Clearance and creepage distances

Extract DIN VDE 0110-01.89*)

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.

Clearances

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:

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

Equiqment 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, contactors, 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 internal to 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 the homogeneous and the inhomogeneous field.

Creepages

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 conductivity caused by condensation must be expected occasionally.

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

Procedure for the user

First select the required supply system, the maximum voltage and calculate the applicable creepage and clearance distances.

To identify the clearance distances:

- Define the installation category.
- Define the degree of pollution expected.
- Select the rated impulse withstand voltage from table 1.
- Define the minimum required clearance from table 2.

Table 1

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

Table 2

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

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

To identify the creepage distances

- From the nominal voltage and the type of supply system check the rated voltage from table 3 a/b.
- From the rated voltage and degree of pollution check the minimum creepage required in table 4.

Table 3a Single phase, three- or two-wire AC or DC systems

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

Table 3b Three-phase, four- or three-wire AC systems

Nominal voltage of supply system[1]	Rated voltage in V		
	Phase-to phase All systems	Phase-to-earth	
r.m.s. in V	r.m.s. in V	r.m.s. in V	r.m.s. in V[3]
60	63	32	63
110 120 127	125	80	125
150[2]	160	–	160
208	200	125	200
220 230 240	250	160	250
300[2]	320	–	320
380 400 415	400	250	400
440	500	250	500
480 500	500	320	500
575	630	400	630
600[2]	630	–	630
660 690	630	400	630

[1] This voltage can be the same as the rated voltage of the equipment.
[2] These values correspond to the values of Table 1.
[3] 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.

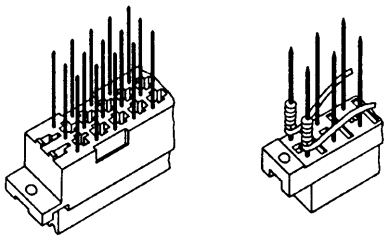
Table 4

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

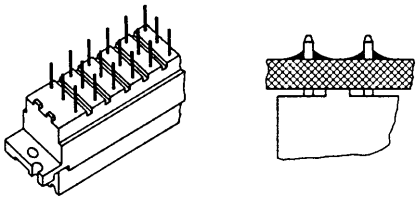
*)It is the users responsibility to ensure that the complete current issue of the specification is considered.

Terminations

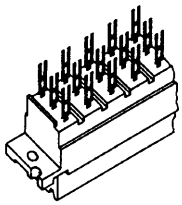
Wrap posts for automatic wiring techniques
explanations page 8



Solder pins for printed circuit boards
explanations page 8

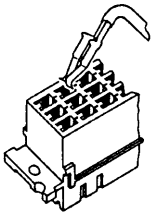


Solder lugs for discrete wiring
explanations page 8

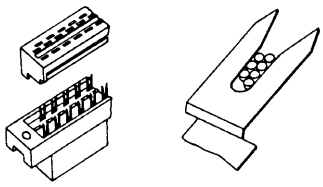


Press-in technique for P.C. boards
Please request our "har-press" catalogue

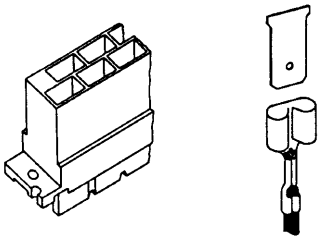
Crimp contacts for flexible wiring and selective loading, also contacts are easily replaced
explanations page 9



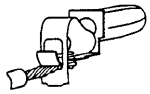
Insulation displacement contacts for mass termination of flat cable



Faston blades for higher power discrete wiring



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



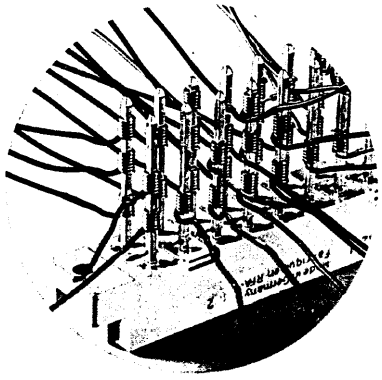
Terminations

Solder connection

The term "soldering" is defined in DIN 8505:

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

Soft solders commonly used on electronic equipment are to DIN 1707. Solders for copper and silver are tin lead and have a melting range 178-215° C, depending on the composition of the alloy. For soldering metallic materials the flux is defined by DIN 8511, P2. Tests are explained in DIN 8526. For soldering the male connectors of series Gds A into printed circuit boards, see recommendations for soldering on page 10.



Standard wrap

Wrapped connection

This technique permits very high wiring density and takes over where other techniques would take up too much space and are not practical. As a result of this technique, there is a great time saving factor and cost per connection is relatively low when large numbers of connections have to be made.

When wires are correctly wrapped onto a precisely made 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 unaffacted by normal climatic or temperature changes.

Production of wrapped connections and associated material are defined in DIN 41 611, P 2.

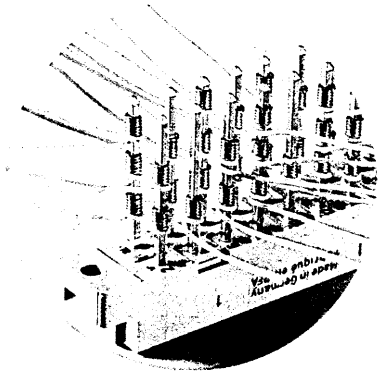
Wrapping techniques

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 previously, but an extra turn is made at the bottom and for this turn insulation is also wrapped around the post to give great mechanical strength to the joint, and also provide some insulation between adjacent posts.



Modified wrap

Wrapping tools

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

These wrapping tools accessories are designed to suit not only the size of post being used but one must also carefully select the correct items for the conductor and insulation size of the wire to be used.

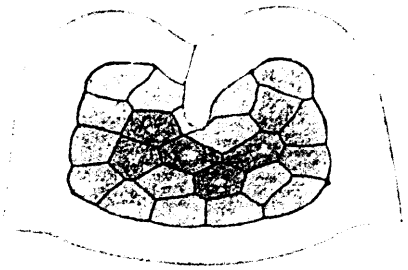
The adjacent table shows commonly used combinations of wire sizes and wrap post. For recommendations on the correct tools, wrapping heads and sleeves to be used on a particular application, we recommend that customers contact the local HARTING sales office.

Wrap posts	Wire, Ø mm	AWG	Insulation Ø mm
0.6 x 0.6 mm Diagonal 0.79–0.86 mm	0.25 0.32	30 28	max. 0.58 max. 0.76
1 x 1 mm Diagonal 1.34–1.45 mm	0.25* 0.4 0.5 0.5 0.8	30 26 24 24 20	max. 0.69 max. 1.04 max. 1.04 max. 1.17 max. 1.5

* With alloy conductors only. Minimum extension factor 8 %

Crimp connection

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



Crimp-cross section

The economical and technical advantages are:

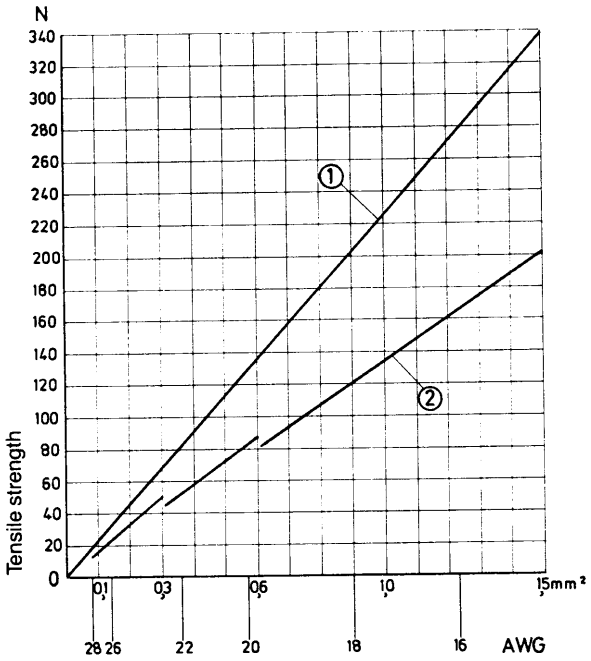
- Constant contact resistance as a result of precisely repeated crimp connection quality
- Corrosion free connections as a result of cold weld action
- Pre-preparation of cable forms with crimp contacts fitted
- More economic cable connection

Requirements for crimp connections are set out in DIN 41 611, P 3.

Pull out force of stranded wire

An essential consideration for good quality crimp connections is the mechanical retention of the wire in the crimp contact. As set out in DIN 41 611, P 3 the pull out force of the wire from the crimp must be at least 60 % (at 0.75 mm²) of the breaking force of the wire itself. The adjacent diagram shows tensile strength plotted against wire cross sectional area and from this you can see the relationship between the breaking strength of wires and the force necessary to destroy HARTING crimp connections.

① Tensile strength of stranded wire
② Pull out force of wires from HARTING crimp contacts for Gds A-F/FC and Gds A-B/C contacts



Wire gauge

Crimping tools

Crimping tools (hand operated or automatic) are carefully designed to produce with high pressure forming parts a symmetrical connection of the crimping part of the contact and the wire being connected with the minimum increase in size at the connection point. The positioner automatically locates the crimp and wire at the correct point in the tool. The wire insulation can on some crimp contacts also be included as a secondary feature to give additional mechanical strength.

A ratchet in the tool performs 2 functions:

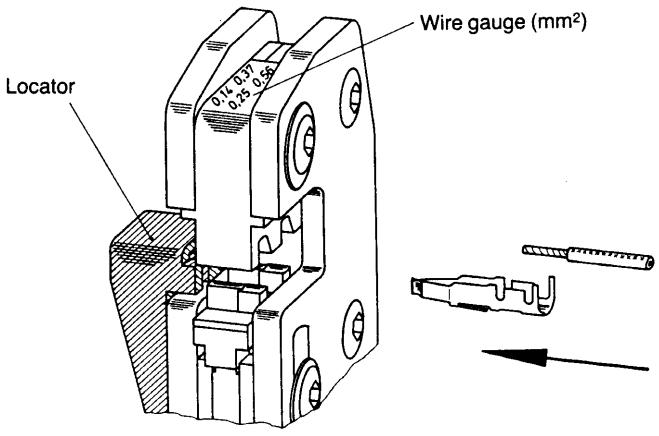
① It prevents insertion of the crimp into the tool for crimping before the jaws are fully open

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

Identical, perfectly formed, connections can be produced using this crimping system.

The adjacent sketches show important features of a HARTING hand crimping tool.

The HARTING crimp automat uses contacts from a reel. The machine strips the insulation from the wire and then crimps the contact. Both the crimping area and insulation support are independently adjustable to facilitate the use of any wire type with dimensions within the stated crimp capacity.



Performance level 3 as per DIN 41612, part 5

50 mating cycles.
Then visual inspection no gas test.
No functional impairment.

Part-number-explanation 09 . . . . . 7 . . .

Performance level 2 as per DIN 41612, part 5

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

Part-number-explanation 09 . . . . . 6 . . .

Performance level 1 as per DIN 41612, part 5

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

Part-number-explanation 09 . . . . . 2 . . .

VG Version as per VG 95 324, part 1

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

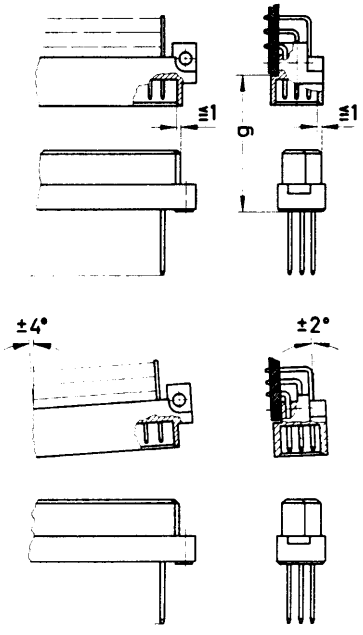
Part-number-explanation 09 . . . . . 4 . . .

Other plating finishes available on request.

Mating conditions

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

These recommendations are set out in DIN 41612 P. 1.
The connectors shall not be coupled and decoupled under electrical load.



g = 12,4 - 14,2

Soldering the male connectors into P.C. Boards

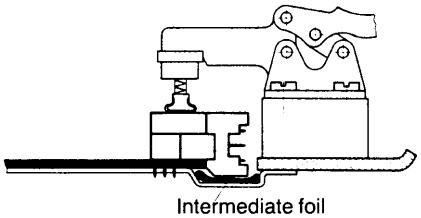
The male connectors of the Gds A series should be protected when soldering using dip, flow or film soldering baths, against contamination as a result of soldering operations or deformation of the connector bodies as a result of overheating.

① For prototypes and short runs cover the connectors with an industrial adhesive tape, e.g. Tesaband 4657 grey. Tape the underside of the connector moulding and adjacent parts of the P.C. Board and tape up the open end of the connector. This will prevent heat and gases from the soldering apparatus damaging the connector. About 140 + 5 mm of tape should be sufficient.

