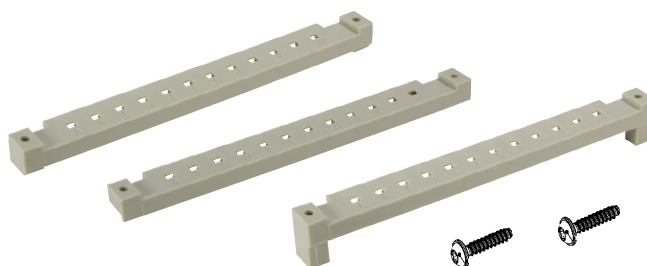
## DIN coding bar with a screw fixing

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

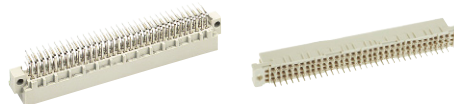
Printed Board Connectors according to DIN 41 612 / IEC 60603-2

Chapter

**Printed Board Connectors – general information**

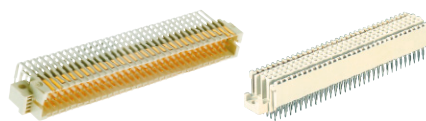
**00**

**DIN Signal (up to 2 A)**  
Types B, 2B, 3B, C, 2C, 3C, M,  
M invers, Q, 2Q, 3Q, R, 2R, 3R



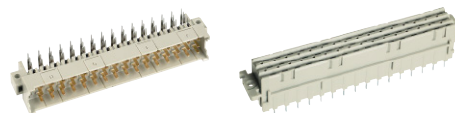
**01**

**harbus® 64**



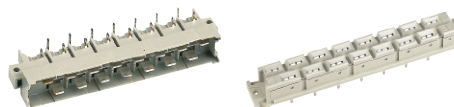
**02**

**DIN Power (up to 6 A)**  
Types D, E, F, FM, 2F, F9,  
interface connectors I



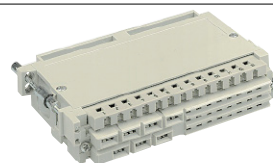
**03**

**DIN Power (up to 15 A)**  
Types H, H15, H16, H3, MH



**04**

**Shell housings and accessories**



**20**

**Tooling**



**30**

**List of part numbers**

**40**

**Addresses**

**50**

## 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.



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**

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.

## The advantages

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

## The terminations

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



Printed Board Connectors – general information

Page

Creepage and clearance distances, CTI .....	<b>00.04</b>
Specifications, assembly instructions .....	<b>00.06</b>
System description .....	<b>00.08</b>
Male and female connectors with pcb fixings .....	<b>00.12</b>
Coding systems .....	<b>00.14</b>
NFF classification .....	<b>00.17</b>
Terminations .....	<b>00.18</b>

## 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 is 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

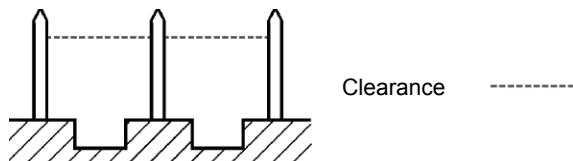
Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

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.



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

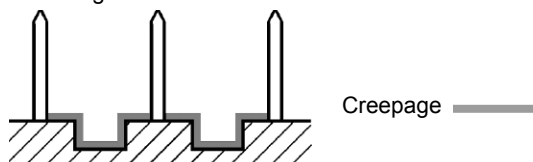
## Exemplary calculation

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.



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.

**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 $\mu$ s 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 <sup>1)</sup>			
	Case A (Inhomogeneous field <sup>3)</sup> )		Case B (Homogeneous field <sup>2)</sup> )	
	Pollution degree		Pollution degree	
	1	2	1	2
0.33	0.01	0.2	0.01	0.2
0.50	0.04		0.04	
0.80	0.1		0.1	
1.5	0.5	0.5	0.3	0.3
2.5	1.5	1.5	0.6	0.6
4.0	3	3	1.2	1.2
6.0	5.5	5.5	2	2
8.0	8	8	3	3

<sup>1)</sup> For higher altitudes see table 2b from DIN VDE 0110 for multiplying factors.

<sup>2)</sup> Verification by an impulse voltage test is required if the clearance is less than the value specified for case A.

<sup>3)</sup> Point to plane.

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

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

Nominal voltage of supply system <sup>1)</sup> $U_{r.m.s.}$ or $U_{-}$ in V	Rated voltage in V	
	Phase-to-phase All systems (between conductors of different polarity for $U_{-}$ )	Phase-to-earth
	$U_{r.m.s.}$ or $U_{-}$	$U_{r.m.s.}$ or $U_{-}$
12.5	12.5	—
24	25	—
25	—	—
30	32	—
42	—	—
48	50	—
50 <sup>2)</sup>	—	—
60	63	—
60/30	63	32
100 <sup>2)</sup>	100	—
110	125	—
120	—	—
150 <sup>2)</sup>	160	—
220	250	—
220/110	250	125
240/120	—	—
300 <sup>2)</sup>	320	—
440/220	500	250
600 <sup>2)</sup>	630	—
480/960	1000	500
1000 <sup>2)</sup>	1000	—

Nominal voltage of supply system <sup>1)</sup> $U_{r.m.s.}$ in V	Rated voltage in V		
	Phase-to-phase	Phase-to-earth	
	$U_{r.m.s.}$	$U_{r.m.s.}$	$U_{r.m.s.}$
60	63	32	63
110	125	80	125
120	—	—	—
127	160	—	160
150 <sup>2)</sup>	200	125	200
220	250	160	250
230	—	—	—
240	320	—	320
300 <sup>2)</sup>	400	250	400
380	500	250	500
400	—	—	—
415	500	320	500
440	630	400	630
480	630	—	630
500	—	—	—
575	630	400	630
600 <sup>2)</sup>	630	—	630
660	630	400	630
690	—	—	—
720	800	500	800
830	—	—	—
960	1000	630	1000
1000 <sup>2)</sup>	1000	—	1000

<sup>1)</sup> This voltage can be the same as the rated voltage of the equipment.

<sup>2)</sup> 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 be used. Systems earthed across impedances are treated as unearthed systems.

**Table 00.04**

Rated voltage (V) $U_{r.m.s.}$ 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

500 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<sub>2</sub>.  
 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<sub>2</sub>.  
 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<sub>2</sub>.  
 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<sub>2</sub>.  
 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.

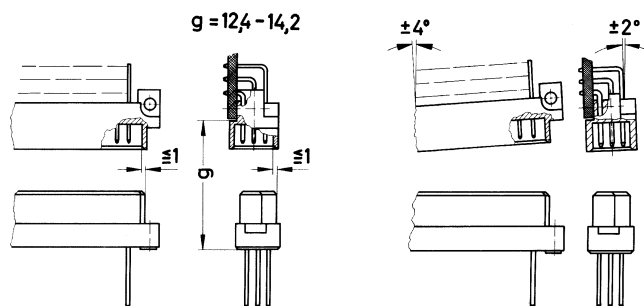
Other plating finishes available on request.

### 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

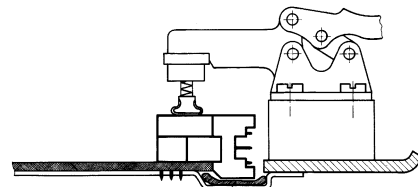
Male connectors should be protected when being soldered in a dip, flow or film soldering baths. Otherwise, they might become contaminated as a result of soldering operations or deformed as a result of overheating.

- ① For prototypes and short runs protect the connectors with an industrial adhesive tape, e.g. Tesaband 4331 ([www.tesa.de](http://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.



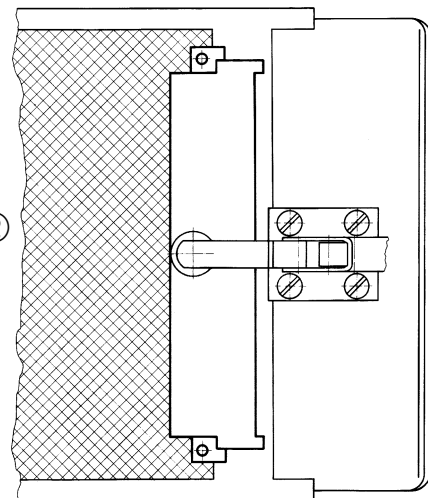
Adhesive tape or protection cap

① + ③



Intermediate foil

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

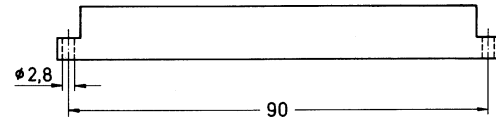
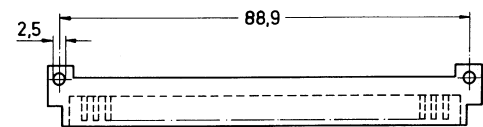
In the basic frame unit according to DIN EN 60 297-3 pcb's are inserted from the front and make contact with the connectors fitted to the back. This basic arrangement gives the following advantages:

- 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.

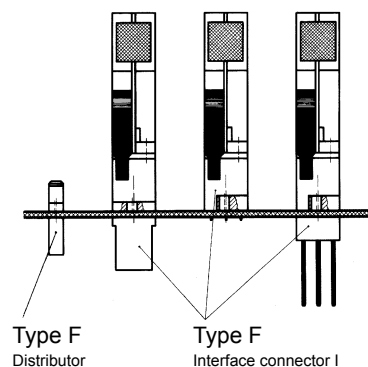
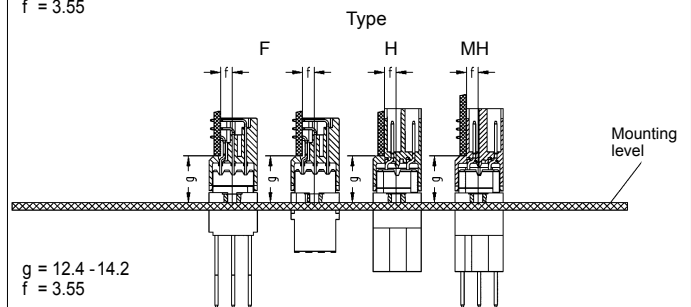
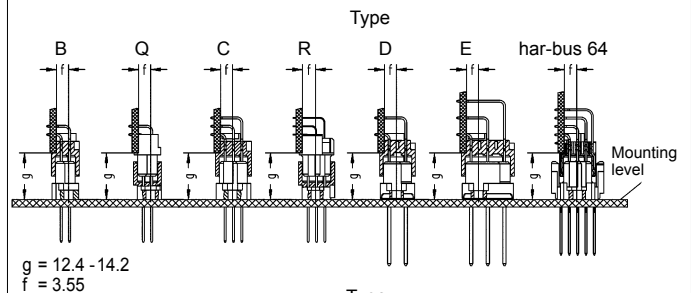
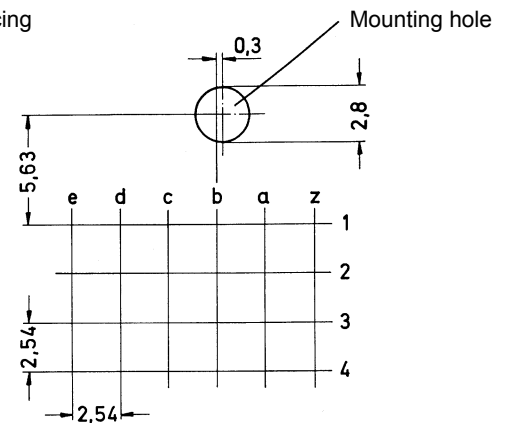
## Complementary components

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.



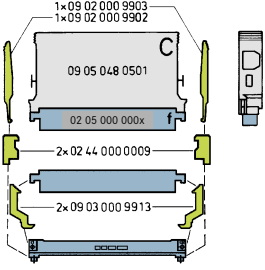
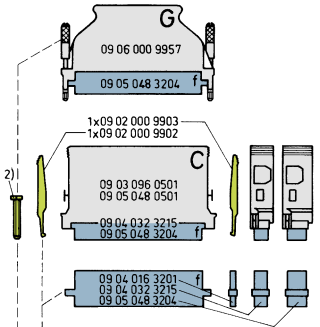
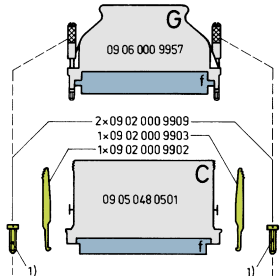
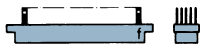


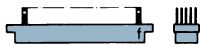






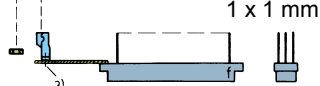

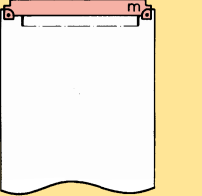
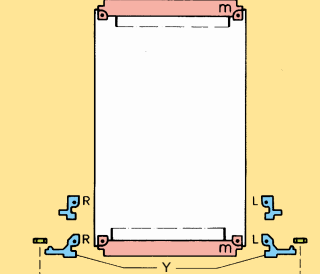
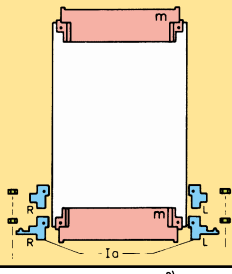

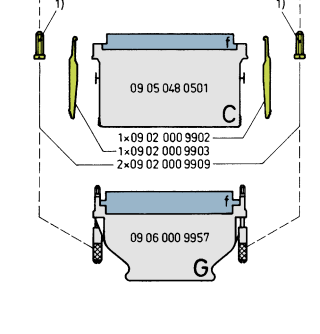
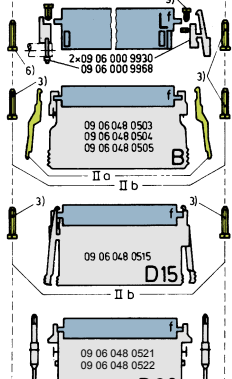
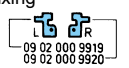


## Contact spacing



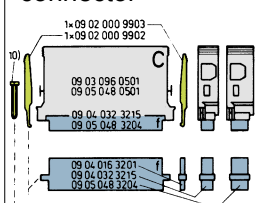
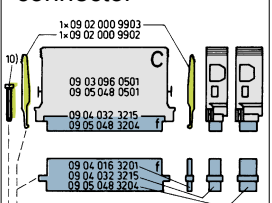


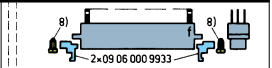
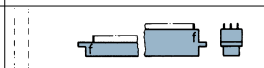
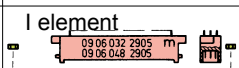

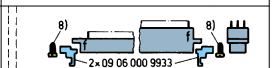
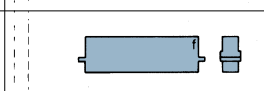
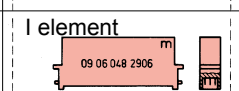
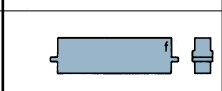
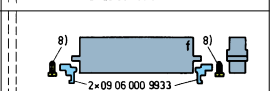
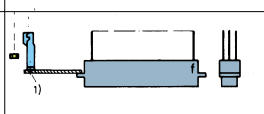
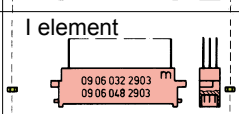
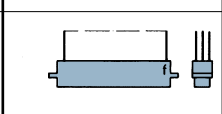
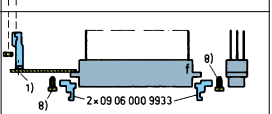
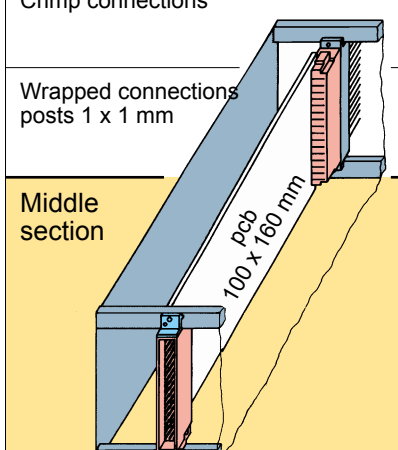
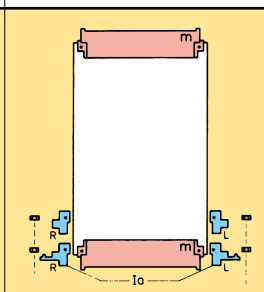
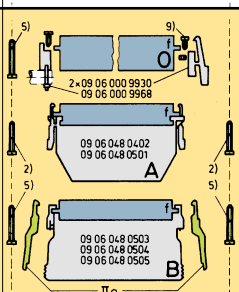
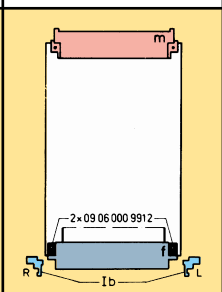
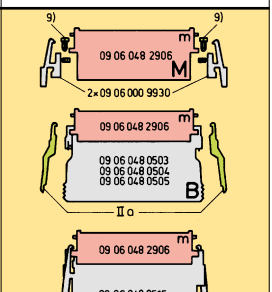
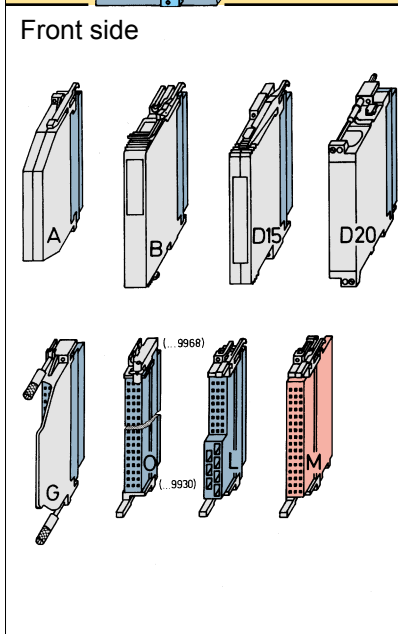
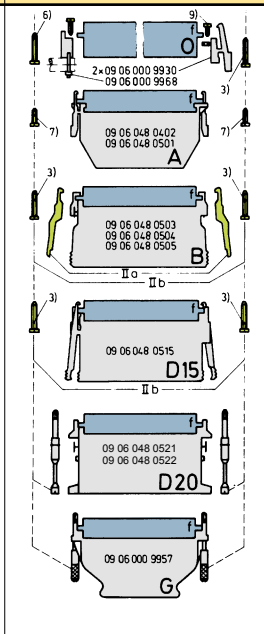
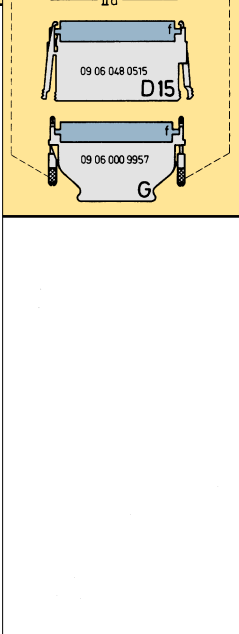
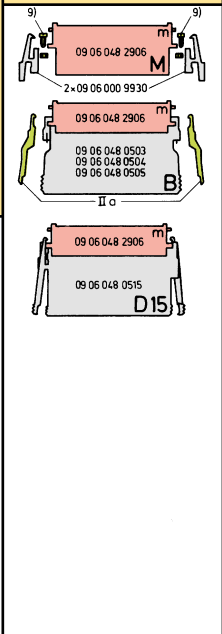
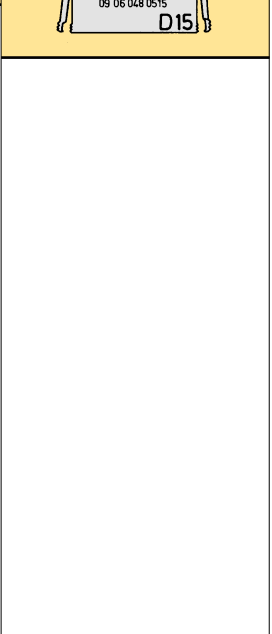
General information

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	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 			
<p>1) Screw fixing (cheesehead screw M 2.5 x 16 + nut) 09 02 000 9909</p> <p>2) 2 x screw fixing (cylindric screw M 2.5 x 25 DIN EN ISO 1207 + nut M 2.5 DIN EN ISO 4032)</p> <p>3) Fixing brackets for latching and screw fixing</p> <p>4) Screw length depends on the pcb thickness</p>			
<p><b>f</b> = female connector  <b>m</b> = male connector  <b>R</b> = right hand  <b>L</b> = left hand</p>			



<i>harbus</i> <sup>®</sup> 64	E		H
<p>Input access from the front side via a female connector</p> 	<p>Input access via a female connector</p> <p>Piggyback connector</p> 		<p>Input access from the front side via a female connector</p> 
			
			
			
	<p>1 x 1 mm</p> 		
			
			
<p>Y =</p>	<p>Combinations</p>	<p>Fixing bracket c for male connectors</p> <p>Multiple fixing</p>  <p>Single fixing</p> 	<p>l element</p> 
	<p>Housing C</p>	<p>latchable</p>	<p>latch and screw fixing</p>
	<p>Housing G</p>	<p>latch and screw fixing (M 2.5 x 16)</p> <p>screw fixing</p>	<p>latch and screw fixing</p> <p>screw fixing</p>

General information

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

F	F, H, MH 24 + 7	MH 24 + 7					
<p>Input access from the wiring side via a female connector</p>	<p>Input access from the front side via a female connector</p>	<p>Input access from the front side via a female connector</p>	<b>Ia</b>				
			Combinations	Fixing bracket a for male connectors Multiple fixing 	Fixing bracket b for male connectors Multiple fixing 		
			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		
			<b>Ib</b>				
			Combinations	Fixing bracket b for female connectors Multiple fixing 	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			
			<b>II</b>				
			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 09 06 000 9930 2x 09 06 000 9968	and 2x 09 06 000 9926		
			Comb. M	2x 09 06 000 9930	-		
			<ol style="list-style-type: none"> <li>1) Fixing brackets for latch and screw fixing</li> <li>2) Screw M 2.5 x 22 belongs to supply of I elements, nut M 2.5 DIN EN ISO 4036 does not belong to scope of supply</li> <li>3) Screw fixing (cheesehead screw M 2.5 x 20 + nut) 09 06 000 9926</li> <li>4) Screw fixing (cheesehead screw M 2.5 x 16 + nut) 09 02 000 9909</li> <li>5) Cheesehead screw (M 2.5 x 26) 09 06 000 9955, nut M 2.5 DIN EN ISO 4036 does not belong to scope of supply</li> <li>6) Screw M 2.5 x 20 belongs to the junction element, hexagonal nut M 2.5 DIN EN ISO 4036 does not belong to scope of supply</li> </ol> <p><b>Following items don't belong to scope of supply</b></p> <ol style="list-style-type: none"> <li>7) Screw M 2.5 x 12 and nut M 2.5 DIN EN ISO 4036</li> <li>8) Screw M 2.5 x 8</li> <li>9) Screw M 2.5 x 8 and nut M 2.5 DIN EN 4032</li> <li>10) Screw M 2.5 x 25 and nut M 2.5 DIN EN 4032</li> </ol> <p>f = female connector m = male connector R = right hand L = left hand</p>				
<p>I element</p>	<p>I element</p>						

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

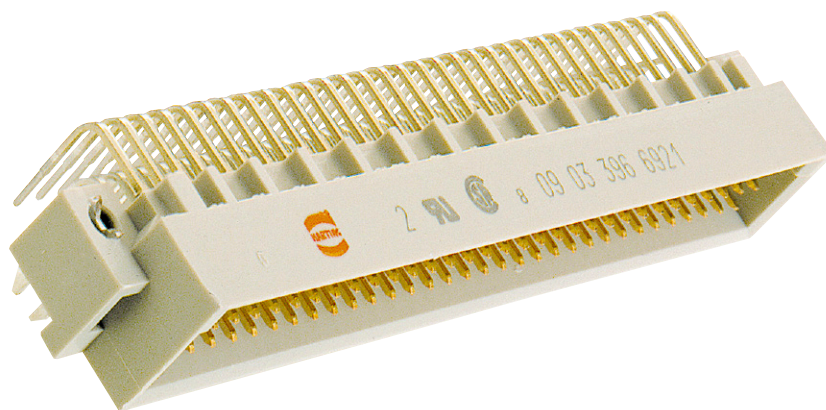
In the soldering process, all component terminations including the snap-in clips are soldered and therefore mechanically secured. This provides mechanical protection for the soldered contacts during mating and unmating of the connector.

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.

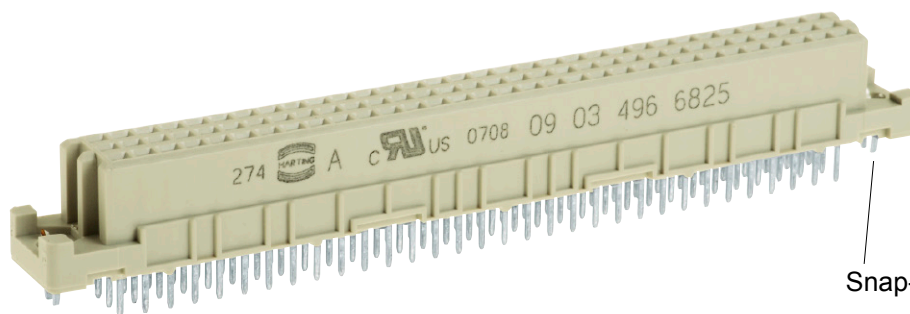
It is possible to supply the majority of male and female connectors with solder termination with snap-in clips (existing articles see product pages).

For pcb thickness  
 $1.6 \pm 0.2 \text{ mm}$   
 $\varnothing = 2.8^{+0.1} \text{ mm}$



Mounting force  
 40 - 60 N

For pcb thickness  
 $1.6 - 4.0 \text{ mm}$   
 $\varnothing = 2.8^{+0.1} \text{ mm}$



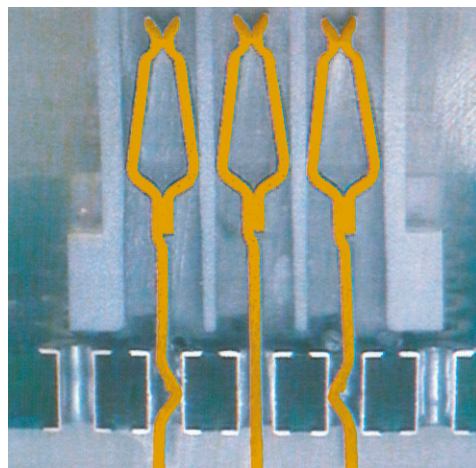
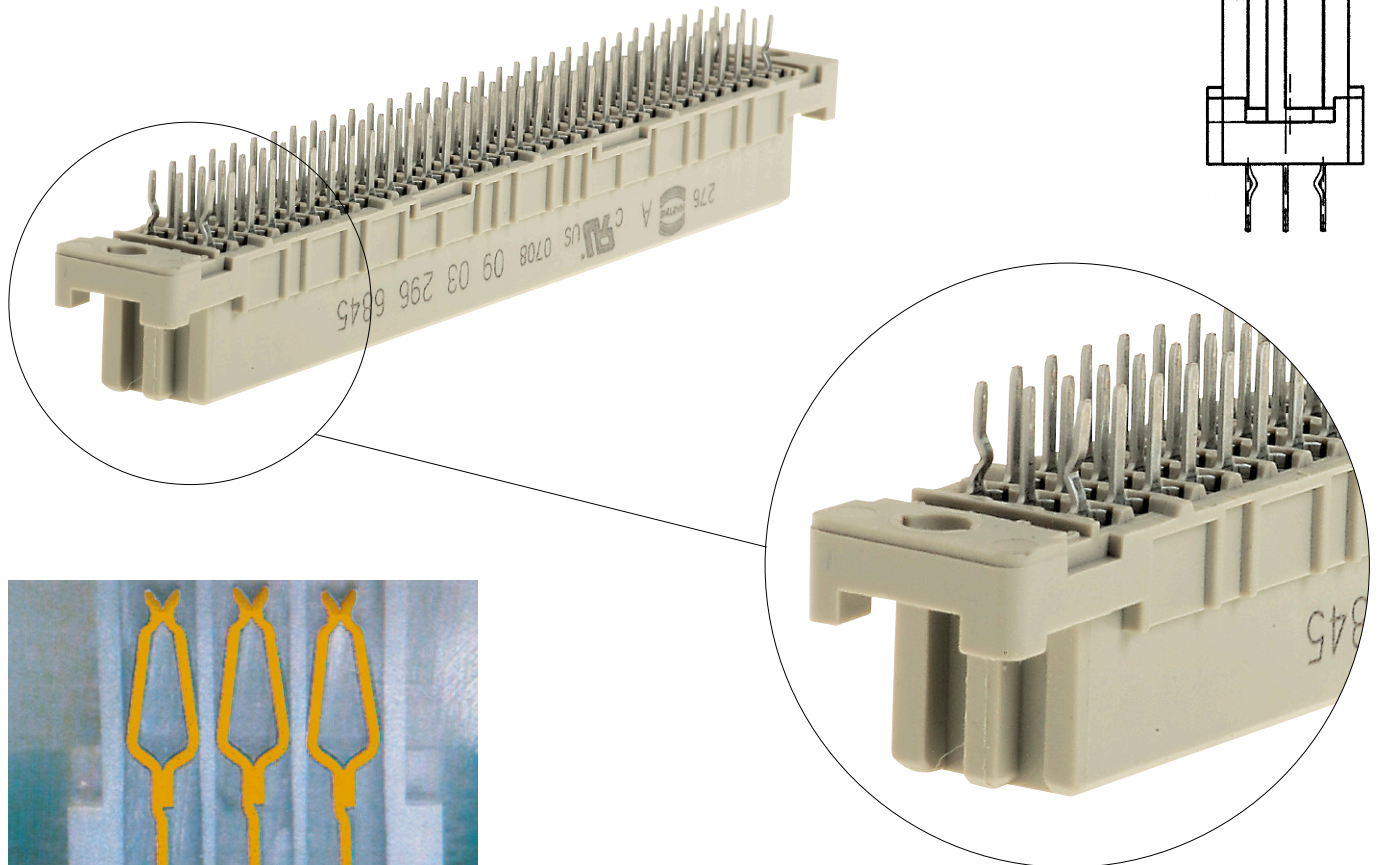
Snap-in clip

## 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.

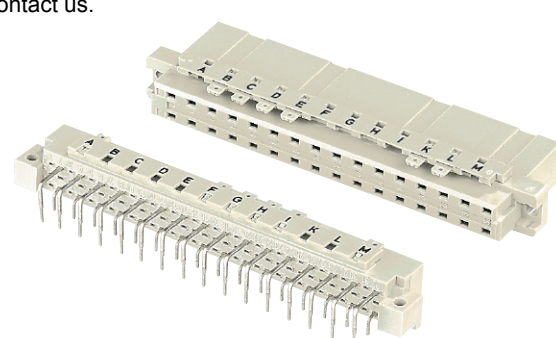

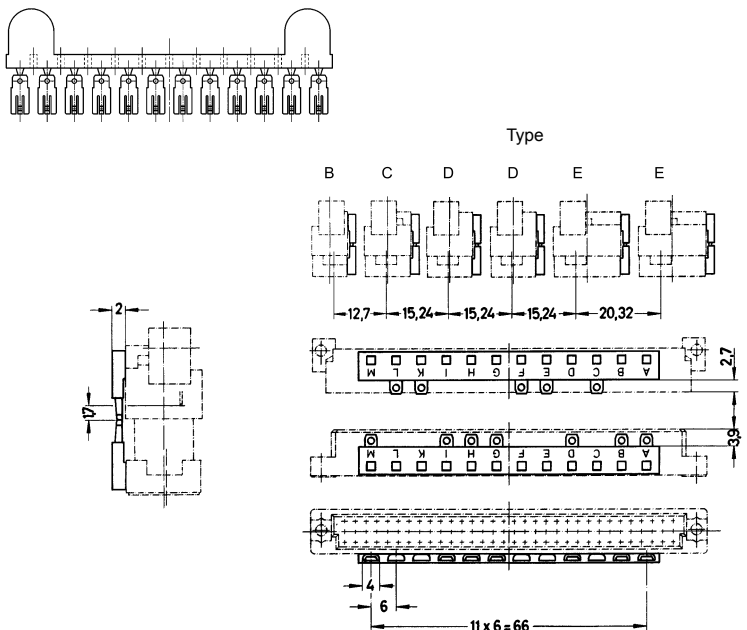


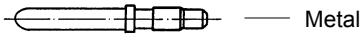

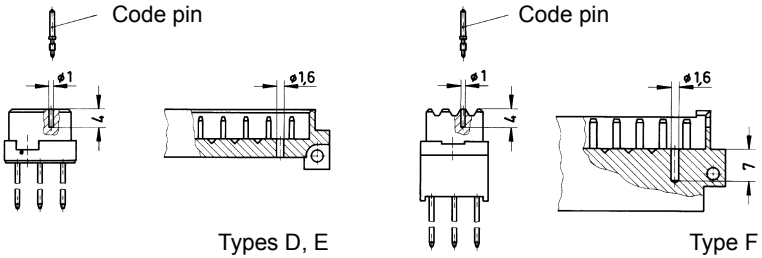
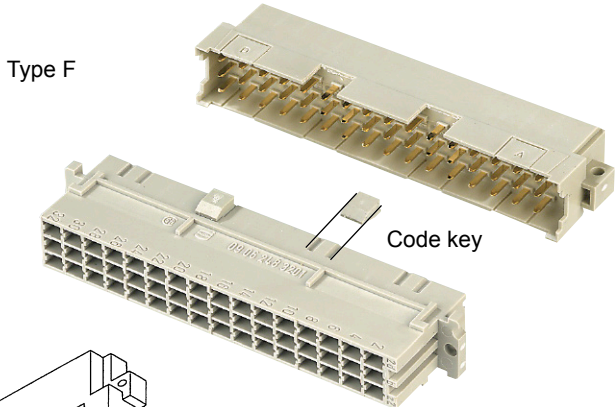
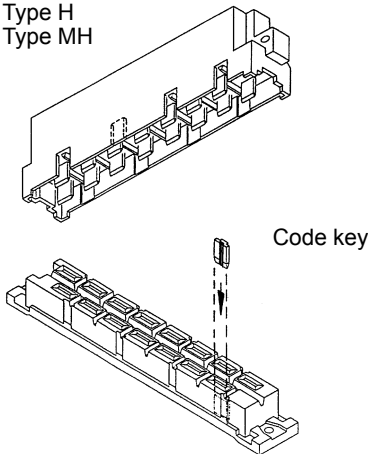

Cross section of a connector with kinked contacts assembled to a pcb

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
<p>Coding system <u>without</u> contact loss – side coding</p>	<p>Male and female connectors</p> <p>Types B, C, D, E and R</p> <p>see product pages or on request</p>	<p>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.</p> <p>The connectors with the integrated coding facility are supplied for types B, C, D, E and R and are available for all variants.</p> <p>Please contact us.</p> 	
<p>Coding system <u>without</u> contact loss – side coding</p> <p>Coding bar for screw fixing</p> <p>for types C and D male connectors for type R female connectors</p> <p>for type B male connectors for type Q female connectors</p> <p>for type E male connectors</p>	<p>09 73 000 9903</p> <p>09 72 000 9903</p> <p>09 05 000 9903</p>	<p>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.</p> 	
<p>Coding pins</p> <p>12 pins on a comb</p> <p>09 02 000 9928</p> <p>Mounting example</p>		 <p>Type</p> <p>B C D D E E</p> <p>12,7 15,24 15,24 15,24 20,32</p> <p>27</p> <p>39</p> <p>4 6 11 x 6 = 66</p>	

Identification	Part number	Drawing	Dimensions in mm
<p><b>Coding system <u>without</u> contact loss</b></p> <p>with code pin</p> <p>Code pin 09 06 000 9950</p> <p>Insertion tool 09 99 000 0103</p> <p>shroud coding Type F</p> <p>Code key 09 06 001 9919</p> <p>shroud coding Types H, MH 24 + 7</p> <p>Code key 09 06 001 9918</p>		<p>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.</p> <p>This coding system is available only for the types D, E, F and interface connectors I.</p>  <p>— Metal</p>  <p>Mounting example</p>  <p>Types D, E</p> <p>Type F</p> <p>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.</p>  <p>Type F</p> <p>Code key</p>  <p>Type H Type MH</p> <p>Code key</p>	
<p>Tool for breaking out the coding area of the male shroud</p>	<p>09 99 000 0242</p>		

Identification	Part number	Drawing	Dimensions in mm
<p><b>Coding system <u>without</u> contact loss</b></p> <p>flange coding</p> <p>Type MH 21 + 5</p> <p>colour red blue green orange</p> <p>colour red blue green orange</p>	<p>Code keys</p> <p>for male connectors</p> <p>09 06 001 9950 09 06 001 9951 09 06 001 9952 09 06 001 9953</p> <p>for female connectors</p> <p>09 06 001 9960 09 06 001 9961 09 06 001 9962 09 06 001 9963</p>	<p>can be mounted with a screwdriver (max. width 3 mm)</p>	
<p><b>Coding system <u>with</u> contact loss</b></p>	<p>Code pin for types B, 2B, 3B, C, 2C, 3C, M, M-flat, Q, 2Q, R, R (HE 11), 2R, har-bus 64</p> <p>09 02 000 9901</p> <p>Removal tool for male contacts</p> <p>09 99 000 0133</p> <p>Code pin for types D, E, F, FM, 2F, MH</p> <p>09 04 000 9908</p> <p>Removal tool for male contacts</p> <p>09 99 000 0038</p>	<p>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.</p> <p>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.</p> <p>Plastic, grey</p> <p>Plastic, black</p>	

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. $\geq 70$	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. $\geq 20$	
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. $\leq 5$
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<sub>2</sub>, HCl, HBr, HCN, HF, SO<sub>2</sub> 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							Group 2						
	I0	I1	I2	I3	I4	NC		I0	I1	I2	I3	I4	NC
F0	Green	Green	Green	Green	Green	Red	F0	Green	Green	Green	Green	Green	Red
F1	Green	Green	X	Green	Green	Red	F1	Green	Green	X	Green	Green	Red
F2	Green	Green	Green	Green	Green	Red	F2	Green	Green	Green	Green	Green	Red
F3	Green	Green	Green	Green	Green	Red	F3	Green	Green	Green	Green	Green	Red
F4	Green	Green	Green	Green	Green	Red	F4	Green	Green	Green	Green	Green	Red
F5	Red	Red	Red	Red	Red	Red	F5	Green	Green	Green	Green	Green	Red

Group 3							Group 4						
	I0	I1	I2	I3	I4	NC		I0	I1	I2	I3	I4	NC
F0	Green	Green	Green	Green	Green	Red	F0	Green	Green	Green	Green	Green	Red
F1	Green	Green	X	Green	Green	Red	F1	Green	Green	X	Green	Green	Red
F2	Green	Green	Green	Green	Green	Red	F2	Green	Green	Green	Green	Green	Red
F3	Green	Green	Green	Green	Green	Red	F3	Green	Green	Green	Green	Green	Red
F4	Green	Green	Green	Green	Green	Red	F4	Green	Green	Green	Green	Green	Red
F5	Green	Red	Red	Red	Red	Red	F5	Green	Green	Green	Green	Green	Red

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.

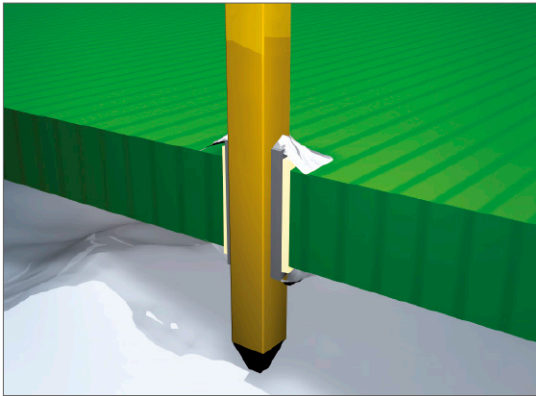
The extended range of connectors complying with the highest classification according to NFF 16-101 and 16-102 considerably reduces our customers' development times: as the selected connectors are suitable for every stipulated hazard or risk class, they are ideal for realizing product platforms, and therefore 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.

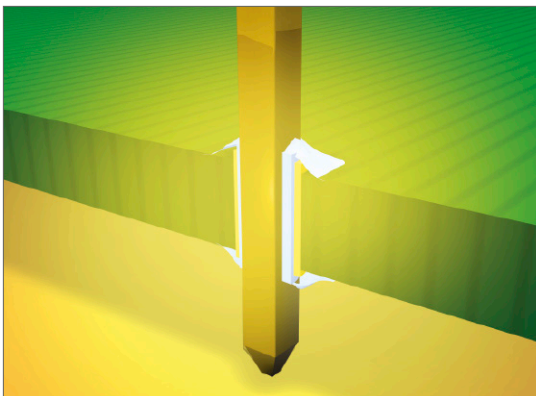
Since 2013 the current European flammability directive is EN 45545:2013. After a transition period, this will replace the national standards, for example NFF 16-101 / 102.

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.

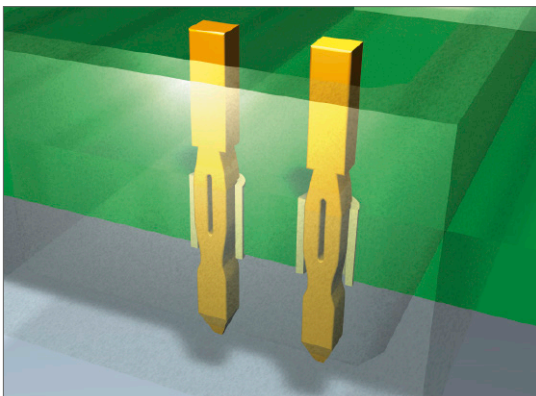
For flammable materials with the mass under 10 g no evidence must be provided. The so-called grouping rule encompasses flammable and non-tested materials which lie closer than 20 mm in the vertical direction and 200 mm in the horizontal direction to each other. Due to this rule, the limit value can be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



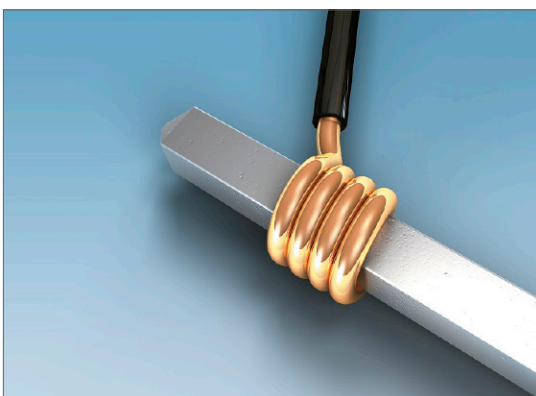
THT soldering technology



THR soldering technology



Press-in technology



Wire wrap terminals

### 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

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

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.

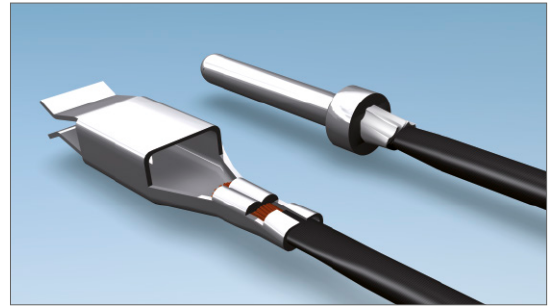
### Wire wrap terminals

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.



## Crimp terminals

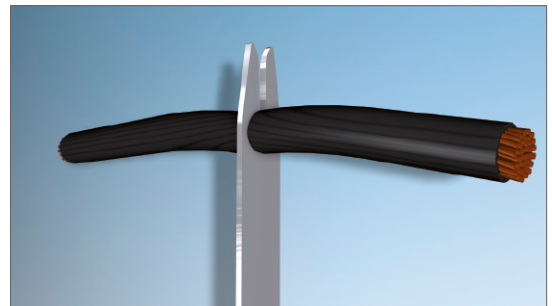
Gas-proof and the miniaturized contact technology are synonymous with crimp technology. The flexible conductor is inserted into the crimp contact and is retained by controlled deformation. This technology is similar to a cold welding process and provides maximum aging resistance and mechanical resistance 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

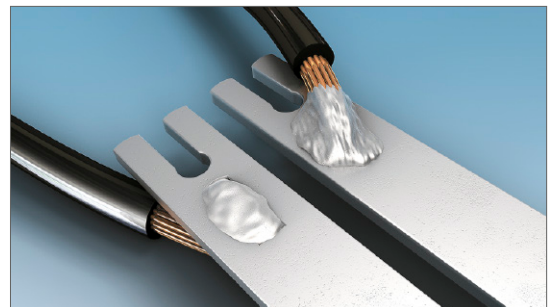
IDC (insulation displacement contact) technology facilitates the simple and safe termination of solid and flexible conductors. With IDC technology, a blade cuts through the wire insulation and produces an elastic termination in a single pass. This gas-proof connection provides maximum safety even for 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

## 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. Today's 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 29454-1. 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.

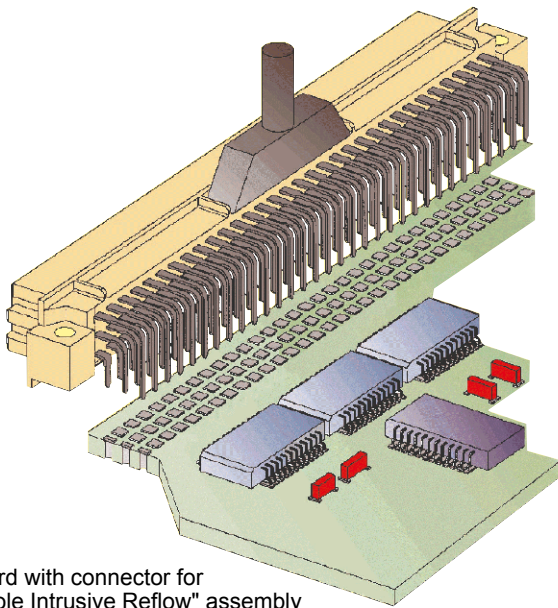


Fig. 1: SMT board with connector for "Pin in Hole Intrusive Reflow" assembly

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

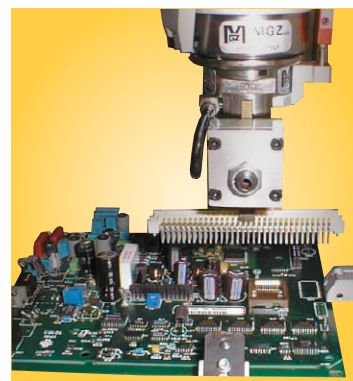


Fig. 2: Pick-and-place machine for odd form components (Courtesy of JOT Automation GmbH)

## 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.

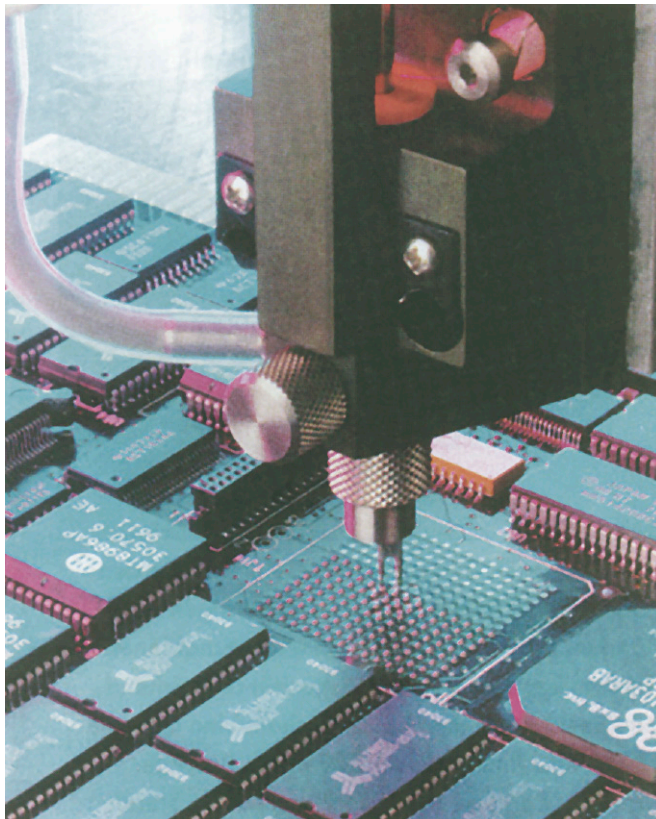


Fig. 3: Dispenser in operation

## 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:

$$V_{\text{Paste}} = 2(V_{\text{H}} - V_{\text{P}})$$

in which:

$V_{\text{Paste}}$  = Required volume of solder paste

$V_{\text{H}}$  = Volume of the plated through hole

$V_{\text{P}}$  = 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 %.

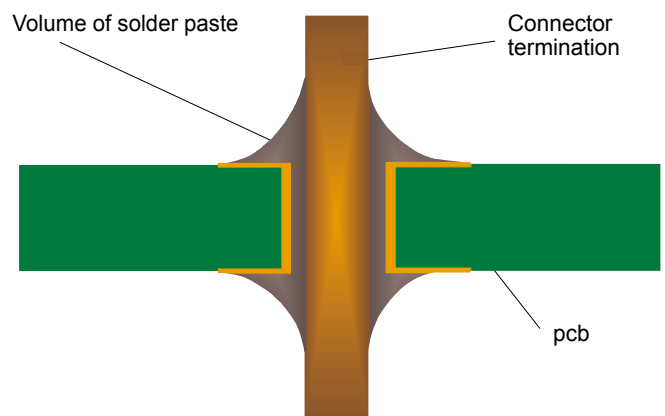


Fig. 4: Plated through hole with connector termination



## 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.

## 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

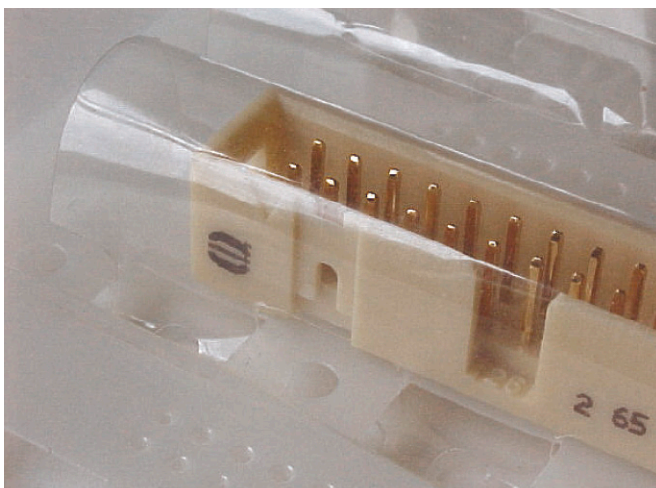


Fig. 5: HARTING connector mounted in a tape ready for placement using an odd form assembly station.

## **har:press** Press-in technology

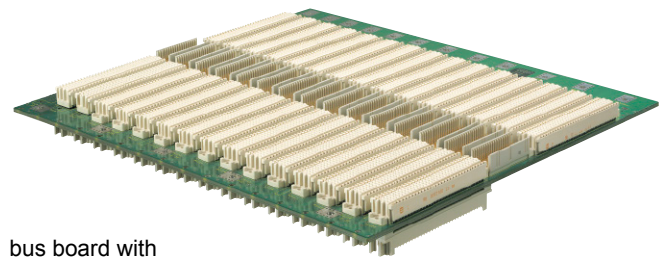
Solderless termination for connectors has proven to be reliable for decades. Today the use of press-in connectors encompasses all fields of electrical and electronical applications.

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.

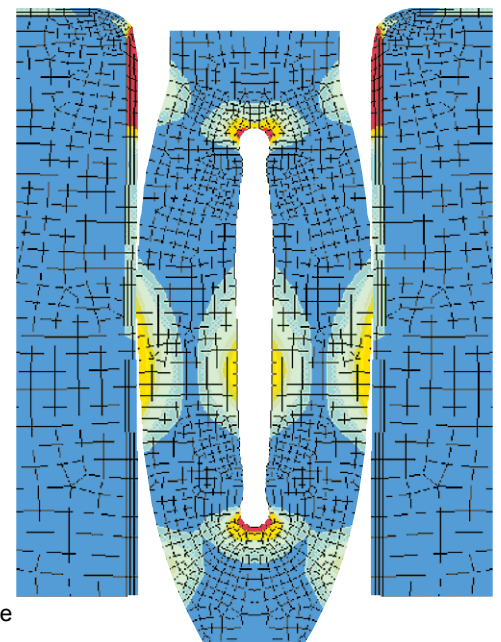
Although the scope of requirements at the press-in process is generally defined in time-tested specifications, the novel press-in zones should offer an optimal handling and a reliable termination. Essentially, this is guaranteed through the design of the press-in zone and the meticulous observance of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

### 2. Pressing in the pins

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

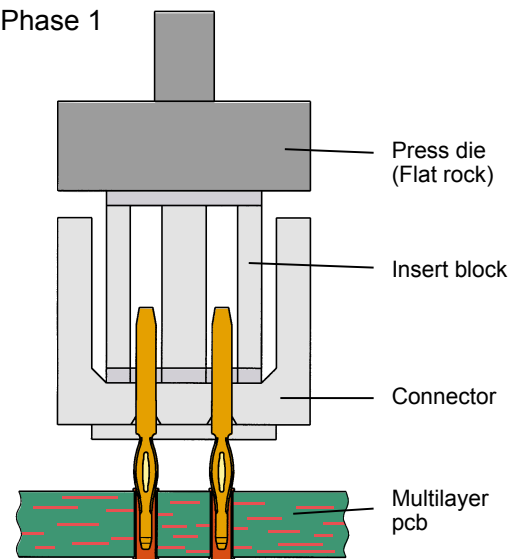
### 3. Obtaining the final position

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

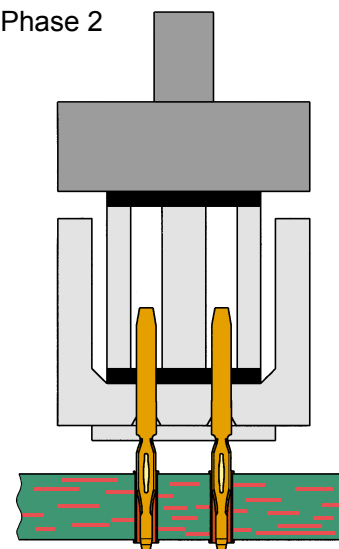
The entire dynamic press-in process is characterised through changes of the press-in force that can be statistically evaluated. HARTING records the changes of force with the help of special software. This is an important step towards permanent process control and documented manufacturing data.

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

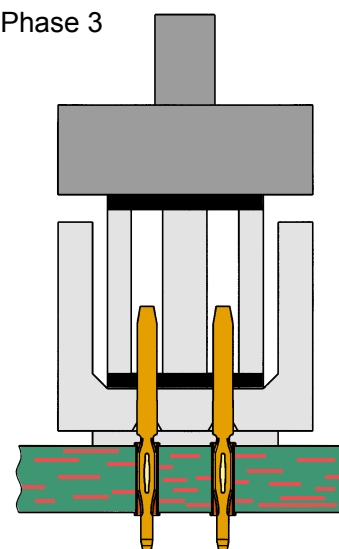
Phase 1



Phase 2



Phase 3



## 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.

<i>Tin-lead plated PCB (HAL) acc. EN 60 352-5</i>	Hole-Ø	1.15±0.025 mm
	Cu	min. 25 µm
	Sn	max. 15 µm
	Plated hole-Ø	0.94-1.09 mm

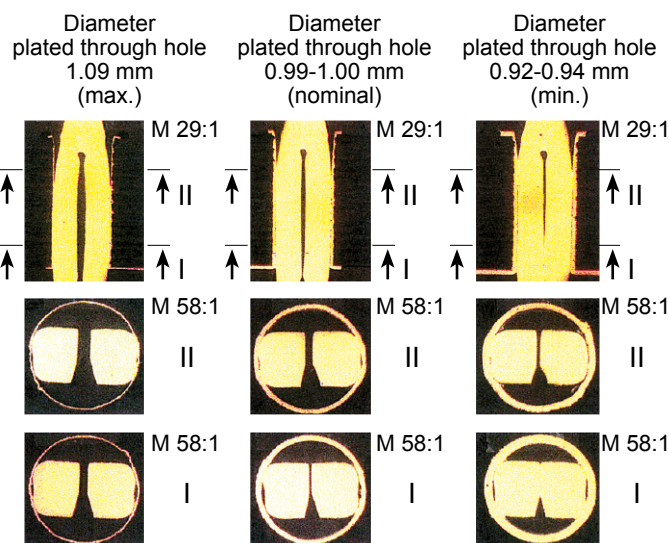
<i>Chemical tin-plated PCB</i>	Hole-Ø	1.15±0.025 mm
	Cu	min. 25 µm
	Sn	min. 0.8 µm
	Plated hole-Ø	1.00-1.10 mm

<i>Au / Ni plated PCB</i>	Hole-Ø	1.15±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

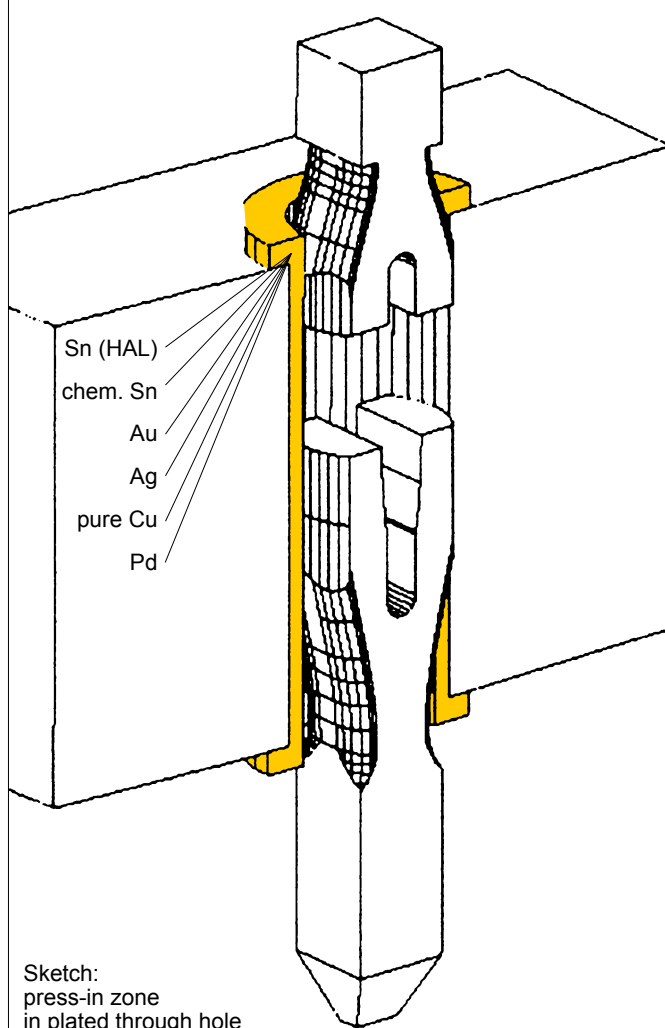
<i>Silver plated PCB</i>	Hole-Ø	1.15±0.025 mm
	Cu	min. 25 µm
	Ag	0.1-0.3 µm
	Plated hole-Ø	1.00-1.10 mm

<i>OSP copper plated PCB</i>	Hole-Ø	1.15±0.025 mm
	Cu	min. 25 µm
	Plated hole-Ø	1.00-1.10 mm

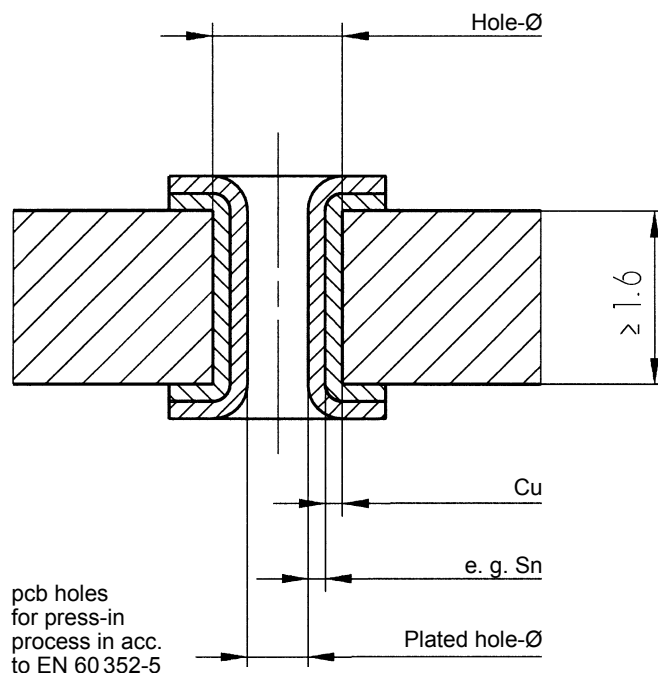
PCB board thickness: ≥ 1.6 mm



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.

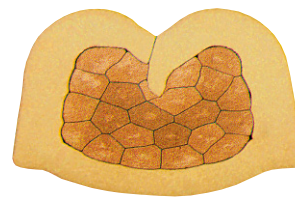
The economical and technical advantages are:

- 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
mm <sup>2</sup>	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

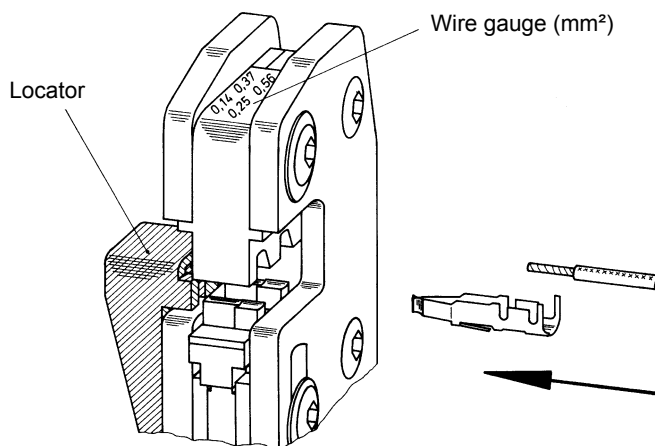
Crimping tools (hand operated or automatic) are carefully designed to guarantee a symmetrical deformation of the crimping area of the contact and the wire through the high pressure forming parts of the tool. The locator automatically engages the crimp contact and the wire at the correct point in the 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 60352-1.

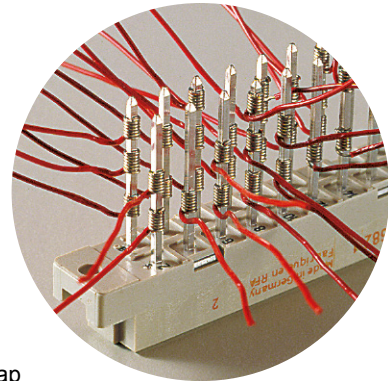
## Wrapping techniques

### 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

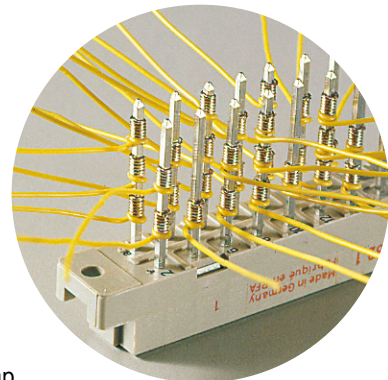
Wire diameter [mm]						
0.25	0.32	0.4	0.5	0.65	0.8	1.0
max. allowed wire Ø incl. wire insulation [mm]						
0.7	0.9	1.17	1.27	1.32	1.5	1.78

Valid for standard wrap

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						
		0.25	0.32	0.4	0.5	0.65	0.8	
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

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

Valid for modified wrap

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						
		0.25	0.32	0.4	0.5	0.65	0.8	
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).





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

Technical characteristics .....		<b>01.10</b>
Type B connectors .....		<b>01.11</b>
Type 2B connectors .....		<b>01.16</b>
Type 3B connectors .....		<b>01.18</b>
Type C connectors .....		<b>01.20</b>
Type 2C connectors .....		<b>01.29</b>
Type 3C connectors .....		<b>01.34</b>
Special contacts type M .....		<b>01.38</b>
Type M connectors .....		<b>01.43</b>
Type M-flat connectors .....		<b>01.46</b>
Type M invers connectors .....		<b>01.48</b>
Type Q, 2Q and 3Q connectors .....		<b>01.52</b>
Type R, RM, R (HE 11), 2R and 3R connectors		<b>01.59</b>
Pin shroud, adapter .....		<b>01.72</b>
Application examples .....		<b>01.76</b>

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	according to the safety regulations of the equipment Explanations see chapter 00
The working voltage also depends on the clearance and creepage dimensions of the pcb itself, and the associated wiring	
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	≤ 20 mΩ
Insulation resistance	≥ 10 <sup>12</sup> Ω for standard articles ≥ 10 <sup>11</sup> Ω for special NFF articles (with part-no. ending 222)

Temperature range	- 55 °C ... + 125 °C - 40 °C ... + 105 °C for press-in connector
The higher temperature limit includes the local ambient and heating effects of the contacts under load	
During reflow soldering	max. + 240 °C for 15 s for THR connectors

Degree of protection for crimp terminal IP20 according to DIN 40 050

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 mm <sup>2</sup> 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 <sup>1)</sup>

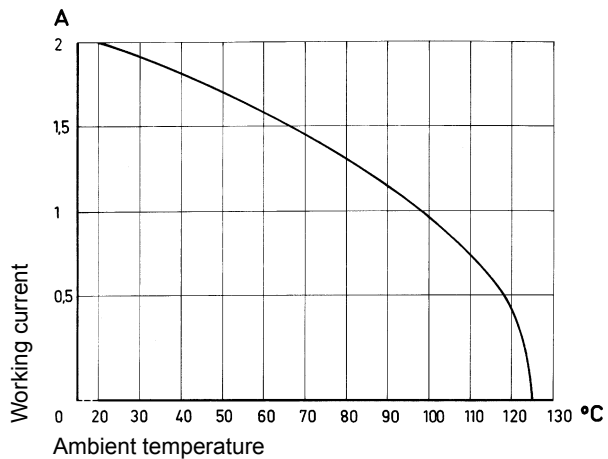
<sup>1)</sup> Explanation performance levels see chapter 00

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

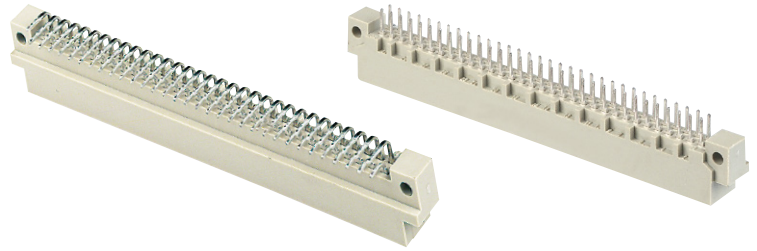
The locking levers provide security for the mated connectors. Fast and simple disconnection is possible (see application examples, pages 01.76 ff).

