

HARTING



Interface connectors

Quality Connections Worldwide

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

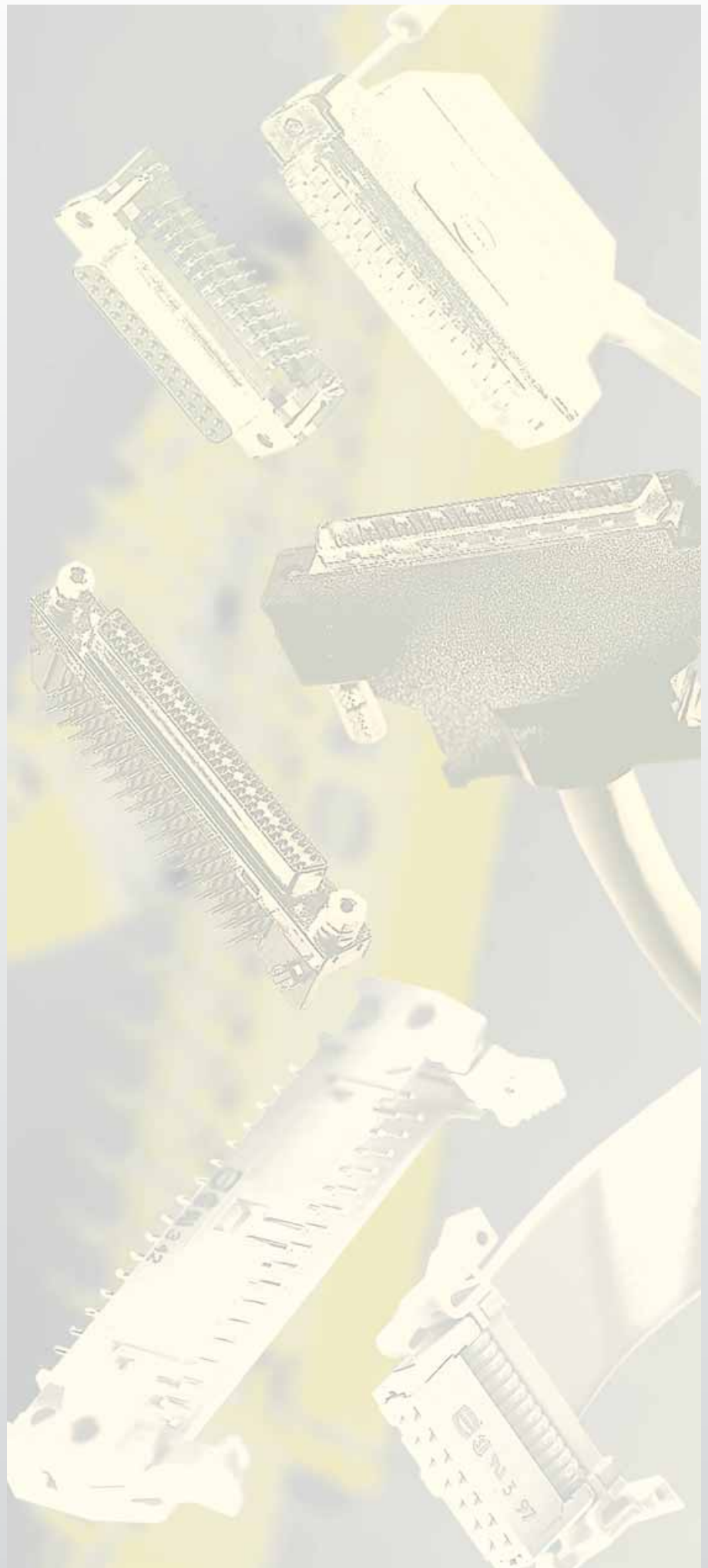
Today, HARTING employs around 2,000 people worldwide, including 150 qualified engineers. The sales team, including more than 100 sales engineers is in daily contact with our customers.

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

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

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

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



Interface connectors

Chapter

harlink® Modular metric high speed connectors
IEC 61 076-4-107, 2.0 mm [0.079"] pitch



00

harmik® Miniature D connectors
IEC 61 076-3-101, 1.27 mm [0.050"] pitch



01

D-Sub – Standard subminiature D connectors
IEC 60 807, 2.54 mm [0.100"] pitch



02

D-Sub – High Density subminiature D connectors



New

03

D-Sub – Mixed subminiature D connectors
DIN 41 652 T1



New

04

D-Sub – Filter subminiature D connectors
IEC 1000, 2.54 mm [0.100"] pitch



New

05

D-Sub – Housing range for subminiature D connectors
Comprehensive shielded and unshielded range



06

D-Sub – Accessories for subminiature D connectors

07

InduCom Robust and EMI protected D-Sub interfaces



New

08

SEK Insulation Displacement Connector system (IDC)
IEC 60 603-13, 2.54 mm [0.100"] pitch



09

Press-in technology
Press-in board connectors



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Surface Mount technology
Surface Mount Compatible (SMC) board connectors



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Tooling for crimp technology



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Tooling for IDC technology



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General information

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har-link® Modular metric high speed connectors, 2.0 mm pitch

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har-link® connector system – general information

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Technical characteristics

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Male and female connectors



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Accessories

00.08

The **har-link®** connector system of HARTING complies with the requirements of IEC 61076-4-107 and is a compact and robust pcb-to-cable interface with excellent data transmission properties for high-speed networking and telecommunications.

All dimensions of the **har-link®** connector are in accordance with IEC 917 and IEEE P 1301 requirements, which allows for easy implementation into both metric and inch-based systems. In addition, **har-link®** supports hot plugging as required by modern bus systems such as CompactPCI, S-bus and VME.

har-link® allows data transmission up to 2 Gbit/s per pair and is therefore perfectly suited for modern transmission protocols such as Low Voltage Differential Signals (see Fig. 1). The design of the **har-link®** connector allows differential pairs to be placed horizontally (parallel to the pcb), thus reducing the skew at high frequencies and considering high signal integrity.

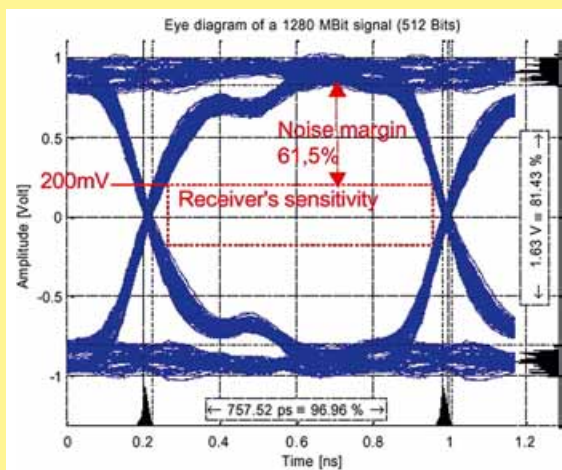


Fig. 1: Eye diagram of a 1280 MBit signal (512 Bits)

The metal shells of the **har-link®** connector are a guarantee for its superior performance in the EMI-polluted environment (see Fig. 2).



Fig. 2: 360° screened-can construction with locking levers

To reach a screening attenuation of more than 50 dB up to 1 GHz, HARTING offers brackets covering each connector in conjunction with a gasket, which is compressed between the bracket and the front panel (see Fig. 3).

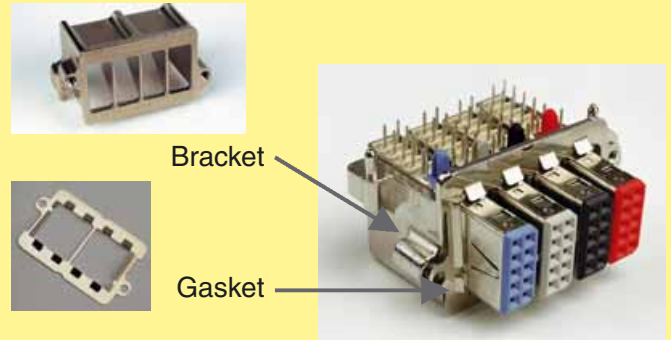


Fig. 3: 4 cavities bracket and gasket

Once plugged, the mated pair shows excellent mating safety. Due to the locking levers on both sides of the male connector, the connection withstands a pulling force of up to 80 N (see Fig. 2).

The high temperature resistant material of the **har-link®** female connector body supports the safe reflow soldering process. For easy identification of female modules, six different colours are available (see Fig. 4).

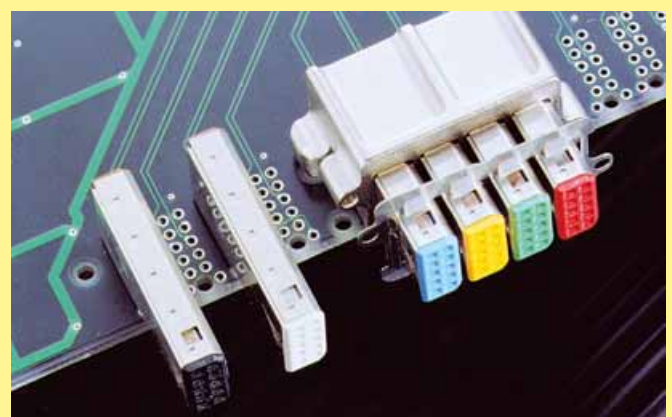
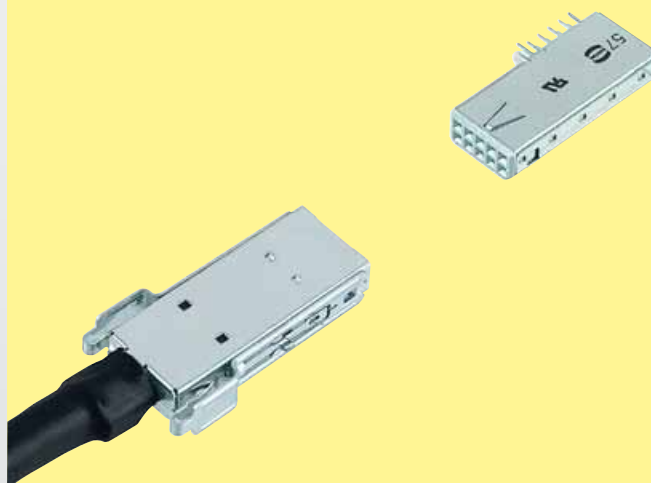


Fig. 4: Differently coloured female modules

In addition to single connectors, HARTING provides cable assemblies with unshielded twisted pairs or with shielded twisted pairs for high speed applications such as IEEE 1355. A crimping tool range for terminating the male **har-link®** connectors is available.



Number of contacts	10
Approvals	IEC 61 076-4-107 UL recognized: E102079
Contact pitch Connector pitch	2 mm 6 mm
Working current	1.5 A at 70 °C
Test voltage U _{r.m.s.}	750 V
Contact resistance Insulation resistance	≤ 30 mΩ ≥ 10 ¹⁰ Ω
Temperature range during reflow soldering	-55 °C ... + 125 °C female: max. + 260 °C for 60 s
Mating cycles	250, performance level 2
Terminations	Insulation displacement (male), AWG 28/7 - 30/7, AWG 30 solid Solder pins for ø 0.6 mm min. (female)
Insertion force Withdrawal force	10 N max. / module 2 N min. / module (without locking levers)
Latching system	Locking levers
Materials	
Mouldings	Male connector: Polyester, UL 94-V0 Female connector: High temperature plastic material, UL 94-V0
Contacts	Copper alloy
Shells	Male connector: Stainless steel Female connector: Silver nickel
Contact surface	<u>Contact zone</u> : Selectively gold-plated <u>Termination zone</u> : Tinned



Male connectors, straight
Female connectors, angled



Identification

No. of
contacts

Colour

Part No.

Male connector
for insulation displacement

10

Black

27 11 161 8001

Female connector
with solder pins

10

Beige (standard)

27 21 121 8000

10

Red

27 21 121 8002

10

Yellow

27 21 121 8004

10

Green

27 21 121 8005

10

Blue

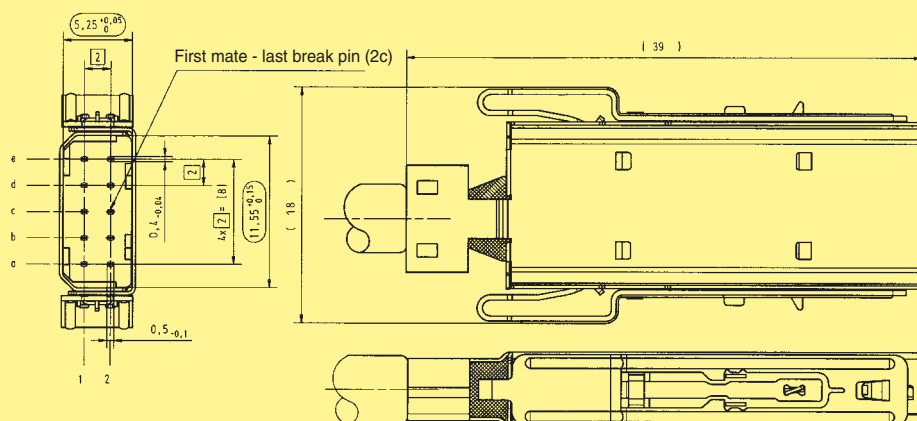
27 21 121 8006

10

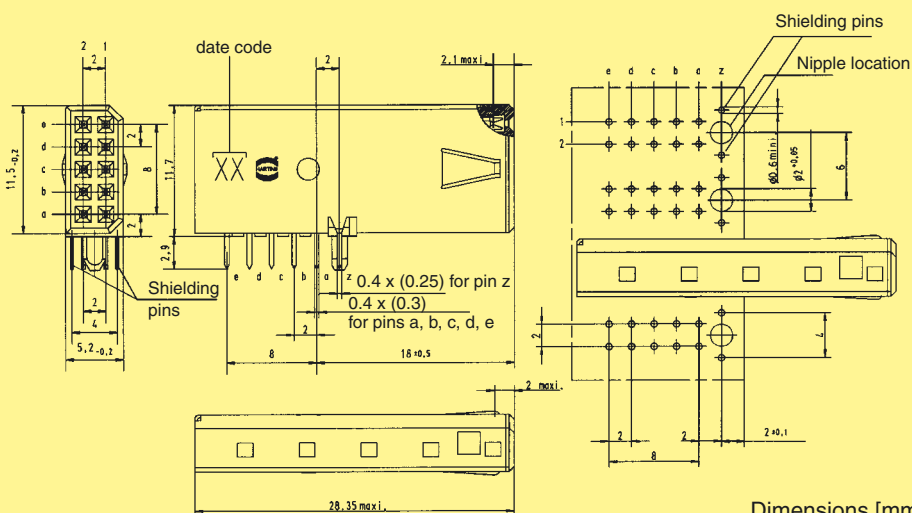
Black

27 21 121 8010

Male connector



Female connector



Dimensions [mm]

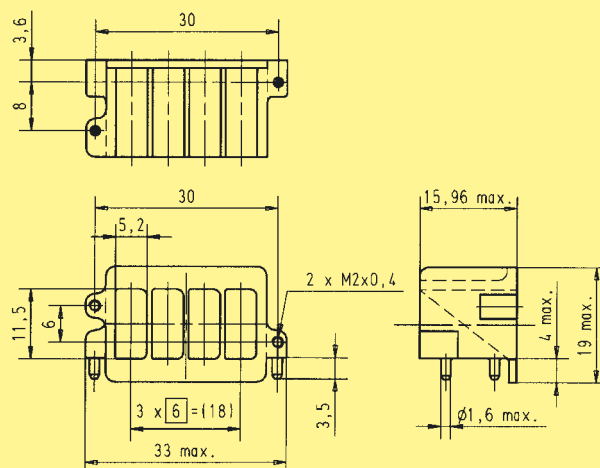


Accessories

Identification	Part No.	Drawing	Dimensions [mm]
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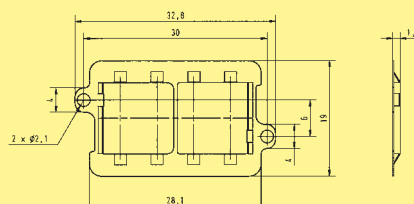
Bracket
with four cavities

27 71 040 0001



Gasket
with four cavities

27 71 040 0002



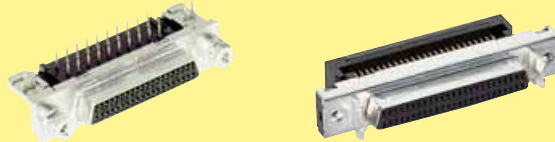
harmik® Miniature D connectors, 1.27 mm pitch

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I/O connectors

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Pin and socket



Technical characteristics

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Pin and socket



Technical characteristics

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Connectors with straight solder pins

01.23

Connectors with right angled solder pins

01.26

Connectors with IDC flat cable termination

01.27

for economical and reliable connections

har-mik

A comprehensive range of high density interface connectors based on two mating design concepts:

- Blade and fork contact in the Pin/Socket range.
- Leaf contact in the Bellows range.

Available in a various number of contacts with options for secure locking of mated connectors in accordance with the following international standards:

- Small Computer System Interface
SCSI-2
SCSI-2 wide
SCSI-3
- Intelligent Peripheral Interface
IPI
- High Performance Peripheral Interface
HIPPI
- High Speed Serial Interface
HSSI
- Media Independent Interface
MII
- Bi-directional Parallel Interface
IEEE – 1284-C
- EIA – TIA
232-E
- IEC
61 076-3-101

UL recognised

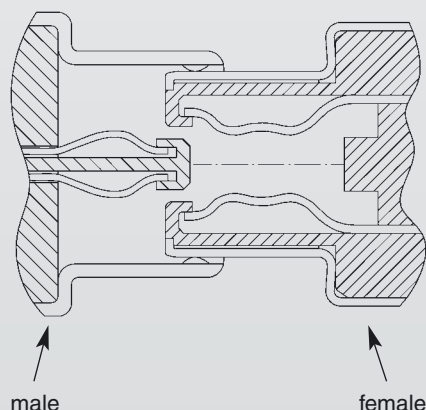
For customer specific applications we can design and manufacture solutions to match your requirement.