② For large run production a jig is recommended. This has a protective cover with a fast action mechanical locking device that shields the connector from the gas and heat generated by the soldering apparatus. For additional protection a foil can be used covering parts not to be soldered.

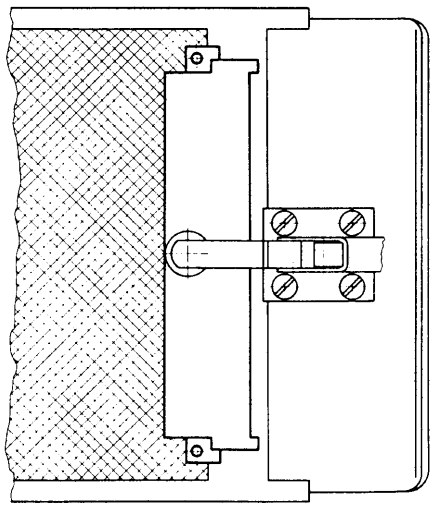
Adhesive tape

①



Intermediate foil

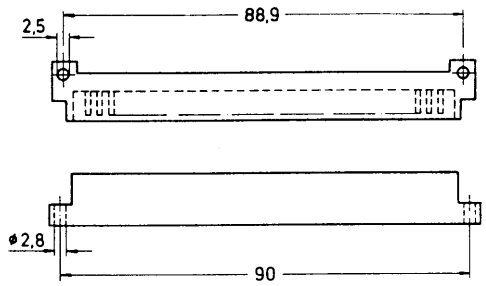
②



Description of Gds A system

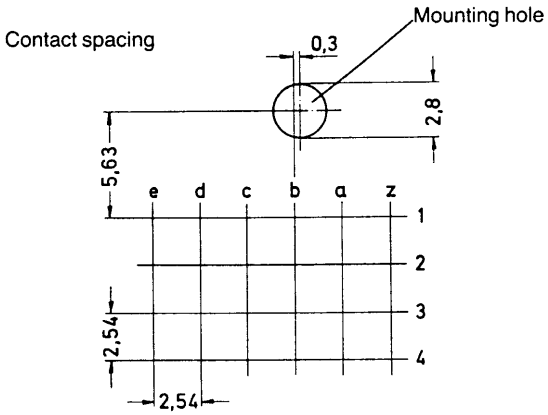
Specifications

These connectors meet the requirements set out in
DIN 41 612
VG 95 324
IEC 603-2
MIL-C-55 302
BT 222
BS 9525
HE 12
NFC 93-420



Design of connectors

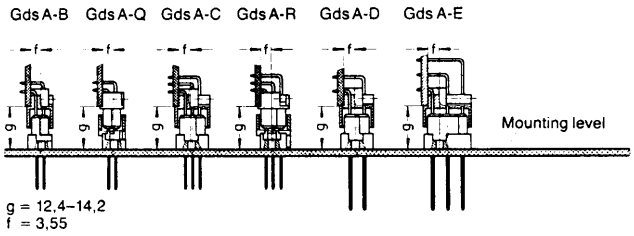
- Standard fixing arrangement.
- Standard positions for P.C. Boards and connectors provides a modular system in the card frame and a standard front panel system.
- Standard wiring matrix on the connection side of the female connectors build up on 2.54 mm (0,1" centres) (This facilitates automatic wiring).
- Printed circuit boards with standard dimensions 100 x 160 mm resp. 233.4 x 160 mm as set out in DIN 41 494 P. 2 standard sizes 3 and 6.



Building up card frame systems

In the basic frame unit according to DIN 41 494 the P.C. Boards are inserted from the front and make contact with the connectors fitted to the back. This basic arrangement gives the following advantages.

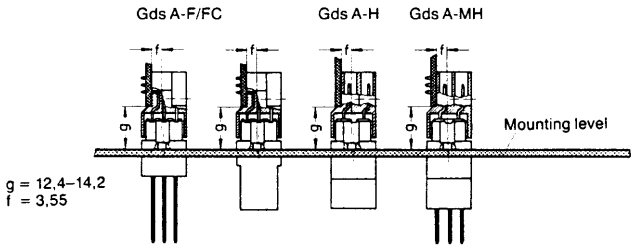
- When using conventional connectors on the back of the card frames, space is left above, below and in the middle along the horizontal line of the frame which can be used to fit extra connectors for cross connection or making plug connections by means of flying lead connectors.
- Using the HARTING system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

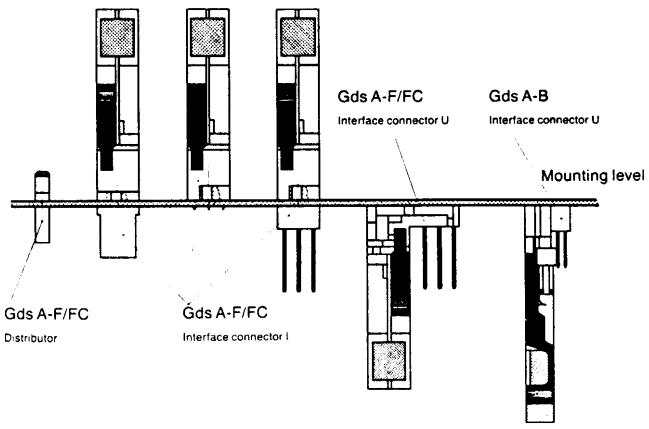


Complementary components

The series Gds A 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.

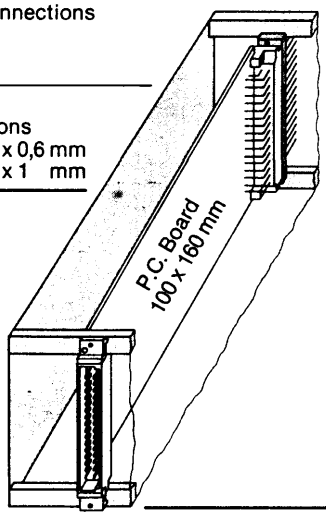
- The flying lead connector consists of a connector with crimp or solder contacts and a shell housing. The flying lead connector is latched or retained in position using screw fixings and is compatible with the connectors: male connector, interface connector I and U.
- Fixing brackets prohibit the withdrawal of the P.C.B. when a flying lead connector is used on the front side of the card frame.
- The interface connector I has on the plug side knife blade contacts and on the connection side solder pins, wrap posts or crimp terminals. It replaces Gds A-F/FC fitted into the frame and gives the possibility to plug straight into the internal wiring using the flying lead connector on the back of the card frame unit.
- The interface connector U has on the same plane male knife contacts compatible with the flying lead connector, and wrap posts for interconnections into the back wiring plane of the card frame. It can be fitted on the back of the card frame above or below the other connectors. Its wrap posts are fixed in the same wiring plane as the other connectors and on the same pitch. By using the flying lead connector with this U connector it is very simple to make plug in connections between the card frame and peripheral equipment/outlying stations.

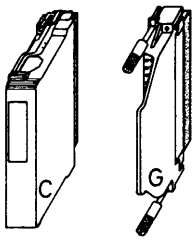




Description of Gds A system

	Gds A-B, Gds A-Q		Gds A-C, Gds A-R
Wiring side	Input access from the front side via a female connector	Input access from the wiring side via a female connector	Input access via a female connector
Soldering technique for flexible wiring			
Soldering technique for P.C.B.			
Crimp connections			
Wrapped connections posts 0,6 x 0,6 mm 1 x 1 mm	0,6 x 0,6mm	U-Element 0,6 x 0,6 mm	0,6 x 0,6mm
Middle section			
Front side			

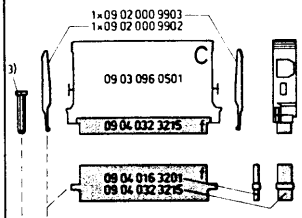
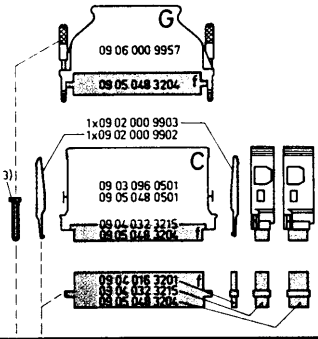
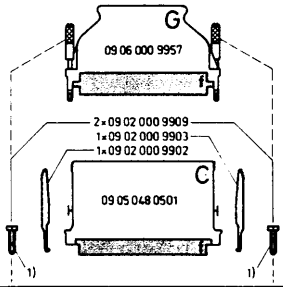
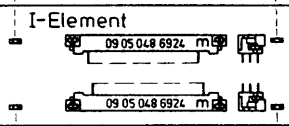
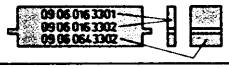
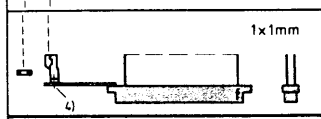
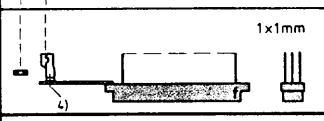
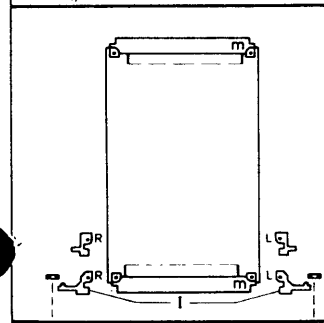
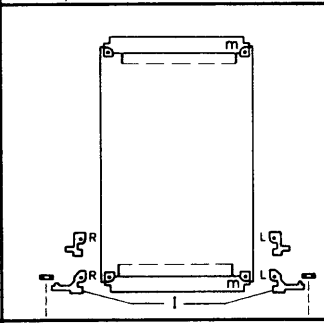
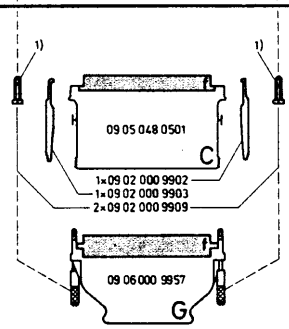
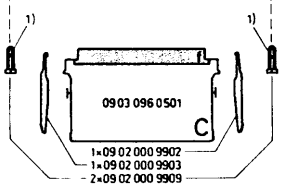
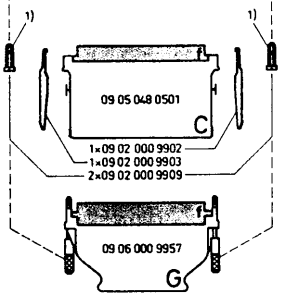




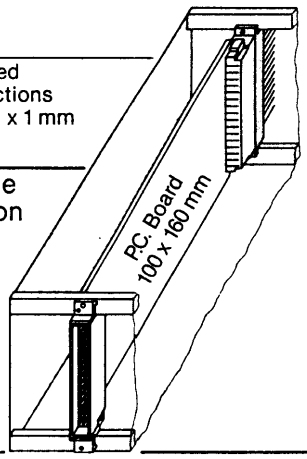
1) Screw fixing (cheesehead screw M 2,5x16 + nut) 09 02 000 9909
2) Screw fixing (cylindric screw M 2,5x22) 09 02 000 9923
3) 2x screw fixing (cylindric screw M 2,5x25 DIN 84 + nut M 2,5 DIN 934)
4) Fixing brackets for latching and screw fixing

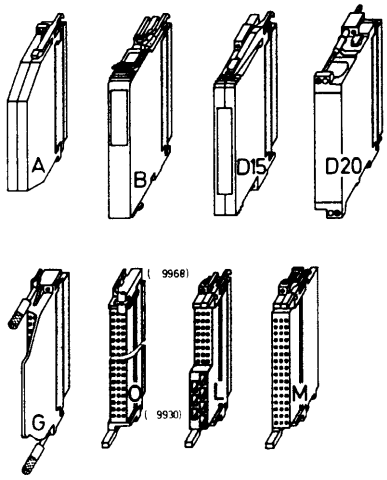
f = female connector
m = male connector
R = right hand
L = left hand