## Fitting and removing crimp contacts

see technical characteristics chapter 03

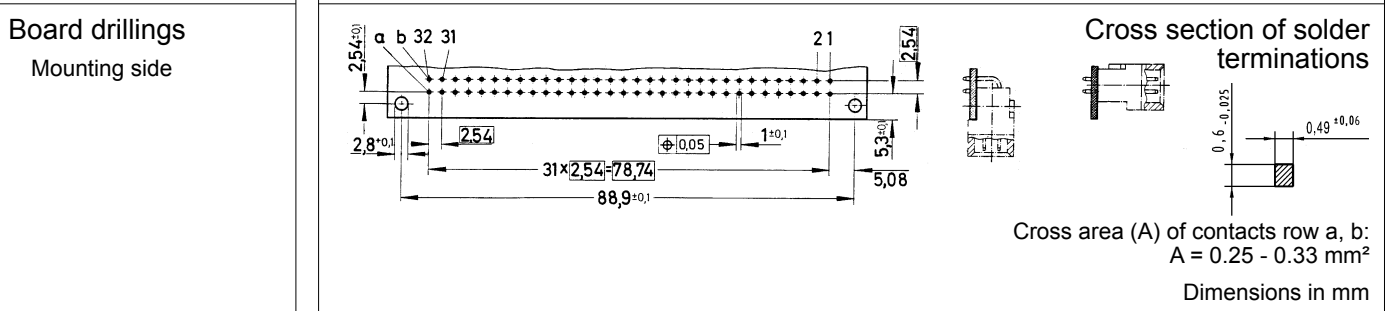
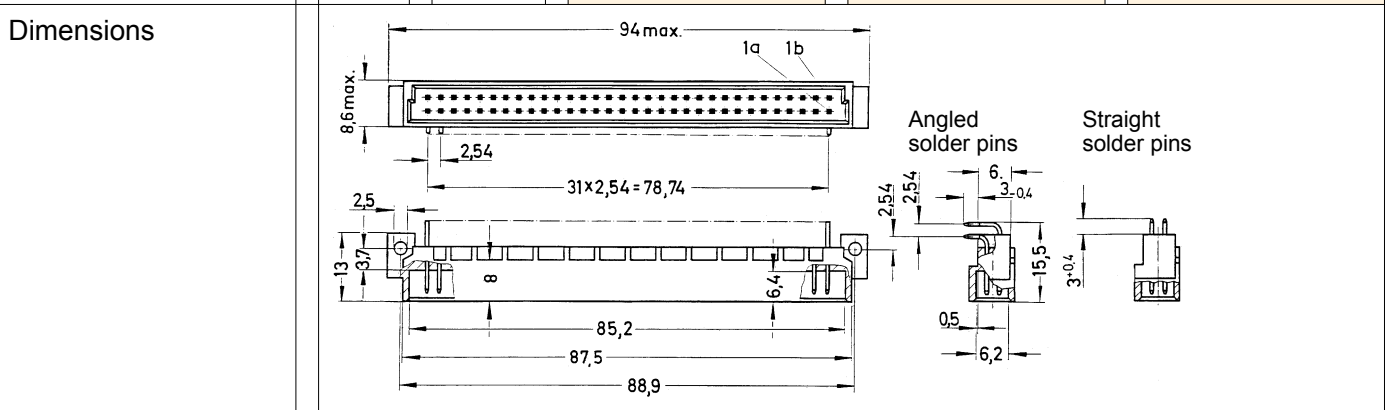
Number of contacts

# 64, 32



Male connectors

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

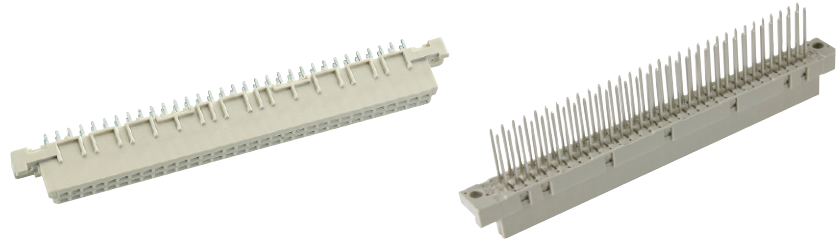


▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]. Lagging pins on request.  
Other contact arrangements on request  
b) Connectors with snap-in clips see chapter 00

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

DIN Signal  
up to 2 A

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		Performance level 3 on request	09 02 264 6824 09 02 464 6824 <sup>b)</sup> 09 02 764 6824 <sup>c)</sup>	09 02 264 2824
	64			09 02 264 6841 <sup>d)</sup>	
Female connector with solder pins 4.5 mm	64			09 02 264 6825 09 02 264 6825 222 <sup>f)</sup> 09 02 464 6825 <sup>b)</sup> 09 02 764 6825 <sup>c)</sup>	09 02 264 2825
	64			09 02 264 6829 <sup>d)</sup>	
Female connector with solder pins 13 mm	64			09 02 264 6421	
Female connector with press-in pins 4.5 mm	64			09 02 264 6850 09 02 264 6850 222 <sup>f)</sup>	09 02 264 2850
Female connector with press-in pins 13 mm	64			09 02 264 6861 <sup>a)</sup>	
Female connector with wrap posts <sup>1)</sup> 13 mm	64			09 02 264 6821	
Female connector with solder lugs 5.5 mm	64		09 02 264 6823		

01  
12

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

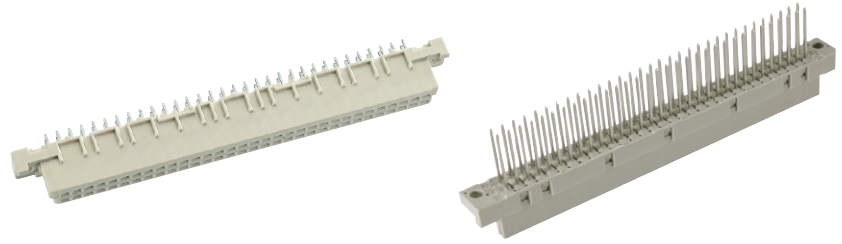
c) Connectors with coding see chapter 00

d) CTI > 400

f) Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2  
Other contact arrangements on request

Number of contacts

# 64



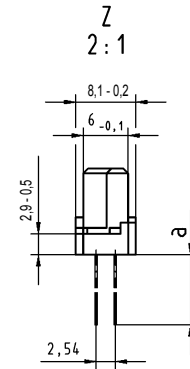
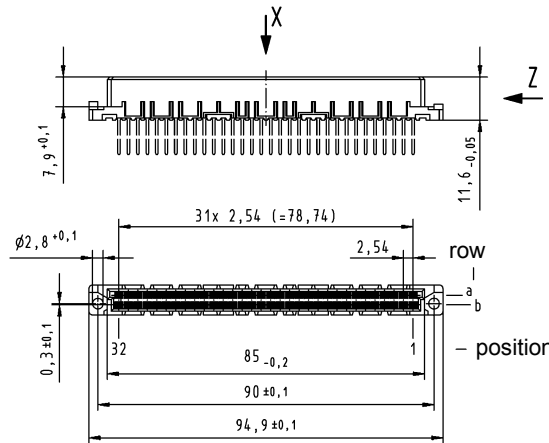
Female connectors

Identification

Drawing

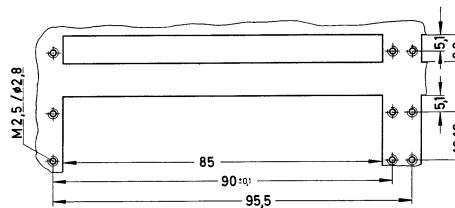
Dimensions in mm

Dimensions

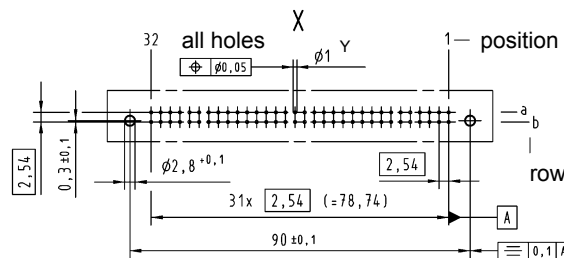


a	
2.9	
4.5	Solder pins
13	
4.5	Press-in pins
13	Wrap posts
13	
5.5	Solder lugs

Panel cut out



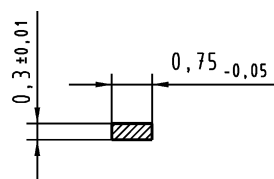
Board drillings  
Mounting side



	Y
Solder	$1 \pm 0.1$
Press-in	see recommendation page 00.25

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

Cross section of solder terminations

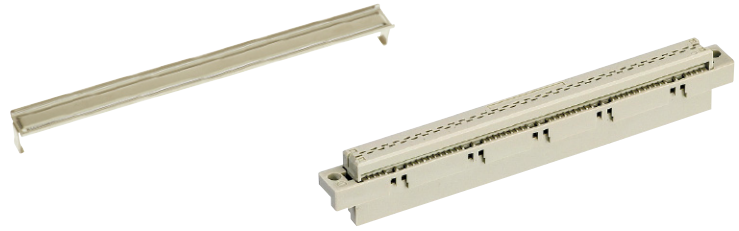


Cross area (A) of contacts  
row a, b: A = 0.20 - 0.23 mm<sup>2</sup>



Number of contacts

# 64



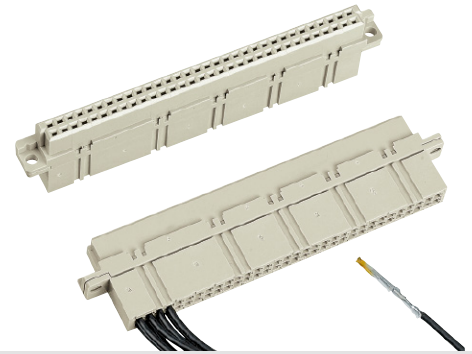
Female connectors

DIN Signal up to 2 A

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for insulation displacement	64	Performance level 2 <sup>1)</sup> 09 02 264 6828  Performance level 3 <sup>1)</sup> 09 02 264 7828	<p>Cable 1 to contact 1 b Contact arrangement View from termination side</p>	
Strain relief (metal)		09 03 000 9940		
Panel cut out				
Flat cable AWG 28/7			<p>Wire (tinned) Gauge AWG 28/7 Insulation material as per UL style</p>	<p><sup>2)</sup> Termination area spacing = 508 mm</p> <p><b>Important: always store reels vertically</b></p> <p>Cu AWG 28/7 0.089 mm<sup>2</sup> PVC</p>
Round flat cable <sup>3)</sup>				<p><sup>3)</sup> Termination area spacing = 100 mm</p>
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		

Number of contacts

max. 64



Female connectors

DIN Signal up to 2 A

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	64	09 02 064 3214 <sup>1)</sup>	<p>                         Contact arrangement View from termination side                          32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1                     </p>	
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 <sup>1)</sup>	09 02 000 8484		09 02 000 8474

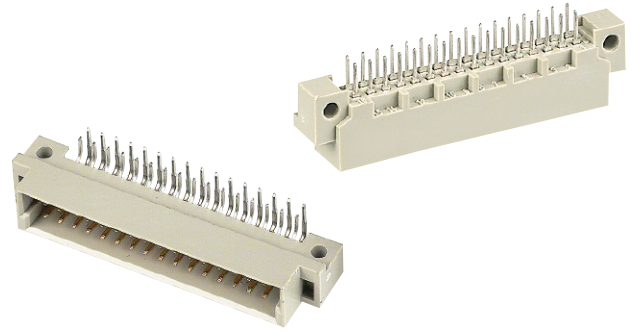
Wire gauge mm <sup>2</sup> 0.09 - 0.5  3.5 + 0.5 mm of insulation is stripped from the wires to be crimped For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2) Insertion, removal and crimping tools see chapter 30	AWG 28 - 20	Insulation ø mm 0.7 - 1.5	<p>Bandoliered contacts</p> <p>Individual contacts</p>
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<sup>1)</sup> Packaging unit 1,000 pieces

<sup>2)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

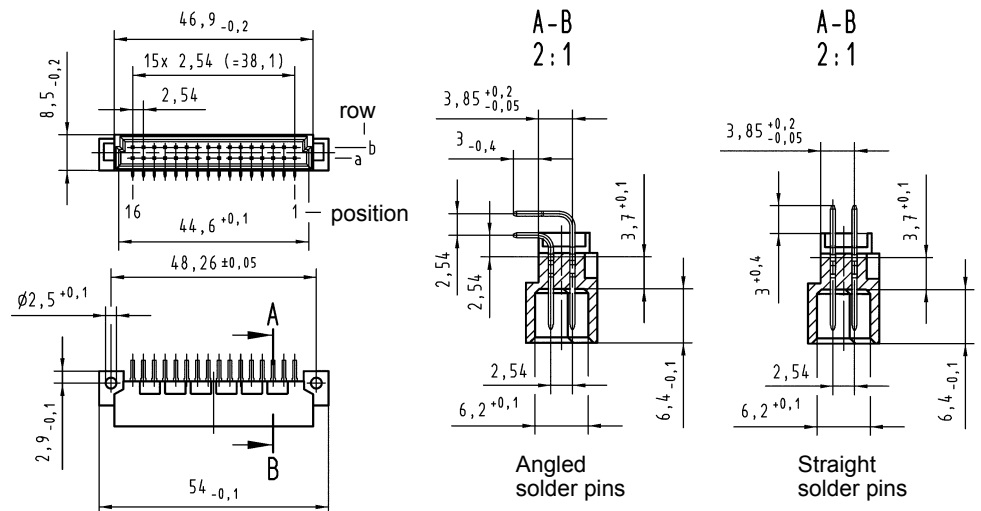
# 32, 16



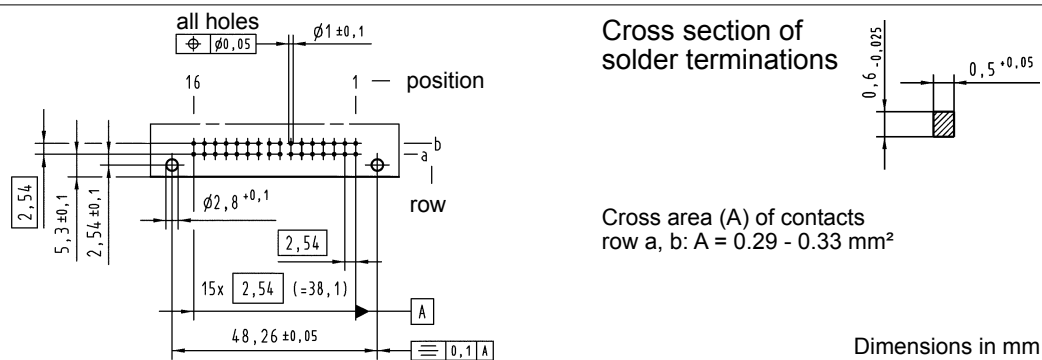
Male connectors

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

Dimensions



Board drillings  
Mounting side



▲ 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

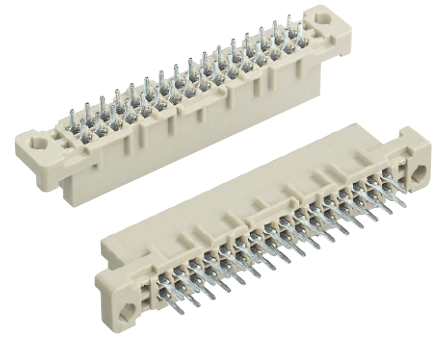
d) CTI > 400

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

Other contact arrangements on request

Number of contacts

# 32

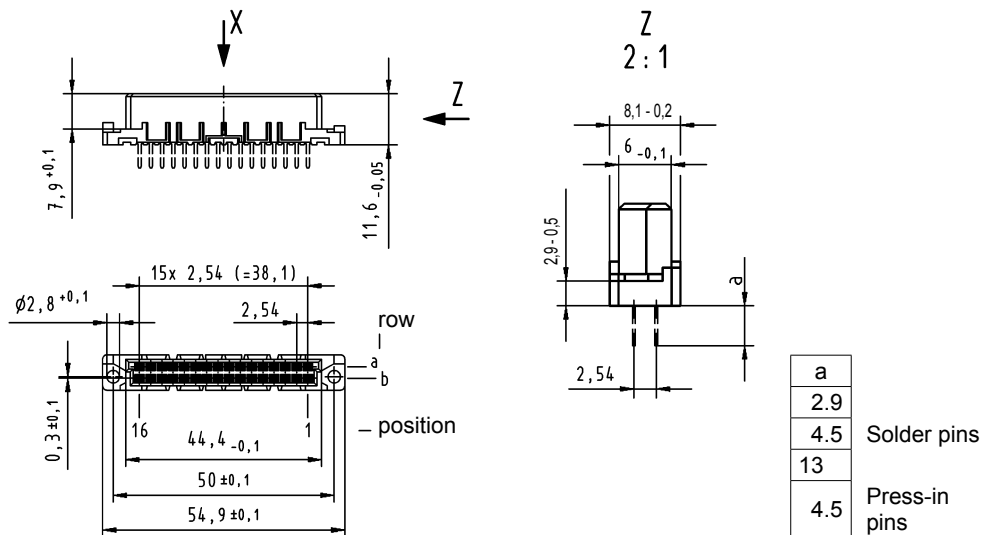


Female connectors

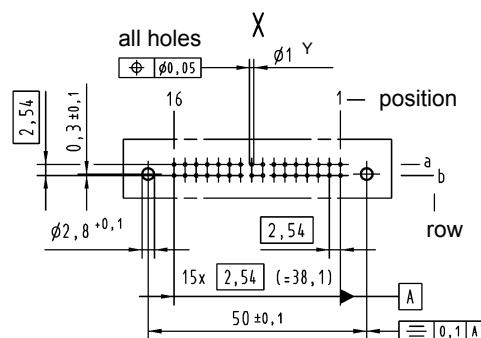
Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00		
				3	2	1
Female connector with solder pins 2.9 mm  THR	32		Performance level 3 on request	09 22 232 6824 09 22 232 6824 222 <sup>f)</sup> 09 22 432 6824 <sup>b)</sup>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

DIN Signal up to 2 A

Dimensions



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

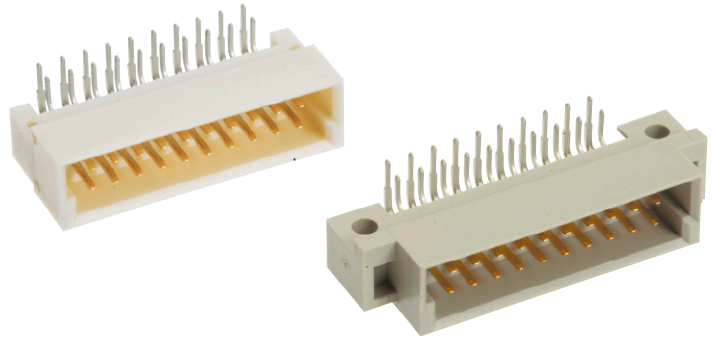
Dimensions in mm

<sup>b)</sup> Connectors with snap-in clips see chapter 00  
<sup>d)</sup> CTI > 400

<sup>f)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2  
Other contact arrangements on request

Number of contacts

# 20



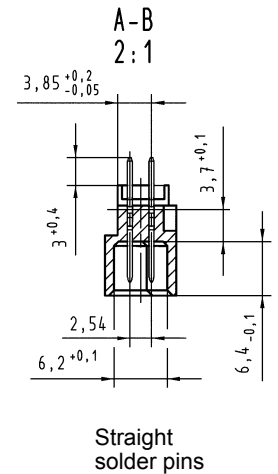
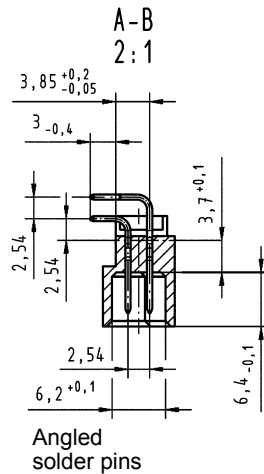
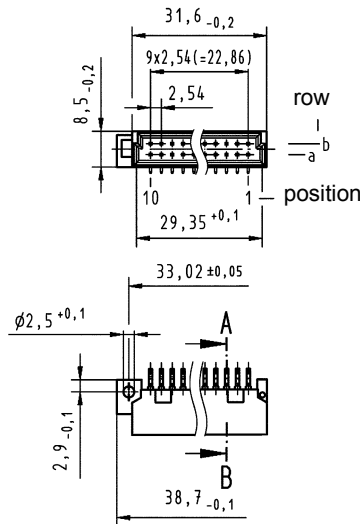
Male connectors

DIN Signal up to 2 A

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	Performance level 1 on request
				09 24 320 6921 <sup>b)</sup>	
				09 24 120 6919 <sup>d)</sup>	
				09 24 120 6571	
Male connector with angled solder pins without fixing flange	20		Performance level 3 on request	09 24 120 6571	Performance level 1 on request
				09 24 120 6579 <sup>d)</sup>	
Male connector with angled solder pins with fixing flange, THR	20		Performance level 3 on request	09 24 120 6919 <sup>d)</sup>	Performance level 1 on request
				09 24 120 6571	
Male connector with angled solder pins without fixing flange, THR	20		Performance level 3 on request	09 24 120 6571	Performance level 1 on request
				09 24 120 6579 <sup>d)</sup>	
Male connector with straight solder pins with fixing flange	20		Performance level 3 on request	09 24 120 6922	Performance level 1 on request

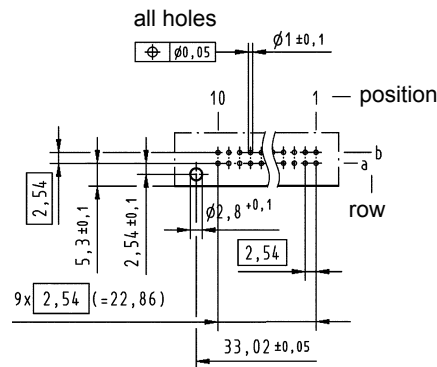
Dimensions

with fixing flange    without fixing flange

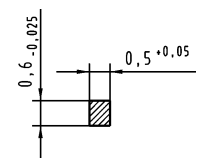


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b: A = 0.29 - 0.33 mm<sup>2</sup>

Dimensions in mm

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

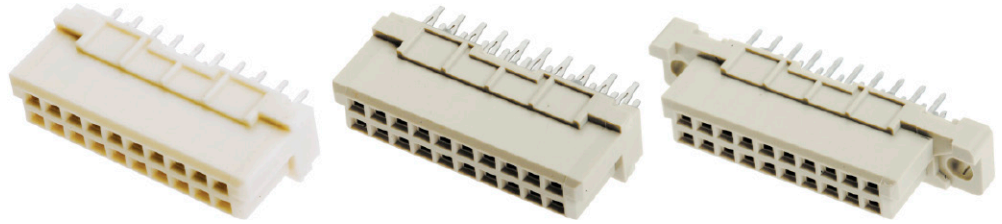
<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>d)</sup> CTI > 400



Number of contacts

# 20



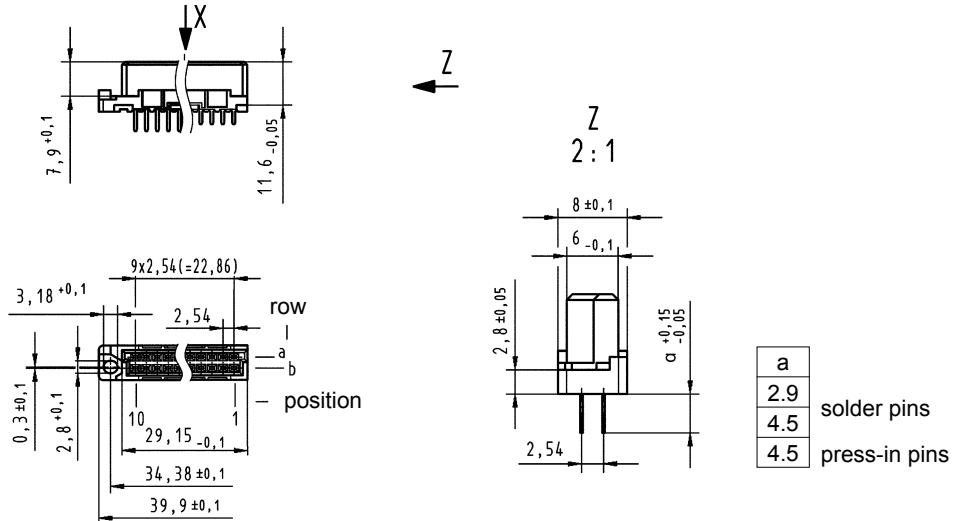
Female connectors

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

DIN Signal up to 2 A

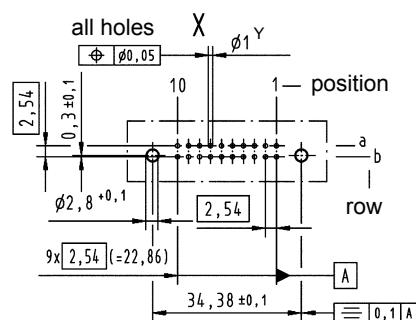
Dimensions

with fixing flange    without fixing flange



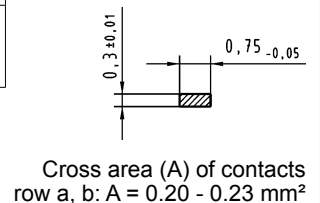
Board drillings

Mounting side



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

Cross section of solder terminations

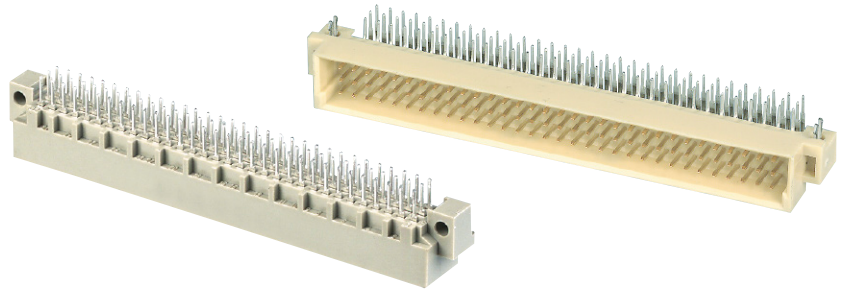


Dimensions in mm

<sup>d)</sup> CTI > 400

Number of contacts

96, 64, 32



Male connectors

DIN Signal  
up to 2 A

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

<sup>▲</sup> Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]. Lagging pins on request.

<sup>b)</sup> Connectors with snap-in clips see chapter 00

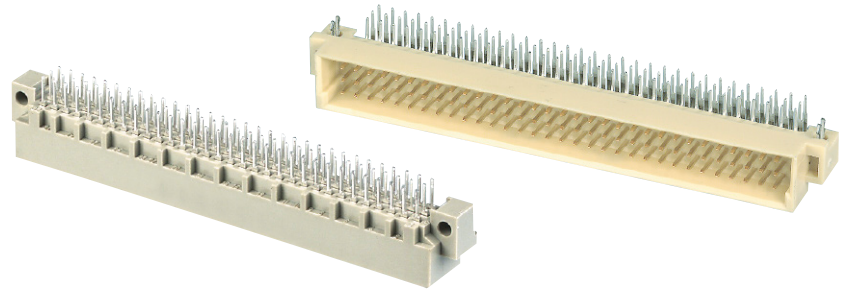
<sup>c)</sup> Connectors with coding see chapter 00

<sup>d)</sup> CTI > 400

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

Number of contacts

# 96, 64, 32



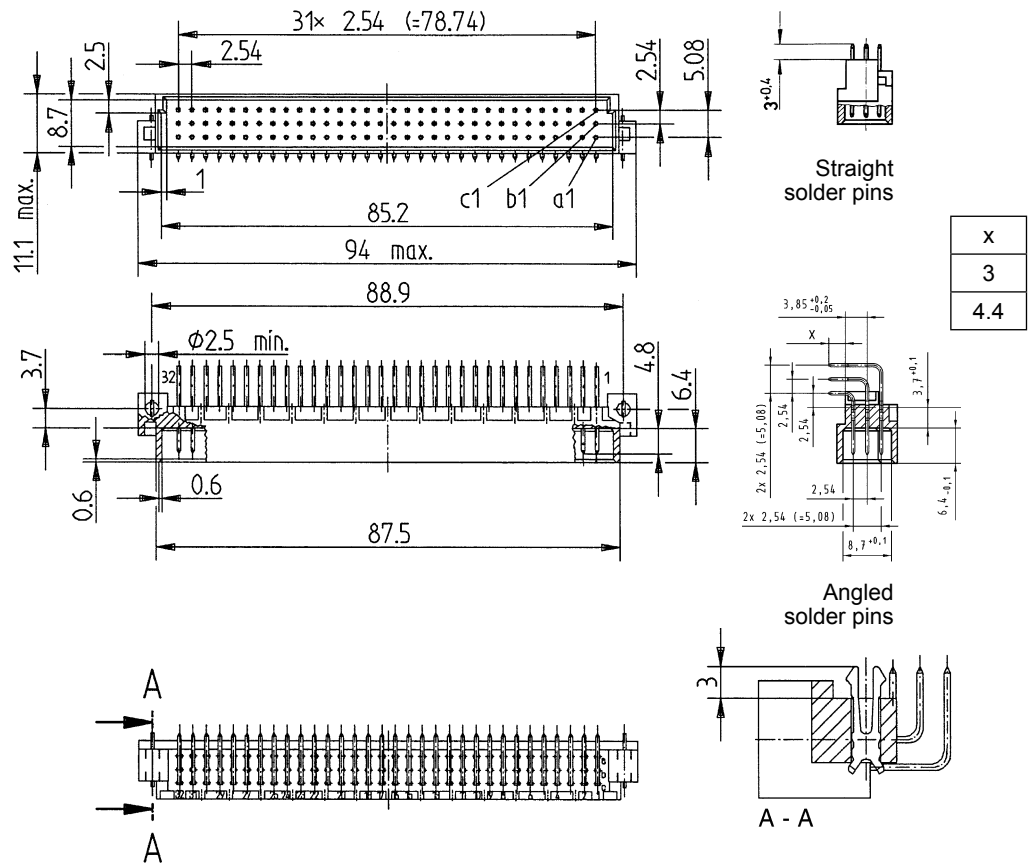
Male connectors

Identification

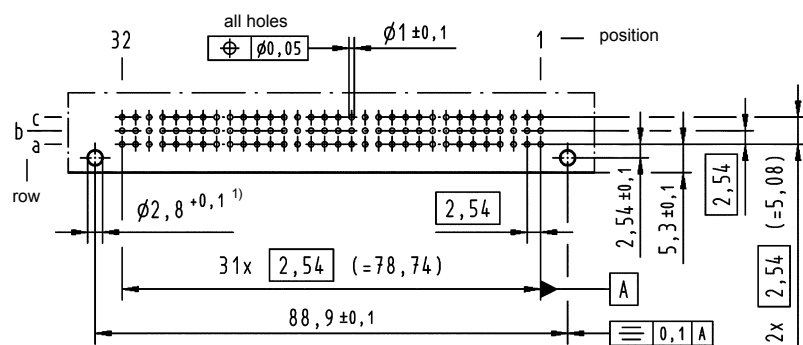
Drawing

Dimensions in mm

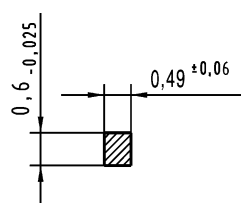
Dimensions



Board drillings  
Mounting side



Cross section of solder terminations



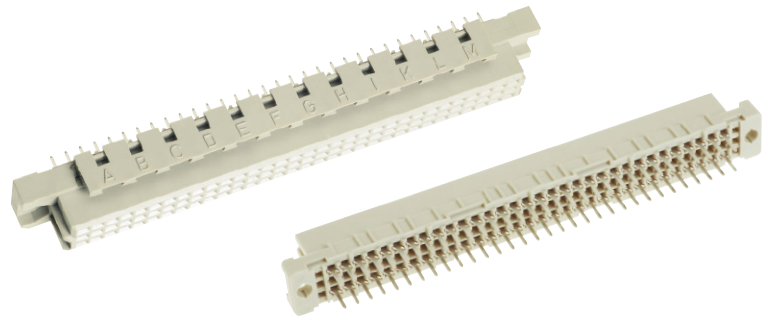
Cross area (A) of contacts row a, b, c:  $A = 0.25 - 0.33 \text{ mm}^2$

Dimensions in mm

<sup>1)</sup> Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm  $\phi$  to reduce standard mounting force

Number of contacts

# 96, 64, 32



## Female connectors

DIN Signal up to 2 A

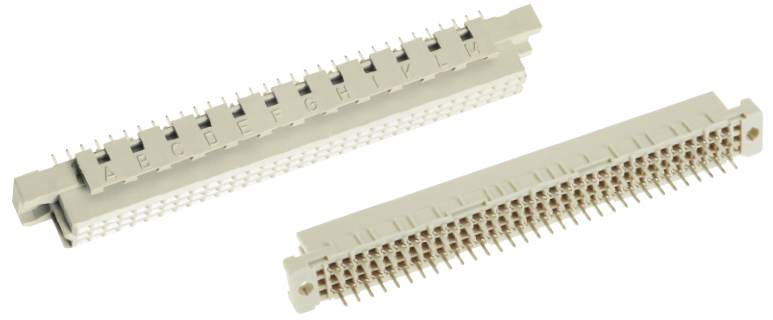
Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00		
			3	2	1
Female connector with solder pins 2.9 mm	96		09 03 296 7824	09 03 296 6824 09 03 296 6824 222 <sup>f)</sup> 09 03 496 6824 <sup>b)</sup> 09 03 796 6824 <sup>c)</sup>	09 03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

<sup>1)</sup> Kinked pins for fixing the connector onto the pcb see chapter 00  
<sup>b)</sup> Connectors with snap-in clips see chapter 00  
<sup>c)</sup> Connectors with coding see chapter 00

<sup>d)</sup> CTI > 400  
<sup>f)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

96, 64, 32



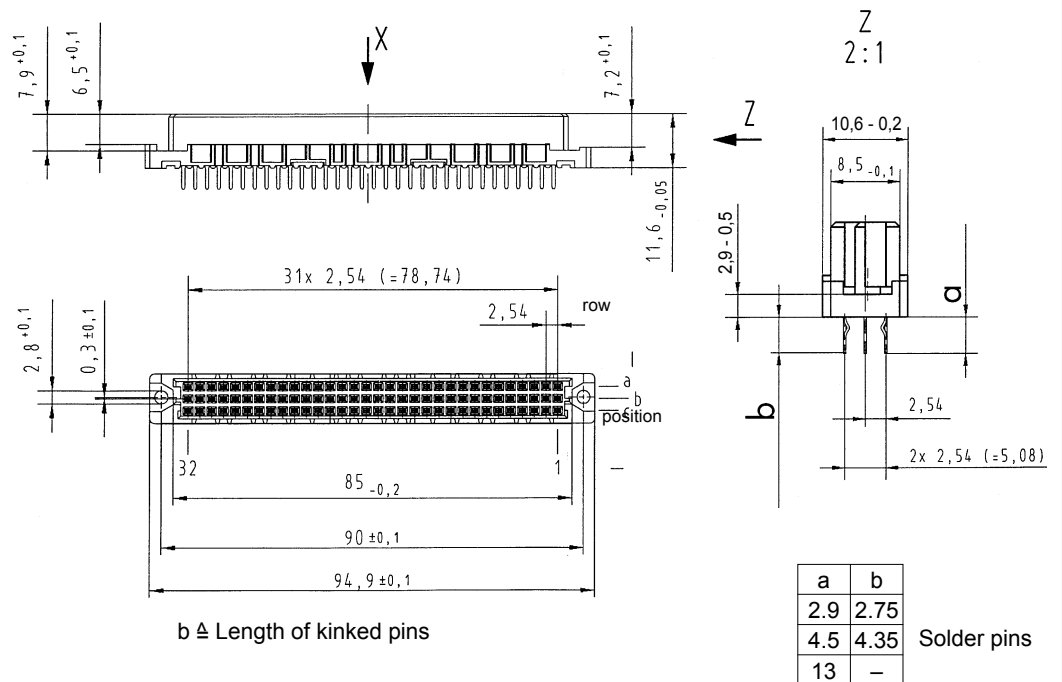
Female connectors

Identification

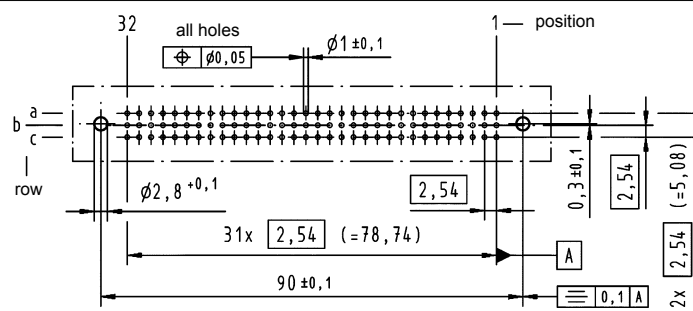
Drawing

Dimensions in mm

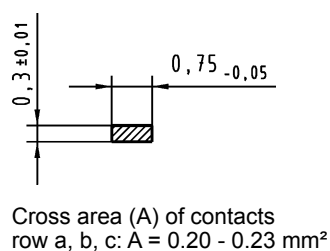
Dimensions



Board drillings  
Mounting side



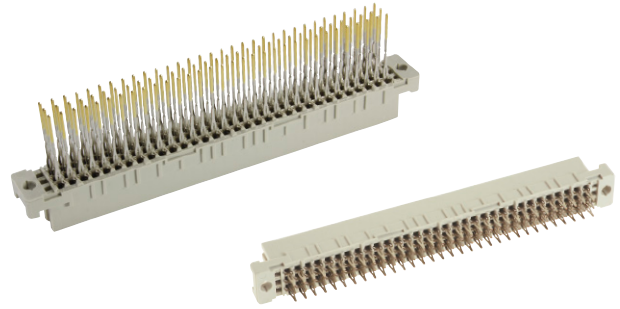
Cross section of  
solder terminations





Number of contacts

# 96, 64, 32



## Female connectors

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

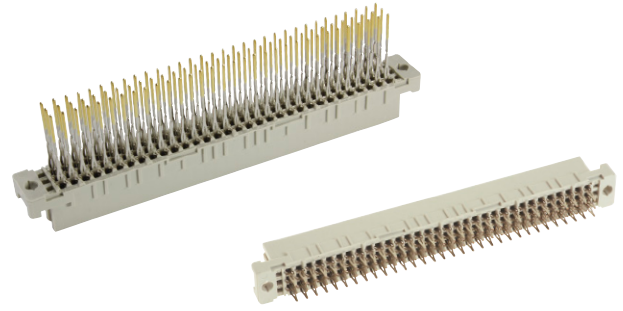
<sup>2)</sup> Contacts for rear interfacing gold plated (performance level 2)

<sup>c)</sup> Connectors with coding see chapter 00

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

Number of contacts

# 96, 64, 32



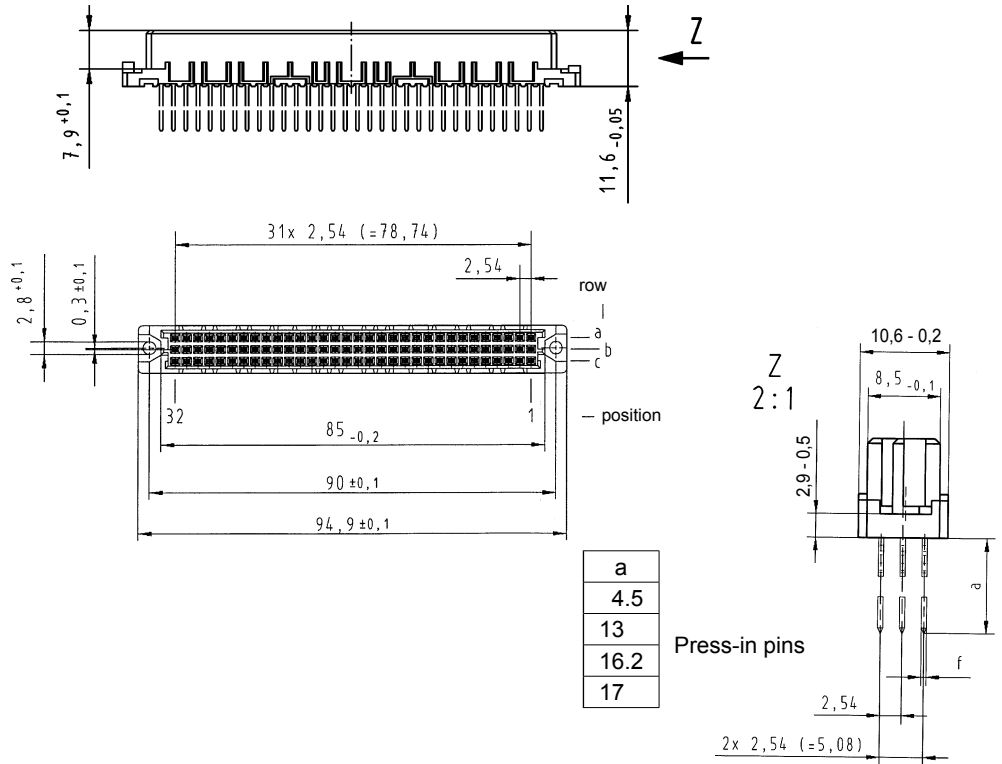
Female connectors

Identification

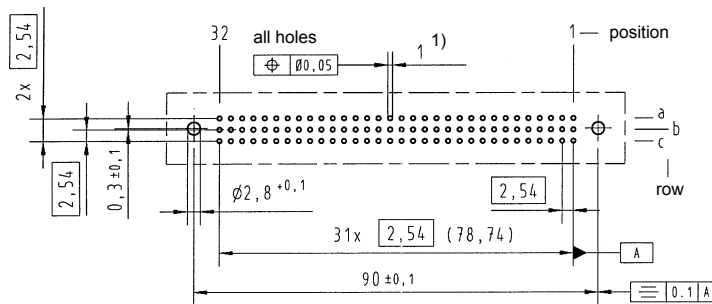
Drawing

Dimensions in mm

Dimensions



Board drillings  
Mounting side



Dimensions in mm

<sup>1)</sup> refer to recommended configuration of pcb holes, see page 00.25

Number of contacts

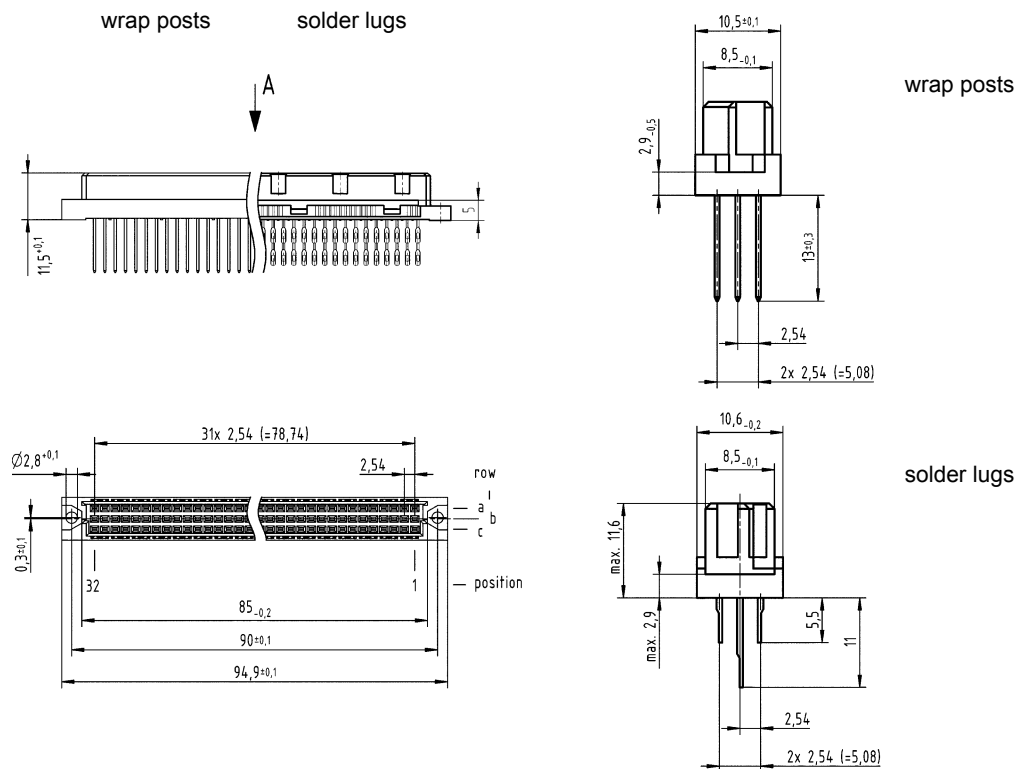
# 96, 64



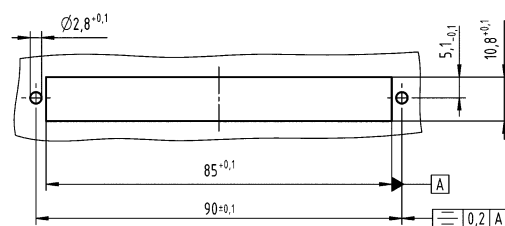
Female connectors

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

Dimensions



Panel cut out



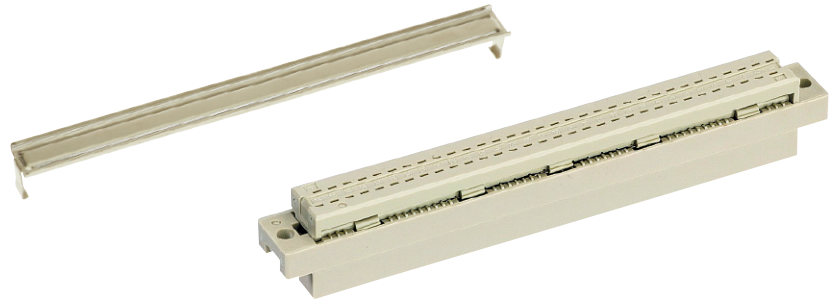
Identification strips for female connectors with wrap posts  
09 03 000 9939

Dimensions in mm

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

Number of contacts

# 64



Female connectors

DIN Signal  
up to 2 A

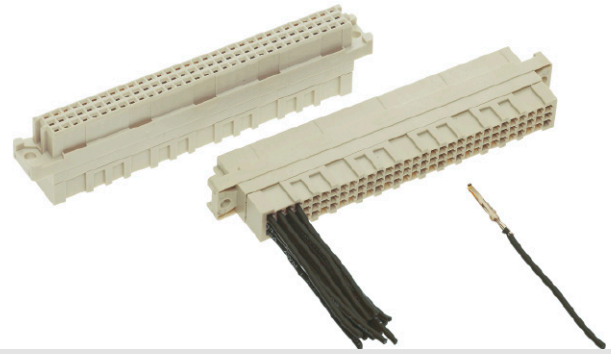
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for insulation displacement	64	Performance level 2 <sup>1)</sup> 09 03 264 6828		
		Performance level 3 <sup>1)</sup> 09 03 264 7828		
Strain relief (metal)		09 03 000 9940	<p>Cable 1 to contact 1 c Contact arrangement View from termination side</p>	
Panel cut out			<p>Mateable with 3 row male connector type C, no female contacts in the middle row</p>	
Flat cable AWG 28/7			<p>Wire (tinned) Gauge AWG 28/7 Insulation material as per UL style PVC</p>	<sup>2)</sup> Termination area spacing = 508 mm  <b>Important: always store reels vertically</b>
Round flat cable <sup>3)</sup>			<p>Edge mark on first conductor</p>	<sup>3)</sup> 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

<sup>1)</sup> 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				(2:1)
Type C	96	09 03 096 3214 <sup>f)</sup> 09 03 596 3214 <sup>c)f)</sup>		
Type C Position marking turned for mating type R male	96	09 03 096 3217 <sup>f)</sup>		
				Reihe row a b Position position

Identification	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00
Female crimp contacts BC		2 1
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 <sup>1)</sup>	09 02 000 8484	09 02 000 8474

Wire gauge mm <sup>2</sup>	AWG	Insulation ø mm	<p>Bandoliered contacts</p> <p>Individual contacts</p>
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			

DIN Signal up to 2 A

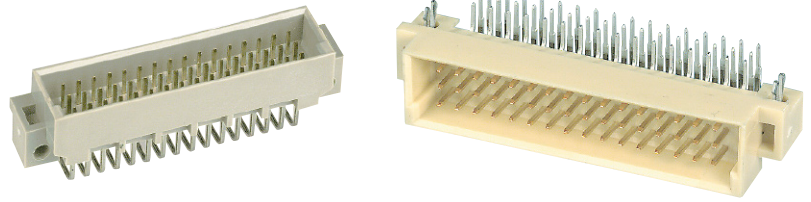
01  
28

<sup>c)</sup> Connectors with coding see chapter 00  
<sup>1)</sup> Packaging unit 1,000 pieces  
<sup>f)</sup> 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	Performance levels according to IEC 60603-2. Explanation chapter 00			
			Part number 3	2	1	
Male connector with angled solder pins	48		09 23 148 7921	09 23 148 6921	09 23 148 2921	
			09 23 348 7921 <sup>b)</sup>	09 23 148 6921 222 <sup>f)</sup>	09 23 348 2921 <sup>b)</sup>	
	THR THR on a reel	48		09 23 148 7919	09 23 148 6919 <sup>d)</sup>	
					09 23 348 6919 <sup>b)d)</sup>	
	THR	32		09 23 132 7921	09 23 132 6921	09 23 132 2921
				09 23 332 7921 <sup>b)</sup>	09 23 332 6921 <sup>b)</sup>	09 23 332 2921 <sup>b)</sup>
		32			09 23 132 6919 <sup>d)</sup>	
				09 23 332 6919 <sup>b)d)</sup>		
	16			09 23 116 6931	09 23 116 2931	
				09 23 316 6931 <sup>b)</sup>		
	46 + 2 <sup>▲</sup>		09 23 148 7951	09 23 148 6951		
				09 23 348 6951 <sup>b)</sup>		
Male connector with straight solder pins	THR	48		09 23 148 7922	09 23 148 6922	09 23 148 2922
					09 23 148 6920 <sup>d)</sup>	
	THR	32		09 23 132 7922	09 23 132 6922	09 23 132 2922
		32			09 23 132 6920 <sup>d)</sup>	

DIN Signal up to 2 A

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

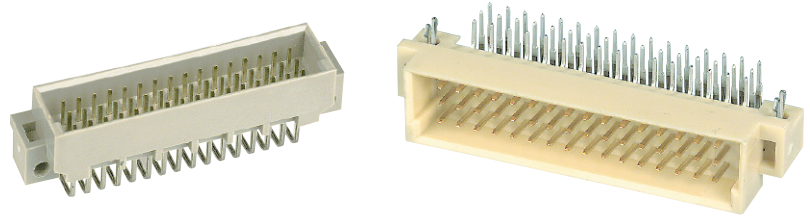
b) Connectors with snap-in clips see chapter 00

d) CTI > 400

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

Number of contacts

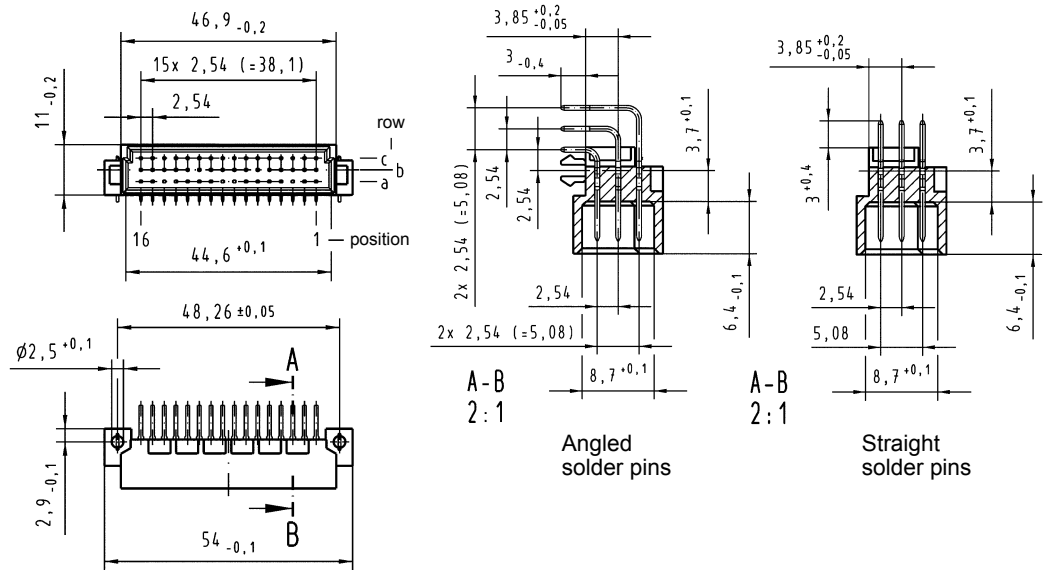
# 48, 32, 16



Male connectors

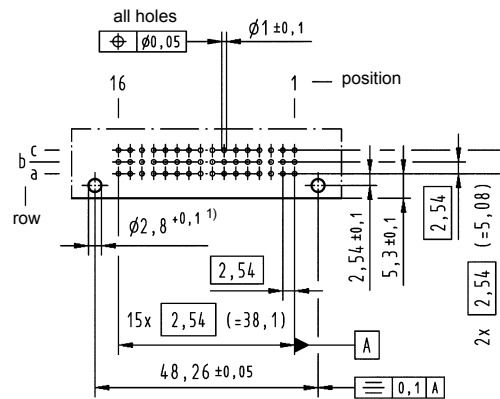
Identification Drawing Dimensions in mm

Dimensions

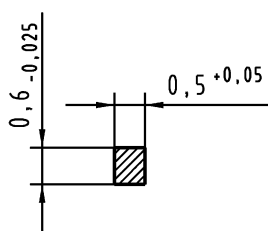


Board drillings

Mounting side



Cross section of solder terminations

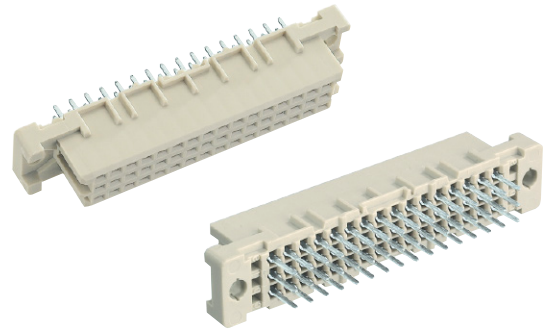


Cross area (A) of contacts row a, b, c: A = 0.29 - 0.33 mm<sup>2</sup>

<sup>1)</sup> 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

DIN Signal  
up to 2 A

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

<sup>1)</sup> To be used only for wire wrap termination

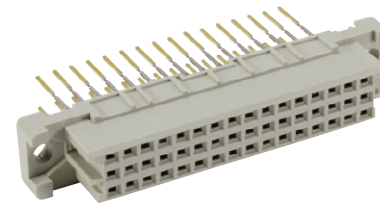
<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>d)</sup> CTI > 400

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

Number of contacts

# 48, 32



## Female connectors

DIN Signal up to 2 A

Identification      No. of contacts      Contact arrangement      Part number      Performance levels according to IEC 60603-2. Explanation chapter 00

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00
			3	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
	32			09 23 248 6850 222 <sup>f)</sup> 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 <sup>f)</sup>		
Type 2C Position marking turned for mating type 2R male	48	09 23 048 3217 <sup>f)</sup>		

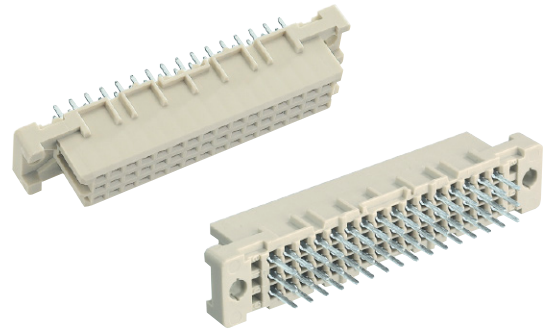
01  
32

Other contact arrangements on request

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

Number of contacts

48, 32



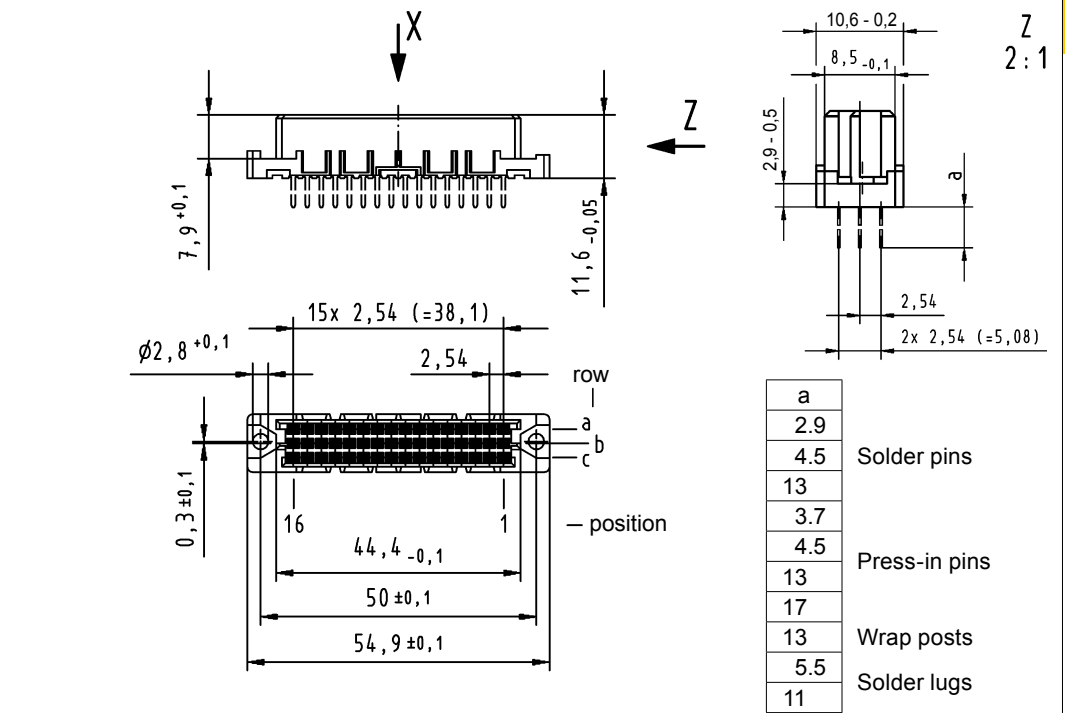
Female connectors

Identification

Drawing

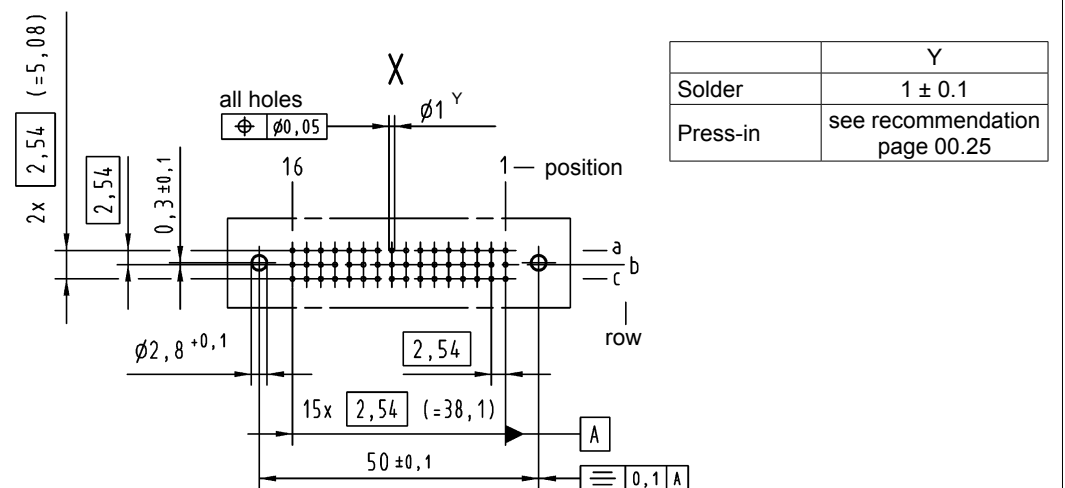
Dimensions in mm

Dimensions

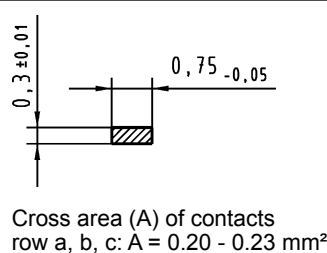


Board drillings

Mounting side



Cross section of solder terminations



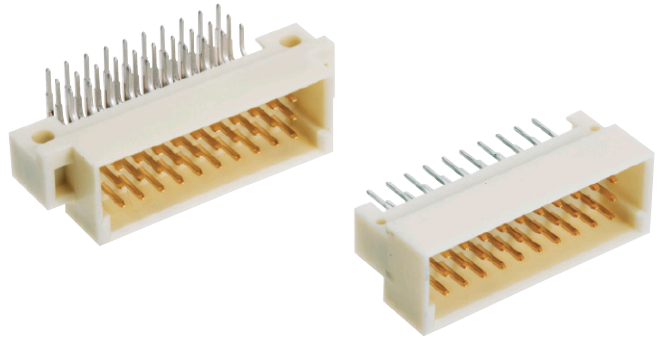
Dimensions in mm

DIN Signal  
up to 2 A



Number of contacts

# 30, 20



## Male connectors

DIN Signal up to 2 A

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

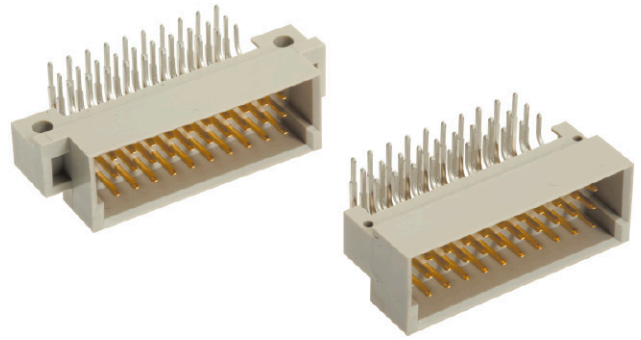
Other contact arrangements as well with lagging/leading pins on request

<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>d)</sup> CTI > 400

Number of contacts

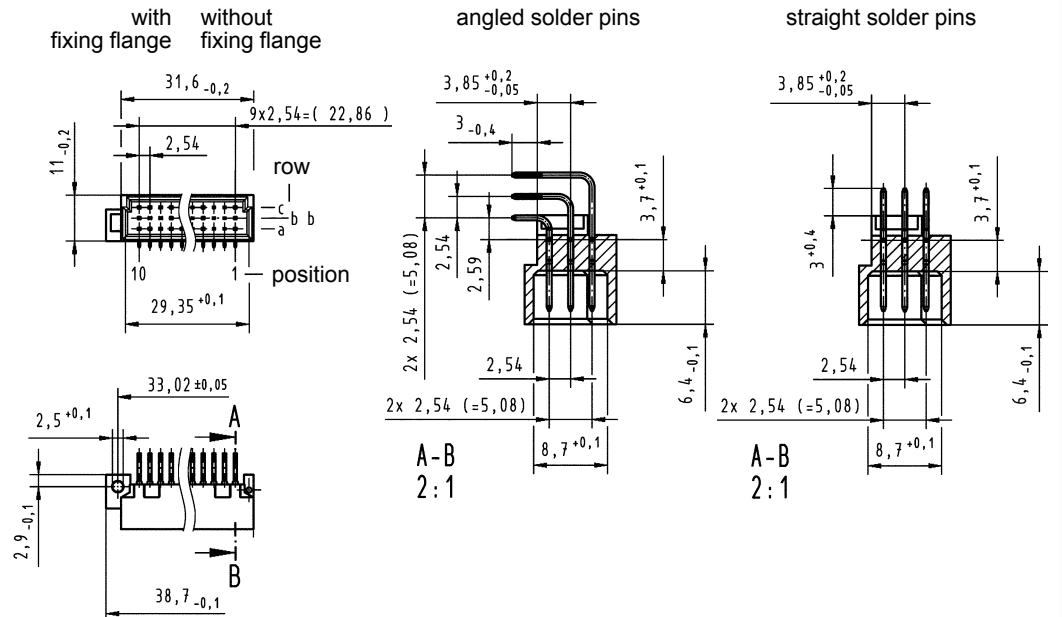
## 30, 20



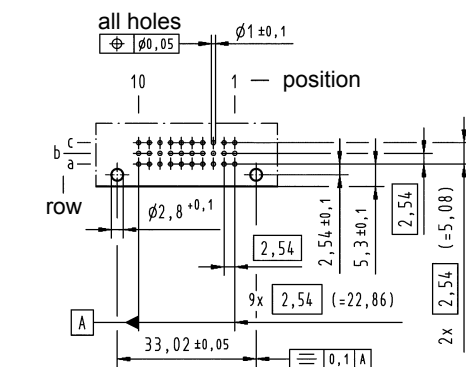
Male connectors

Identification      Drawing      Dimensions in mm

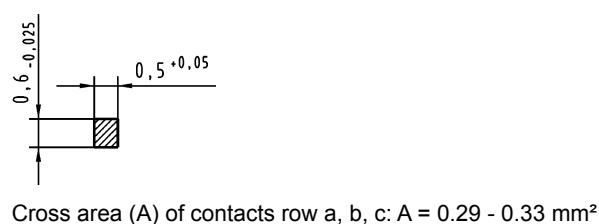
Dimensions



Board drillings  
Mounting side

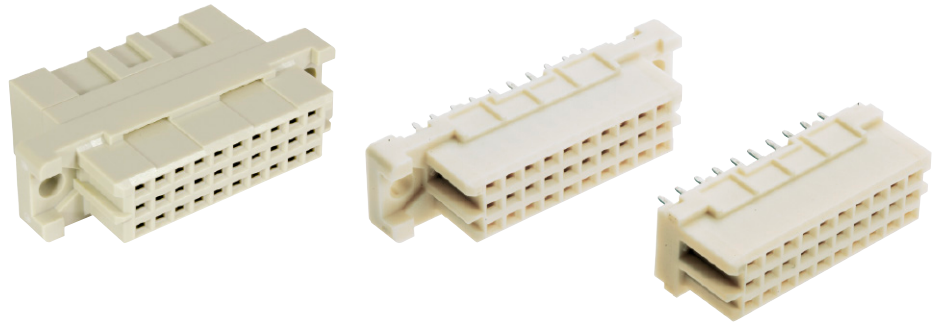


Cross section of solder terminations



Number of contacts

# 30, 20



Female connectors

DIN Signal up to 2 A

Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60 603-2.			
			3	2	1	
Female connector with solder pins 2.9 mm						
with fixing flange	30		Performance level 3 on request	09 25 230 6824	Performance level 1 on request	
without fixing flange	20			09 25 220 6824		
with fixing flange, THR	30			09 25 230 6841 <sup>d)</sup>		
without fixing flange, THR	30			09 25 230 6414 <sup>d)</sup>		
Female connector with solder pins 4.5 mm						
with fixing flange	30			09 25 230 6825		
without fixing flange	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			

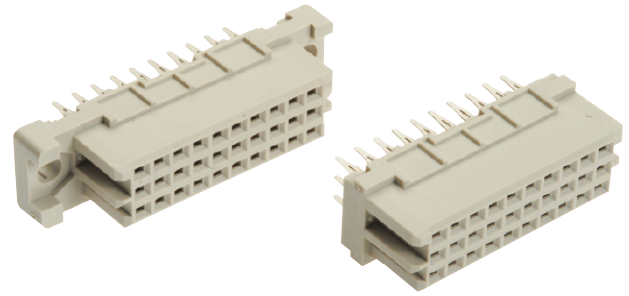
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Female connector for crimp contacts				
Order contacts separately see page 01.28				
Type 3C	30	09 25 030 3214 <sup>f)</sup>		
Type 3C	30	09 25 030 3217 <sup>f)</sup>		
Position marking turned for mating type 3R male				

<sup>d)</sup> CTI > 400

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

Number of contacts

# 30, 20



Female connectors

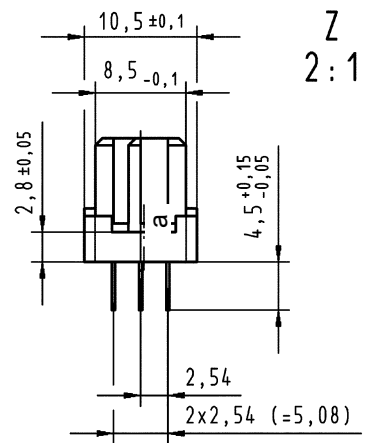
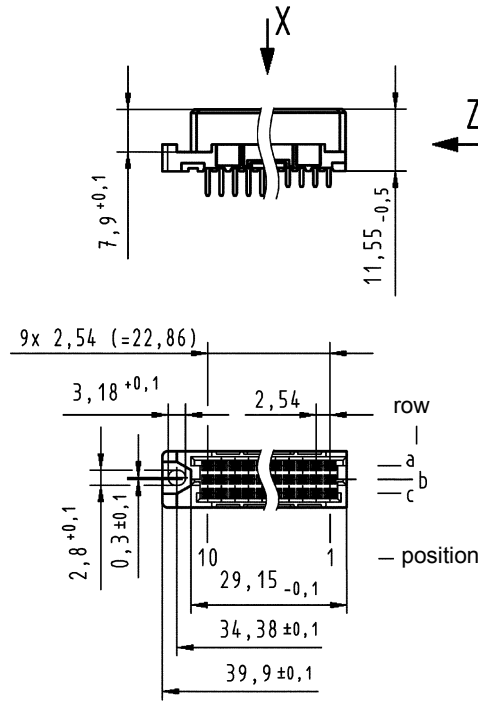
Identification

Drawing

Dimensions in mm

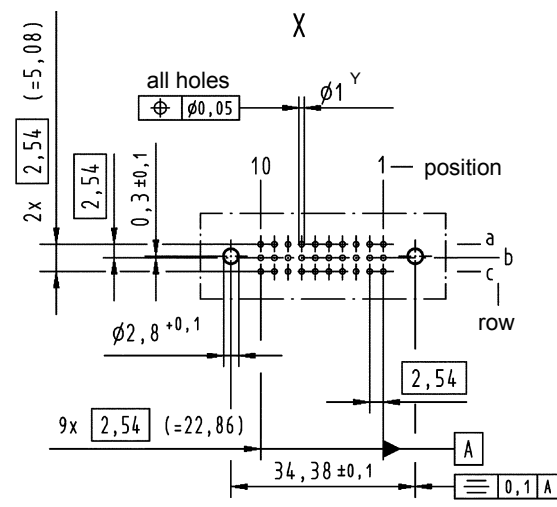
Dimensions

with fixing flange    without fixing flange



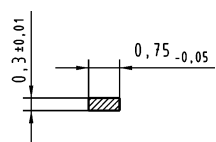
a	
2.9	
4.5	solder pins
13	
4.5	press-in pins

Board drillings  
Mounting side



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

Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.20 - 0.23 mm<sup>2</sup>

DIN Signal up to 2 A

- Application matrix**
- Coax Contacts
  - High Voltage Contacts
  - High Power Contacts
  - FOC- Contacts

Application		Male		Female		Connector
		Part number		Part number		
		09 03 1XX X901		09 03 1XX X901		Male connector type M angled
		09 73 1XX 6902 / 6903 / 6904 / 6907 / 6974 / 6991		09 73 1XX 6902 / 6903 / 6904 / 6907 / 6974 / 6991		Male connector type M invers
		09 03 2XX 6804 / 6805 / 6850		09 03 2XX 6804 / 6805 / 6850		Female connector type M straight
		09 03 2XX 6864 / 6865 / 6830		09 03 2XX 6864 / 6865 / 6830		Female connector type M flat
		09 73 2XX 6801		09 73 2XX 6801		Female connector type M invers
		09 03 2XX 3214		09 03 2XX 3214		Female connector type M crimp
		09 06 X21 6883		09 06 X21 6883		Male connector type MH 21+5
		09 06 121 6981		09 06 121 6981		Female connector type MH 21+5
		09 29 002 3201		09 29 002 3201		Male connector type M0+2
		09 29 002 3401		09 29 002 3401		Female connector type M0+2

Board to Backplane	Mezzanine	pcb to pcb	Application		Impedance	Termination	
			Part number			Part number	
1. M M	6. M invers M	8. M M invers	09 03 000 6160	09 03 000 6160	50 Ω	solder/crimp	cable s
2. M M flat	7. M invers M flat		09 03 000 6161	09 03 000 6161	50 Ω	solder/crimp	cable a
3. M invers M invers			09 03 000 6165	09 03 000 6165	50 Ω	solder	pcb s
4. MH 21+5 MH 21+5			09 03 000 6162	09 03 000 6162	50 Ω	solder	pcb a
5. M0+2 M0+2			09 03 000 6182	09 03 000 6182	50 Ω	solder	pcb s
			09 03 000 6260	09 03 000 6260	50 Ω	solder/crimp	cable s
			09 03 000 6261	09 03 000 6261	50 Ω	solder/crimp	cable a
			09 03 000 6262	09 03 000 6262	50 Ω	solder	pcb a
			09 03 000 6263	09 03 000 6263	50 Ω	solder	pcb a
			09 03 000 6265	09 03 000 6265	50 Ω	solder	pcb s
			09 03 000 6274	09 03 000 6274	50 Ω	solder/crimp	cable s
			09 03 000 6181	09 03 000 6181	75 Ω	solder/crimp	cable s
			09 03 000 6269	09 03 000 6269	75 Ω	solder	pcb a
			09 03 000 6281	09 03 000 6281	75 Ω	solder/crimp	cable s
			09 03 000 6140	09 03 000 6140	High voltage 2.8 kV		
			09 03 000 6240	09 03 000 6240	High voltage 2.8 kV		

● = 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

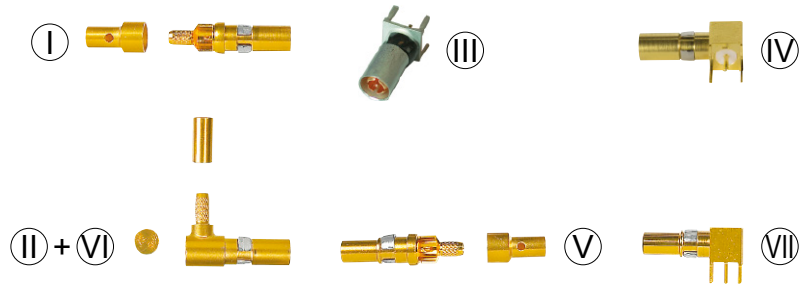


Part number	Currency	Termination		Preleading
		solder	cable	
09 03 000 6101	10 A	solder	cable	-
09 03 000 6102	20 A	solder	cable	-
09 03 000 6103	40 A	solder	cable	-
09 03 000 6104	40 A	solder	pcb	-
09 03 000 6110	40 A	solder	pcb	-
09 03 000 6113	10 A	crimp	cable	-
09 03 000 6114	20 A	crimp	cable	-
09 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	FOC ceramic ferrule*			
20 10 230 4211	FOC for SI-fibre (HCS)*			
20 10 230 4221	FOC for SI-fibre (HCS)*			
20 10 001 4211	FOC for 1 mm (POF)*			
20 10 001 4221	FOC for 1 mm (POF)*			