Sales department
HARTING components

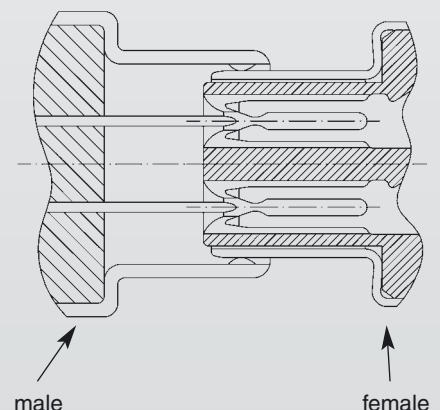


Certified according to EN ISO 9001
in design/development, production,
installation and servicing

Bellows
with leaf contact design



Pin and Socket
with blade and fork contact design



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Number of contacts 20, 26, 28, 50, 68, 100

Pitch 1.27 mm

Working current 1 A

Working voltage 240 V ~

Test voltage $U_{r.m.s.}$ 750 V

Contact resistance $\leq 30 \text{ m}\Omega$

Insulation resistance $\geq 10^3 \text{ M}\Omega$

Temperature range -55 °C ... + 105 °C

Terminations

Solder pins
Straight for pcb holes
min. $\varnothing 0.74 \text{ mm}$
Angled 90° for pcb holes
min. $\varnothing 0.74 \text{ mm}$

Insulation displacement
Discrete wire
AWG 28 to AWG 30
max. section: 0.089 mm^2
min. section: 0.050 mm^2
Insulation $\varnothing$ min. 0.50 mm
 $\varnothing$ max. 0.88 mm
Flat cable
AWG 30 pitch 0.635 mm

Materials

Moulding
Thermoplastic resin
glass-fibre filled UL 94-V0
Liquid Crystal Polymer (LCP)
for SCSI 3, straight

Contacts
Copper alloy

Contact surface
Selectively gold-plated

Metal shell
Die cast zamac or stamped
steel, nickel-plated

Hoods
Die cast zamac, nickel-plated

Thermoplastic resin
nickel-plated, steel insert



Number of contacts

20–68

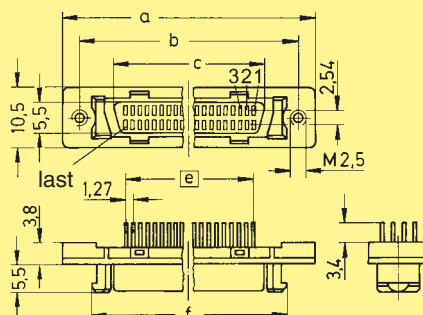


Female connectors, straight

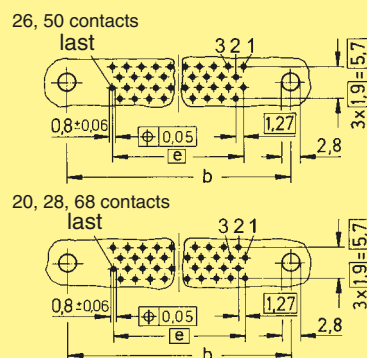
Identification	No. of contacts	Part No.
Female connectors with straight solder pins	20	60 01 020 5102
	26	60 01 026 5102
	28	60 01 028 5102
	50	60 01 050 5102
	68	60 01 068 5102

Dimensions

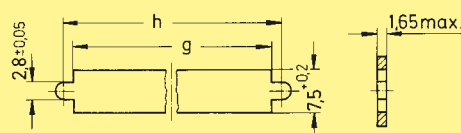
	a	b _{±0.1}	c	e	f	g	h
20	33.40	27.43	15.60	9 x 1.27 = 11.43	23.24	23.70	27.45
26	37.21	31.24	19.41	12 x 1.27 = 15.24	27.05	27.50	31.25
28	38.48	32.51	20.68	13 x 1.27 = 16.51	28.32	28.80	32.50
50	52.45	46.48	34.65	24 x 1.27 = 30.48	42.29	42.80	46.50
68	63.88	57.91	46.08	33 x 1.27 = 41.91	53.72	54.20	57.90



Board drillings



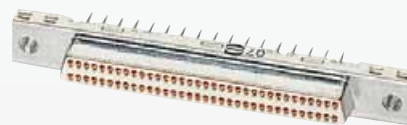
Panel cut out



Dimensions in mm

Number of contacts

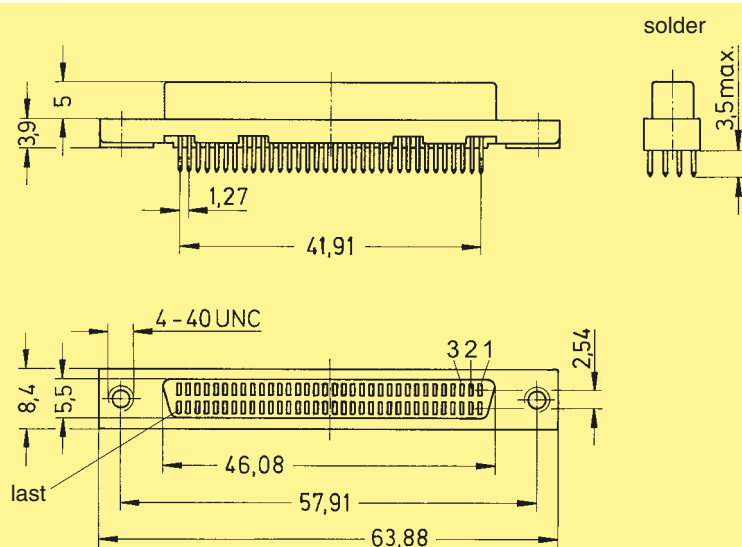
68



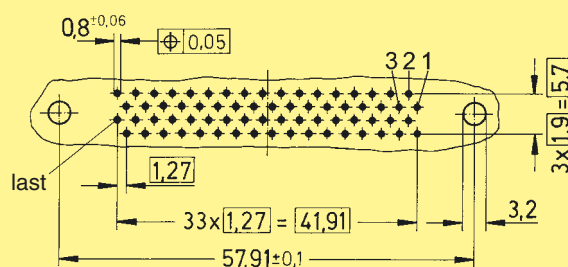
Female connectors, straight

Identification	No. of contacts	Part No.
Female connector with straight solder pins	68	60 02 068 5120

Dimensions



Board drillings
(Components side)



Dimensions in mm

Number of contacts

20–68

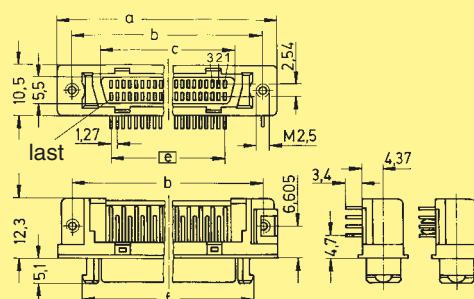


Female connectors, angled

Identification		No. of contacts	Part No.
Female connectors with angled solder pins		20	60 01 020 51 ..
		26	60 01 026 51 ..
		28	60 01 028 51 ..
		50	60 01 050 51 ..
		68	60 01 068 51 ..
Panel fixing	Board fixing		
M 2.5	M 2.5	32	
M 2.5	Board lock	40	

Dimensions

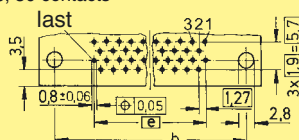
	a	b _{±0.1}	c	e	f	g	h
20	33.40	27.40	15.60	9 x 1.27 = 11.43	23.24	23.70	27.45
26	37.21	31.24	19.41	12 x 1.27 = 15.24	27.05	27.50	31.25
28	38.48	32.48	20.68	13 x 1.27 = 16.51	28.32	28.80	32.50
50	52.45	46.45	34.65	24 x 1.27 = 30.48	42.29	42.80	46.50
68	63.88	57.88	46.08	33 x 1.27 = 41.91	53.72	54.20	57.90



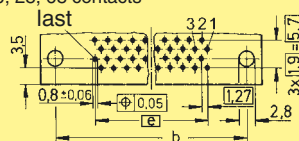
without board lock with board lock

Board drillings

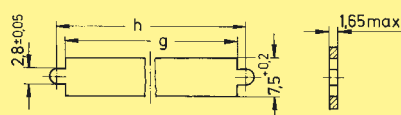
26, 50 contacts



20, 28, 68 contacts



Panel cut out



Dimensions in mm

Number of contacts

68–100



Female connectors, angled

Identification

No. of contacts

Part No.

Female connectors
with angled solder pins

68

60 02 068 51 . .

With female screw lock
Without female screw lock

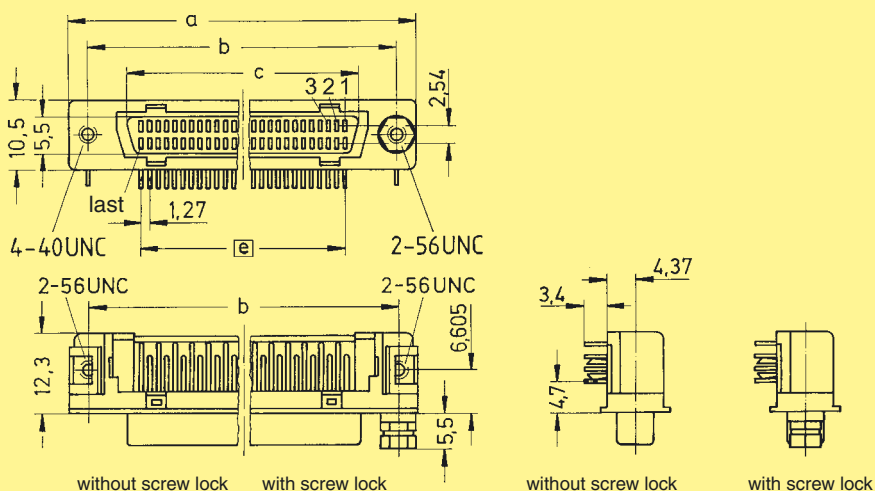
41
50

With female screw lock

100

60 02 100 5141

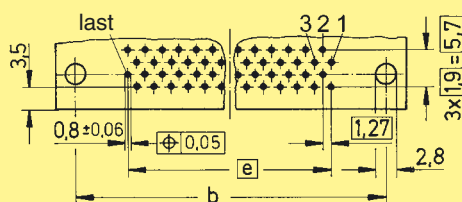
Dimensions



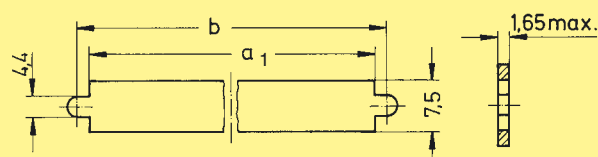
	a	b _{± 0.1}	c	e
68	63.88	57.91	46.08	33 x 1.27 = 41.91
100	84.20	78.23	66.40	49 x 1.27 = 62.33

Board drillings
(Components side)

68 contacts, 100 contacts



Panel cut out



	a ₁	b
68	54.22	57.91
100	74.53	78.23

Dimensions in mm

Number of contacts

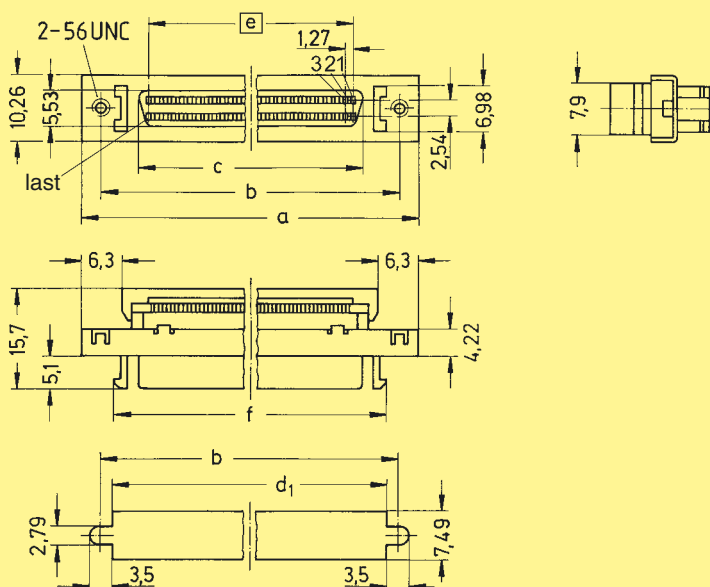
50–68



Female connectors for IDC flat cable, straight

Identification	No. of contacts	Part No.	
Female panel connectors with insulation displacement termination for IDC flat cable pitch 0.635 mm AWG 30		with latch system	with screw lock system
	50	60 04 050 5343	60 04 050 5344
	68	60 04 068 5343	60 04 068 5344

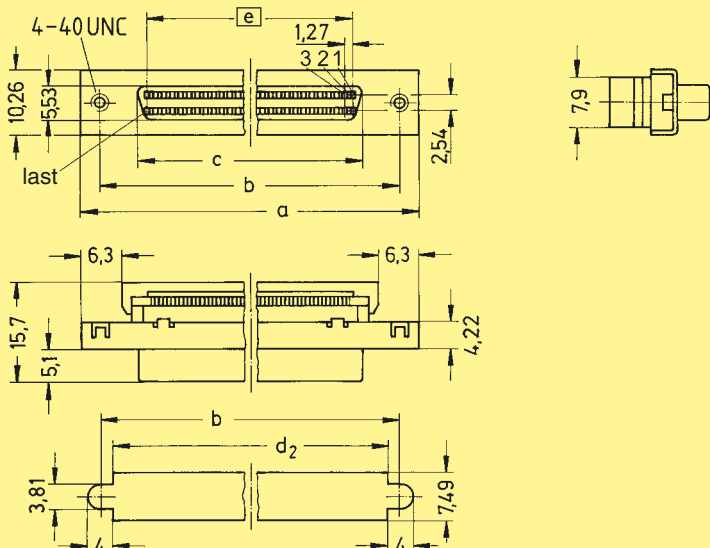
Dimensions for connectors with latch system



	a	b	c	d ₁	d ₂	e	f
50	52.45	46.48	34.70	42.80	42.30	30.48	42.30
68	63.88	57.91	46.13	54.23	53.72	41.91	53.72

Panel cut out

Dimensions for connectors with screw lock system



Panel cut out

Dimensions in mm

Number of contacts

20–100



Male connectors for IDC discrete wire, straight

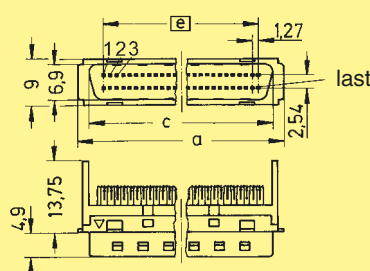
Identification	No. of contacts	Part No.
Male connectors with insulation displacement termination for discrete wire AWG 28/30		
	20	60 03 020 52 ..
	26	60 03 026 52 ..
	28	60 03 028 52 ..
	50	60 03 050 52 ..
	68	60 03 068 52 ..
	100	60 03 100 52 ..
Insulation diameter (mm)		
Ø = 0.50–0.65	00	
Ø = 0.65–0.80	10	
Ø = 0.80–0.88	20	

Available sizes

	Part No.	Ø	20	26	28	50	68	100
Male	60 03 ... 5200	0.50–0.65	●	●	●	●	●	
	60 03 ... 5210	0.65–0.80	●			●	●	●
	60 03 ... 5220	0.80–0.88	●	●	●	●	●	

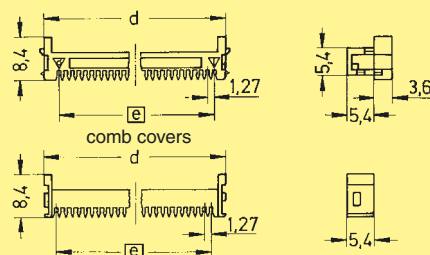
● = Available sizes

Dimensions



	a	c	d	e
20	21.25	17.00	16.75	11.43
26	25.06	20.81	20.56	15.24
28	26.33	22.08	21.83	16.51
50	40.30	36.05	35.80	30.48
68	51.73	47.48	47.23	41.91
100	72.05	67.80	67.55	62.23

Comb cover
(delivered with connectors)



Dimensions in mm



High quality contact surfaces require expertise and latest technological equipment.

Technology at HARTING preserves natural resources thus improving the environment

Number of contacts 20, 26, 28, 36, 50, 68, 80

Pitch 1.27 mm

Working current 1 A

Working voltage 240 V ~

Test voltage $U_{r.m.s.}$ 750 V

Contact resistance $\leq 40 \text{ m}\Omega$

Insulation resistance $\geq 10^3 \text{ M}\Omega$

Temperature range -55 °C ... + 105 °C

Terminations

Solder cup AWG 24
Insulation max. $\varnothing$ 1 mm

Solder pins Straight for pcb holes
min. $\varnothing$ 0.74 mm
Angled 90° for pcb holes
min. $\varnothing$ 0.74 mm

Insulation displacement AWG 28 to AWG 30
max. section: 0.089 mm²
min. section: 0.050 mm²
Insulation $\varnothing$ min. 0.50 mm
 $\varnothing$ max. 0.65 mm

Materials

Moulding Thermoplastic resin
glass-fibre filled UL 94-V0

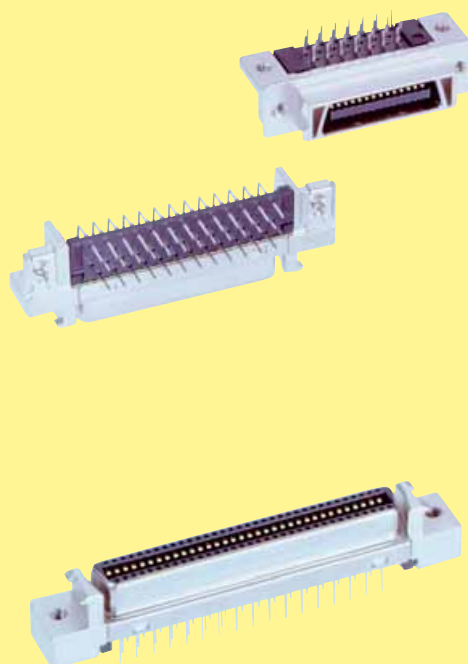
Contacts Copper alloy

Contact surface Selectively gold-plated

Metal shell Die cast zamac or stamped
steel, nickel-plated

Hoods Die cast zamac, nickel-plated

Thermoplastic resin
nickel-plated, steel insert



Number of contacts

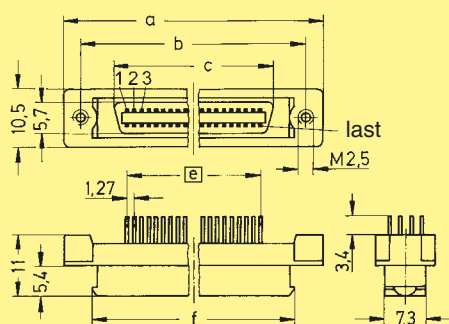
20–80



Male and female connectors, straight

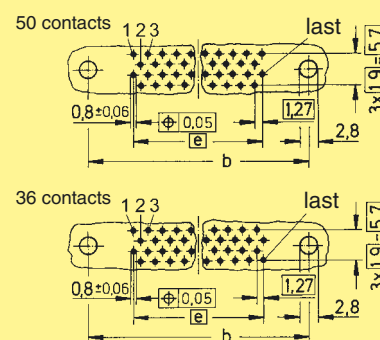
Identification	No. of contacts	Part No.	
Male and female connectors with straight solder pins		Male connector	Female connector
	20		60 11 020 5102
	26		60 11 026 5102
	36	60 11 036 5202	60 11 036 5102
	50	60 11 050 5202	60 11 050 5102
	68		60 11 068 5102
	80		60 11 080 5102

Dimensions for male connectors

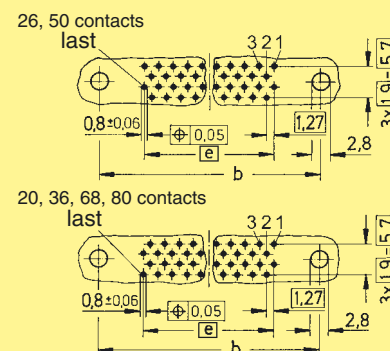
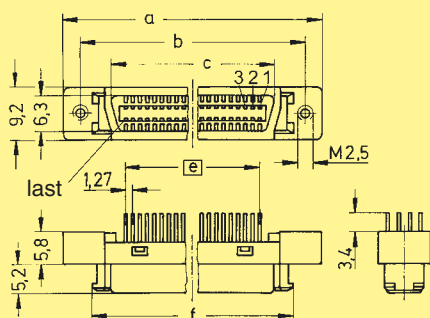


	a	b _{±0.1}	c	e	f	g	h
20	33.35	27.45	16.45	9 x 1.27 = 11.43	23.30	23.70	27.45
26	37.16	31.26	20.26	12 x 1.27 = 15.24	27.11	27.50	31.25
36	43.51	37.61	26.61	17 x 1.27 = 21.59	33.46	33.90	37.60
50	52.40	46.50	35.50	24 x 1.27 = 30.48	42.35	42.80	46.50
68	63.83	57.93	46.93	33 x 1.27 = 41.91	53.78	54.20	57.90
80	71.45	65.55	54.55	39 x 1.27 = 49.53	61.40	61.80	65.55

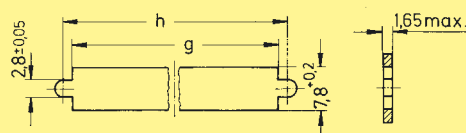
Board drillings



Dimensions for female connectors



Panel cut out



Dimensions in mm

har-mik

Number of contacts

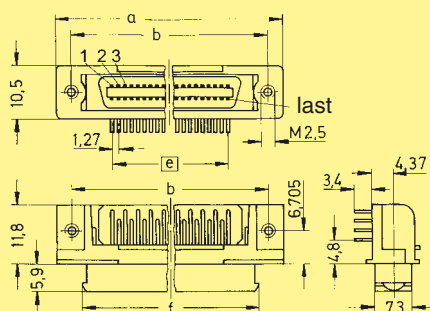
20–80



Male and female connectors, angled

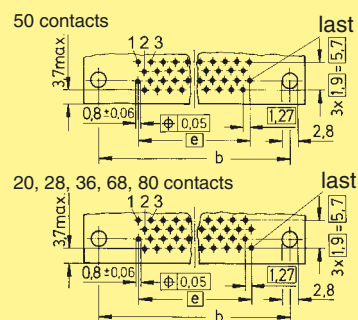
Identification	No. of contacts	Part No.
Male and female connectors with angled solder pins		Male connector
		Female connector
	20	60 11 020 5232
	26	60 11 026 51...
	28	60 11 028 5232
	36	60 11 036 5232
	50	60 11 050 5232
	68	60 11 068 5232
	80	60 11 080 5232
	Without board lock	32
	With board lock	40