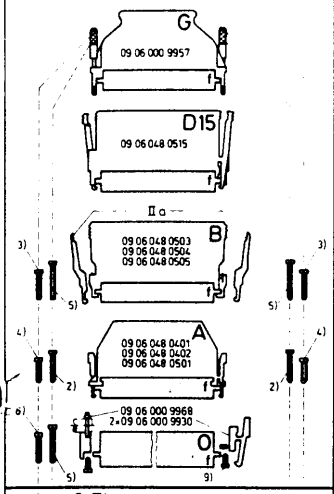
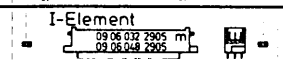
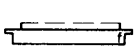
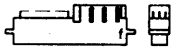
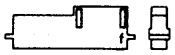
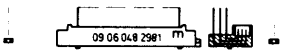
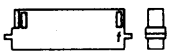
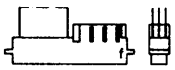
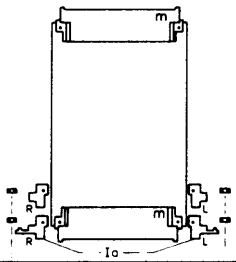
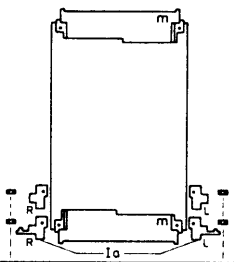
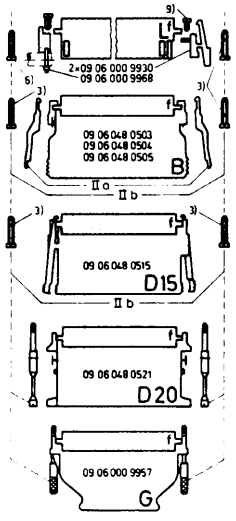
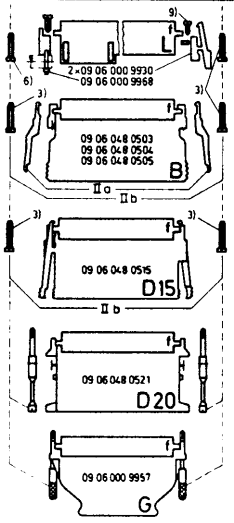
Combi-nations	Fixing bracket c for male connectors		I-Element	U-Element
	Multiple fixing	Single fixing		
Housing C	latchable	latch and screw fixing (M 2,5x16)	latch and screw fixing	
Housing G		screw fixing	screw fixing	

Gds A-D	Gds A-E		Distributor Gds A-F/FC
Input access from the front side via a female connector Piggy back connector 	Input access via a female connector Piggy back connector 		
			
		I-Element 	
			
			
			
			

	Gds A-F/FC			
Wiring side	Input access via a female Connector		Output from the front side via a male connector	
	Piggy back connector			Piggy back connector
Soldering technique for flexible wiring				
Soldering technique for P.C.B.		I-Element		
Crimp connections		I-Element		
Wrapped connections posts 1 x 1 mm		I-Element		
Middle section				
Front side				





Gds A-F/FC	Gds A-H	Gds A-MH
Input access from the wiring side via a female connector	Input access from the front side via a female connector	Input access from the front side via a female connector
		
I-Element 		
		
U-Element 		
		
		

Ia

Combinations	Fixing bracket a for male connectors: Multiple fixing (09 06 000 9901 / 09 06 000 9902)	Fixing bracket a for male connectors: Single fixing (09 06 000 9905 / 09 06 000 9906)	Fixing bracket b for male connectors: Multiple fixing (09 06 000 9907 / 09 06 000 9908)	Fixing bracket b for male connectors: Single fixing (09 06 000 9909 / 09 06 000 9910)
Housing A	latch and (M 2,5x12) screw fixing		latchable	
Housing B			latch and (M 2,5x20) screw fixing	
Housing D15			latch and (M 2,5x20) screw fixing	
Housing D20			screw fixing	
Housing G			screw fixing	
Comb. O (...9930)			latch and (M 2,5x20) screw fixing	
Comb. O (...9968)			screw fixing	
Comb. L (...9930)			latch and (M 2,5x20) screw fixing	
Comb. L (...9968)			screw fixing	

Ib

Combinations	Fixing bracket b for female connectors: Multiple fixing (09 06 000 9933 / 09 06 000 9933)	Fixing bracket b for female connectors: Single fixing (09 06 000 9951 / 09 06 000 9952)	I-Element	U-Element
Housing A			(M 2,5x22) latch and (M 2,5x16) screw fixing	
Housing B	latchable		(M 2,5x26) latch and (M 2,5x20) screw fixing	
Housing D15	latchable		latchable	
Housing G			screw fixing	
Comb. O (...9930)			latchable	
Comb. O (...9968)			(M 2,5x26) screw fixing (M 2,5x20)	
Comb. M	latchable			

II

Housing B/D15	IIa		IIb	
09 06 048 0503	2x	09 06 000 9913	and/or 2x	09 06 000 9926
09 06 048 0504	1x	09 06 000 9913 / 09 06 000 9919	and/or 2x	09 06 000 9926
09 06 048 0505	1x	09 06 000 9913 / 09 06 000 9919	and/or 2x	09 06 000 9926
09 06 048 0515	—	—	and 2x	09 06 000 9926
Comb. O + L	2x 2x	09 06 000 9930 09 06 000 9968	and 2x —	09 06 000 9926 —
Comb. M	2x	09 06 000 9930	—	—

1) Fixing brackets for latch and screw fixing
2) Screw (M 2,5x22) belongs to supply of I-elements, nut (M 2,5 DIN 439) does not belong to scope of supply
3) Screw fixing (cheesehead screw M 2,5x20 + nut) 09 06 000 9926
4) Screw fixing (cheesehead screw M 2,5x16 + nut) 09 02 000 9909
5) Cheesehead screw (M 2,5x26) 09 06 000 9955, nut (M 2,5 DIN 439) does not belong to scope of supply
6) Screw (M 2,5x20) belongs to junction-element, Hexagonal nut (M 2,5 DIN 439) does not belong to scope of supply.

Subsequent items not normally supplied
7) Screw (M 2,5x12) and nut (M 2,5 DIN 439)
8) Screw (M 2,5x8)
9) Screw (M 2,5x8) and nut (M 2,5 DIN 934)
10) Screw (M 2,5x25) and nut (M 2,5 DIN 934)

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

Explanations to the Gds A summary

Type	① Find the right series				
Part No.					
② Technical characteristics					
③ Number of contacts Contact arrangement			⑦ Terminations		
		Male connectors	Angled solder pins		1)
					2)
			Straight solder pins < 4 mm		< 4 1)
					< 4 2)
			Straight solder pins ≧ 4 mm		≧ 4 1)
					≧ 4 2)
④ Available types in different performance levels			Straight wrap posts		1)
					2)
			Angled wrap posts		
		1) Without first mating contacts 2) With first mating contacts	Faston blade		
		Female connectors	Straight wrap posts		
			Straight solder pins < 4 mm		< 4
			Straight solder pins ≧ 4 mm		≧ 4
			Solder lugs		
			Angled solder pins		
			Crimp terminal		
			Press-in technique1)		
			Faston blade		
			Cage clamp terminal		
⑤ Drawing and part No. on page			Insulation displacement termination		
		Interface connectors I and U	Straight solder pins		≦ 4
			Straight wrap posts		1□
			Crimp terminal		
			Wrap posts 1 x 1 mm		1□
			Wrap posts 0.6 x 0.6 mm		0,6□
⑥ Appropriate accessories		Distributor	Crimp terminal		
			Wrap posts 1 x 1 mm		1□
		Piggy back connectors for 1x1 mm pins Pin shroud for 0.6x0.6 mm pins	Crimp terminal		1 row 2 rows 3 rows
Parts can be used for		Shell housing			A
					B
					C
					D
					G
					O
		Fixing brackets			a
					b
					c

1) Please request our "har·press" catalogue

Type			B				2B			C					2C			
Part No.			09 02				09 22			09 03					09 23			
Working current			2				2			2					2			
Clearance (mm) Creepage (mm)			≧ 1.2 ≧ 1.2				≧ 1.2 ≧ 1.2			≧ 1.2 ≧ 1.2					≧ 1.2 ≧ 1.2			
Minimum assembly spacing			2 x 5.08 mm				2 x 5.08 mm			3 x 5.08 mm					3 x 5.08 mm			
Number of contacts			64	32	32		32	16		96	64	32	32		48	32	16	
Contact arrangement View from termination side			ba 1 3	ba 2 4	ba 1 3	Page	ba 1 3	ba 1 3	Page	cba 1 3	cba 1 3	cba 2 4	cba 1 3	Page	cba 1 3	cba 1 3	cba 1 3	Page
Male connectors		[1]	●	●	●	22	●	●	28	●	●	●	●	30	●	●	●	36
		[2]	●			22	●		28	●	●			30	●			36
		< 4[1]	●	●	●	22	●	●	28	●	●	●	●	30	●	●	●	36
		< 4[2]	●			22	●		28	●	●			30	●			36
			●	●	●	22				●	●	●	●	30				
Female connectors			●	●	●	24	●	●	29	●	●	●	●	32	●	●	●	37
		< 4	●	●	●	24	●	●	29	●	●	●	●	32	●	●	●	37
		≧ 4	●	●	●	24	●	●	29	●	●	●	●	32	●	●	●	37
			●	●	●	24				●	●	●	●	32				
			see Q →				see 2 Q →			see R →					see 2 R →			
			●	←	←	27				●	←	←	←	35				
			●			26					●			34				
Interface connectors I																		
U		0.6□	●			23					←							
Distri-butor																		
Pin shroud				→							●			118				
Shell housing																		
		C		●		94					●			94				
Fixing brackets																		
		c		●		96					●			99				

[1]) Without first mating contacts [2]) With first mating contacts

Summary Gds A

Type			M					D		E		F/FC				FM		2F/FC	
Part No.			09 03					09 04		09 05		09 06				09 06		09 26	
Working current			2					6		6		6				6		6	
Clearance (mm) Creepage (mm)			≧ 1.2 ≧ 1.2					≧ 1.6 ≧ 3.0		≧ 1.6 ≧ 3.0		≧ 1.6 ≧ 3.0				≧ 1.6 ≧ 3.0		≧ 1.6 ≧ 3.0	
Minimum assembly spacing			3 x 5.08 mm					3 x 5.08 mm		4 x 5.08 mm		3 x 5.08 mm				3 x 5.08 mm		3 x 5.08 mm	
Number of contacts			8	16	32	48		32		8		4	2	32		5		24	
Contact arrangement View from termination side							Page		Page		Page				Page		Page		Page
Male connectors		1)	●	●	●	●	38	●	44	●	48	●	●	●	54	●	64		
		2)						●	44	●	48	●	●		54				
		< 4 1)						●	44										
		< 4 2)						●	44										
		≦ 4 1)								●	48	●	●		55				
		1)										●	●		55				
												●			57			●	67
Female connectors			●	●	●	●	39	●	45	●	50	●	●	●	58	●	65		
		< 4	●	●	●	●	39	●	45	●	50	●	●	●	58				
		≧ 4	●	●	●	●	39	●	45	●	50	●	●	●	58				
								●	45	●	50	●	●	●	58				
								●	46			●	●	●	61				
								●	47	●	51	●	←	←	62	●	65	●	68
												●	●	●	60				
Interface connectors —		≦ 4								●	49	●	●		55				
		1□										●	●		55				
												●	←	←	56			●	66
U		1□										●	←	←	57			●	67
Distributor								●	63	●	63		●		63				
		1□											●3)						
Piggy back connector		1 row						●	115	●	115		●		115				
		2 rows						●	115	●	115		●		115				
		3 rows								●	115		●		115				
Shell housing		A											●		98			●	69
		B											●		100				
		C						●	94	●	94								
		D											●		104				
		G								●	112		●		112				
		O											●		112				
Fixing brackets		a											●		99				
		b											●		102				
		c						●	96	●	96								

1) Without first mating contacts 2) With first mating contacts 3) Please ask for special documentation

Summary Gds A

Type			H		MH		Q				2Q				R					2R				
Part No.			09 06		09 06		09 72				09 27				09 73					09 28				
Working current			15		6	15	2				2				2					2				
Clearance (mm) Creepage (mm)			≧ 4.5 ≧ 8.0		≧ 1.6 ≧ 3.0	≧ 4.5 ≧ 8.0	≧ 1.2 ≧ 1.2				≧ 1.2 ≧ 1.2				≧ 1.2 ≧ 1.2					≧ 1.2 ≧ 1.2				
Minimum assembly spacing			3 x 5.08 mm		3 x 5.08 mm		2 x 5.08 mm				2 x 5.08 mm				3 x 5.08 mm					3 x 5.08 mm				
Number of contacts			15		24 + 7		64	32	32		32	16	16		96	64	32	32		48	32	16	16	
Contact arrangement View from termination side				Page		Page				Page				Page					Page					Page
Male connectors		1)	●	72	●	77																		
		2)	●	72	●	77																		
		< 4 1)					●	●	●	81	●	●	●	83	●	●	●	●	85	●	●	●	●	87
		< 4 2)					●			81	●			83	●				85	●				87
		≧ 4 1)					●	●	●	81	●	●	●	83	●	●	●	●	85	●	●	●	●	87
		≧ 4 2)					●			81	●			83	●				85	●				87
		1)					●	●	●	81	●	●	●	83	●	●	●	●	85	●	●	●	●	87
		2)					●			81	●			83	●				85	●				87
			●	72	●	77																		
Female connectors					●	78																		
		≧ 4	●	74	●	78																		
							●	●	●	80	●	●	●	82	●	●	●	●	84	●	●	●	●	86
					●	78																		
			●	73	●	78																		
			●	75																				
Interface connectors —																								
Interface connectors U																								
Distri-butor					●	63																		
Pin shroud							→			96					●				118					
Shell housing		B	●	100	●	100																		
		D	●	104	●	104																		
		G	●	112	●	112																		
		O	●	112	●	112																		
Fixing brackets		b	●	102	●	102																		
		R					●			96					●				96					

1) Without first mating contacts 2) With first mating contacts

Male and female connectors with snap-in-clips

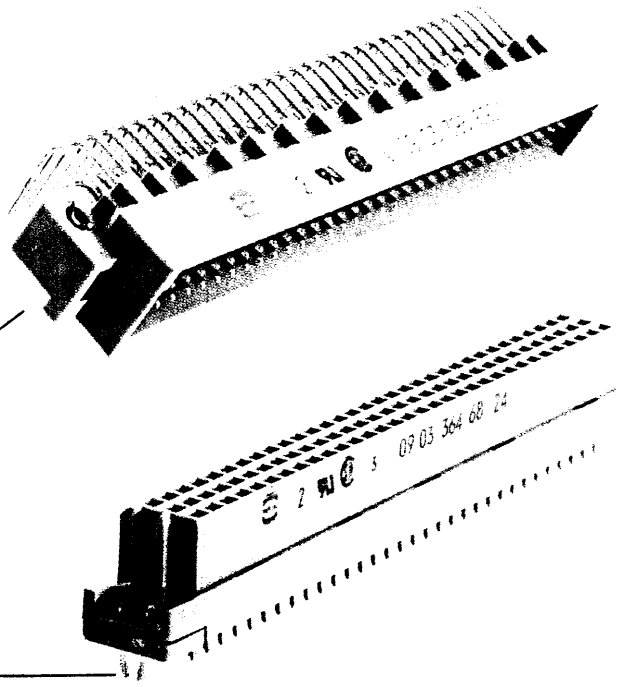
The automatic insertion of components into P.C.B.'s is increasing at a high rate.