DIN Signal  
up to 2 A

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

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

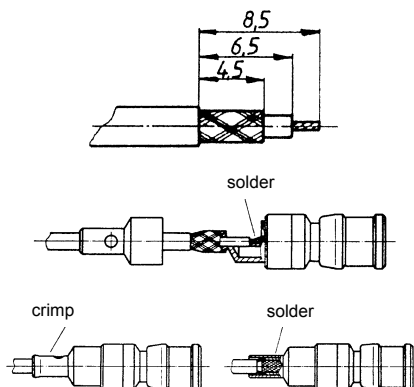


## Coaxial contacts

Identification	Part number Performance level 1	Drawing	Dimensions in mm						
<b>Male coaxial contacts for female connectors</b> (I) for straight solder and/or crimp termination (II) for angled solder and/or crimp termination (III) for straight pcb termination for type M-flat for type M (IV) for angled pcb termination for type M invers	acc. to DIN 41626 09 03 000 6160 09 03 000 6181 <sup>1)</sup> 09 03 000 6161 09 03 000 6182 09 03 000 6165 09 03 000 6162		<table border="1"> <thead> <tr> <th></th> <th>X</th> </tr> </thead> <tbody> <tr> <td>6165</td> <td>16.05</td> </tr> <tr> <td>6182</td> <td>14.2</td> </tr> </tbody> </table>		X	6165	16.05	6182	14.2
	X								
6165	16.05								
6182	14.2								
<b>Female coaxial contacts for male connectors</b> (V) for straight solder and/or crimp termination (VI) for angled solder and/or crimp termination (VII) angled for pcb termination straight for pcb termination for type M invers	09 03 000 6260 09 03 000 6281 <sup>1)</sup> 09 03 000 6274 <sup>2)</sup> 09 03 000 6261 09 03 000 6262 09 03 000 6269 <sup>1)</sup> 09 03 000 6263 <sup>2)</sup> 09 03 000 6265								

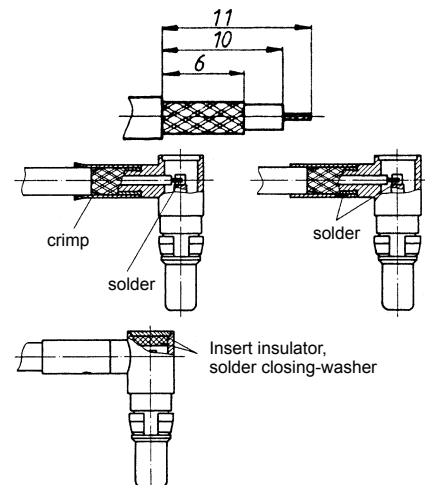
## Assembly instruction for contacts

(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

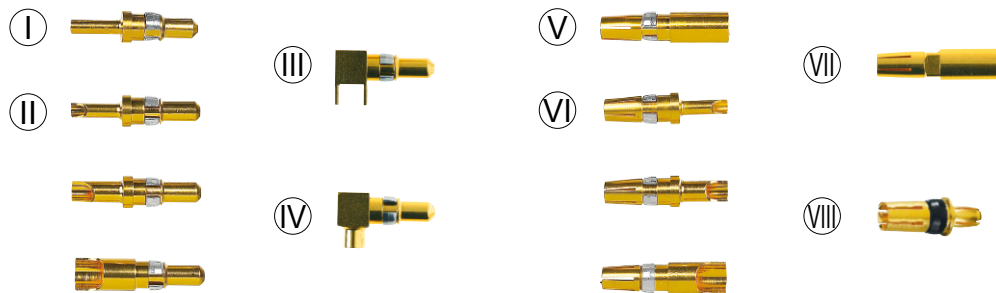


## High voltage contacts

Identification	Part number Performance level 1	Drawing	Dimensions in mm
<b>I</b> High voltage male contact for male connectors <sup>1)</sup> for straight solder termination 2.8 kV	acc. to DIN 41 626 09 03 000 6140		
<b>II</b> High voltage female contact for female connectors <sup>1)</sup> 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		
<b>III</b> Removal tool incl. removal jacket for contact replacement in male and female connectors	09 99 000 0174		
Replacement removal jacket	09 99 000 0243		
<b>IV</b> Removal tool 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 <sub>rms</sub>					
	Working voltage	250 V <sub>max.</sub>					
	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	

<sup>1)</sup> Contact resistance internal wire max. 3 mΩ



## High current contacts

DIN Signal up to 2 A

Identification	Part number	Performance level 1	Drawing	Dimensions in mm
----------------	-------------	---------------------	---------	------------------

High current male contacts for male connectors <sup>1)</sup>	
Ⓘ for straight crimp termination	10 A 20 A 40 A
Ⓜ for straight solder termination	10 A 20 A 40 A
Leading contact	40 A
Ⓜ for angled pcb termination	max. 40 A*
Leading contact	max. 40 A*
Ⓜ for straight pcb termination	max. 40 A* max. 40 A*
* depending on the pcb design	

acc. to DIN 41626	
09 03 000 6113	10 A
09 03 000 6114	20 A
09 03 000 6115	40 A
09 03 000 6101	10 A
09 03 000 6102	20 A
09 03 000 6103	40 A
09 03 000 6133	40 A
09 03 000 6104	max. 40 A*
09 03 000 6134	max. 40 A*
09 03 000 6110	max. 40 A*
09 03 000 6135	max. 40 A*

	∅ A	∅ B	wire gauge [mm <sup>2</sup> ]	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

	∅
10 A	1.7
20 A	2.8
40 A	4.8

	x	y
... 6104	17.7	6.4
... 6134	18.4	7.0

High current female contacts for female connectors <sup>1)</sup>	
Ⓧ for straight crimp termination	10 A 20 A 40 A
Ⓨ for straight solder termination	10 A 20 A 40 A
Ⓩ for screw fixing on busbar	40 A
for type M invers for solder termination	40 A
Ⓩ for type M-flat for press-in termination	40 A
for solder termination	40 A

09 03 000 6213	10 A
09 03 000 6214	20 A
09 03 000 6215	40 A
09 03 000 6201	10 A
09 03 000 6202	20 A
09 03 000 6203	40 A
09 03 000 6245	40 A
09 03 000 6207	40 A
09 03 000 6250	40 A
09 03 000 6225	40 A

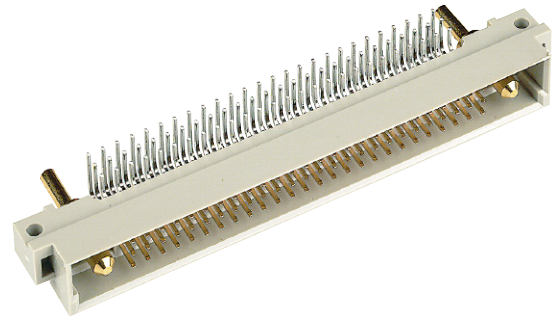
	∅ A	∅ B	wire gauge [mm <sup>2</sup> ]	AWG
10 A	1.85	2.55	1.5	16
20 A	2.80	3.70	4	12
40 A	4.40	5.60	10	8

	∅
10 A	1.7
20 A	2.8
40 A	4.8

<sup>1)</sup> Contact resistance max. 1.5 mΩ  
<sup>2)</sup> Contact resistance internal wire max. 3 mΩ

Number of contacts

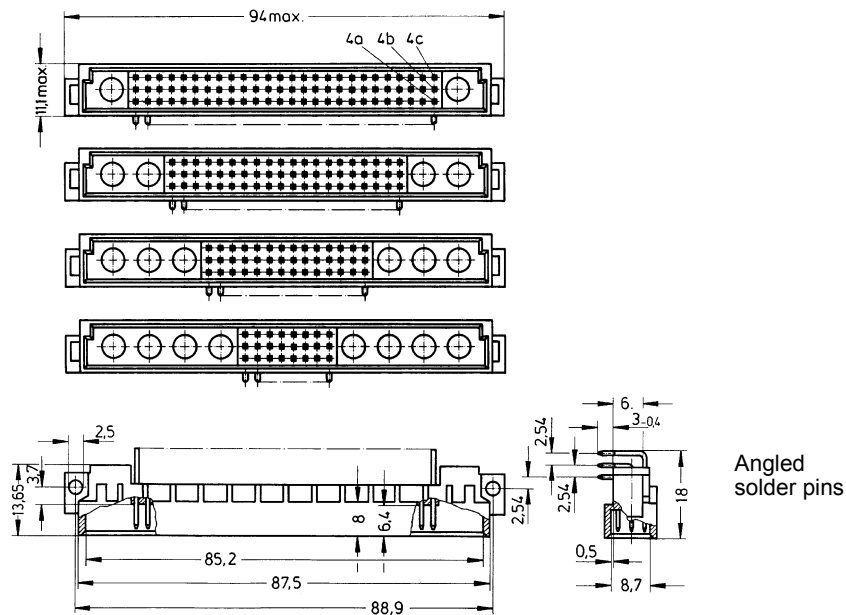
# 78+2, 60+4, 42+6, 24+8



Male connectors

Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00		
			3	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 <sup>b)</sup>	09 03 178 2901 09 03 378 2901 <sup>b)</sup>
	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

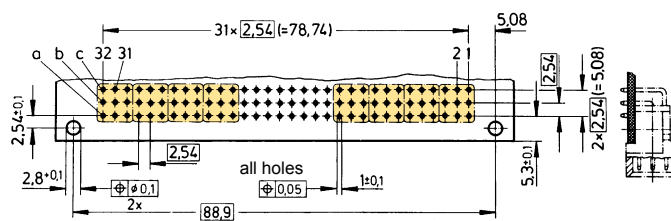
## Dimensions



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

DIN Signal up to 2 A

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

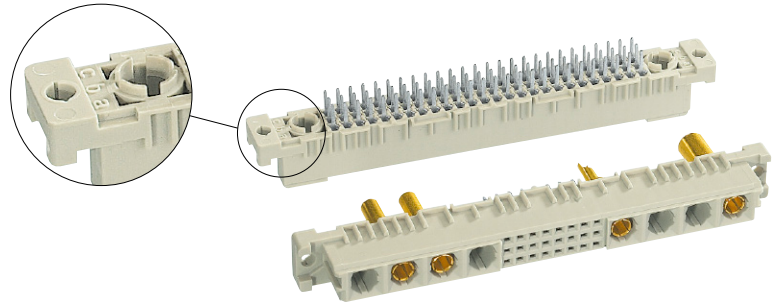
\* Pre-loaded with special contacts on request

<sup>b)</sup> Connectors with snap-in clips see chapter 00



Number of contacts

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



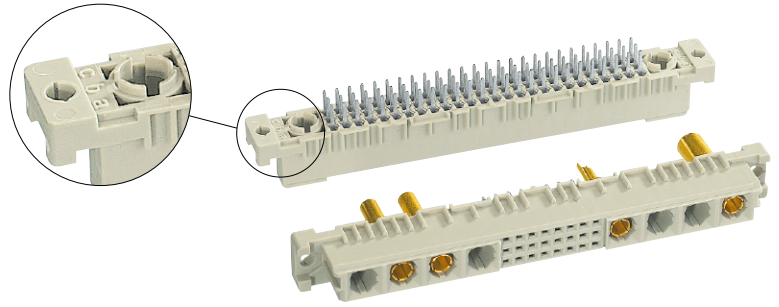
Female connectors

DIN Signal  
up to 2 A

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

Number of contacts

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



Female connectors

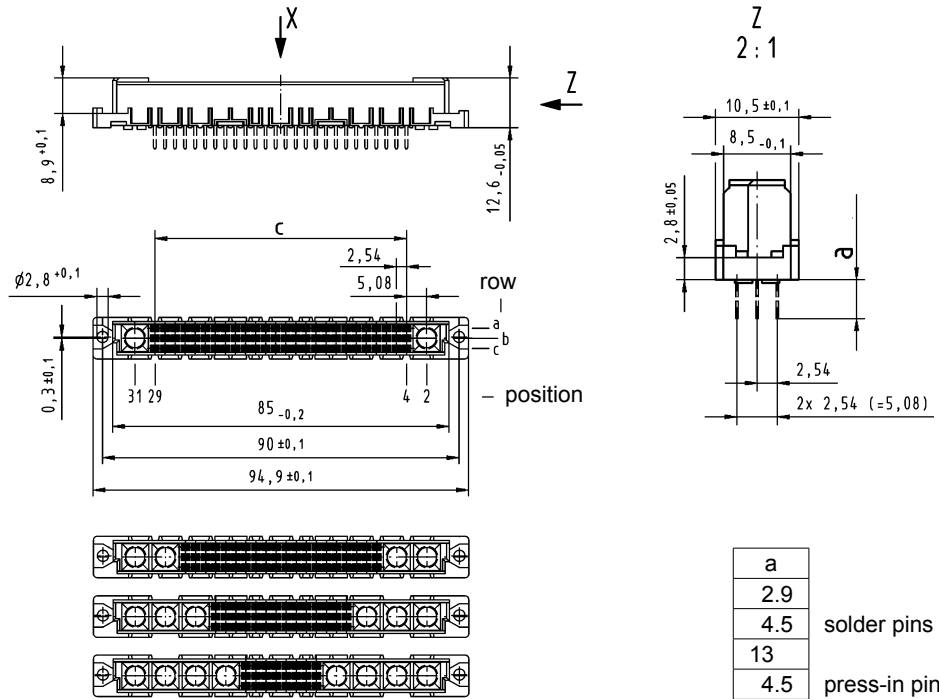
Identification

Drawing

Dimensions in mm

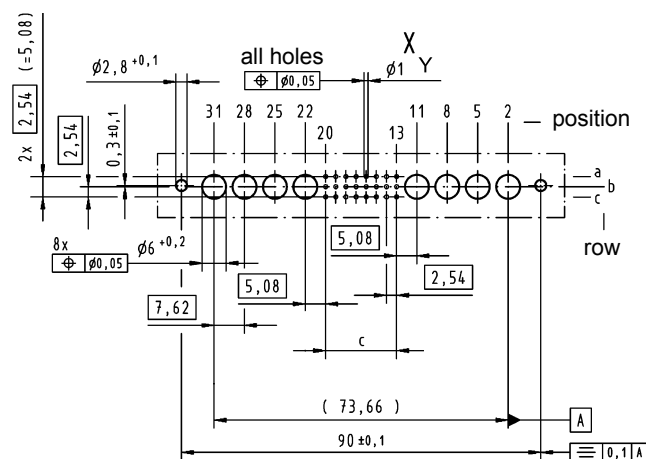
Dimensions

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



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

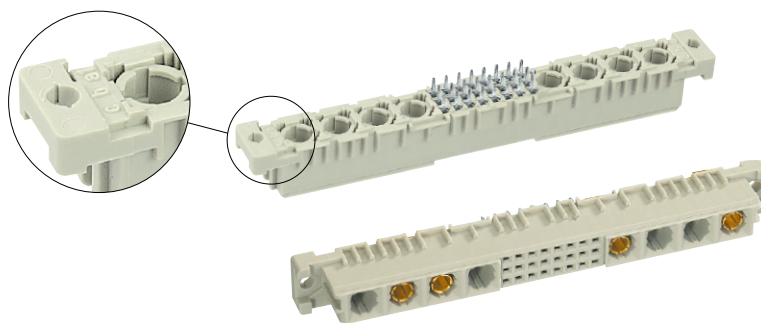
Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78

Dimensions in mm

DIN Signal up to 2 A

Number of contacts

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



Female connectors

DIN Signal  
up to 2 A

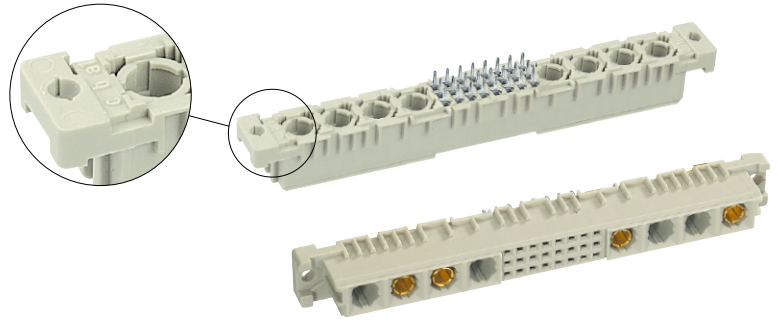
Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60 603-2. Explanation chapter 00			
			Part number 3	2	1	
Female connector with solder pins 2.9 mm  (without special contacts)*	78 + 2		Performance level 3 on request	09 03 278 6864		
	60 + 4			09 03 478 6864 <sup>b)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

\* Pre-loaded with special contacts on request

<sup>b)</sup> Connectors with snap-in clips see chapter 00

Number of contacts

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



Female connectors

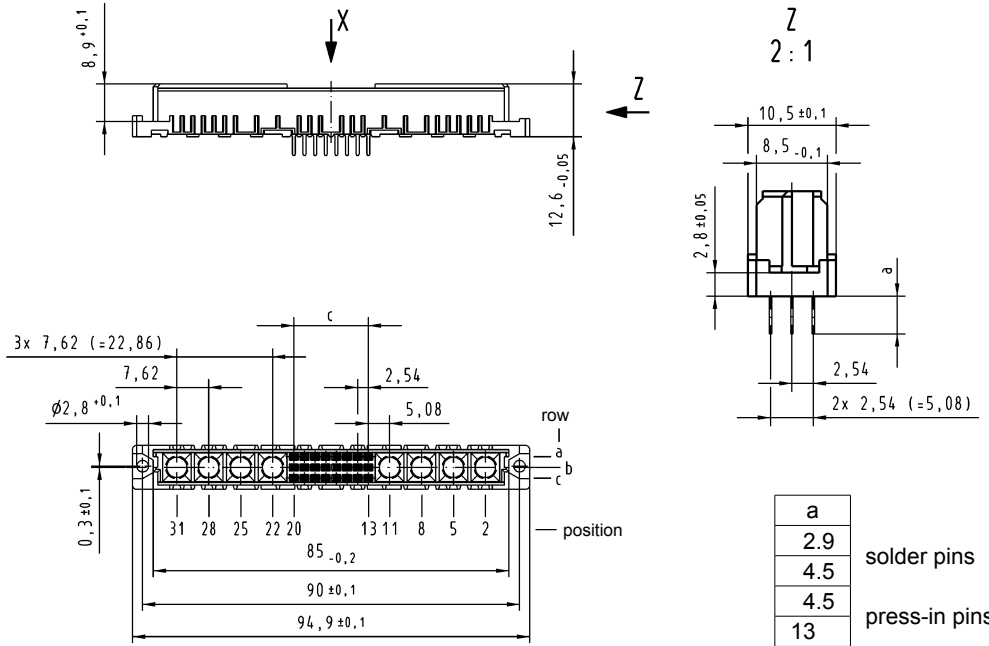
Identification

Drawing

Dimensions in mm

Dimensions

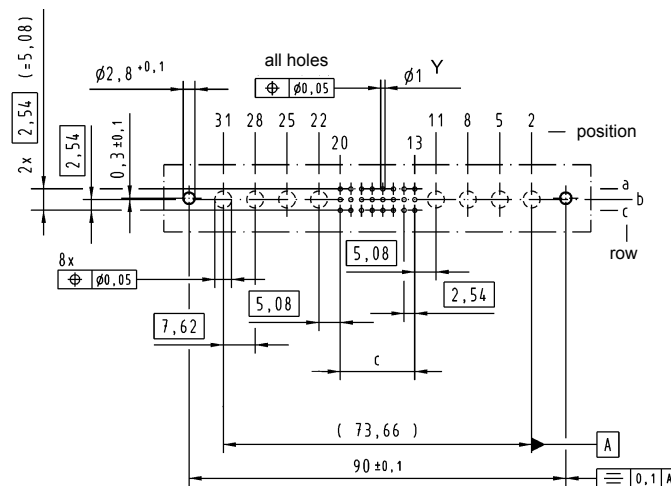
Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff



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

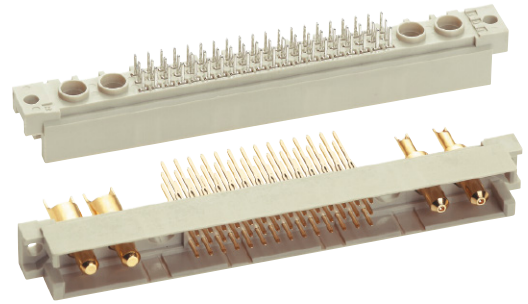
Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78

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

DIN Signal  
up to 2 A

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00		
				3	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●			

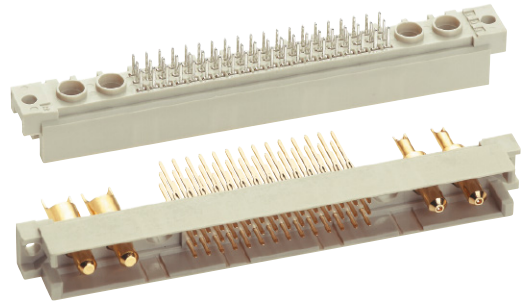
Male connectors with 17 mm wrap posts on request  
 ● Wrap posts for interfacing selectively gold plated (performance level 3)  
 Other contact arrangements on request



Number of contacts

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

Male connectors

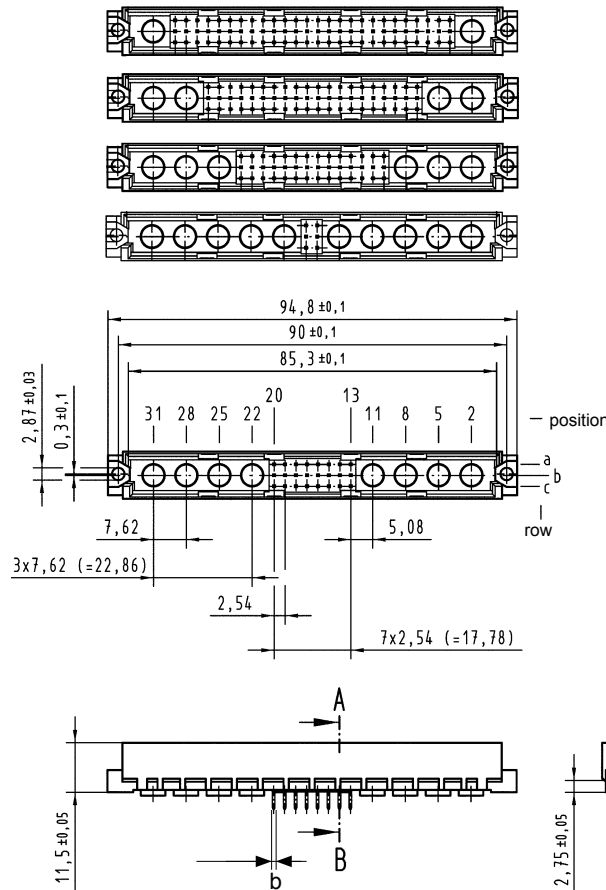


Identification

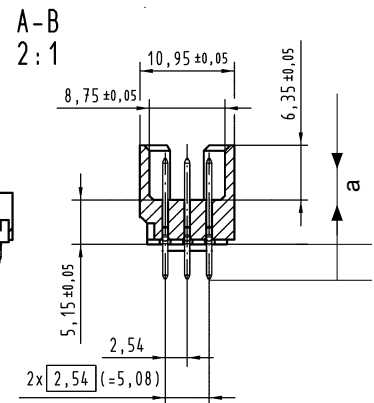
Drawing

Dimensions in mm

Dimensions



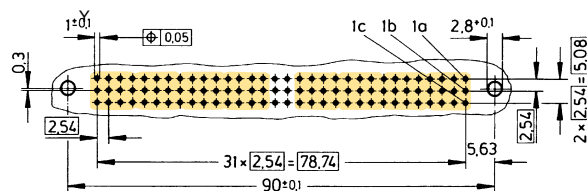
a	b	
2.5	∅ 0.7	Solder pins
4.0		
6.0		
13	□ 0.6	Wrap posts
5.0	-	Press-in pins
13	-	



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

Board drillings

Mounting side

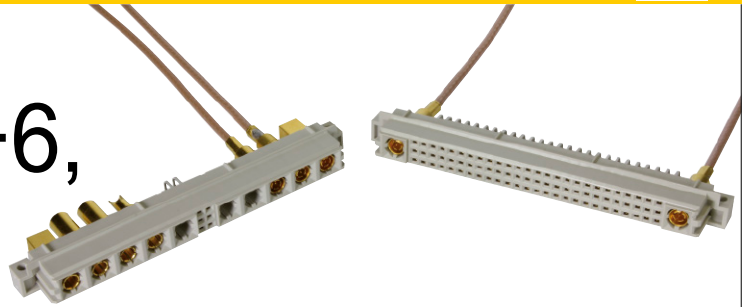


	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Board drillings depend on type and special contact loading

Number of contacts

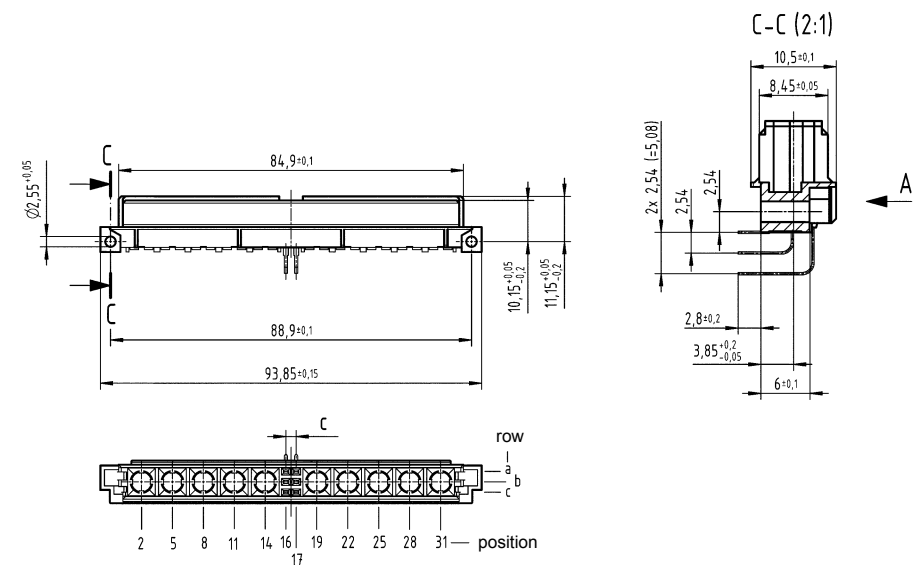
# 78+2, 60+4, 42+6, 24+8, 6+10



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	

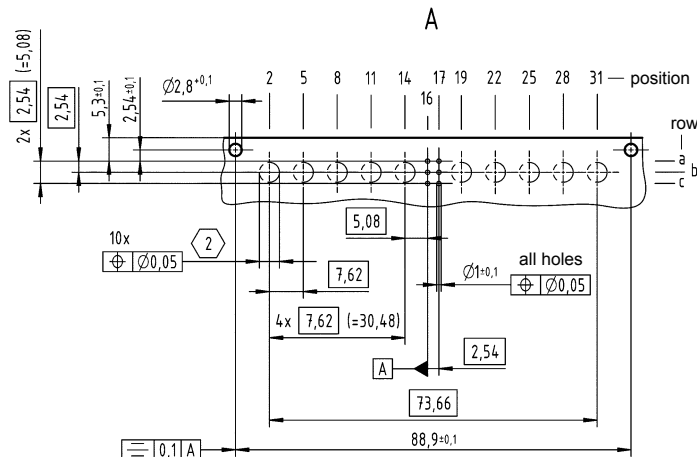
Dimensions



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

Board drillings

Mounting side

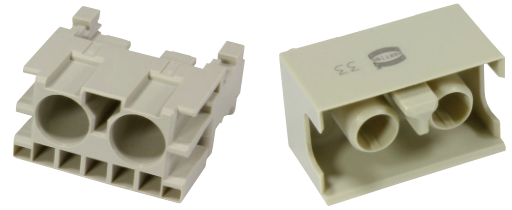


Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78
6 + 10	1 x 2.54 = 2.54

Dimensions in mm

Number of contacts

# 0+2



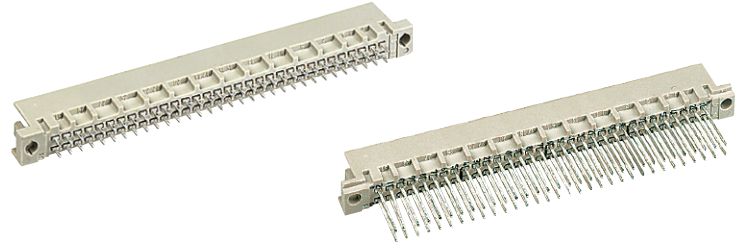
Male and female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
<p>Male connector, angled (without special contacts)</p> <p>Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff</p>	<p>0 + 2</p>	<p>09 29 002 3201</p>	<p>max 23 20 A-A 90° 3.75 3.5 2.5 10 18.5 13 23.7 B 4x2.5(±0.1) holes for special contacts acc. to DIN 41626 B board layout for straight contacts acc. to DIN 41626 B board layout for angled contacts acc. to DIN 41626 2x <math>\varnothing 2.15^{+0.05}</math> 2x <math>\varnothing 2.75^{+0.05}</math> 10 6 9.5 5.08 2.54 2.46 5.08 all holes <math>\varnothing 2.05</math></p>	
<p>Female connector, straight (without special contacts)</p> <p>Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.40 ff</p>	<p>0 + 2</p>	<p>09 29 002 3401</p>	<p>A 24.8 13.65 10 6.2 holes for special contacts acc. to DIN 41626 A board drillings not metalised 20 10 3.75 10 16.6 14.85 2.5 2x <math>\varnothing 2.15^{+0.05}</math> 2x <math>\varnothing 2.05</math></p>	<p>Dimensions in mm</p>

DIN Signal up to 2 A

Number of contacts

# 64

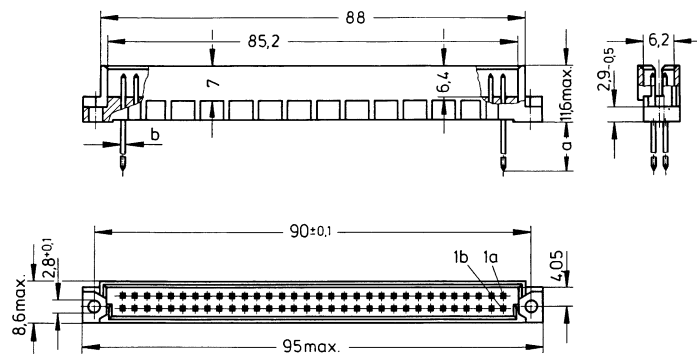


## Male connectors

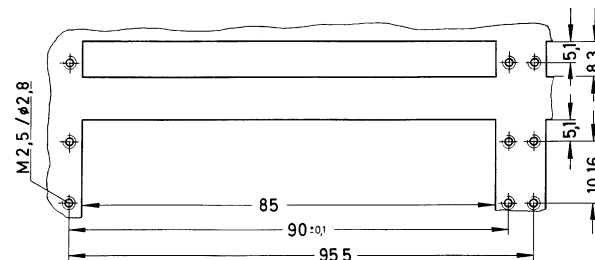
Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00
			3	2
Male connector with solder pins 2.5 mm	64		09 72 164 7902	09 72 164 6902 09 72 364 6902 <sup>b)</sup>
	64		09 72 164 7903	09 72 164 6903
	64			09 72 164 6577
Male connector with wrap posts <sup>1)</sup>	64		09 72 164 7907	09 72 164 6907
	64			09 72 164 6909
Male connector with press-in pins	64			09 72 164 6904
	62 + 2 <sup>▲</sup>			09 72 164 6954
	64			09 72 164 6985 <sup>w)</sup> 09 72 164 6974* 09 72 164 6995 <sup>w)</sup>

Performance level 1 on request

## Dimensions

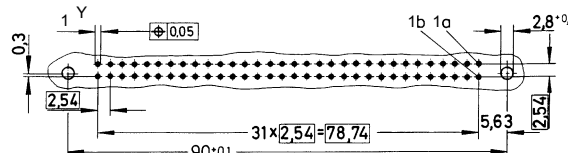


## Panel cut out



## Board drillings

Mounting side



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

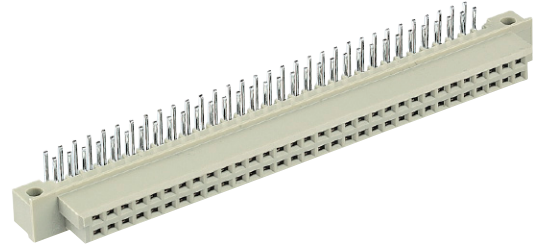
Dimensions in mm

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)

<sup>1)</sup> To be used only for wire wrap termination  
<sup>b)</sup> Connectors with snap-in clips see chapter 00  
<sup>w)</sup> Wrap posts not for interfacing, no performance level

Number of contacts

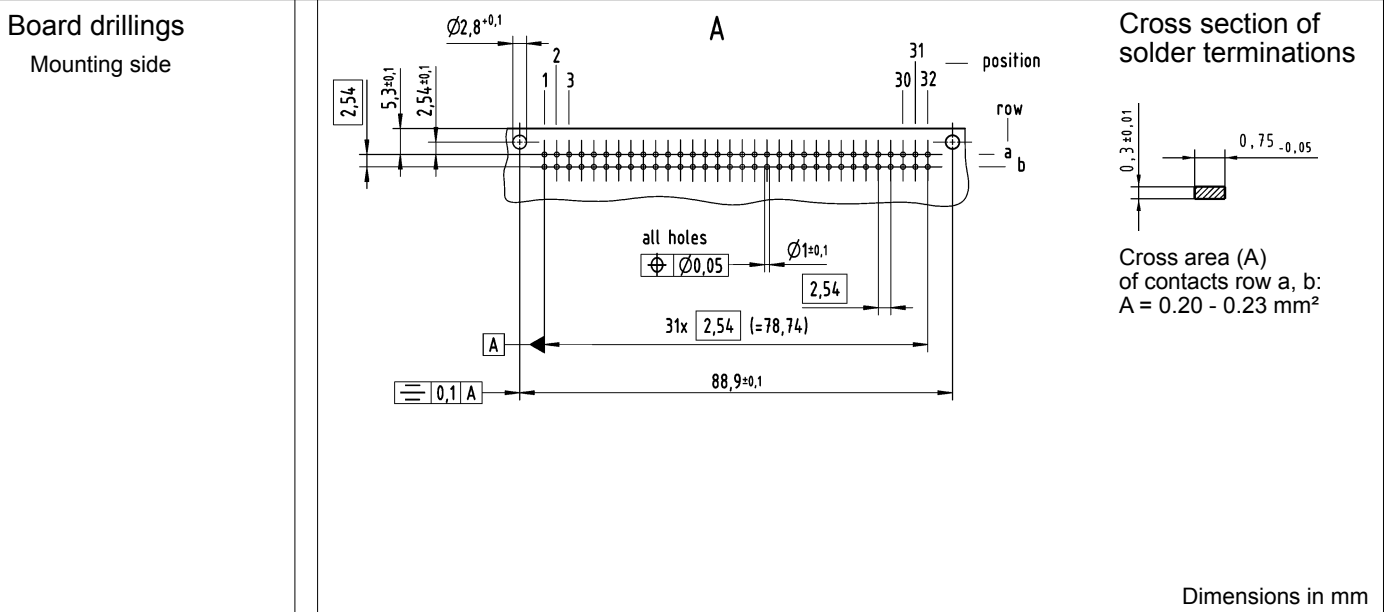
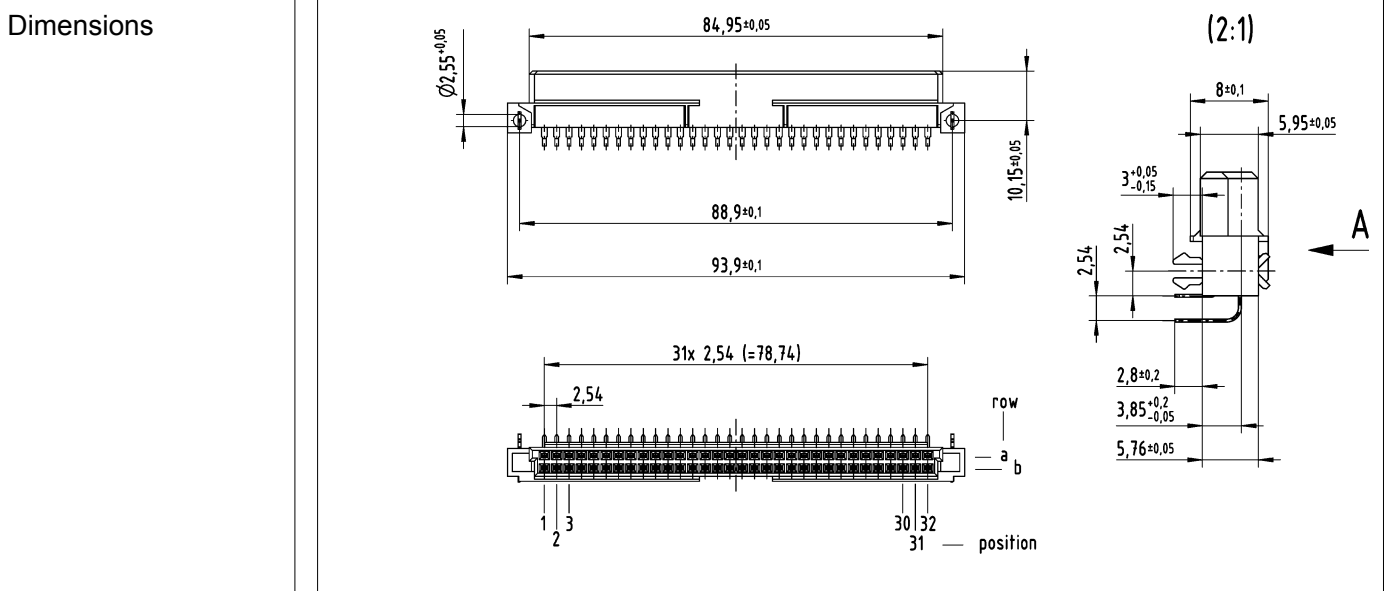
# 64



Female connectors

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

DIN Signal up to 2 A



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

<sup>b)</sup> Connectors with snap-in clips see chapter 00

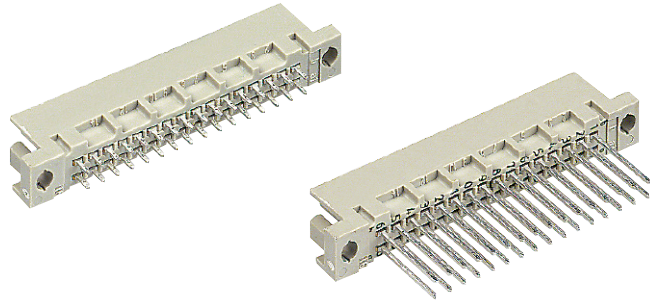
<sup>d)</sup> CTI > 400

Dimensions in mm



Number of contacts

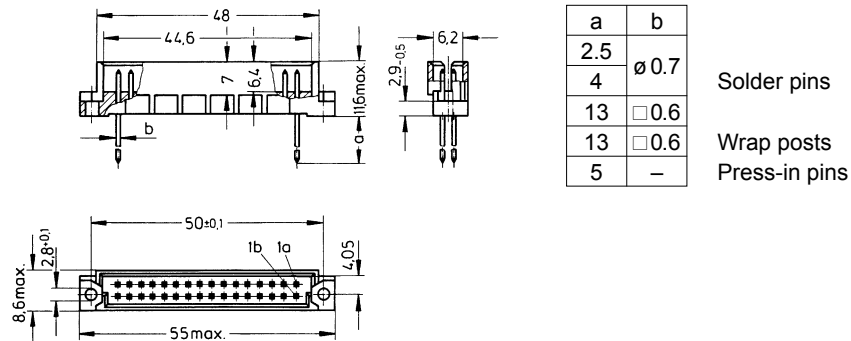
# 32



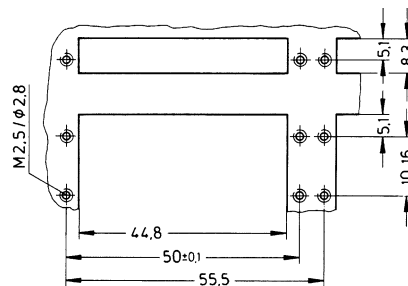
## Male connectors

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

## Dimensions



## Panel cut out



## Board drillings Mounting side

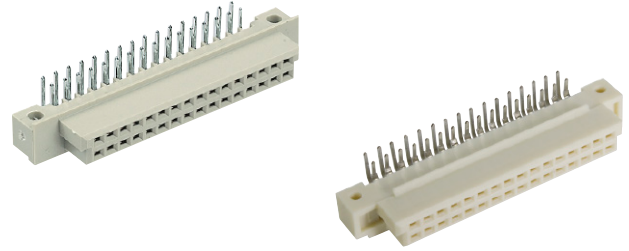


Dimensions in mm

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

Number of contacts

# 32

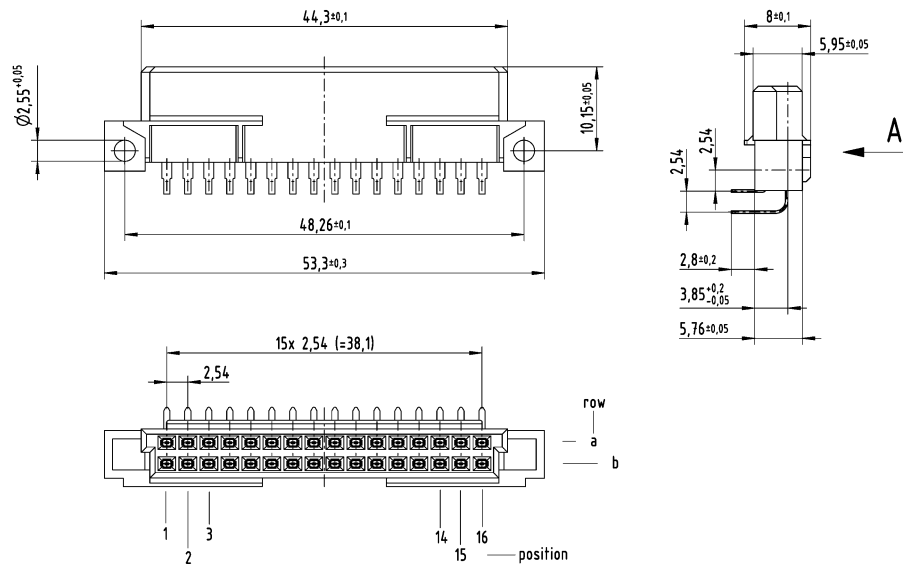


Female connectors

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

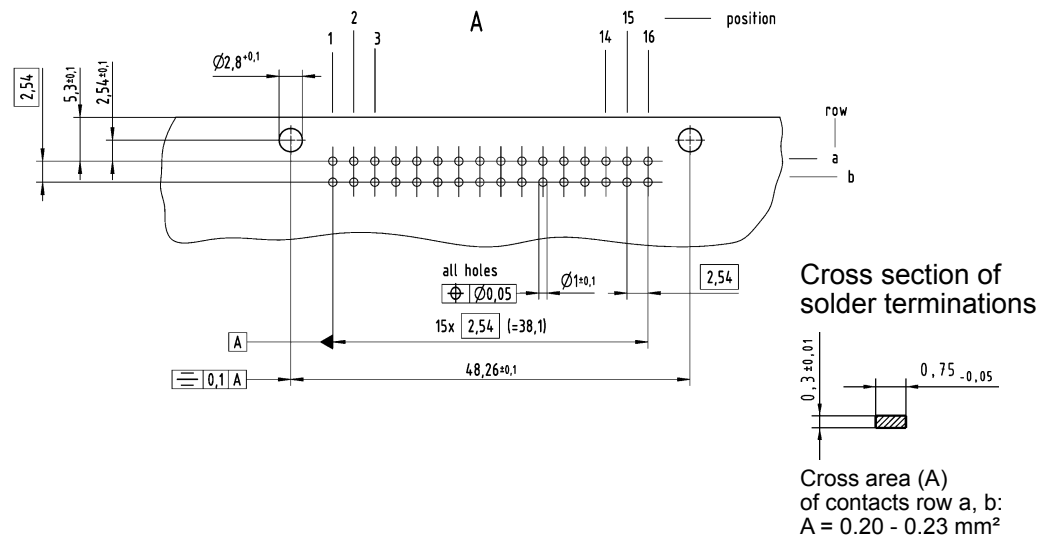
DIN Signal up to 2 A

Dimensions



Board drillings

Mounting side

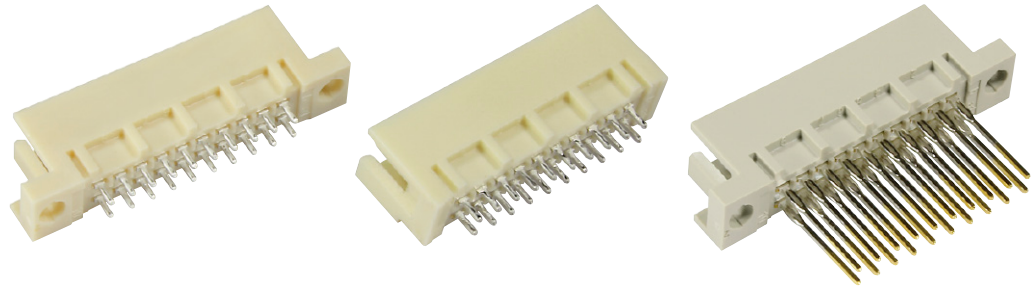


Dimensions in mm

Other contact arrangements as well with lagging/leading pins on request  
d) CTI > 400

Number of contacts

# 20



## Male connectors

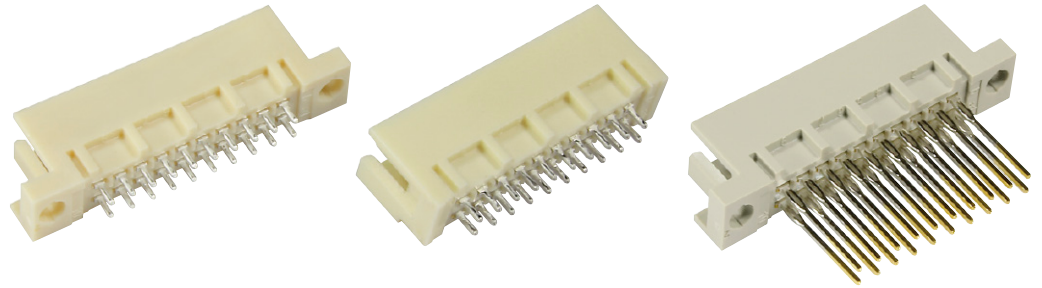
Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00	
				3	2
<b>Male connector with solder pins 2.5 mm</b> with fixing flange  with fixing flange, THR with fixing flange, THR, 240 pieces on a reel  without fixing flange  without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

<sup>1)</sup> To be used only for wire wrap termination

<sup>d)</sup> CTI > 400

Number of contacts

# 20



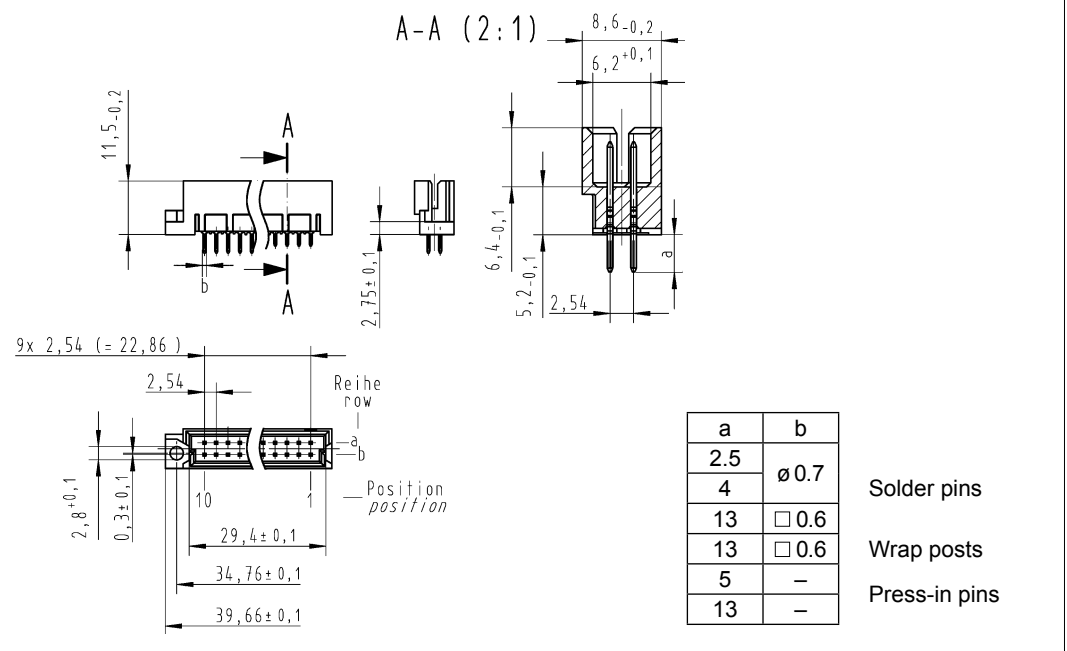
Male connectors

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

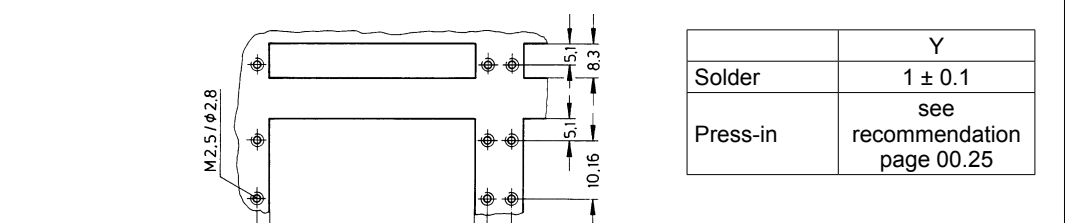
DIN Signal up to 2 A

Identification Drawing Dimensions in mm

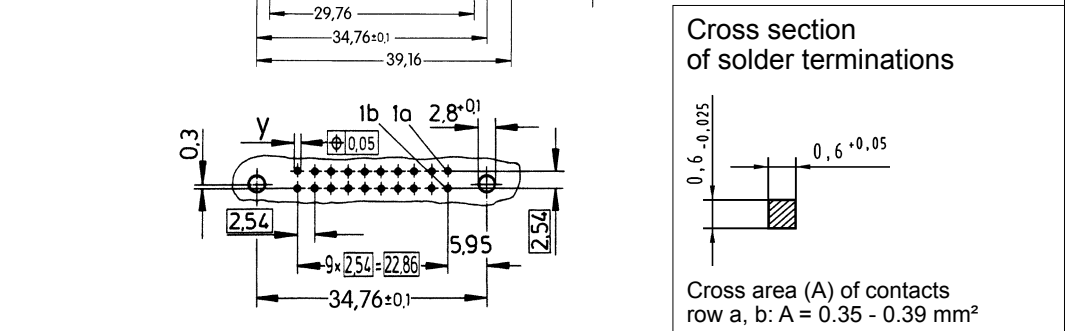
Dimensions



Panel cut out



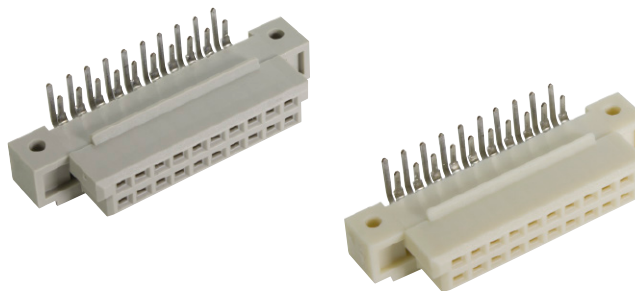
Board drillings  
Mounting side



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

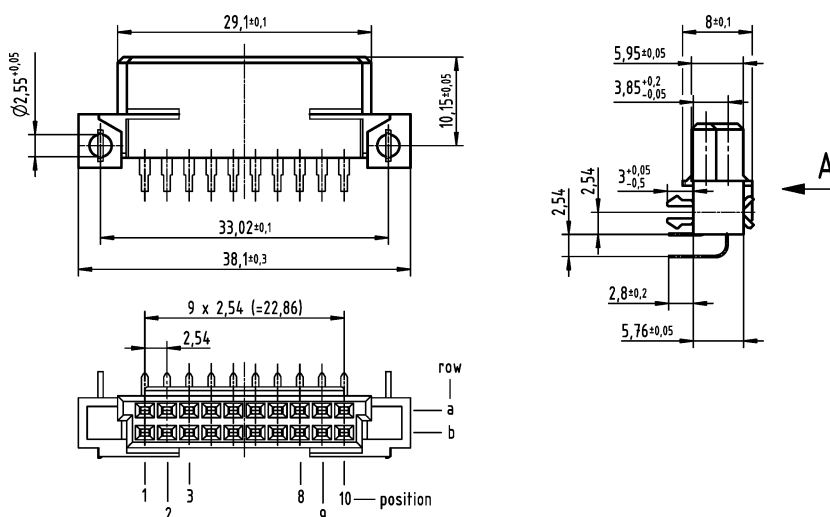


Female connectors

DIN Signal up to 2 A

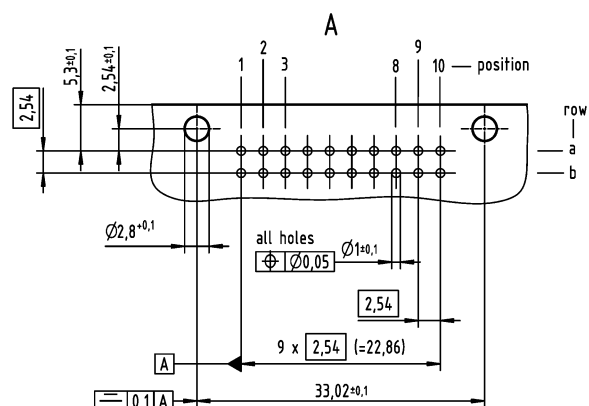
Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00
			3	2
Female connector with angled solder pins	20		Performance level 3 on request	09 75 220 6801 09 75 420 6801 <sup>b)</sup>
THR	20			09 75 220 6804 <sup>d)</sup> 09 75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

Dimensions

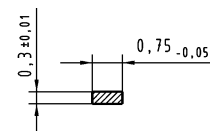


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b:  
A = 0.20 - 0.23 mm<sup>2</sup>

Dimensions in mm

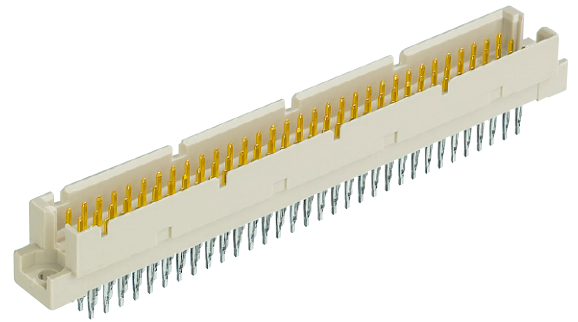
Other contact arrangements as well with lagging/leading pins on request

<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>d)</sup> CTI > 400

Number of contacts

# 96, 64

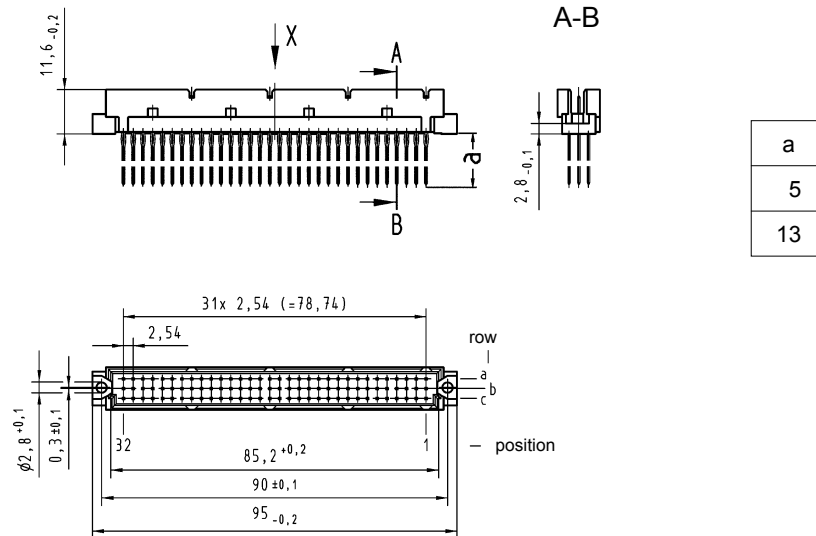


Male connectors

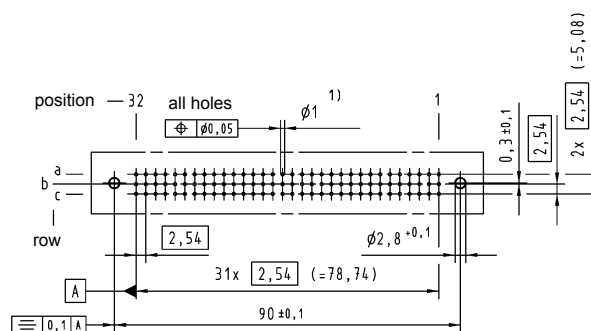
Identification	No. of contacts	Contact arrangement	Part number 3	Performance levels according to IEC 60 603-2. Explanation chapter 00 2	1
Male connector with press-in terminations	5.0 mm		Performance level 3 on request	Performance level 2 on request	09 79 196 2950
					09 79 164 2950
	13 mm				09 79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

DIN Signal  
up to 2 A

Dimensions



Board drillings  
Mounting side



Dimensions in mm

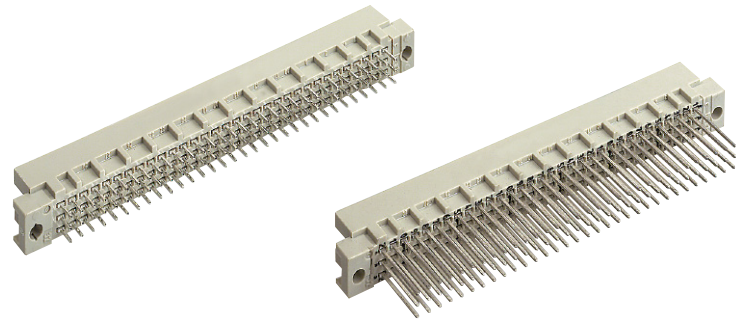
\* Wrap posts for interfacing selectively gold plated (performance level 1)  
<sup>1)</sup> refer to recommended configuration of pcb holes, see page 00.25

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



Number of contacts

# 96, 64



## Male connectors

DIN Signal up to 2 A

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

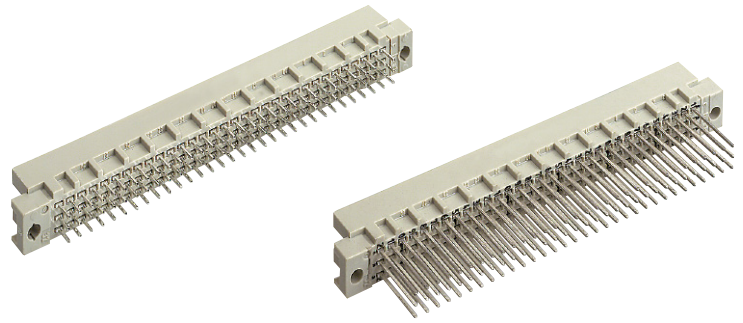
01  
60

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]  
 ● Wrap posts for interfacing selectively gold plated (performance level 3)  
 ○ 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



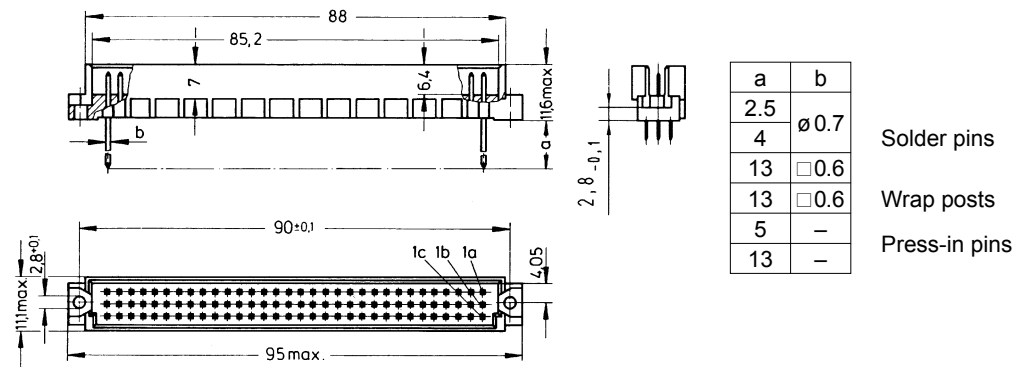
Male connectors

Identification

Drawing

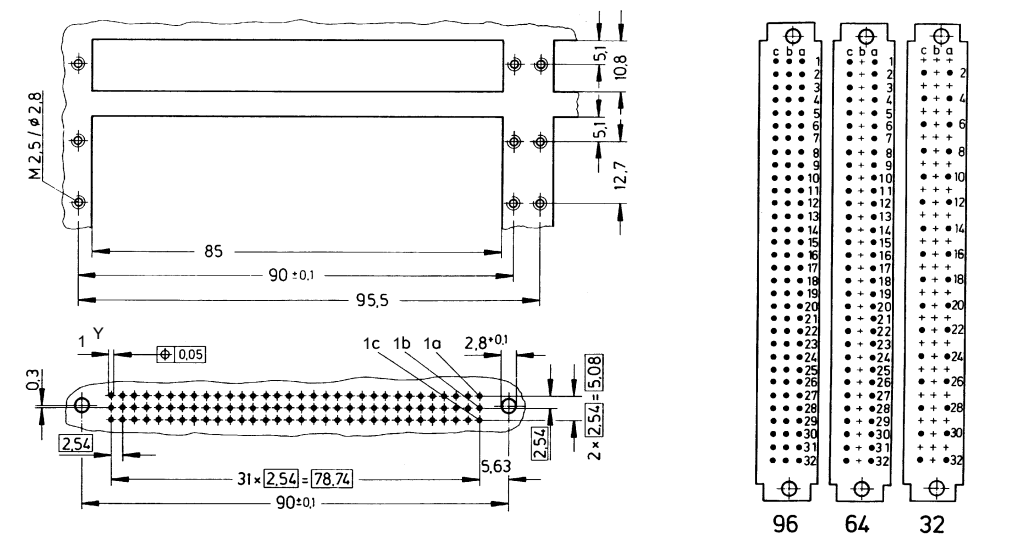
Dimensions in mm

Dimensions



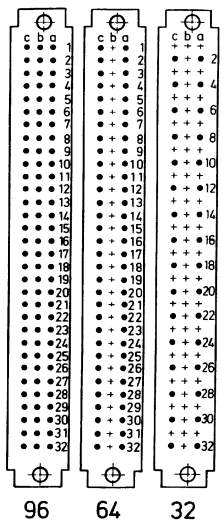
Panel cut out

Board drillings  
Mounting side

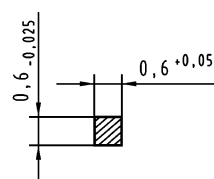


	Y
Solder	1 ± 0.1
Press-in	see recommendation page 00.25

Contact arrangement  
View from termination side



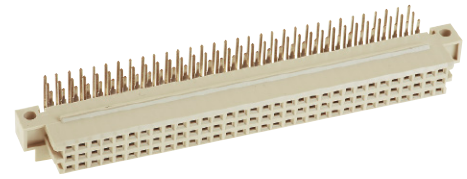
Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.35 - 0.39 mm<sup>2</sup>

Number of contacts

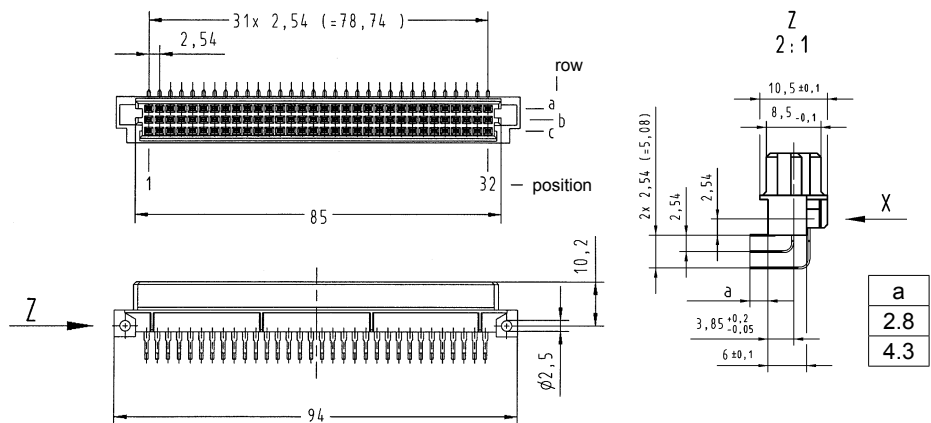
# 96, 64, 32



## Female connectors

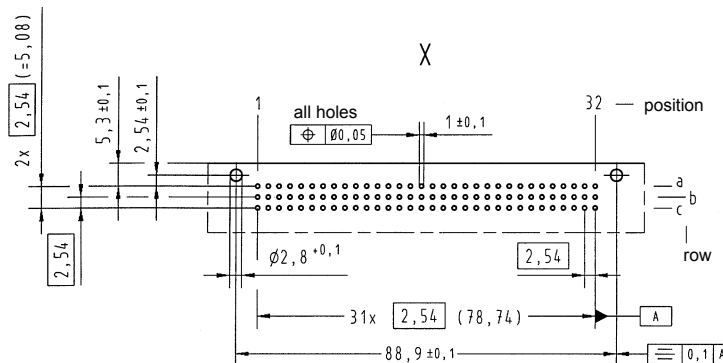
Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00		
			Part number 3	2	1
Female connector with angled solder pins Length 2.8 mm	THR		09 73 296 7801 09 73 496 7801 <sup>b)</sup>	09 73 296 6801 09 73 496 6801 <sup>b)</sup> 09 73 796 6801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

## Dimensions

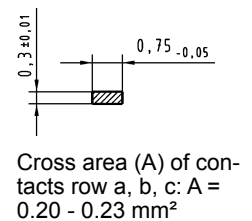


## Board drillings

Mounting side



## Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.20 - 0.23 mm<sup>2</sup>

Dimensions in mm

Other contact arrangements on request

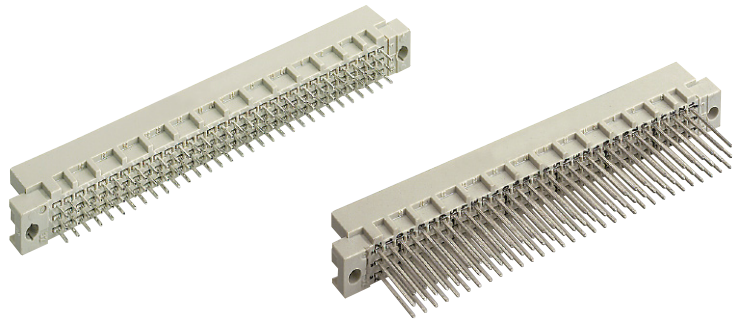
<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>c)</sup> Connectors with coding see chapter 00

<sup>d)</sup> CTI > 400

Number of contacts

# 96, 64

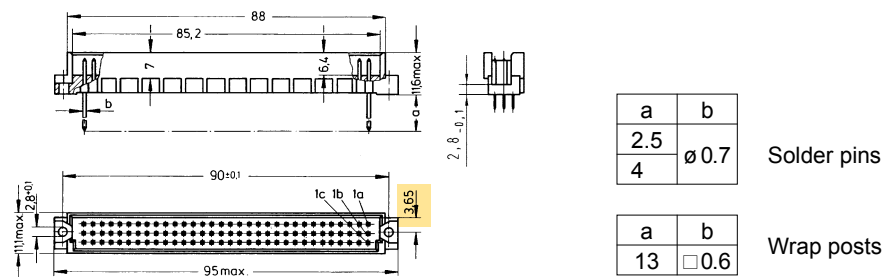


Male connectors

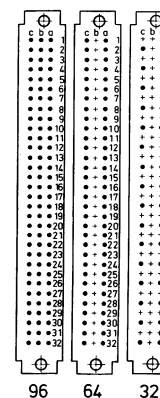
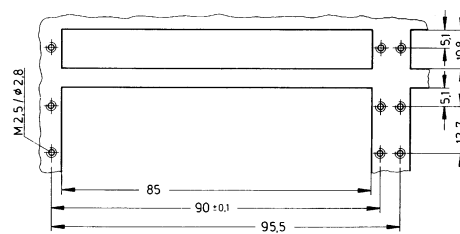
Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00		
			Part number 3	2	1
Male connector with solder pins 2.5 mm	96		Performance level 3 on request	09 79 196 6902	Performance level 1 on request
Male connector with solder pins 4.0 mm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

DIN Signal up to 2 A

Dimensions

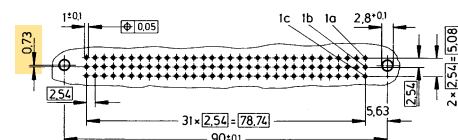


Panel cut out



Contact arrangement  
View from termination side

Board drillings  
Mounting side



Dimensions in mm

Other contact arrangements on request

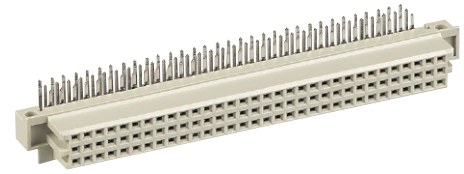
= deviating dimensions from standard male connectors (see page 01.60f)

<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>1)</sup> To be used only for wire wrap termination

Number of contacts

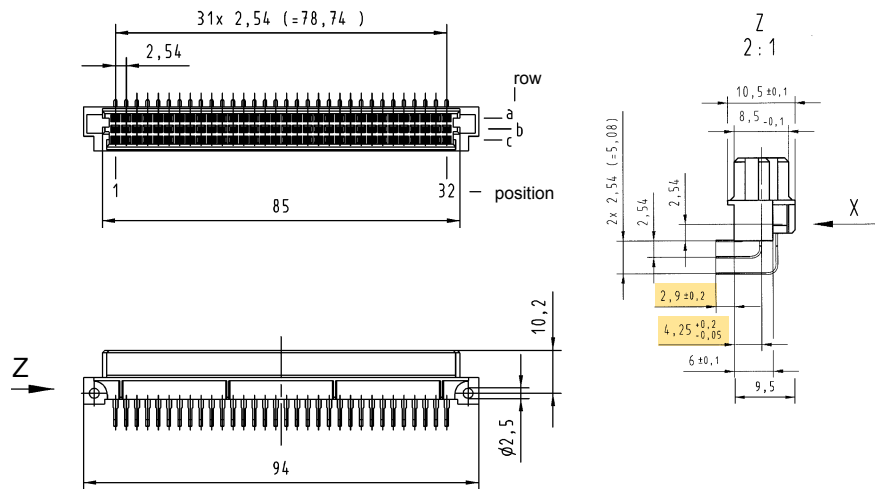
# 96, 64



## Female connectors

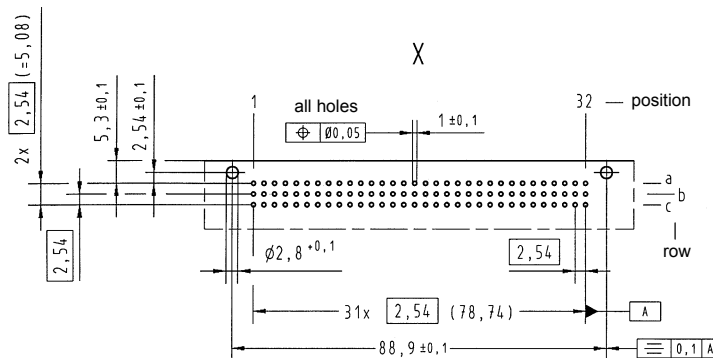
Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00		
			Part number 3	2	1
Female connector with angled solder pins	96		09 79 296 7801	09 79 296 6801 09 79 496 6801 <sup>b)</sup>	Performance level 1 on request
	64		09 79 264 7801	09 79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