Dimensions for male connectors

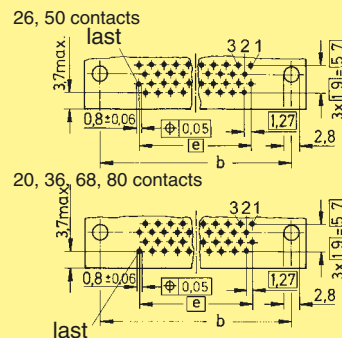
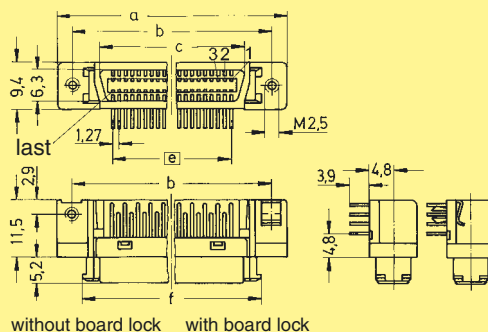


	a	b _{±0.1}	c	e	f	g	h
20	33.40	27.40	16.45	9 x 1.27 = 11.43	23.30	23.70	27.45
26	37.16	31.26	20.26	12 x 1.27 = 15.24	27.11	27.50	31.25
28	38.48	32.48	—	13 x 1.27 = 16.51	28.38	28.80	32.50
36	43.56	37.56	26.61	17 x 1.27 = 21.59	33.46	33.90	37.60
50	52.45	46.45	35.50	24 x 1.27 = 30.48	42.35	42.80	46.50
68	63.88	57.88	46.93	33 x 1.27 = 41.91	53.78	54.20	57.90
80	71.50	65.50	54.55	39 x 1.27 = 49.53	61.40	61.80	65.55

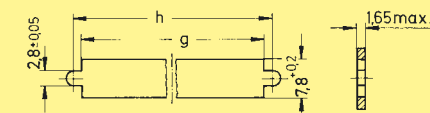
Board drillings



Dimensions for female connectors



Panel cut out



Dimensions in mm

Number of contacts

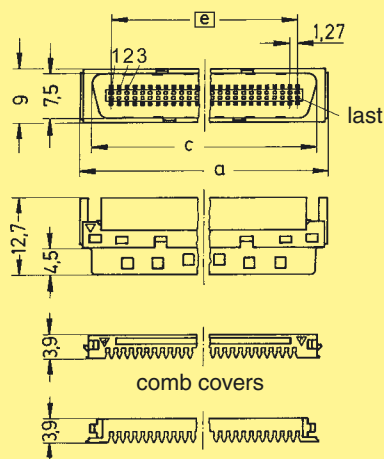
20–80



Male and female connectors for IDC discrete wire, straight

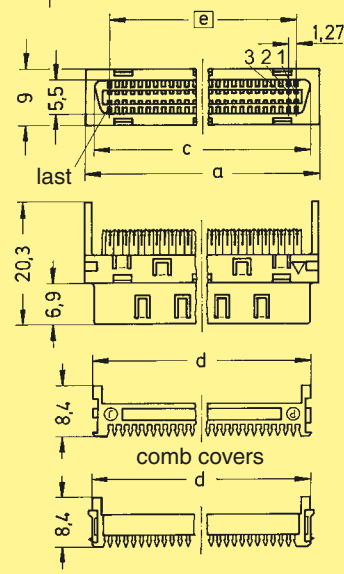
Identification	No. of contacts	Part No.	
Male and female connectors with insulation displacement termination for discrete wire AWG 28/30 Insulation diameter (mm) $\varnothing = 0.50\text{--}0.65$		Male connector	Female connector
	20	60 13 020 5200	60 13 020 5100
	26	60 13 026 5200	
	28		60 13 028 5100
	36	60 13 036 5200	60 13 036 5100
	50	60 13 050 5200	60 13 050 5100
	68	60 13 068 5200	60 13 068 5100
	80	60 13 080 5200	60 13 080 5100

Dimensions for male connectors



	a	c	e
20	21.24	17.55	11.43
26	25.05	21.36	15.24
36	31.40	27.71	21.59
50	40.29	36.60	30.48
68	51.72	48.03	41.91
80	59.34	55.65	49.53

Dimensions for female connectors



	a	c	d	e
20	19.25	16.25	16.75	11.43
28	24.33	21.33	21.83	16.51
36	29.41	26.41	26.91	21.59
50	38.30	35.30	35.80	30.48
68	49.73	46.73	47.23	41.91
80	57.35	54.35	54.85	49.53

Dimensions in mm

Number of contacts

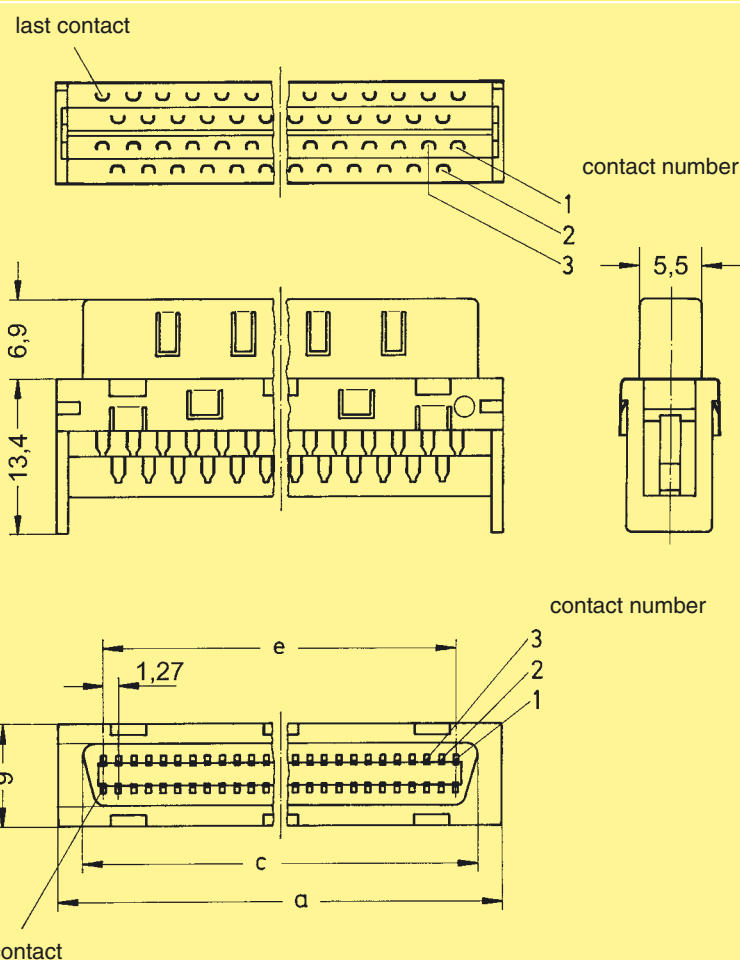
20–50



Female connectors, straight

Identification	No. of contacts	Part No.
Female connectors with solder cup AWG 24	20	60 13 020 5180
	28	60 13 028 5180
	36	60 13 036 5180
	50	60 13 050 5180

Dimensions



	a	c	e
20	19.25	16.25	11.43
28	24.33	21.33	16.51
36	29.41	26.41	21.59
50	38.30	35.30	30.48

Dimensions in mm

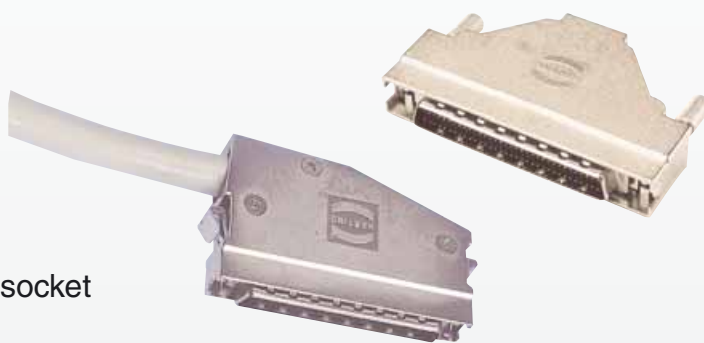


Metal hoods for male and female pin and socket and for female bellows connector

har-mik

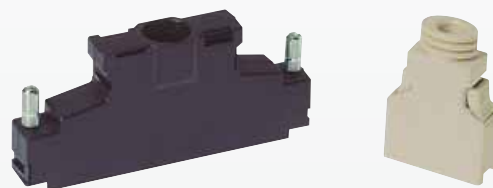
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																												
Metal hood Standard cable entry	28 36 50 68	60 03 028 0155 60 03 036 0155 60 03 050 0155 60 03 068 0155	<table><tr><td></td><td>a</td><td>b</td><td>c</td></tr><tr><td>28</td><td>34.03</td><td>26.23</td><td>6.50 x 6.00</td></tr><tr><td>36</td><td>39.11</td><td>31.31</td><td>9.50 x 8.00</td></tr><tr><td>50</td><td>48.00</td><td>40.20</td><td>8.50 x 7.00</td></tr><tr><td>68</td><td>59.43</td><td>51.63</td><td>9.00 x 8.00</td></tr></table>		a	b	c	28	34.03	26.23	6.50 x 6.00	36	39.11	31.31	9.50 x 8.00	50	48.00	40.20	8.50 x 7.00	68	59.43	51.63	9.00 x 8.00									
	a	b	c																													
28	34.03	26.23	6.50 x 6.00																													
36	39.11	31.31	9.50 x 8.00																													
50	48.00	40.20	8.50 x 7.00																													
68	59.43	51.63	9.00 x 8.00																													
Metal hood Large cable entry	20 26 28 36 50 68	60 03 020 0255 60 03 026 0255 60 03 028 0255 60 03 036 0255 60 03 050 0255 60 03 068 0255	<table><tr><td></td><td>a</td><td>b</td><td>c</td></tr><tr><td>20</td><td>28.95</td><td>21.15</td><td>8.00 x 8.50</td></tr><tr><td>26</td><td>32.76</td><td>24.96</td><td>8.00 x 6.75</td></tr><tr><td>28</td><td>34.03</td><td>26.23</td><td>8.50 x 7.20</td></tr><tr><td>36</td><td>39.11</td><td>31.31</td><td>9.00 x 10.00</td></tr><tr><td>50</td><td>48.00</td><td>40.20</td><td>9.00 x 10.00</td></tr><tr><td>68</td><td>59.43</td><td>51.63</td><td>9.00 x 10.00</td></tr></table>		a	b	c	20	28.95	21.15	8.00 x 8.50	26	32.76	24.96	8.00 x 6.75	28	34.03	26.23	8.50 x 7.20	36	39.11	31.31	9.00 x 10.00	50	48.00	40.20	9.00 x 10.00	68	59.43	51.63	9.00 x 10.00	
	a	b	c																													
20	28.95	21.15	8.00 x 8.50																													
26	32.76	24.96	8.00 x 6.75																													
28	34.03	26.23	8.50 x 7.20																													
36	39.11	31.31	9.00 x 10.00																													
50	48.00	40.20	9.00 x 10.00																													
68	59.43	51.63	9.00 x 10.00																													
Metal hood with polarization Large cable entry	80	60 03 080 0455	<table><tr><td></td><td>a</td><td>b</td><td>c</td></tr><tr><td>80</td><td>59.25</td><td>67.05</td><td>9.00 x 10.00</td></tr></table>		a	b	c	80	59.25	67.05	9.00 x 10.00																					
	a	b	c																													
80	59.25	67.05	9.00 x 10.00																													

For other size, please consult us.



Metal hoods for male and female pin and socket and for female bellows connector

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																													
Metal hood Cable side entry	20 26 50 68	60 03 020 0555 60 03 026 0555 60 03 050 0555 60 03 068 0555	<table><tr><th rowspan="2"></th><th colspan="2">Shell dimensions</th><th colspan="2">Cable dimensions</th></tr><tr><th>a</th><th>b</th><th>min.</th><th>max.</th></tr><tr><td>20</td><td>29.0</td><td>32.9</td><td>6.2</td><td>8.0</td></tr><tr><td>26</td><td>32.8</td><td>32.9</td><td>6.5</td><td>8.5</td></tr><tr><td>50</td><td>48.0</td><td>35.6</td><td>8.3</td><td>10.3</td></tr><tr><td>68</td><td>59.4</td><td>35.6</td><td>8.7</td><td>10.7</td></tr></table>		Shell dimensions		Cable dimensions		a	b	min.	max.	20	29.0	32.9	6.2	8.0	26	32.8	32.9	6.5	8.5	50	48.0	35.6	8.3	10.3	68	59.4	35.6	8.7	10.7	
	Shell dimensions		Cable dimensions																														
	a	b	min.	max.																													
20	29.0	32.9	6.2	8.0																													
26	32.8	32.9	6.5	8.5																													
50	48.0	35.6	8.3	10.3																													
68	59.4	35.6	8.7	10.7																													
Large cable side entry	68	60 03 068 0655	<table><tr><th rowspan="2"></th><th colspan="2">Shell dimensions</th><th colspan="2">Cable dimensions</th></tr><tr><th>a</th><th>b</th><th>min.</th><th>max.</th></tr><tr><td>68</td><td>59.4</td><td>35.6</td><td>10.0</td><td>12.0</td></tr></table>		Shell dimensions		Cable dimensions		a	b	min.	max.	68	59.4	35.6	10.0	12.0																
	Shell dimensions		Cable dimensions																														
	a	b	min.	max.																													
68	59.4	35.6	10.0	12.0																													
Metal hood Top cable entry	68	60 03 068 01 ...	<table><tr><th rowspan="2"></th><th colspan="2">Shell dimensions</th><th colspan="2">Cable dimensions</th></tr><tr><th>a</th><th>b</th><th>min.</th><th>max.</th></tr><tr><td>68</td><td>65.1</td><td>38.2</td><td>8.7</td><td>10.7</td></tr></table>		Shell dimensions		Cable dimensions		a	b	min.	max.	68	65.1	38.2	8.7	10.7																
	Shell dimensions		Cable dimensions																														
	a	b	min.	max.																													
68	65.1	38.2	8.7	10.7																													
With male jack screw 2-56 UNC	45																																
With male jack screw 4-40 UNC	47																																



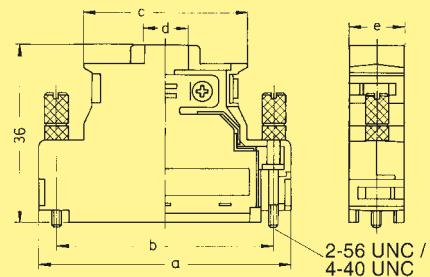
Plastic hood with internal metal screen

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

Plastic hood
with internal screen
for male and female pin and socket
range and
for female bellows range

50	60 03 050 01 ..
68	60 03 068 01 ..
100	60 03 100 01 ..

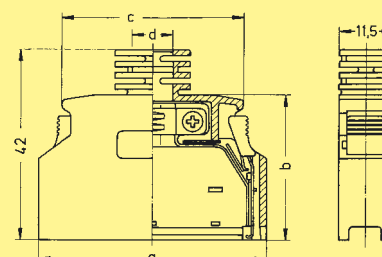
With male jack screw 2-56 UNC 43
With male jack screw 4-40 UNC 46



	a	b	c	d	e
50	54.00	46.48	35.00	10.50	12.00
68	65.41	57.91	38.40	14.00	12.00
100	85.73	78.23	42.00	13.00	12.00

Plastic hood
with internal screen
for male bellows range

20	60 13 020 0153
26	60 13 026 0153
36	60 13 036 0153
50	60 13 050 0153
68	60 13 068 0153
80	60 13 080 0153



	a	b	c	d
20	29.65	34.50	19.95	6.80
26	33.46	38.31	23.76	7.10
36	39.81	32.00	30.11	8.20
50	48.70	32.00	39.00	8.70
68	60.13	32.00	50.43	9.10
80	67.75	32.00	58.05	9.70



Female screw lock

Identification	Part No.	Drawing	Dimensions in mm
Screw lock Thread: M 2.5 / 2-56 UNC Height: 2.9 mm	60 01 000 9013		
Screw lock Thread: 4-40 UNC / 4-40 UNC Height: 3.99 mm	60 01 000 9018		
Screw lock Thread: 4-40 UNC / 2-56 UNC Height: 3.99 mm	60 01 000 9019		
Screw lock Thread: 4-40 UNC / 2-56 UNC Height: 5.5 mm	60 01 000 9020		
Screw lock Thread: 4-40 UNC / 4-40 UNC Height: 5.5 mm	60 01 000 9021		

for economical and reliable connections

A comprehensive range of high density intra cabinet connectors based on two mating design concepts:

- Blade and fork contact in the Pin/Socket range.
- Leaf contact in the Bellows range.

Available in a various number of contacts according to the following international standards and applications:

- Small Computer System Interface
SCSI-2
SCSI-2 wide
SCSI-3
- S Bus
IEEE 1496
- Internal Bus extension through
“Daisy chain” inter-linking via
0.635 mm pitch flat cable.
The 4-point design of the IDC
contact provides accurate and
reliable termination even with
teflon cable.

UL recognised

For customer specific applications we can design and manufacture solutions to match your requirement.