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

In the following 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:

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



Mounting force
40–60 N

Provides transport safety before soldering
15 N

Tin plated snap-in-clip

For P.C.B. thickness
1.6 ± 0.2 mm
∅ = $2.8^{+0.1}$ mm

For P.C.B. thickness
1.6 – 3.2 mm
∅ = $2.8^{+0.1}$ mm

It is possible to supply the majority of solder pin male and female connectors according to DIN 41 612 with snap-in-clips.
To define versions with snap-in-clips please change the fifth digit of the part number as described below.

Standard Connectors	Connectors with snap-in-clips
09 . . 0	09 . . 3 . . . . .
09 . . 1	
09 . . 2	

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 15 A type CH 40 A max. type M
Clearance	≧ 1.2 mm
Creepage	≧ 1.2 mm
High current contacts	
Type CH	
Clearance	≧ 3.0 mm
Creepage	≧ 4.0 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions of the P.C. Board itself, and the associated wiring	according to the safety regulations of the equipment. Explanations page 6
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	≦ 15 mΩ ≦ 20 mΩ including crimp connection
Insulation resistance	≧ 10^{12} Ω
Temperature range The higher temperature limit includes the local ambient and heating effect of the contacts under load	−65 °C + 125 °C
Degree of protection for crimp terminal according to DIN 40050	IP 20
Electrical termination	
Male connector	Solder pins 0.6 x 0.6 mm for P.C.B. connections Ø 0.8 + 0.3 mm Wrap posts 0.6 x 0.6 mm diagonal 0.79–0.86 mm
Female connector	Wrap posts 0.6 x 0.6 mm diagonal 0.79–0.86 mm Solder pins 0.6 x 0.6 mm for P.C.B. connections Ø 1 ± 0.1 mm according to IEC 326 for P.C.B. connections Ø 0.8 + 0.3 mm on request Solder lugs Crimp terminal 0.09–0.5 mm² Insulation displacement connection AWG 28/7 Connector for faston 6.3 x 2.5
Insertion and withdrawal force	16 way ≦ 15 N 32 way ≦ 30 N 48 way ≦ 45 N 64 way ≦ 60 N 96 way ≦ 90 N
Materials	
Mouldings	Thermoplastic resin, glass-fibre filled
Contacts	Copper alloy
Contact surface	Contact zone: selectively gold-plated according to performance level[1]) Termination zone: tinned Heavy current contacts type CH silver plated Wrap posts selectively gold plated on request

[1]) Explanations of performance levels page 10

You will find angled female connectors for

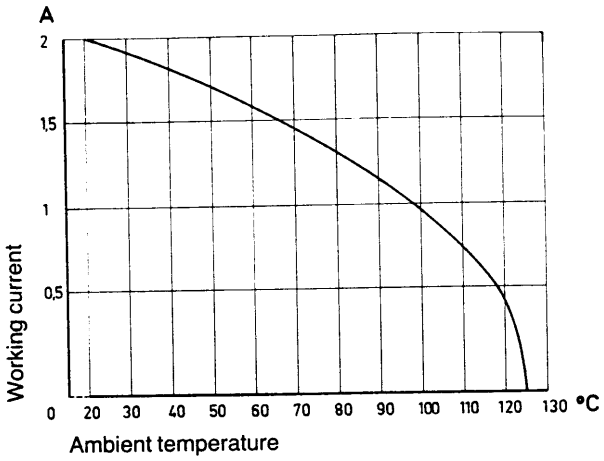
Series Gds A-B	on page 80	type Q
Series Gds A-2B	on page 82	type 2Q
Series Gds A-C	on page 84	type R
Series Gds A-2C	on page 86	type 2R

Mating conditions page 10 Coding systems page 88

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, not 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 41640, part 3.

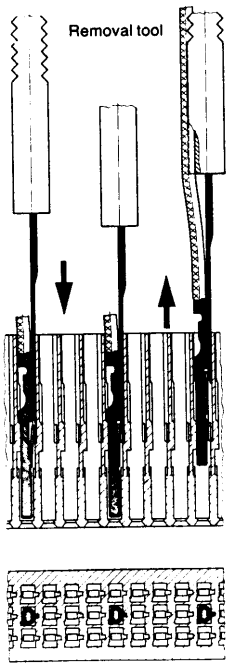


Fitting the crimp contacts

After crimping the wires onto the contacts the crimp contacts are correctly orientated and inserted into cavities in the connector body in the required configuration. They snap into position and are firmly held in place. A light pull on the wire will check that they are correctly located. When using stranded wire having a gauge below 0.37 mm², an insertion tool is required.

Removing the crimp contacts

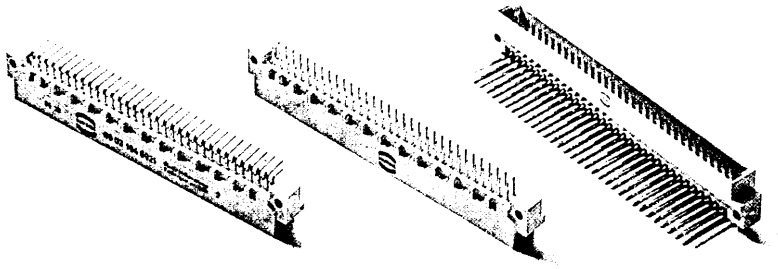
The removal tool is inserted into a slot on the side of the respective crimp cavity. This action compresses the contact retaining spring and the contact can then be easily withdrawn using a light pull on the wire. This action will cause no damage to the contact/wire which can be repositioned/refitted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



Gds A-B DIN 41 612 · VG 95 324 · Type B

Number of contacts

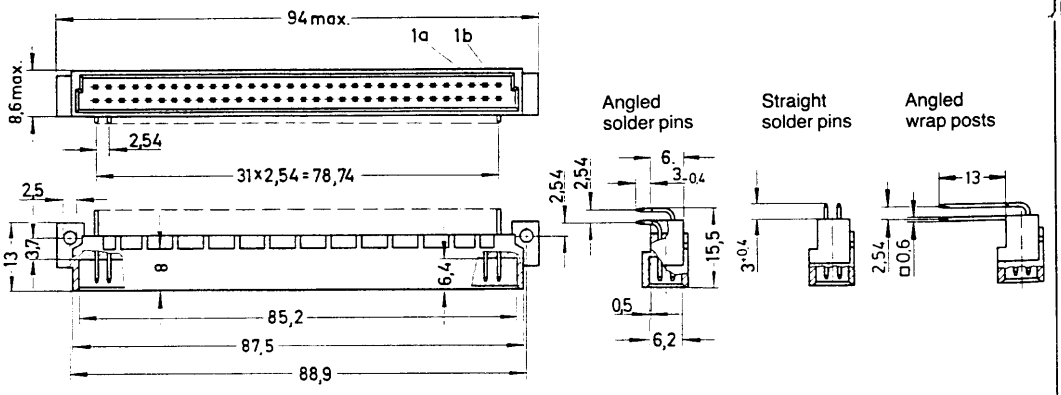
64, 32



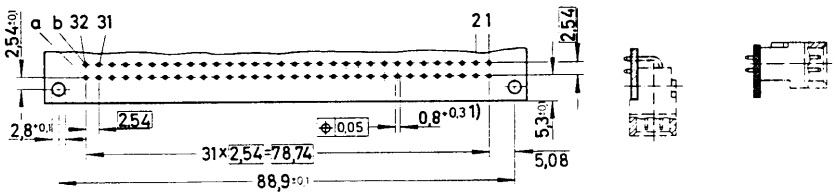
Male connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612, explanations page 10 2	1	VG
Male connector with angled solder pins	64	1234	09 02 164 7921	09 02 164 6921	09 02 164 2921*	09 02 164 4921*
	32	1234	09 02 132 7921	09 02 132 6921	09 02 132 2921*	09 02 132 4921*
	32	1234	09 02 132 7931	09 02 132 6931	09 02 132 2931*	
	62 + 2▲	1234	09 02 164 7951	09 02 164 6951	09 02 164 2951*	
Male connector with straight solder pins	64	1234	09 02 164 7922	09 02 164 6922	09 02 164 2922*	
	32	1234	09 02 132 7922	09 02 132 6922	09 02 132 2922*	
	32	1234	09 02 132 7932	09 02 132 6932	09 02 132 2932*	
	62 + 2▲	1234	09 02 164 7952	09 02 164 6952	09 02 164 2952*	
Male connector with angled wrap posts	64	1234	09 02 164 7928	09 02 164 6928	09 02 164 2928*	
	32	1234	09 02 132 7928	09 02 132 6928	09 02 132 2928*	
	32	1234	09 02 132 7938	09 02 132 6938	09 02 132 2938*	
Male connector with angled press-in terminations	Part Nos. and versions see "har · press" catalogue					

Dimensions



Board drillings



1) When angled wrap posts are used ∅ 1 ± 0.1 mm

Mating conditions page 10

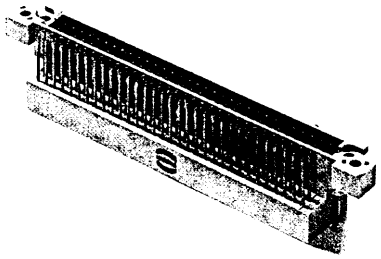
Dimensions in mm

▲ Male connectors with 2 first mating contacts [(0.8 mm) pos. a1 and a32]*
Male connectors with contacts in other positions/other rows on request

*Not normally kept in stock

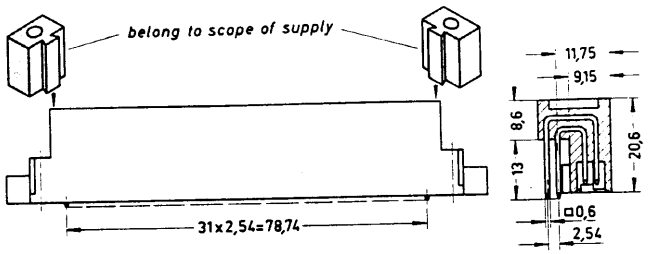
Number of contacts

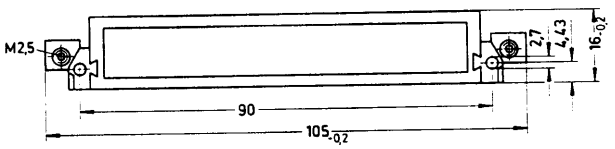
64

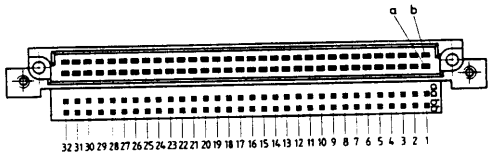


Interface connector U

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Interface connector U with wrap posts 0.6 x 0.6 mm	64	09 02 064 2981	Performance level 1	B