## Dimensions



## Board drillings

Mounting side



Dimensions in mm

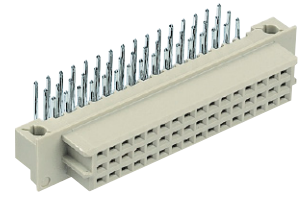
Other contact arrangements on request

<sup>b)</sup> Connectors with snap-in clips see chapter 00

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

Number of contacts

# 48, 32

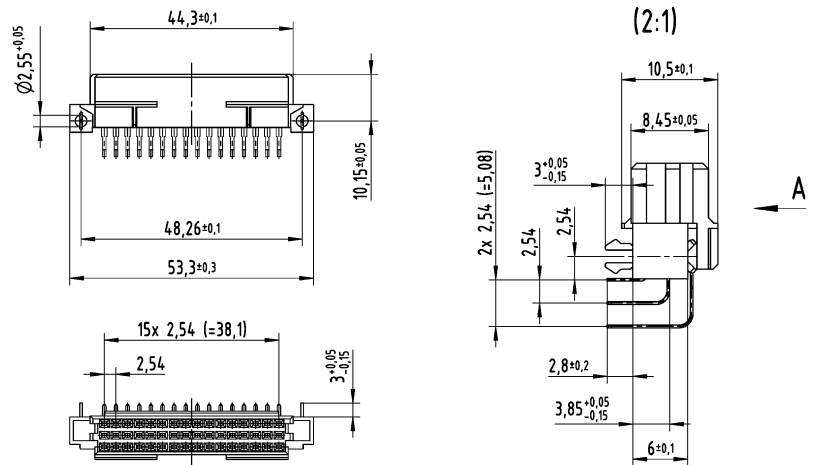


Female connectors

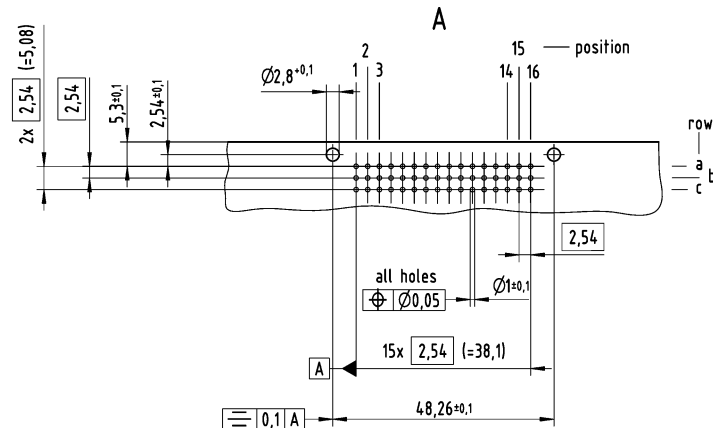
Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00		
			3	2	1
Female connector with angled solder pins  THR THR on a reel	48		Performance level 3 on request	09 28 248 6801 09 28 448 6801 <sup>b)</sup>	Performance level 1 on request
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

DIN Signal up to 2 A

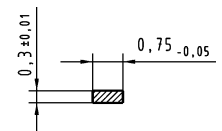
Dimensions



Board drillings  
Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b, c:  
A = 0.20 - 0.23 mm<sup>2</sup>

Dimensions in mm

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

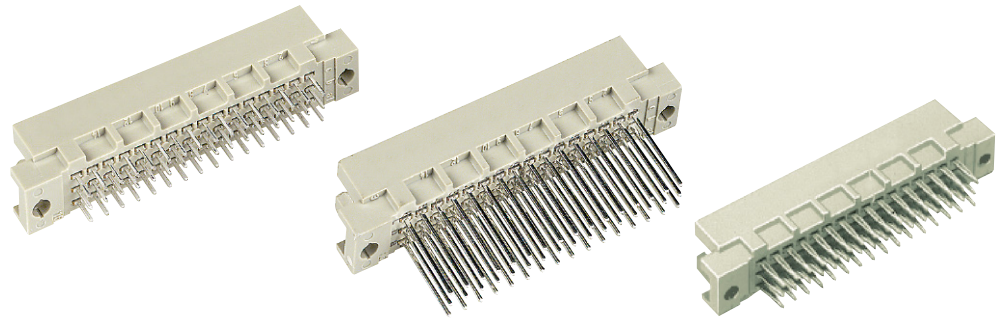
<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>d)</sup> CTI > 400



Number of contacts

# 48, 32



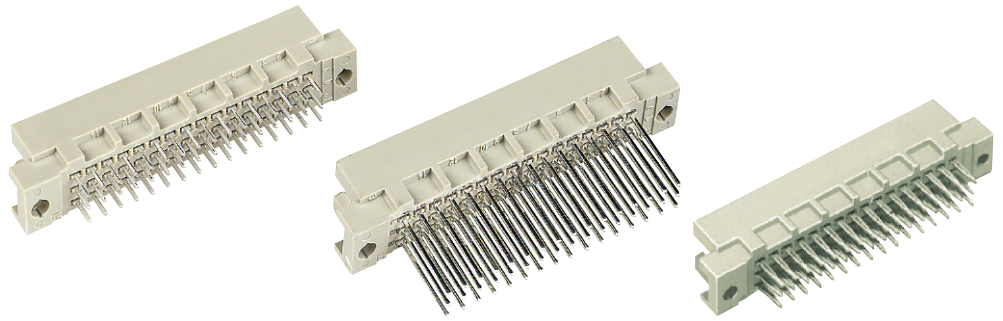
## Male connectors

Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00		
			3	2	1
Male connector with solder pins 2.5 mm	48		09 28 148 7902 09 28 348 7902 <sup>b)</sup>	09 28 148 6902 09 28 348 6902 <sup>b)</sup>	09 28 148 2902
		THR			
	32		09 28 132 7902	09 28 132 6902	09 28 132 2902
		THR			
Male connector with solder pins 4.0 mm	48		09 28 148 7903	09 28 148 6903 09 28 148 6903 222 <sup>f)</sup> 09 28 348 6903 <sup>b)</sup>	09 28 148 2903
		THR			
	32		09 28 132 7903	09 28 132 6903	09 28 132 2902
		THR			
Male connector with solder pins 13 mm	48			09 28 148 6577	
	THR	48			09 28 148 6521 <sup>d)</sup>
Male connector with wrap posts <sup>1)</sup> 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				
Male connector with press-in pins 13 mm	48		09 28 148 7985	09 28 148 6985 <sup>w)</sup> 09 28 148 6974*	
	32				

\* Wrap posts for interfacing selectively gold plated (performance level 3)  
<sup>1)</sup> To be used only for wire wrap termination  
<sup>b)</sup> Connectors with snap-in clips see chapter 00  
<sup>d)</sup> CTI > 400  
<sup>f)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2  
<sup>w)</sup> Wrap posts not for interfacing, no performance level

Number of contacts

# 48, 32



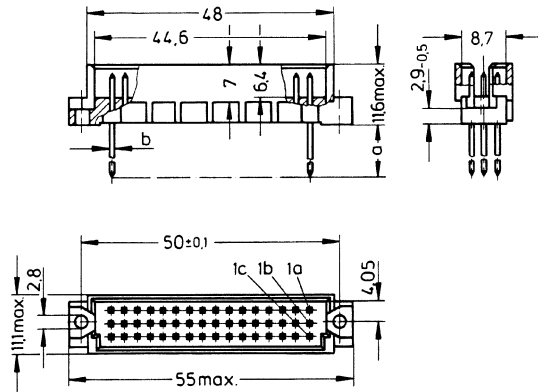
Male connectors

Identification

Drawing

Dimensions in mm

Dimensions



a	b
2.5	∅ 0.7
4	∅ 0.6
13	∅ 0.6
5	—
13	—

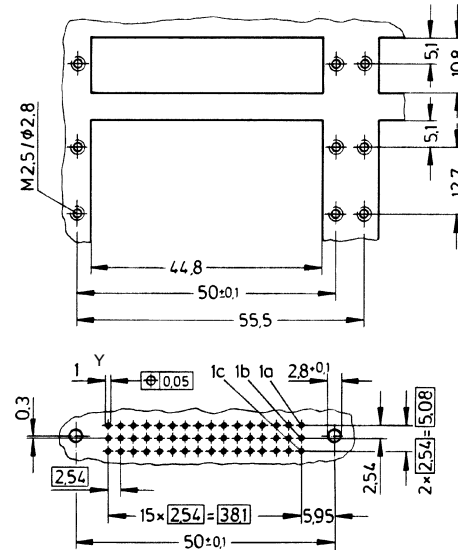
Solder pins

Wrap posts

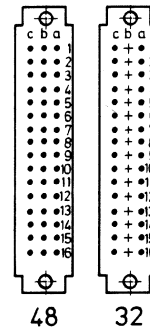
Press-in pins

Panel cut out

Board drillings  
Mounting side

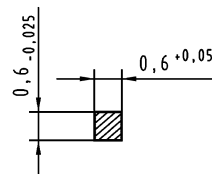


Contact arrangement  
View from termination side



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

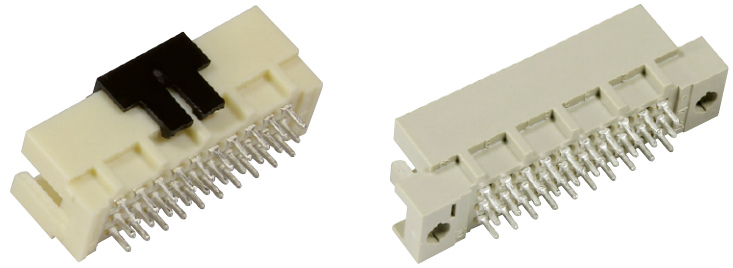
Cross section of solder terminations



Cross area (A) of contacts row a, b, c:  $A = 0.35 - 0.39 \text{ mm}^2$

Number of contacts

# 30, 20



## Male connectors

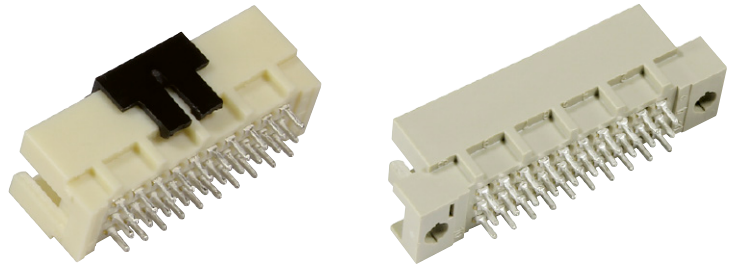
DIN Signal  
up to 2 A

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

<sup>1)</sup> To be used only for wire wrap termination  
<sup>d)</sup> CTI > 400

Number of contacts

# 30, 20



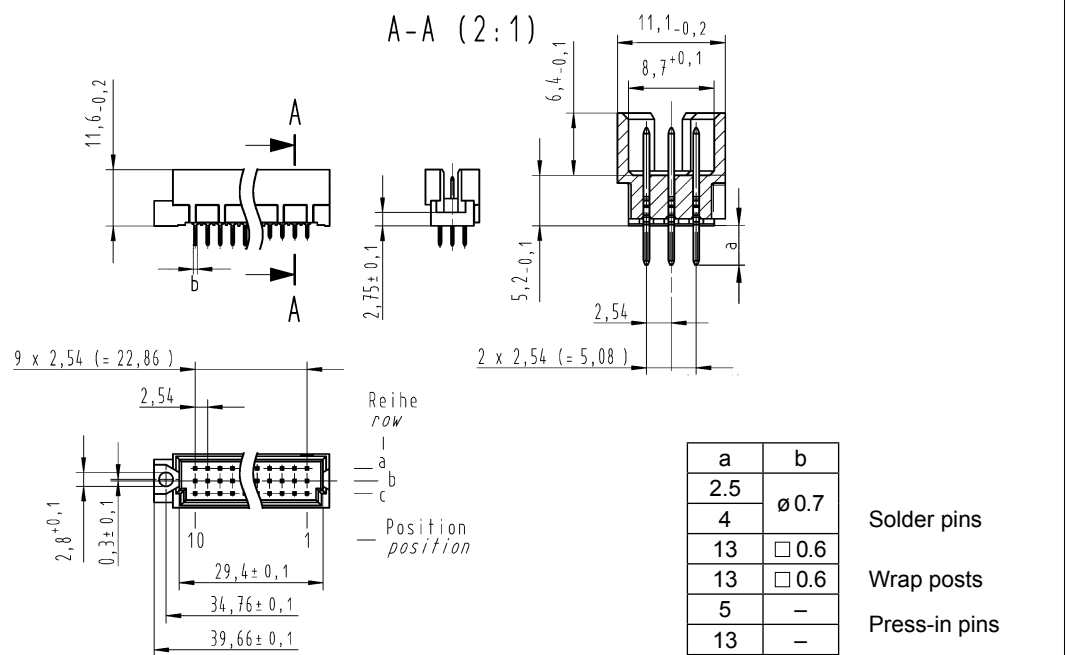
Male connectors

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

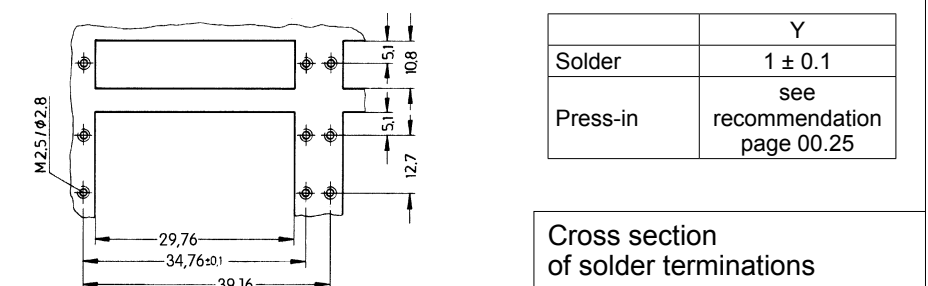
DIN Signal up to 2 A

Identification      Drawing      Dimensions in mm

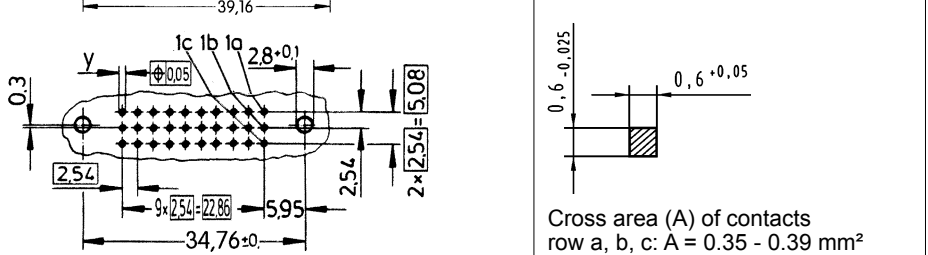
Dimensions



Panel cut out



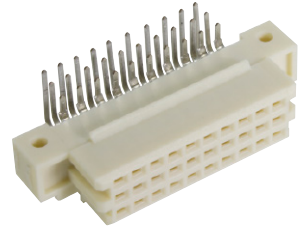
Board drillings  
Mounting side



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

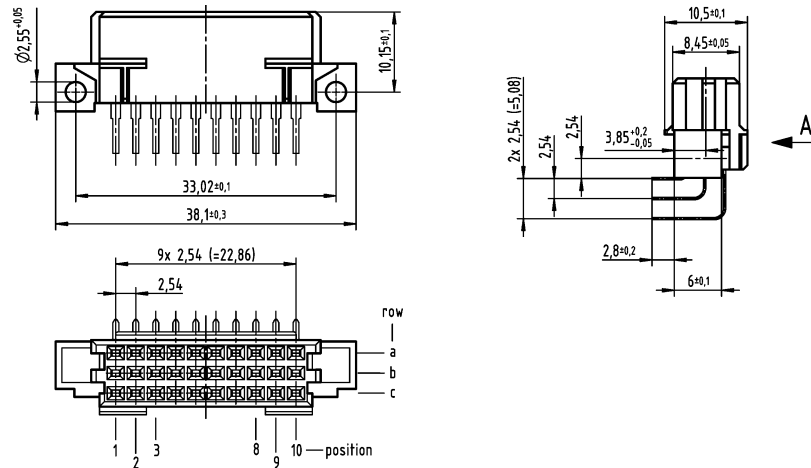
# 30



## Female connectors

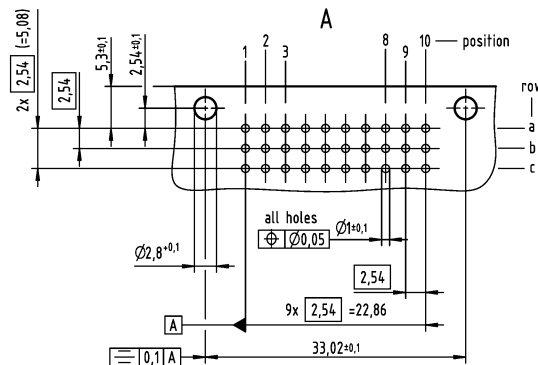
Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00
			3	2 1
Female connector with angled solder pins	30		Performance level 3 on request	09 29 230 6801 09 29 430 6801 <sup>b)</sup>
THR THR on a reel	30			09 29 230 6804 <sup>d)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

## Dimensions

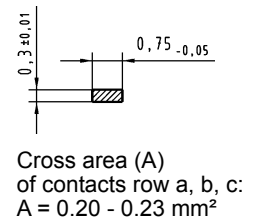


## Board drillings

Mounting side



## Cross section of solder terminations



Dimensions in mm

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

<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>d)</sup> CTI > 400

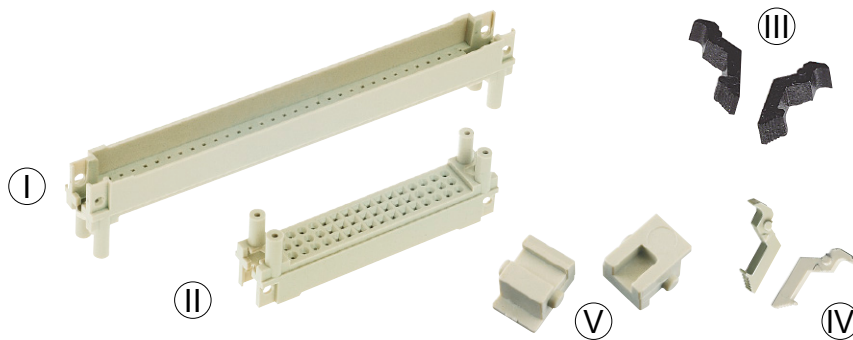




Number of contacts

# 96, 48

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



DIN Signal  
up to 2 A

Identification	Termination length ± 0.3	pcb-thickness ± 0.4	Dimension a ± 0.1	Part number – Pin shrouds with		
				press-in fixing <sup>1)</sup>	screw fixing	
Pin shrouds for female connectors type C and for male connectors type R I	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
	17.0	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 II	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 II	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
	17.0	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	
			10,7	09 23 000 9951	09 23 000 9961	
			9,9	09 23 000 9952	09 23 000 9962	
			9,1	09 23 000 9953	09 23 000 9963	
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

<sup>1)</sup> Processing only with press-in tools, see chapter 30

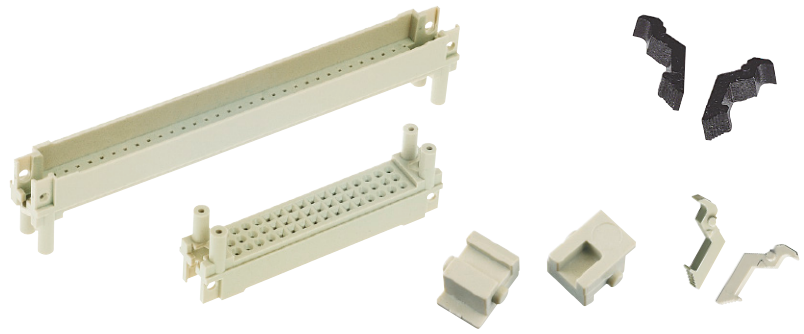
# Pin shroud



Number of contacts

# 96, 48

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

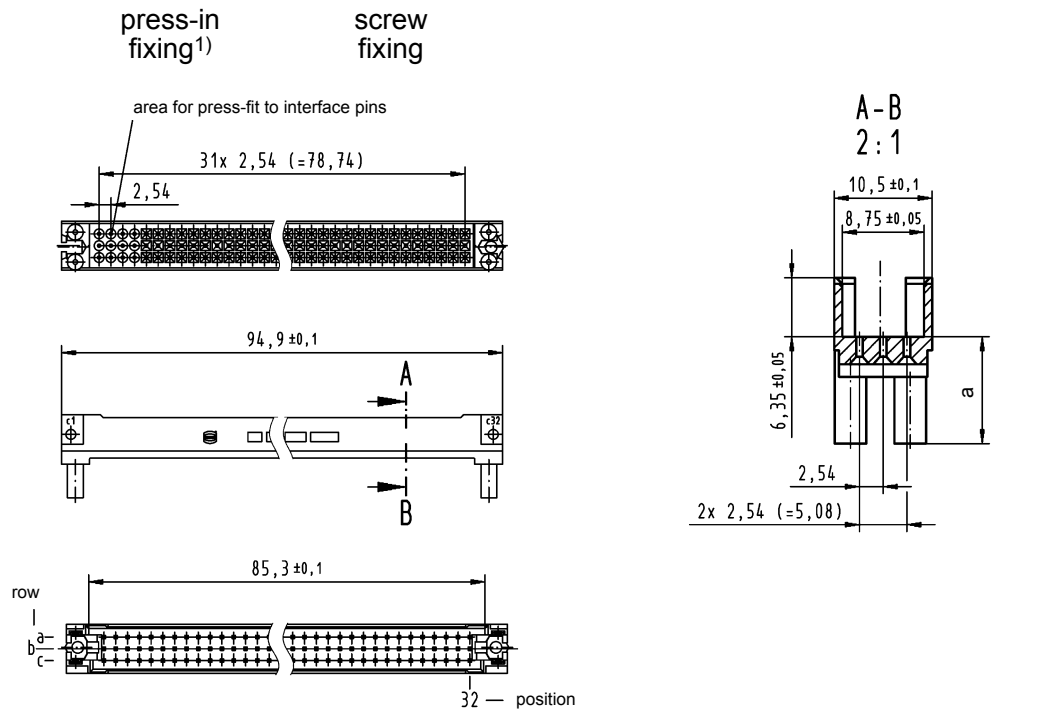


Identification

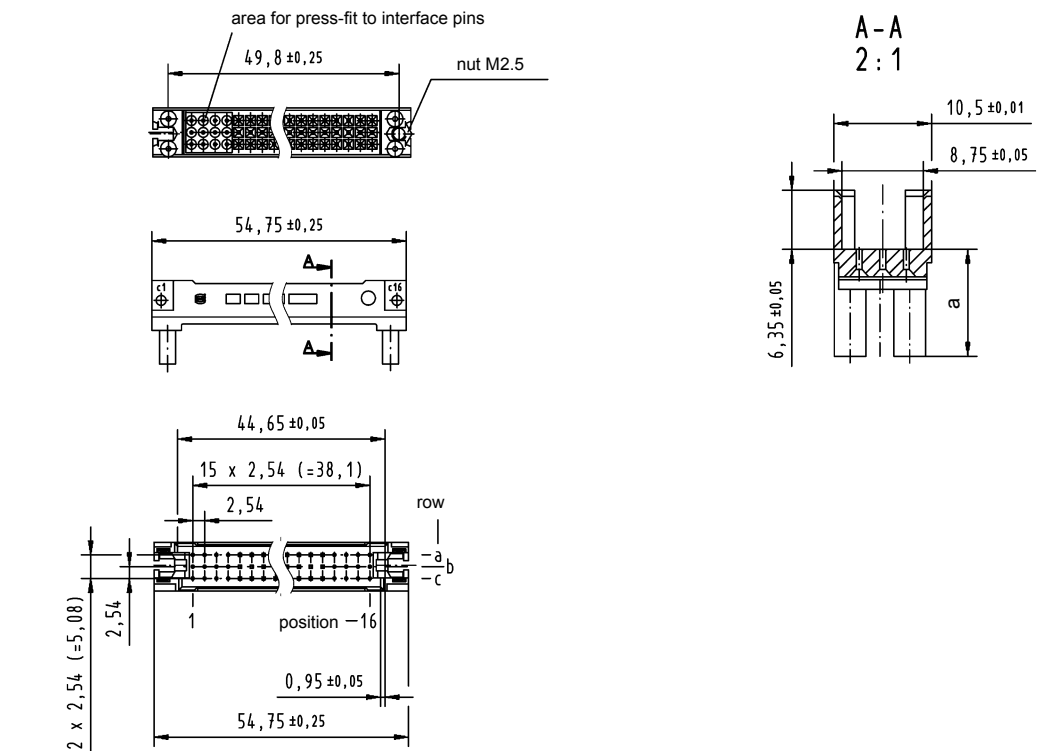
Drawing

Dimensions in mm

Pin shrouds  
for female connectors  
type C, R



Pin shrouds  
for female connectors  
type 2C, 2R

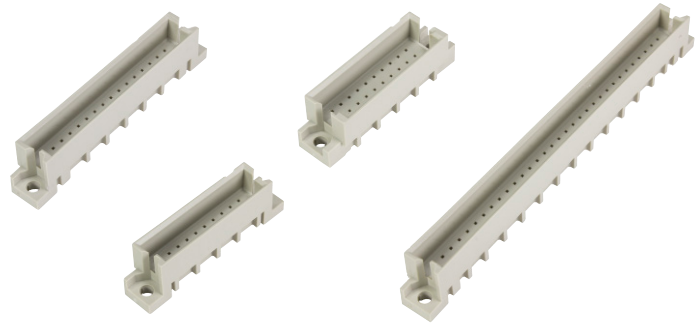


DIN Signal  
up to 2 A

1) Tooling see chapter 30

Number of contacts

# 64, 32, 30, 20



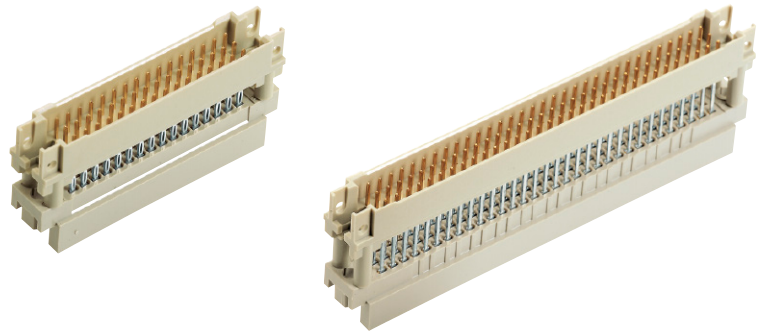
Pin shrouds  
for types B, 2B, 3B, 3C, Q, 2Q, 3Q and 3R

DIN Signal  
up to 2 A

Identification	No. of contacts	Part number	Drawing	Dimensions in mm																				
<p>Pin shrouds for female connectors type B for male connectors type Q</p>	64	09 72 164 3101																						
<p>Pin shrouds for female connectors type 2B for male connectors type 2Q</p>	32	09 27 132 3101																						
<p>Pin shrouds for female connectors type 3B for male connectors type 3Q</p>	20	09 75 120 3101	<p>A-A (2:1)</p> <table border="1"> <thead> <tr> <th></th> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>B / Q</td> <td>78.74</td> <td>85.2</td> <td>90.00</td> <td>95.00</td> </tr> <tr> <td>2B / 2Q</td> <td>38.10</td> <td>44.1</td> <td>50.00</td> <td>55.00</td> </tr> <tr> <td>3B / 3Q</td> <td>22.86</td> <td>29.4</td> <td>34.76</td> <td>39.66</td> </tr> </tbody> </table>		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	
	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																				
<p>Pin shrouds for female connectors type 3C for male connectors type 3R</p>	30	09 29 130 3101																						
<p>These pin shrouds must be pressed on the interfacing contacts.</p> <p>After the assembly the interfacing contacts should have a contact length of appr. 4.8 mm.</p>																								

Number of contacts

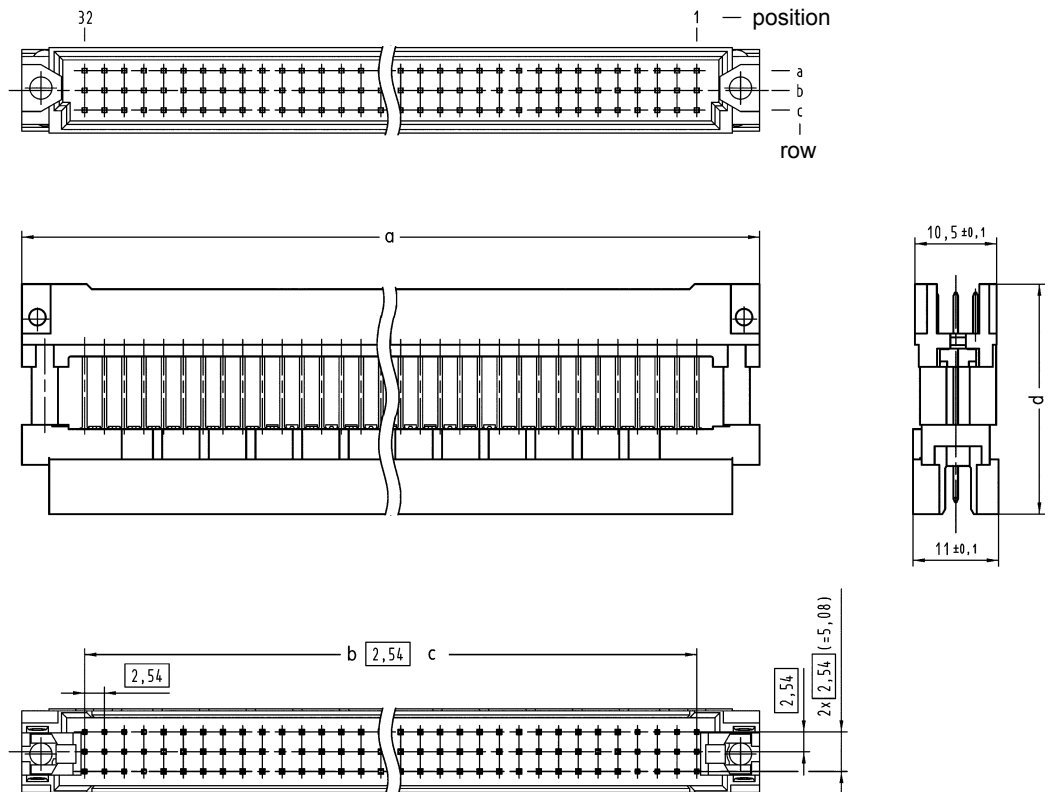
# 96, 48



## Mezzanine Adapter

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60 603-2.		
				3	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

DIN Signal up to 2 A

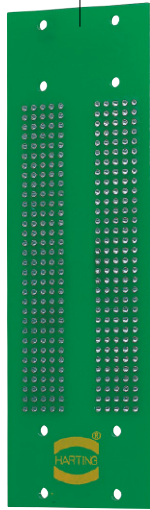
DIN Signal up to 2 A

## Application 1

Female connector  
09 03 296 6861



Backplane



Pin shroud  
09 03 000 9957



Locking lever  
09 03 000 9914



Female connector  
09 03 264 6828



Female connector  
09 03 096 3214

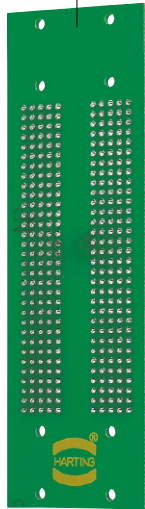


## Application 2

Female connector  
09 03 296 6862



Backplane



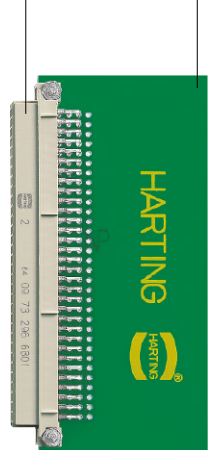
Pin shroud  
09 03 000 9953



Locking lever  
09 03 000 9913



Female connector  
09 73 296 6801



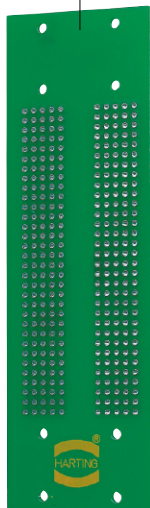
Daughtercard

## Application 3

Female connector  
09 03 296 6861



Backplane



Pin shroud  
09 03 000 9957



Fixing brackets  
09 03 000 9921



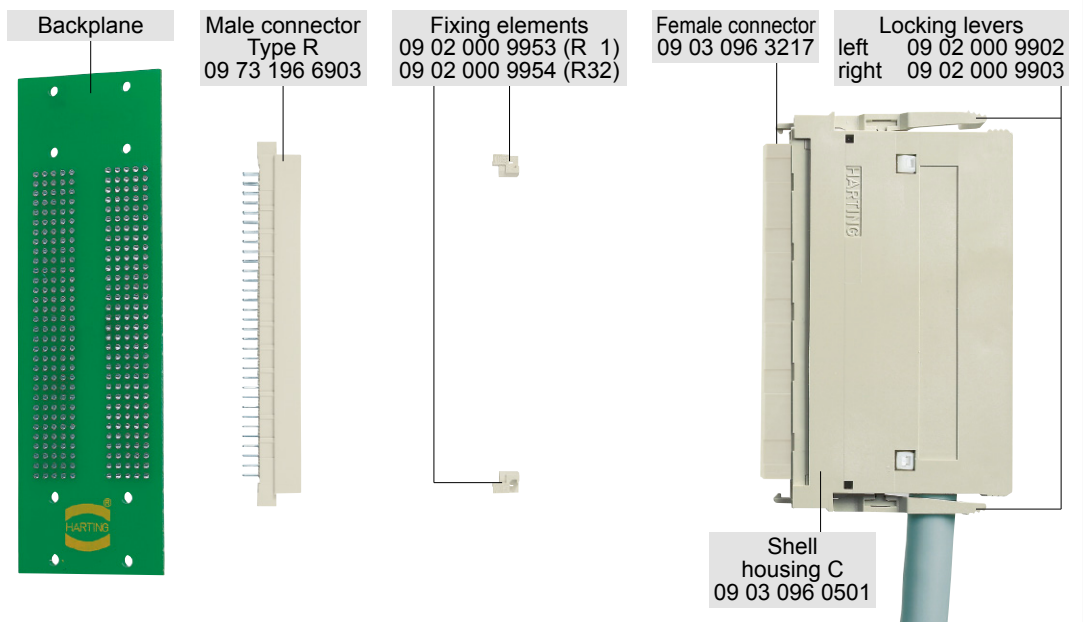
Female connector  
09 03 096 3214



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

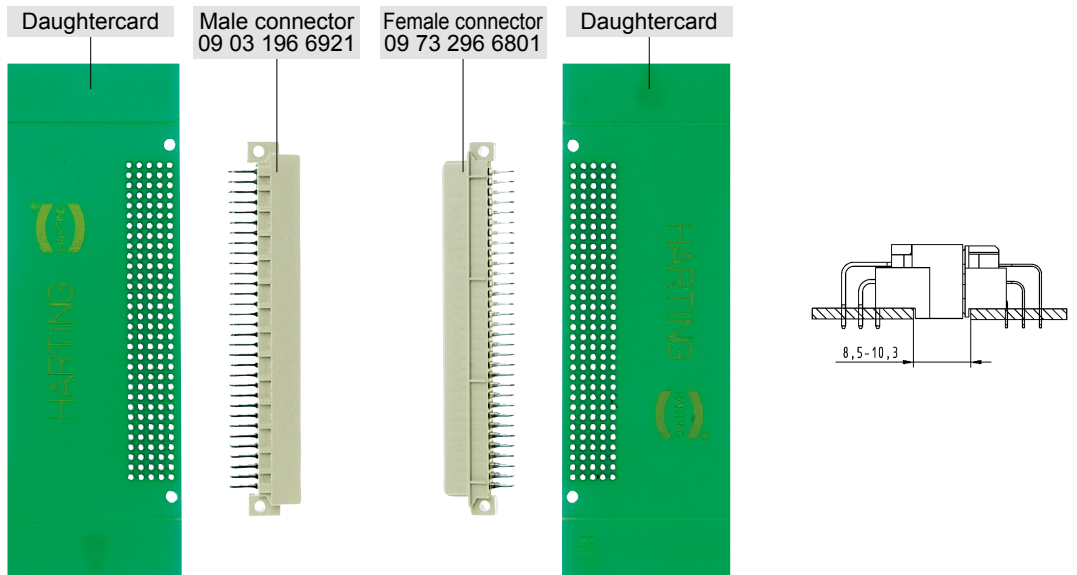
Shell housing C  
09 03 096 0501

## Application 4

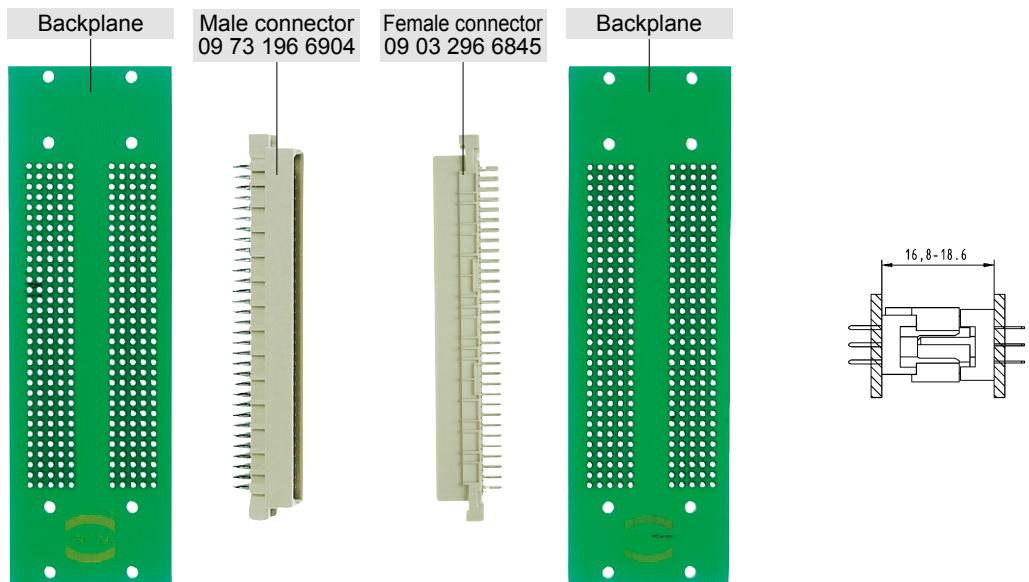


DIN Signal  
up to 2 A

## Application 5\*



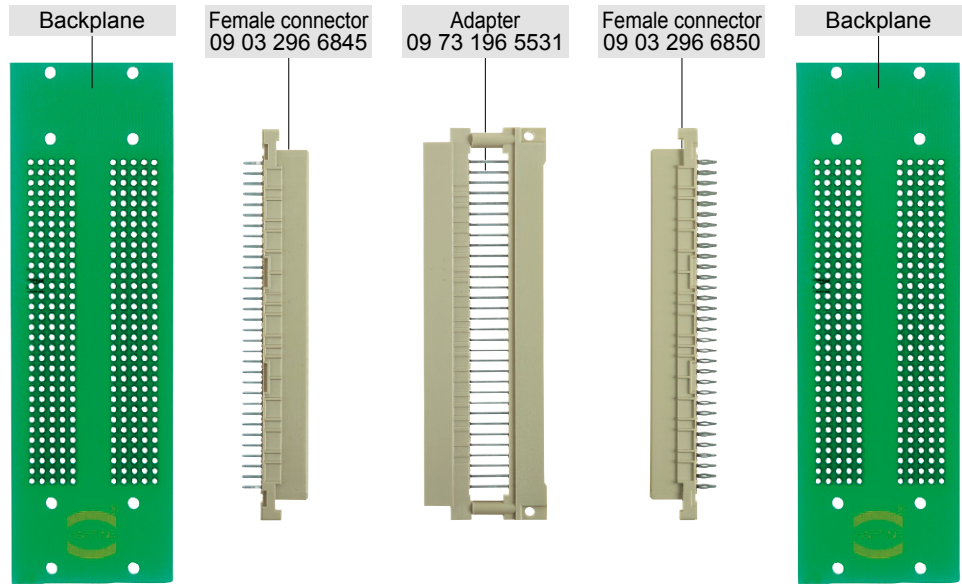
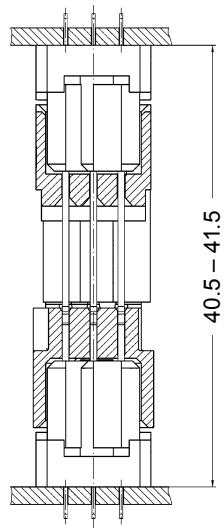
## Application 6\*



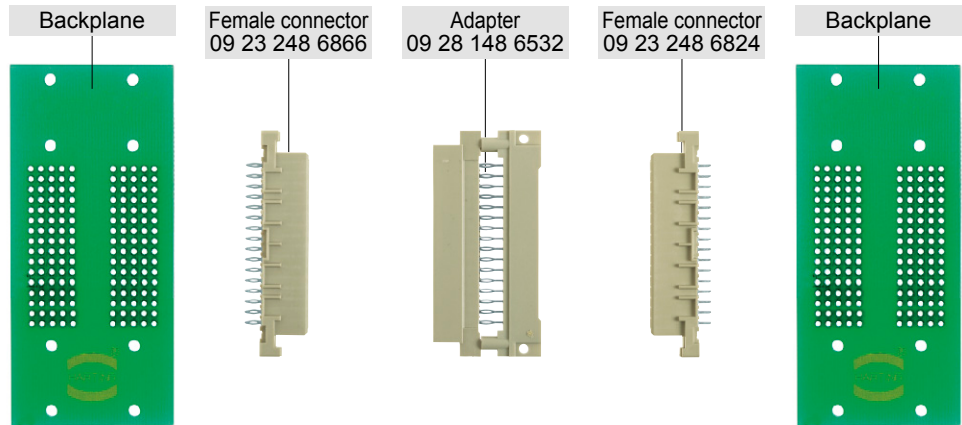
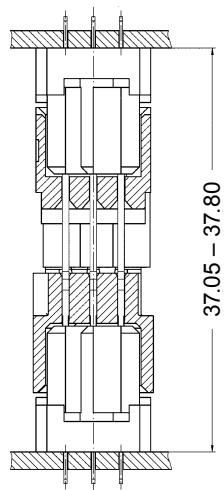
\* Position marking turned: a1 contacts a32, a2 contacts a31, ...



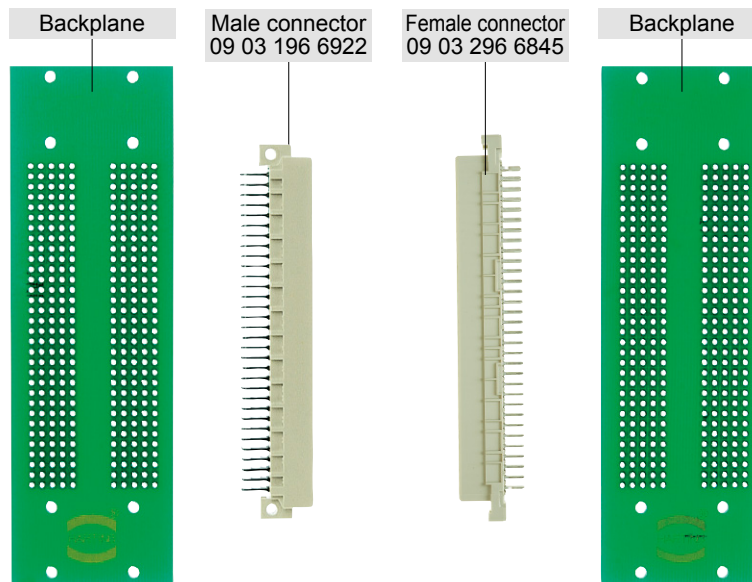
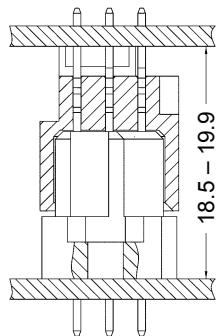
## Application 7



## Application 8



## Application 9



**harbus® 64**

Page

VMEbus systems ..... **02.02**

**harbus® 64**

System description ..... **02.03**

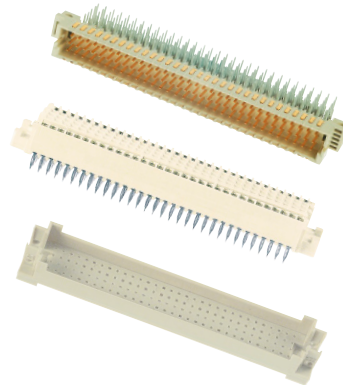
Technical characteristics ..... **02.10**

Male connectors ..... **02.11**

Female connectors ..... **02.12**

Pin shrouds ..... **02.16**

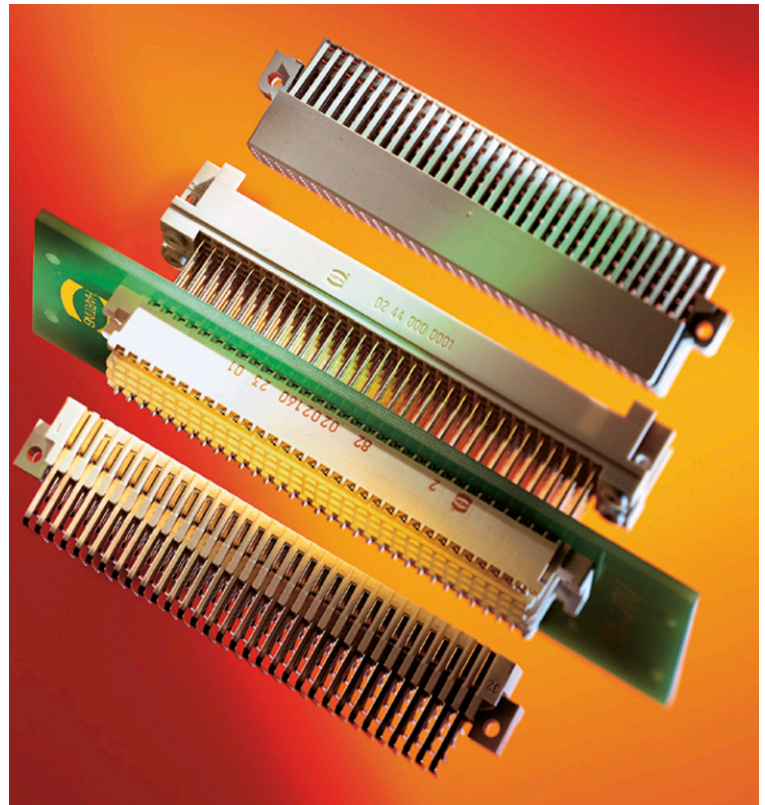
Application examples ..... **02.17**



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.

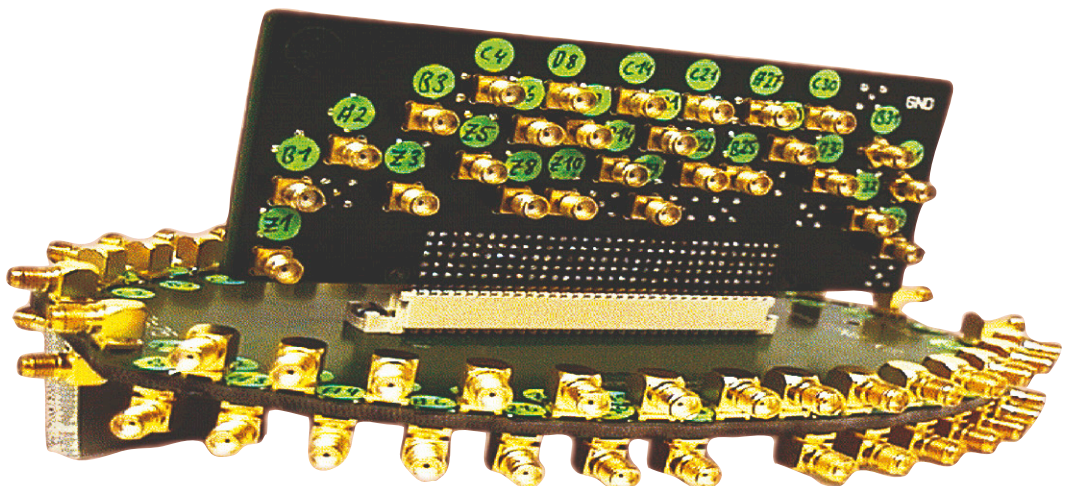
Additional advantages appear under real-time conditions, where unforeseen events have to be managed. This is realised with the program interrupt concept and variable control that closely monitors the bus system.



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.

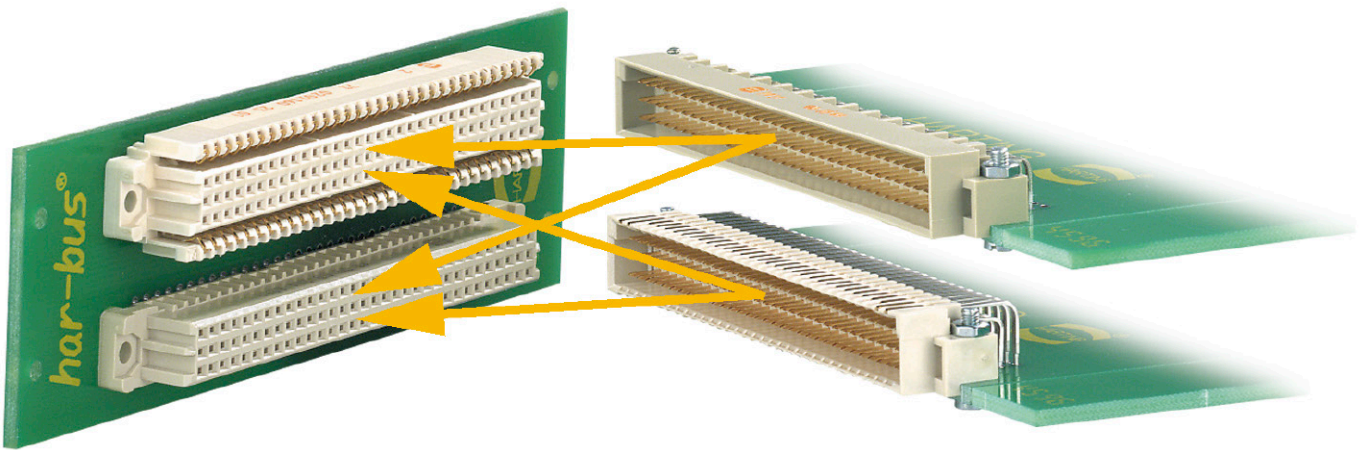
When VME architecture was increased from 8-bit to 64-bit and data transmission rates up to 160 Mbyte/s (VME 64x), HARTING introduced **harbus® 64** with 160 pins. This Eurocard connector is 100 % backwards compatible to existing 3 row connectors with 96 contacts, therefore old can plug into new.

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.



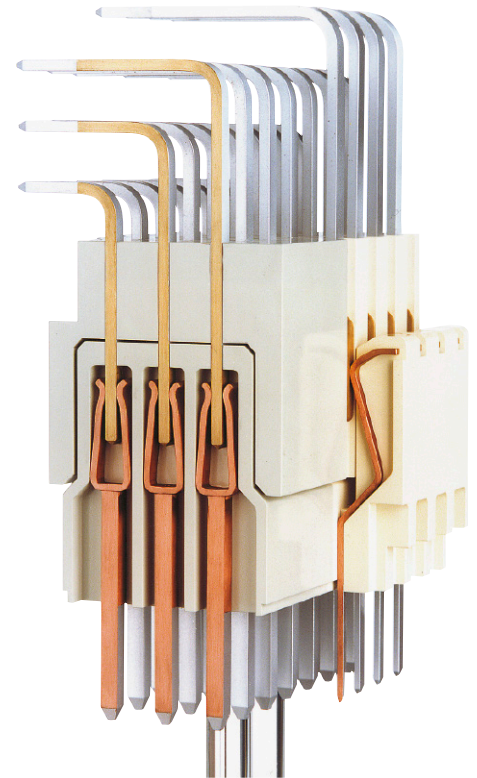


## Backward compatibility

The design of **harbus® 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, **harbus® 64** provides the opportunity to adapt the system economically without a complete redesign to a new bus architecture.



## **harbus® 64** – five rows – 160 poles

Two additional rows of contacts in the **harbus® 64** connector offer new system features:

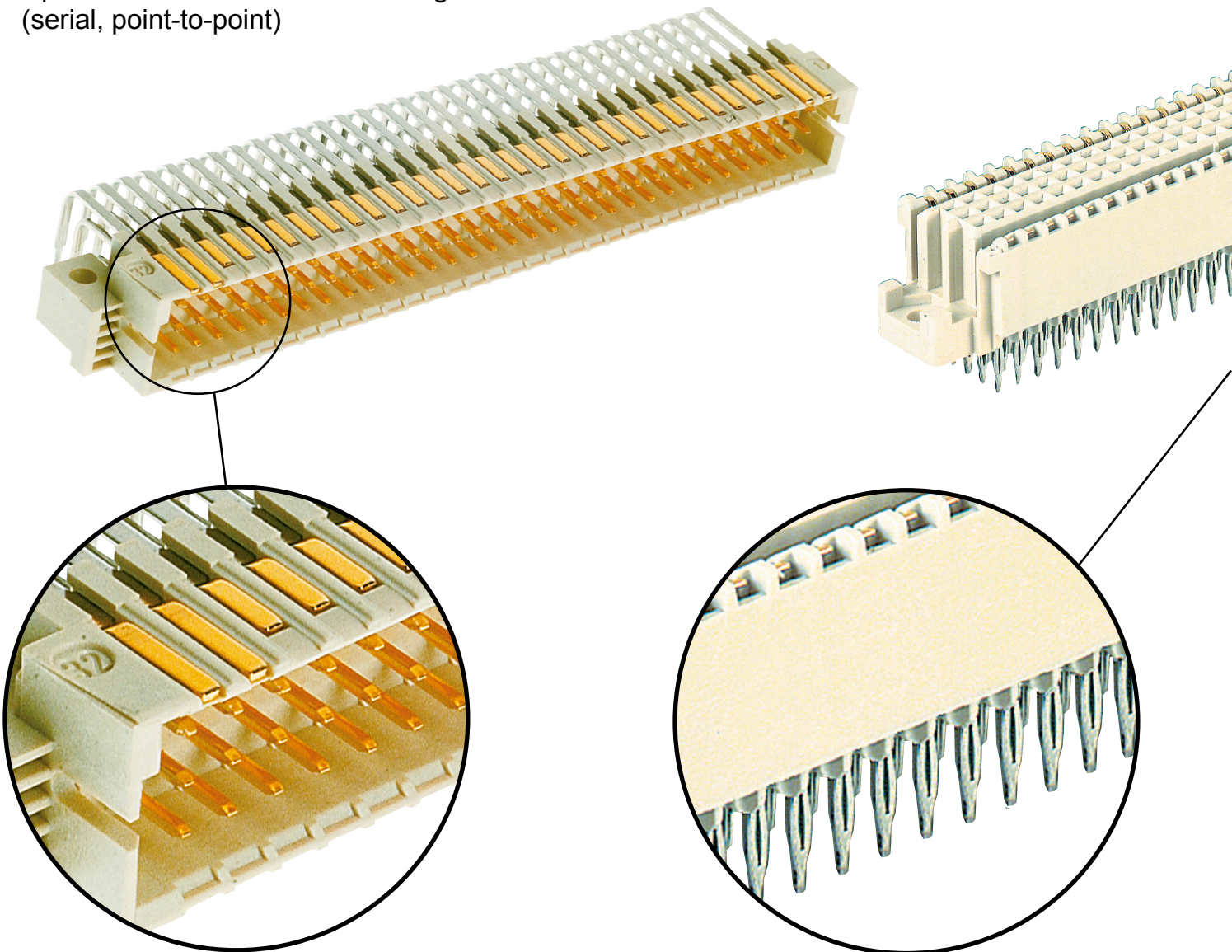
- Additional contacts for I/O and system upgrade
- New voltage supplies for 3.3 V and 48 V system components
- Identifying locations of system components and the bus length. “Plug & Play“
- Improved signal/ground ratio for reliable signal data transfer at rates up to 320 MByte/s (VMEbus) resp. 1.25 Gb/s (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 **harbus® 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.



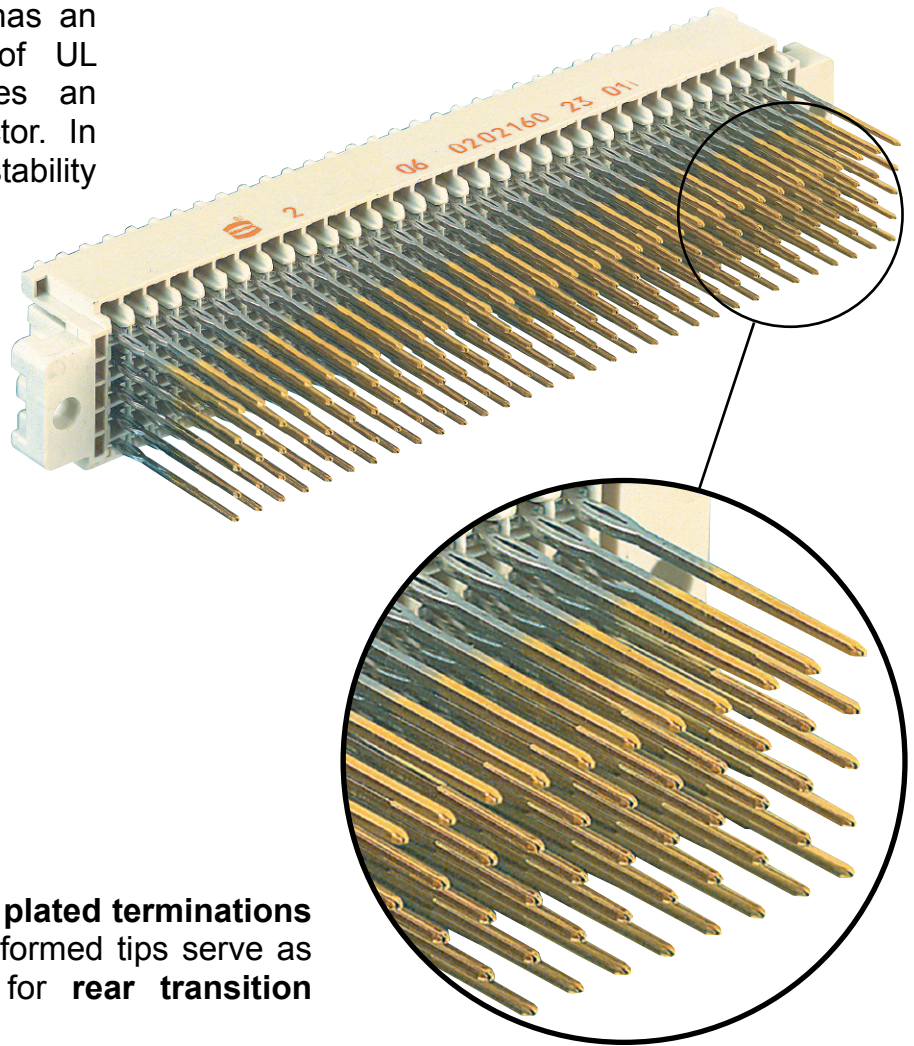
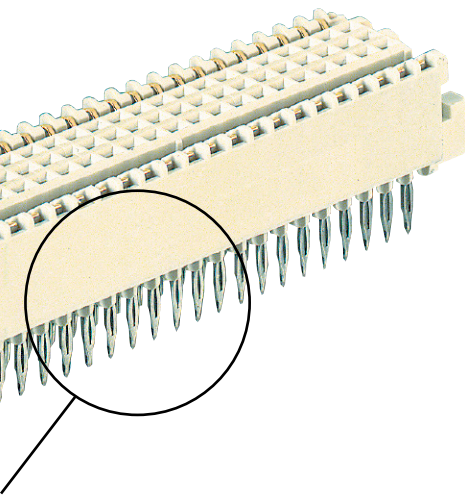
**Four preleading contacts (1.5 mm)** serve to pre-load the transmit and receive logic so that the bus will not experience glitches during **live insertion** of new cards into the backplane.

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.



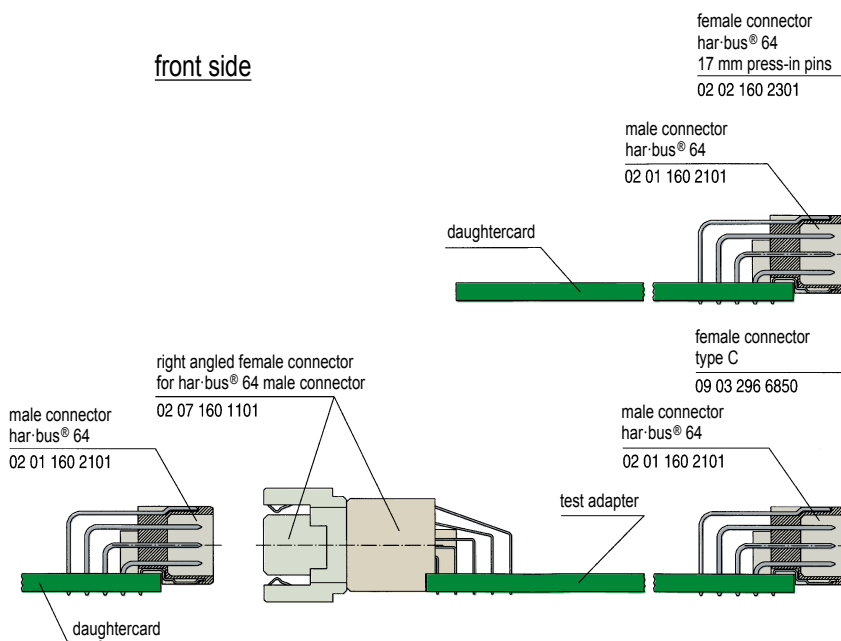
The insulator, made of LCP, has an inherent flammability rating of UL 94-V0 and therefore provides an **environment friendly** connector. In addition, the heat deformation stability of LCP makes the connector **surface-mount compatible** (see chapter 00).



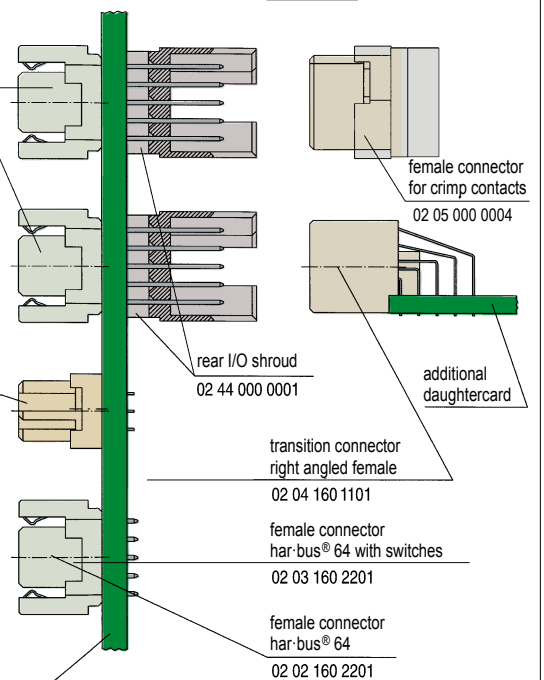
**Partially gold plated terminations** with precisely formed tips serve as contact area for **rear transition boards**.

### system description

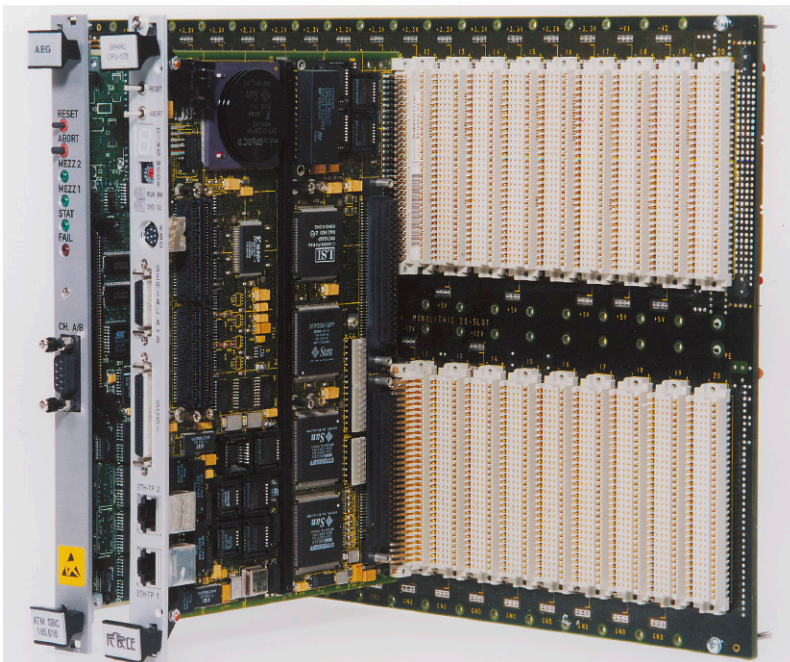
#### front side



#### rear side







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.

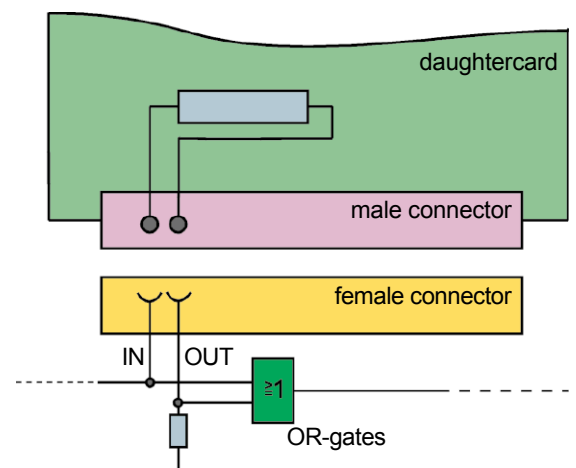
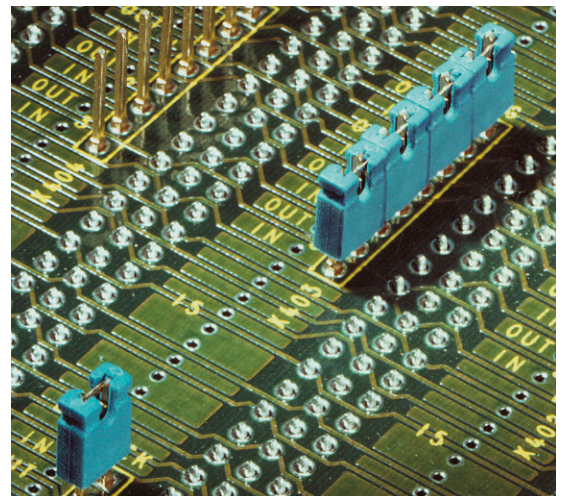
The VME protocol requests 5 daisy-chains on position 1 of every backplane.

These lines are defined to go through every daughter card.

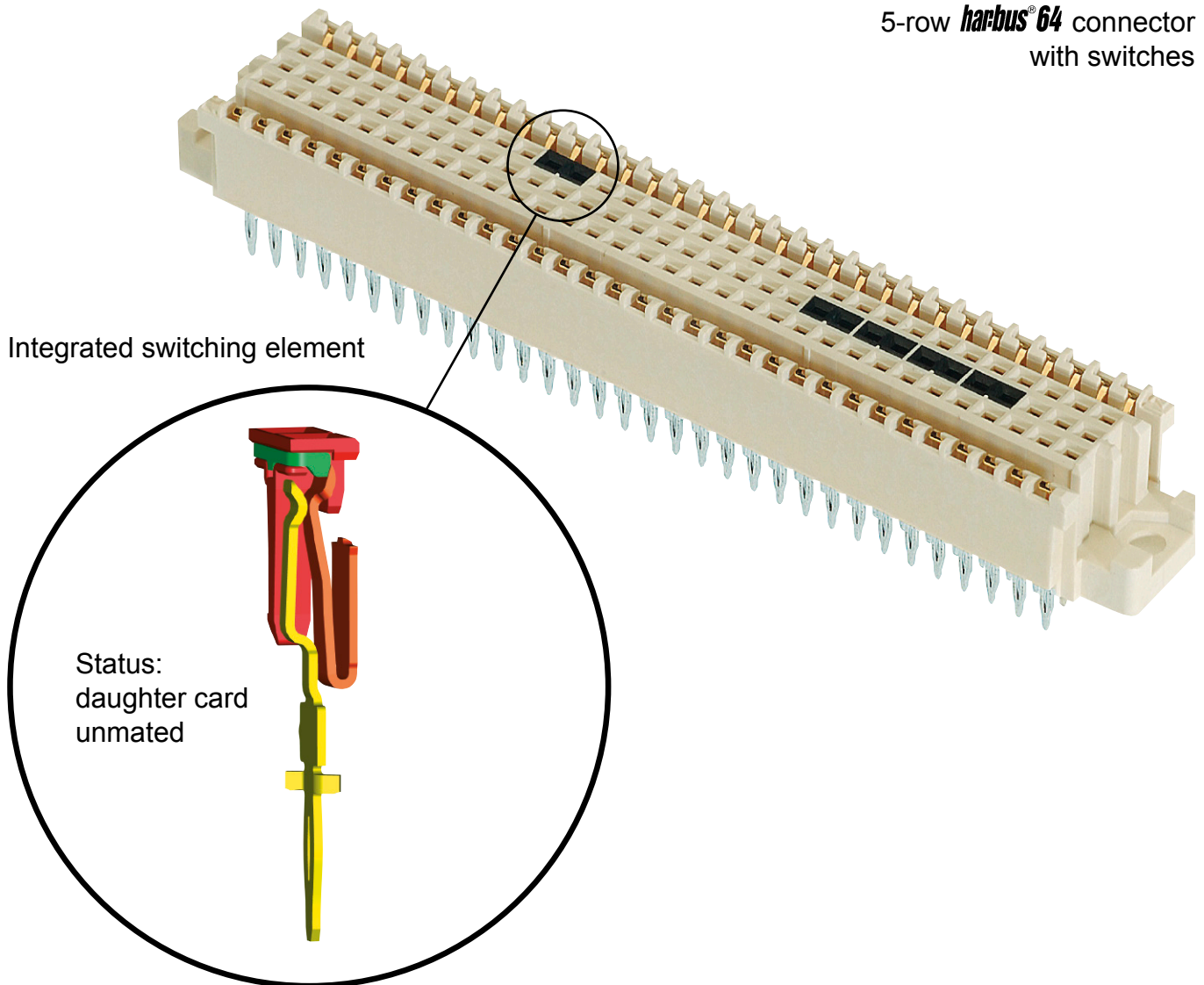
Therefore, in case of unloaded card slots the signal have to be bridged across the connector.