Sales department
HARTING components



Certified according to EN ISO 9001
in design/development, production,
installation and servicing

Pitch 1.27 mm

Working current

pcb connector 1 A
Flat cable connector 0,5 A

Working voltage

pcb connector 240 V ~
Flat cable connector 100 V ~

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

pcb connector 750 V
Flat cable connector 500 V

Contact resistance $\leq 25 \text{ m}\Omega$

Insulation resistance $\geq 10^3 \text{ M}\Omega$

Temperature range $-55 \text{ }^\circ\text{C} \dots +105 \text{ }^\circ\text{C}$

Terminations

Solder pins Straight for pcb holes
min. $\varnothing 0.74 \text{ mm}$
Angled 90° for pcb holes
min. $\varnothing 0.74 \text{ mm}$

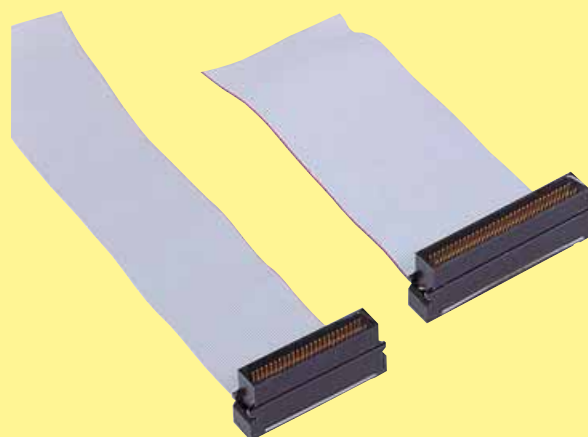
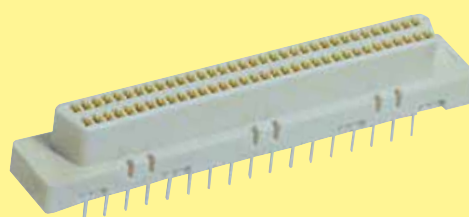
Insulation displacement Flat cable
AWG 30 pitch 0.635 mm

Materials

Moulding Thermoplastic resin
glass-fibre filled UL 94-V0

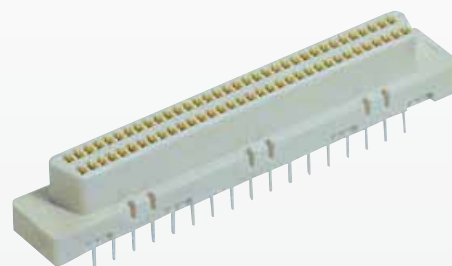
Contacts
pcb connector Copper alloy
Flat cable connector Beryllium copper

Contact surface Selectively gold-plated



Number of contacts

68

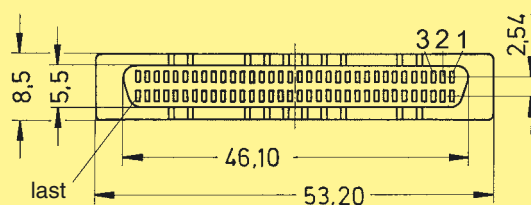
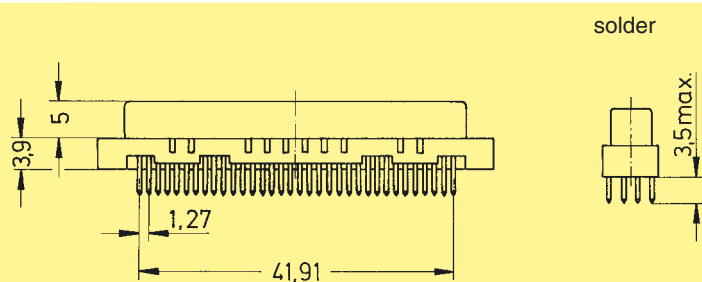


Female connectors, straight

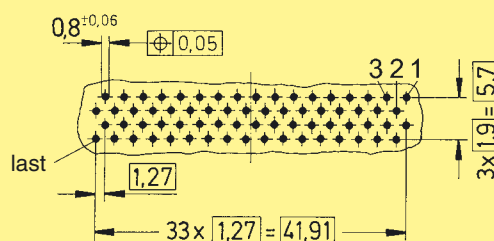
har-mik

Identification	No. of contacts	Part No.
Female connector with straight solder pins	68	60 05 068 5100

Dimensions



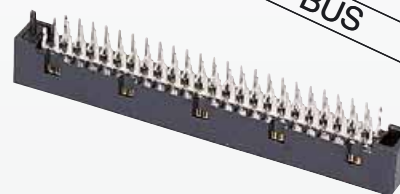
Board drillings
(Components side)



Dimensions in mm

Number of contacts

96



S-BUS

Male connector, straight

Identification

No. of contacts

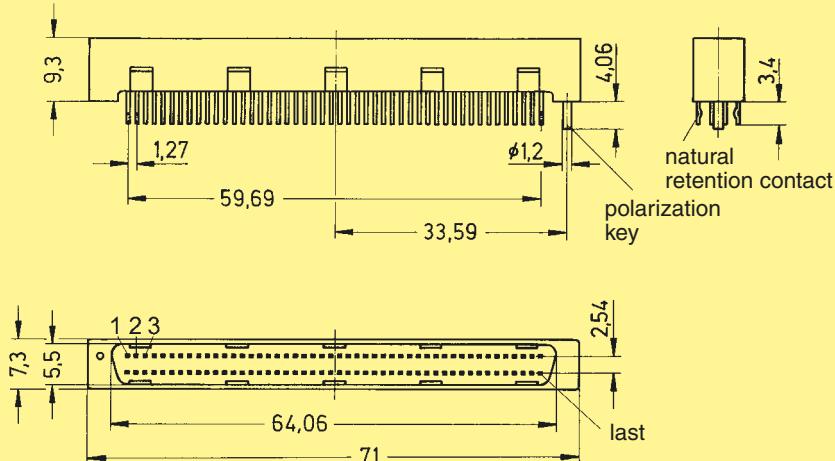
Part No.

Male connector straight with natural retention solder pins

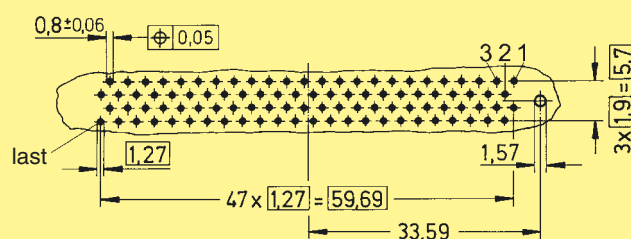
96

60 05 096 5218

Dimensions



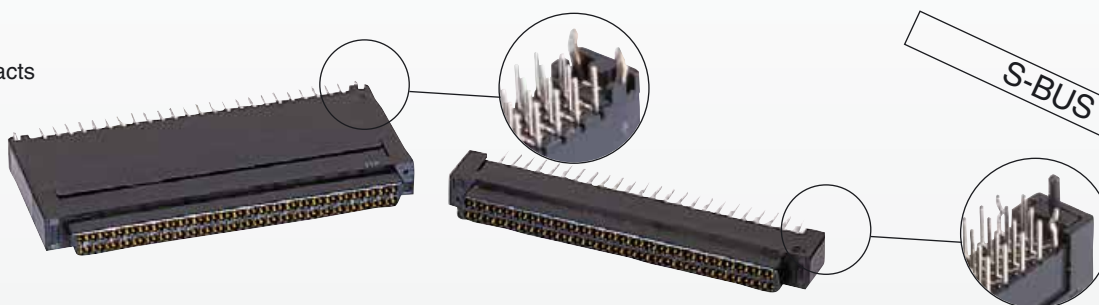
Board drillings
(Components side)



Dimensions in mm

Number of contacts

96

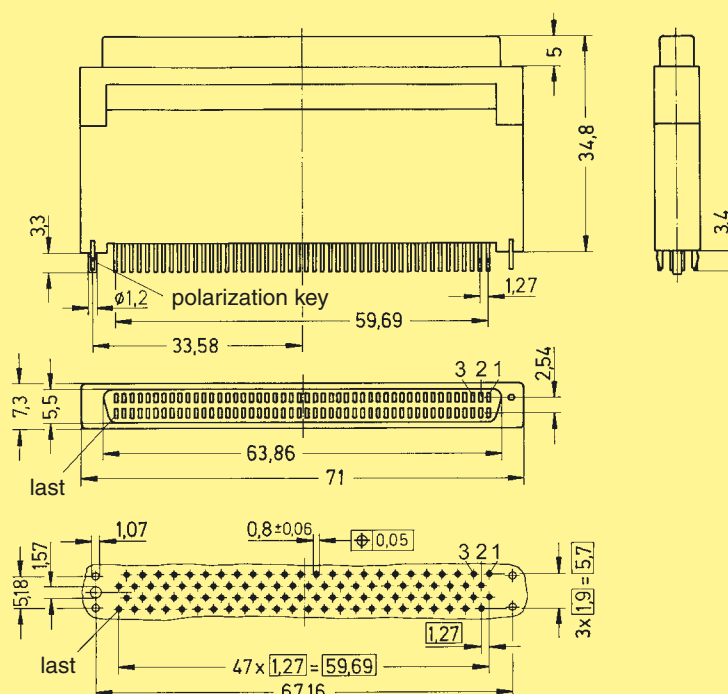


Female connectors, straight

Identification	No. of contacts	Part No.	
Female connectors with straight solder pins	96	34.80 mm high version	14.45 mm high version
		60 05 096 5121	60 05 096 5118

Dimensions

34.80 mm high version
with board lock



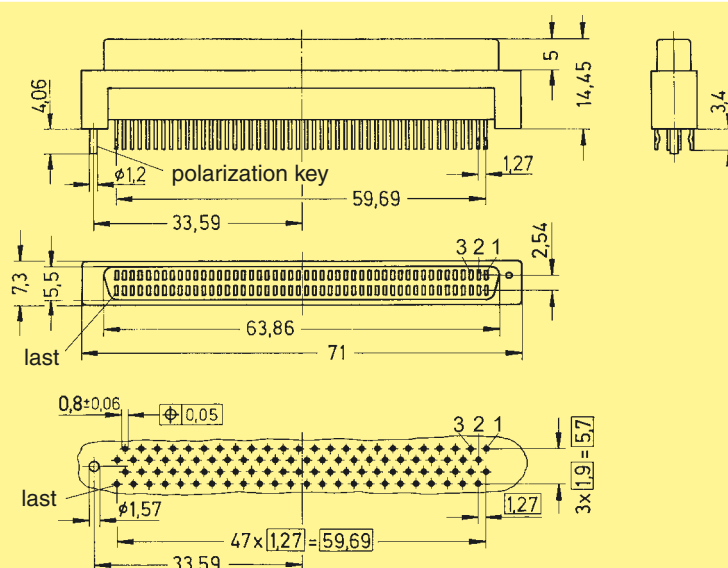
Dimensions in mm

Board drillings

(Components side)

Dimensions

14.45 mm high version
with natural retention pins



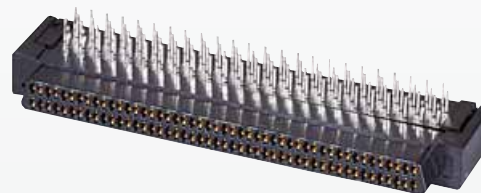
Dimensions in mm

Board drillings

(Components side)

Number of contacts

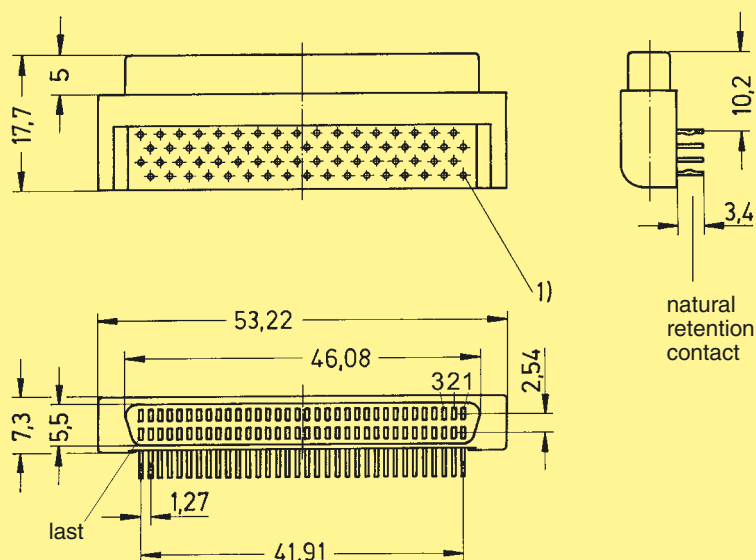
68



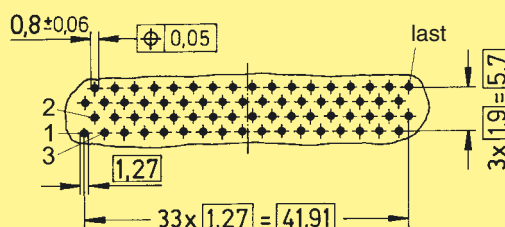
Female connector, angled

Identification	No. of contacts	Part No.
Female connector angled with natural retention solder pins	68	60 05 068 5143

Dimensions



Board drillings
(Components side)



Dimensions in mm

Number of contacts

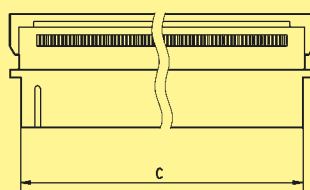
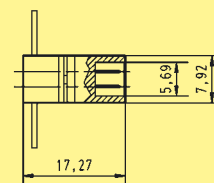
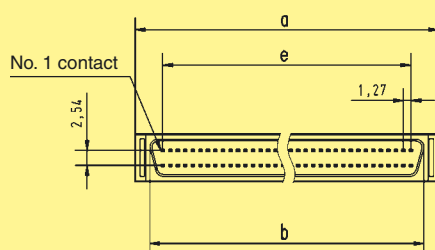
50–68



Male connectors for IDC flat cable, straight

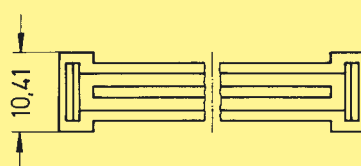
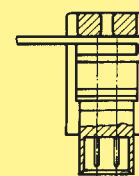
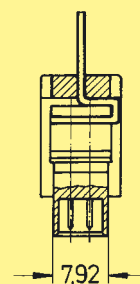
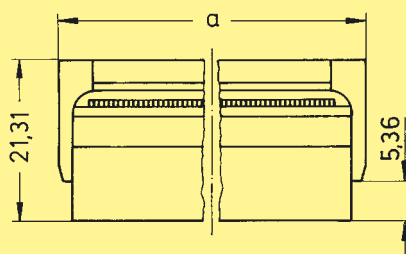
Identification	No. of contacts	Part No.	
Male connectors with insulation displacement termination for IDC flat cable pitch 0.635 mm AWG 30 Strain relief order separately		Male connector	Strain relief
	50 68	60 06 050 5440 60 06 068 5440	60 06 050 9001 60 06 068 9001

Dimensions



	a	b	c	e
50	39.75	34.85	36.19	30.48
68	51.26	46.28	47.62	41.91

Strain relief

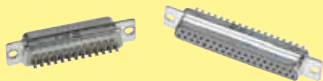


	a
50	39.83
68	53.44

Dimensions in mm

D-Sub – Standard subminiature D connectors, 2.54 mm pitch

Page

Technical characteristics for solder connectors		02.02
Versions with straight solder pins		02.04
Mounting details for angled solder connectors		02.08
Original Versions		02.10
Mounting height 7.3 mm 9-37 way 8.7 mm 50 way		
Standard Versions		02.12
Mounting height 7.3 mm 9-37 way 8.7 mm 50 way		
Low Profile Versions		02.18
Mounting height 3.6 mm 9-37 way 6.2 mm 50 way		
U.S. Footprint Versions		02.22
Mounting height 6.3 mm 9-37 way		
Mounting details		02.24
Technical characteristics for cable connectors		02.26
Versions with wrap posts		02.27
Versions with crimp terminal/crimp contacts		02.28
Versions with insulation displacement termination		02.32
Versions with solder buckets		02.34

Number of contacts 9, 15, 25, 37, 50
UL recognized

Working current

see current carrying capacity chart

Turned contacts 7.5 A max.
Stamped contacts 6.5 A max.

Test voltage $U_{r.m.s.}$ 1 kV

Clearance and creepage ≥ 1.0 mm

Contact resistance ≤ 10 m Ω
Insulation resistance $\geq 10^{10}$ Ω

Temperature range -55 °C ... + 125 °C
The higher temperature limit includes the local ambient and heating effect of the contacts under load

Terminations
a) Solder pins $\varnothing$ 0.6 mm for P.C.B. holes $\varnothing$ 0.8/1 mm
b) Solder pins, angled 90° $\varnothing$ 0.6 mm for P.C.B. holes $\varnothing$ 1 mm

Materials

Mouldings and hoods Thermoplastic resin, glass-fibre filled (PBTP), UL 94-V0

Contacts Copper alloy

Contact surface¹⁾
Contact zone: selectively gold-plated according to performance level¹⁾
Termination zone: SnPb

Metal shell Tinned steel

Insertion and withdrawal force

Connector on P.C.B.

Solder, straight with clips

– insertion max. per connector: 60 N
– withdrawal min. per connector: 10 N

Mating force

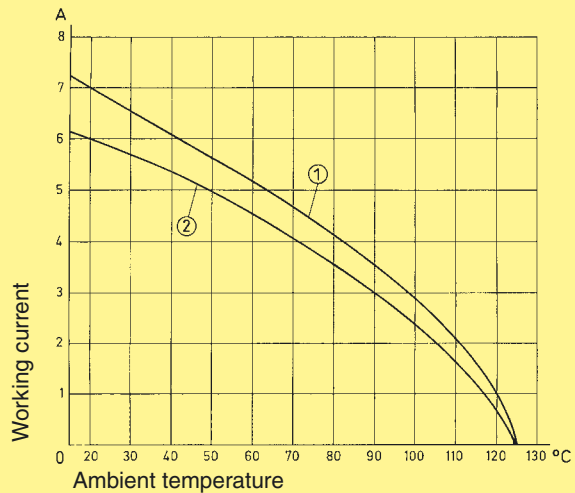
9 way ≤ 30 N
15 way ≤ 50 N
25 way ≤ 83 N
37 way ≤ 123 N
50 way ≤ 167 N

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.

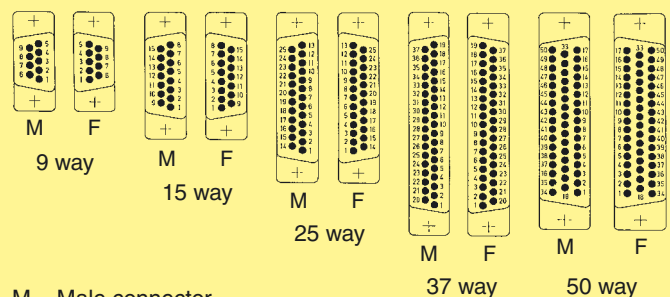
Control and test procedures according to DIN IEC 60 512.



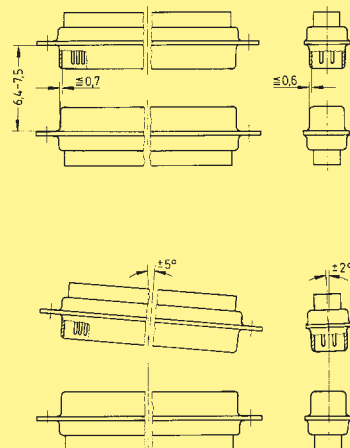
Example: 25 way connector

- ① Turned contacts
② Stamped contacts

Contact arrangement View from termination side



Mating conditions as per DIN 41 652



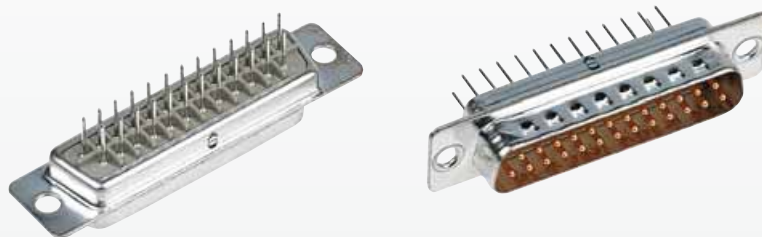
¹⁾ Performance level 3 as per DIN 41 652, part 2, ≥ 50 mating cycles, no gas test

Performance level 2 as per DIN 41 652, part 2, ≥ 200 mating cycles, 4 days gas test using 10 ppm SO₂

Other performance levels on request

Number of contacts

9–50

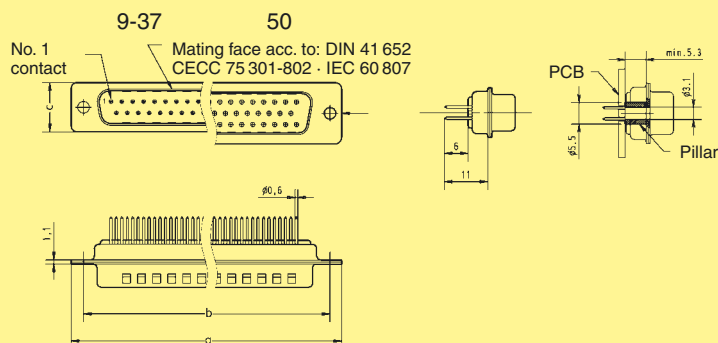


Turned solder pins, straight

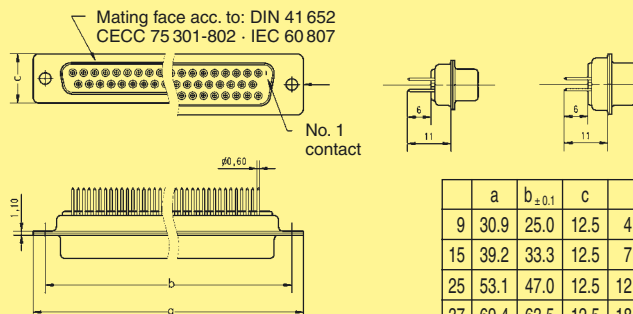
D-Sub - S

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples	9 15 25 37 50	09 67 009 5654 09 67 015 5654 09 67 025 5654 09 67 037 5654 09 67 050 5654 ¹⁾	09 67 009 5655 09 67 015 5655 09 67 025 5655 09 67 037 5655 09 67 050 5655 ¹⁾
Female connector tinned metal shell	9 15 25 37 50	09 67 009 4754 09 67 015 4754 09 67 025 4754 09 67 037 4754 09 67 050 4754 ¹⁾	09 67 009 4755 09 67 015 4755 09 67 025 4755 09 67 037 4755 09 67 050 4755 ¹⁾