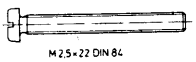






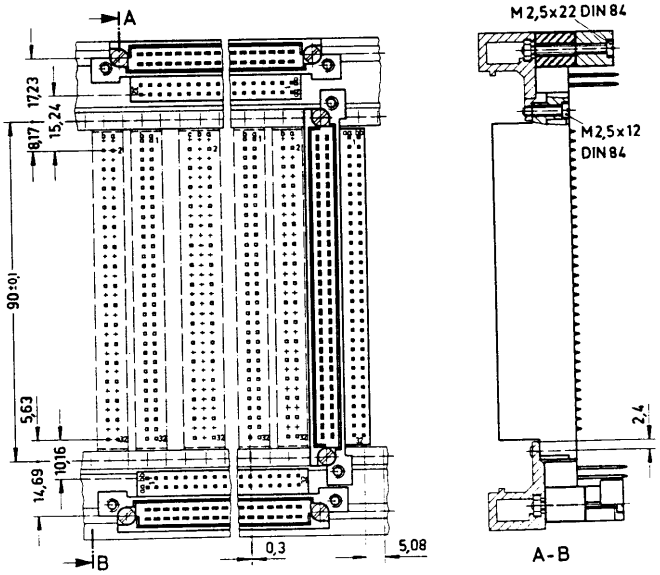
Locking screw

09 02 000 9923[1])



[1]) Order 2 pieces for one interface connector U

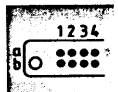
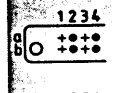
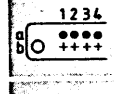
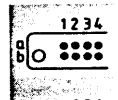
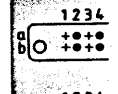
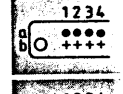
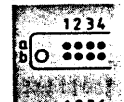
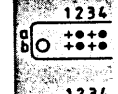
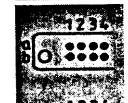
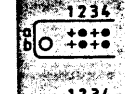
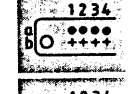
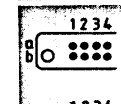
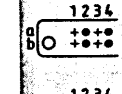
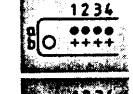
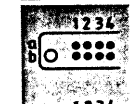
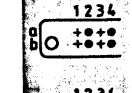
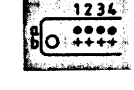
Mounting example



Number of contacts

64, 32

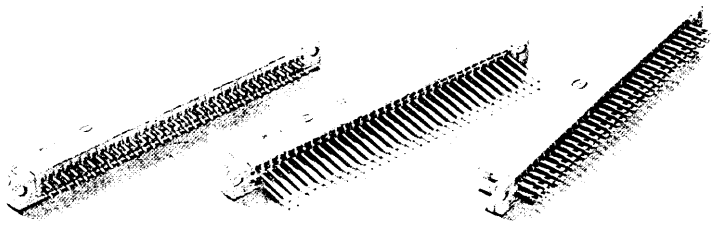
Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	2	1	VG
Female connector with solder pins 2.5 mm	64		09 02 164 7824	09 02 164 6824	09 02 164 2824*	09 02 164 4824*
	32		09 02 132 7824	09 02 132 6824	09 02 132 2824*	09 02 132 4824*
	32		09 02 132 7834	09 02 132 6834	09 02 132 2834*	
Female connector with solder pins 4 mm	64		09 02 164 7825	09 02 164 6825	09 02 164 2825*	09 02 164 4825*
	32		09 02 132 7825	09 02 132 6825	09 02 132 2825*	09 02 132 4825*
	32		09 02 132 7835	09 02 132 6835	09 02 132 2835*	
Female connector with solder pins 7 mm	64		09 02 164 7827	09 02 164 6827	09 02 164 2827*	
	32		09 02 132 7827	09 02 132 6827	09 02 132 2827*	
	32		09 02 132 7837	09 02 132 6837	09 02 132 2837*	
Female connector with wrap posts 13 mm	64		09 02 164 7821	09 02 164 6821	09 02 164 2821*	09 02 164 4821*
	32		09 02 132 7821	09 02 132 6821	09 02 132 2821*	09 02 132 4821*
	32		09 02 132 7831	09 02 132 6831	09 02 132 2831*	
Female connector with wrap posts 17 mm	64			09 02 164 6811*		
	32			09 02 132 6811*		
	32					
Female connector with solder lugs	64		09 02 164 7823	09 02 164 6823	09 02 164 2823*	
	32		09 02 132 7823	09 02 132 6823	09 02 132 2823*	
	32		09 02 132 7833	09 02 132 6833	09 02 132 2833*	

Performance levels according to DIN 41 612, explanations page 10

Wrap posts selectively gold plated on request

*Not normally kept in stock



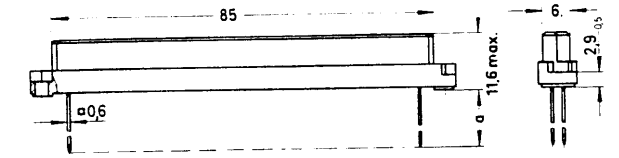
Identification

Drawing

Dimensions in mm

B

Female connectors type B DIN 41 612

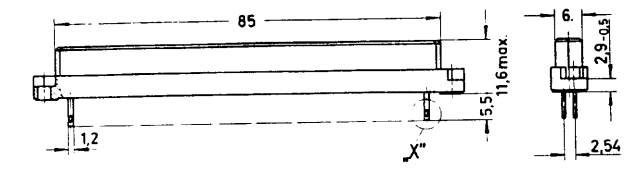


a
2.5
4
7

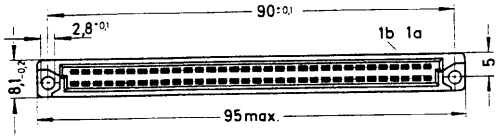
Solder pins

a
13
17

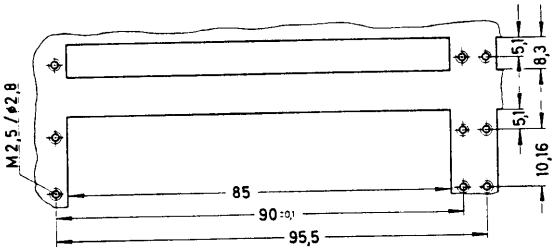
Wrap posts



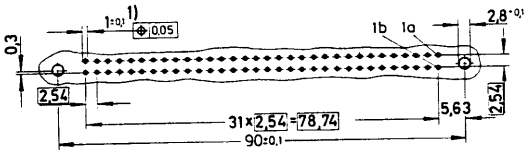
Solder lugs



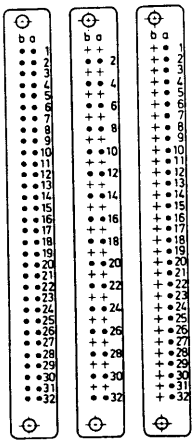
Panel cut out



Board drillings



Contact arrangement
View from termination side

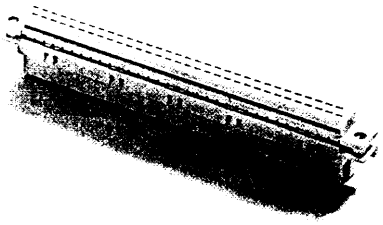


1) Solder pins for holes Ø 0.8 + 0.3 mm on request

Mating conditions page 10
Marking strips page 92
Coding information page 88

Number of contacts

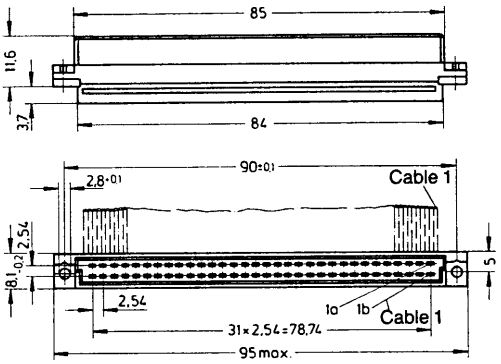
64



Female connectors

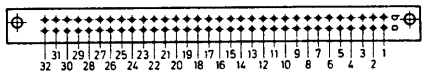
Identification		Number of contacts	Part No.
Female connector for insulation displacement		64	Performance level 2 09 02 264 6828 Performance level 3 09 02 264 7828
Panel cut out			
Flat cable AWG 28/7			
grey	30.48 m	64	09 18 064 7003
grey	152.40 m	64	09 18 064 7004
colour coded	30.48 m	64	09 18 064 7005
twisted pair[1]	30.48 m	64	09 18 064 7006
Bench press			09 99 000 0114
Base plate			09 99 000 0150
Flat cable cutter			09 99 000 0116
Spare parts			
Blade			09 99 000 0179
Cutting plate			09 99 000 0180

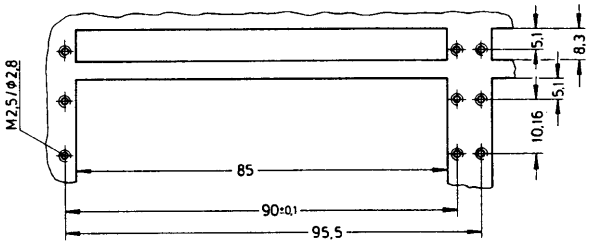
Drawing

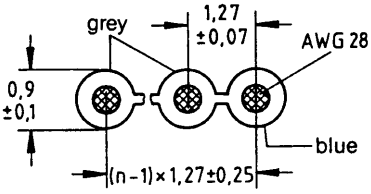


Cable 1 to contact 1b

Contact arrangement View from termination side



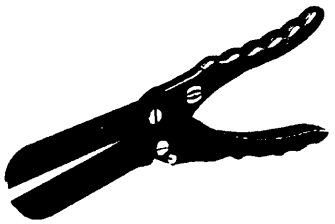




[1]Termination area spacing = 508 mm

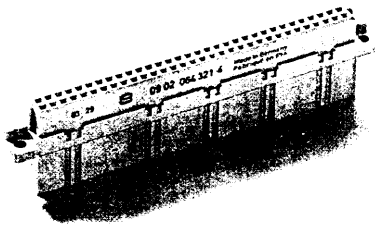
Wire (tinned) Cu
Gauge AWG 28/7 0.089 mm²
Insulation material PVC
as per UL 2651

Important:
always store reels vertically

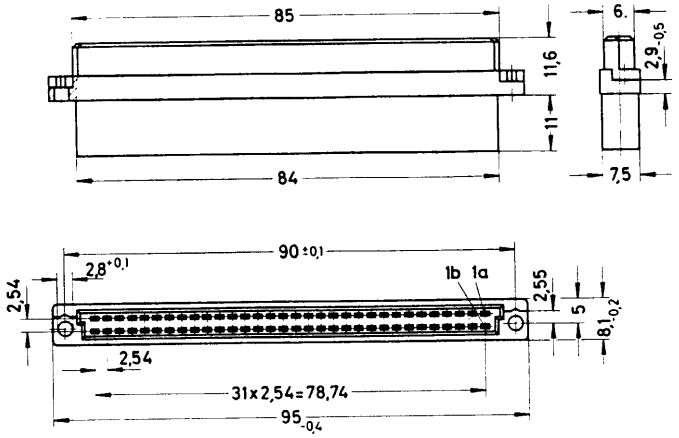


Number of contacts

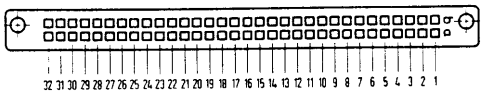
max. 64



Female connectors

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

Contact arrangement View from termination side



Shell housing 09 02 064 0501 / 09 02 064 0502 page 94

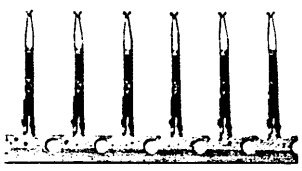
Identification	Part No. 2	Performance levels according to DIN 41 612, explanations page 10 1	Special
Female crimp contacts			
Bandoliered contacts (approx. 5000 pieces)	09 02 000 6484	09 02 000 6474	09 02 000 6424
Bandoliered contacts (approx. 500 pieces)	09 02 000 8434	09 02 000 8444	please check change-over to performance level 1 or 2
Individual contacts	09 02 000 8484	09 02 000 8474	09 02 000 6434

Wire gauge mm²	AWG	Insulation Ø mm
0.09–0.5	28–20	0.7–1.5

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

Crimping tools page 90

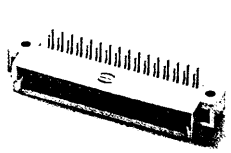
Bandoliered contacts

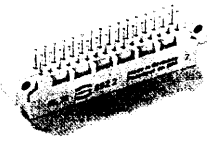


Individual contacts

Number of contacts

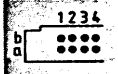
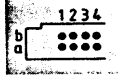
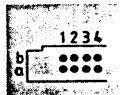
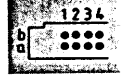
32, 16