### 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*<sup>®</sup> 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 *harbus*<sup>®</sup> 64 connector  
with switches



**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

MEMBER  
**VITA**  
Open Standards, Open Markets

**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  $\leq 20 \text{ m}\Omega$   
rows z, d  $\leq 30 \text{ m}\Omega$

Insulation resistance  $\geq 10^{10} \Omega$  acc. to IEC 60512-2

Temperature range for press-in termination  
- 55 °C ... + 125 °C  
- 40 °C ... + 105 °C  
acc. to IEC 60512-11

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  $\varnothing 1.0 \pm 0.1 \text{ mm}$   
according to IEC 60326-3  
Crimp terminal  
0.09 - 0.50 mm<sup>2</sup>  
Compliant press-in terminations

pcb thickness  $\geq 1.6 \text{ mm}$   
Recommended pcb holes for press-in technology See recommendation page 00.25 in acc. to EN 60352-5

Insertion and withdrawal force  $\leq 160 \text{ N}$

### 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

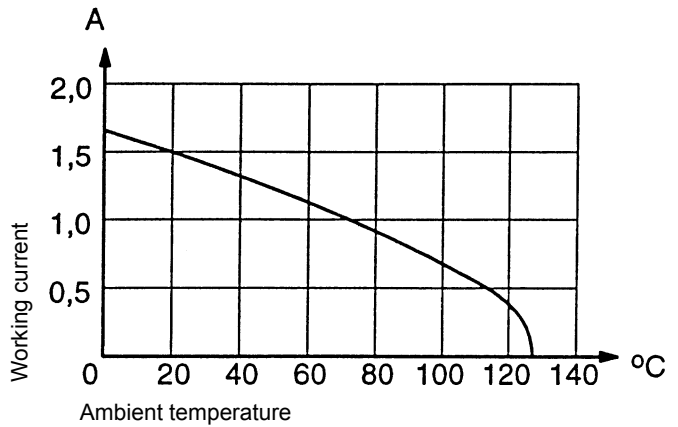
### Contact surface

Contact zone Plated acc. to performance level<sup>1)</sup>

### 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 load-ed contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60512



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

### harbus® 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  $\leq 60 \text{ m}\Omega$

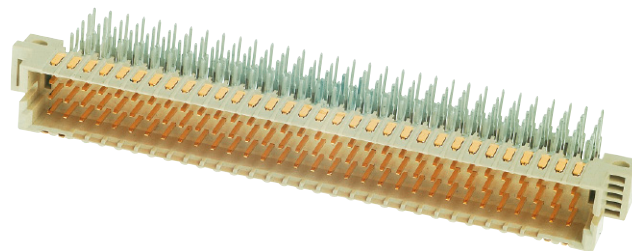
### Insertion and withdrawal force

Complete connector  $\leq 180 \text{ N}$

<sup>1)</sup> Explanation performance levels see chapter 00

Number of contacts

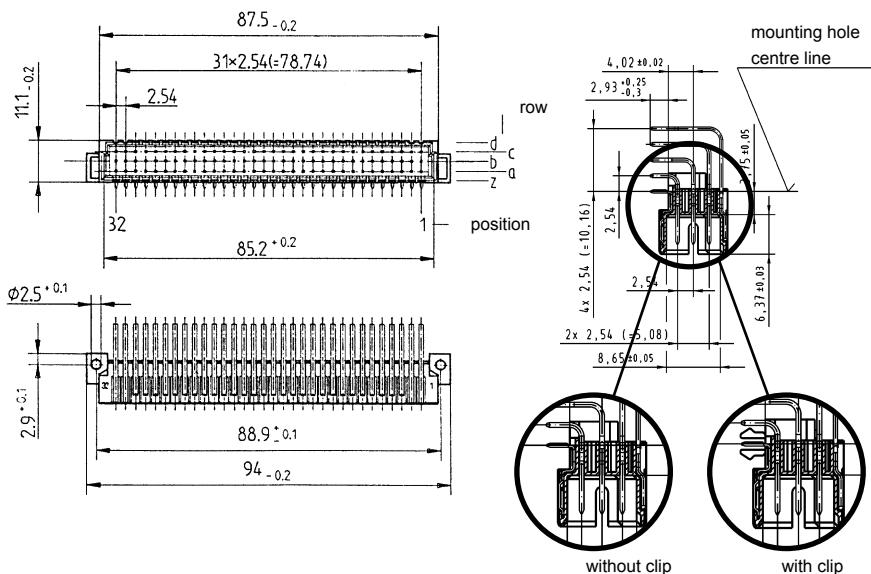
# 160



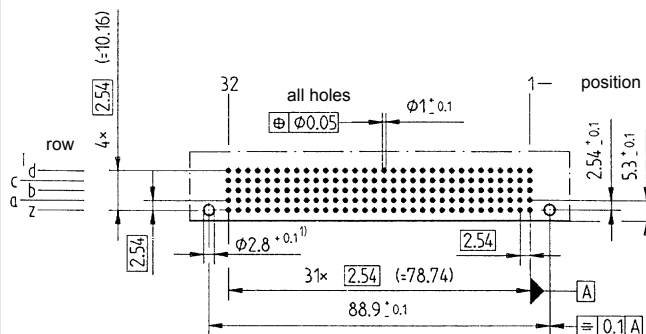
Male connectors, angled, THR compatible

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

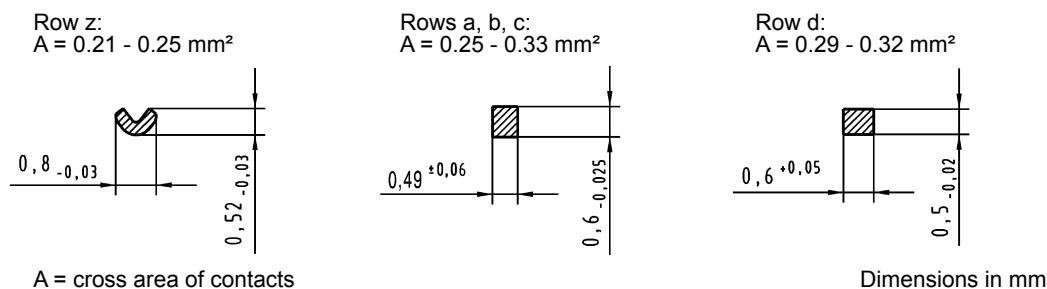
Dimensions



Board drillings  
Mounting side



Cross section of solder terminations

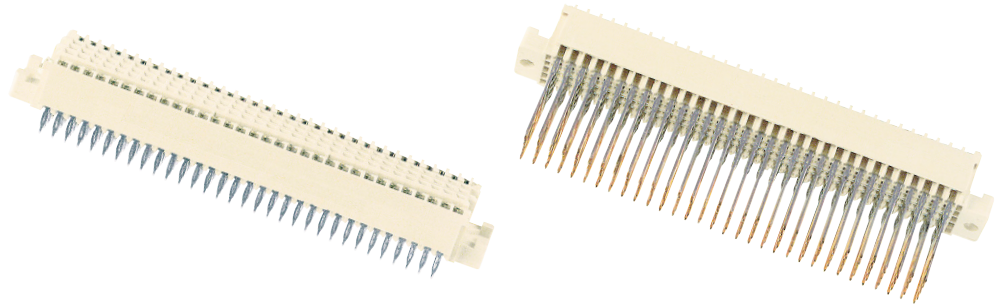


\* Pre-leading contacts at positions d1, d2, d31 and d32  
<sup>1)</sup> Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm Ø to reduce standard mounting force (see chapter 00)  
<sup>2)</sup> Special variant with min. 1.27 µm (50 µinch) Au and SnPb on termination



Number of contacts

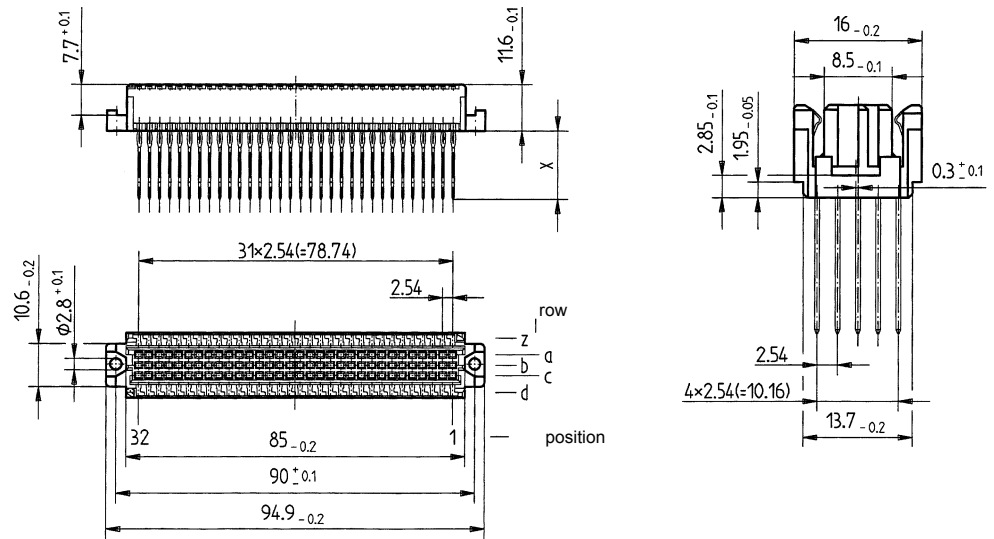
# 160



## Female connectors

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 61 076-4-113	
				2	1
Female connectors, straight <sup>2)</sup> with press-in terminations					
with fixing flange					
3.7 mm	160	z, a, b, c, d			02 02 160 1601
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 fixing flange					
5 mm	160	z, a, b, c, d	02 02 160 2202		02 02 160 1202
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		

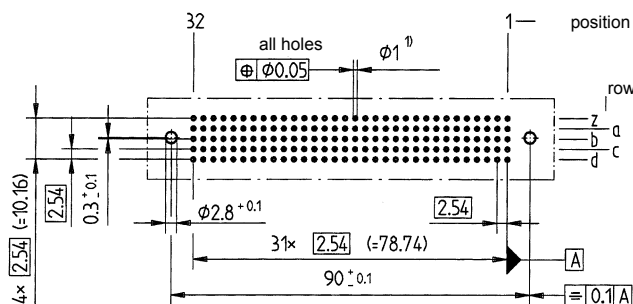
## Dimensions



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

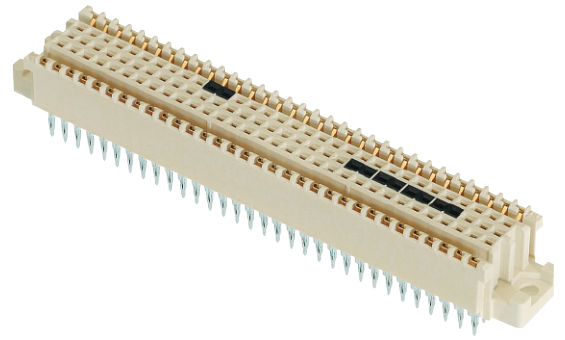
Tooling see chapter 30

<sup>1)</sup> Press-in technology and refer to recommended configuration of pcb holes, see page 00.25

\* selectively gold-plated

Number of contacts

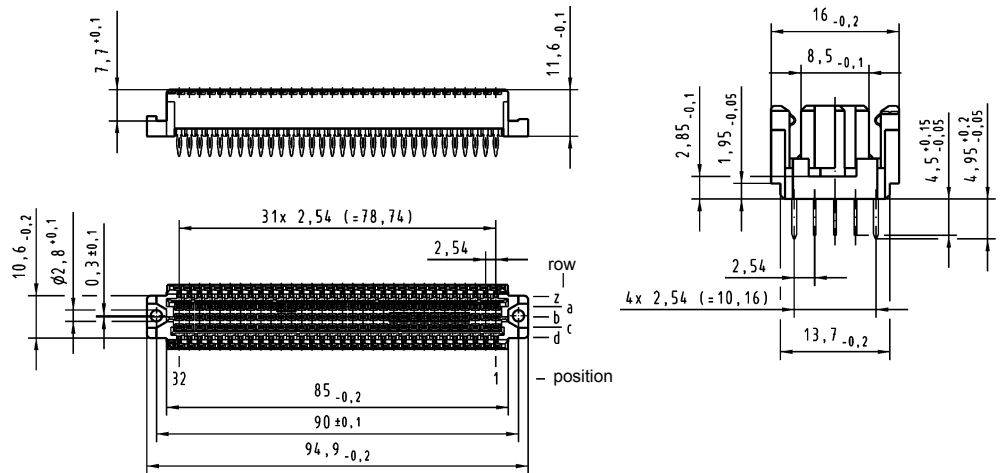
# 160



Female connectors

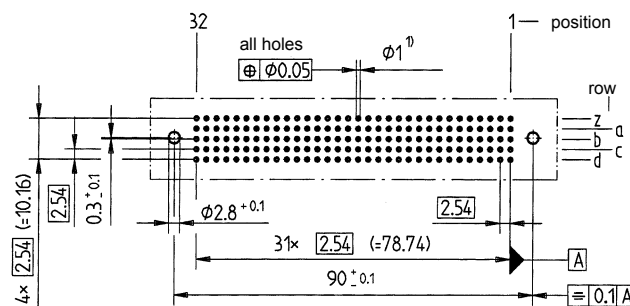
Identification	No. of contacts	Contact arrangement	Part number
Female connectors, straight with switches <sup>2)</sup>			Performance level 2 according to IEC 61076-4-113 Explanation chapter 00
with press-in terminations			
with flange 4.5/5 mm	160	z, a, b, c, d	02 03 160 2201

Dimensions



Board drillings

Mounting side



Dimensions in mm

Tooling see chapter 30

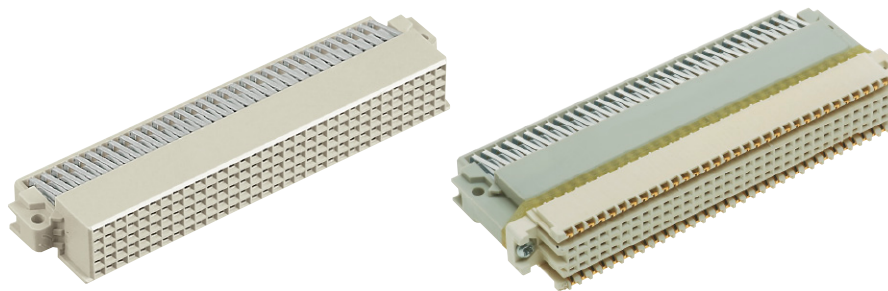
<sup>1)</sup> Press-in technology see page 00.25

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



Number of contacts

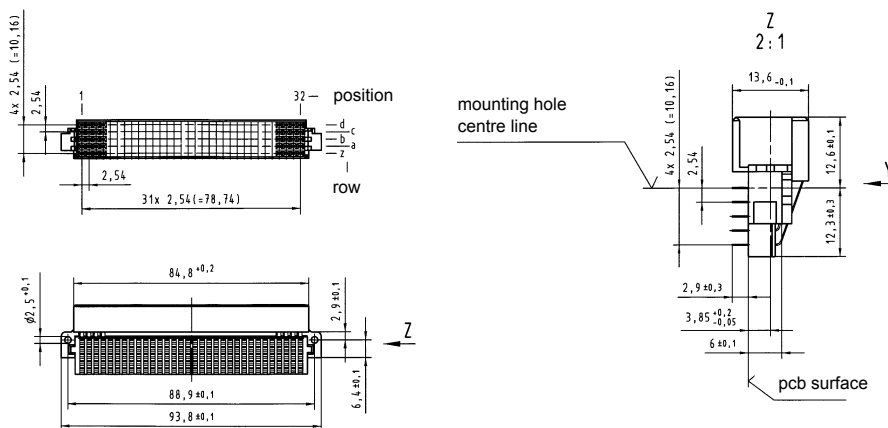
# 160



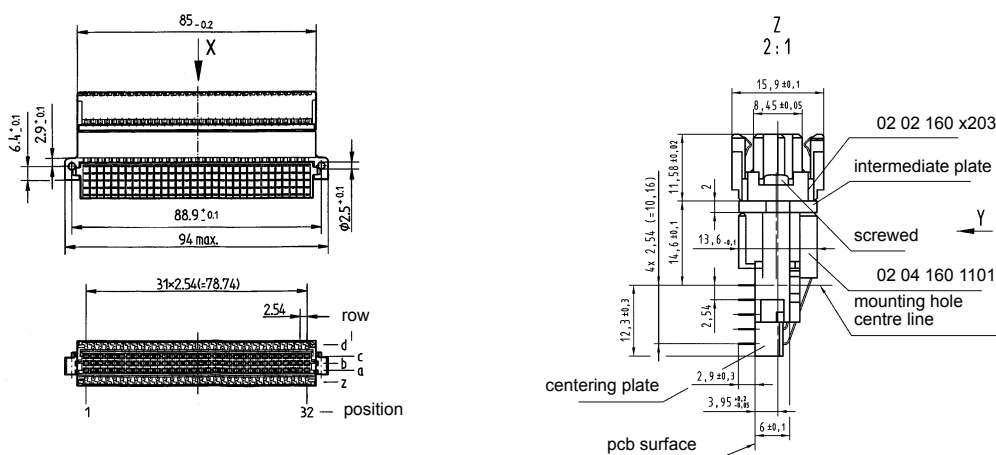
## Female connectors

Identification	No. of contacts	Contact arrangement	Part number
Female connectors, angled with solder pins			Performance level 1 according to IEC 61076-4-113 Explanation chapter 00
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

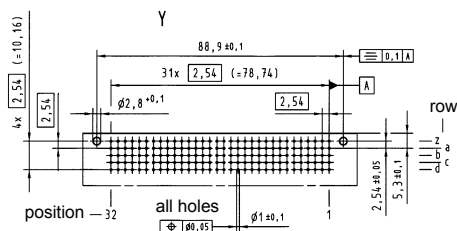
### Dimensions 02 04 160 1101



### Dimensions 02 07 160 1101



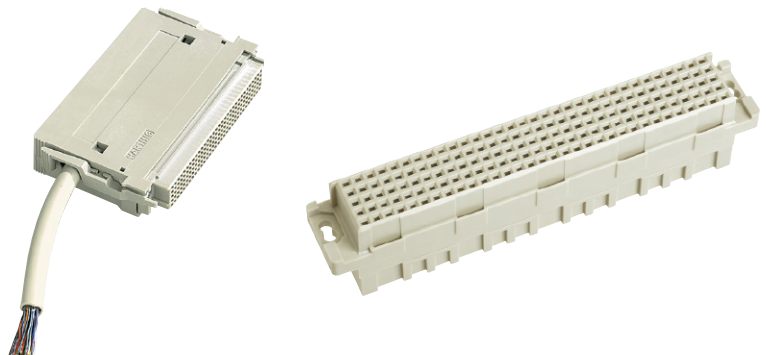
### Board drillings Mounting side



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	Part number		Performance levels according to IEC 61076-4-113. Explanation chapter 00	
	2		1	

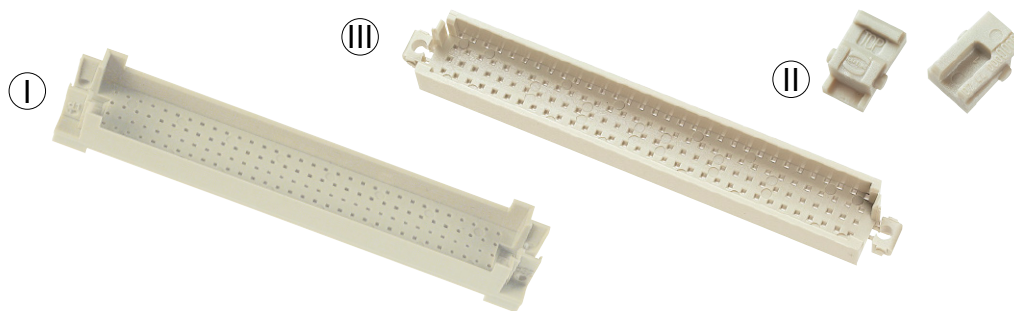
Identification	Part number		Performance levels according to IEC 61076-4-113. Explanation chapter 00	
	2		1	
Female crimp contacts har-bus® 64				
Bandoliered contacts (approx. 5,000 pieces)	02 05 000 2511		02 05 000 1511	
Bandoliered contacts (approx. 500 pieces)	02 05 000 2512		02 05 000 1512	
Individual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

Wire gauge	AWG	Insulation ø	
mm <sup>2</sup>		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			<p>Bandoliered contacts</p> <p>Individual contacts</p>

<sup>1)</sup> Packaging unit 1,000 pieces

Number of contacts

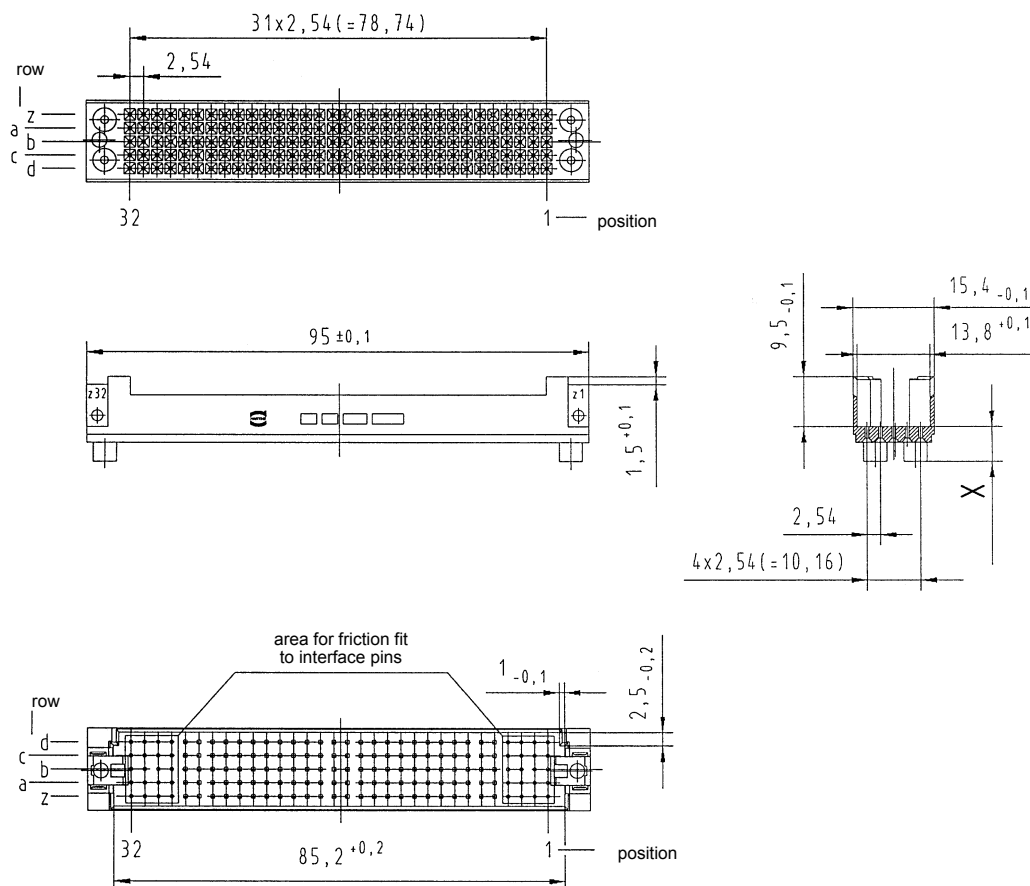
160



Pin shrouds

Identification	pcb-thickness ± 0.3	Dimension X - 0.1	Part number
Pin shrouds <sup>1)</sup> I	1.6 2.2 2.8 3.4 4.0 4.6 5.2 5.8 6.4	7.8 7.2 6.6 6.0 5.4 4.8 4.2 3.6 3.0	02 44 000 0012 02 44 000 0011 02 44 000 0007 02 44 000 0001 02 44 000 0002 02 44 000 0003 02 44 000 0004 02 44 000 0005 02 44 000 0006
II Fixing brackets for shell housing C <sup>2)</sup>			02 44 000 0009
III Shroud insert for 3 row female connectors			02 44 000 0008

Dimensions



Dimensions in mm

<sup>1)</sup> Insert block (02 09 000 0012) for assembly see chapter 30

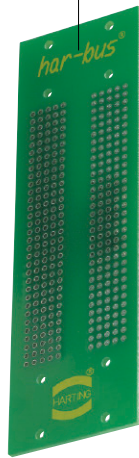
<sup>2)</sup> order 2 pieces per connector

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

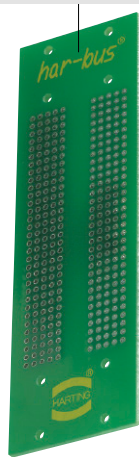
Locking lever  
left 09 02 000 9902  
right 09 02 000 9903

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

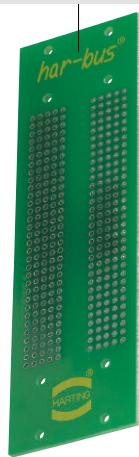


Application 3

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



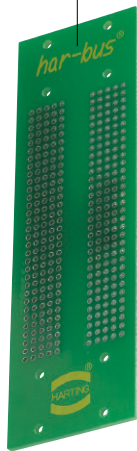
\* Only for applications without rear P0-connector

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

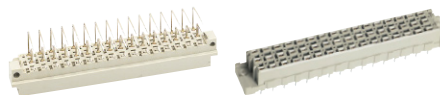
Page

Technical characteristics types D and E ..... **03.10**

Type D connectors ..... **03.11**



Type E connectors ..... **03.15**



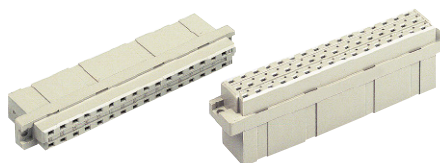
Pin shrouds for type E ..... **03.20**



Application examples type E ..... **03.21**

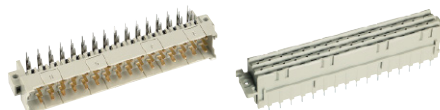
Technical characteristics piggyback connectors ..... **03.22**

Piggyback connectors ..... **03.23**



Technical characteristics types F, F9, FM and 2F ..... **03.26**

Type F connectors ..... **03.27**



Pin shrouds for type F ..... **03.36**

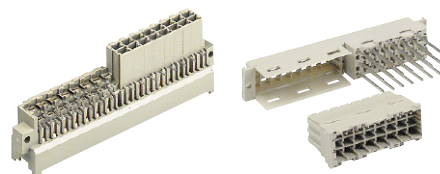


Application examples type F ..... **03.38**

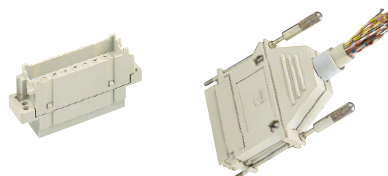
Type F9 connectors ..... **03.41**



Type FM connectors ..... **03.42**



Type 2F connectors ..... **03.44**



DIN Power  
up to 6 A



<b>Number of contacts</b>	
Type D	32
Type E	48

<b>Contact spacing (mm)</b>	
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

<b>Working current</b>	6 A max.
see current carrying capacity chart	1 A max. for female connector type E angled

<b>Clearance</b>	
Types D and E	≥ 3.0 mm
Type E male connector row separation 2.54 mm	≥ 1.6 mm

<b>Creepage</b>	≥ 3.0 mm
-----------------	----------

<b>Working voltage</b>	
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

<b>Test voltage <math>U_{r.m.s.}</math></b>	1.55 kV
---	---------

<b>Contact resistance</b>	≤ 15 mΩ
	≤ 20 mΩ for female connector type E angled

<b>Insulation resistance</b>	≥ 10 <sup>12</sup> Ω for standard articles
	≥ 10 <sup>11</sup> Ω for special NFF articles (with part-no. ending 222)

<b>Temperature range</b>	- 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 connectors

<b>Degree of protection for crimp terminal according to DIN 40 050</b>	IP20
--	------

<b>Electrical termination</b>	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 mm <sup>2</sup>
	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

<b>Insertion and withdrawal force</b>	32 way ≤ 40 N
	48 way ≤ 75 N

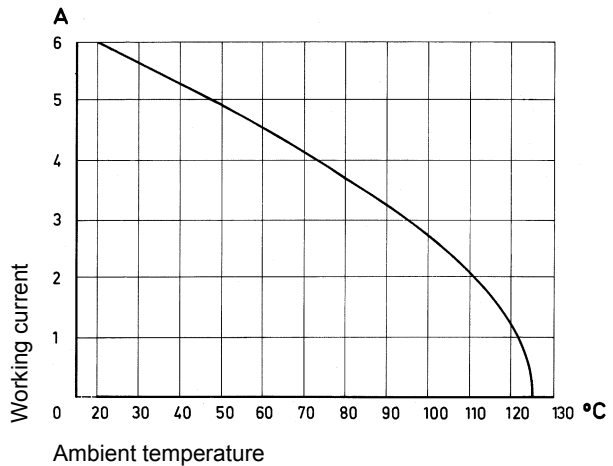
<b>Materials</b>	
Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
<b>Contact surface</b>	
Contact zone	Selectively gold plated according to performance level <sup>1)</sup>

<sup>1)</sup> 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

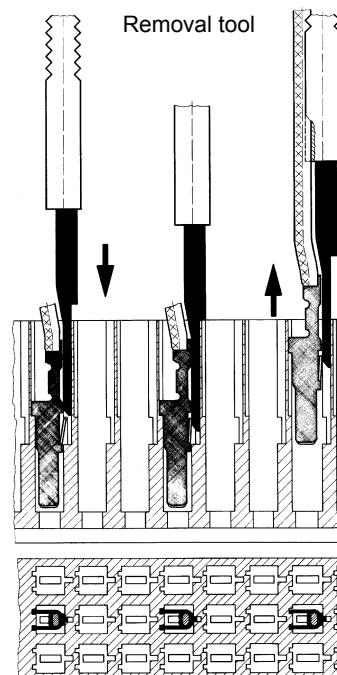


## Fitting the crimp contacts

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 mm<sup>2</sup> an insertion tool is necessary.

## Removing the crimp contacts

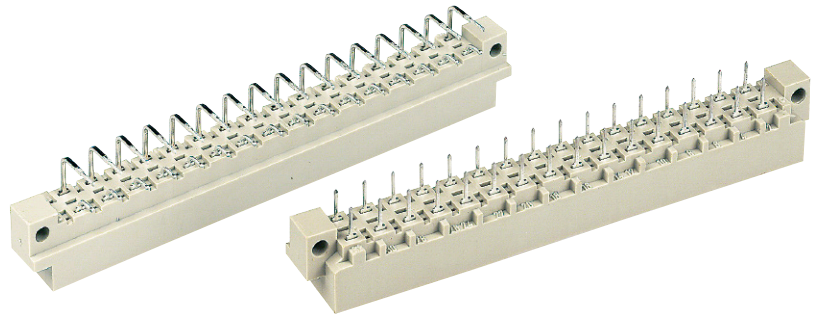
The removal tool is inserted into a slot on the termination side of the respective crimp cavity. This action compresses the contact retaining spring therefore the contact can then be easily withdrawn using a light pull on the wire. This action will cause no damage to the contact/wire which can be repositioned/refitted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



DIN Power up to 6 A

Number of contacts

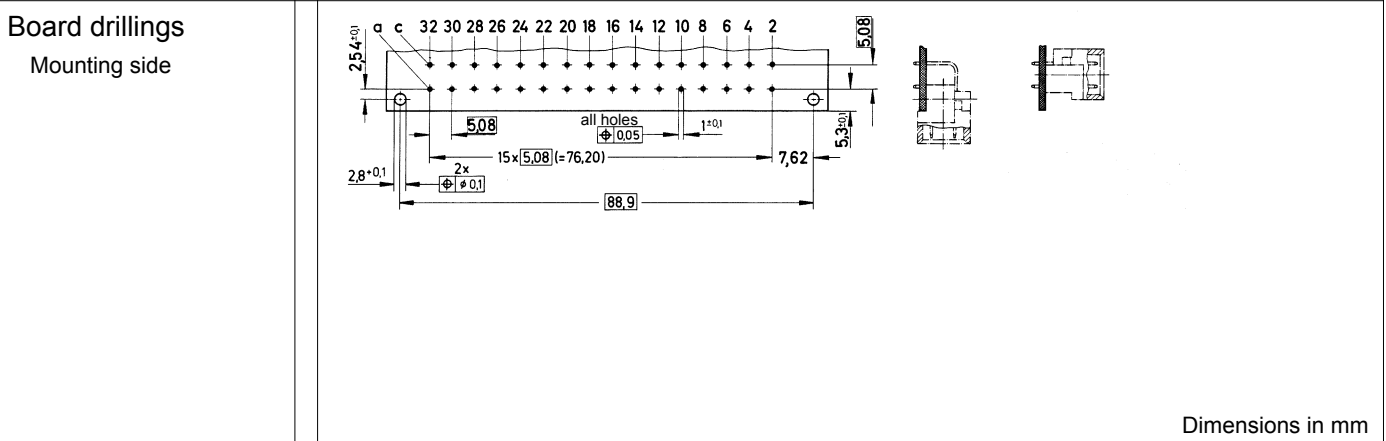
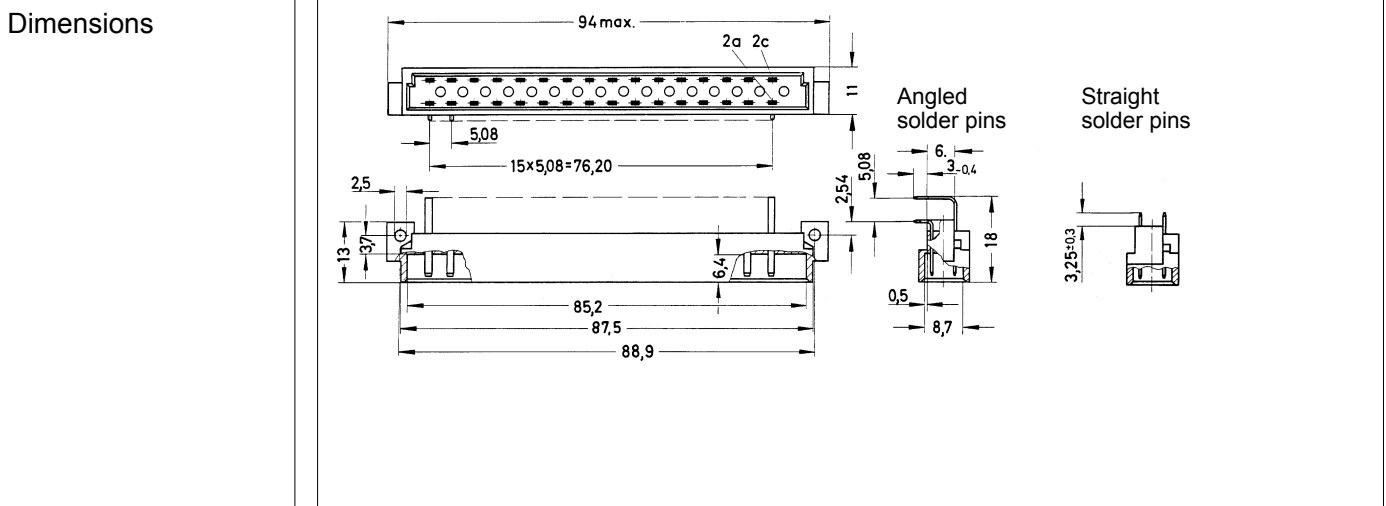
# 32



Male connectors

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

DIN Power up to 6 A



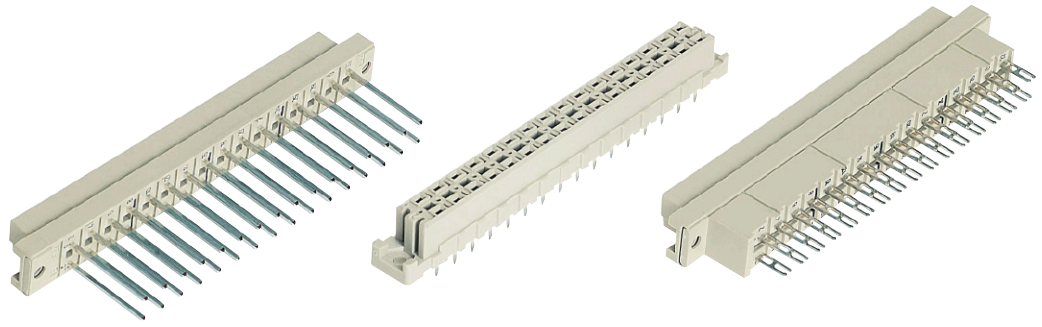
03  
11

<sup>▲</sup> Male connectors with 2 leading contacts [(0.8 mm) pos. a2 and a3]  
Other contact arrangements on request

<sup>b)</sup> Connectors with snap-in clips see chapter 00  
<sup>c)</sup> Connectors with coding see chapter 00  
<sup>d)</sup> CTI > 400

Number of contacts

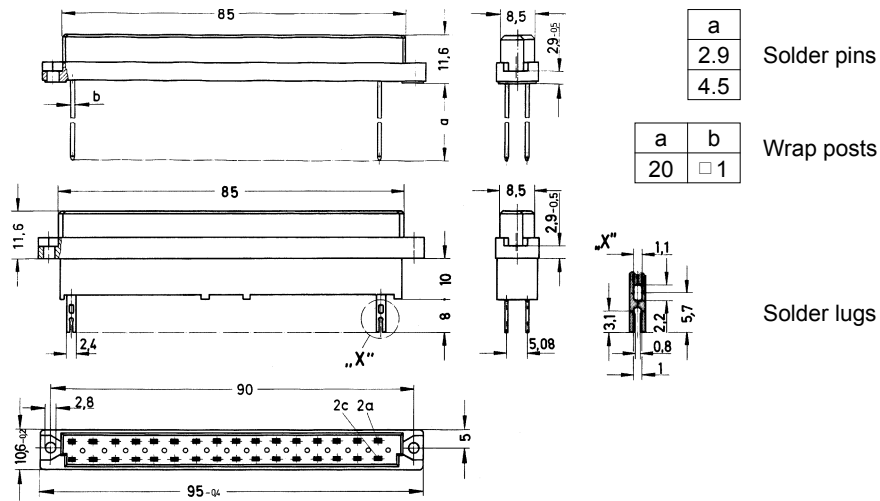
# 32



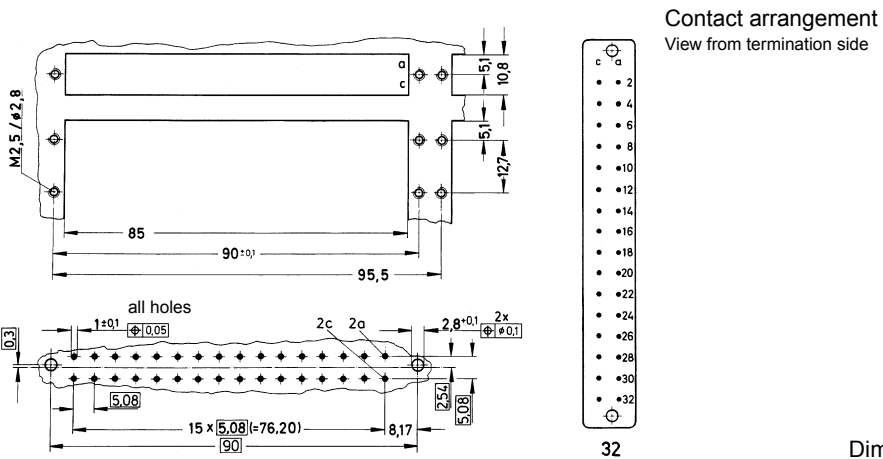
Female connectors

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00		
			3	2	1	
Female connector with solder pins 2.9 mm	32		09 04 232 7832	09 04 232 6832 09 04 732 6832 <sup>c)</sup>	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 <sup>b)</sup> 09 04 732 6831 <sup>c)</sup>	09 04 232 2831	
Female connector with wrap posts 20 mm	32		09 04 232 7821	09 04 232 6821 09 04 732 6821 <sup>c)</sup>	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

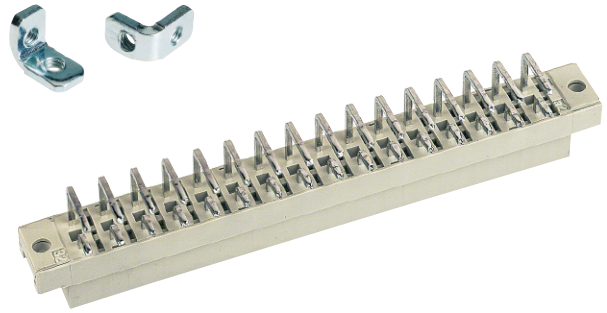


DIN Power up to 6 A

<sup>b)</sup> Connectors with snap-in clips see chapter 00  
<sup>c)</sup> 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			09 06 000 9912 <sup>1)</sup>		
Board drillings Mounting side					

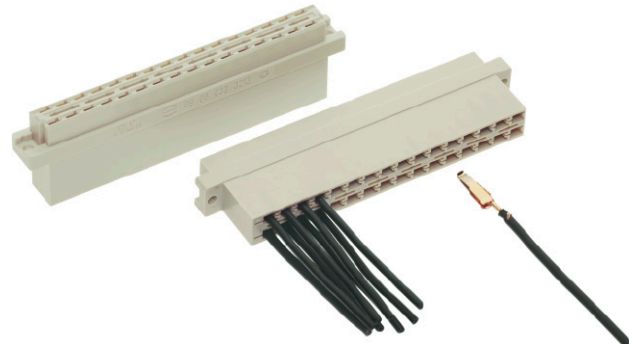
<sup>1)</sup> order 2 pieces for one connector

DIN Power up to 6 A

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 <sup>f)</sup>		
	32	09 04 532 3213 <sup>c)</sup> 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 <sup>1)</sup>	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 <sup>2)</sup> (lockable)			09 06 000 6420

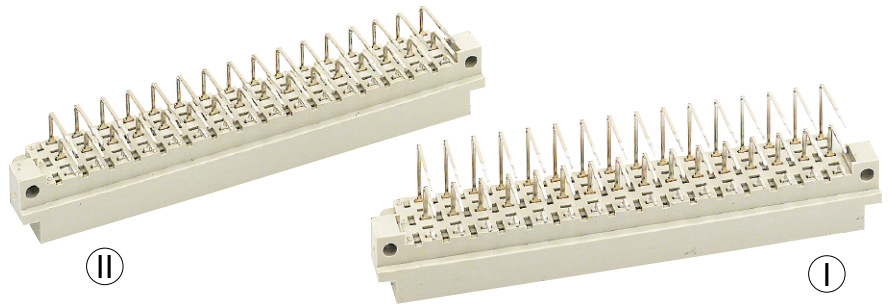
Identification	Wire gauge mm <sup>2</sup>	AWG	Insulation ø mm	Identification
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8
3.5 + 0.5 mm of insulation is stripped from the wires to be crimped				
For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)				
Insertion, removal and crimping tools see chapter 30				

DIN Power up to 6 A

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

Number of contacts

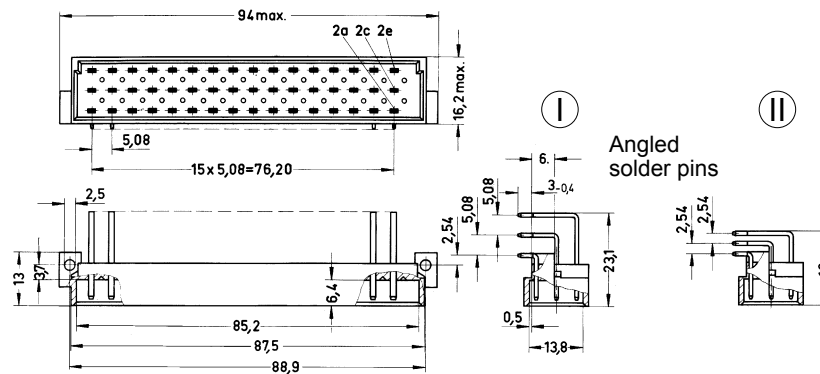
# 48



Male connectors

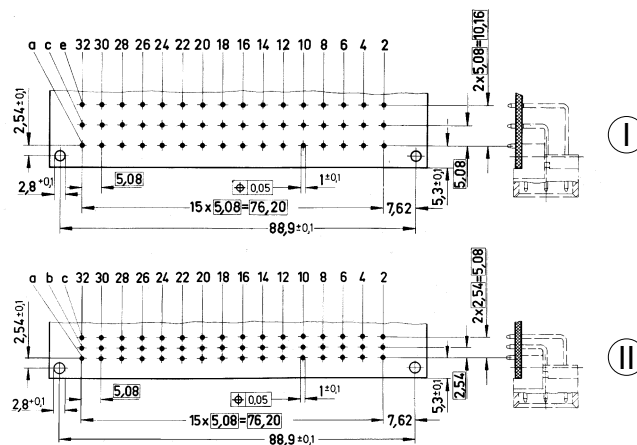
Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00		
				3	2	1
Male connector with angled solder pins  Row separation termination side 5.08 mm ①  Row separation termination side 2.54 mm ②  THR	48		09 05 148 7921	09 05 148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

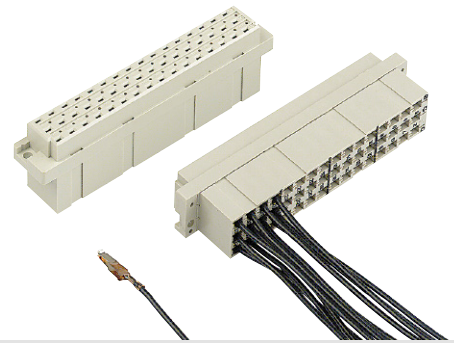
<sup>b)</sup> Connectors with snap-in clips see chapter 00  
<sup>c)</sup> Connectors with coding see chapter 00  
<sup>d)</sup> CTI > 400





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 <sup>1)</sup> 09 05 548 3202 <sup>c)</sup>	<p>85, 84, 11,6, 14,8, 13,6, 2,9, 15,1, 15,7, 90±0,1, 2,8<sup>+0,1</sup>, 2e, 2c, 2a, 5,08, 15 x 5,08 = 76,20, 8,17, 95-0,4, 2 x 5,08 = 10,16</p> <p>View from termination side</p> <p>Shell housing 09 05 048 0501 see chapter 20</p>	

DIN Power up to 6 A

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, 2, 3	09 06 000 6484, 09 06 000 6481, 09 06 000 6482	09 06 000 6474, 09 06 000 6471, 09 06 000 6472
Bandoliered contacts (approx. 250 pieces)	1, 2, 3	09 06 000 7484, 09 06 000 7481, 09 06 000 7482	09 06 000 7474, 09 06 000 7471, 09 06 000 7472
Individual contacts <sup>1)</sup>	1, 2, 3	09 06 000 8484, 09 06 000 8481, 09 06 000 8482	09 06 000 8474, 09 06 000 8471, 09 06 000 8472
Female contacts with solder lugs <sup>2)</sup> (lockable)			09 06 000 6420

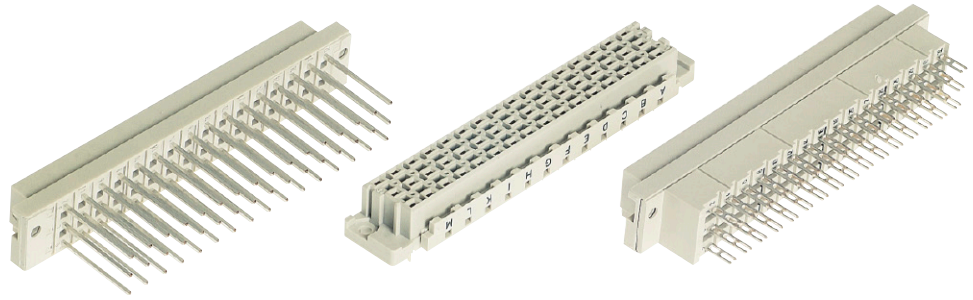
FC	Wire gauge	Wire gauge mm <sup>2</sup>	AWG	Insulation ø mm	Identification
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5	<p>Bandoliered contacts</p> <p>Individual contacts</p>
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0	
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8	
3.5 + 0.5 mm of insulation is stripped from the wires to be 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					

<sup>c)</sup> Connectors with coding see chapter 00  
<sup>f)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

<sup>1)</sup> Packaging unit 1,000 pieces  
<sup>2)</sup> Solder contacts must not be used together with shell housing A. Special contact surface: 2 µm gold.

Number of contacts

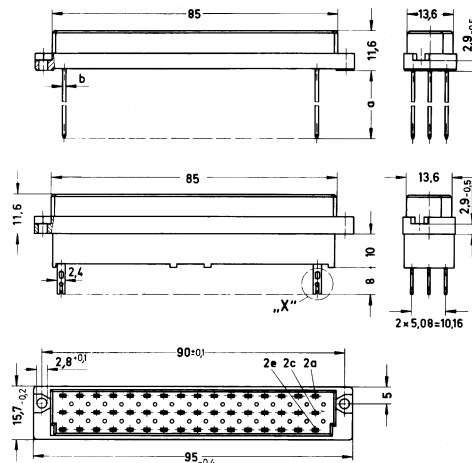
# 48



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 <sup>b)</sup> 09 05 748 6831 <sup>c)</sup> 09 05 848 6831 <sup>b)c)</sup>	09 05 248 2831 09 05 748 2831 <sup>c)</sup>
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 <sup>•</sup>	09 05 248 2851 <sup>•</sup>

Dimensions

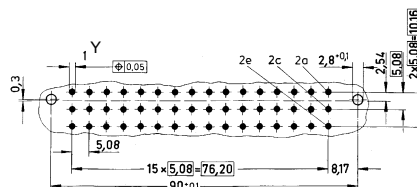


a	b
2.9	0.8 x 0.53
4.5	0.8 x 0.53
20	□ 1
4.5	0.6 x 0.6
11.5	0.6 x 0.6

Solder pins  
Wrap posts  
Press-in pins

Solder lugs

Board drillings  
Mounting side



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

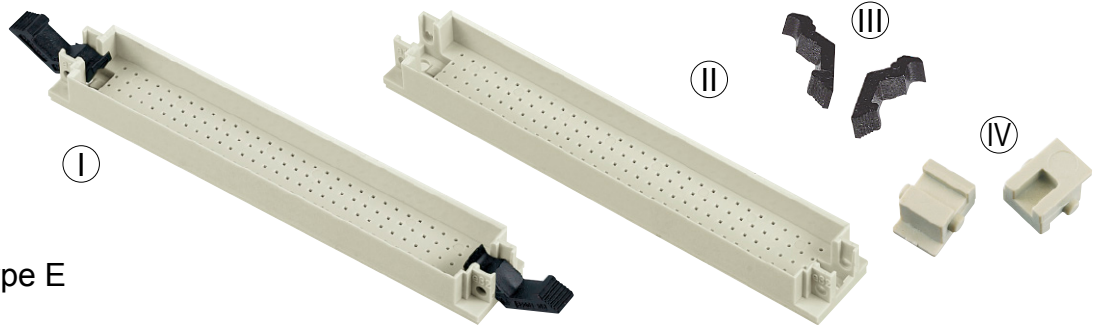
Dimensions in mm

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



Number of contacts

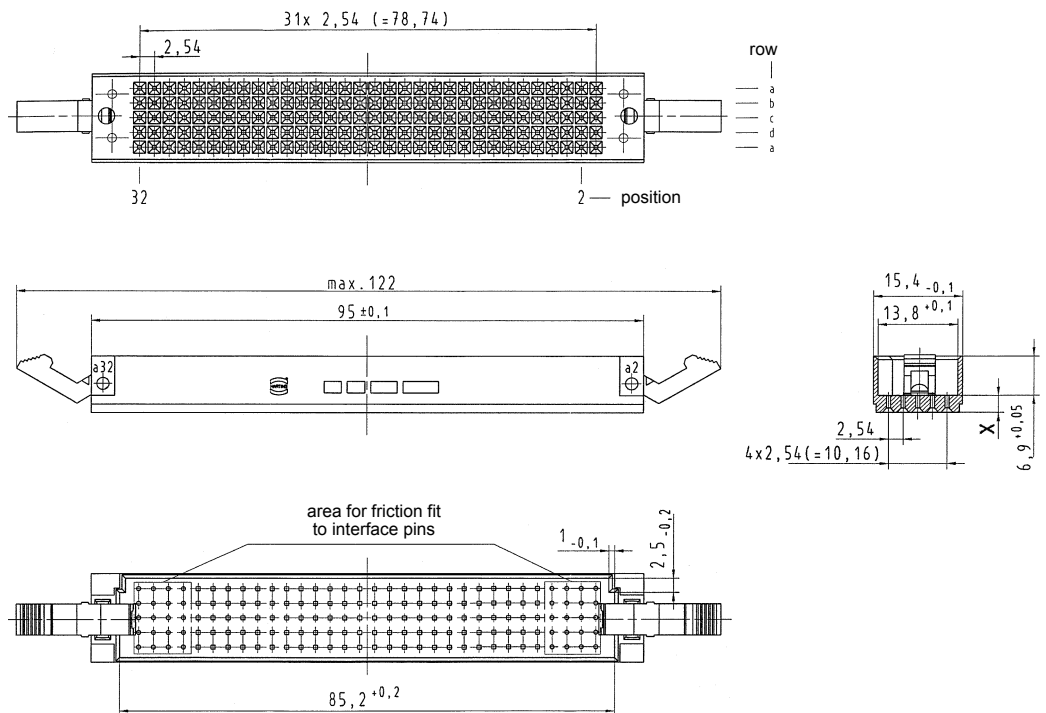
# 48



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 <sup>f)</sup>
I with locking levers	3.4	3.0	09 05 000 9922
II without locking levers	3.4	3.0	09 05 000 9912 <sup>f)</sup>
III Locking lever for female connector type E <sup>1)</sup>			09 03 000 9914
IV Fixing brackets for shell housing C <sup>1)</sup>			09 03 000 9921 <sup>f)</sup>

## Dimensions



Dimensions in mm

<sup>1)</sup> order 2 pieces per connector

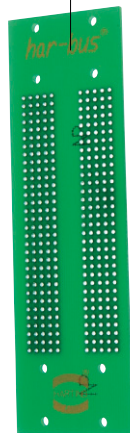
<sup>f)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

## Application 1

Female connector  
09 05 248 6851



Backplane



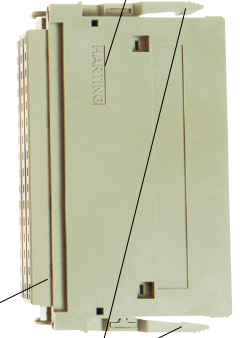
Pin shroud  
09 05 000 9912



Fixing brackets  
09 03 000 9921



Shell housing C  
09 05 048 0501



Female connector  
with crimp contacts  
09 05 048 3202

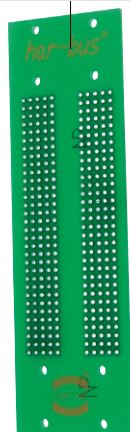
Locking lever  
left 09 02 000 9902  
right 09 02 000 9903

## 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

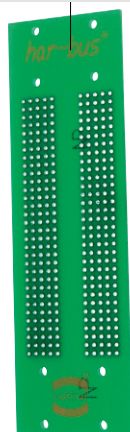


## Application 3

Female connector  
09 05 248 6851



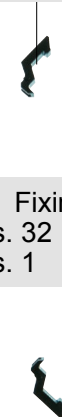
Backplane



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

DIN Power  
up to 6 A



Number of contacts	16, 32, 48
Working current see current carrying capacity chart	6 A max.
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 <sup>12</sup> Ω for standard articles

Termination	Crimp terminal 0.09-1.5 mm <sup>2</sup>
-------------	--

Materials	
Mouldings and hoods	Thermoplastic resin, glass-fibre filled
Contacts	Copper alloy

### 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.

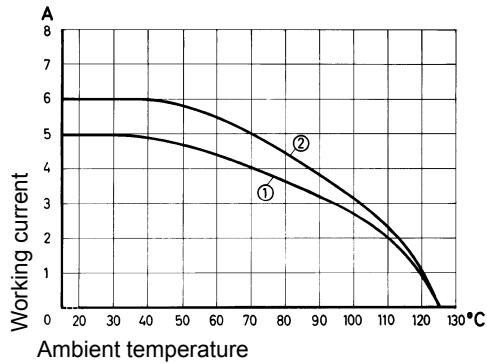
After crimping they can be easily inserted into the chambers of the connector body with the aid of an insertion tool. Insertion errors can be simply rectified with the use of a removal tool.

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.

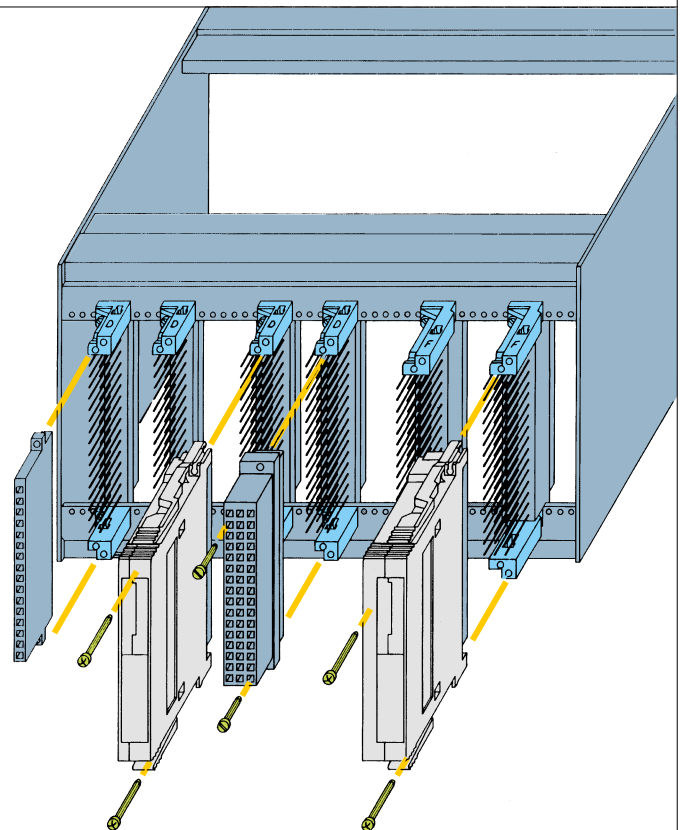
### Current carrying capacity

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



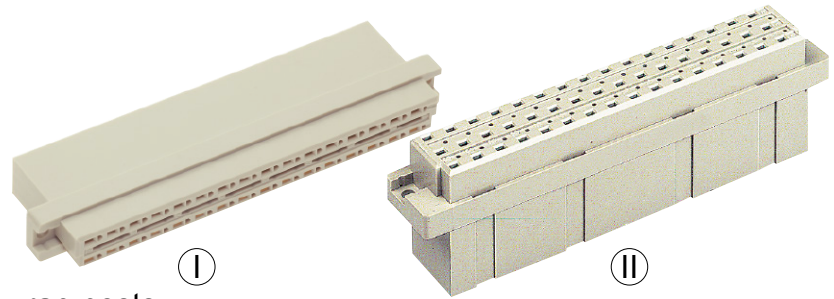
① with shell housing    ② without shell housing



DIN Power up to 6 A

Number of contacts

# max. 48



Piggyback connectors for 1 x 1 mm wrap posts

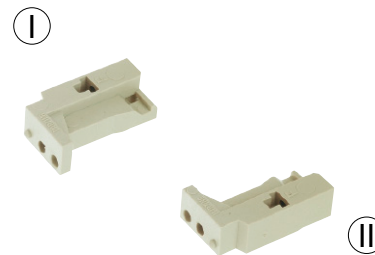
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
Piggyback connector for crimp contacts Order contacts separately  (I)	16	09 04 016 3201 <sup>f)</sup>		
	32	09 04 032 3215 <sup>f)</sup>		
	48	09 05 048 3204 <sup>f)</sup>		

DIN Power up to 6 A

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

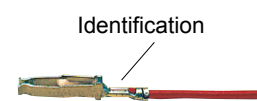
Number of contacts

# max. 48



## Accessories

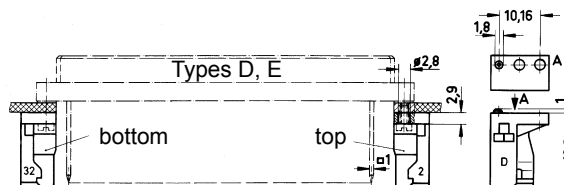
Identification	No. of contacts	Part number	Drawing	Dimensions in mm																
<b>Female FC crimp contacts</b> individual contacts <sup>1)</sup> FC1 FC2 FC3 Bandoliered contacts (approx. 2,500 pcs.) FC1 FC2 FC3			<table border="1"> <thead> <tr> <th>Identi- fication</th> <th>Wire gauge mm<sup>2</sup></th> <th>AWG</th> <th>Insulations <math>\varnothing</math> mm</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.09-0.25</td> <td>28-24</td> <td>0.7-1.5</td> </tr> <tr> <td>2</td> <td>0.14-0.56</td> <td>26-20</td> <td>0.8-2.0</td> </tr> <tr> <td>3</td> <td>0.50-1.50</td> <td>20-16</td> <td>1.6-2.8</td> </tr> </tbody> </table> <p>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</p>	Identi- fication	Wire gauge mm <sup>2</sup>	AWG	Insulations $\varnothing$ mm	1	0.09-0.25	28-24	0.7-1.5	2	0.14-0.56	26-20	0.8-2.0	3	0.50-1.50	20-16	1.6-2.8	
Identi- fication	Wire gauge mm <sup>2</sup>	AWG	Insulations $\varnothing$ mm																	
1	0.09-0.25	28-24	0.7-1.5																	
2	0.14-0.56	26-20	0.8-2.0																	
3	0.50-1.50	20-16	1.6-2.8																	
<b>Mateable with                      1 x 1 mm wrap posts</b>																				



## Distance fixing brackets for female connectors

Type D  
 Type E

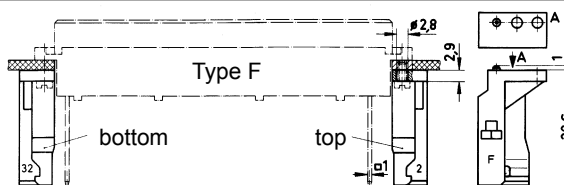
top (pos. 2)  
 09 04 000 9907<sup>f)</sup>  
 bottom (pos. 32)  
 09 04 000 9906<sup>f)</sup>



Type F



top (pos. 2)  
 09 06 000 9936<sup>f)</sup>  
 bottom (pos. 32)  
 09 06 000 9937<sup>f)</sup>



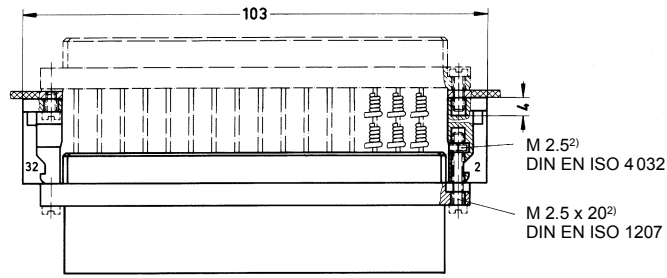
<sup>1)</sup> Packaging unit 1,000 pieces  
<sup>f)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Identification

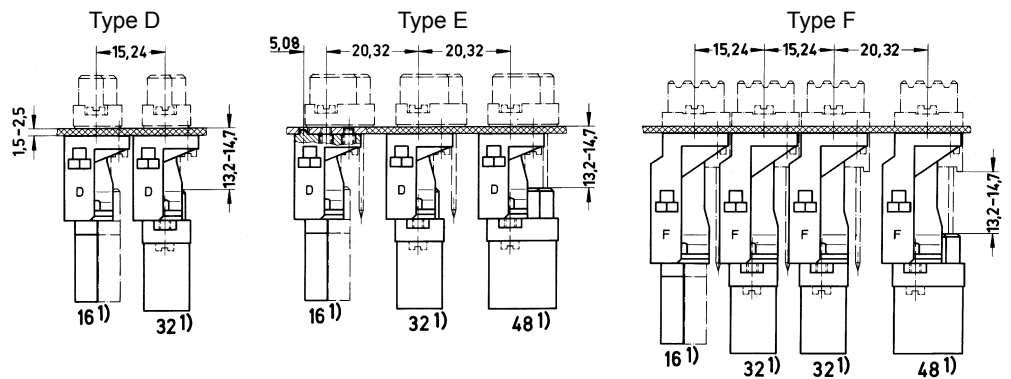
Drawing

Dimensions in mm

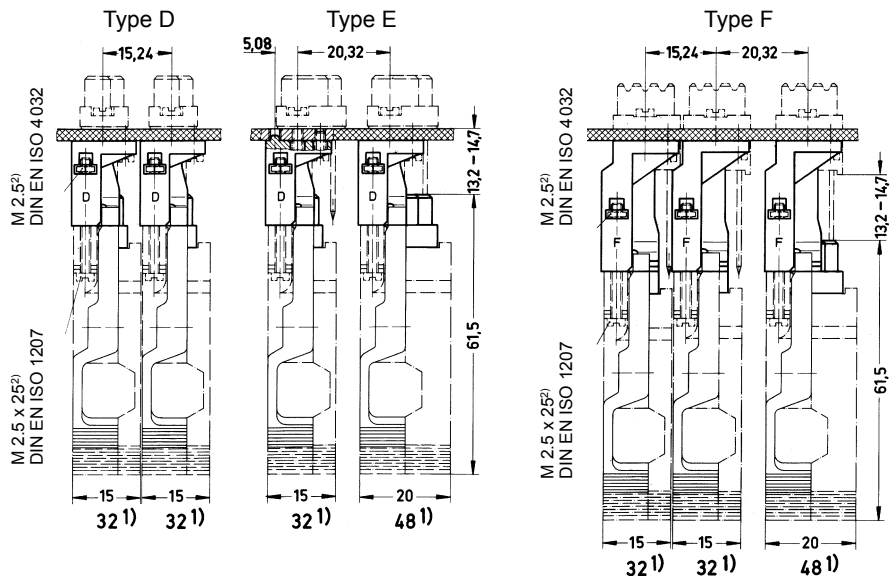
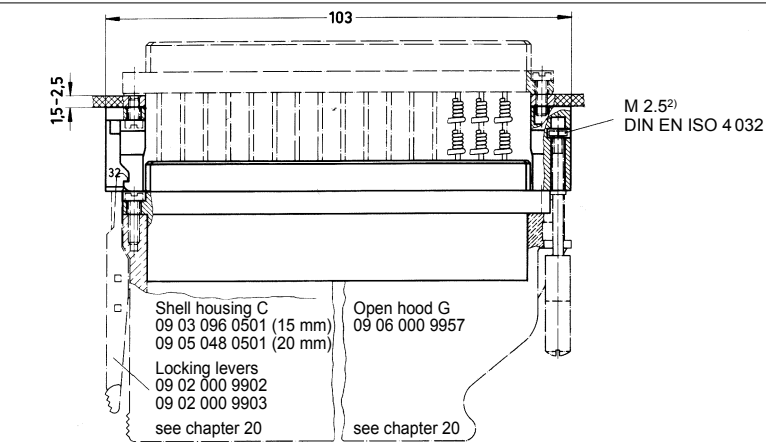
Mounting examples  
of piggyback  
connectors



without housings



with housings



DIN Power  
up to 6 A

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<sup>12</sup> Ω for standard articles  
≥ 10<sup>11</sup> 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  
During reflow soldering

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

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 mm<sup>2</sup>  
Angled solder pins 1 x 1 mm for pcb connections Ø 1.6 ± 0.1 mm  
Solder lugs  
Compliant press-in terminations  
pcb thickness  
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  
Copper alloy

### Contacts

### Contact surface

Contact zone

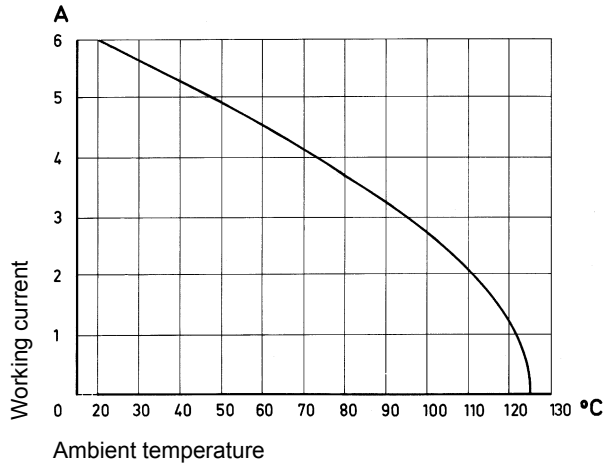
Selectively plated according to performance level<sup>1)</sup>

<sup>1)</sup> 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

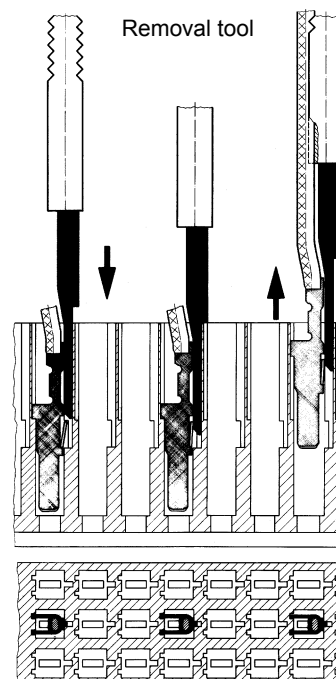


## Fitting the crimp contacts

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 mm<sup>2</sup> an insertion tool is necessary.