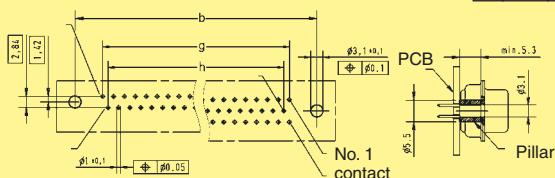
Male connector



Female connector



Board drillings



Dimensions in mm

¹⁾ Not normally kept in stock

Mating conditions see page 02.02

Number of contacts

9–50

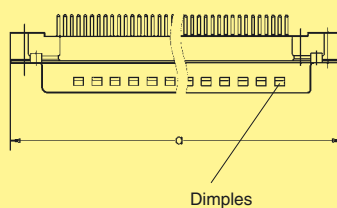
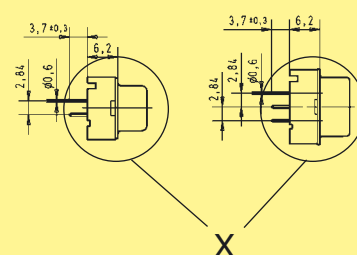
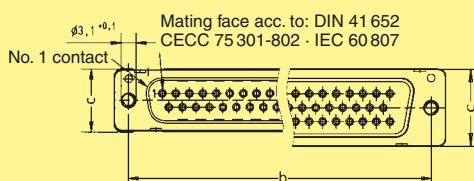


Turned solder pins, straight without grounding-pins

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples available on request	9 15 25 37 50	09 66 121 770 09 66 221 770 09 66 321 770 09 66 421 770 09 66 521 770	09 66 121 670 09 66 221 670 09 66 321 670 09 66 421 670 09 66 521 670
Please insert digit for flange thread or fitted female screw locks	M3 ▶ 1 4-40 UNC ▶ 2 fitted screw locks 4-40 UNC ▶ 3		

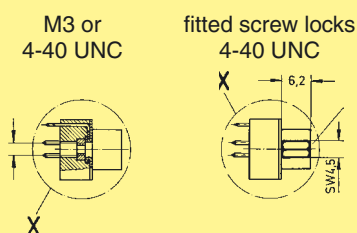
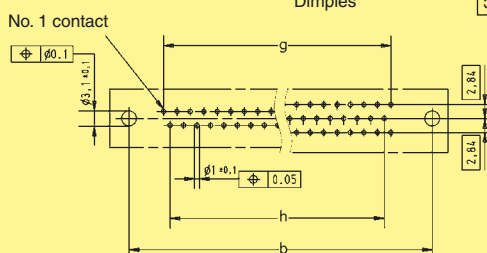
Male connector

9-37 50



	a	b _{±0.1}	c	g	h
9	30.9	25.0	12.9	4 x [2.74] = [10.96]	3 x [2.74] = [8.22]
15	39.2	33.3	12.9	7 x [2.74] = [19.18]	6 x [2.74] = [16.44]
25	53.1	47.0	12.9	12 x [2.76] = [33.12]	11 x [2.76] = [30.36]
37	69.4	63.5	12.9	18 x [2.76] = [49.68]	17 x [2.76] = [46.92]
50	67.0	61.1	15.7	16 x [2.76] = [44.16]	15 x [2.76] = [41.40]

Board drillings



Dimensions in mm

Mating conditions see page 02.02

Number of contacts

9–50



Stamped solder pins, straight with/without grounding board locks

D-Sub - S

Identification	No. of contacts	Part No.			
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3		Performance level 2	
Male connector tinned metal shell with dimples					
Without grounding board locks	9	09 65 121 770 .		09 65 121 670 .	
	15	09 65 221 770 .		09 65 221 670 .	
	25	09 65 321 770 .		09 65 321 670 .	
	37	09 65 421 770 .		09 65 421 670 .	
With grounding board locks	9	09 65 161 771 .		09 65 161 671 .	
	15	09 65 261 771 .		09 65 261 671 .	
	25	09 65 361 771 .		09 65 361 671 .	
	37	09 65 461 771 .		09 65 461 671 .	
Female connector tinned metal shell					
Without grounding board locks	9	09 66 111 750 .		09 66 111 650 .	
	15	09 66 211 750 .		09 66 211 650 .	
	25	09 66 311 750 .		09 66 311 650 .	
	37	09 66 411 750 .		09 66 411 650 .	
	50	09 66 511 750 .		09 66 511 650 .	
With grounding board locks	9	09 66 151 751 .		09 66 151 651 .	
	15	09 66 251 751 .		09 66 251 651 .	
	25	09 66 351 751 .		09 66 351 651 .	
	37	09 66 451 751 .		09 66 451 651 .	
Please insert digit for flange thread or fitted female screw locks					
Ø 3.1 mm hole ▶ 0 ¹⁾ M3 ▶ 1 4-40 UNC ▶ 2 fitted screw locks 4-40 UNC ▶ 3 ²⁾					

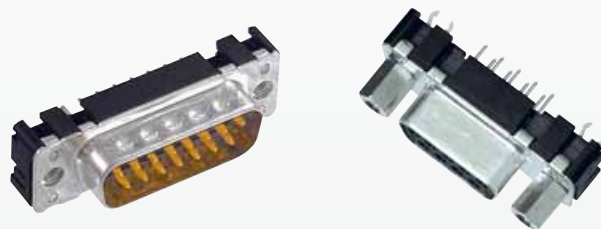
¹⁾ Option 0 is only available for male and female connectors without grounding board locks. Not normally kept in stock.

²⁾ Fitted screw locks 4-40 UNC not normally kept in stock for performance level 3

Connector dimensions see page 02.07. Mating conditions see page 02.02.

Number of contacts

9–50

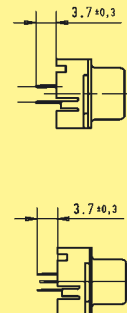
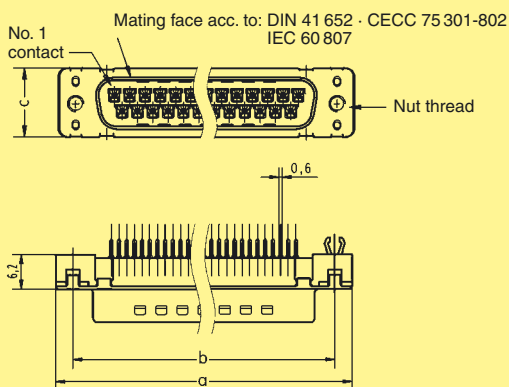
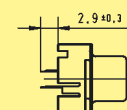
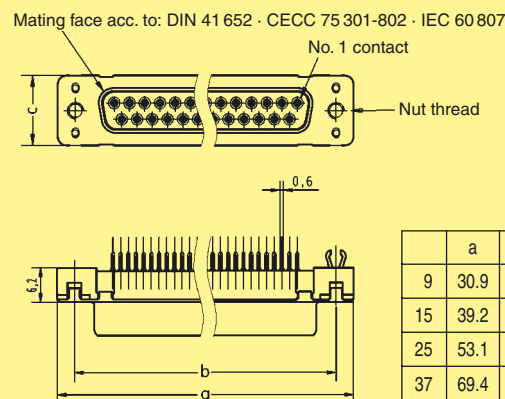


Stamped solder pins, straight with/without grounding board locks

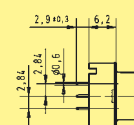
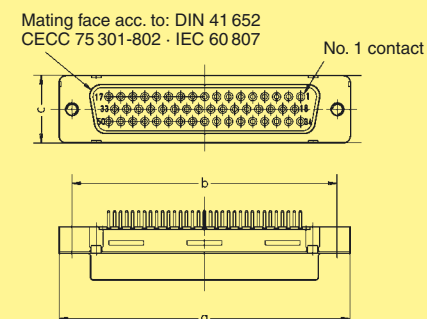
Identification

Drawing

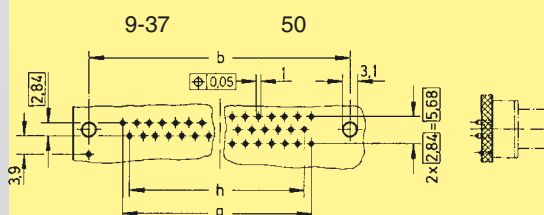
Dimensions in mm

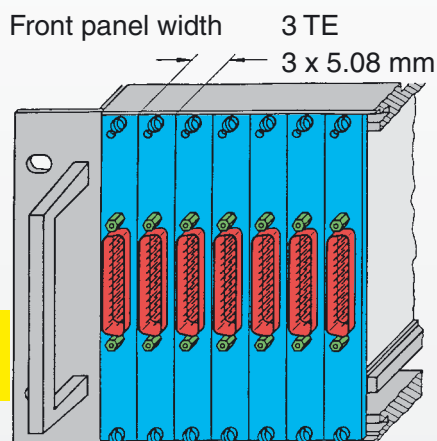
Male connector
9 – 37 contacts

Female connector
9 – 37 contacts


	a	b _{±0.1}	c	g	h
9	30.9	25.0	12.5	4 x 2.74 = 10.96	3 x 2.74 = 8.22
15	39.2	33.3	12.5	7 x 2.74 = 19.18	6 x 2.74 = 16.44
25	53.1	47.0	12.5	12 x 2.76 = 33.12	11 x 2.76 = 30.36
37	69.4	63.5	12.5	18 x 2.76 = 49.68	17 x 2.76 = 46.92
50	67.0	61.1	15.4	16 x 2.76 = 44.16	15 x 2.76 = 41.40

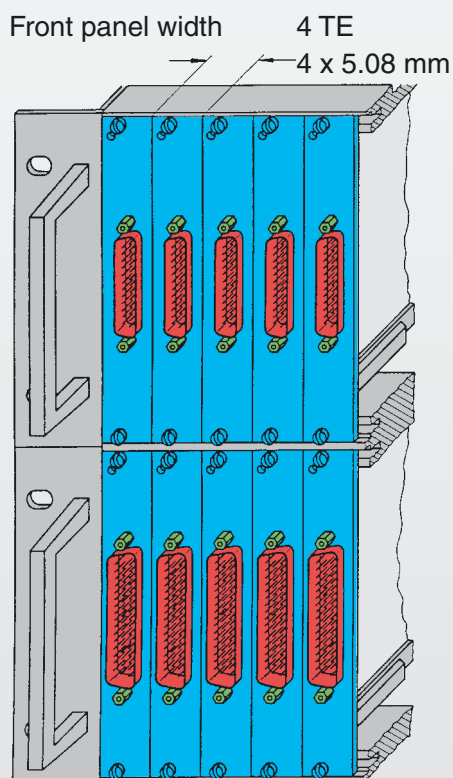
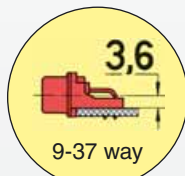
Female connector
50 contacts


Board drillings

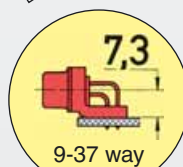




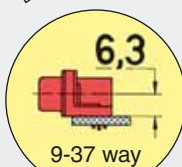
Low Profile Versions
pages 02.18 – 02.21



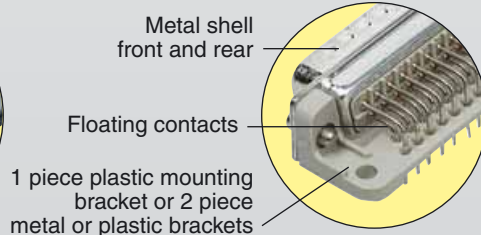
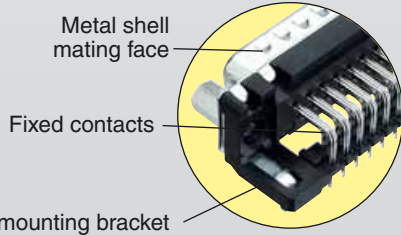
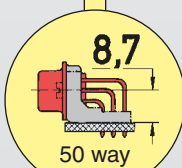
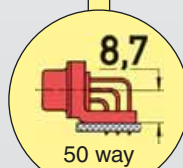
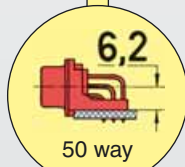
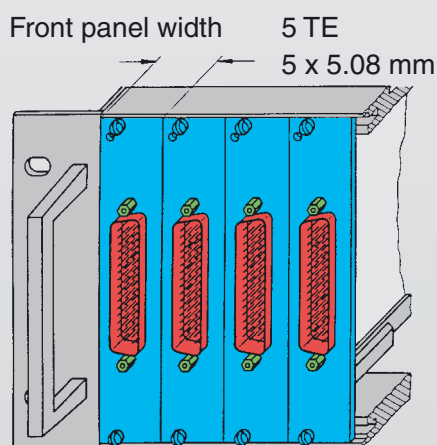
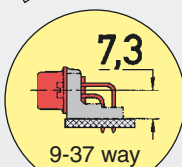
Standard Versions
pages 02.12 – 02.17



U.S. Footprint Versions
pages 02.22 – 02.23



Original Versions
pages 02.10 – 02.11



Advantages

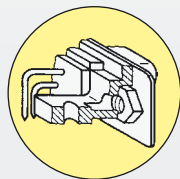
All-round protective metal shell

- Polarisation
- Contact protection
- Tin plated shell
- Male connector with dimples

Tinned terminations for increased solderability

Grounding contact riveted to metal shell

Integrated plastic mounting bracket



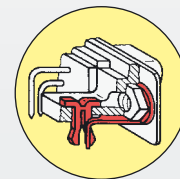
Mounting bracket

Contact surface finish to different performance levels

Panel

Different metal threads possible in flange area

- M 3
- 4-40 UNC
- fitted female screw locks 4-40 UNC
- max. torque ≤ 0.8 Nm



Mounting bracket with snap-in-clips and grounding pin

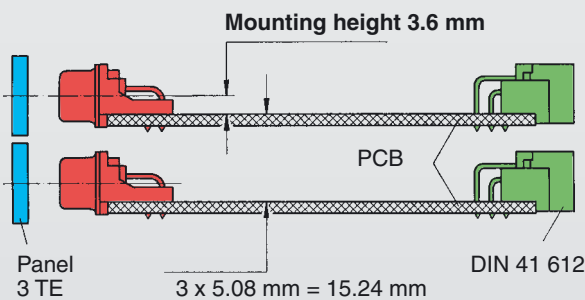
Mounting height

Low Profile Versions

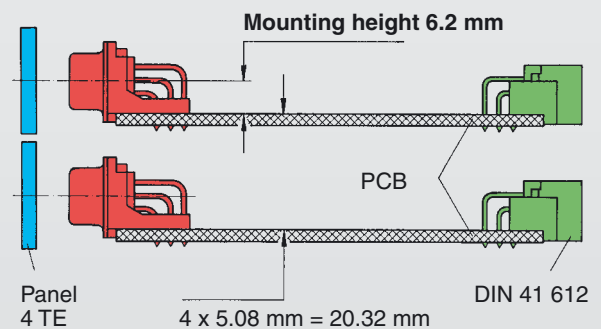
The reduced mounting height of these connectors allow them to be used on the same PCB as DIN 41 612 types

with no loss of packaging density when card frames to DIN 41 494 are used.

9-37 way connectors with 3.6 mm mounting height can be fitted to front panels of 3 TE (15.24 mm) width.



50 way connectors with 6.2 mm mounting height can be fitted to front panels of 4 TE (20.32 mm) width.

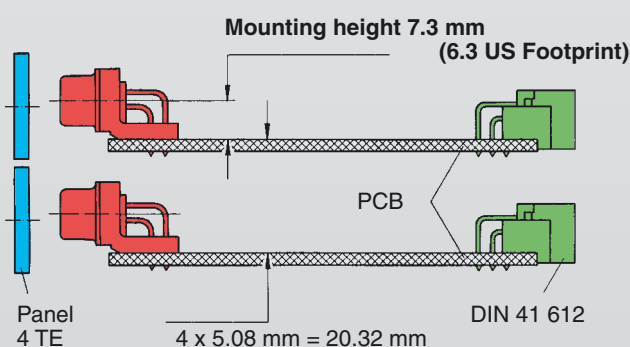


Standard Versions

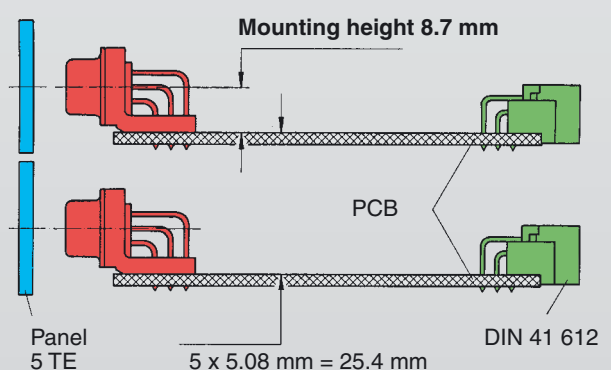
Original Versions

US Footprint

9-37 way connectors with 7.3 mm mounting height can be fitted to front panels of 4 TE (20.32 mm) width.



50 way connectors with 8.7 mm mounting height can be fitted to front panels of 5 TE (25.4 mm) width.



9-50



Original Versions

D-Sub - S

Identification	No. of contacts	Part No.																															
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level 2																														
Male connector tinned metal shell with dimples	9 15 25 37 50 9 15 25 37 50	2.84 mm pitch 09 67 009 5663 09 67 015 5663 09 67 025 5663 09 67 037 5663 09 67 050 5663 2.54 mm pitch 09 67 009 5657 ²⁾ 09 67 015 5657 ²⁾ 09 67 025 5657 ²⁾ 09 67 037 5657 ²⁾ 09 67 050 5657 ²⁾	2.84 mm pitch 09 67 009 5664 09 67 015 5664 09 67 025 5664 09 67 037 5664 09 67 050 5664 ²⁾ 2.54 mm pitch 09 67 009 5658 ²⁾ 09 67 015 5658 ²⁾ 09 67 025 5658 ²⁾ 09 67 037 5658 ²⁾ 09 67 050 5658 ²⁾																														
Female connector tinned metal shell	9 15 25 37 50 9 15 25 37 50	2.84 mm pitch 09 67 009 4763 09 67 015 4763 09 67 025 4763 09 67 037 4763 09 67 050 4763 2.54 mm pitch 09 67 009 4757 ²⁾ 09 67 015 4757 ²⁾ 09 67 025 4757 ²⁾ 09 67 037 4757 ²⁾ 09 67 050 4757 ²⁾	2.84 mm pitch 09 67 009 4764 09 67 015 4764 09 67 025 4764 09 67 037 4764 09 67 050 4764 ²⁾ 2.54 mm pitch 09 67 009 4758 ²⁾ 09 67 015 4758 ²⁾ 09 67 025 4758 ²⁾ 09 67 037 4758 ²⁾ 09 67 050 4758 ²⁾																														
Male connector	9-3750 <table><thead><tr><th></th><th>a</th><th>b ± 0.1</th><th>c</th><th>f</th></tr></thead><tbody><tr><td>9</td><td>30.9</td><td>25.0</td><td>12.5</td><td>2.74</td></tr><tr><td>15</td><td>39.2</td><td>33.3</td><td>12.5</td><td>2.74</td></tr><tr><td>25</td><td>53.1</td><td>47.0</td><td>12.5</td><td>2.76</td></tr><tr><td>37</td><td>69.4</td><td>63.5</td><td>12.5</td><td>2.76</td></tr><tr><td>50</td><td>67.0</td><td>61.1</td><td>15.4</td><td>2.76</td></tr></tbody></table>				a	b ± 0.1	c	f	9	30.9	25.0	12.5	2.74	15	39.2	33.3	12.5	2.74	25	53.1	47.0	12.5	2.76	37	69.4	63.5	12.5	2.76	50	67.0	61.1	15.4	2.76
	a	b ± 0.1	c	f																													
9	30.9	25.0	12.5	2.74																													
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37	69.4	63.5	12.5	2.76																													
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Female connector	9-3750 <table><thead><tr><th></th><th>a</th><th>b ± 0.1</th><th>c</th><th>f</th></tr></thead><tbody><tr><td>9</td><td>30.9</td><td>25.0</td><td>12.5</td><td>2.74</td></tr><tr><td>15</td><td>39.2</td><td>33.3</td><td>12.5</td><td>2.74</td></tr><tr><td>25</td><td>53.1</td><td>47.0</td><td>12.5</td><td>2.76</td></tr><tr><td>37</td><td>69.4</td><td>63.5</td><td>12.5</td><td>2.76</td></tr><tr><td>50</td><td>67.0</td><td>61.1</td><td>15.4</td><td>2.76</td></tr></tbody></table>				a	b ± 0.1	c	f	9	30.9	25.0	12.5	2.74	15	39.2	33.3	12.5	2.74	25	53.1	47.0	12.5	2.76	37	69.4	63.5	12.5	2.76	50	67.0	61.1	15.4	2.76
	a	b ± 0.1	c	f																													
9	30.9	25.0	12.5	2.74																													
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37	69.4	63.5	12.5	2.76																													
50	67.0	61.1	15.4	2.76																													