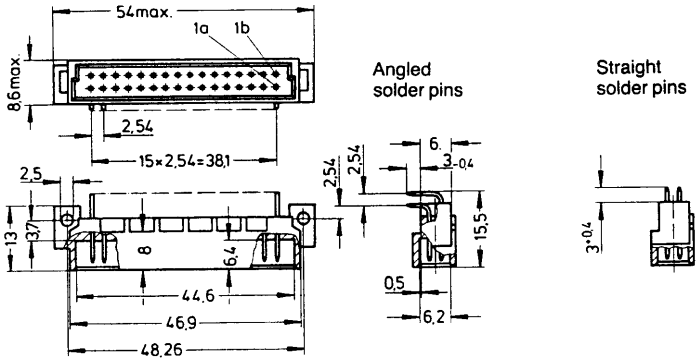


Male connectors

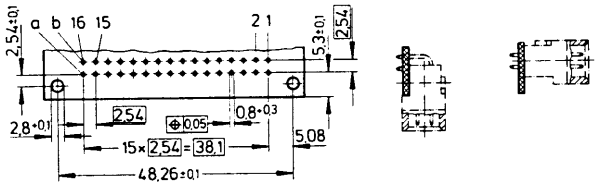
2B

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612, explanations page 10 2	1
Male connector with angled solder pins	32		09 22 132 7921	09 22 132 6921	09 22 132 2921*
	16		09 22 116 7931	09 22 116 6931	09 22 116 2931*
	30 + 2▲		09 22 132 7951	09 22 132 6951	09 22 132 2951*
Male connector with straight solder pins	32		09 22 132 7922	09 22 132 6922	09 22 132 2922*
	16		09 22 116 7932	09 22 116 6932	09 22 116 2932*
	30 + 2▲		09 22 132 7952	09 22 132 6952	09 22 132 2952*
Male connector with angled press-in terminations		Part Nos. and versions see "har · press" catalogue			

Dimensions



Board drillings



Dimensions in mm

▲ Male connectors with 2 first mating contacts [(0.8 mm) pos. a1 and a16]*
Male connectors with contacts in other positions/other rows on request

*Not normally kept in stock

Number of contacts

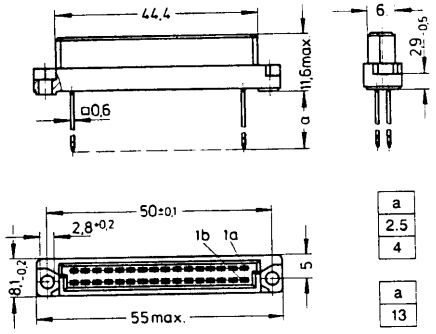
32, 16

Female connectors

Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612, explanations page 10 3	2	1
Female connector with solder pins 2.5 mm	32	1 2 3 4	09 22 132 7824	09 22 132 6824	09 22 132 2824*
	16	1 2 3 4	09 22 116 7834	09 22 116 6834	09 22 116 2834*
Female connector with solder pins 4.0 mm	32	1 2 3 4	09 22 132 7825	09 22 132 6825	09 22 132 2825*
	16	1 2 3 4	09 22 116 7835	09 22 116 6835	09 22 116 2835*
Female connector with wrap posts 13 mm	32	1 2 3 4	09 22 132 7821	09 22 132 6821	09 22 132 2821*
	16	1 2 3 4	09 22 116 7831	09 22 116 6831	09 22 116 2831*

2B

Dimensions



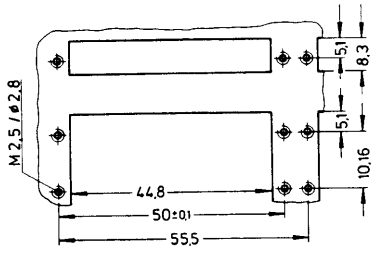
a
2.5
4

Solder pins

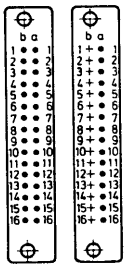
a
13

Wrap posts

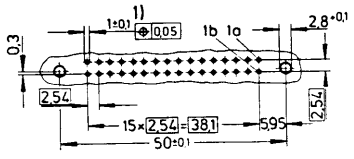
Panel cut out



Contact arrangement
View from termination side



Board drillings



1) Solder pins for holes ∅ 0.8 + 0.3 mm on request

Mating conditions page 10
Coding information page 88

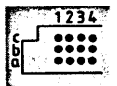
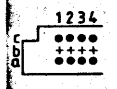
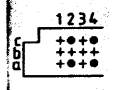
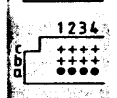
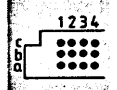
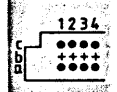
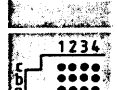
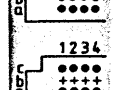
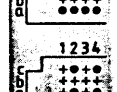
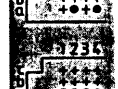
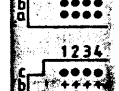
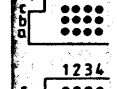
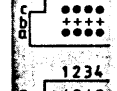
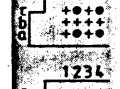
Dimensions in mm

*Not normally kept in stock

Number of contacts

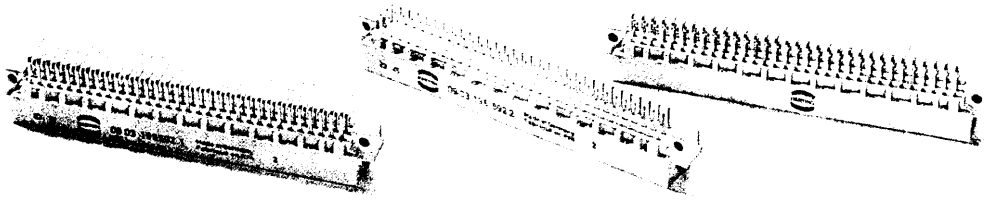
96, 64, 32

Male connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612, explanations page 10 2	1	VG
Male connector with angled solder pins	96		09 03 196 7921	09 03 196 6921	09 03 196 2921*	09 03 196 4921*
	64		09 03 164 7921	09 03 164 6921	09 03 164 2921*	09 03 164 4921*
	32		09 03 132 7921	09 03 132 6921	09 03 132 2921*	09 03 132 492
	32		09 03 132 7931	09 03 132 6931	09 03 132 2931*	
	94 + 2▲		09 03 196 7951	09 03 196 6951	09 03 196 2951*	
	62 + 2▲		09 03 164 7951	09 03 164 6951	09 03 164 2951*	
Male connector with straight solder pins	96		09 03 196 7922	09 03 196 6922	09 03 196 2922*	
	64		09 03 164 7922	09 03 164 6922	09 03 164 2922*	
	32		09 03 132 7922	09 03 132 6922	09 03 132 2922*	
	32		09 03 132 7932	09 03 132 6932	09 03 132 2932*	
	94 + 2▲		09 03 196 7952	09 03 196 6952	09 03 196 2952*	
	62 + 2▲		09 03 164 7952	09 03 164 6952	09 03 164 2952*	
Male connector with angled wrap posts	96		09 03 196 7928	09 03 196 6928	09 03 196 2928*	
	64		09 03 164 7928	09 03 164 6928	09 03 164 2928*	
	32		09 03 132 7928	09 03 132 6928	09 03 132 2928*	
	32		09 03 132 7938	09 03 132 6938	09 03 132 2938*	
Male connector with angled press-in terminations	Part Nos. and versions see "har · press" catalogue					

▲ Male connectors with 2 first mating contacts [(0.8 mm) pos. a1 and a32]*
Male connectors with contacts in other positions/other rows on request

* Not normally kept in stock

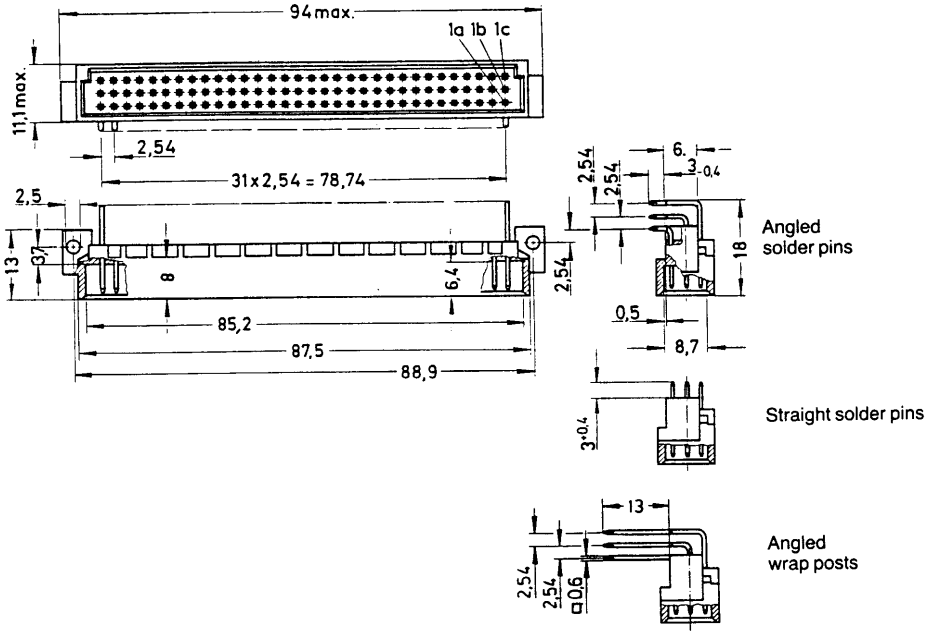


Identification

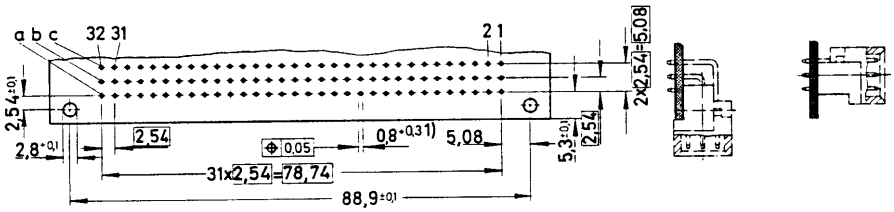
Male connector
Type C
DIN 41 612

Drawing

Dimensions in mm



Board drillings



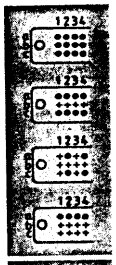
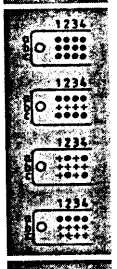
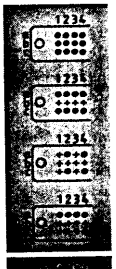
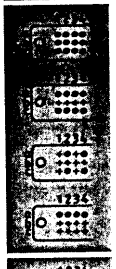
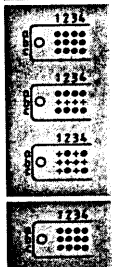
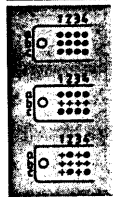
1) When angled wrap posts are used ∅ 1 ± 0.1 mm

Mating conditions page 10

Number of contacts

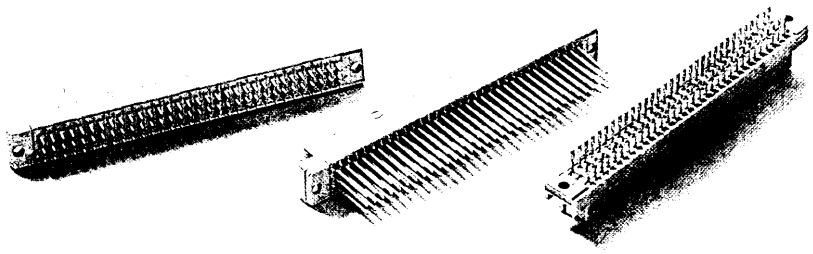
96, 64, 32

Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612, explanations page 10 2	1	VG
Female connector with solder pins 2.5 mm	96		09 03 196 7824	09 03 196 6824	09 03 196 2824*	09 03 196 4824*
	64		09 03 164 7824	09 03 164 6824	09 03 164 2824*	09 03 164 4824*
	32		09 03 132 7824	09 03 132 6824	09 03 132 2824*	09 03 132 4824*
	32		09 03 132 7834	09 03 132 6834	09 03 132 2834*	
Female connector with solder pins 4 mm	96		09 03 196 7825	09 03 196 6825	09 03 196 2825*	09 03 196 4825*
	64		09 03 164 7825	09 03 164 6825	09 03 164 2825*	09 03 164 4825*
	32		09 03 132 7825	09 03 132 6825	09 03 132 2825*	09 03 132 4825*
	32		09 03 132 7835	09 03 132 6835	09 03 132 2835*	
Female connector with solder pins 7 mm	96		09 03 196 7827	09 03 196 6827	09 03 196 2827*	
	64		09 03 164 7827	09 03 164 6827	09 03 164 2827*	
	32		09 03 132 7827	09 03 132 6827	09 03 132 2827*	
	32		09 03 132 7837	09 03 132 6837	09 03 132 2837*	
Female connector with wrap posts 13 mm	96		09 03 196 7821	09 03 196 6821	09 03 196 2821*	09 03 196 4821*
	64		09 03 164 7821	09 03 164 6821	09 03 164 2821*	09 03 164 4821*
	32		09 03 132 7821	09 03 132 6821	09 03 132 2821*	09 03 132 4821*
	32		09 03 132 7831	09 03 132 6831	09 03 132 2831*	
Female connector with wrap posts 17 mm	96			09 03 196 6811*		
	64			09 03 164 6811*		
	32			09 03 132 6811*		
Female connector with solder lugs	96		09 03 196 7823	09 03 196 6823	09 03 196 2823*	
	64		09 03 164 7823	09 03 164 6823	09 03 164 2823*	
	32		09 03 132 7823	09 03 132 6823	09 03 132 2823*	
Female connector with press-in terminations			Part Nos. and versions see "har·press" catalogue			