## Removing the crimp contacts

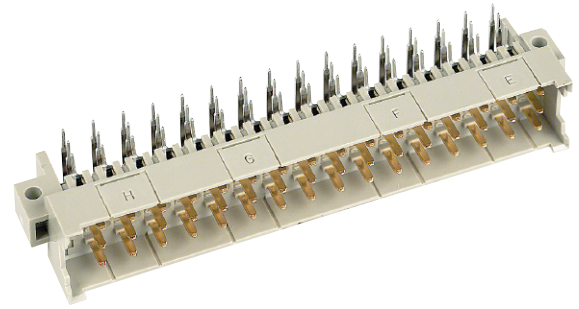
The removal tool is inserted into a slot on the termination side of the respective crimp cavity. This action compresses the contact retaining spring therefore the contact can then be easily withdrawn using a light pull on the wire. This action will cause no damage to the contact/wire which can be repositioned/refitted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



DIN Power up to 6 A

Number of contacts

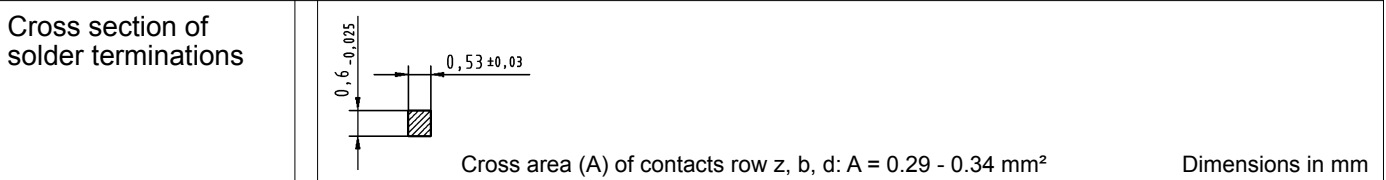
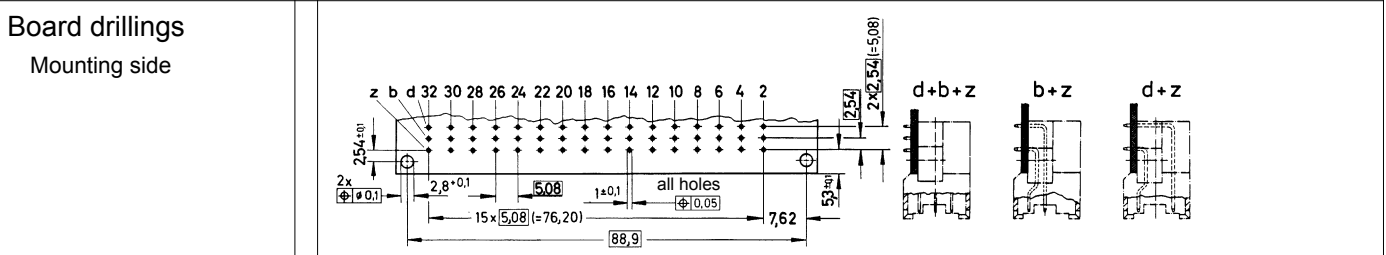
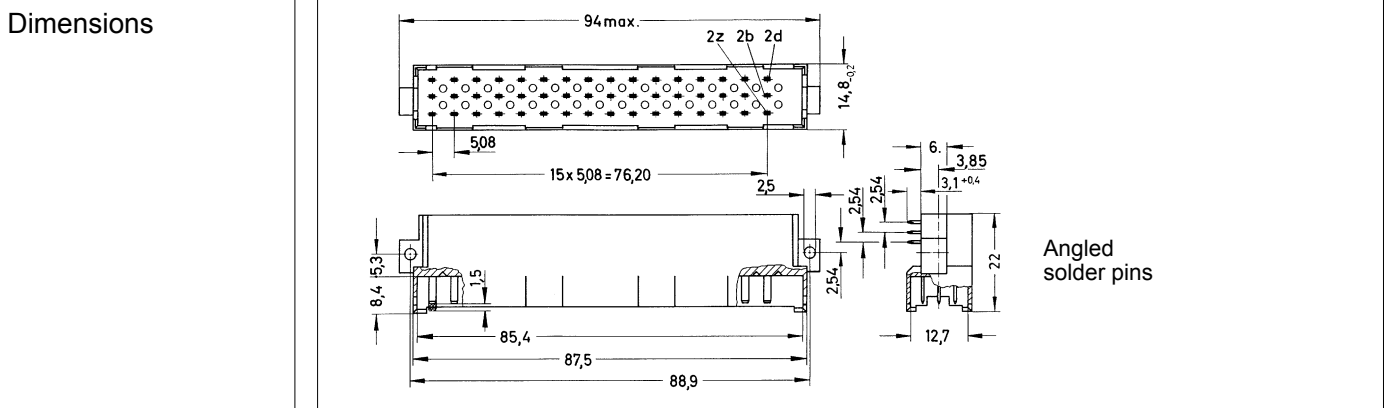
# 48, 32



Male connectors

Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60603-2. Explanation chapter 00			
			Part number 3	2	1	
Male connector with angled solder pins <sup>1)</sup>	48		09 06 148 7901	09 06 148 6901 09 06 148 6901 222 <sup>f)</sup> 09 06 348 6901 <sup>b)</sup> 09 06 348 6901 222 <sup>b)f)</sup>	09 06 148 2901 09 06 148 2901 222 <sup>f)</sup>	
					09 06 148 6951 <sup>d)</sup> 09 06 348 6951 <sup>b)d)</sup>	09 06 348 2951 <sup>b)d)</sup>
	32		09 06 132 7901 09 06 332 7901 <sup>b)</sup>	09 06 132 6901 09 06 132 6901 222 <sup>f)</sup>	09 06 132 2901	
				09 06 132 7931	09 06 132 6931 09 06 132 6931 222 <sup>f)</sup> 09 06 332 6931 <sup>b)</sup>	09 06 132 2931 09 06 332 2931 <sup>b)</sup>
	1 leading contact (position z 32)	47 + 1			09 06 148 6921 09 06 348 6921 <sup>b)</sup>	09 06 148 2921
	2 leading contacts (positions b 2 + b 32)	31 + 1		09 06 132 7921	09 06 132 6921	09 06 132 2921
	46 + 2			09 06 148 6925 09 06 148 6925 222 <sup>f)</sup>	09 06 148 2925	

DIN Power up to 6 A



03  
27

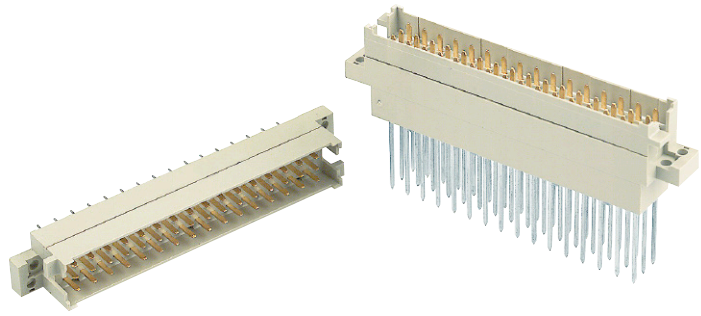
Other contact arrangements on request  
<sup>1)</sup> With shroud coding, see also chapter 00  
<sup>b)</sup> Connectors with snap-in clips see chapter 00

<sup>d)</sup> CTI > 400  
<sup>f)</sup> 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 <sup>1)</sup> 0.6 x 0.6 mm	48		Performance level 1* 09 06 048 2905 <sup>f)</sup>		
	32		09 06 032 2905 <sup>f)</sup>		
	32		09 06 032 2941 <sup>f)</sup>		
Board drillings Mounting side					
Interface connector I with wrap posts <sup>1)</sup> 1 x 1 mm	48		Performance level 1* 09 06 048 2903 <sup>f)</sup>		
	48		09 06 048 2963 <sup>f)</sup>		
	32		09 06 032 2903 <sup>f)</sup>		
Panel cut out					Contact arrangement View from termination side 

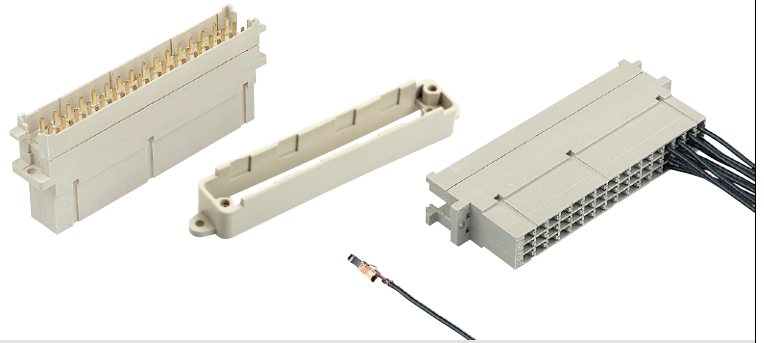
DIN Power up to 6 A

03-28

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

Number of contacts

# 48



## Interface connector I

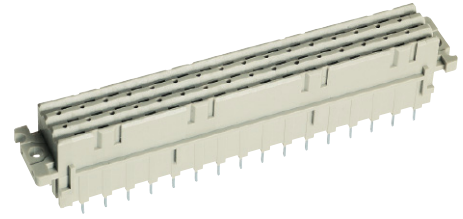
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
<p>Interface connector I utilising female crimp contacts<sup>1)</sup></p> <p>Order crimp contacts separately see page 03.33</p>	48	<p>Performance level 1 acc. to IEC 60 603-2</p> <p>09 06 048 2906<sup>f)</sup></p>	<p>5,08 90 2z 2b 2d 2,8 0,3 2x3,81=7,62 15 x 5,08 = 76,20 8,17 95-0,4 84 20 14,8 12,7 12,3 2,9-0,3 38 8-0,3 14,8-0,2 85,4</p> <p>Contact arrangement View from termination side</p> <p>32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 PP 99 2z</p> <p>„X“</p>	<p>M2,5/ø 2,8 7,5 15,5 7,5 15,24 85 90±0,1 95,5</p>
<p>Shell housing see chapter 20</p>				
<p>Panel cut out</p>				
<p>Shroud<sup>1)</sup> 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.</p>		09 06 001 9964	<p>max. 121 105±0,1 A A 18±0,1 3,7±0,1 112±0,1 94,45±0,1 90±0,1 97,5±0,1 101,15±0,1 112±0,1 94,45±0,1 90±0,1 97,5±0,1 101,15±0,1</p> <p>Inkl. Einpressmutter M2,5 incl. insert nut M2,5</p> <p>M2,5 ø 2,8 ± 0,1</p>	

DIN Power up to 6 A

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

Number of contacts

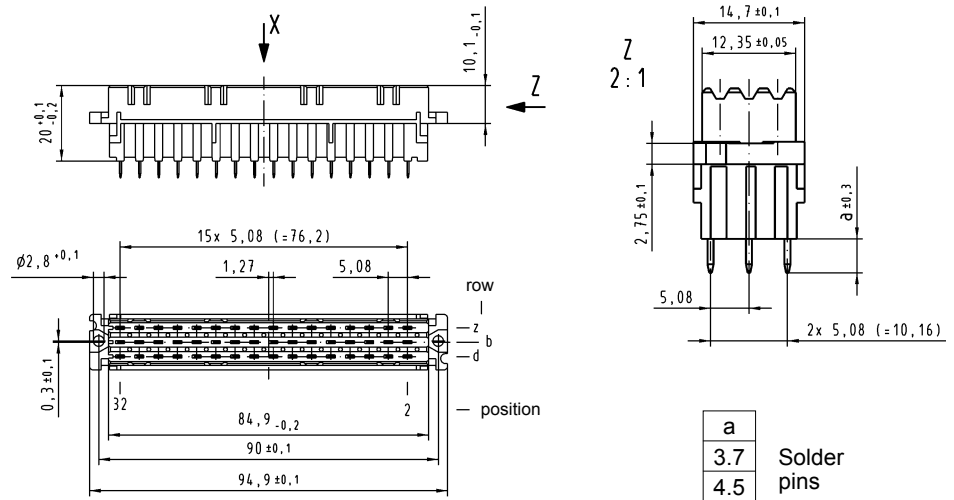
# 48, 32



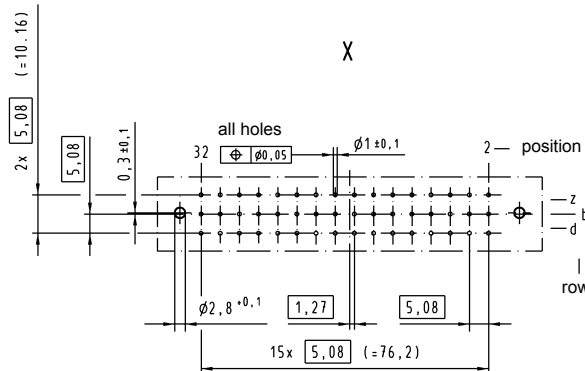
Female connectors

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 solder pins 3.7 mm <sup>1)</sup>	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 <sup>1)</sup>	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



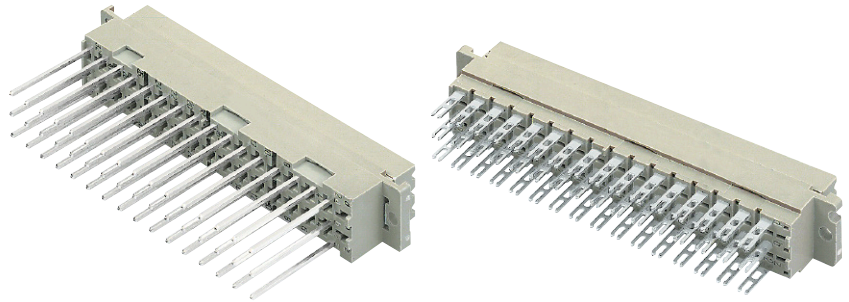
Dimensions in mm

<sup>1)</sup> With shroud coding, see also chapter 00

DIN Power up to 6 A

Number of contacts

# 48, 32

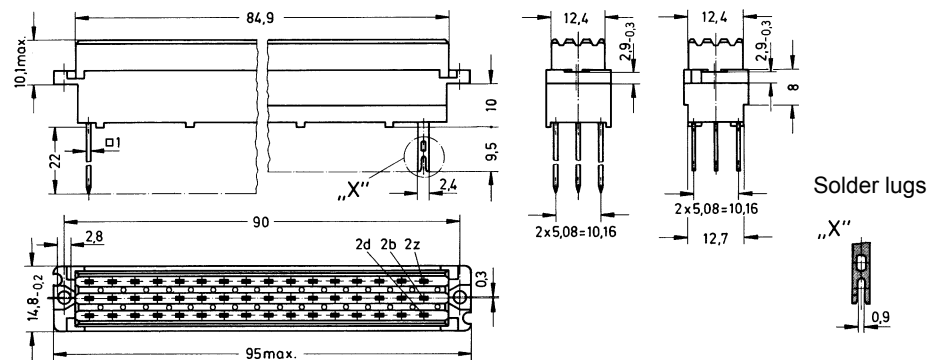


Female connectors

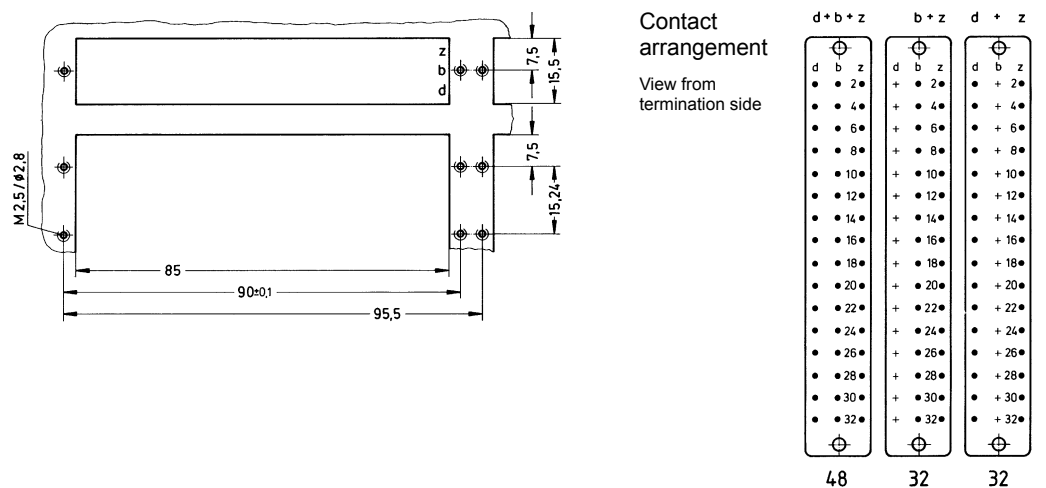
Identification	No. of contacts	Contact arrangement	Performance levels according to IEC 60 603-2. Explanation chapter 00		
			Part number 3	2	1
Female connector with wrap posts 22 mm	48		09 06 248 7821	09 06 248 6821	09 06 248 2821 09 06 248 2821 222 <sup>f)</sup>
	32		09 06 232 7821	09 06 232 6821	09 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

DIN Power up to 6 A

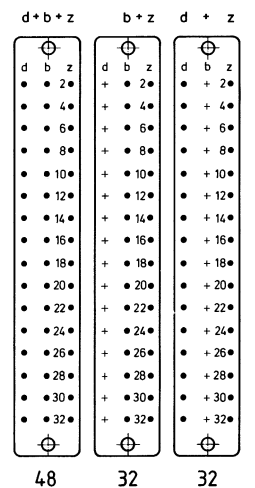
Dimensions



Panel cut out



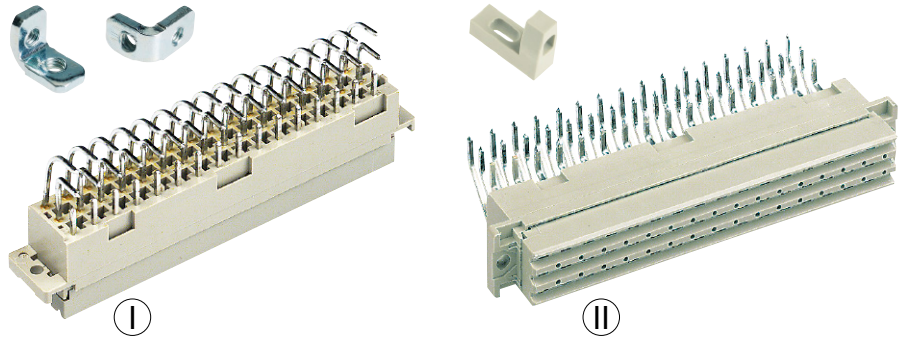
Contact arrangement  
View from termination side



Dimensions in mm

Number of contacts

# 48, 32



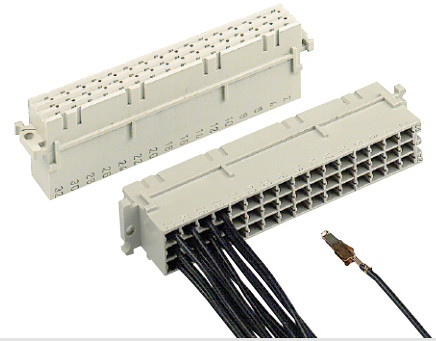
Female connectors

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		Performance level 3 on request	09 06 248 6826	Performance level 1 on request
	32			09 06 232 6826	
	48			09 06 248 6836	
	32			09 06 232 6846	
	32			09 06 232 6836	
Dimensions					
Fixing bracket		Metal	09 06 000 9912 <sup>1)</sup>	for version	
		Plastic	09 06 000 9975 <sup>1)</sup>	for version	
Board drillings Mounting side					

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 <sup>1)</sup> Order contacts separately	48	09 06 248 3201 09 06 248 3201 222 <sup>f)</sup>	<p>Contact arrangement View from termination side</p>	
Shell housing see chapter 20				

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 <sup>2)</sup>	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 <sup>3)</sup> (lockable)			09 06 000 6420

FC	Wire gauge	Wire gauge mm <sup>2</sup>	AWG	Insulation ø mm	Identification
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5	<p>Bandoliered contacts</p> <p>Individual contacts</p>
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					

DIN Power up to 6 A

<sup>1)</sup> With shroud coding, see also chapter 00

<sup>2)</sup> Packaging unit 1,000 pieces

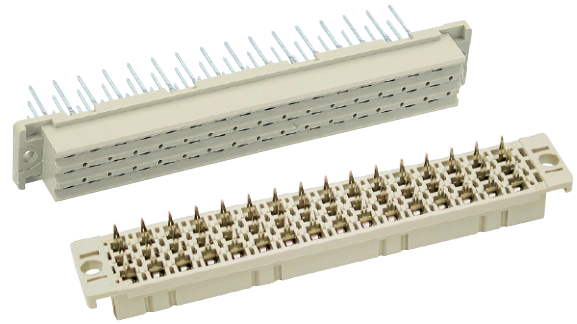
<sup>3)</sup> Solder contacts must not be used together with shell housing A. Special contact surface: 2 µm gold.

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



Number of contacts

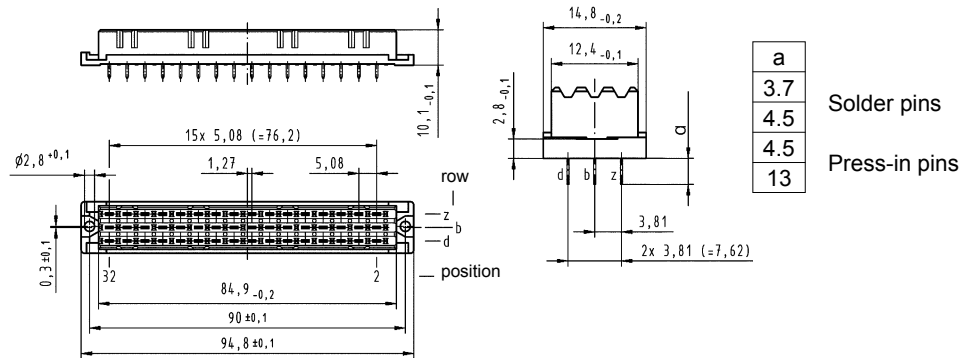
# 48, 32



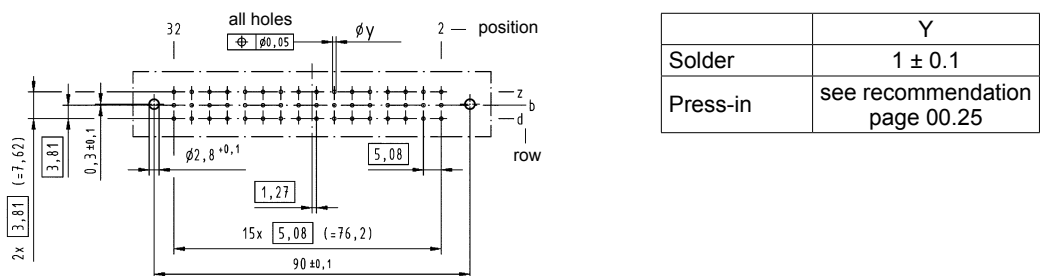
Female connectors

Identification	No. of contacts	Contact arrangement	Part number	Performance levels according to IEC 60 603-2. Explanation chapter 00		
				3	2	1
Female connector <sup>1)</sup> "low profile" with solder pins 3.7 mm	48		09 06 248 7833	09 06 248 6833 09 06 248 6833 222 <sup>f)</sup>	09 06 248 2833 09 06 248 2833 222 <sup>f)</sup>	
	32					
	32					
Female connector <sup>1)</sup> "low profile" with solder pins 4.5 mm	48		09 06 248 7833	09 06 248 6834 09 06 248 6834 222 <sup>f)</sup>	09 06 248 2834	
	32					
	32					
Female connector <sup>1)</sup> "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 <sup>f)</sup>	
	32					
	32					
Female connector "low profile" with press-in pins 13 mm	48		09 06 248 7832	09 06 248 6832 09 06 248 6838*	09 06 248 2832 09 06 248 2832 222 <sup>f)</sup>	
	32					

Dimensions



Board drillings  
Mounting side



Dimensions in mm

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

<sup>1)</sup> With shroud coding, see also chapter 00

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

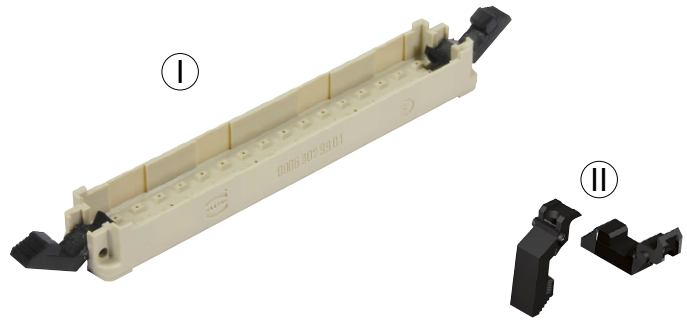
<sup>w)</sup> Wrap posts not for interfacing, no performance level



Number of contacts

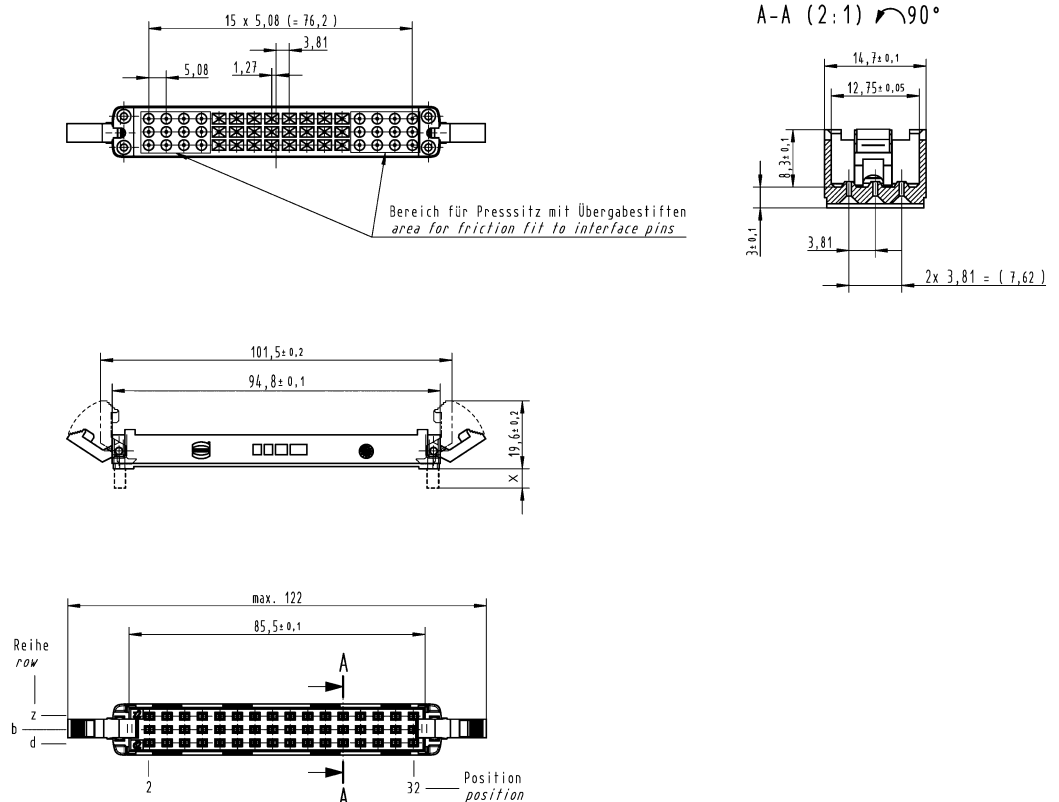
# 48

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			
Ⓚ with locking levers <sup>2)</sup> and press-in fixing	1.6 - 2.4	1.6	09 06 002 9902
Ⓚ without locking levers for screw fixing	1.6 - 2.4	1.6	09 06 002 9912
Ⓚ with locking levers <sup>2)</sup> and press-in fixing	3.2 - 4.0	0	09 06 002 9901
Ⓚ without locking levers for screw fixing	3.2 - 4.0	0	09 06 002 9911
Ⓛ Locking lever for female connector type F <sup>1)</sup>			09 06 001 9946

## Dimensions



Dimensions in mm

DIN Power  
up to 6 A

03  
-  
36

<sup>1)</sup> order 2 pieces per connector  
<sup>2)</sup> Press-in tools see chapter 30



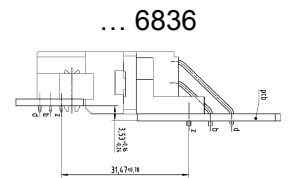
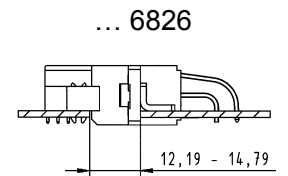
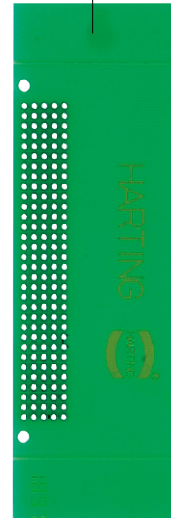
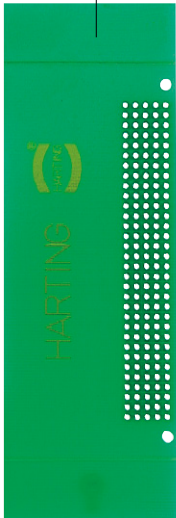
## Application 1

Daughtercard

Male connector  
09 06 148 6901

Female connector  
09 06 248 6826  
09 06 248 6836

Daughtercard



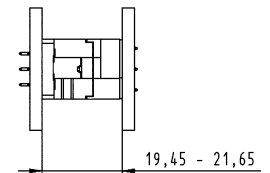
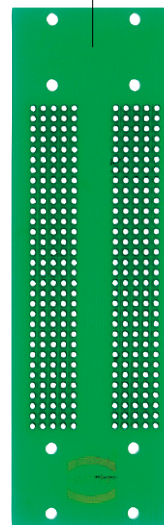
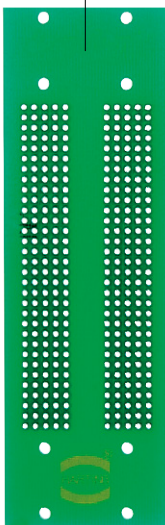
## Application 2

Backplane

Male connector  
09 06 048 2905

Female connector  
09 06 248 2833

Backplane

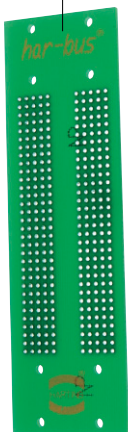


## Application 3

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

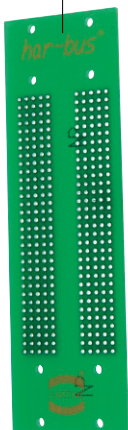
DIN Power  
up to 6 A

## Application 4

Female connector  
09 06 248 6838



Backplane



Pin shroud  
+ Locking lever  
09 06 002 9901



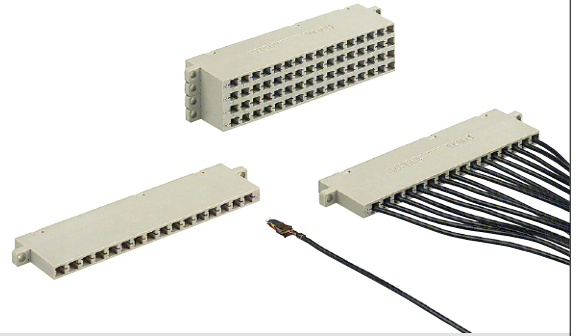
Female connector  
for crimp contacts  
09 06 248 3201





Number of contacts

64, 16



Universal adaptors

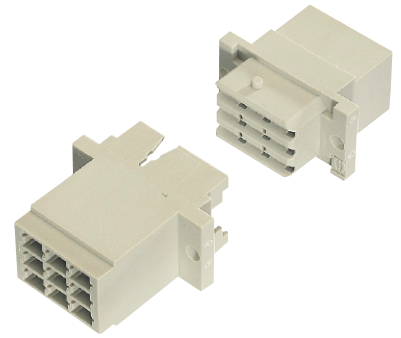
DIN Power  
up to 6 A

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 <sup>f)</sup>		
	16 x 1	09 06 016 3302 <sup>f)</sup>		
	16 x 4	09 06 064 3302 <sup>f)</sup>		
Panel cut out				

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

Number of contacts

**max. 9**



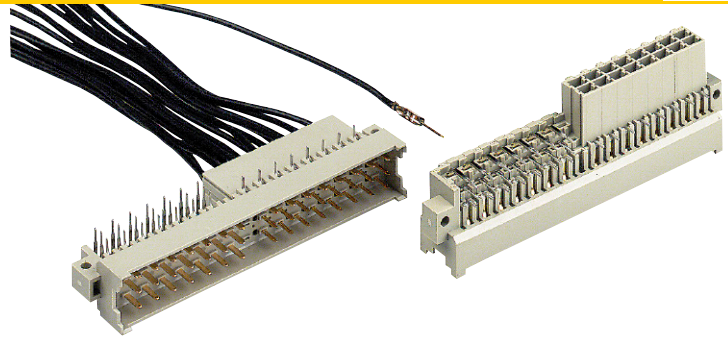
Female and male connectors

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		

DIN Power up to 6 A

Number of contacts

# 45



Male connectors

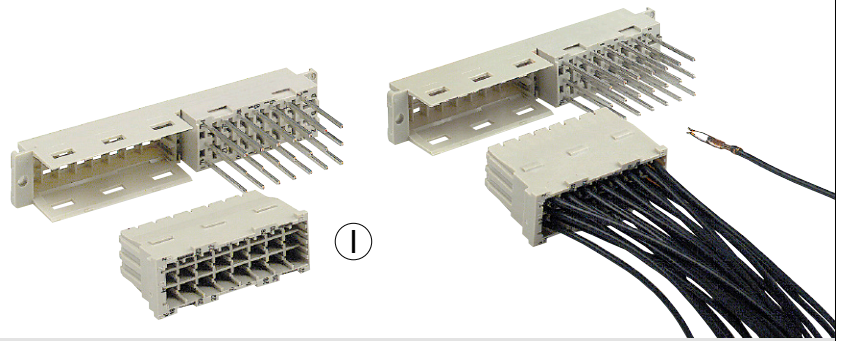
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
<p>Male connector</p> <p>29 angled solder pins</p> <p>16 cavities for male crimp contacts</p> <p>crimp contacts see page 03.44</p>	45	<p>Performance level 1 acc. to IEC 60 603-2</p> <p>09 06 145 2971</p>		
<p>Board drillings</p> <p>Mounting side</p>				

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

DIN Power up to 6 A

Number of contacts

# 45



Female connectors

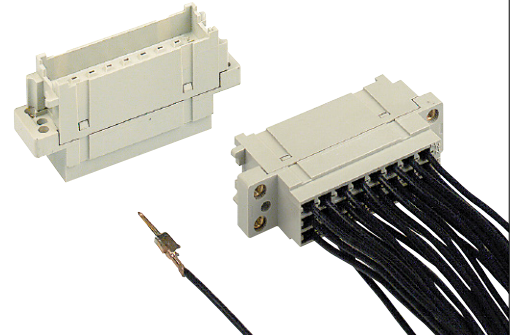
Identification	No. of contacts	Part number	Drawing	Dimensions in mm
<p>Female connector</p> <p>Female moulding with 21 wrap posts 22 mm</p> <p>with 21 solder pins 4.5 mm</p>	45	<p>Performance level 1 acc. to IEC 60 603-2</p> <p>09 06 045 2871<sup>f)</sup></p> <p>09 06 045 2875<sup>f)</sup></p>	<p>Latches</p> <p>Crimp moulding is supplied with the female moulding</p> <p>2.8<sup>+0.1</sup></p> <p>90<sup>±0.1</sup></p> <p>2d 2b 2z</p> <p>2x3.81=7.62</p> <p>5.08</p> <p>5.08</p> <p>7x5.08=35.56</p> <p>10.16</p> <p>6x5.08=30.48</p> <p>8.17</p> <p>95 max.</p> <p>14.8<sup>-0.2</sup></p> <p>0.3</p> <p>12.4</p> <p>2.9<sup>+0.03</sup></p> <p>2x5.08=10.16</p> <p>View from termination side</p>	
<p>Crimp moulding for 24 female crimp contacts</p> <p>crimp contacts see page 03.33</p>	45	09 06 024 3202 <sup>f)</sup>		
<p>Removal tool for the crimp moulding</p>		09 99 000 0172		

DIN Power up to 6 A

<sup>f)</sup> 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
<b>Male crimp FC contacts</b>			
Bandoliered contacts (approx. 2,500 pieces)	1 2 3	09 06 000 9564 09 06 000 9561 09 06 000 9562	09 06 000 9544 09 06 000 9541 09 06 000 9542
Bandoliered contacts (approx. 250 pieces)	2 3		09 06 000 5541 09 06 000 5542
Individual contacts <sup>1)</sup>	1 2 3	09 06 000 9574 09 06 000 9571 09 06 000 9572	09 06 000 9554 09 06 000 9551 09 06 000 9552

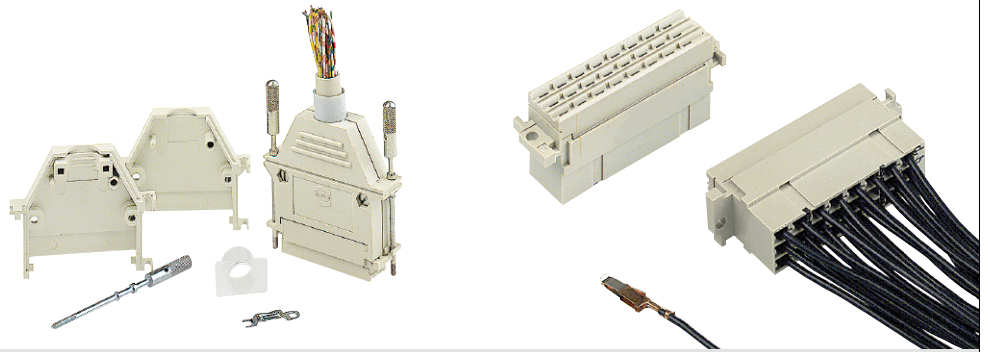
FC	No. of contacts	Wire gauge mm <sup>2</sup>	AWG	Insulation ø mm	Identification
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5	
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0	
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8	
3.5 + 0.5 mm of insulation is stripped from the wires to be crimped For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2) Insertion, removal and crimping tools see chapter 30					

<sup>1)</sup> Packaging unit 1,000 pieces

DIN Power up to 6 A

Number of contacts

**max. 24**



Female connectors

Identification	No. of contacts	Part number	Drawing	Dimensions in mm
<p>Female connector for crimp contacts</p> <p>Order contacts separately see page 03.33</p>	24	09 26 024 3201 <sup>f)</sup>		
<p>Shell housing A with integrated fixing screws</p> <p>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</p>		09 26 024 0401 <sup>f)</sup>		
<p>Open hood</p> <p>Supplied with:                      Open hood 1x                      Locking screw 2x                      Screw BZ 2.2x9.5 2x                      Cable tie 1x</p>		09 26 000 9901 <sup>f)</sup>		

DIN Power up to 6 A

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





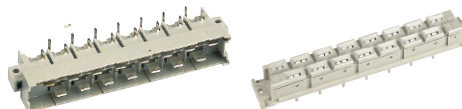
Types H, H15, H16, H3, MH 24 + 7, MH 21 + 5

Page

Technical characteristics type H .....

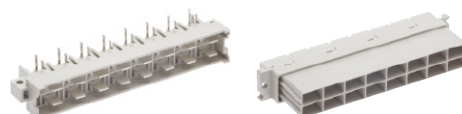
**04.10**

Type H15 connectors .....



**04.11**

Type H16 connectors .....



**04.16**

Type H3 connectors .....

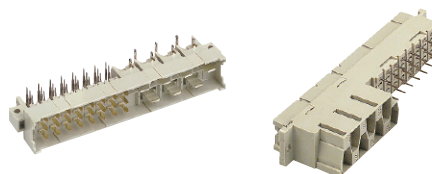


**04.17**

Technical characteristics type MH .....

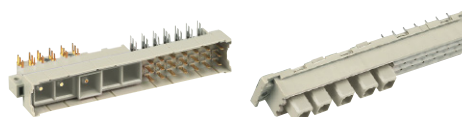
**04.20**

Type MH 24 + 7 connectors .....



**04.21**

Type MH 21 + 5 connectors .....



**04.23**

**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** 15 A max.  
 see current carrying capacity chart

**Clearance** Type H15:  $\geq 4.5$  mm  
 Type H3:  $\geq 4.0$  mm

**Creepage** Type H15:  $\geq 8.0$  mm  
 Type H3:  $\geq 3.7$  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:  $\geq 3.1$  kV  
 Type H3:  $\geq 2.5$  kV

**Contact resistance**  $\leq 8$  m $\Omega$

**Insulation resistance**  $\geq 10^{12}$   $\Omega$  for standard articles  
 $\geq 10^{11}$   $\Omega$  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

**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  $\varnothing 1.6 \pm 0.1$  mm DIN EN 60 097  
 Cage clamp terminal 0.14-1.5 mm<sup>2</sup>

**Insertion and withdrawal force**  
 Type H15:  $\leq 90$  N  
 Type H3:  $\leq 20$  N

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

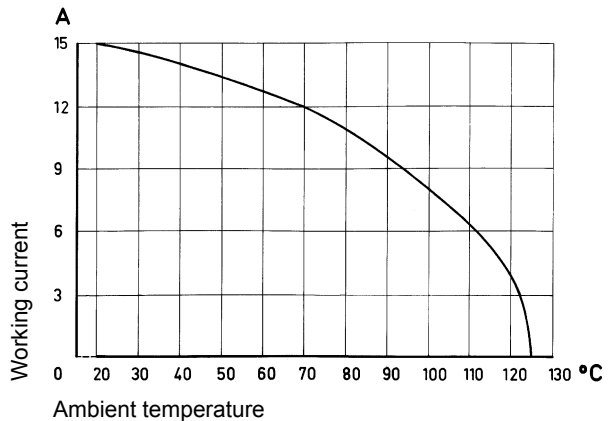
**Contact surface**  
 Contact zone Hard silver plated or gold plated

Mating conditions see chapter 00  
 Coding systems see chapter 00

## Current carrying capacity

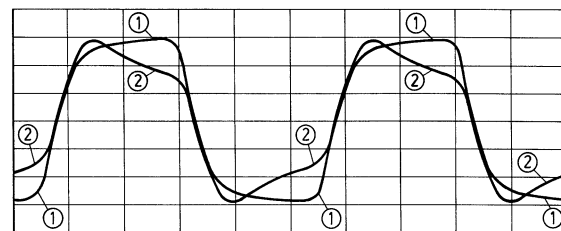
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the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

Control and test procedures according to DIN IEC 60 512



## Low currents and voltages

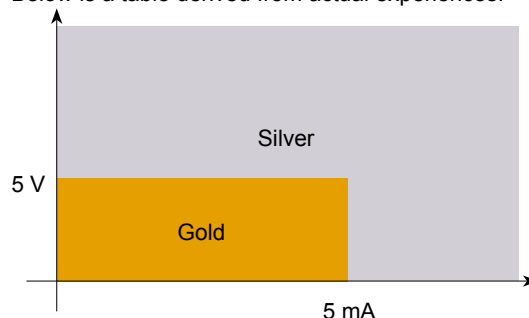
Type H standard contacts have a silver plated surface. This precious metal has excellent conductive properties. In the course of a contact's lifetime, the silver surface generates a black oxide layer due to its affinity to sulphur. This layer is smooth and very thin and is partly interrupted when the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



Changes to the transmitted signal after artificial 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.

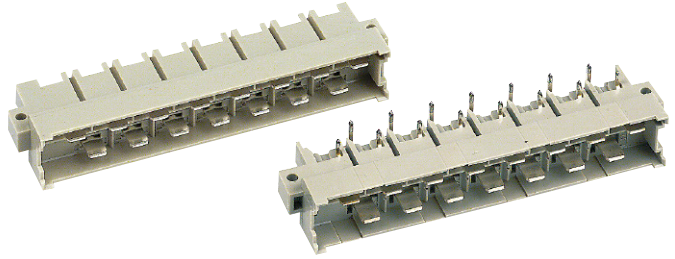
Below is a table derived from actual experiences.



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	15	Performance level 1 acc. to IEC 60603-2 09 06 015 2912 <sup>1)f)</sup>	<p>Contact arrangement View from termination side</p> <p>Board drillings</p>	
1 leading contact (position z 32)	14 + 1	09 06 015 2931 <sup>1)f)</sup>		
2 leading contacts (position z 4 + z 32)	13 + 2	09 06 015 2922 <sup>1)f)</sup>		
Male connector with angled solder pins <sup>3)</sup>	15	09 06 115 2911 <sup>1)</sup> 09 06 115 2911 222 <sup>1)f)</sup>	<p>Contact arrangement View from termination side</p> <p>Board drillings</p>	
1 leading contact (position z 32)	14 + 1	09 06 115 2932 <sup>1)</sup> 09 06 115 2932 222 <sup>1)f)</sup>		
2 leading contacts (position z 4 + z 32)	13 + 2	09 06 115 2921 <sup>1)</sup> 09 06 115 2991 <sup>2)</sup>		
Male connector with straight solder pins	15	09 06 015 2913 <sup>1)f)</sup>	<p>Contact arrangement View from termination side</p> <p>Board drillings</p>	
1 leading contact (position z 32)	14 + 1	09 06 015 2914 <sup>1)f)</sup>		

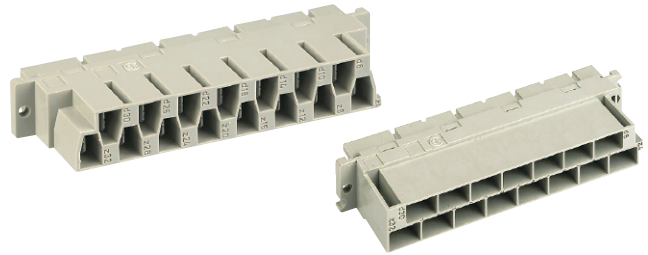
DIN Power up to 15 A

Other contact arrangements on request  
<sup>1)</sup> Variant with silver plated contacts  
<sup>2)</sup> Variant with gold plated contacts

<sup>3)</sup> With shroud coding, see chapter 00  
<sup>f)</sup> 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
<p>Female connector for faston 6.3 x 2.5<sup>1)</sup></p> <p>Cannot be used in a shell housing</p>	15	<p>Performance level 1 acc. to IEC 60603-2</p> <p>09 06 215 2811</p>	<p>Contact arrangement View from termination side</p>	
<p>Female connector for faston 6.3 x 2.5<sup>1)</sup></p> <p>May be used in a shell housing</p>	15 15	<p>09 06 215 2871</p> <p>09 06 215 2871 222<sup>f)</sup></p>	<p>Contact arrangement View from termination side</p>	
Panel cut out				

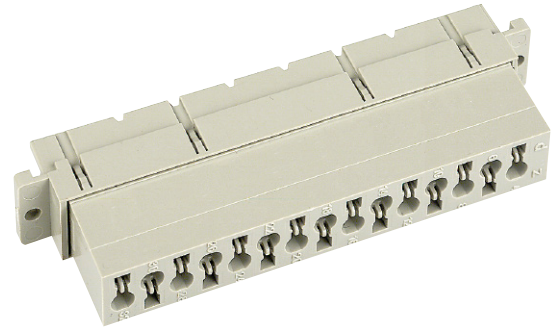
DIN Power up to 15 A

04  
12

<sup>1)</sup> With shroud coding, see chapter 00  
<sup>f)</sup> 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
<p>Female connector with cage clamp</p> <p>May be used in a shell housing</p>	<p>15</p>	<p>Performance level 1 acc. to IEC 60 603-2</p> <p>09 06 015 2813<sup>f)</sup></p>	<p>84,9 10,1 21,4 84 12,4 2,9-0,3 14,8 8-0,3 12,3 12,7 14,8-0,2 14,8 8,17 14x5,08=71,12 6d 4z 5,08 6,5 2,8-0,1 0,3 90±0,1 95-0,4</p> <p>Contact arrangement View from termination side Slot for screw driver</p> <p>32 30 28 26 24 22 20 18 16 14 12 10 8 6 4</p> <p>Shell housing see chapter 20</p>	
<p>Panel cut out</p>			<p>M2,5/φ2,8 85 90±0,1 95,5 7,2 15 7,2 15,24</p>	
<p>Termination instructions</p>			<p>1 2 3 4</p> <p>Screw driver width: 2.5 x 0.4 mm Stripping length: 4 - 10 mm Wire gauge: 0.14 - 1.5 mm<sup>2</sup> (AWG 26 - 16)</p>	

DIN Power up to 15 A

<sup>f)</sup> 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 <sup>3)</sup>		Performance level 1 acc. to IEC 60 603-2								
2.7 mm	15	09 06 215 2812 <sup>1)</sup>		<table border="1"> <tr><th>a</th></tr> <tr><td>2.7</td></tr> <tr><td>4</td></tr> <tr><td>5.5</td></tr> <tr><td>7</td></tr> <tr><td>10</td></tr> </table>	a	2.7	4	5.5	7	10
a										
2.7										
4										
5.5										
7										
10										
4 mm	15	09 06 215 2821 <sup>1)</sup> 09 06 215 2821 222 <sup>1)f)</sup> 09 06 215 2892 <sup>2)</sup> 09 06 215 2892 222 <sup>2)f)</sup>								
5.5 mm	15	09 06 215 2890 <sup>2)</sup>								
7 mm	15	09 06 215 2831 <sup>1)</sup> 09 06 215 2891 <sup>2)</sup>								
10 mm	15	09 06 215 2841 <sup>1)</sup>								
Board drillings Mounting side										
			<p>Contact arrangement View from termination side</p>							

DIN Power  
up to 15 A

<sup>1)</sup> Variant with silver plated contacts  
<sup>2)</sup> Variant with gold plated contacts  
<sup>3)</sup> With shroud coding, see chapter 00

<sup>f)</sup> 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
<p>Female connector "low profile" with press-in pins 3.6 mm</p> <p>Contact space termination side 5.08 mm</p>	15	<p>Performance level 1 acc. to IEC 60 603-2</p> <p>09 06 215 2854 09 06 215 2854 222<sup>f)</sup></p>	<p>Board drillings Mounting side</p>	
<p>Contact space termination side 2.54 mm</p>	15	<p>09 06 215 2856 09 06 215 2856 222<sup>f)</sup></p>	<p>Board drillings Mounting side</p>	

DIN Power  
up to 15 A

04  
15

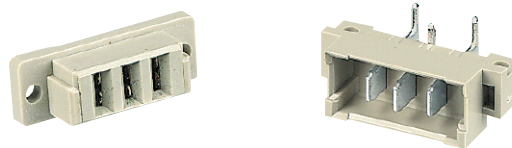
<sup>1)</sup> Refer to recommended configuration of pcb holes, see page 00.25

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



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	<p>Board drillings</p>	
Female connector with solder pins	3	09 06 203 2811	<p>Board drillings</p>	

DIN Power up to 15 A

## 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 mm <sup>2</sup>
------------------------	--

Contact surface	
Contact zone	Selectively plated according to performance level <sup>1)</sup>

<b>HEAVY DUTY SECTION*</b>	
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

<b>BOTH PARTS</b>	
Insulation resistance	≥ 10 <sup>12</sup> Ω for standard articles ≥ 10 <sup>11</sup> 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

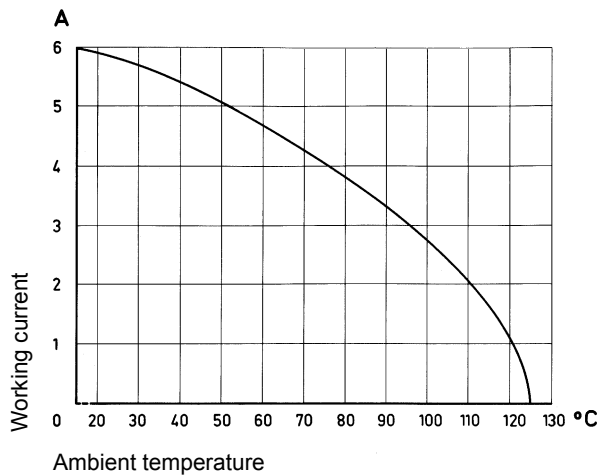
<b>Materials</b>	
Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy

## Current carrying capacity

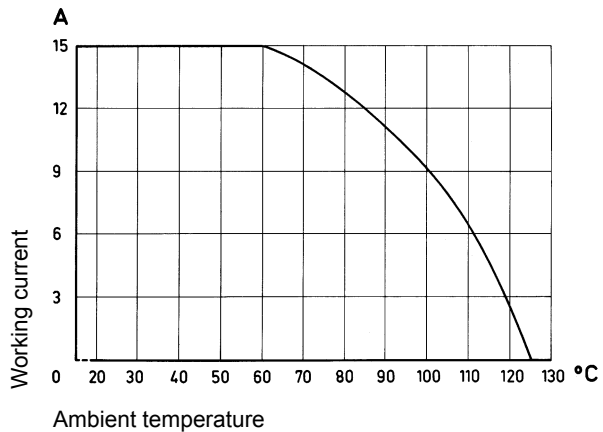
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the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

Control and test procedures according to DIN IEC 60 512

### Electronic section



### Heavy duty section



\* only for type MH 24 + 7

<sup>1)</sup> Explanation of performance levels see chapter 00

Mating conditions see chapter 00  
Coding systems see chapter 00



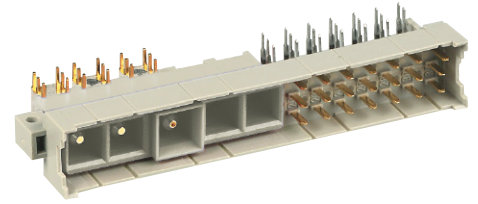




Number of contacts

# 21 + 5

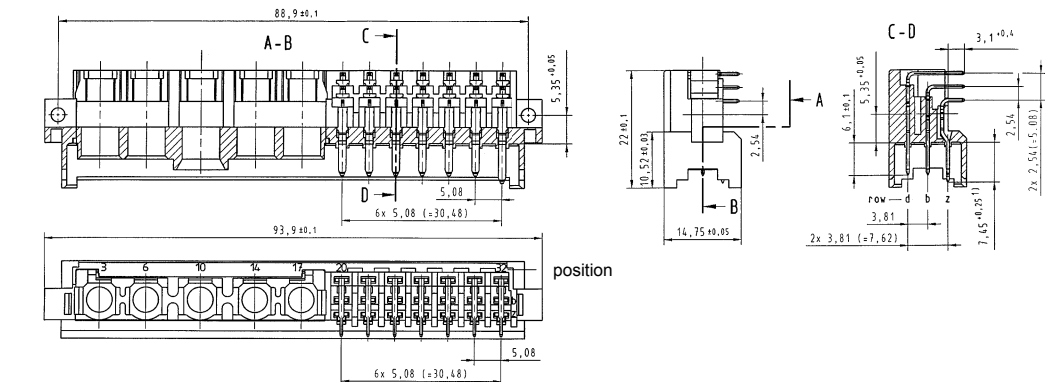
F + M



## Male connectors

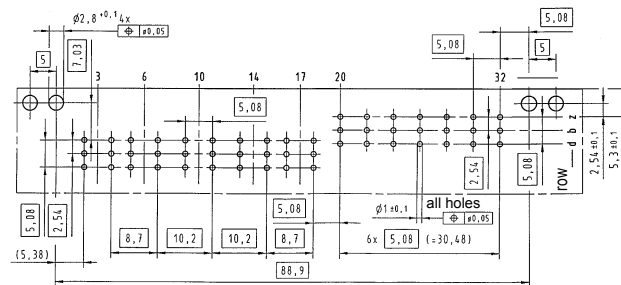
Identification	No. of contacts	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00
		3	2 1
Male connector with angled solder pins (without special contacts)*	21 + 5	Performance level 3 on request	09 06 121 6981
High current contact for printed circuit terminations max. 40 A <sup>2)</sup> leading contact max. 40 A <sup>2)</sup>			09 03 000 6127 09 03 000 6128
Removal tool			09 99 000 0328

## Dimensions



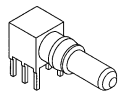
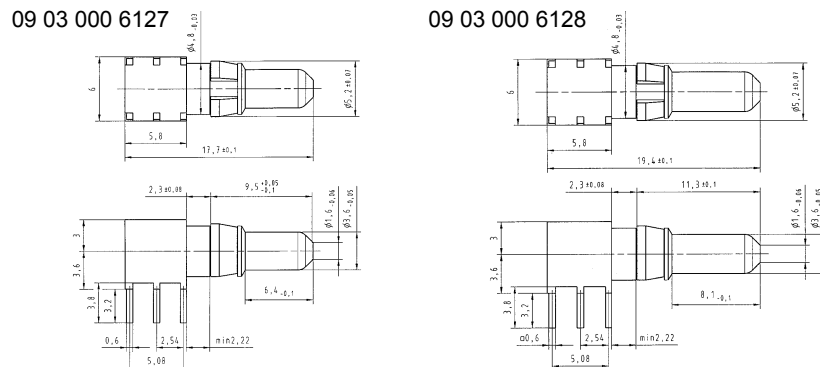
## Board drillings

Mounting side



<sup>1)</sup> Leading contact in position z 32

## Dimensions



Dimensions in mm

DIN Power up to 15 A

\* Pre-loaded with special contacts on request

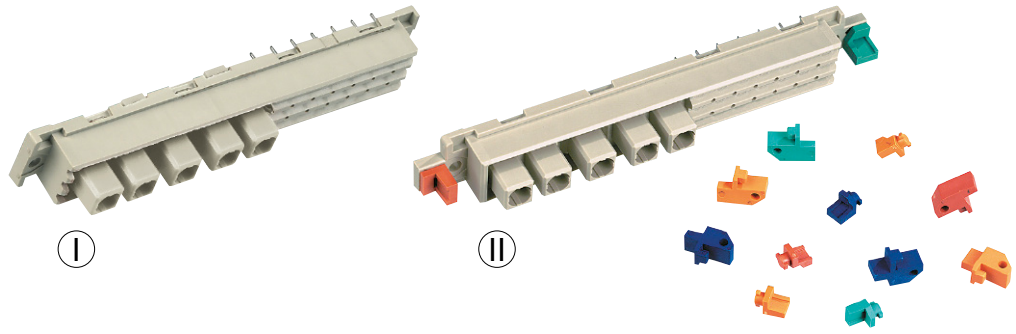
Code keys see chapter 00

<sup>2)</sup> Depending on the pcb design

Further special contacts see chapter 01

Number of contacts

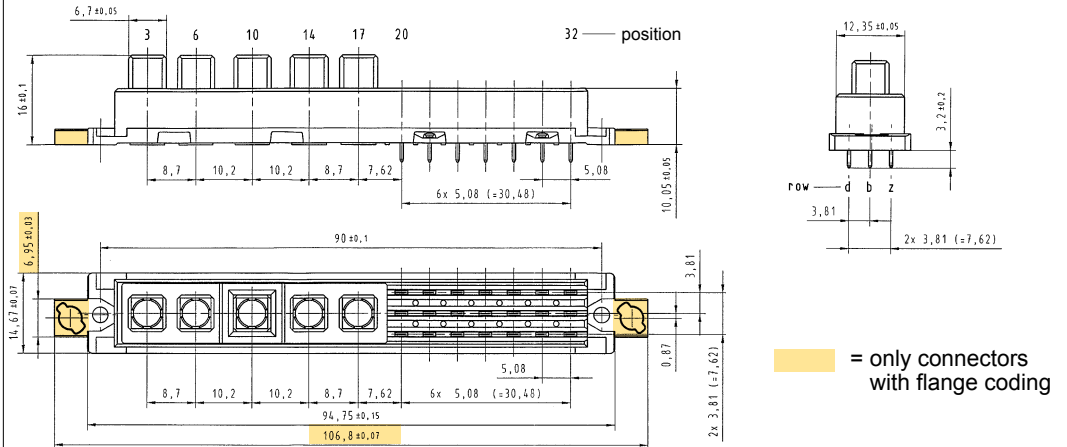
**21 + 5**  
F + M



Female connectors

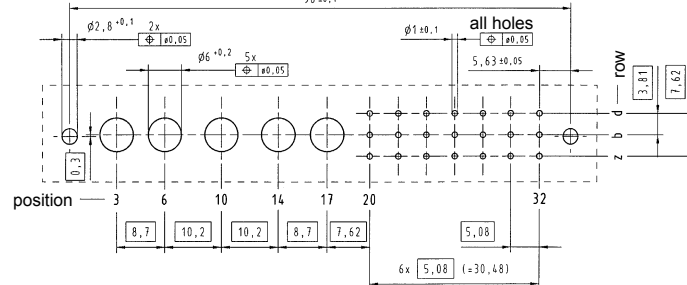
Identification	No. of contacts	Part number	Performance levels according to IEC 60603-2. Explanation chapter 00
		3	2 1
Female connector with solder pins 3.2 mm (without special contacts)			
without flange coding (I)	21 + 5	Performance level 3 on request	09 06 221 6883
with flange coding <sup>1)</sup> (II)	21 + 5		09 06 721 6883
High current contact Crimp contacts for printed circuit termination 20 A			09 03 000 6220

Dimensions

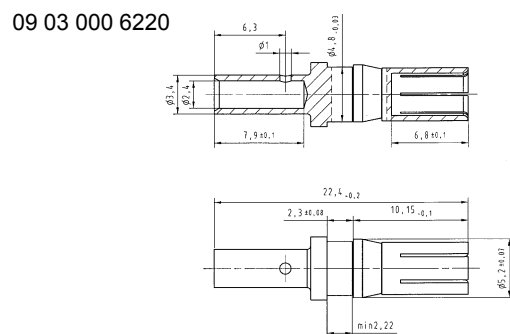


= only connectors with flange coding

Board drillings  
Mounting side



Dimensions



Dimensions in mm

DIN Power up to 15 A

04 · 24

<sup>1)</sup> 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

Page

Summary of shell housings and accessories ..... **20.02**

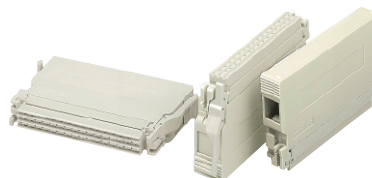
Shell housing C ..... **20.04**



Shell housing 2C, 3C ..... **20.08**

Shell housing A ..... **20.10**

Shell housing B ..... **20.12**



Shell housing D 15 ..... **20.16**

Open hood G ..... **20.19**



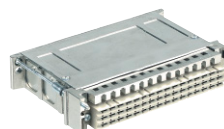
Junction element O ..... **20.19**

Shell housings D 20/2 and D 20/4 ..... **20.20**

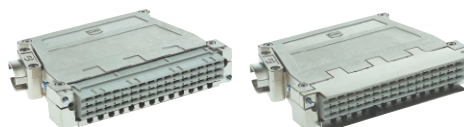


EMC housing ..... **20.26**

Shell housings D 20/2 and D 20/4 metallised. .... **20.27**



Shell housings D 20 metal ..... **20.30**



Electronic connectors in Heavy Duty Housings ..... **20.33**

# Summary shell housings and accessories



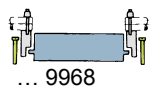
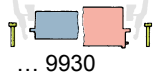
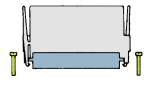

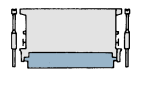

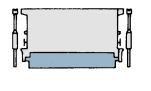

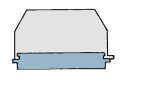






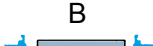
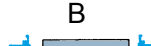
Appropriate connectors in shell housings	Types B, C, D, E, har-bus® 64	Types 2C, 3C	Type F	Types F, H, MH	Types E, F, H, MH
Check list: How to order shell housings and accessories.  The Part number is stated.					
Shell housings	<b>C</b> 09 02 064 0501 09 02 064 0502 09 03 096 0501 09 05 048 0501	<b>2C, 3C</b> 09 23 048 0501 09 25 030 0501	<b>A</b> 09 06 048 0501 09 06 048 0402	<b>B</b> 09 06 048 0503 09 06 048 0504 09 06 048 0505	<b>G</b> 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 <small>Order 2 pieces, in some cases each with different Part Nos. for left and right hand</small>	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 <small>Order 2 sets</small>	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	<b>C</b> 	<b>C</b> 	<b>A</b> 	<b>B</b> 	<b>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 9907 09 06 000 9966
Multiple fixing right	09 02 000 9920	09 02 000 9920	09 06 000 9902	09 06 000 9908 09 06 000 9967	09 06 000 9908 09 06 000 9967
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 9909 09 06 001 9934
Single fixing right	09 02 000 9922	09 02 000 9922	09 06 000 9906	09 06 000 9910 09 06 001 9935	09 06 000 9910 09 06 001 9935
for female connectors				<b>B</b> 	
Multiple fixing left				09 06 000 9933	
Multiple fixing right				09 06 000 9933	
Fixing brackets for angled male connectors on pcb	<b>C</b> 	<b>C</b> 			
left	09 02 000 9926	09 02 000 9926			
right	09 02 000 9927	09 02 000 9927			
Fixing brackets for inverse male connectors on pcb	<b>R</b> 	<b>R</b> 			
R 1	09 02 000 9953	09 02 000 9953			
R 32	09 02 000 9954	09 02 000 9954			
Distance fixing brackets for piggyback connectors					
Type D top	09 04 000 9907				09 04 000 9907
Type E bottom	09 04 000 9906				09 04 000 9906
Type F top	09 06 000 9936				09 06 000 9936
Type F bottom	09 06 000 9937				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
<p>Check list: How to order shell housings and accessories.</p> <p>The Part number is stated.</p>	 ... 9968   ... 9930	  	  	  	  
Shell housings	<p><b>O</b></p> <p>09 06 000 9968 09 06 000 9930°</p> <p>° order 2 pieces</p>	<p><b>D 15</b></p> <p>09 06 048 0515</p>	<p><b>D 20</b></p> <p>09 06 048 0521 09 06 048 0522</p>	<p><b>D 20 metallised</b></p> <p>09 06 948 0521 09 06 948 0522</p>	<p><b>D 20 metal</b></p> <p>09 06 848 0550 09 06 848 0551</p>
Cable insert			<p>09 06 000 9988 09 06 000 9989</p>	<p>09 06 900 9988</p>	
Insert for LED			<p>09 06 000 9986 09 06 000 9987</p>	<p>09 06 900 9986 09 06 900 9987</p>	
<p>Locking lever</p> <p>Order 2 pieces, in some cases each with different Part Nos. for left and right hand</p>		<p>Supplied with the shell housing</p>			
<p>Locking screws</p> <p>Order 2 sets for fixing elements with male connectors for interface connectors I</p>	<p>09 06 000 9926</p> <p>⚙ M 2.5 x 20 ⚙ M 2.5</p>	<p>09 06 000 9926</p> <p>⚙ M 2.5 x 16 ⚙ M 2.5</p>	<p>Supplied with the shell housing</p>	<p>Supplied with the shell housing</p>	<p>Supplied with the shell housing</p>
<p>Shroud</p> <p>for screw fixing with interface connector I</p>	—	—	<p>09 06 001 9964</p>	<p>09 06 001 9964</p>	—
<p>Fixing brackets</p> <p>for 19" racks</p> <p>for male connectors</p>	<p><b>B</b></p> 	<p><b>B</b></p> 	<p><b>B</b></p> 	<p><b>B</b></p> 	<p><b>B</b></p> 
<p>Multiple fixing</p> <p>left</p>	<p>09 06 000 9907 09 06 000 9966</p>	<p>09 06 000 9907 09 06 000 9966</p>	<p>09 06 000 9907 09 06 000 9966 09 06 000 9995 09 06 000 9997</p>	<p>09 06 900 9907 09 06 900 9966 09 06 900 9995 09 06 900 9997</p>	<p>09 06 900 9997</p>
<p>right</p>	<p>09 06 000 9908 09 06 000 9967</p>	<p>09 06 000 9908 09 06 000 9967</p>	<p>09 06 000 9908 09 06 000 9967 09 06 000 9996 09 06 000 9998</p>	<p>09 06 900 9908 09 06 900 9967 09 06 900 9996</p>	<p>09 06 900 9996</p>
<p>Single fixing</p> <p>left</p>	<p>09 06 000 9909 09 06 001 9934</p>	<p>09 06 000 9909 09 06 001 9934</p>	<p>09 06 000 9909 09 06 001 9934</p>	<p>09 06 900 9909 09 06 901 9934</p>	<p>09 06 800 9943 09 06 901 9924</p>
<p>right</p>	<p>09 06 000 9910 09 06 001 9935</p>	<p>09 06 000 9910 09 06 001 9935</p>	<p>09 06 000 9910 09 06 001 9935</p>	<p>09 06 900 9910 09 06 901 9935</p>	<p>09 06 800 9944 09 06 901 9925</p>
<p>for female connectors</p>	<p><b>B</b></p> 	<p><b>B</b></p> 			
<p>Multiple fixing</p> <p>left right</p>	<p>only ... 9930</p> <p>09 06 000 9933 09 06 000 9933</p>	<p>09 06 000 9933 09 06 000 9933</p>			
<p>Protection and fixing strip</p> <p>for 20 mm shell housing</p>			<p>09 06 001 9909</p>	<p>09 06 901 9909</p>	

Shell housings

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

Round cable insert

Locking levers 2 x

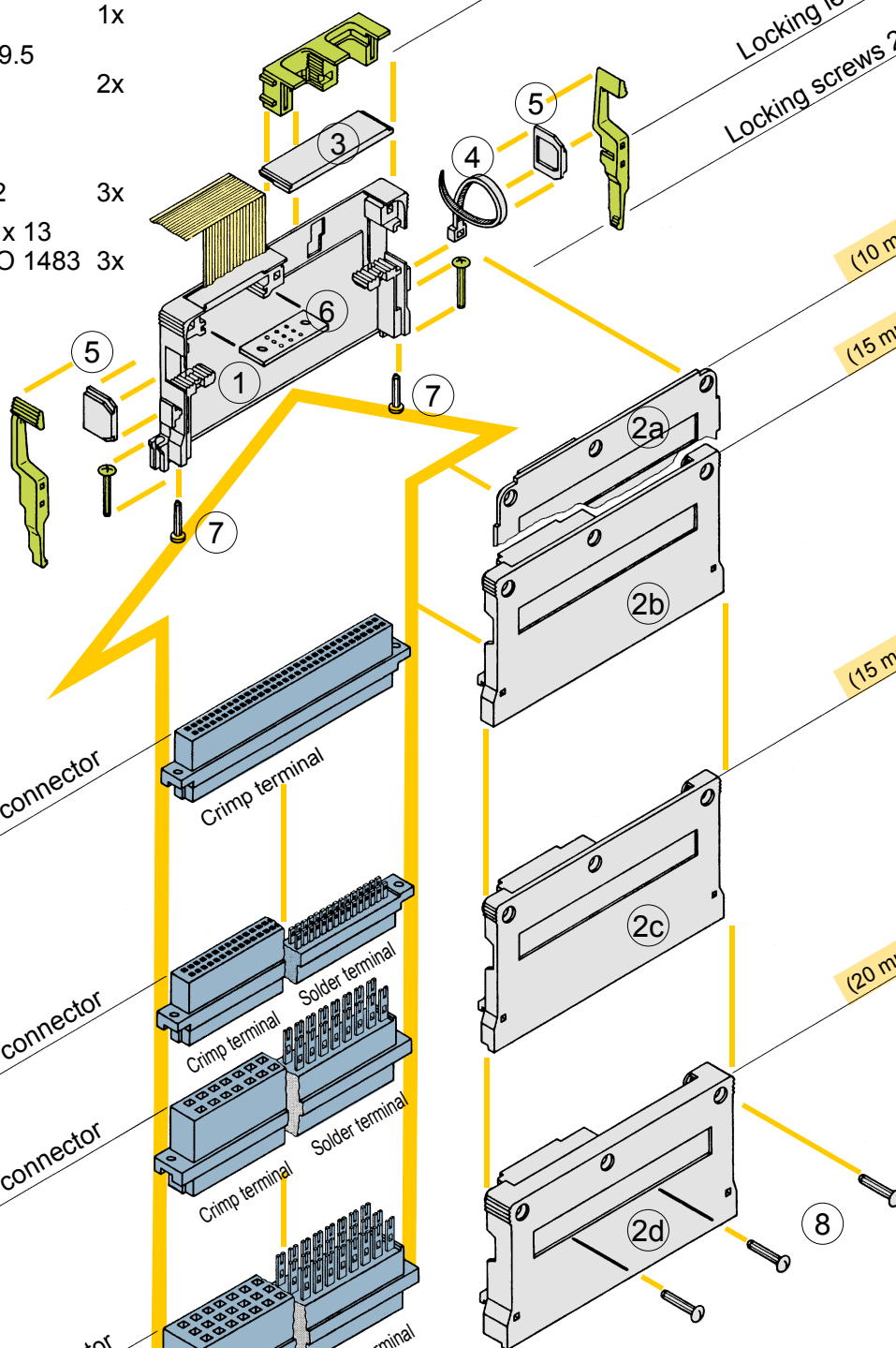
Locking screws 2 x

(10 mm) 09 02 064 0501

(15 mm) 09 02 064 0502

(15 mm) 09 03 096 0501

(20 mm) 09 05 048 0501



Type B female connector

Crimp terminal

Type C female connector

Crimp terminal Solder terminal

Type D female connector

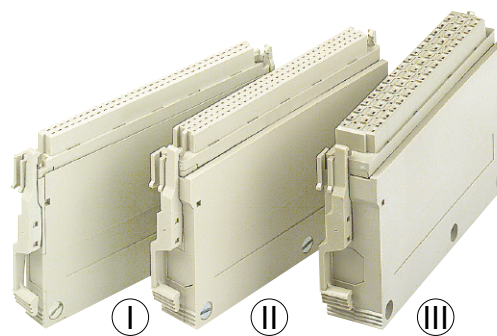
Crimp terminal Solder terminal

Type E female connector  
har-bus® 64 female connector

Crimp terminal Solder terminal

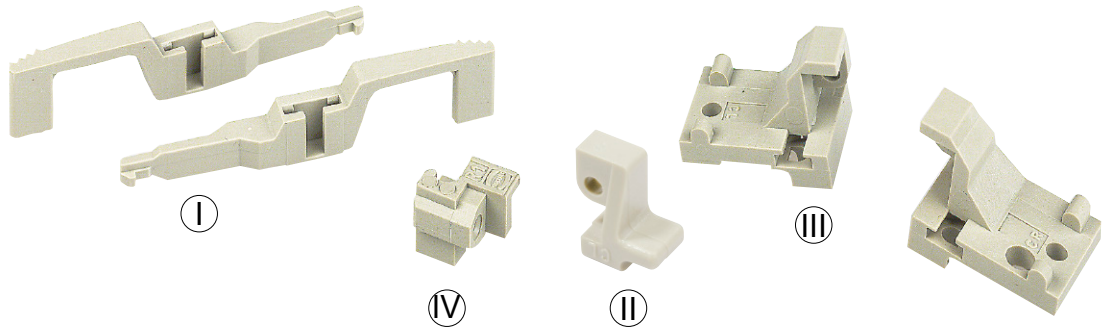
- Separate accessories for housings ■
- Fitting female connectors ■
- Flat cable access ■
- Housing parts supplied ■