Dimensions in mm

Dimensions in mm

Mating conditions see page 02.02
Accessories see page 02.11
Board drillings see page 02.11



Accessories for turned solder pins, angled

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																																				
Mounting comb for alignment of floating angled solder pins	9-50	09 99 000 0097																																						
Fixing bracket Metal bracket	9-37 50	09 67 000 9910 ¹⁾ 09 67 000 9911 ¹⁾	<table><tr><td></td><td>a</td><td>b</td></tr><tr><td>9-37</td><td>10.8</td><td>6.5</td></tr><tr><td>50</td><td>12.2</td><td>8.0</td></tr></table>		a	b	9-37	10.8	6.5	50	12.2	8.0																												
	a	b																																						
9-37	10.8	6.5																																						
50	12.2	8.0																																						
Plastic bracket	9-50	09 67 000 9913 ¹⁾																																						
Mounting bracket for row separation 2.54/2.84 mm threaded flange M3	9 15 25 37 50	09 67 000 9935 09 67 000 9997 09 67 000 9998 09 67 000 9938 09 67 000 9939 ²⁾	<table><tr><td></td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr><tr><td>9</td><td>25.0</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.74</td></tr><tr><td>15</td><td>33.3</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.74</td></tr><tr><td>25</td><td>47.0</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.76</td></tr><tr><td>37</td><td>63.5</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.76</td></tr><tr><td>50</td><td>61.1</td><td>13.5</td><td>8.7^{-0.2}</td><td>17.0</td><td>2.76</td></tr></table>		b	c	d	e	f	9	25.0	12.0	7.3 ^{+0.2}	14.7	2.74	15	33.3	12.0	7.3 ^{+0.2}	14.7	2.74	25	47.0	12.0	7.3 ^{+0.2}	14.7	2.76	37	63.5	12.0	7.3 ^{+0.2}	14.7	2.76	50	61.1	13.5	8.7 ^{-0.2}	17.0	2.76	
	b	c	d	e	f																																			
9	25.0	12.0	7.3 ^{+0.2}	14.7	2.74																																			
15	33.3	12.0	7.3 ^{+0.2}	14.7	2.74																																			
25	47.0	12.0	7.3 ^{+0.2}	14.7	2.76																																			
37	63.5	12.0	7.3 ^{+0.2}	14.7	2.76																																			
50	61.1	13.5	8.7 ^{-0.2}	17.0	2.76																																			
threaded flange 4-40 UNC	9 15 25 37 50	09 67 000 9987 09 67 000 9988 09 67 000 9989 09 67 000 9990 09 67 000 9991 ²⁾	<table><tr><td></td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr><tr><td>9</td><td>25.0</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.74</td></tr><tr><td>15</td><td>33.3</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.74</td></tr><tr><td>25</td><td>47.0</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.76</td></tr><tr><td>37</td><td>63.5</td><td>12.0</td><td>7.3^{+0.2}</td><td>14.7</td><td>2.76</td></tr><tr><td>50</td><td>61.1</td><td>13.5</td><td>8.7^{-0.2}</td><td>17.0</td><td>2.76</td></tr></table>		b	c	d	e	f	9	25.0	12.0	7.3 ^{+0.2}	14.7	2.74	15	33.3	12.0	7.3 ^{+0.2}	14.7	2.74	25	47.0	12.0	7.3 ^{+0.2}	14.7	2.76	37	63.5	12.0	7.3 ^{+0.2}	14.7	2.76	50	61.1	13.5	8.7 ^{-0.2}	17.0	2.76	
	b	c	d	e	f																																			
9	25.0	12.0	7.3 ^{+0.2}	14.7	2.74																																			
15	33.3	12.0	7.3 ^{+0.2}	14.7	2.74																																			
25	47.0	12.0	7.3 ^{+0.2}	14.7	2.76																																			
37	63.5	12.0	7.3 ^{+0.2}	14.7	2.76																																			
50	61.1	13.5	8.7 ^{-0.2}	17.0	2.76																																			
Board drillings angled solder pins	9-37 50	<table><tr><td></td><td>b</td><td>g</td><td>h</td></tr><tr><td>9</td><td>25.0</td><td>4 x 2.74 = 10.96</td><td>3 x 2.74 = 8.22</td></tr><tr><td>15</td><td>33.3</td><td>7 x 2.74 = 19.18</td><td>6 x 2.74 = 16.44</td></tr><tr><td>25</td><td>47.0</td><td>12 x 2.76 = 33.12</td><td>11 x 2.76 = 30.36</td></tr><tr><td>37</td><td>63.5</td><td>18 x 2.76 = 49.68</td><td>17 x 2.76 = 46.92</td></tr></table> <table><tr><td></td><td>f</td></tr><tr><td>09 67 000 9911</td><td>13.20</td></tr><tr><td>09 67 000 9913</td><td>13.20</td></tr><tr><td>Mounting bracket</td><td>12.95</td></tr></table>		b	g	h	9	25.0	4 x 2.74 = 10.96	3 x 2.74 = 8.22	15	33.3	7 x 2.74 = 19.18	6 x 2.74 = 16.44	25	47.0	12 x 2.76 = 33.12	11 x 2.76 = 30.36	37	63.5	18 x 2.76 = 49.68	17 x 2.76 = 46.92		f	09 67 000 9911	13.20	09 67 000 9913	13.20	Mounting bracket	12.95										
	b	g	h																																					
9	25.0	4 x 2.74 = 10.96	3 x 2.74 = 8.22																																					
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	f																																							
09 67 000 9911	13.20																																							
09 67 000 9913	13.20																																							
Mounting bracket	12.95																																							

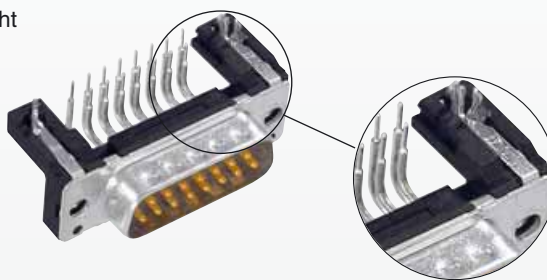
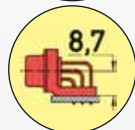
¹⁾ order 2 per connector
²⁾ only row separation 2.54 mm

³⁾ for 2.54/2.84 mm row separation
⁴⁾ Not in conjunction with mounting bracket

Number of contacts

Mounting height

9–37
50



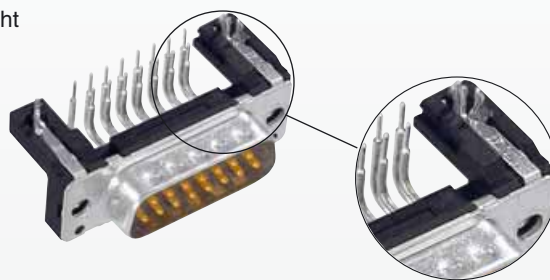
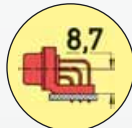
Turned solder pins, angled with/without snap-in-clips and grounding board locks

D-Sub - S

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples		2.84 mm pitch	2.84 mm pitch
With snap-in clips and grounding board locks	9	09 66 163 781	09 66 163 681
	15	09 66 263 781	09 66 263 681
	25	09 66 363 781	09 66 363 681
	37	09 66 463 781	09 66 463 681
	50	09 66 563 781	09 66 563 681
		2.54 mm pitch	2.54 mm pitch
	9	09 66 162 781	09 66 162 681
	15	09 66 262 781	09 66 262 681
	25	09 66 362 781	09 66 362 681
	37	09 66 462 781	09 66 462 681
	50	09 66 562 781	09 66 562 681
Without snap-in clips and grounding board locks	9	09 66 123 780	09 66 123 680
	15	09 66 223 780	09 66 223 680
	25	09 66 323 780	09 66 323 680
	37	09 66 423 780	09 66 423 680
	50	09 66 523 780	09 66 523 680
		2.54 mm pitch	2.54 mm pitch
	9	09 66 122 780	09 66 122 680
	15	09 66 222 780	09 66 222 680
	25	09 66 322 780	09 66 322 680
	37	09 66 422 780	09 66 422 680
	50	09 66 522 780	09 66 522 680
Please insert digit for flange thread or fitted female screw locks			
M3 ▶	1		
4-40 UNC ▶	2		
fitted screw locks 4-40 UNC ▶	3		

Number of contacts

Mounting height

9-37
50


Turned solder pins, angled with/without snap-in-clips and grounding board locks

Identification

Drawing

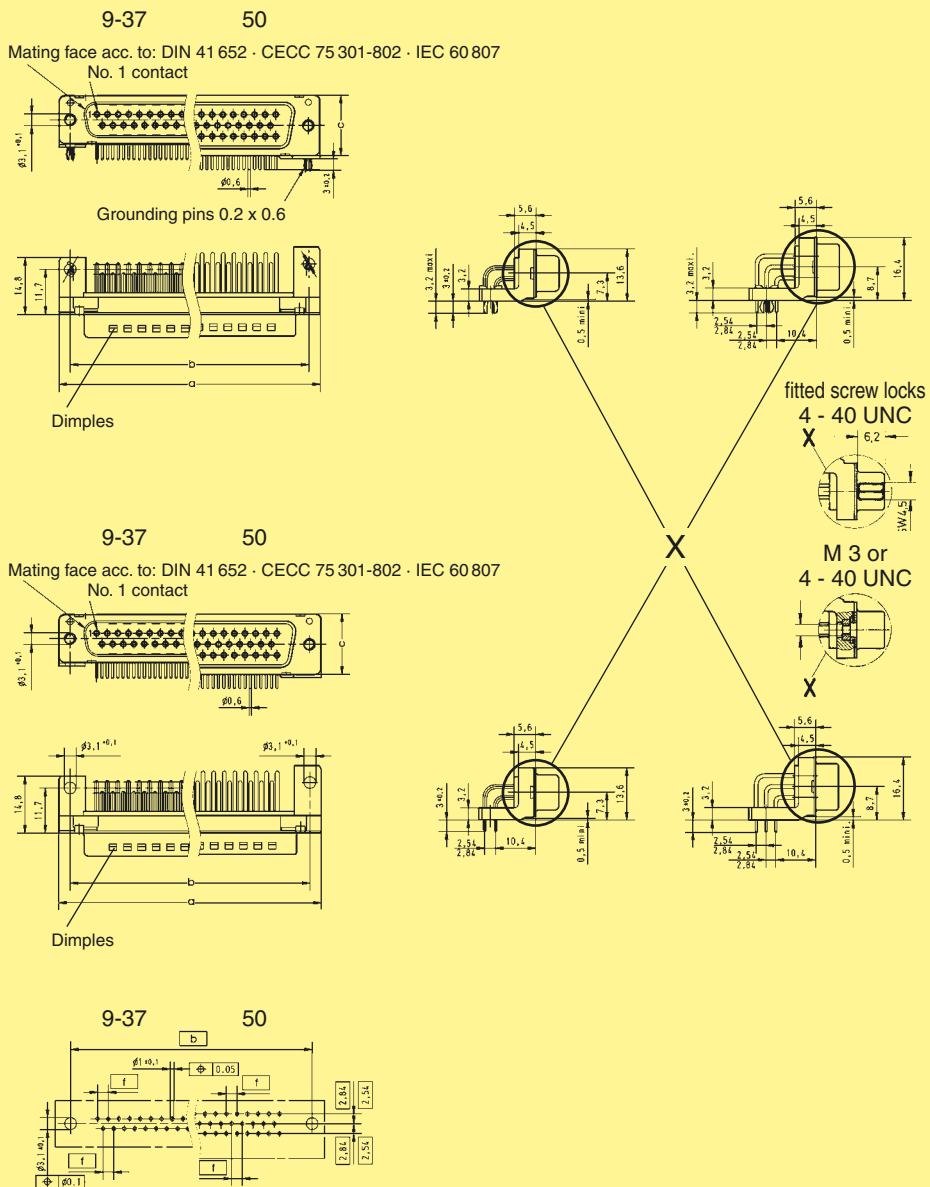
Dimensions in mm

Male connector

With snap-in clips
and grounding board locks

Without snap-in clips
and grounding board locks

Board drillings

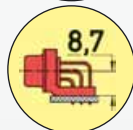


	a	b ± 0.1	c	f
9	30.90	25.00	12.90	2.74
15	39.20	33.30	12.90	2.74
25	53.10	47.00	12.90	2.76
37	69.40	63.50	12.90	2.76
50	67.00	61.10	15.70	2.76

Number of contacts

Mounting height

9–37
50



Standard Versions

Stamped solder pins, angled with grounding board locks

D-Sub - S

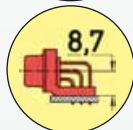
Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples		2.84 mm pitch	2.84 mm pitch
	9	09 65 163 781 . 1)	09 65 163 681 . 1)
	15	09 65 263 781 . 1)	09 65 263 681 . 1)
	25	09 65 363 781 . 1)	09 65 363 681 . 1)
	37	09 65 463 781 . 1)	09 65 463 681 . 1)
		2.54 mm pitch	2.54 mm pitch
	9	09 65 162 781 .	09 65 162 681 .
	15	09 65 262 781 .	09 65 262 681 .
	25	09 65 362 781 .	09 65 362 681 .
	37	09 65 462 781 .	09 65 462 681 .
Female connector tinned metal shell		2.84 mm pitch	2.84 mm pitch
	9	09 66 153 761 . 1)	09 66 153 661 . 1)
	15	09 66 253 761 . 1)	09 66 253 661 . 1)
	25	09 66 353 761 . 1)	09 66 353 661 . 1)
	37	09 66 453 761 . 1)	09 66 453 661 . 1)
	50	09 66 553 761 . 1)	09 66 553 661 . 1)
		2.54 mm pitch	2.54 mm pitch
	9	09 66 152 761 .	09 66 152 661 .
	15	09 66 252 761 .	09 66 252 661 .
	25	09 66 352 761 .	09 66 352 661 .
	37	09 66 452 761 .	09 66 452 661 .
	50	09 66 552 761 . 1)	09 66 552 661 . 1)
Please insert digit for flange thread or fitted female screw locks			
Ø 3.1 mm hole ▶ 0 ¹⁾ M3 ▶ 1 4-40 UNC ▶ 2 fitted screw locks 4-40 UNC ▶ 3			

¹⁾ Not normally kept in stock

Number of contacts

Mounting height

9–37
50



Standard Versions

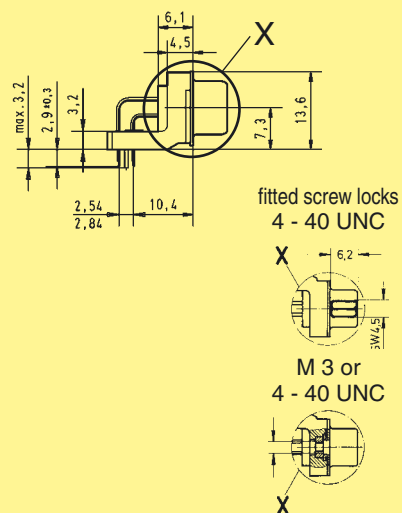
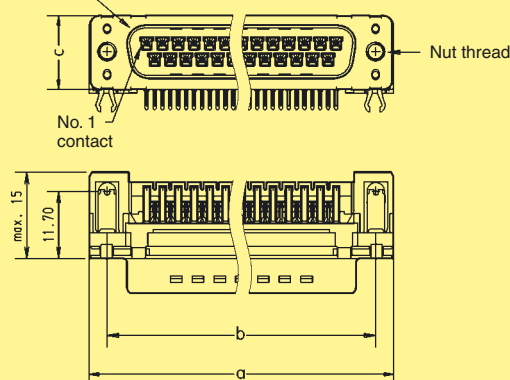
Stamped solder pins, angled with grounding board locks

Identification

Drawing

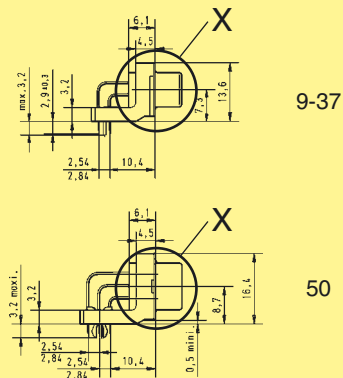
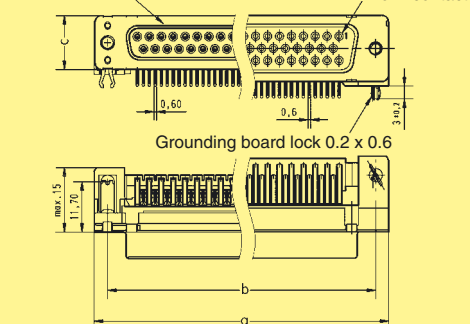
Dimensions in mm

Male connector

Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807


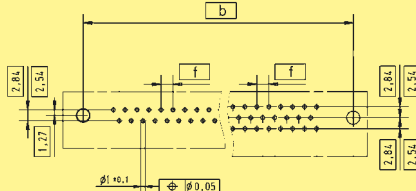
Female connector

9-37 50

Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807


Board drillings

9-37 50

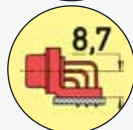


	a	b ± 0.1	c	f
9	30.90	25.00	12.50	2.74
15	39.20	33.30	12.50	2.74
25	53.10	47.00	12.50	2.76
37	69.40	63.50	12.50	2.76
50	67.00	61.10	15.40	2.76

Number of contacts

Mounting height

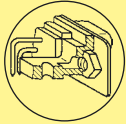
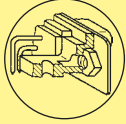
9–37
50



Standard Versions

Stamped solder pins, angled without grounding board locks

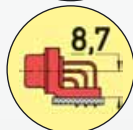
D-Sub - S

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples 	9 15 25 37	2.84 mm pitch 09 65 123 780 09 65 223 780 09 65 323 780 09 65 423 780	2.84 mm pitch 09 65 123 680 09 65 223 680 09 65 323 680 09 65 423 680
	9 15 25 37	2.54 mm pitch 09 65 122 780 09 65 222 780 09 65 322 780 09 65 422 780	2.54 mm pitch 09 65 122 680 09 65 222 680 09 65 322 680 09 65 422 680
Female connector tinned metal shell 	9 15 25 37 50	2.84 mm pitch 09 66 113 760 ¹⁾ 09 66 213 760 ¹⁾ 09 66 313 760 ¹⁾ 09 66 413 760 ¹⁾ 09 66 513 760 ¹⁾	2.84 mm pitch 09 66 113 660 ¹⁾ 09 66 213 660 ¹⁾ 09 66 313 660 ¹⁾ 09 66 413 660 ¹⁾ 09 66 513 660 ¹⁾
	9 15 25 37 50	2.54 mm pitch 09 66 112 760 09 66 212 760 09 66 312 760 09 66 412 760 09 66 512 760 ¹⁾	2.54 mm pitch 09 66 112 660 09 66 212 660 09 66 312 660 09 66 412 660 09 66 512 660 ¹⁾
Please insert digit for flange thread or fitted female screw locks Ø 3.1 mm hole ▶ 0 ¹⁾ M3 ▶ 1 4-40 UNC ▶ 2 fitted screw locks 4-40 UNC ▶ 3			