Wrap posts selectively gold plated on request

*Not normally kept in stock

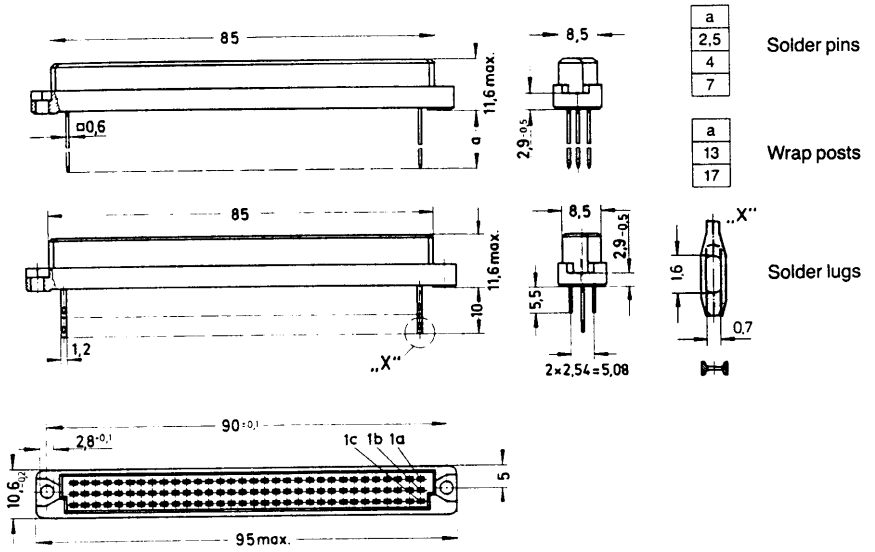


Identification

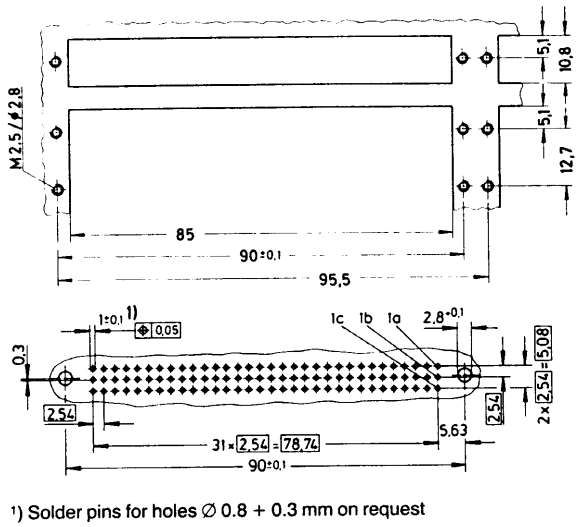
Drawing

Dimensions in mm

Female connectors type C DIN 41 612



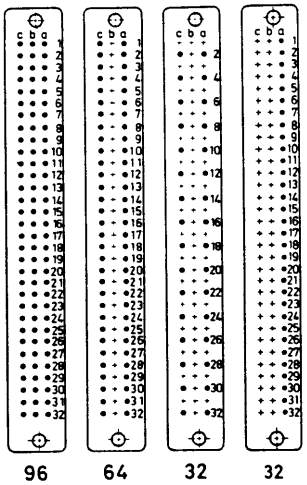
Panel cut out



1) Solder pins for holes Ø 0.8 + 0.3 mm on request

Board drillings

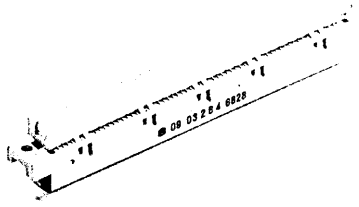
Contact arrangement
View from termination side



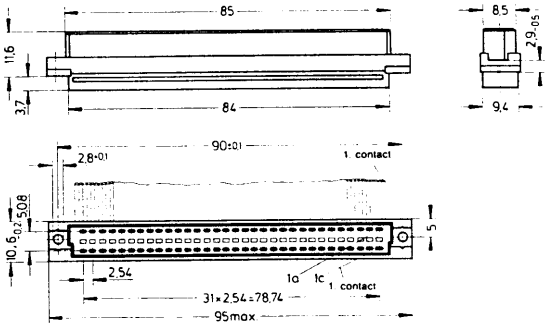
Mating conditions page 10
Marking strips page 92
Coding information page 88

Number of contacts

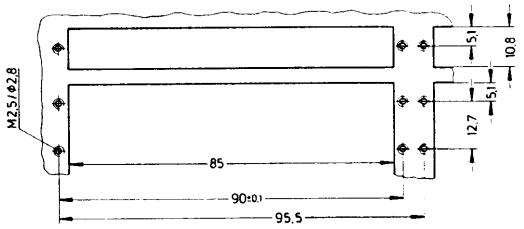
64



Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for insulation displacement	64	Performance level 2 09 03 264 6828		
		Performance level 3 09 03 264 7828	Cable 1 to contact 1c	

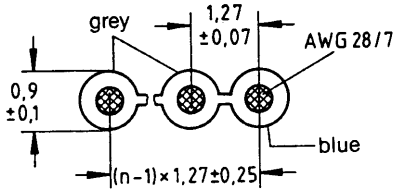
Contact arrangement View from termination side



Mateable with 3-row male connector Gds A-C.
No female contacts in middle row.

Panel cut out

Flat cable
AWG 28/7



grey	30.48 m	64	09 18 064 7003
grey	152.40 m	64	09 18 064 7004
colour coded	30.48 m	64	09 18 064 7005
twisted pair[1]	30.48 m	64	09 18 064 7006

Wire (tinned) Cu
Gauge AWG 28/7 0.089 mm²
Insulation material PVC
as per UL 2651

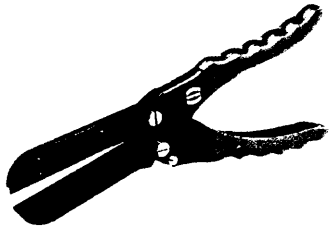
[1] Termination area spacing = 508 mm

Important:
always store reels vertically

Bench press 09 99 000 0114

Base plate 09 99 000 0150

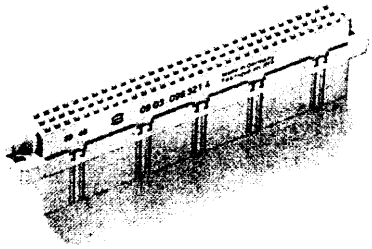
Flat cable cutter 09 99 000 0116



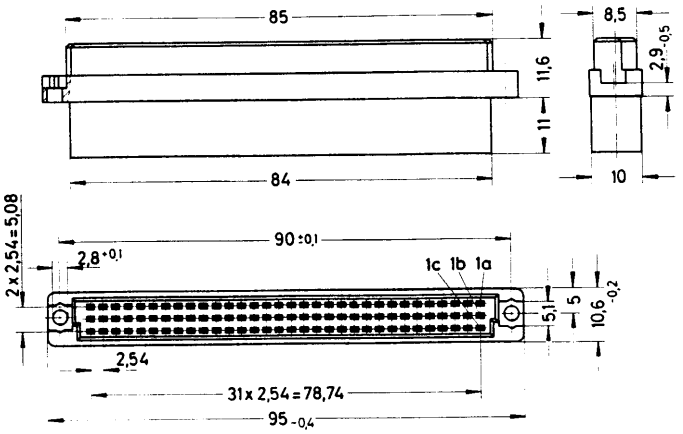
Spare parts
Blade 09 99 000 0179
Cutting plate 09 99 000 0180

Number of contacts

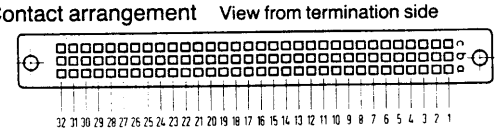
max. 96



Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	96	09 03 096 3214		

Contact arrangement View from termination side



Shell housing 09 03 096 0501 page 94

C

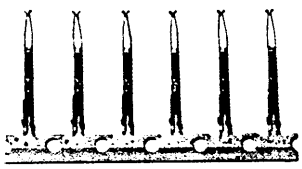
Identification	Part No. 2	Performance levels according to DIN 41 612, explanations page 10 1	Special
Female crimp contacts			
Bandoliered contacts (approx. 5000 pieces)	09 02 000 6484	09 02 000 6474	09 02 000 6424
Bandoliered contacts (approx. 500 pieces)	09 02 000 8434	09 02 000 8444	please check change-over to performance level 1 or 2
Individual contacts	09 02 000 8484	09 02 000 8474	09 02 000 6434

Wire gauge mm²	AWG	Insulation Ø mm
0.09–0.5	28–20	0.7–1.5

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

Crimping tools page 90

Bandoliered contacts

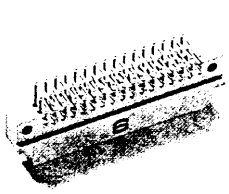


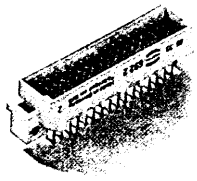
Individual contacts

Gds A-2C DIN 41 612 · VG 95 324 · complementary to type C

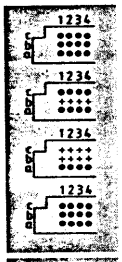
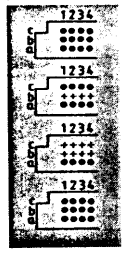
Number of contacts

48, 32, 16



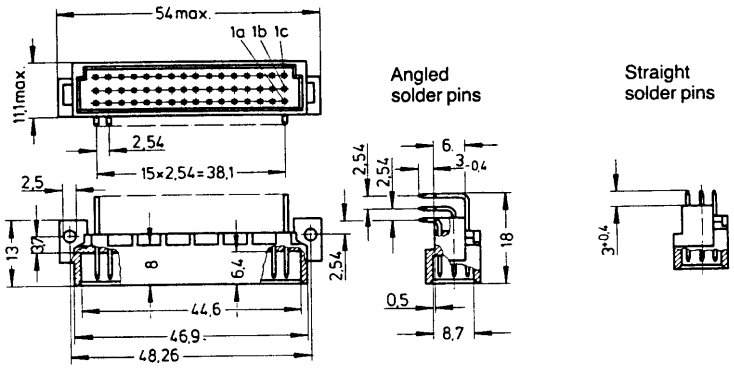


Male connectors

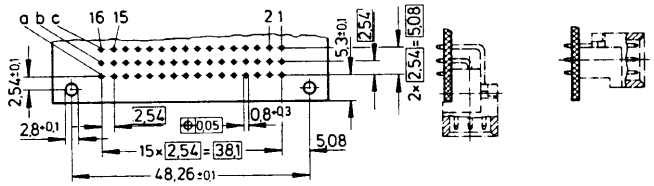
Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612, explanations page 10 3	2	1
Male connector with angled solder pins	48		09 23 148 7921	09 23 148 6921	09 23 148 2921*
	32		09 23 132 7921	09 23 132 6921	09 23 132 2921*
	16		09 23 116 7931	09 23 116 6931	09 23 116 2931*
	46 + 2▲		09 23 148 7951	09 23 148 6951	09 23 148 2951*
Male connector with straight solder pins	48		09 23 148 7922	09 23 148 6922	09 23 148 2922*
	32		09 23 132 7922	09 23 132 6922	09 23 132 2922*
	16		09 23 116 7932	09 23 116 6932	09 23 116 2932*
	46 + 2▲		09 23 148 7952	09 23 148 6952	09 23 148 2952*
Male connector with angled press-in terminations	Part Nos. and versions see "har · press" catalogue				

2C

Dimensions



Board drillings



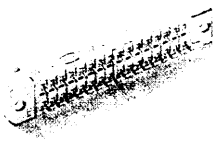
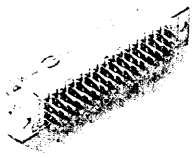
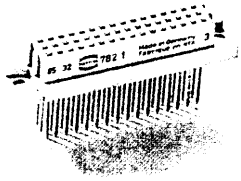
Dimensions in mm

*Not normally kept in stock

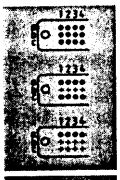
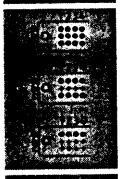
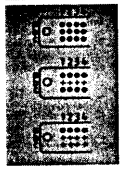
Gds A-2C DIN 41 612 · VG 95 324 · complementary to type C