# 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		

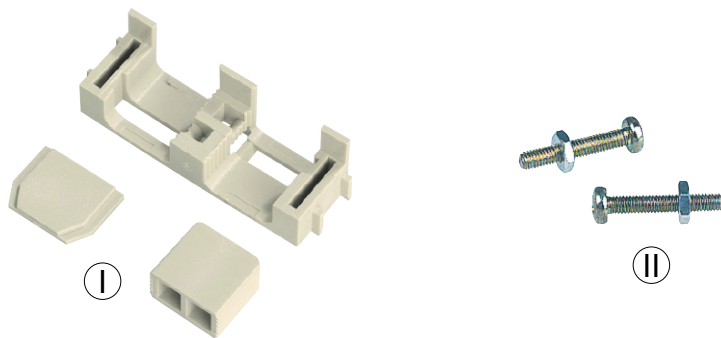
Shell housings



## 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 60297, 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



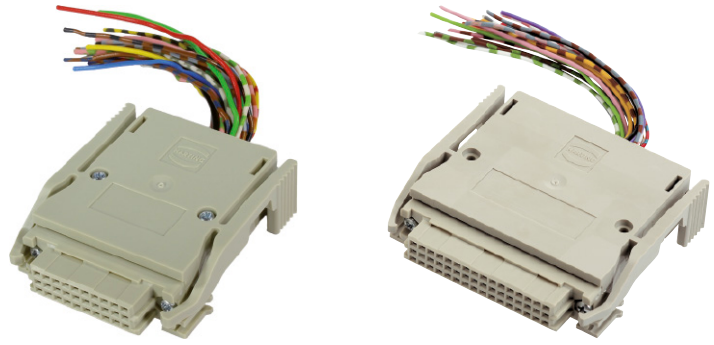
## Accessories

Identification	Part number	Drawing	Dimensions in mm
<b>Fixing brackets C</b> for angled male connectors on pcb without fixing possibility in 19" racks	left 09 02 000 9926 <sup>f)</sup>  right 09 02 000 9927 <sup>f)</sup>		
<b>Round cable insert</b> 2 x $\varnothing$ 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 <sup>f)</sup>		6,5 12
<b>Round cable insert</b> 2 x $\varnothing$ 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 <sup>f)</sup>		11,5 12
<b>Locking screws</b>  (II)	09 02 000 9909 <sup>1)</sup>		

<sup>1)</sup> Order 2 pieces for one shell housing

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

# Shell housing 2C, 3C

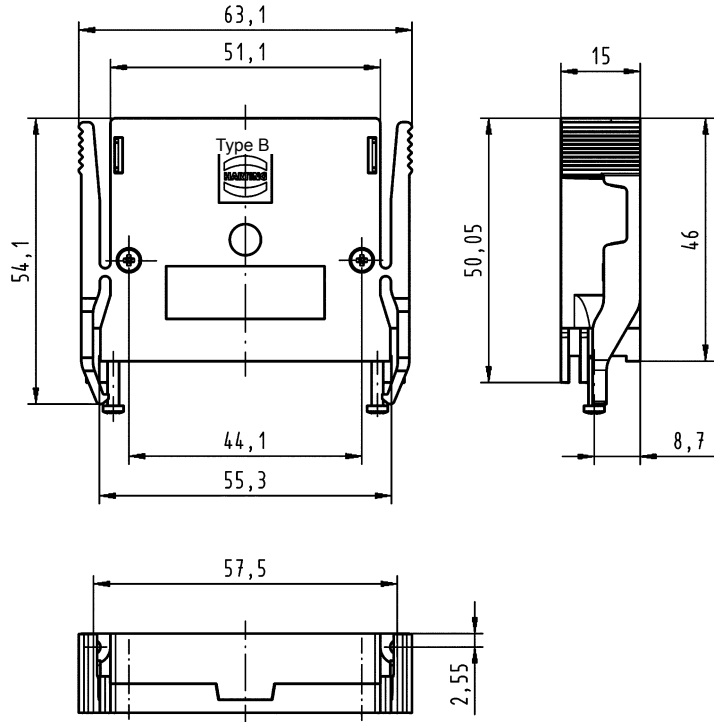


Identification                      Part number                      Drawing                      Dimensions in mm

Shell housing 2C  
for female connectors  
type 2C

09 23 048 0501

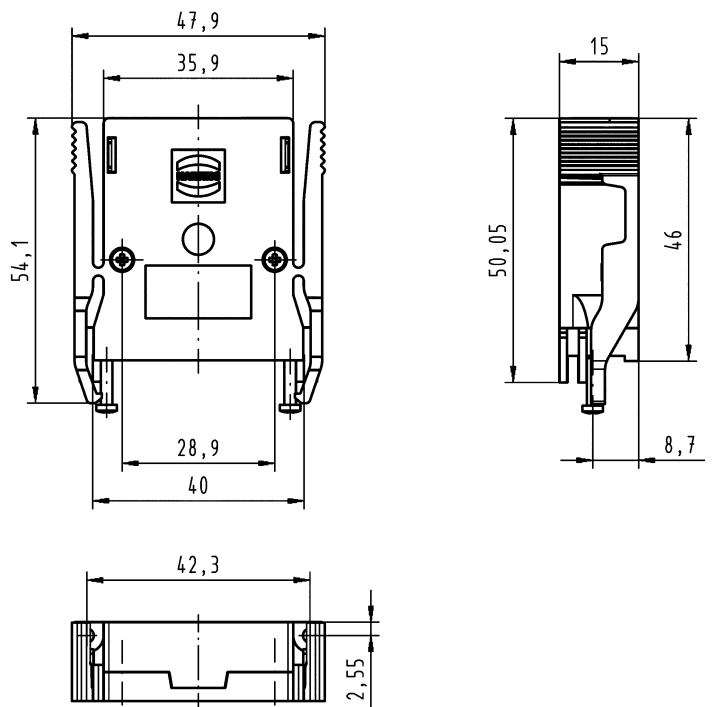
Supplied with:  
Shell 1x  
Cover with 2 locking  
levers 1x  
Cable tie 1x  
Screw 2.2 x 9.5  
4x (09 06 001 9974)



Shell housing 3C  
for female connectors  
type 3C

09 25 030 0501

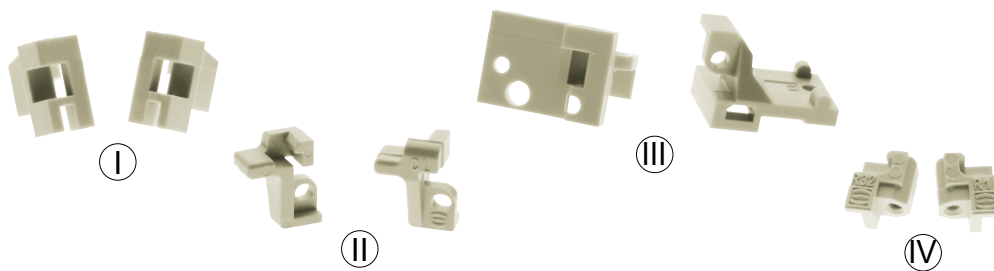
Supplied with:  
Shell 1x  
Cover with 2 locking  
levers 1x  
Cable tie 1x  
Screw 2.2 x 9.5  
4x (09 06 001 9974)



Shell housings

20  
08



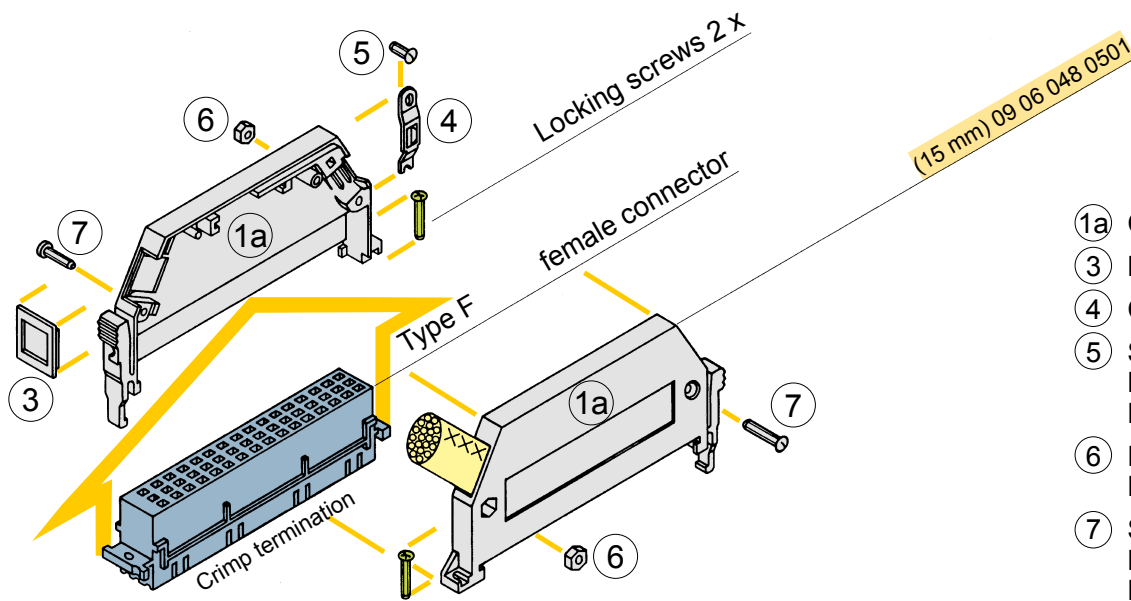


## Accessories

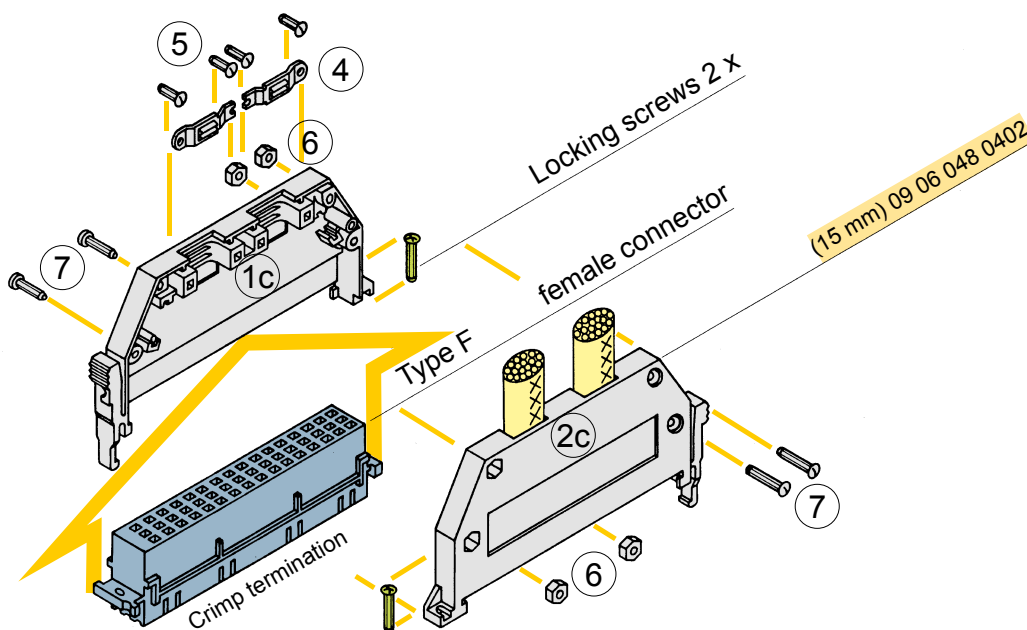
Identification	Part number	Drawing	Dimensions in mm									
<b>Fixing brackets C</b> for angled male connectors on pcb without fixing possibility in 19" racks I	left 09 02 000 9926  right 09 02 000 9927		<table border="1"> <thead> <tr> <th></th> <th>a</th> </tr> </thead> <tbody> <tr> <td>2C</td> <td>63.7</td> </tr> <tr> <td>3C</td> <td>48.4</td> </tr> </tbody> </table>		a	2C	63.7	3C	48.4			
	a											
2C	63.7											
3C	48.4											
<b>Fixing brackets C</b> for male connectors for 19" racks according to DIN EN 60 297, part 3-101  <b>Multiple fixing</b> II	left 09 02 000 9919  right 09 02 000 9920											
<b>Single fixing</b> III	left 09 02 000 9921  right 09 02 000 9922		<table border="1"> <thead> <tr> <th></th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>2C</td> <td>82.3</td> <td>88.4</td> </tr> <tr> <td>3C</td> <td>67.1</td> <td>73.2</td> </tr> </tbody> </table>		b	c	2C	82.3	88.4	3C	67.1	73.2
	b	c										
2C	82.3	88.4										
3C	67.1	73.2										
<b>Fixing brackets R</b> for inverse male connectors on pcb's IV  <b>Screw</b> DIN ISO 7049 M2.2 x 9.5	R 1 09 02 000 9953  R 32 09 02 000 9954  09 06 001 9974		<table border="1"> <thead> <tr> <th></th> <th>d</th> </tr> </thead> <tbody> <tr> <td>2C</td> <td>64.1</td> </tr> <tr> <td>3C</td> <td>48.9</td> </tr> </tbody> </table>		d	2C	64.1	3C	48.9			
	d											
2C	64.1											
3C	48.9											

Shell housings





- 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

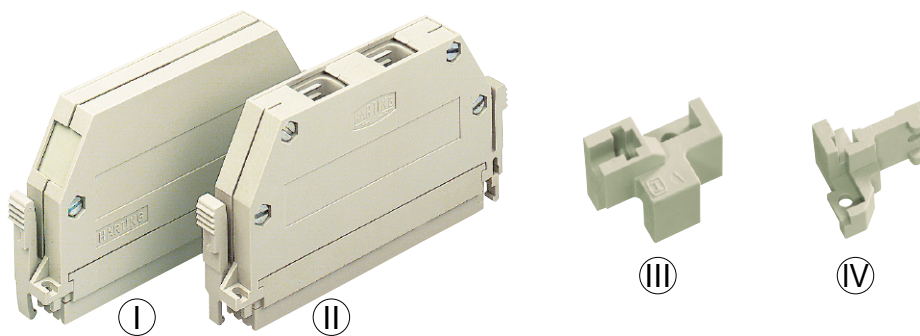


- ①c Shell 1x
- ②c Cover 1x
- ④ Cable clamp 2x
- ⑤ Screw BZ 2.9 x 9.5 DIN ISO 1481 4x
- ⑥ Hexagonal nut M3 DIN EN ISO 4032 4x
- ⑦ Screw M3 x 12 DIN EN ISO 1207 4x

Shell housings

- Separate accessories for housings
- Fitting female connectors
- Cable access
- Housing parts supplied

# Shell housing A for type F



Identification	Part number	Drawing	Dimensions in mm
<b>Shell housing A</b>  Side entry I	15 mm 09 06 048 0501 <sup>f)</sup>		
Top entry II	15 mm 09 06 048 0402 <sup>f)</sup>		
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 <sup>f)</sup>  right 09 06 000 9902 <sup>f)</sup>		
Single fixing IV	left 09 06 000 9905 <sup>f)</sup>  right 09 06 000 9906 <sup>f)</sup>		

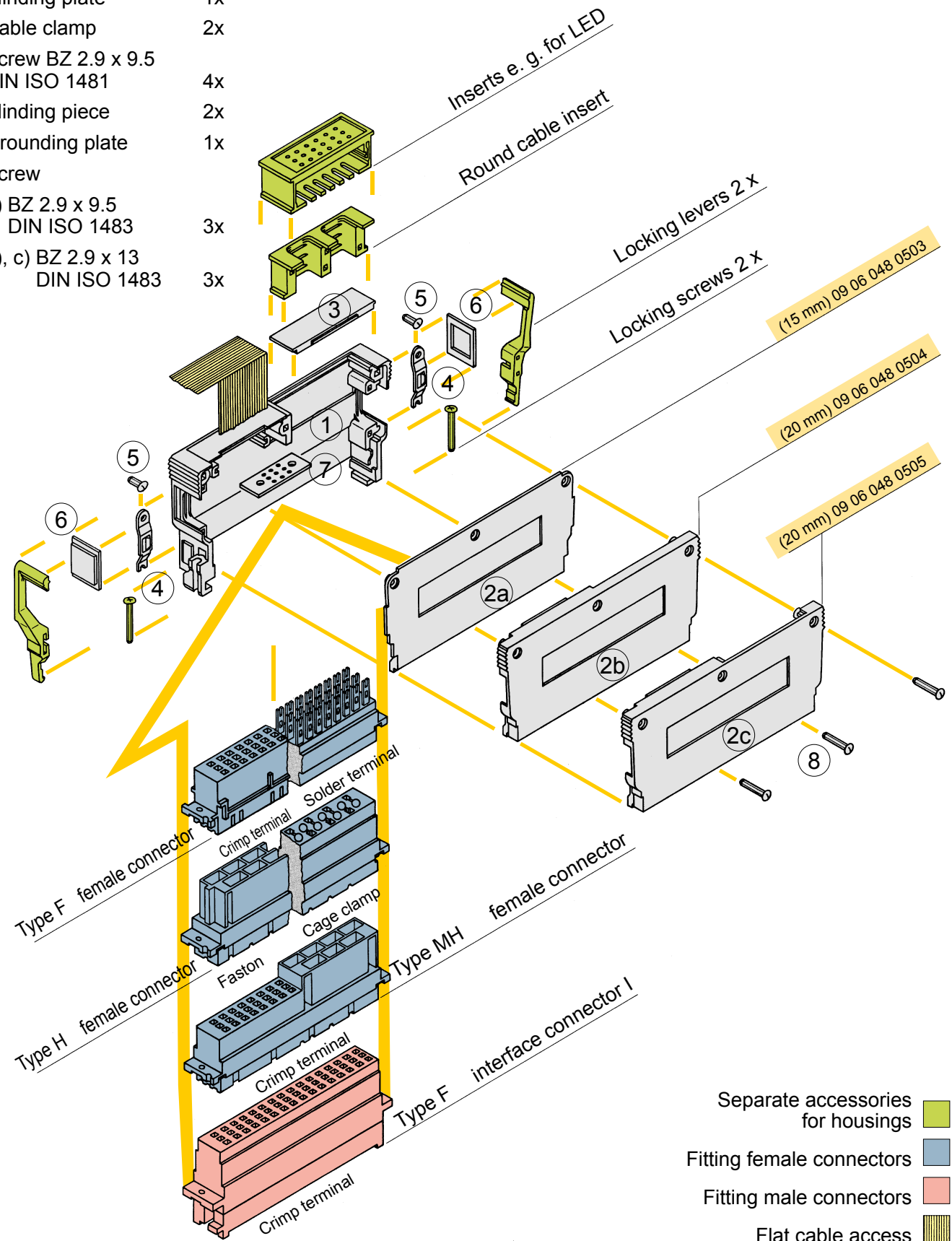
Shell housings

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

# Shell housing B for types F, H and MH

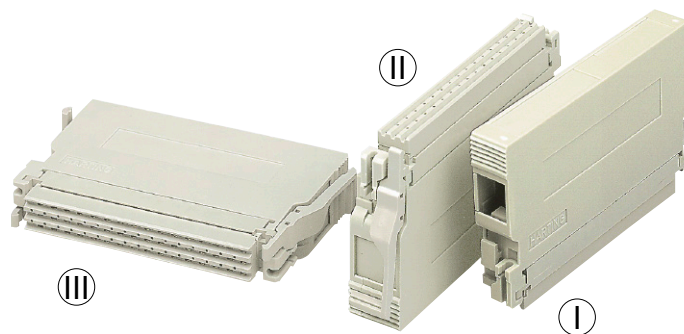


- ① Shell 1x
- ② Cover 1x
- ③ Blinding plate 1x
- ④ Cable clamp 2x
- ⑤ Screw BZ 2.9 x 9.5  
DIN ISO 1481 4x
- ⑥ Blinding piece 2x
- ⑦ Grounding plate 1x
- ⑧ Screw
  - a) BZ 2.9 x 9.5  
DIN ISO 1483 3x
  - b), c) BZ 2.9 x 13  
DIN ISO 1483 3x



Shell housings

# Shell housing B for types F, H and MH

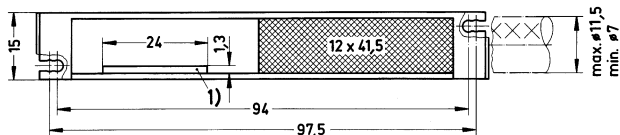


Identification                      Part number                      Drawing                      Dimensions in mm

Shell housing B

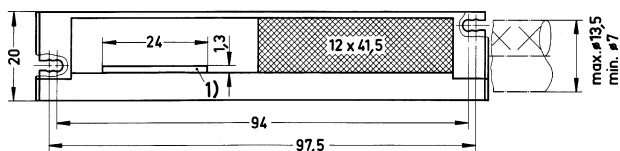
I

15 mm  
09 06 048 0503



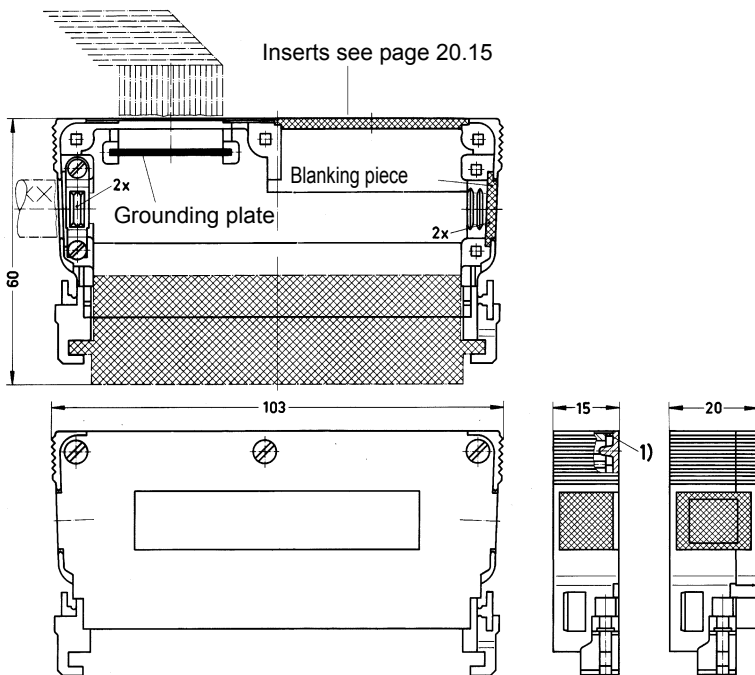
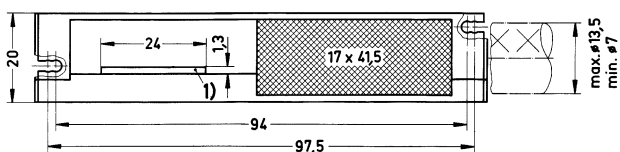
II

20 mm  
09 06 048 0504



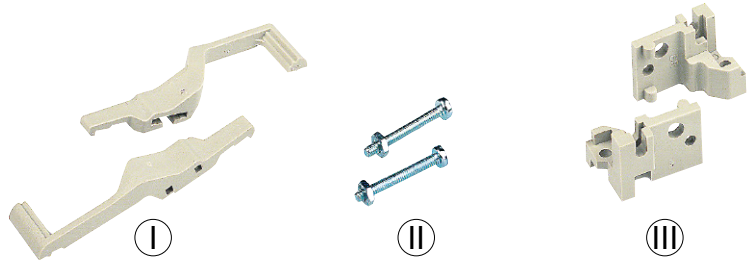
III

20 mm  
09 06 048 0505



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

Shell housings



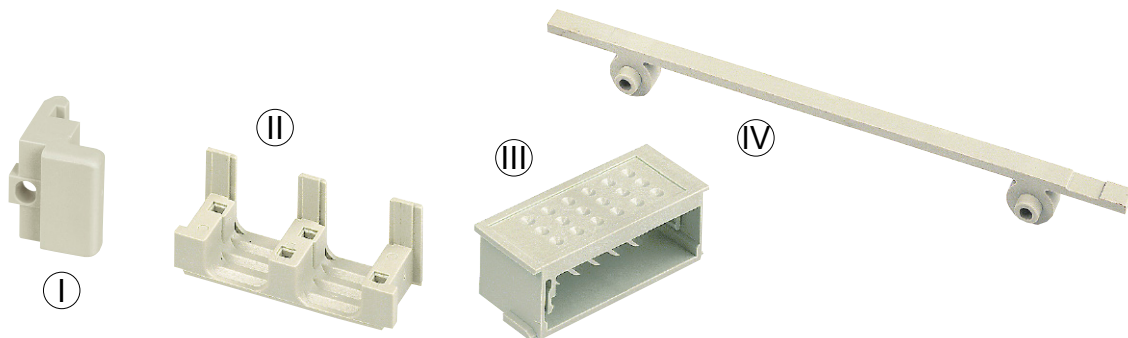
## Accessories

Identification	Part number	Drawing	Dimensions in mm
<b>Locking lever for shell housing B</b> 09 06 048 0503 ①	09 06 000 9913 <sup>1)</sup> f)		
09 06 048 0504 09 06 048 0505 left 09 06 000 9913 <sup>f)</sup> right 09 06 000 9919 <sup>f)</sup>	1) Order 2 pieces for one shell housing		
<b>Locking screws</b> ②	09 06 000 9926 <sup>1)</sup>		
<b>Fixing brackets B for male connectors for 19" racks according to DIN EN 60 297, part 3-101</b> Multiple fixing without nut with nut M 2.5 DIN 562 ③	left 09 06 000 9907 <sup>f)</sup> right 09 06 000 9908 <sup>f)</sup> left 09 06 000 9966 <sup>f)</sup> right 09 06 000 9967 <sup>f)</sup>		
Single fixing without nut with nut M 2.5 DIN 562	left 09 06 000 9909 <sup>f)</sup> right 09 06 000 9910 <sup>f)</sup> left 09 06 001 9934 right 09 06 001 9935		

Shell housings

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

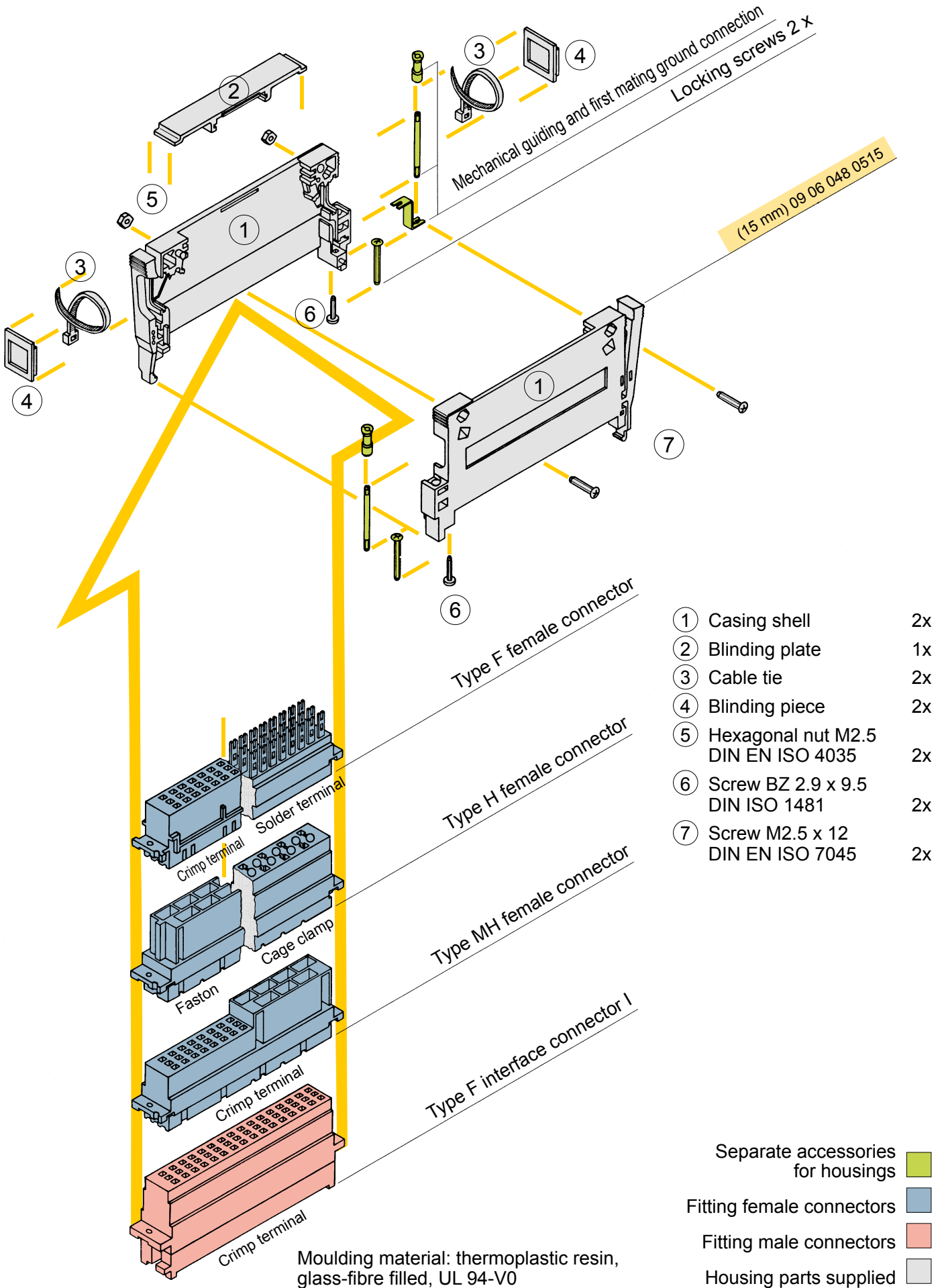




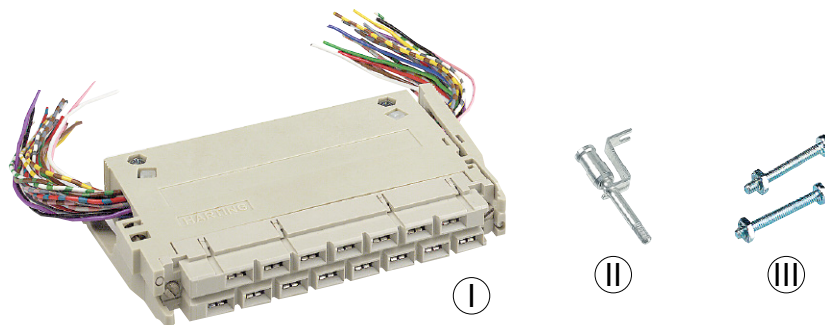
## Accessories

Identification	Part number	Drawing	Dimensions in mm
<p>Fixing brackets B for female connectors for 19" racks according to DIN EN 60297, part 3-101</p> <p>Multiple fixing</p> <p>Ⓚ</p> <p><sup>1)</sup> Order 2 pieces for one female connector</p>	09 06 000 9933 <sup>1)</sup>	<p>M 2.5 x 8 DIN EN ISO 1207<sup>2)</sup></p> <p>Female connector type F</p> <p>2x 09 06 000 9912</p> <p><sup>2)</sup> nut and screw not supplied with fixing brackets</p>	
<p>Round cable insert 2 x <math>\varnothing</math> 10</p> <p>for shell housings B 09 06 048 0503 09 06 048 0504</p> <p>Supplied with: Round cable insert 1x Blinding piece 1x</p>	09 06 000 9914	<p>max. <math>\varnothing</math> 10 min. <math>\varnothing</math> 7</p> <p>10 12</p>	
<p>Round cable insert 2 x <math>\varnothing</math> 12.5</p> <p>Ⓛ</p> <p>for shell housing B 09 06 048 0505</p> <p>Supplied with: Round cable insert 1x Blinding piece 1x</p>	09 06 000 9915	<p>max. <math>\varnothing</math> 12.5 min. <math>\varnothing</math> 7</p> <p>14.5 12</p>	
<p>Insert for LED</p> <p>Ⓜ</p> <p>for shell housing B 09 06 048 0505</p>	09 06 000 9917	<p>35 508 762</p> <p>pcb 35.5 x 17 x 1.5</p> <p>A-B 3.2</p> <p>C-D 8 2.5</p>	
<p>Protection strip</p> <p>Ⓨ</p> <p>Used with shell housings type B for front side access 09 06 048 0504 09 06 048 0505</p>	09 06 000 9929	<p>128,5 88,9±0,1 5</p> <p>09 06 000 9909 09 06 000 9910</p> <p>Male connector type F 20</p>	





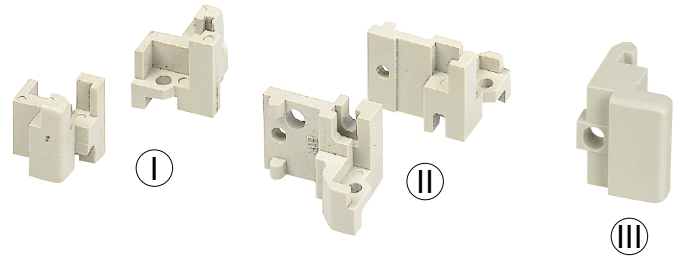
# Shell housing D 15 for types F, H and MH



Identification	Part number	Drawing	Dimensions in mm
<p>Shell housing D 15</p> <p>Ⓚ</p>	<p>15 mm 09 06 048 0515<sup>1)</sup></p>		
<p>Mechanical guiding and first mating ground connection</p> <p>Ⓛ</p>	<p>09 06 000 9961</p>		
<p>Locking screws</p> <p>Ⓜ</p> <p><sup>1)</sup> Order 2 pieces for one shell housing</p>	<p>09 06 000 9926<sup>1)</sup></p>		

Shell housings

<sup>1)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2



## 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



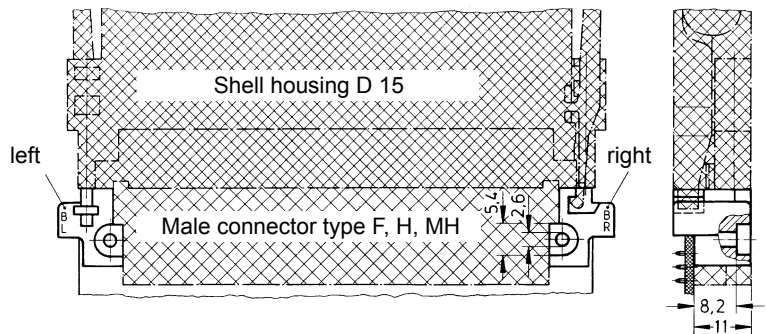
left  
09 06 000 9907

right  
09 06 000 9908

with nut  
M 2.5 DIN 562

left  
09 06 000 9966

right  
09 06 000 9967



### Single fixing

without nut



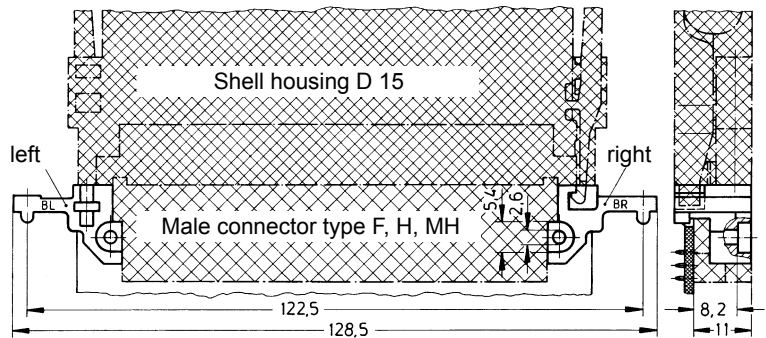
left  
09 06 000 9909

right  
09 06 000 9910

with nut  
M 2.5 DIN 562

left  
09 06 001 9934

right  
09 06 001 9935

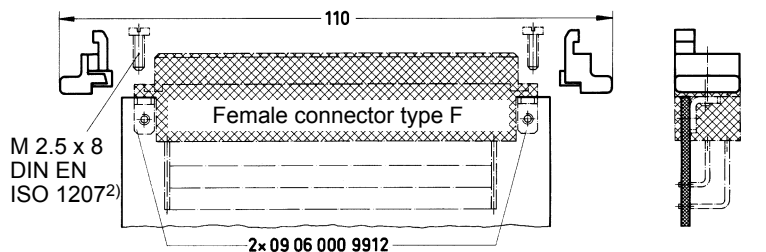


Fixing brackets B for female connectors for 19" racks according to DIN EN 60 297, part 3-101

### Multiple fixing

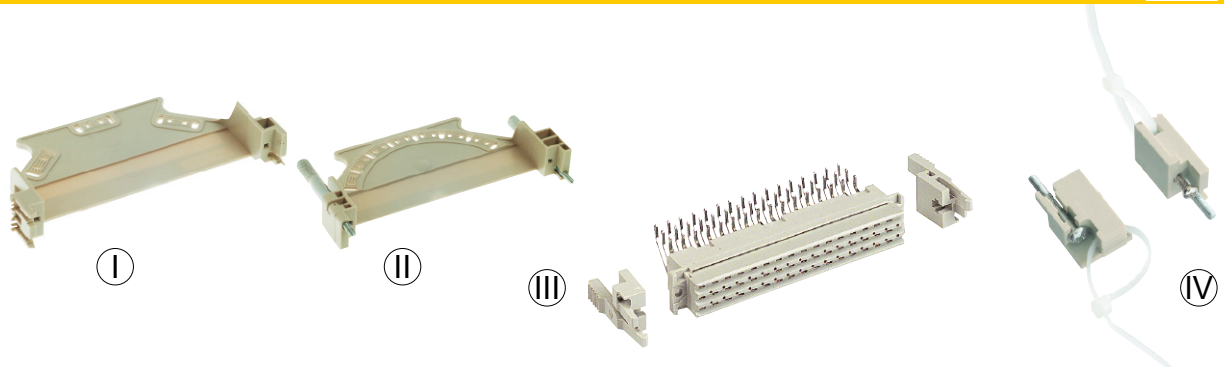


09 06 000 9933<sup>1)</sup>



<sup>1)</sup> Order 2 pieces for one female connector

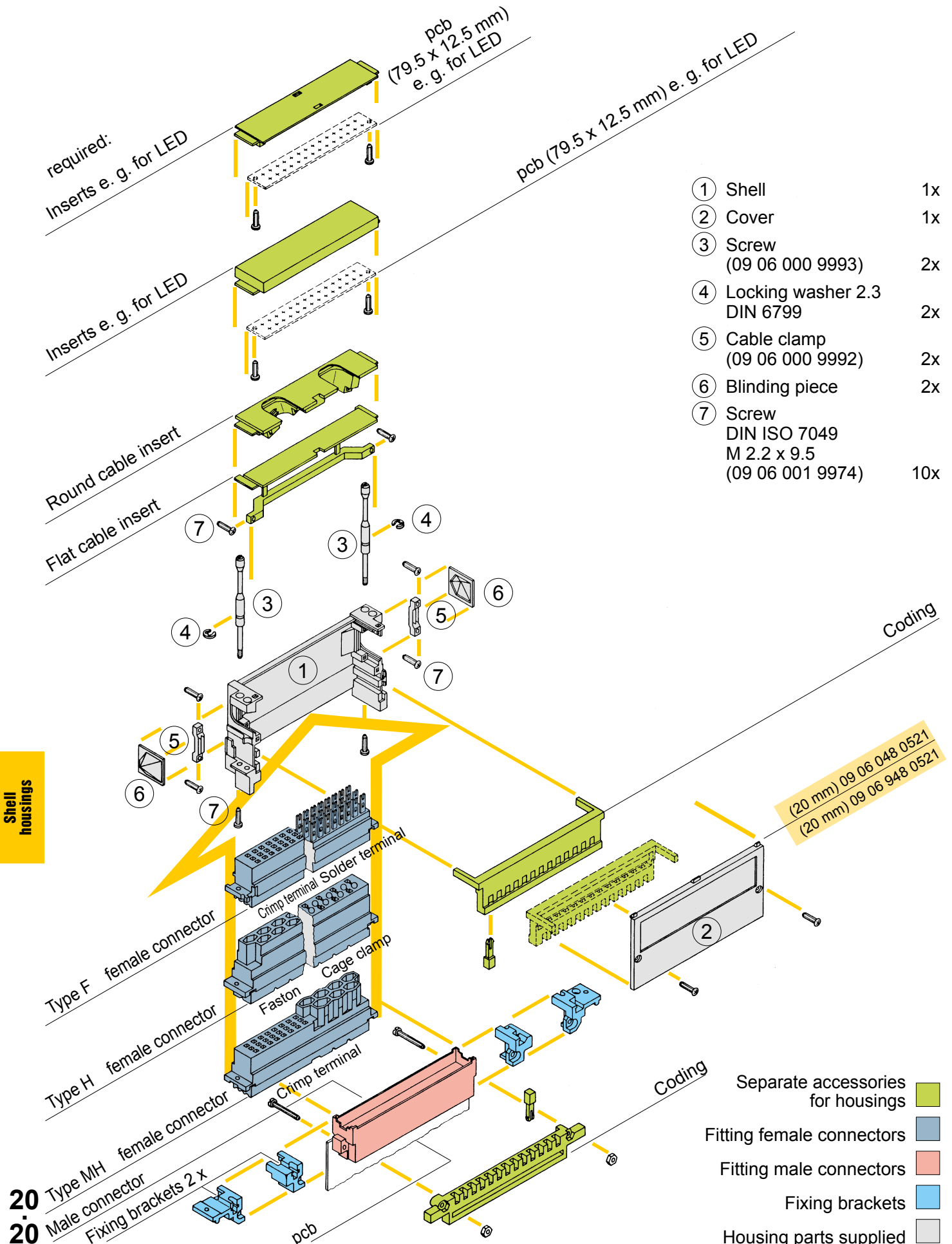
<sup>2)</sup> nut and screw not supplied with fixing brackets



Identification	Part number	Drawing	Dimensions in mm
<p><b>Open hood G</b> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">I</span></p> <p>for types E, F, H and MH, for applications <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">A</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">B</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">C</span></p> <p>Supplied with:                      Open hood 1x                      Locking screw 2x (09 06 000 9958)                      Cable tie 1x                      Screw 2x</p>	09 06 000 9957	<p>2 x ST 2.2 x 9.5 F-Z; E1U; ISO 7049</p>	
<p><b>Open hood G</b> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">II</span></p> <p>for types E, F, H and MH, for application <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">C</span></p> <p>Supplied with:                      Open hood 1x                      Pre-assembled, undetachable locking screw 2x                      Cable tie 1x                      Screw 2x</p>	09 06 001 9939		
<p><b>Junction element O</b></p> <p>for type F <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">IV</span></p> <p>Supplied with:                      Junction element 2x                      Cable tie 2x                      Screw 2x                      Screw M2.5 x 20 2x</p>	09 06 000 9968	<p>2 x ST 2.2 x 9.5 F-Z; E1U; ISO 7049</p>	
<p><b>Locking lever</b></p> <p>for type F, H and MH <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">III</span></p> <p><sup>1)</sup> Order 2 pieces for one female connector</p>	<p>09 06 000 9930<sup>1)</sup></p> <p>09 06 000 9911<sup>1)</sup></p>	<p><sup>2)</sup> nut and screw not supplied with locking levers</p>	

Shell housings

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



required:  
Inserts e. g. for LED

pcb  
(79.5 x 12.5 mm)  
e. g. for LED

Inserts e. g. for LED

pcb (79.5 x 12.5 mm) e. g. for LED

Round cable insert  
Flat cable insert

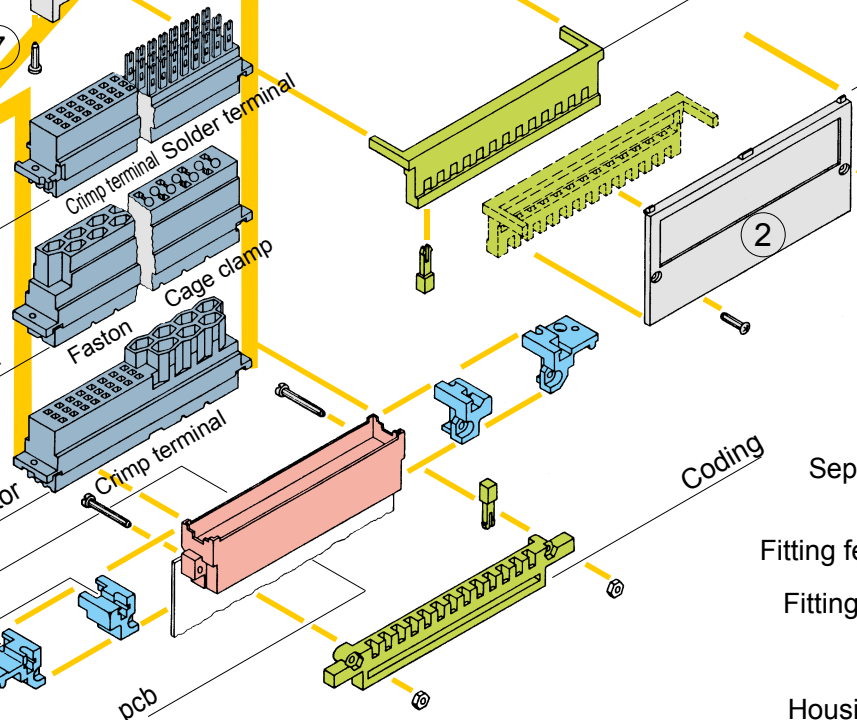
- ① Shell 1x
- ② Cover 1x
- ③ Screw (09 06 000 9993) 2x
- ④ Locking washer 2.3 DIN 6799 2x
- ⑤ Cable clamp (09 06 000 9992) 2x
- ⑥ Blinding piece 2x
- ⑦ Screw DIN ISO 7049 M 2.2 x 9.5 (09 06 001 9974) 10x

Coding

(20 mm) 09 06 048 0521  
(20 mm) 09 06 948 0521

Shell housings

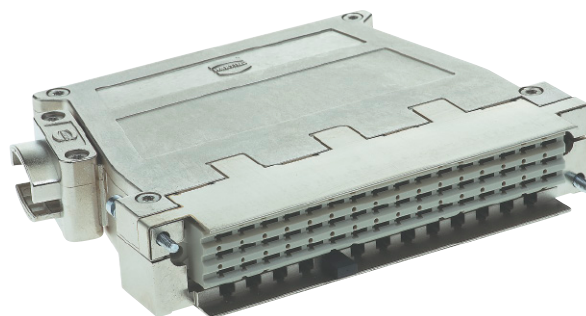
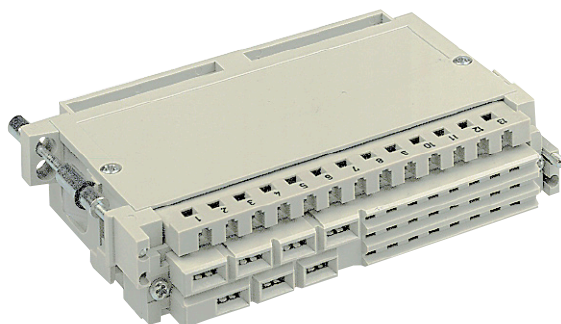
20 Type F female connector  
20 Type H female connector  
20 Type MH female connector  
20 Male connector  
Fixing brackets 2 x



- 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





## 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

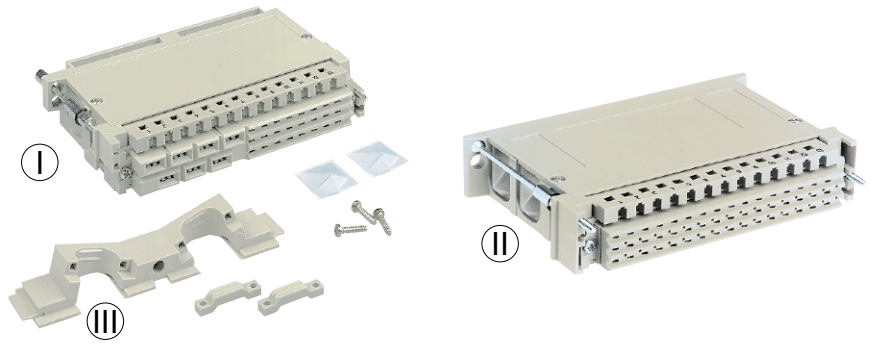
## Technical characteristics

	D 20/2	D 20/2 metallised <sup>1)</sup>	D 20/4	D 20/4 metallised <sup>1)</sup>	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

<sup>1)</sup> upper temperature limit is +105 °C



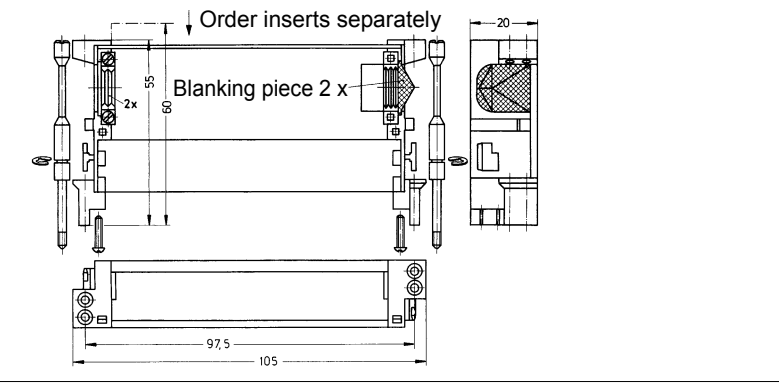
# Shell housing D 20 for types F, H and MH



Identification                      Part number                      Drawing                      Dimensions in mm

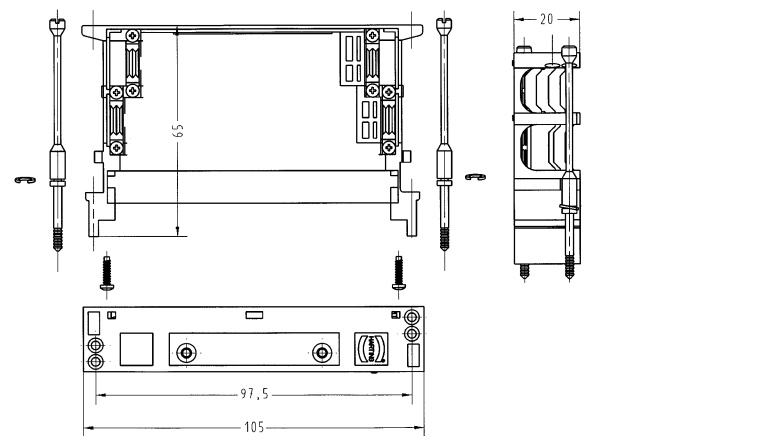
Shell housing  
D 20/2  
Two side  
cable entries  
  
I

20 mm  
09 06 048 0521



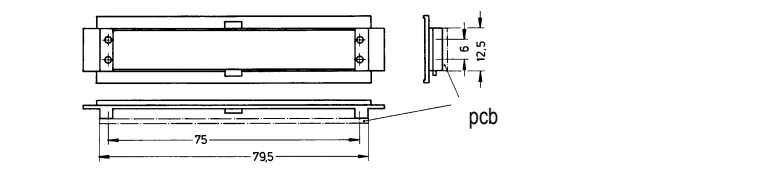
Shell housing  
D 20/4  
Four side  
cable entries  
  
II  
  
Supplied with:  
Shell 1x  
Cover 1x  
Locking screw 2x  
(09 06 000 9920)  
Locking washer 2.3 2x  
Screw BZ 2.2x9.5 12x  
Blinding piece 3x  
Cable clamp 2x

20 mm  
09 06 048 0522



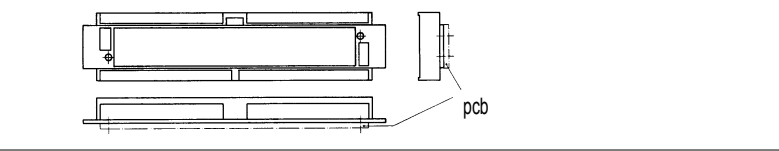
Inserts e. g. for LED\*  
  
for 55 mm height

09 06 000 9986



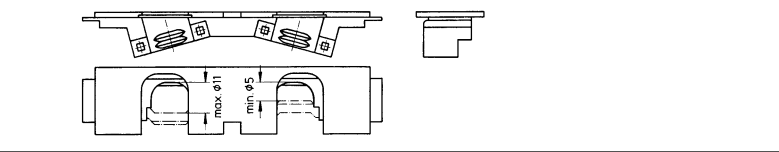
for 60 mm height

09 06 000 9987



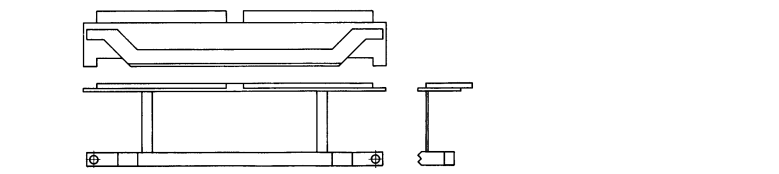
Round cable insert\*  
2 x  $\varnothing$  11  
  
III

09 06 000 9988



Flat cable insert\*

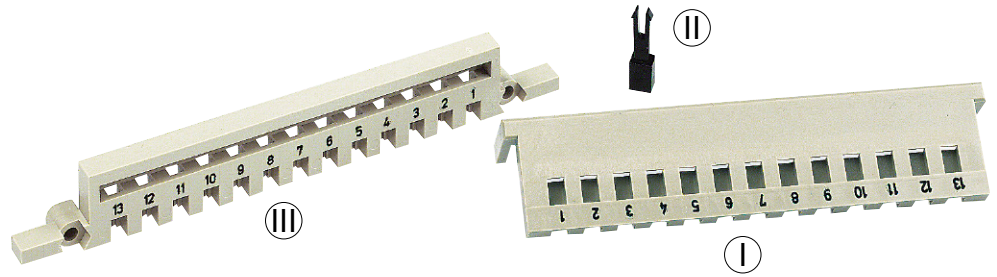
09 06 000 9989



Shell housings

20  
-  
22

\* Fits D 20/2  
Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2



## Coding

Identification	Part number	Drawing	Dimensions in mm
<p>Code comb for shell housing<sup>3)</sup> (can also be used as a blanking cover)</p> <p>Ⓚ</p>	09 06 000 9984 <sup>f)</sup>		
<p>Coding pin<sup>3)</sup></p> <p>Ⓛ</p> <p>1) Order 13 pieces per code comb</p>	09 06 001 9905 <sup>1)</sup>		
<p>Code comb for male connectors<sup>3)</sup></p> <p>Ⓜ</p> <p>short version for a full metal locking lever</p> <p>with nut M2.5</p>	<p>09 06 000 9985<sup>f)</sup></p> <p>09 06 001 9985<sup>f)</sup></p> <p>09 06 001 9995<sup>f)</sup></p>		
<p>Mounting possibilities for the code comb in the shell housing D 20/2</p>		<p>2) Use the lower slot when coding the male connector with fixing brackets</p> <p>Mounting example <b>A</b> max. cable entry <math>\varnothing</math> 14 mm to the top, see page 20.25</p> <p>Mounting example <b>B</b> max. cable entry <math>\varnothing</math> 14 mm to the bottom, see page 20.25</p>	

<sup>3)</sup> Fits D 20/2 and D 20/4

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

Identification	Part number	Drawing	Dimensions in mm
<p>Mounting possibilities for code comb at the male connector with fixing brackets</p>			
<p>Fixing brackets B for male connectors* for 19" racks according to DIN EN 60 297, part 3-101</p> <p>Single fixing* without nut</p> <p>with nut M 2.5 DIN 562</p>	<p>left 09 06 000 9909</p> <p>right 09 06 000 9910</p> <p>left 09 06 001 9934</p> <p>right 09 06 001 9935</p>		
<p>Multiple fixing* without coding at the fixing bracket without nut</p> <p>without coding at the fixing bracket with nut M 2.5 DIN 562</p> <p>with coding at fixing bracket<sup>1)</sup> with nut M 2.5 DIN 562</p> <p>15 mm 20 mm</p> <p>15 mm 20 mm</p>	<p>left 09 06 000 9907</p> <p>right 09 06 000 9908</p> <p>left 09 06 000 9966</p> <p>right 09 06 000 9967</p> <p>left 09 06 000 9995 09 06 000 9997</p> <p>right 09 06 000 9996 09 06 000 9998</p>		
<p>Protection and fixing strip* for 20 mm shell housing</p> <p>Single fixing fits female connectors and I element crimp</p>	<p>09 06 001 9909</p>		

<sup>2)</sup> supplied with fixing

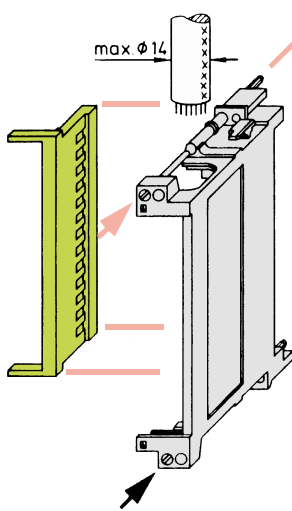
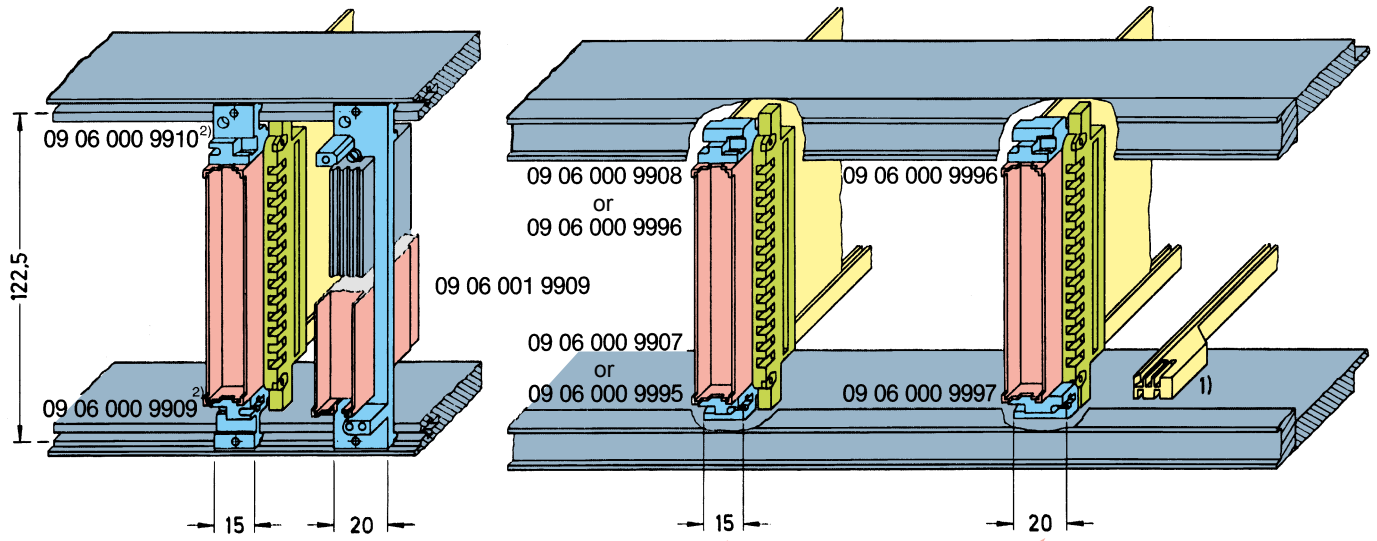
\* Fits D 20/2 and D 20/4  
<sup>1)</sup> Specific coding between the fixing bracket and the pcb guiding rail.  
 The guiding rail and corresponding coding pins are not scope of delivery

Mounting examples

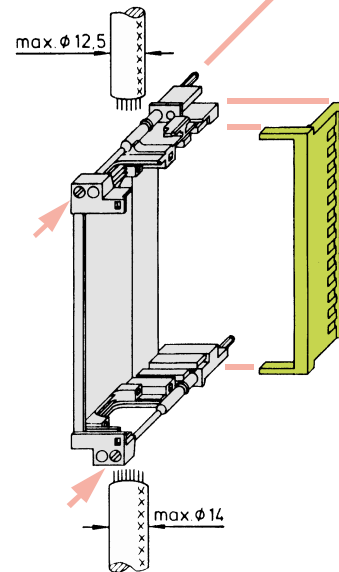
Dimensions in mm

Single fixing

Multiple fixing



Mounting example A<sup>2)</sup>  
max. cable entry to the top



Mounting example B  
max. cable entry to the bottom

Separate accessories for housings

Fitting female connectors

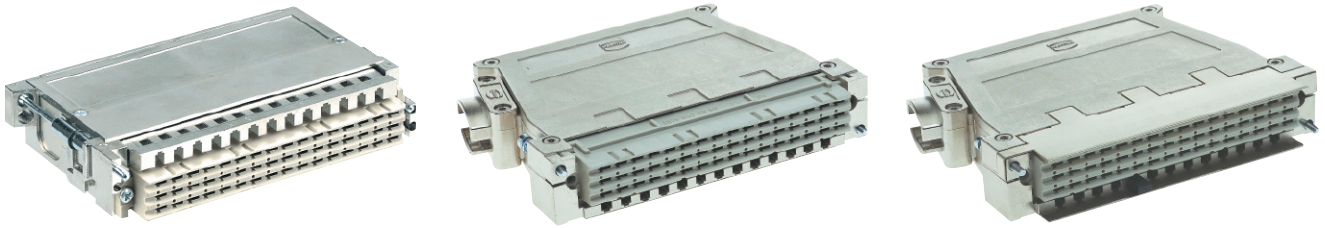
Fitting male connectors

Fixing brackets

Housing parts supplied

<sup>1)</sup> Specific coding between the fixing bracket and the pcb guiding rail

<sup>2)</sup> Max. cable entry ( $\phi$  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 60603-2. 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.