Number of contacts

Mounting height

9–37
50



Standard Versions

Stamped solder pins, angled without grounding board locks

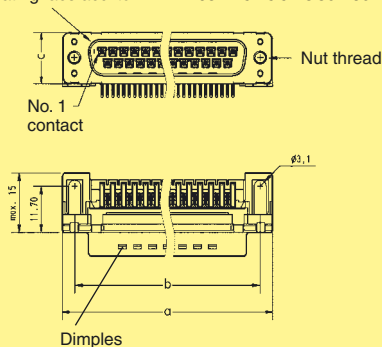
Identification

Drawing

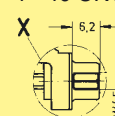
Dimensions in mm

Male connector

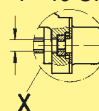
Mating face acc. to: DIN 41 652 · CECC 75 301-802 · IEC 60 807



fitted screw locks
4 - 40 UNC



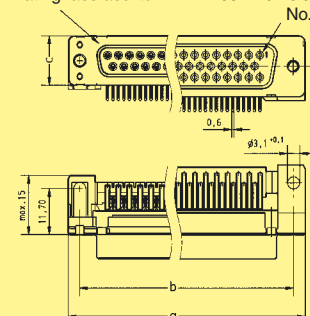
M 3 or
4 - 40 UNC



Female connector

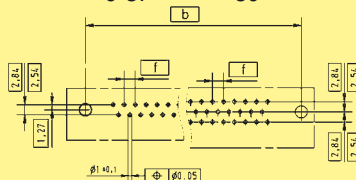
9-37 50

Mating face acc. to: DIN 41 652 · CECC 75 301-802 · IEC 60 807



Board drillings

9-37 50

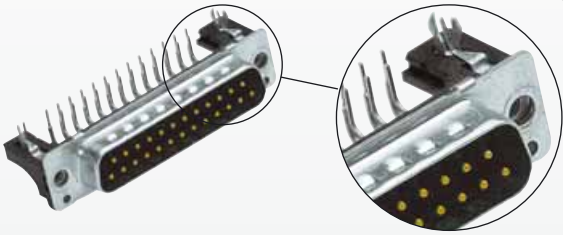
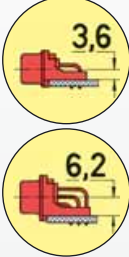


	a	b ± 0.1	c	f
9	30.90	25.00	12.50	2.74
15	39.20	33.30	12.50	2.74
25	53.10	47.00	12.50	2.76
37	69.40	63.50	12.50	2.76
50	67.00	61.10	15.40	2.76

Number of contacts

9–37
50

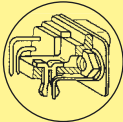
Mounting height



Low Profile Versions

Turned solder pins, angled with snap-in-clips and grounding board locks

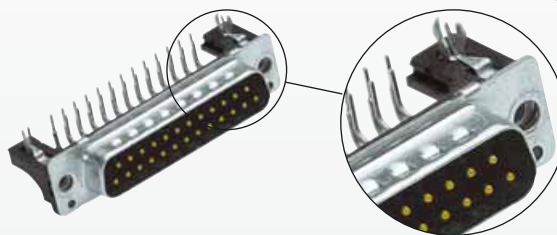
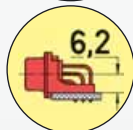
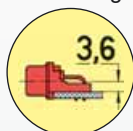
D-Sub - S

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples			
		2.54 mm pitch	2.54 mm pitch
	9	09 66 162 781 .	09 66 162 681 .
	15	09 66 262 781 .	09 66 262 681 .
	25	09 66 362 781 .	09 66 362 681 .
	37	09 66 462 781 .	09 66 462 681 .
	50	09 66 562 781 .	09 66 562 681 .
Please insert digit for flange thread or fitted female screw locks			
M3 ▶	5		
4-40 UNC ▶	6		
fitted screw locks 4-40 UNC ▶	7		

Number of contacts

Mounting height

9-37
50



Low Profile Versions

Turned solder pins, angled with snap-in-clips and grounding board locks

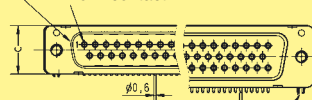
Identification

Drawing

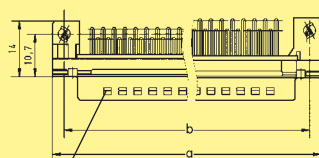
Dimensions in mm

Male connector

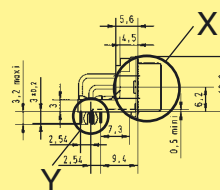
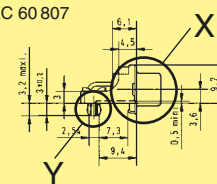
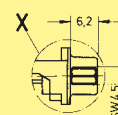
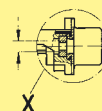
9-37 50
Mating face acc. to: DIN 41 652 · CECC 75 301-802 · IEC 60 807
No. 1 contact



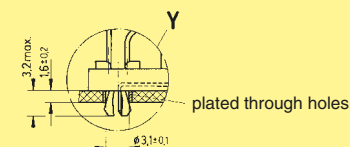
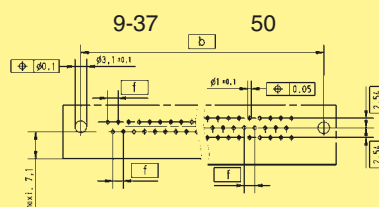
Grounding board lock 0.2 x 0.6



Dimples


fitted screw locks
4 - 40 UNC

M 3 or
4 - 40 UNC


Board drillings

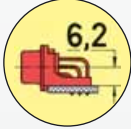


	a	b ± 0.1	c	f
9	30.90	25.00	12.50	2.74
15	39.20	33.30	12.50	2.74
25	53.10	47.00	12.50	2.76
37	69.40	63.50	12.50	2.76
50	67.00	61.10	15.70	2.76

Number of contacts

9–37
50

Mounting height



Low Profile Versions

Stamped solder pins, angled with grounding board locks

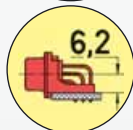
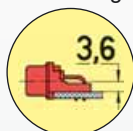
D-Sub - S

Identification	No. of contacts	Part No.			
Performance levels Explanations see page 02.02 Other contact surfaces on request		Performance level 3		Performance level 2	
Male connector tinned metal shell with dimples					
	9	09 65 162 781 .		09 65 162 681 .	
	15	09 65 262 781 .		09 65 262 681 .	
	25	09 65 362 781 .		09 65 362 681 .	
	37	09 65 462 781 .		09 65 462 681 .	
Female connector tinned metal shell					
	9	09 66 152 761 .		09 66 152 661 .	
	15	09 66 252 761 .		09 66 252 661 .	
	25	09 66 352 761 .		09 66 352 661 .	
	37	09 66 452 761 .		09 66 452 661 .	
	50	09 66 552 761 . ¹⁾		09 66 552 661 . ¹⁾	
Please insert digit for flange thread or fitted female screw locks					
M3 ▶	5				
4-40 UNC ▶	6				
fitted screw locks 4-40 UNC ▶	7				

¹⁾ Not normally kept in stock

Number of contacts

Mounting height

9-37
50


Low Profile Versions

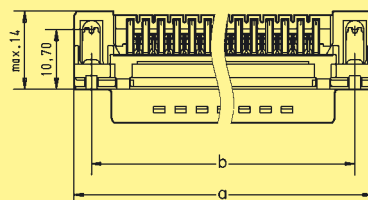
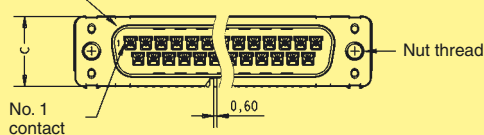
Stamped solder pins, angled with grounding board locks

Identification

Drawing

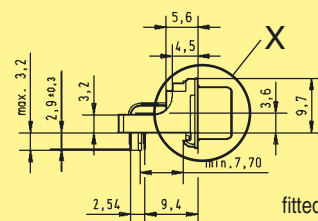
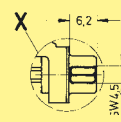
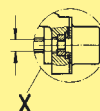
Dimensions in mm

Male connector

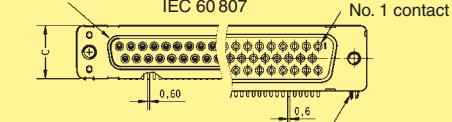
Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807


9-37

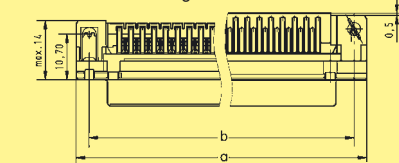
50


fitted screw locks
4 - 40 UNC

M 3 or
4 - 40 UNC


Female connector

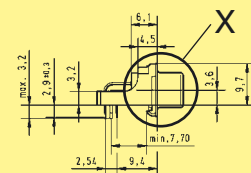
Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807


Grounding board lock 0.2 x 0.6

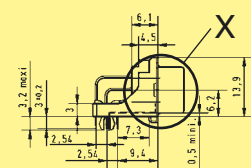


9-37

50

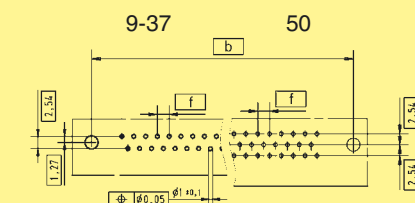


9-37



50

Board drillings

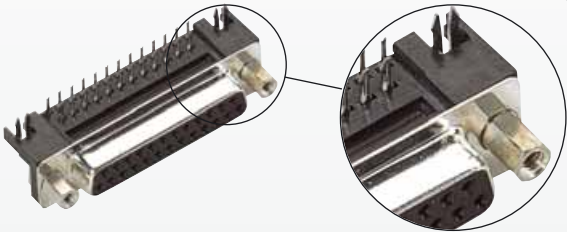
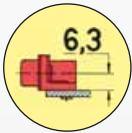


	a	b±0.1	c	f
9	30.90	25.00	12.50	2.74
15	39.20	33.30	12.50	2.74
25	53.10	47.00	12.50	2.76
37	69.40	63.50	12.50	2.76
50	67.00	61.10	15.40	2.76

Number of contacts

9–37

Mounting height



U.S. Footprint

Stamped solder pins, angled with snap-in-clips and grounding board locks

D-Sub - S

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.02 Other performance levels on request		Performance level 3	Performance level S4 ¹⁾
Male connector tinned metal shell with dimples			
		2.84 mm pitch	2.84 mm pitch
	9	09 68 163 781 .	09 68 163 581 .
	15	09 68 263 781 .	09 68 263 581 .
	25	09 68 363 781 .	09 68 363 581 .
	37	09 68 463 781 .	09 68 463 581 .
Female connector tinned metal shell			
		2.84 mm pitch	2.84 mm pitch
	9	09 68 153 761 .	09 68 153 561 .
	15	09 68 253 761 .	09 68 253 561 .
	25	09 68 353 761 .	09 68 353 561 .
	37	09 68 453 761 .	09 68 453 561 .
Please insert digit for flange thread or fitted female screw locks			
M3 ▶ 1 ²⁾			
4-40 UNC ▶ 2			
fitted screw locks 4-40 UNC ▶ 3			

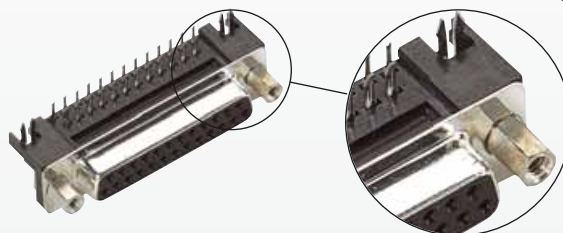
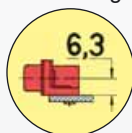
¹⁾ S4: ≥ 0.76 µm Au (30 µinch)

²⁾ Not normally kept in stock

Number of contacts

9–37

Mounting height



U.S. Footprint

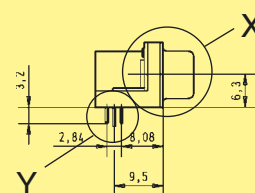
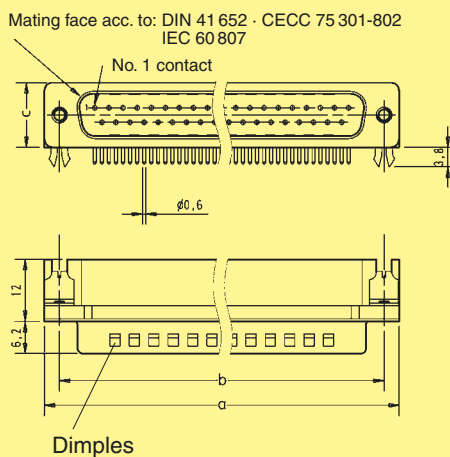
Stamped solder pins, angled with snap-in-clips and grounding board locks

Identification

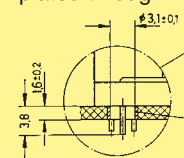
Drawing

Dimensions in mm

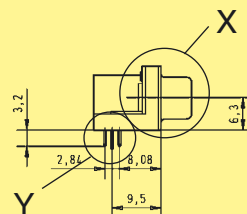
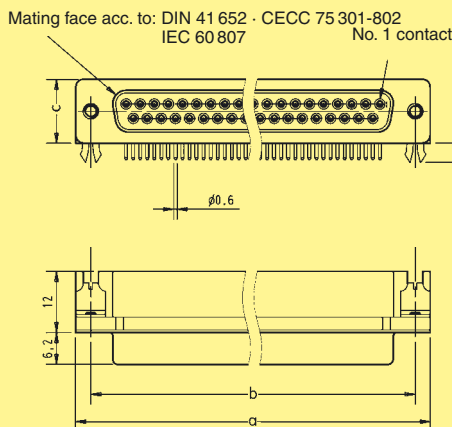
Male connector



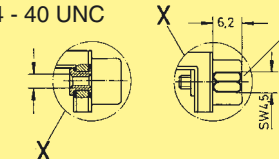
plated through holes



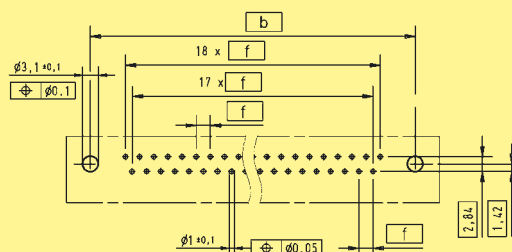
Female connector



M 3 or 4 - 40 UNC fitted screw locks



Board drillings



	a	b ± 0.1	c	f
9	30.90	25.00	12.55	2.74
15	39.20	33.30	12.55	2.74
25	53.10	47.00	12.55	2.77
37	69.40	63.50	12.55	2.77

Identification

Drawing

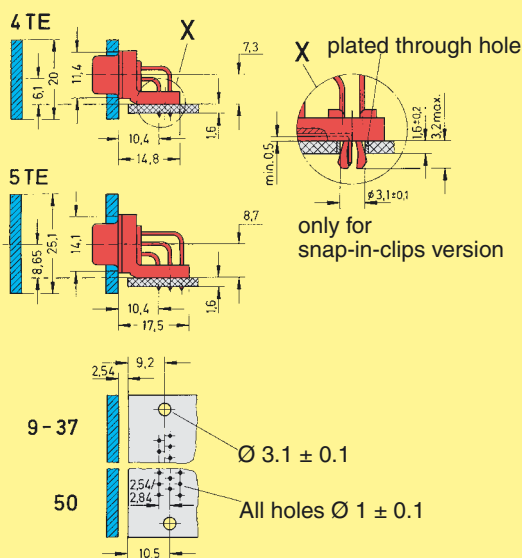
Dimensions in mm

Standard Versions

Mounting height 7.3 mm

9-37 way
for front panel
4 units of width (TE)

Mounting height 8.7 mm

50 way
for front panel
5 units of width (TE)

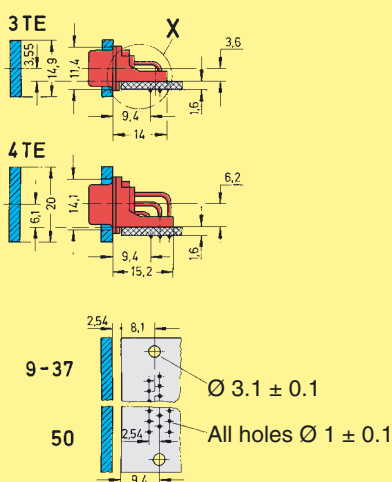
for connectors see pages 02.12 – 02.17

Low Profile Versions

Mounting height 3.6 mm

9-37 way
for front panel
3 units of width (TE)

Mounting height 6.2 mm

50 way
for front panel
4 units of width (TE)

When used in a wave soldering process the mating face of the connector must be protected with adhesive tape.

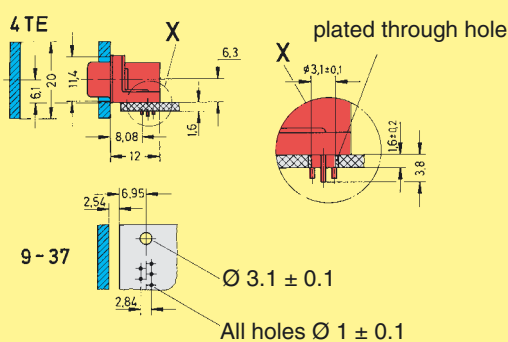


Adhesive tape

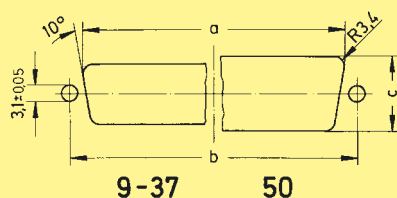
for connectors see pages 02.18 – 02.21

U.S. Footprint Versions

Mounting height 6.3 mm

9-37 way
for front panel
4 units of width (TE)

for connectors see pages 02.22 – 02.23

Panel cut out
for front panel

	a	b ± 0.1	c
9	20.5	25.0	11.4
15	28.8	33.3	11.4
25	42.5	47.0	11.4
37	59.1	63.5	11.4
50	56.3	61.1	14.1



Fully automated assembly line, split into two sublines for a high production flexibility.

Subline one for pre-assembly and subline two for customizing.

The assembly line features an integrated online camera inspection system and laser printing.

Our claim is quality.

Our challenge is to improve quality from day to day.



SEK connector mounted in a tape ready for placement using an odd form assembly station.

Number of contacts 9, 15, 25, 37, 50
UL recognized

Working current

see current carrying capacity chart

Turned contacts 7.5 A max.

Stamped contacts 6.5 A max.

Insulation displacement 2 A max.

Test voltage $U_{r.m.s.}$ 1 kV

Clearance and creepage ≥ 1.0 mm
 ≥ 0.7 mm (insulation displacement)

Contact resistance ≤ 10 m Ω
Insulation resistance $\geq 10^{10}$ Ω

Temperature range -55 °C ... + 125 °C

Terminations

- Solder buckets max. 0.5 mm²
- Crimp contacts
0.09-0.56 mm²
AWG 28-20
- Insulation displacement
AWG 28/7 and AWG 26/7
AWG 28/1 and AWG 30/1
- Wrap posts 0.6 x 0.6 mm
diagonal 0.8-0.86 mm
length 13 mm

Materials

Mouldings and hoods Thermoplastic resin, glass-fibre filled (PBTP)
UL 94-V0

Contacts Copper alloy

Contact surface¹⁾ Contact zone: selectively gold-plated according to performance level¹⁾
Termination zone: SnPb

Metal shell Tinned steel

Mating force

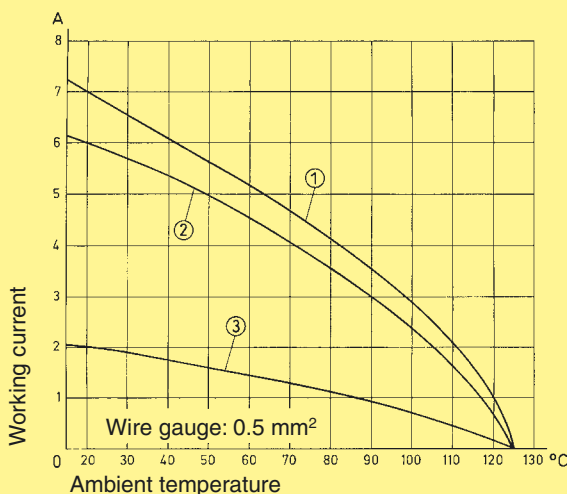
9 way	≤ 30 N
15 way	≤ 50 N
25 way	≤ 83 N
37 way	≤ 123 N
50 way	≤ 167 N

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 IEC 60 512.