Number of contacts

48, 32, 16

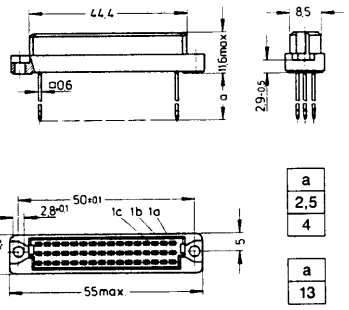




Female connectors

Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612, explanations page 10 3	2	1
Female connector with solder pins 2.5 mm	48		09 23 148 7824	09 23 148 6824	09 23 148 2824*
	32		09 23 132 7824	09 23 132 6824	09 23 132 2824*
	16		09 23 116 7834	09 23 116 6834	09 23 116 2834*
Female connector with solder pins 4.0 mm	48		09 23 148 7825	09 23 148 6825	09 23 148 2825*
	32		09 23 132 7825	09 23 132 6825	09 23 132 2825*
	16		09 23 116 7835	09 23 116 6835	09 23 116 2835*
Female connector with wrap posts 13 mm	48		09 23 148 7821	09 23 148 6821	09 23 148 2821*
	32		09 23 132 7821	09 23 132 6821	09 23 132 2821*
	16		09 23 116 7831	09 23 116 6831	09 23 116 2831*

2C

Dimensions



a
2,5
4

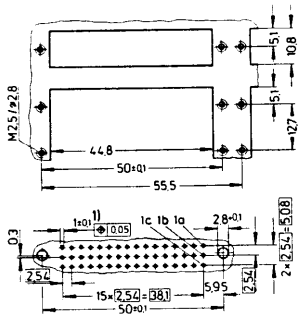
Solder pins

a
13

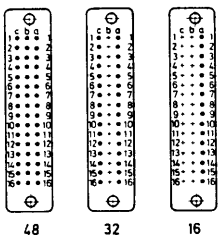
Wrap posts

Panel cut out

Board drillings



Contact arrangement
View from termination side



¹) Solder pins for holes ∅ 0.8 + 0.3 mm on request

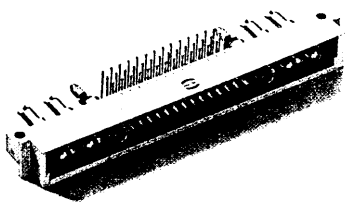
Mating conditions page 10
Coding information page 88

Dimensions in mm

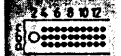
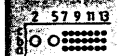
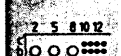
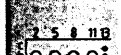
*Not normally kept in stock

Number of contacts

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

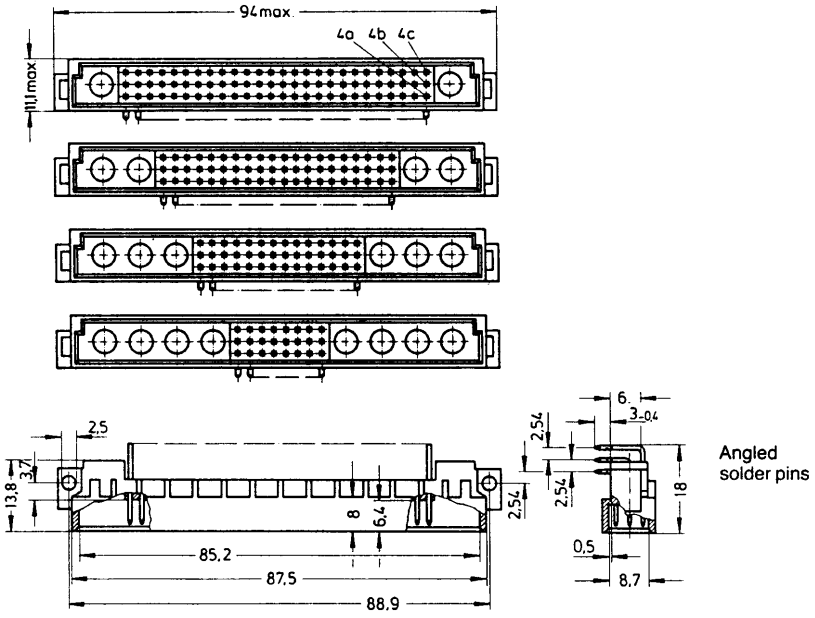


Male connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612, explanations page 10 2	1
Male connector with angled solder pins	78+2		09 03 178 7901	09 03 178 6901	09 03 178 2901*
	60+4		09 03 160 7901	09 03 160 6901	09 03 160 2901*
	42+6		09 03 142 7901	09 03 142 6901	09 03 142 2901*
	24+8		09 03 124 7901	09 03 124 6901	09 03 124 2901*

M

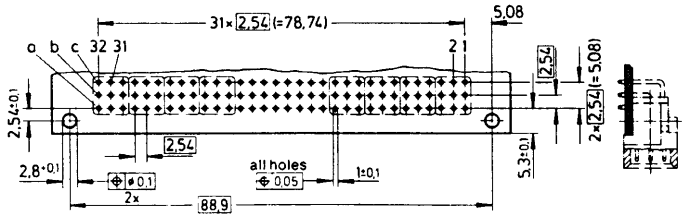
Dimensions



Angled solder pins

Order separately high current, high voltage, coaxial and fibre optic contacts, see page 40

Board drillings



Dimensions in mm

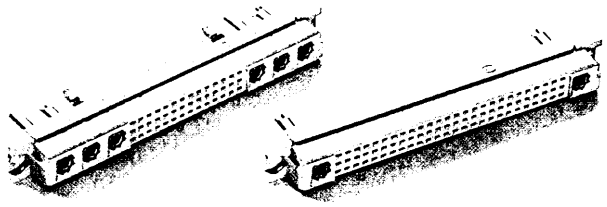
Please request separate data sheet for inverse versions

*Not normally kept in stock

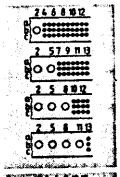
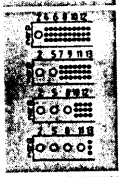
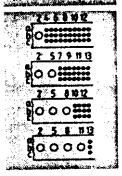
Gds A-M DIN 41 612 · VG 95 324 · Type M

Number of contacts

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

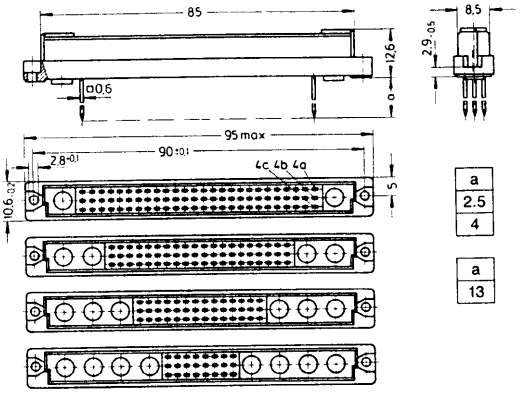


Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	2	1
Female connector with solder pins 2.5 mm	78 + 2		09 03 178 7804	09 03 178 6804	09 03 178 2804*
	60 + 4		09 03 160 7804	09 03 160 6804	09 03 160 2804*
	42 + 6		09 03 142 7804	09 03 142 6804	09 03 142 2804*
	24 + 8		09 03 124 7804	09 03 124 6804	09 03 124 2804*
Female connector with solder pins 4.0 mm	78 + 2		09 03 178 7805	09 03 178 6805	09 03 178 2805*
	60 + 4		09 03 160 7805	09 03 160 6805	09 03 160 2805*
	42 + 6		09 03 142 7805	09 03 142 6805	09 03 142 2805*
	24 + 8		09 03 124 7805	09 03 124 6805	09 03 124 2805*
Female connector with wrap posts 13 mm	78 + 2		09 03 178 7801	09 03 178 6801	09 03 178 2801*
	60 + 4		09 03 160 7801	09 03 160 6801	09 03 160 2801*
	42 + 6		09 03 142 7801	09 03 142 6801	09 03 142 2801*
	24 + 8		09 03 124 7801	09 03 124 6801	09 03 124 2801*

M

Dimensions



a
2.5
4

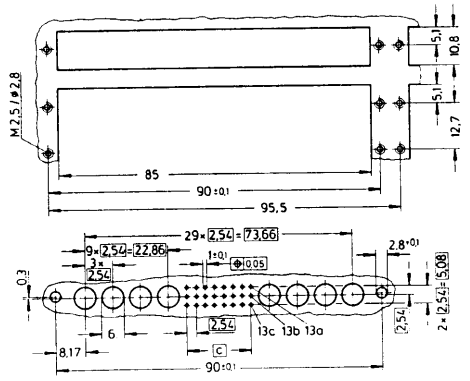
Solder pins

a
13

Wrap posts

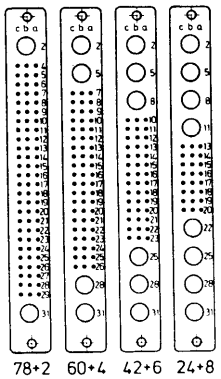
Order separately high current, high voltage, coaxial and fibre optic contacts, see page 40

Panel cut out



Board drillings

Contact arrangement
View from termination side



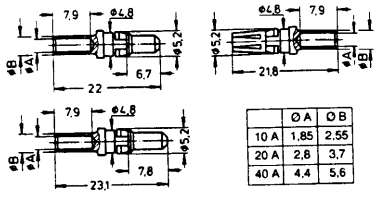
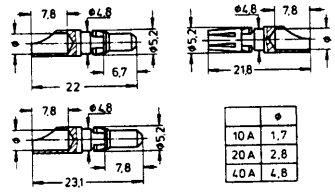
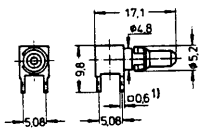
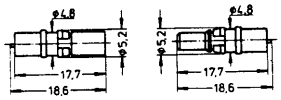
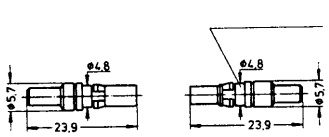
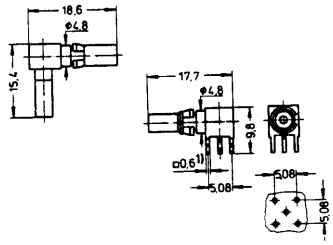
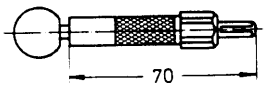
Typ	c
78+2	25 × 2,54 = 63,5
60+4	19 × 2,54 = 48,26
42+6	13 × 2,54 = 33,02
24+8	7 × 2,54 = 17,78

Mating conditions page 10
Coding information page 88

Dimensions in mm

Please request separate data sheet for inverse versions

*Not normally kept in stock

Identification		Part No. Male contacts for...	Performance level 2 Female contacts for...	Drawing	Dimensions in mm
		..male connector	..female connector		
High current contacts for straight crimp terminations	10 A	09 03 000 6113	09 03 000 6213		
	20 A	09 03 000 6114	09 03 000 6214		
	40 A	09 03 000 6115	09 03 000 6215		
First mate contact	10 A	09 03 000 6123			
	20 A	09 03 000 6124			
	40 A	09 03 000 6125			
Crimping tool for high current contacts		09 99 000 0196			
		..male connector	..female connector		
High current contacts for straight solder terminations	10 A	09 03 000 6101	09 03 000 6201		
	20 A	09 03 000 6102	09 03 000 6202		
	40 A	09 03 000 6103	09 03 000 6203		
First mate contact	10 A	09 03 000 6111			
	20 A	09 03 000 6122			
	40 A	09 03 000 6133			
High current contacts for printed circuit terminations	10 A	..male connector 09 03 000 6104			[M] [1]) Solder pins for hole ∅ 1 ± 0.1 mm
High voltage contacts for straight solder terminations	2.8 kV	..male connector 09 03 000 6140	..female connector 09 03 000 6240		Wire gauge max. 0.5 mm²
Coaxial contacts for straight solder and/or crimp terminations		..female connector 09 03 000 6160	..male connector without knurled area 09 03 000 6260 with knurled area 09 03 000 6274		with/without knurled area
Coaxial contacts for angled solder and/or crimp terminations		09 03 000 6161			
Coaxial contacts for printed circuit terminations			09 03 000 6262		[1]) Solder pins for hole ∅ 1 ± 0.1 mm
Crimping tool for coaxial contacts		09 99 000 0194			
Removal tool for contacts		09 99 000 0174			

Characteristics for contacts and wires

	Coaxial contacts	High current contacts	High voltage contacts
Impedance	50Ω	—	—
Insulation resistance	10^{12}Ω	—	—
Contact resistance		max. 1.5 mΩ	
Internal wire	≦ 10 mΩ	—	≦ 3 mΩ
External wire	≦ 3 mΩ	—	—
Working voltage	250 V ~	—	2.8 kV
Voltage resistance	750 V ~	—	3.8 kV
Max. working current	1.5 A	40 A	1.5 A
Contact finish	perf. level 2	perf. level 2	perf. level 2
Cable group	2	—	—

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

Fibre optic contacts on request