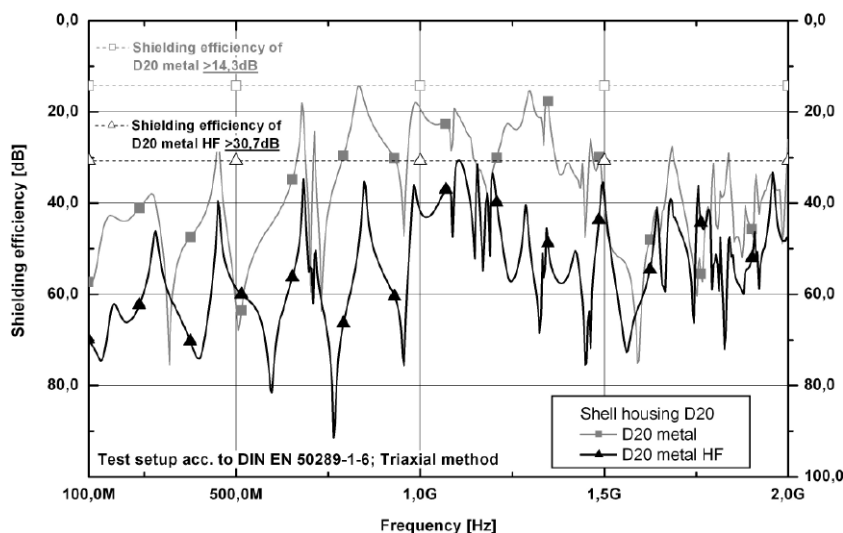
One advantage of metallised housings is their reduced weight (40 grams compared to 180 grams of a full metal housing). Therefore, minimal interference is applied to the pcb in applications where strong vibration is occurring. The HARTING housings are comparatively light through the use of metallised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

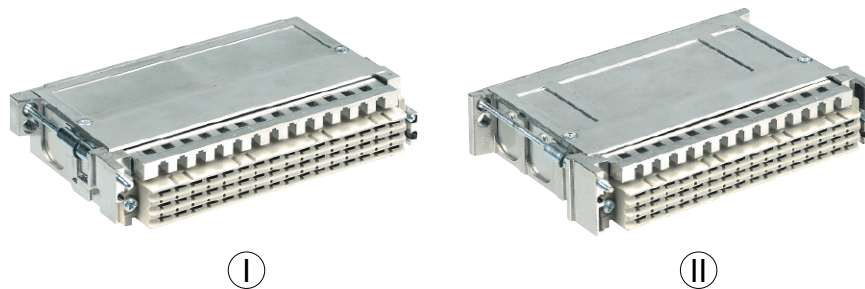
**“A high-resistance interruption of the cable shield (e.g. by using “pigtailed” via twisted stranded wires of the cable shield) may affect the EMC performance and therefore cause unacceptable effects to the electromagnetic environment.”**

**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).**





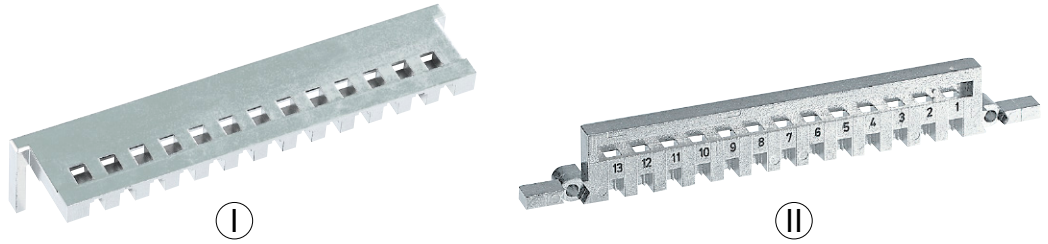
# Shell housing D 20 metallised for types F, H and MH



Identification	Part number	Drawing	Dimensions in mm
<p>Shell housing D 20/2 metallised with two side cable entries</p> <p style="text-align: center;">I</p> <p>Supplied with: see page 20.20</p>	<p>20 mm 09 06 948 0521</p>	<p>Order inserts separately</p>	
<p>Shell housing D 20/4 metallised with four side cable entries</p> <p style="text-align: center;">II</p> <p>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</p>	<p>20 mm 09 06 948 0522</p>		
<p>Metallised insert e. g. for LED*</p> <p>for 55 mm height</p>	<p>09 06 900 9986</p>		
<p>for 60 mm height</p>	<p>09 06 900 9987</p>		
<p>Metallised round cable insert* 2 x <math>\varnothing</math> 11</p>	<p>09 06 900 9988</p>		

\* Fits D 20/2 metallised  
Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2





## Coding

Identification                      Part number                      Drawing                      Dimensions in mm

<p>Metallised code comb for shell housing<sup>3)</sup> (can also be used as blanking cover)</p> <p>Ⓚ</p>	<p>09 06 900 9984<sup>f)</sup></p>		<p>Dimensions in mm</p>
--	------------------------------------	--	-------------------------

<p>Code pin<sup>3)</sup></p> <p>1) Order 13 pieces per code comb</p>	<p>09 06 001 9905<sup>1)</sup></p>	
--	------------------------------------	--

<p>Metallised code comb for male connector<sup>3)</sup></p> <p>Ⓛ</p> <p>short version for a full metal locking lever</p>	<p>09 06 900 9985<sup>f)</sup> 09 06 901 9985<sup>f)</sup></p>	
--	--	--

<p>Mounting possibilities for the code comb in shell housing D 20/2 metallised</p>		<p>2) Use the lower slot when coding the male connector with fixing brackets</p> <p>Mounting example <b>A</b> max. cable entry <math>\varnothing</math> 14 mm to the top, see page 20.25 Mounting example <b>B</b> max. cable entry <math>\varnothing</math> 14 mm to the bottom, see page 20.25</p>
--	--	--

Shell housings

20  
-  
28

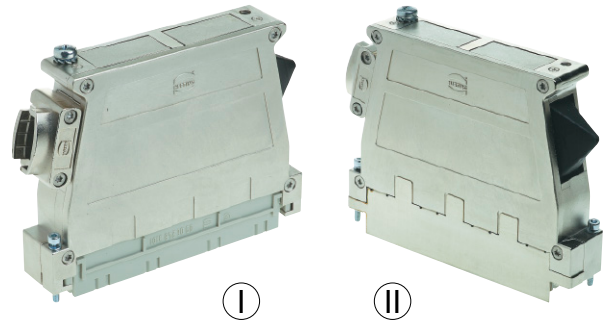
<sup>3)</sup> Fits D 20/2 and D 20/4 metallised  
<sup>f)</sup> Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Identification	Part number	Drawing	Dimensions in mm
<p>Mounting possibilities for coding at the male connector with fixing brackets</p>		<p>09 06 900 9996 09 06 900 9910 09 06 900 9908 M 2.5 M 2.5 x 18 DIN EN ISO 1207 09 06 900 9907 09 06 900 9909 M 2.5 09 06 900 9995 09 06 900 9997 pcb M 2.5 DIN EN ISO 4036</p>	
<p>Fixing brackets B metallised for male connectors* for 19" racks according to DIN EN 60 297, part 3-101</p> <p>Single fixing* without nut</p> <p>with nut M 2.5 DIN EN ISO 4036</p>	<p>left 09 06 900 9909 right 09 06 900 9910</p> <p>left 09 06 901 9934 right 09 06 901 9935</p>	<p>Shell housing D 20 left right BR 122,5 M 2.5 DIN EN ISO 4036 14 16</p>	
<p>Multiple fixing* without coding at fixing bracket without nut</p> <p>without coding at fixing bracket with nut M 2.5 DIN 562</p> <p>with coding at fixing bracket<sup>1)</sup> with nut M 2.5 DIN 562</p>	<p>left 09 06 900 9907 right 09 06 900 9908</p> <p>left 09 06 900 9966 right 09 06 900 9967</p> <p>left 15 mm 09 06 900 9995 20 mm 09 06 900 9997</p> <p>right 15 mm 09 06 900 9996</p>	<p>Shell housing D 20 left right BR 128,5 M 2.5 DIN 562 mounting examples 09 06 900 9995 09 06 900 9997 M 2.5 DIN 562 M 2.5 DIN 562</p>	
<p>Protection and fixing* strip for 20 mm shell housing Single fixing fits female connectors and I element crimp</p>	<p>09 06 901 9909</p>	<p>128,5 122,5 97,5 3,3 M 2.5</p>	

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

<sup>1)</sup> Specific coding between the fixing bracket and pcb guiding rail

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



Identification                      Part number                      Drawing                      Dimensions in mm

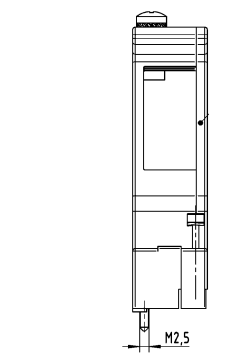
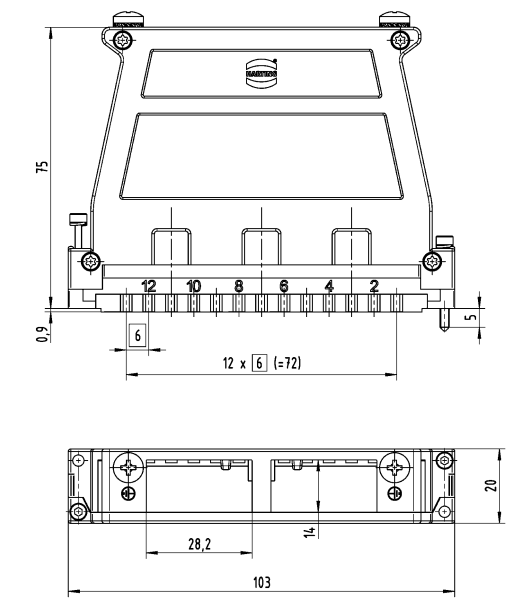
Shell housing  
D 20 metal

①

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 housings

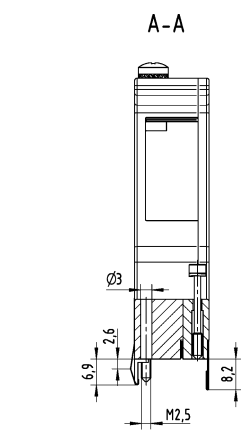
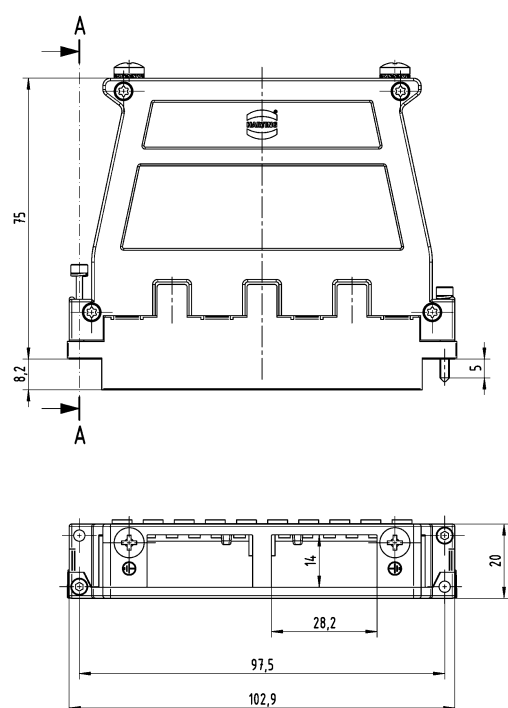
Shell housing  
D 20 metal HF  
with nickel-plated  
surface

②

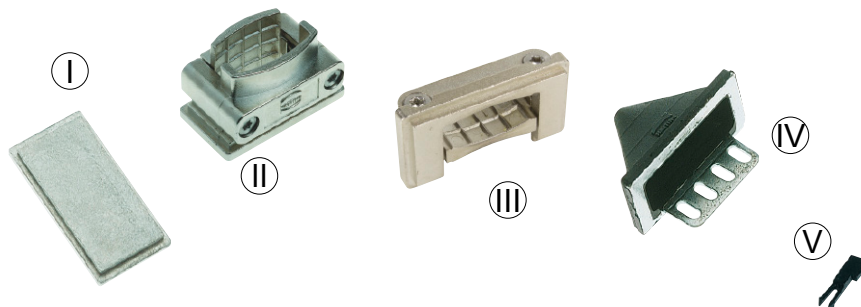
Supplied with:

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

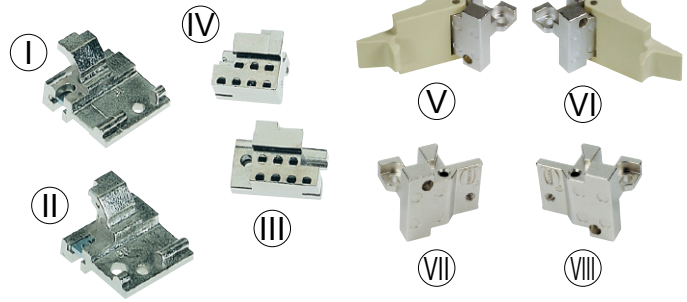


# Shell housing D 20 metal for types F, H and MH



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

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



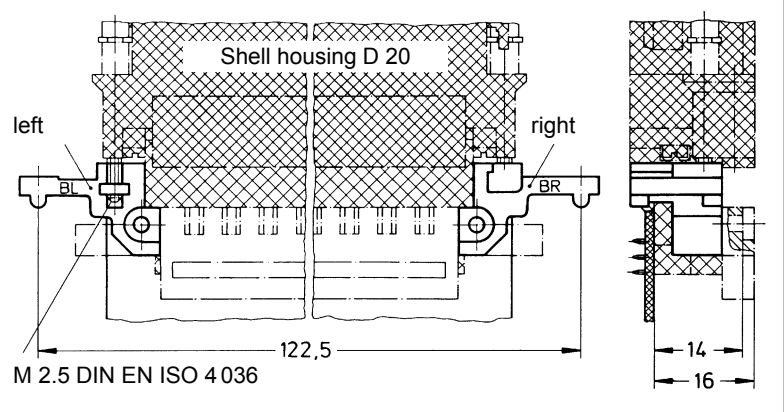
Identification                      Part number                      Drawing                      Dimensions in mm

**Fixing brackets B metallised for male connectors**  
for 19" racks according to DIN EN 60 297, part 3-101

**Single fixing** (I)  
with nut M 2.5 DIN EN ISO 4 036 (II)

left 20 mm 09 06 901 9924<sup>f)</sup>

right 20 mm 09 06 901 9925<sup>f)</sup>



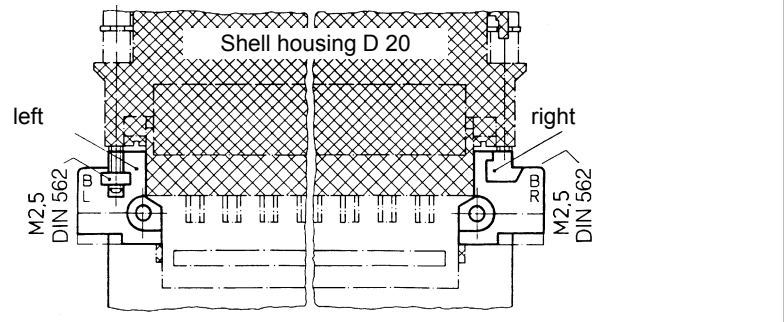
**Multiple fixing**

with coding at fixing bracket with nut M 2.5 DIN 562 (III)

(IV)

left 20 mm 09 06 900 9997<sup>f)</sup>

right 15 mm 09 06 900 9996<sup>f)</sup>



Shell housings

**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)

without ejector handle (VII)

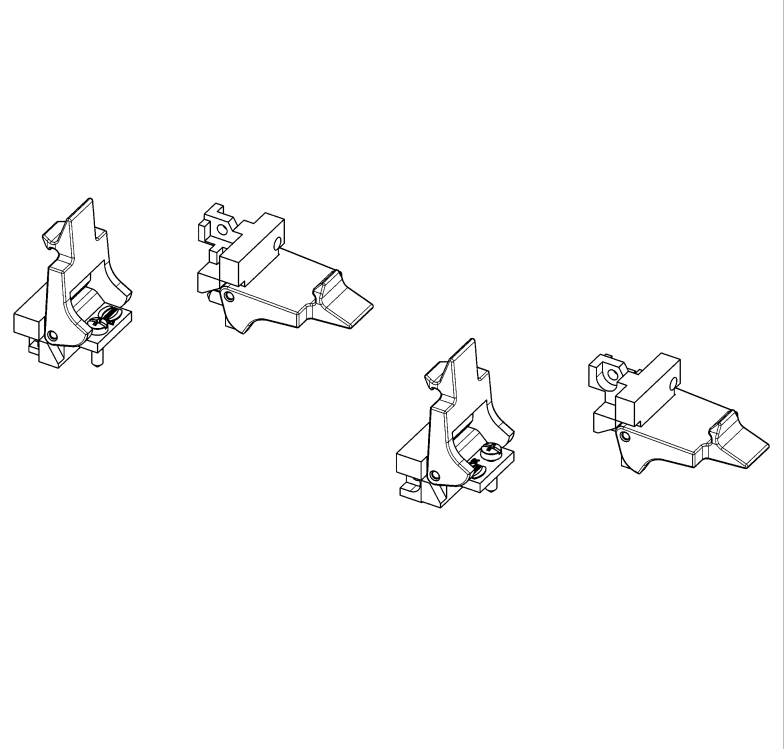
(VIII)

left 09 06 800 9946

right 09 06 800 9948

left 09 06 800 9966

right 09 06 800 9968



20  
-  
32

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



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

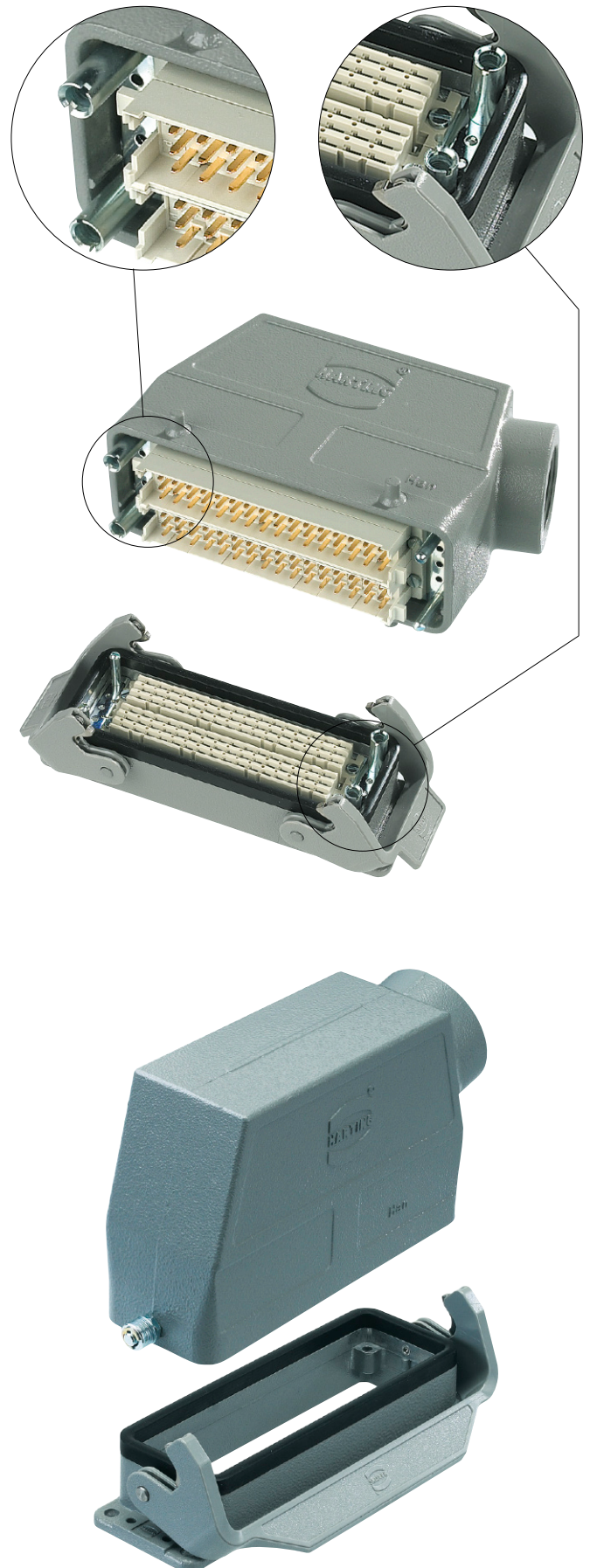
Degree of protection for hoods and housings: IP65

## Retaining frames

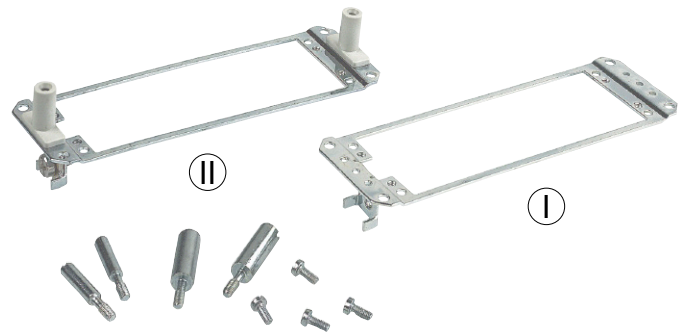
For fixing the inserts into the housing.

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.





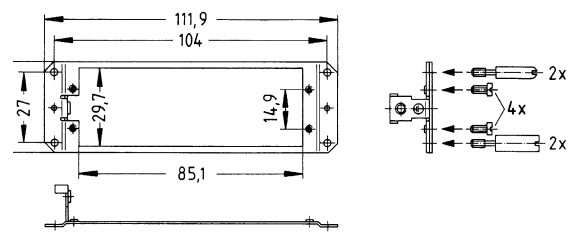


Identification                      Part number                      Drawing                      Dimensions in mm

Retaining frame without contact elements

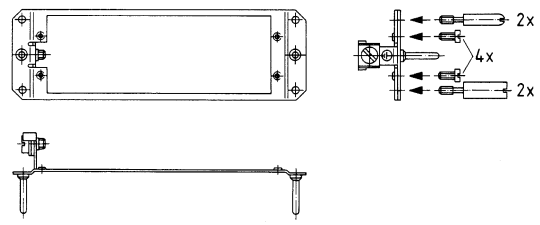
Ⓛ

09 06 001 9904



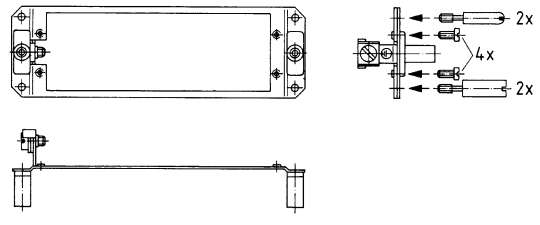
Retaining frame with 2 contact pins and ground termination

09 06 001 9902



Retaining frame with 2 contact sockets and ground termination

09 06 001 9903

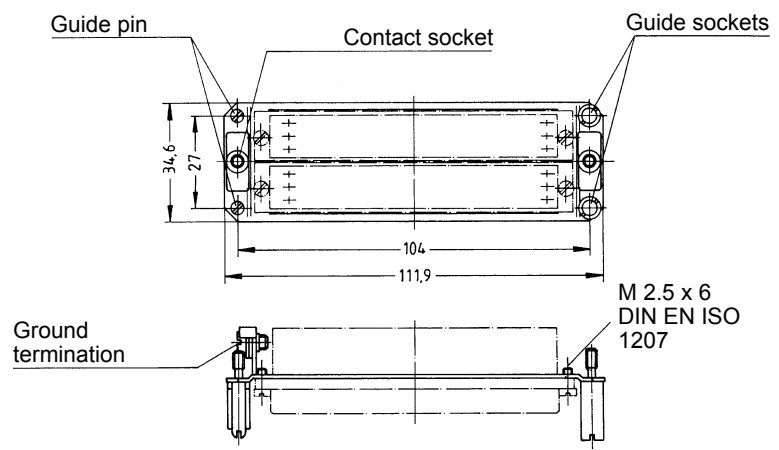


Ⓜ

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**

Page

Press-in technology

Modular tooling system for starting connector press-in .....	<b>30.02</b>
Handling indications .....	<b>30.03</b>
Press-in tooling .....	<b>30.05</b>
Repair tooling .....	<b>30.07</b>
Hand bench presses / pneumatic presses .....	<b>30.11</b>
CPM press-in machines .....	<b>30.12</b>

Crimp technology

Manual crimping tools .....	<b>30.16</b>
Insertion and removal tools .....	<b>30.17</b>
Semiautomatic crimping tools .....	<b>30.17</b>
Automatic crimping tools .....	<b>30.18</b>
Overview: Tools for crimp contacts .....	<b>30.20</b>

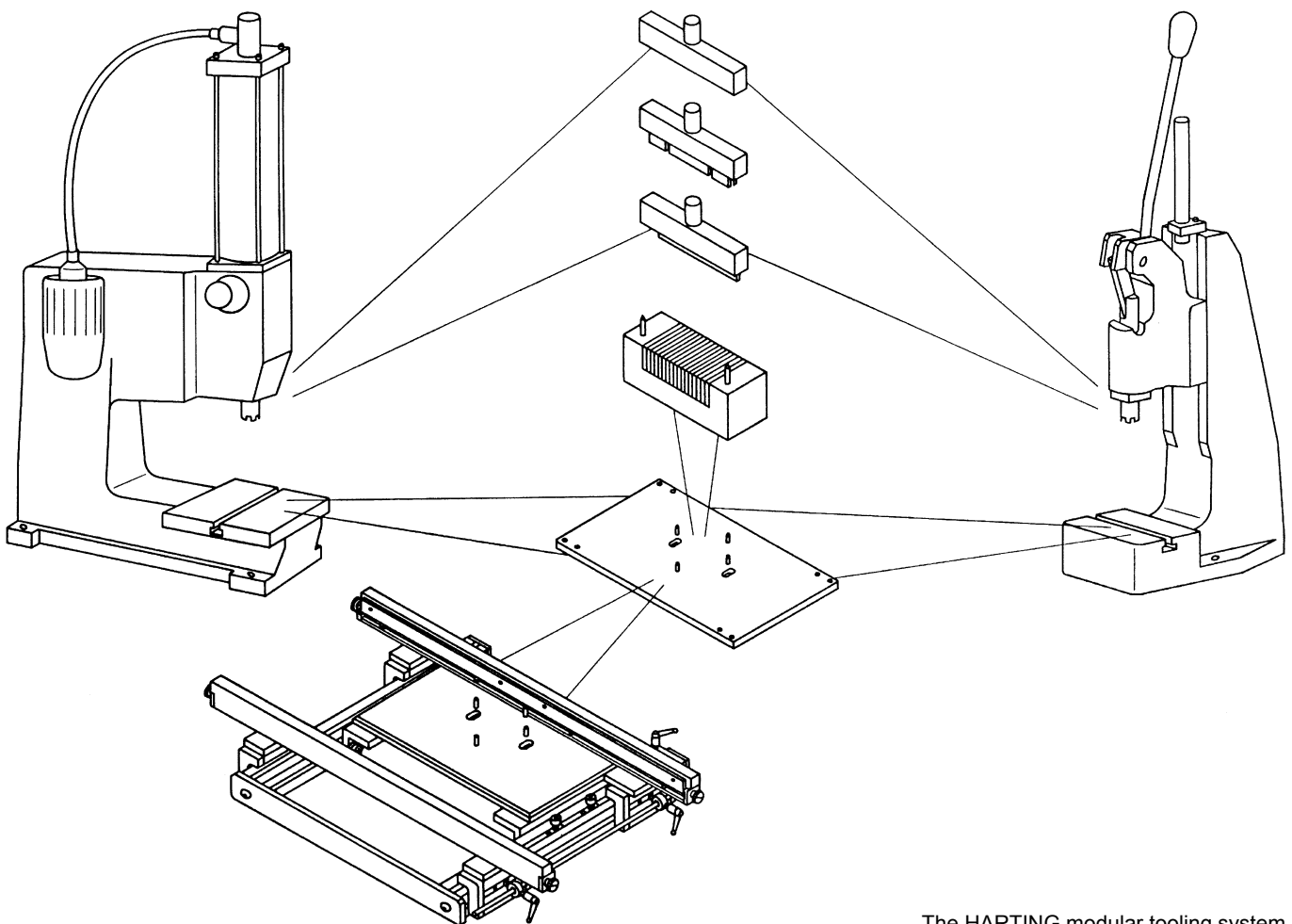
The diversity of connector types with press-in terminations and varying termination styles make it necessary to have a simple, flexible tooling system that can be continuously updated.

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



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.

## 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°.

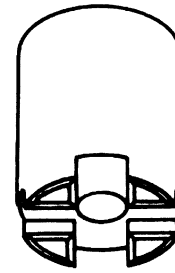
Two guide pins position the bottom tool in relation to the top tool simply and accurately.

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

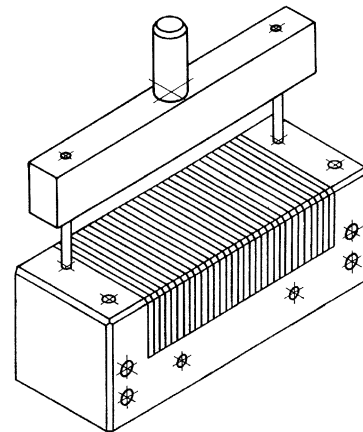
Two pairs of pins on the base plate locate the bottom tool in relation to the top tool in steps of 90°.

## Height compensation

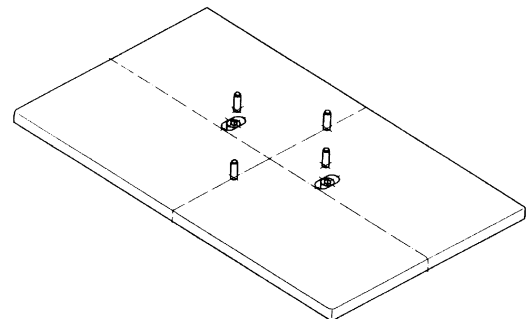
- Various overall heights of connectors are accommodated by type-specific top tools.
- Various pcb thicknesses are accommodated by the use of spacers between the bottom tool and base plate.



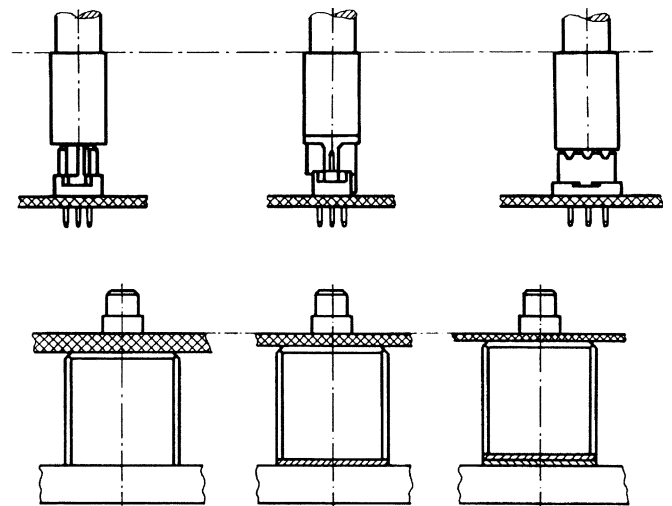
Ram with cross-shaped groove



Positioning the bottom tool in relation to top tool



Base plate with pairs of location pins at 90°



## 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.

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 (narrow version)

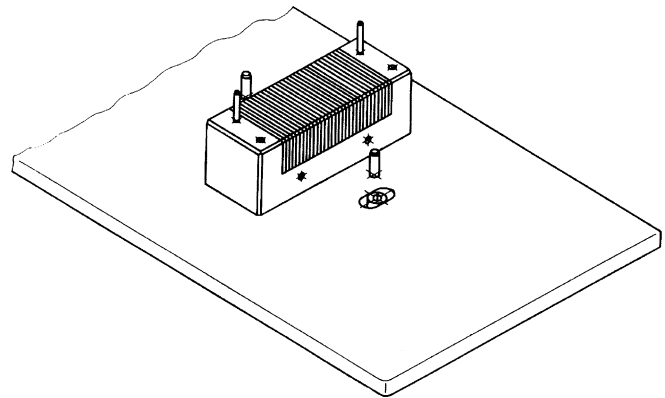
In addition to the square bottom tool with multi-functional properties, HARTING offers the alternative of a narrow bottom tool for assembling connectors with straight press-in terminations. This tool supports the pcb within the press-in connector zone and therefore makes it possible to assemble connectors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

## Guide frame

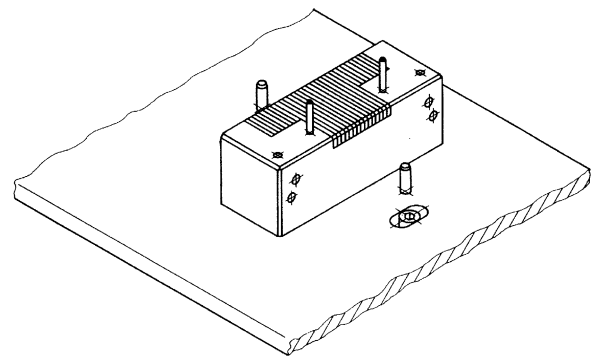
The guide frame screwed to the base plate ensures the correct positioning of the pcb in relation to the top and bottom tools and permits a much higher rate of assembly.

Both guide rails are adjustable to accommodate various pcb sizes.

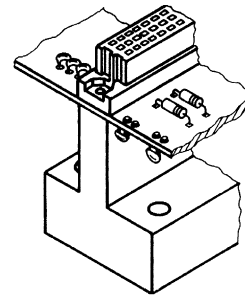
A spring-loaded supporting rail lifts the pcb away from the bottom tool after the press-in operation ensuring that no damage occurs to the conductors as it passes through the machine.



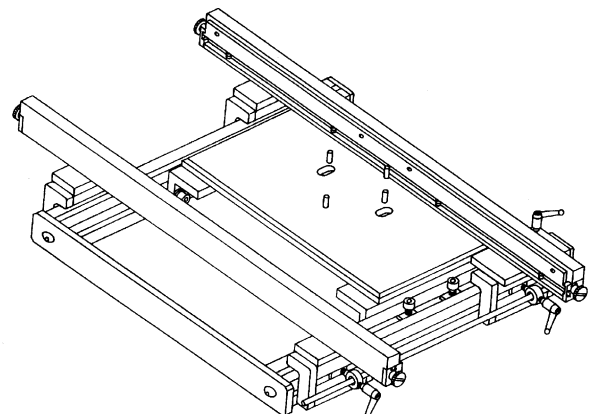
Bottom tool set for assembling connectors with angled pins



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



Narrow version of the bottom tool for special applications



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

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

\* Connectors see separate catalogue



Identification		Part number	Drawing	Dimensions in mm
Top tool without insert block for use with <b>male connectors</b>	Type Q, 2Q R, 2R	09 99 000 0181 09 99 000 0183		Type Q, 2Q Type R, 2R
	with insert block for use with <b>male connectors</b>	Type Q, 2Q, 3Q R, 2R, 3R	09 99 000 0197	
Insert blocks for use with <b>male connectors</b>	Type Q 2Q 3Q R 2R 3R	09 99 000 0275 09 99 000 0274 09 99 000 0263 09 99 000 0277 09 99 000 0276 09 99 000 0264		
	for use with <b>shrouds</b>	har-bus® 64 Type E Type C, R Type 2C, 2R Type F		
Top tool for use with <b>female connectors</b>	Type B, 2B, 3B C, 2C, 3C D-Sub* SEK 18* har-mik*	09 99 000 0197		Type B, 2B, 3B, C, 2C, 3C Type E, F, H har-bus® 64
	Type E F H	09 99 000 0221		
	har-bus® 64	02 99 000 0002		
	Type M (24+8) M (42+6) M (60+4) M (78+2)	09 99 000 0269 09 99 000 0270 09 99 000 0271 09 99 000 0272		
Top tool only for short posts and pcb thickness > 1.6 mm and without guide frame  for use with <b>female connectors</b>	Type C	09 99 000 0228		Type C Type F, H har-bus® 64
	Type F H	09 99 000 0229		
	har-bus® 64	02 99 000 0016		

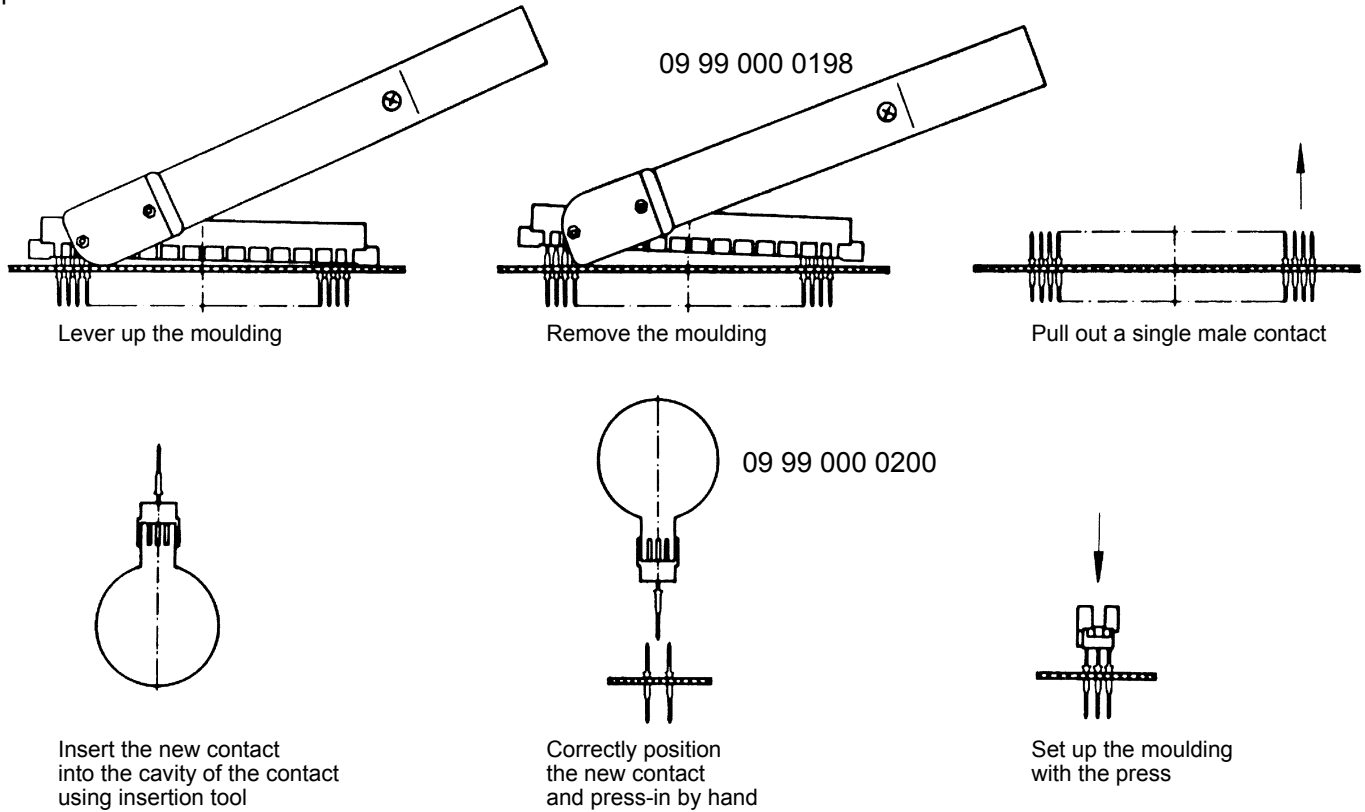
Tooling

\* Connectors see separate catalogues

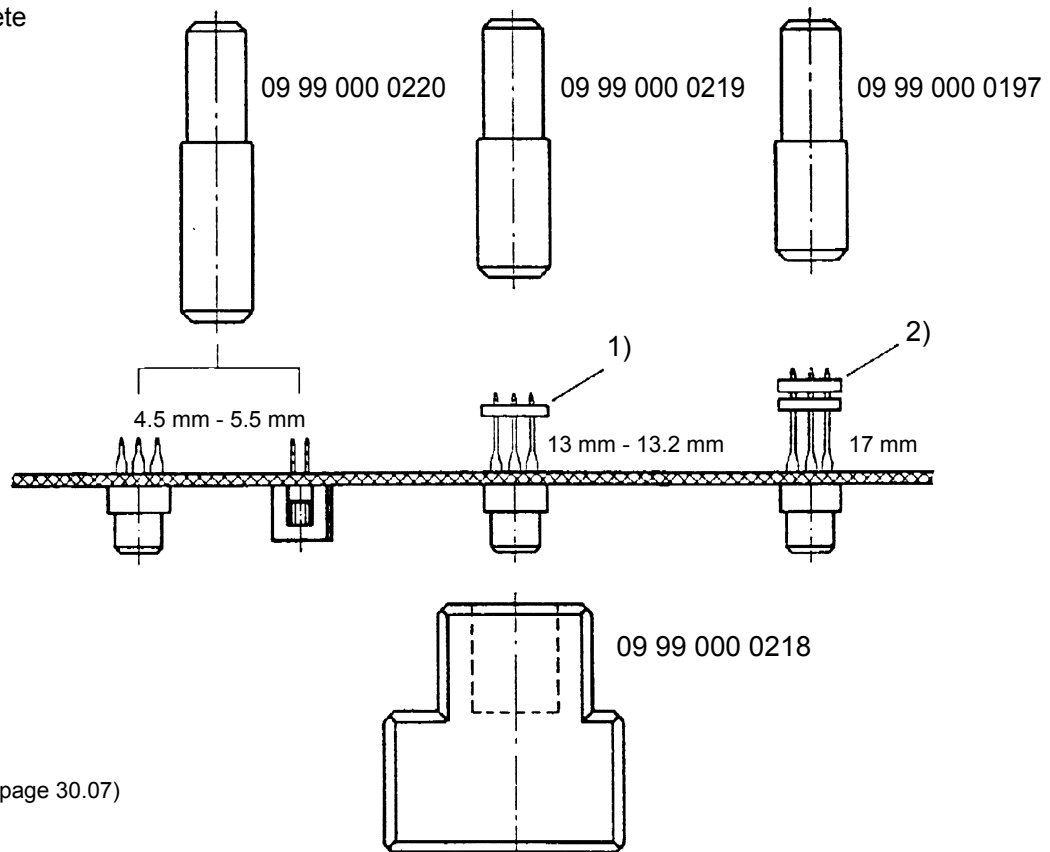
Identification	for use with	Part number	Drawing	Dimensions in mm															
Removal tool for moulding	<b>Male connectors</b> Type Q, 2Q, 3Q R, 2R, 3R	09 99 000 0198		12															
Removal tool for single male contacts		09 99 000 0239																	
Insertion tool for single male press-in contacts		09 99 000 0200		50 40 11															
Press-out tool	<b>Termination length</b>  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		<table border="1"> <thead> <tr> <th>Termination length [mm]</th> <th>x [mm]</th> <th>y [mm]</th> </tr> </thead> <tbody> <tr> <td>17</td> <td>12</td> <td>18.7</td> </tr> <tr> <td>13 - 13.2</td> <td>12</td> <td>22.7</td> </tr> <tr> <td>11.5</td> <td>14</td> <td>20.1</td> </tr> <tr> <td>4.5 - 5.3</td> <td>12</td> <td>30.2</td> </tr> </tbody> </table> <p>With the different dimension y no adjustment of hand bench press necessary.</p>	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
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																	
Termination support for protection against bending of 13 mm - 17 mm terminations	<b>Male connectors</b> Type Q, 2Q, 3Q R, 2R, 3R  <b>Female connectors</b> Type B, 2B, 3B C, 2C, 3C	09 99 000 0240		11 95 5,4															
	<b>Female connectors</b> Type F	09 99 000 0241		14,8 87,5 4,8															
Support block for repair and removal	<b>Male connectors</b> Type Q, 2Q, 3Q R, 2R, 3R SEK 18*  <b>Female connectors</b> Type B, 2B, 3B C, 2C, 3C F	09 99 000 0218		40 100 26 40,7															

\* Connectors see separate catalogue

## Replacement of single male press-in contacts



## Replacement of complete press-in connectors



<sup>1)</sup> Termination support (see page 30.07)

<sup>2)</sup> for 17 mm wrap posts  
two termination supports are recommended

Identification	for use with	Part number	Drawing	Dimensions in mm
Removal tool for moulding	<b>Female connectors</b> har-bus® 64	02 99 000 0003		
Removal tool (heavy duty) for moulding	<b>Female connectors</b> har-bus® 64	02 99 000 0006		
Press-out tool for 17 mm terminations	<b>Female connectors</b> har-bus® 64	02 99 000 0004		
Press-out tool for 5 mm / 4.5 mm terminations	<b>Female connectors</b> har-bus® 64	02 99 000 0008		
Support block	<b>Female connectors</b> 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 quantities. 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		<p>Technical characteristics</p> <p>Working stroke 25 mm</p> <p>Press force 15 kN max.</p> <p>Hole <math>\varnothing</math> in the ram <math>\varnothing</math> 10 mm</p> <p>Net weight approx. 23 kg</p>
Pneumatic press 40 kN	09 99 000 0282		<p>Technical characteristics</p> <p>Total stroke 48 mm</p> <p>Working stroke 0-6 mm</p> <p>Press force 40 kN max.</p> <p>Air pressure 6 bar</p> <p>Hole <math>\varnothing</math> in the ram <math>\varnothing</math> 10.01 mm</p> <p>Net weight 136 kg</p> <p>Power supply 110 V / 220 V AC</p>
Adaptor for height compensation <sup>1)</sup>	09 99 000 0279		
Guide frame with base plate Standard type for pcb size x = 123.5 - 309.5 mm  Long type <sup>2)</sup> for pcb size x = 123.5 - 668.5 mm  Base plate	09 99 000 0244  09 99 000 0261  09 99 000 0255		

<sup>1)</sup> suitable for 09 99 000 0282 and all CPM machines (see page 30.12 ff.)  
<sup>2)</sup> 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.

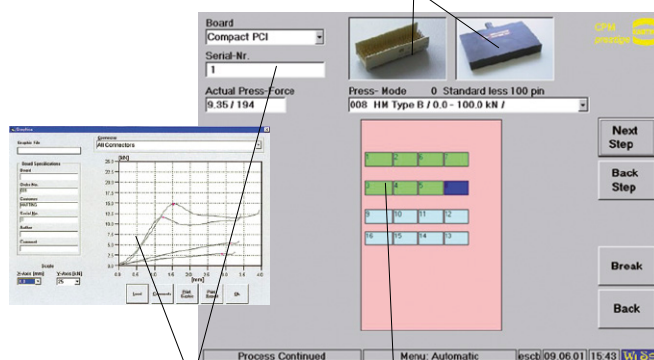
The visualisation of the entire press-in process (the position of the connector, press-in forces etc.) allows the rapid recognition and eradication of the possible error sources. With the addition of a barcode reader (1D and 2D)<sup>1)</sup> the parameters of every pcb layout can be stored, recalled 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.



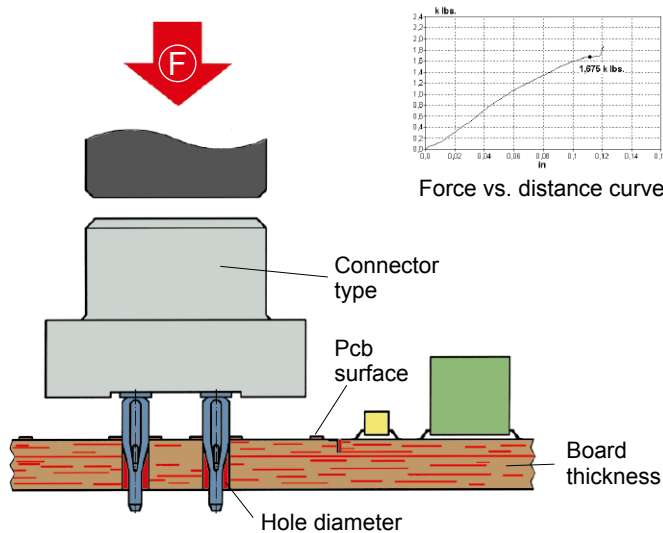
Visual guiding system via touch monitor

Real photos of connectors and tools



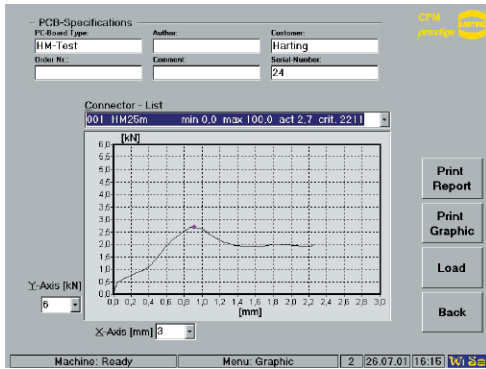
Process data

Layout with current position highlighted



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

<sup>1)</sup> 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

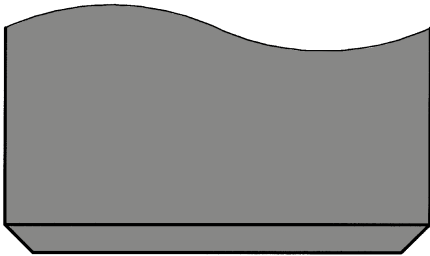
### Process monitoring and quality assurance:

- 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.

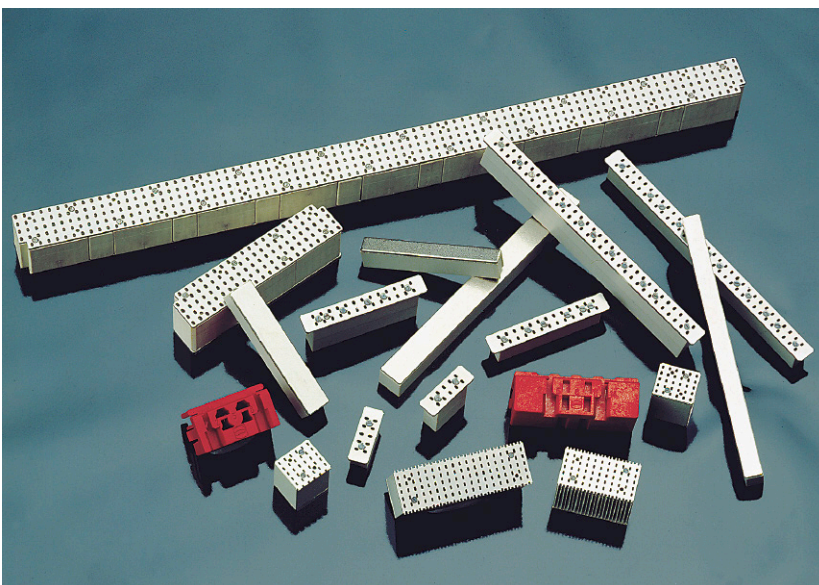
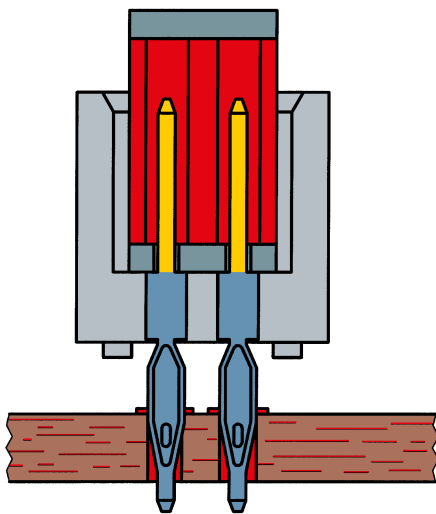


## Advantages of press inserts

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.



A large grid area for taking notes, consisting of approximately 30 columns and 25 rows of small squares.

Identification	Part number	Drawing	Dimensions in mm
<p><b>HARTING crimping tool</b> for individual contacts</p> <p>BC / FC 1 / har-bus® 64</p> <p>FC 2</p> <p>FC 3</p> <p><b>Locator</b></p> <p>BC / FC 1 / har-bus® 64</p> <p>FC 2</p> <p>FC 3</p>	<p>09 99 000 0075</p> <p>09 99 000 0076</p> <p>09 99 000 0077</p> <p>09 99 000 0640</p> <p>09 99 000 0641</p> <p>09 99 000 0642</p>	<p>Wire gauge</p> <p>BC: 0.09 - 0.50 mm<sup>2</sup></p> <p>FC 1: 0.09 - 0.25 mm<sup>2</sup></p> <p>FC 2: 0.14 - 0.56 mm<sup>2</sup></p> <p>FC 3: 0.50 - 1.50 mm<sup>2</sup></p>	
<p><b>HARTING crimping tool</b> for individual contacts BC / FC and har-bus® 64</p> <p><b>Crimping insert set</b> for individual contacts each set contains locator and crimp insert top and bottom part</p> <p>BC / FC 1 / har-bus® 64</p> <p>FC 2</p> <p>FC 3</p> <p>BC / har-bus® 64 solid wire</p> <p><b>Locator</b></p> <p>BC / har-bus® 64</p> <p>FC</p> <p><b>Service case</b> for crimping tool and 5 sets inserts, incl. screwdriver for insert change, without contents</p>	<p>09 99 000 0620</p> <p>09 99 000 0621</p> <p>09 99 000 0622</p> <p>09 99 000 0623</p> <p>09 99 000 0629</p> <p>09 99 000 0630</p> <p>09 99 000 0631</p> <p>09 99 000 0632</p>	<p>Wire gauge</p> <p>BC: 0.09 - 0.50 mm<sup>2</sup></p> <p>FC 1: 0.09 - 0.25 mm<sup>2</sup></p> <p>FC 2: 0.14 - 0.56 mm<sup>2</sup></p> <p>FC 3: 0.50 - 1.50 mm<sup>2</sup></p> <p>BC: 0.13 mm<sup>2</sup> (solid wire)</p>	<p>Order crimping inserts separately</p> 
<p><b>Crimping tool</b> for individual contacts FC 1, FC 2 and FC 3 (Service tool)</p>	<p>09 99 000 0191</p>	<p>Wire gauge</p> <p>FC 1: 0.14 - 0.25 mm<sup>2</sup></p> <p>FC 2: 0.25 - 0.56 mm<sup>2</sup></p> <p>FC 3: 0.75 - 1.50 mm<sup>2</sup></p> <p>Locator (09 99 000 0205) is supplied with the tool.</p>	

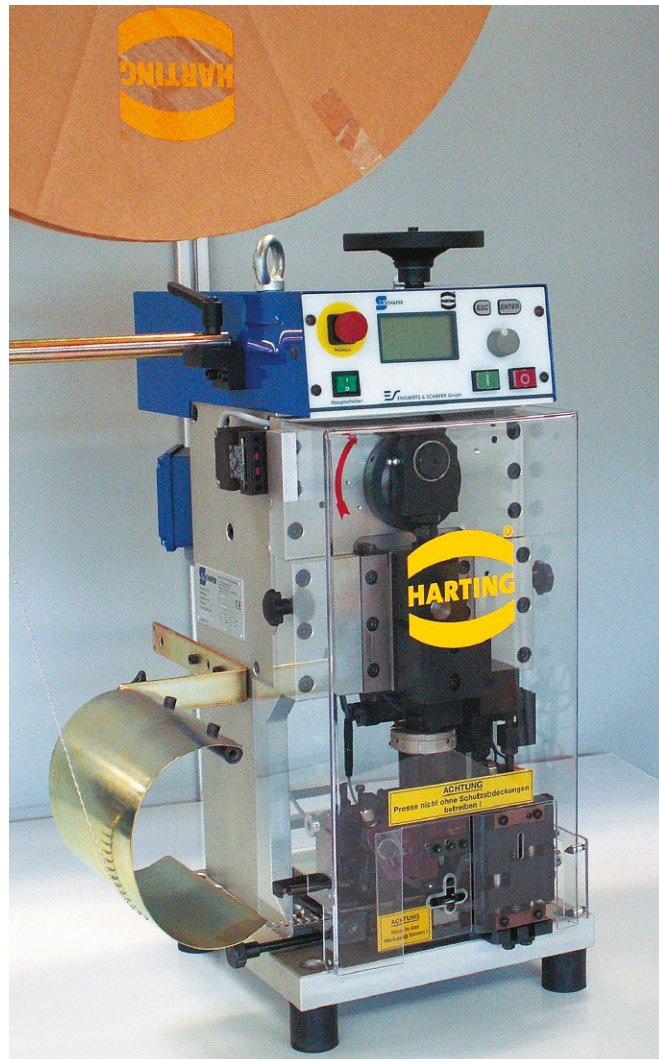
Tooling



Identification	Part number	Drawing	Dimensions in mm
<p><b>HARTING crimping tool</b> for bandoliered contacts (500 pieces) BC / har-bus® 64</p> <p>for bandoliered contacts (250 pieces)</p> <p>FC 1</p> <p>FC 2</p> <p>FC 3</p> <p>BC / har-bus® 64 solid wire</p>	<p>09 99 000 0248</p> <p>09 99 000 0247</p> <p>09 99 000 0119</p> <p>09 99 000 0120</p> <p>09 99 000 0627</p>	<p>Wire gauge 0.09 - 0.5 mm<sup>2</sup></p> <p>Wire gauge 0.09 - 0.25 mm<sup>2</sup></p> <p>0.14 - 0.56 mm<sup>2</sup></p> <p>0.50 - 1.50 mm<sup>2</sup></p> <p>0.13 mm<sup>2</sup> (solid wire)</p>	
<p><b>HARTING semi-automatic crimping device</b></p> <p>Main drive, foot-operated 115/230 V – 50 Hz</p> <p>Real holder for 2,500 contacts FC 1, FC 2 or FC 3 and for 5,000 contacts BC / har-bus® 64</p>	<p>09 99 000 0246</p> <p>09 99 000 0158</p>	<p>Locator not necessary</p>	
<p><b>Crimping head for bandoliered contacts</b> BC / har-bus® 64</p> <p>FC 1</p> <p>FC 2</p> <p>FC 3</p> <p>BC/har-bus® 64 solid wire</p>	<p>09 99 000 0252</p> <p>09 99 000 0249</p> <p>09 99 000 0250</p> <p>09 99 000 0251</p> <p>09 99 000 0628</p>	<p>Wire gauge 0.09 - 0.5 mm<sup>2</sup></p> <p>0.09 - 0.25 mm<sup>2</sup></p> <p>0.14 - 0.56 mm<sup>2</sup></p> <p>0.5 - 1.5 mm<sup>2</sup></p> <p>0.13 mm<sup>2</sup> (solid wire)</p>	
<p><b>Insertion tool</b> for contacts BC / har-bus® 64</p> <p>for contacts FC 1, FC 2 and FC 3</p>	<p>09 99 000 0100</p> <p>09 99 000 0088</p>		
<p><b>Removal tool</b> for contacts BC / har-bus® 64</p> <p>for contacts FC 1, FC 2 and FC 3</p>	<p>09 99 000 0101</p> <p>09 99 000 0087</p>		



**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

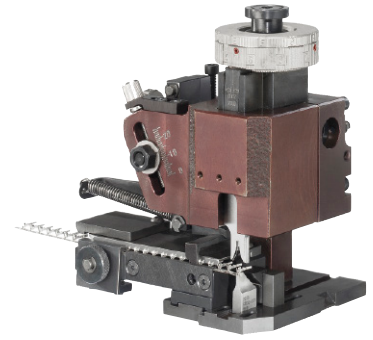
Illumination Integrated tool light

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



Identification	for use with	Part number	Wire gauge [mm <sup>2</sup> ]	AWG	Insulation [Ø mm]	
Crimping tool  for DIN 41 612 connectors <sup>1)</sup>	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 <sup>2)</sup>	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

<sup>1)</sup> 3.5 + 0.5 mm of insulation is stripped from the wire to be crimped

<sup>2)</sup> 2.5 + 0.5 mm of insulation is stripped from the wire to be crimped

DIN 41612 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		mm <sup>2</sup>	0.09-0.5			0.13 mm <sup>2</sup> solid wire			0.09-0.5			0.13 mm <sup>2</sup> 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 41612 Power crimp contacts			FC crimp contacts 09 06 000 ....								
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		mm <sup>2</sup>	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



Part number	Page	Part number	Page	Part number	Page	Part number	Page	Part number	Page
02 01 160 1101	02.11	02 09 000 0017	03.19	09 02 000 9902	00.10	09 02 000 9954	20.06	09 02 332 6931	01.11
02 01 160 1102	02.11	02 09 000 0017	03.21	09 02 000 9902	01.76	09 02 000 9954	20.09		
02 01 160 1105	02.11	02 09 000 0018	03.19	09 02 000 9902	01.77			09 02 364 6921	01.11
02 01 160 1106	02.11	02 09 000 0018	03.21	09 02 000 9902	02.17	09 02 064 0501	00.08		
				09 02 000 9902	03.21	09 02 064 0501	20.02	09 02 464 6824	01.12
02 01 160 2101	02.05			09 02 000 9902	03.25	09 02 064 0501	20.04	09 02 464 6825	01.12
02 01 160 2101	02.11			09 02 000 9902	20.02	09 02 064 0501	20.05	09 02 632 6921	01.11
02 01 160 2102	02.11	02 44 000 0001	02.05	09 02 000 9902	20.06	09 02 064 0501	20.07		
		02 44 000 0001	02.16	09 02 000 9902	20.06	09 02 064 0502	00.08	09 02 664 6921	01.11
		02 44 000 0002	02.16	09 02 000 9903	00.08	09 02 064 0502	20.02		
		02 44 000 0003	02.16	09 02 000 9903	00.09	09 02 064 0502	20.04	09 02 764 6824	01.12
02 02 160 1201	02.12	02 44 000 0004	02.16	09 02 000 9903	00.10	09 02 064 0502	20.05	09 02 764 6825	01.12
02 02 160 1202	02.12	02 44 000 0005	02.16	09 02 000 9903	01.76				
02 02 160 1301	02.12	02 44 000 0006	02.16	09 02 000 9903	01.77				
02 02 160 1302	02.12	02 44 000 0007	02.16	09 02 000 9903	02.17				
02 02 160 1601	02.12	02 44 000 0007	02.17	09 02 000 9903	03.21	09 02 064 3214	01.15	09 03 000 6101	01.39
		02 44 000 0007	02.18	09 02 000 9903	03.25	09 02 132 2921	01.11	09 03 000 6101	01.42
02 02 160 2201	02.05	02 44 000 0008	02.16	09 02 000 9903	20.02	09 02 132 2931	01.11	09 03 000 6102	01.39
02 02 160 2201	02.12	02 44 000 0008	02.17	09 02 000 9903	20.06			09 03 000 6102	01.42
02 02 160 2202	02.12	02 44 000 0008	02.17	09 02 000 9903	20.06	09 02 132 6921	01.11	09 03 000 6103	01.39
02 02 160 2301	02.05	02 44 000 0009	00.09	09 02 000 9909	00.08	09 02 132 6922	01.11	09 03 000 6103	01.42
02 02 160 2301	02.12	02 44 000 0009	02.16	09 02 000 9909	00.09	09 02 132 6922	01.11	09 03 000 6104	01.39
02 02 160 2301	02.17	02 44 000 0009	02.17	09 02 000 9909	00.11	09 02 132 6931	01.11	09 03 000 6104	01.39
02 02 160 2301	02.18	02 44 000 0009	02.17	09 02 000 9909	00.11	09 02 132 6932	01.11	09 03 000 6104	01.42
02 02 160 2301	02.18	02 44 000 0011	02.16	09 02 000 9909	20.02			09 03 000 6110	01.39
02 02 160 2302	02.12	02 44 000 0012	02.16	09 02 000 9909	20.07	09 02 132 7921	01.11	09 03 000 6110	01.42
02 02 160 2804	02.12			09 02 000 9910	20.02	09 02 132 7922	01.11	09 03 000 6110	01.42
				09 02 000 9910	20.07	09 02 132 7922	01.11	09 03 000 6113	01.39
				09 02 000 9910	20.07	09 02 132 7931	01.11	09 03 000 6113	01.42
		02 99 000 0001	30.05	09 02 000 9911	20.02			09 03 000 6113	01.42
		02 99 000 0002	30.06	09 02 000 9911	20.02	09 02 164 2921	01.11	09 03 000 6114	01.39
02 03 160 2201	02.05	02 99 000 0002	30.06	09 02 000 9911	20.07	09 02 164 2922	01.11	09 03 000 6114	01.42
02 03 160 2201	02.13	02 99 000 0003	30.09	09 02 000 9919	00.09	09 02 164 2922	01.11	09 03 000 6114	01.42
		02 99 000 0003	30.10	09 02 000 9919	00.09	09 02 164 2951	01.11	09 03 000 6115	01.39
		02 99 000 0003	30.10	09 02 000 9919	20.02	09 02 164 2951	01.11	09 03 000 6115	01.42
		02 99 000 0004	30.09	09 02 000 9919	20.02	09 02 164 2952	01.11	09 03 000 6115	01.42
		02 99 000 0004	30.09	09 02 000 9919	20.06			09 03 000 6127	01.39
		02 99 000 0004	30.10	09 02 000 9919	20.06			09 03 000 6127	04.23
02 04 048 1101	03.19	02 99 000 0004	30.10	09 02 000 9919	20.09	09 02 164 6919	01.11	09 03 000 6127	04.23
02 04 048 1101	03.21	02 99 000 0005	30.09	09 02 000 9919	20.09	09 02 164 6919	01.11	09 03 000 6128	01.39
		02 99 000 0005	30.10	09 02 000 9920	00.09	09 02 164 6920	01.11	09 03 000 6128	01.39
		02 99 000 0005	30.10	09 02 000 9920	20.02	09 02 164 6921	01.11	09 03 000 6128	04.23
02 04 160 1101	02.05	02 99 000 0006	30.09	09 02 000 9920	20.06	09 02 164 6921 222	01.11	09 03 000 6133	01.39
02 04 160 1101	02.14	02 99 000 0006	30.10	09 02 000 9920	20.06	09 02 164 6922	01.11	09 03 000 6133	01.42
		02 99 000 0006	30.10	09 02 000 9920	20.09	09 02 164 6922	01.11	09 03 000 6133	01.42
		02 99 000 0007	30.10	09 02 000 9921	00.09	09 02 164 6951	01.11	09 03 000 6134	01.39
		02 99 000 0008	30.09	09 02 000 9921	20.02	09 02 164 6952	01.11	09 03 000 6134	01.42
		02 99 000 0008	30.10	09 02 000 9921	20.06			09 03 000 6135	01.39
02 05 000 0003	02.15	02 99 000 0008	30.10	09 02 000 9921	20.06	09 02 164 7919	01.11	09 03 000 6135	01.42
02 05 000 0004	02.05	02 99 000 0016	30.06	09 02 000 9921	20.09	09 02 164 7921	01.11	09 03 000 6135	01.42
02 05 000 0004	02.15			09 02 000 9921	20.09	09 02 164 7921	01.11	09 03 000 6140	01.38
02 05 000 0004	02.17			09 02 000 9922	00.09	09 02 164 7922	01.11	09 03 000 6140	01.41
02 05 000 0004	02.18			09 02 000 9922	20.02			09 03 000 6140	01.41
02 05 000 0005	02.15			09 02 000 9922	20.06	09 02 264 2824	01.12	09 03 000 6160	01.38
				09 02 000 9922	20.06	09 02 264 2824	01.12	09 03 000 6160	01.40
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				09 02 000 9926	20.09			09 03 000 6162	01.40
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02 05 000 2513	02.15	09 02 000 8444	01.15	09 02 000 9927	20.09	09 02 264 6823	01.12	09 03 000 6165	01.40
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09 03 000 6213	01.39	09 03 000 9959	01.72	09 03 164 7951	01.20	09 03 242 6864	01.46	09 03 296 2845	01.22
09 03 000 6213	01.42	09 03 000 9960	01.72			09 03 242 6865	01.46	09 03 296 2850	01.24
09 03 000 6214	01.39	09 03 000 9961	01.72	09 03 178 2901	01.43			09 03 296 2850 222	01.24
09 03 000 6214	01.42	09 03 000 9962	01.72	09 03 178 6901	01.43	09 03 260 2840	01.46	09 03 296 2852 252	01.24
09 03 000 6215	01.39	09 03 000 9963	01.72			09 03 260 6401	01.44	09 03 296 2855	01.22
09 03 000 6215	01.42	09 03 000 9964	01.72	09 03 178 7901	01.43	09 03 260 6804	01.44		
09 03 000 6220	01.39	09 03 000 9965	01.72			09 03 260 6805	01.44	09 03 296 6411	01.24
09 03 000 6220	04.24	09 03 000 9966	01.72	09 03 196 2919	01.20	09 03 260 6830	01.46	09 03 296 6416	01.24
09 03 000 6225	01.39	09 03 000 9967	01.72	09 03 196 2921	01.20	09 03 260 6840	01.46	09 03 296 6421	01.22
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09 03 000 6240	01.38	09 03 000 9969	01.72	09 03 196 2922	01.20	09 03 260 6864	01.46	09 03 296 6823	01.26
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09 03 000 6260	01.38	09 03 096 0501	01.77	09 03 196 6921	01.20	09 03 264 2845	01.22	09 03 296 6841	01.22
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09 03 000 6274	01.38	09 03 124 2901	01.43	09 03 224 6804	01.44	09 03 264 6829	01.22	09 03 296 6861	01.76
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09 03 000 9952	01.72	09 03 164 2951	01.20	09 03 232 7824	01.22	09 03 278 6830	01.46	09 03 364 7951	01.20
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09 03 000 9954	01.72	09 03 164 6919	01.20	09 03 232 7855	01.22	09 03 278 6864	01.46		
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09 03 000 9956	01.72	09 03 164 6922	01.20	09 03 242 6804	01.44				
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09 03 396 6918	01.20			09 05 000 9912	03.20	09 05 648 6931	03.15	09 06 000 8471	03.17
09 03 396 6919	01.20	09 03 896 6921	01.20	09 05 000 9912	03.21			09 06 000 8471	03.33
09 03 396 6921	01.20			09 05 000 9914	03.20	09 05 748 2831	03.18	09 06 000 8472	03.14
09 03 396 6951	01.20			09 05 000 9922	03.20			09 06 000 8472	03.17
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09 03 396 7921	01.20	09 04 000 9906	03.24					09 06 000 8474	03.14
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09 03 432 2824	01.22	09 04 000 9907	03.24	09 05 048 0501	00.10	09 05 848 6921	03.15	09 06 000 8474	03.33
		09 04 000 9907	20.02	09 05 048 0501	02.17			09 06 000 8474	03.14
09 03 432 6824	01.22	09 04 000 9908	00.16	09 05 048 0501	03.21			09 06 000 8481	03.14
09 03 432 6825	01.22			09 05 048 0501	03.25	09 06 000 5541	03.44	09 06 000 8481	03.17
				09 05 048 0501	20.02	09 06 000 5542	03.44	09 06 000 8481	03.33
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09 03 464 2825	01.22	09 04 016 3201	00.09	09 05 048 0501	20.04			09 06 000 8482	03.17
		09 04 016 3201	00.10	09 05 048 0501	20.05	09 06 000 6420	03.14	09 06 000 8482	03.33
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09 03 496 2825	01.22	09 04 132 2921	03.11	09 05 048 6924	03.16	09 06 000 6471	03.14	09 06 000 9551	03.44
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09 03 496 6824	01.22	09 04 132 6921	03.11			09 06 000 6471	03.33	09 06 000 9554	03.44
09 03 496 6825	01.22	09 04 132 6922	03.11	09 05 148 2921	03.15	09 06 000 6471	03.33	09 06 000 9554	03.44
		09 04 132 6951	03.11	09 05 148 2931	03.15	09 06 000 6472	03.14	09 06 000 9561	03.44
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09 03 632 6921	01.20			09 05 148 6951	03.15	09 06 000 6474	03.17	09 06 000 9572	03.44
		09 04 232 2821	03.12	09 05 148 6961	03.15	09 06 000 6474	03.33	09 06 000 9574	03.44
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		09 04 232 2826	03.13	09 05 148 7921	03.15	09 06 000 6481	03.14	09 06 000 9901	00.11
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09 06 000 9909	20.14	09 06 000 9957	00.09	09 06 001 9919	00.15	09 06 032 2905	00.11	09 06 048 0522	20.22
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09 06 000 9909	20.18	09 06 000 9957	00.11	09 06 001 9934	20.03	09 06 032 2941	03.28	09 06 048 2903	03.28
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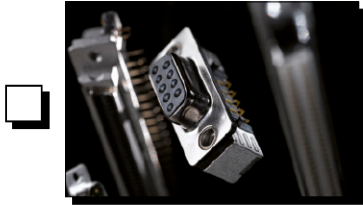
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09 73 196 6903	01.77	09 73 496 6801	01.62			09 99 000 0200	30.08		
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09 73 196 6904	01.60	09 73 496 6855	01.62	09 79 464 6801	01.64	09 99 000 0205	30.16	20 10 001 4211	01.39
09 73 196 6904	01.77			09 79 496 6801	01.64	09 99 000 0218	30.07	20 10 001 4221	01.39
09 73 196 6907	01.60	09 73 496 7801	01.62			09 99 000 0218	30.08		
09 73 196 6953	01.60	09 73 664 6947	01.60			09 99 000 0219	30.07	20 10 125 4212	01.39
09 73 196 6954	01.60			09 89 050 0000	30.13	09 99 000 0219	30.08	20 10 125 4222	01.39
09 73 196 6974	01.60	09 73 696 6902	01.60			09 99 000 0220	30.07		
09 73 196 6985	01.60	09 73 696 6904	01.60			09 99 000 0220	30.08	20 10 230 4211	01.39
09 73 196 6995	01.60	09 73 696 6947	01.60			09 99 000 0221	30.06	20 10 230 4221	01.39
				09 98 000 3004	30.19	09 99 000 0221	30.07		
09 73 196 7902	01.60	09 73 796 6801	01.62	09 98 000 3005	30.19	09 99 000 0221	30.07		
09 73 196 7903	01.60			09 98 000 3006	30.19	09 99 000 0228	30.06		
09 73 196 7904	01.60			09 98 000 3007	30.19	09 99 000 0229	30.06		
09 73 196 7907	01.60	09 75 120 3101	01.74	09 98 000 3008	30.19	09 99 000 0239	30.07	61 03 000 0042	20.31
09 73 196 7974	01.60			09 98 000 3009	30.19	09 99 000 0240	30.07	61 03 000 0044	20.31
		09 75 120 6504	01.56	09 98 000 3012	30.19	09 99 000 0241	30.07	61 03 000 0141	20.31
09 73 206 6801	01.50	09 75 120 6519	01.56			09 99 000 0242	00.15	61 03 000 0143	20.31
		09 75 120 6519 792	01.56	09 98 000 5000	30.18	09 99 000 0243	01.41		
09 73 224 6801	01.50	09 75 120 6520	01.56			09 99 000 0244	30.11		
		09 75 120 6521	01.56			09 99 000 0246	30.17		
09 73 232 2801	01.62	09 75 120 6521	01.56			09 99 000 0246	30.17		
		09 75 120 6569	01.56	09 99 000 0003	20.31	09 99 000 0247	30.17		
09 73 232 6801	01.62	09 75 120 6569 792	01.56	09 99 000 0038	00.16	09 99 000 0248	30.17		
09 73 232 6811	01.62	09 75 120 6570	01.56	09 99 000 0075	30.16	09 99 000 0249	30.17		
		09 75 120 6574	01.57	09 99 000 0076	30.16	09 99 000 0250	30.17		
09 73 232 7801	01.62	09 75 120 6577	01.56	09 99 000 0077	30.16	09 99 000 0251	30.17		
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09 73 264 2801	01.62	09 75 120 6907	01.56	09 99 000 0114	01.14	09 99 000 0264	30.06		
09 73 264 2804	01.62	09 75 120 6974	01.57	09 99 000 0114	01.27	09 99 000 0269	30.06		
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				09 99 000 0116	01.27	09 99 000 0271	30.06		
09 73 264 7801	01.62	09 75 220 6801	01.58	09 99 000 0119	30.17	09 99 000 0272	30.06		
		09 75 220 6804	01.58	09 99 000 0120	30.17	09 99 000 0274	30.06		
09 73 278 6801	01.50	09 75 220 6804 791	01.58			09 99 000 0275	30.06		
				09 99 000 0133	00.16	09 99 000 0276	30.06		
09 73 296 2801	01.62	09 75 420 6801	01.58	09 99 000 0150	01.14	09 99 000 0276	30.06		
		09 75 420 6804	01.58	09 99 000 0150	01.27	09 99 000 0277	30.06		
09 73 296 6801	01.62			09 99 000 0158	30.17	09 99 000 0278	30.10		
09 73 296 6801	01.76			09 99 000 0172	03.43	09 99 000 0279	30.11		
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		09 79 164 6903	01.63	09 99 000 0179	01.27	09 99 000 0620	30.16		
09 73 296 7801	01.62	09 79 164 6907	01.63	09 99 000 0180	01.14	09 99 000 0621	30.16		
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09 73 364 2902	01.60	09 79 196 2950	01.59	09 99 000 0181	30.06	09 99 000 0623	30.16		
		09 79 196 2961	01.59			09 99 000 0627	30.17		
09 73 364 6902	01.60			09 99 000 0183	30.06	09 99 000 0628	30.17		
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		09 79 196 6903	01.63	09 99 000 0185	30.05	09 99 000 0629	30.16		
09 73 396 6902	01.60	09 79 196 6907	01.63	09 99 000 0191	30.16	09 99 000 0630	30.16		
09 73 396 6903	01.60			09 99 000 0194	01.41	09 99 000 0630	30.16		
				09 99 000 0196	01.41	09 99 000 0631	30.16		
09 73 464 2804	01.62	09 79 264 6801	01.64						



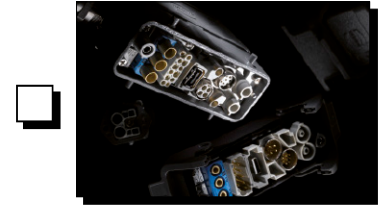
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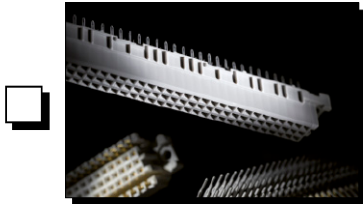
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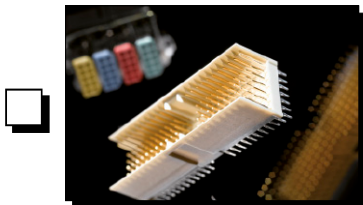
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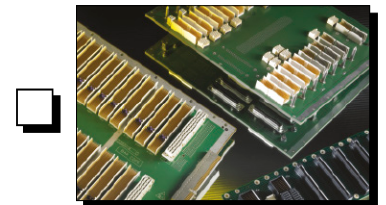
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