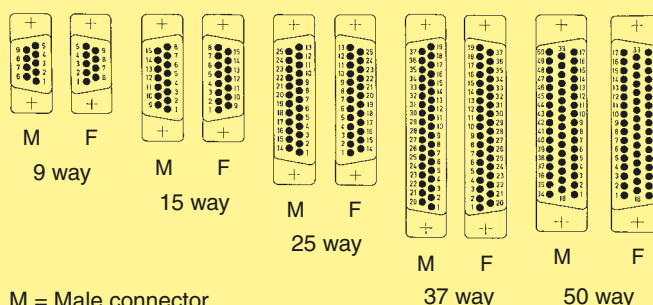
Example: 25 way connector

① Turned contacts

② Stamped contacts

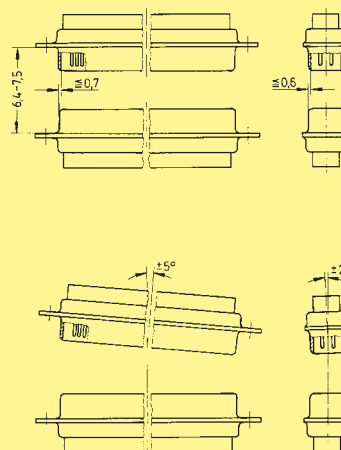
③ Insulation displacement contacts

Contact arrangement View from termination side



M = Male connector
F = Female connector

Mating conditions as per DIN 41 652



¹⁾ Performance level 3 as per DIN 41 652, part 2, ≥ 50 mating cycles, no gas test

Performance level 2 as per DIN 41 652, part 2, ≥ 200 mating cycles, 4 days gas test using 10 ppm SO₂

Other performance levels on request

9-50



D-Sub - S

02
27

Mating conditions see page 02.26

Number of contacts

9–50

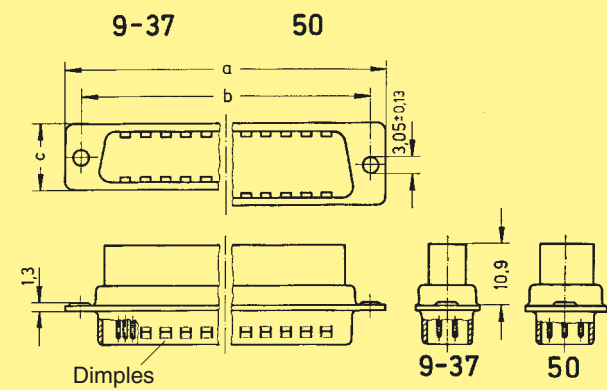


Crimp terminal

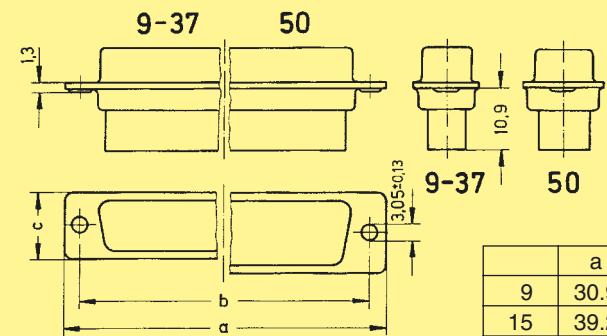
D-Sub - S

Identification	No. of contacts	Part No.
Male connector Order contacts separately tinned metal shell with dimples	9	09 67 009 5601
	15	09 67 015 5601
	25	09 67 025 5601
	37	09 67 037 5601
	50	09 67 050 5601
Female connector Order contacts separately tinned metal shell	9	09 67 009 4701
	15	09 67 015 4701
	25	09 67 025 4701
	37	09 67 037 4701
	50	09 67 050 4701

Male connector

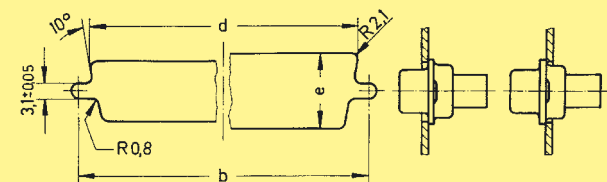


Female connector



	a	b _{±0.1}	c	d	e
9	30.9	25.0	12.5	20.5	12.0
15	39.2	33.3	12.5	28.8	12.0
25	53.1	47.0	12.5	42.5	12.0
37	69.4	63.5	12.5	59.1	12.0
50	67.0	61.1	15.4	56.3	14.8

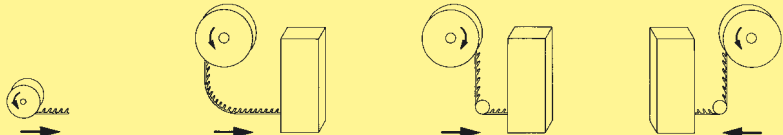
Panel cut out



Dimensions in mm

Crimp contacts

D-Sub - S

Identification	Wire gauge (mm ²)	Part No.			
Performance levels Explanations see page 02.26 Other performance levels on request		stamped male contacts		stamped female contacts	
		Performance level 3	Performance level 2	Performance level 3	Performance level 2
Individual contacts	0.09-0.25 AWG 28-24	09 67 000 7177 ¹⁾	09 67 000 7178 ¹⁾	09 67 000 7277 ¹⁾	09 67 000 7278 ¹⁾
500 pieces/reel Unrolling left		09 67 000 7167	09 67 000 7168	09 67 000 7267	09 67 000 7268
10 000 pieces/reel Unrolling left Unrolling left reversed Unrolling right reversed		09 67 000 7157 09 67 000 7147 09 67 000 7137	09 67 000 7158 09 67 000 7148 09 67 000 7138	09 67 000 7257 09 67 000 7247 09 67 000 7237	09 67 000 7258 09 67 000 7248 09 67 000 7238
Individual contacts	0.25-0.56 AWG 24-20	09 67 000 8177 ¹⁾	09 67 000 8178 ¹⁾	09 67 000 8277 ¹⁾	09 67 000 8278 ¹⁾
500 pieces/reel Unrolling left		09 67 000 8167	09 67 000 8168	09 67 000 8267	09 67 000 8268
10 000 pieces/reel Unrolling left Unrolling left reversed Unrolling right reversed		09 67 000 8157 09 67 000 8147 09 67 000 8137	09 67 000 8158 09 67 000 8148 09 67 000 8138	09 67 000 8257 09 67 000 8247 09 67 000 8237	09 67 000 8258 09 67 000 8248 09 67 000 8238
Unrolling direction		 500 pieces/reel Unrolling left 10 000 pieces/reel Unrolling left 10 000 pieces/reel Unrolling left reversed 10 000 pieces/reel Unrolling right reversed for HARTING tools			

¹⁾ Minimum order 500 pieces or multiples of 500
Insertion and removal tool see chapter 31
Contact dimensions see page 02.31

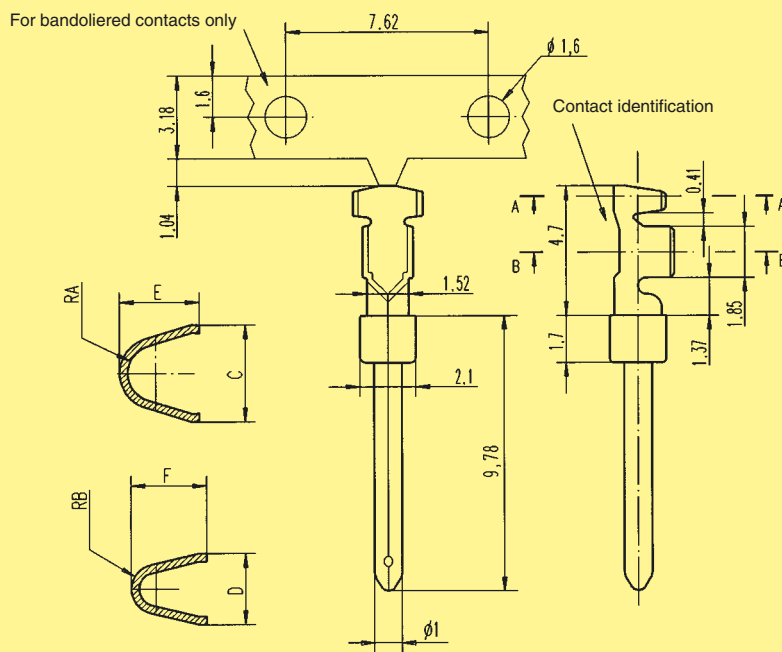
Crimp contacts

Identification

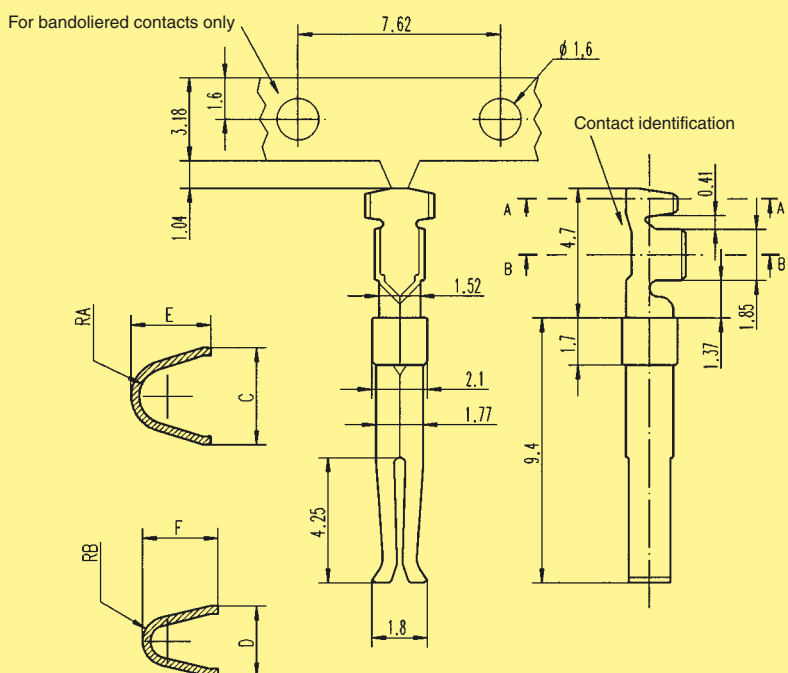
Drawing

Dimensions in mm

Male contacts



Female contacts



AWG	C	D	E	F	RA	RB	Contact identification
20-24	2.46	1.78	1.98	1.90	0.71	0.43	—
24-28	1.65	1.47	1.52	1.52	0.50	0.33	≡

Number of contacts

9–37



Insulation displacement termination

D-Sub - S

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.26 Other performance levels on request		Performance level 3	Performance level 2
Male connector pitch 1.27 mm tinned metal shell with dimples	9 15 25 37	09 66 128 770 . 09 66 228 770 . 09 66 328 770 . 09 66 428 770 .	09 66 128 670 . 09 66 228 670 . 09 66 328 670 . 09 66 428 670 .
Female connector pitch 1.27 mm tinned metal shell	9 15 25 37	09 66 118 750 . 09 66 218 750 . 09 66 318 750 . 09 66 418 750 .	09 66 118 650 . 09 66 218 650 . 09 66 318 650 . 09 66 418 650 .
Please insert digit for flange thread or fitted female screw locks ø 3.1 mm hole ▶ 0 M 3 ▶ 1 ¹⁾ 4-40 UNC ▶ 2			
Strain relief clamp corrosion resistant steel for male and female connector	9 15 25 37	09 66 108 0000 09 66 208 0000 09 66 308 0000 09 66 408 0000	09 66 108 0000 09 66 208 0000 09 66 308 0000 09 66 408 0000
plastic for male and female connector	9 15 25 37	09 66 108 0001 09 66 208 0001 09 66 308 0001 09 66 408 0001	09 66 108 0001 09 66 208 0001 09 66 308 0001 09 66 408 0001

Number of contacts

9–37

Insulation displacement termination

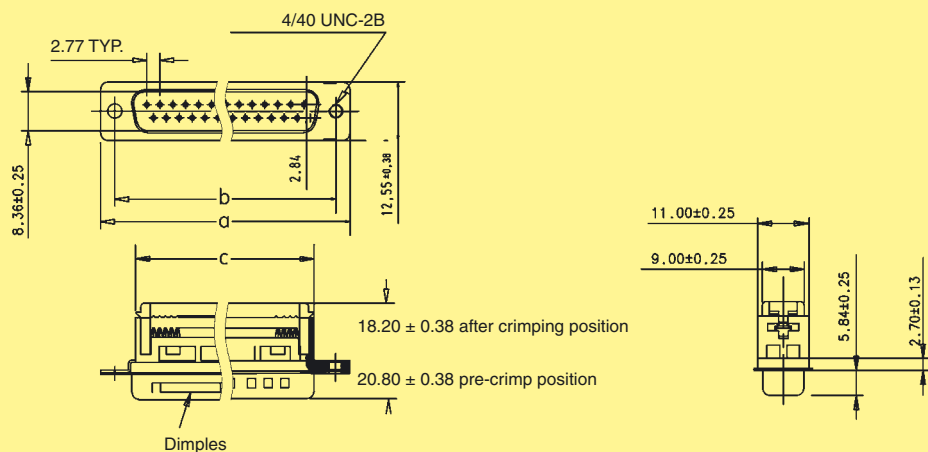


Identification

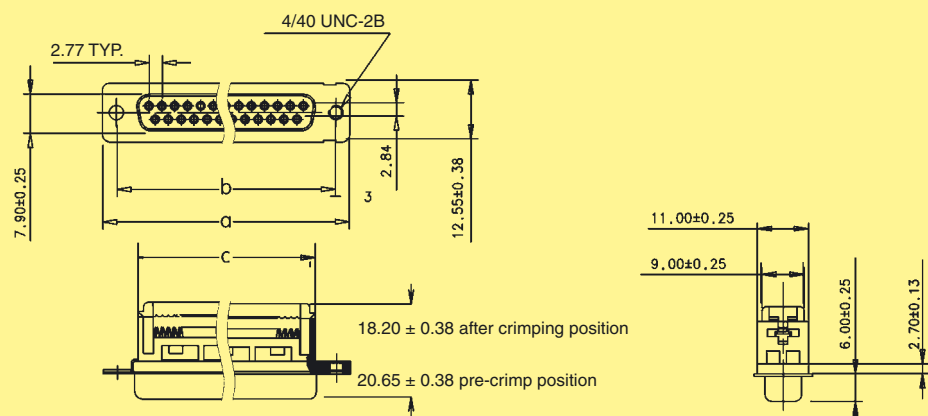
Drawing

Dimensions in mm

Male connector

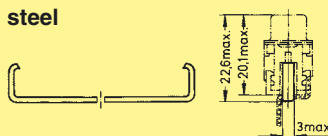


Female connector

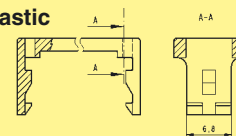


Strain relief clamps

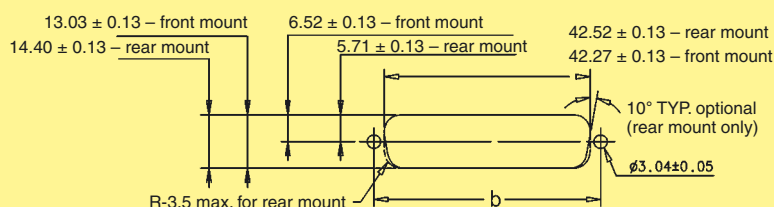
steel



plastic



Panel cut out layout



Male and female connectors

	a	b _{±0.1}	c
9	30.80	24.99	16.10
15	39.10	33.32	24.00
25	53.09	47.04	38.14
37	69.40	63.50	54.60

Specified conductors

- stranded wires – AWG 28/7
- AWG 26/7
- solid wires – AWG 30/1
- AWG 28/1

Number of contacts

9–50



Solder buckets

D-Sub - S

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 02.26 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples		turned contacts 9 09 67 009 5604 15 09 67 015 5604 25 09 67 025 5604 37 09 67 037 5604 50 09 67 050 5604 ¹⁾ stamped contacts 9 09 67 209 5604 15 09 67 215 5604 25 09 67 225 5604 37 09 67 237 5604 50 09 67 250 5604 ¹⁾	turned contacts 09 67 009 5615 09 67 015 5615 09 67 025 5615 09 67 037 5615 09 67 050 5615 stamped contacts 09 67 209 5615 09 67 215 5615 09 67 225 5615 09 67 237 5615 09 67 250 5615 ¹⁾
Female connector tinned metal shell		turned contacts 9 09 67 009 4704 15 09 67 015 4704 25 09 67 025 4704 37 09 67 037 4704 50 09 67 050 4704 ¹⁾ stamped contacts 9 09 67 209 4704 15 09 67 215 4704 25 09 67 225 4704 37 09 67 237 4704 50 09 67 250 4704 ¹⁾	turned contacts 09 67 009 4715 09 67 015 4715 09 67 025 4715 09 67 037 4715 09 67 050 4715 stamped contacts 09 67 209 4715 09 67 215 4715 09 67 225 4715 09 67 237 4715 09 67 250 4715 ¹⁾

Number of contacts

9–50



Solder buckets

Identification

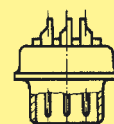
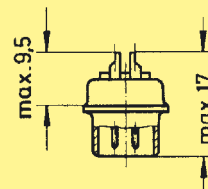
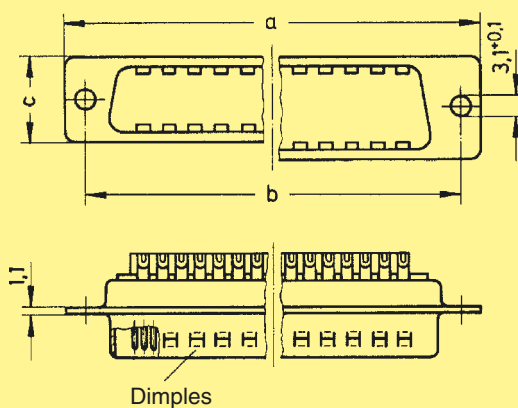
Drawing

Dimensions in mm

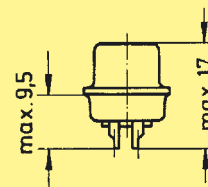
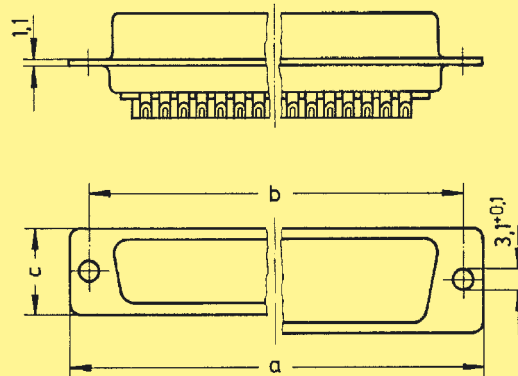
Male connector

9-37

50

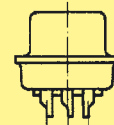


Female connector

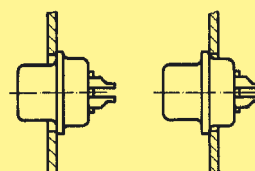
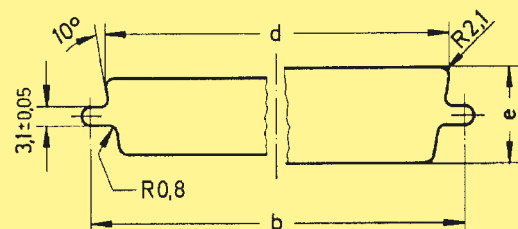


9-37

50



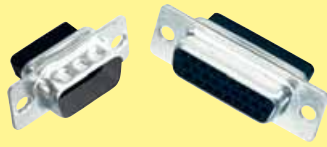
Panel cut out



	a	b ±0.1	c	d	e
9	30.9	25.0	12.5	20.5	12.0
15	39.2	33.3	12.5	28.8	12.0
25	53.1	47.0	12.5	42.5	12.0
37	69.4	63.5	12.5	59.1	12.0
50	67.0	61.1	15.4	56.3	14.8

New**D-Sub – High Density subminiature D connectors**

Page

Technical characteristics	03.02
Connectors with crimp terminal / crimp contacts 	03.03
Connectors with angled solder pins	03.06
Connectors with straight solder pins	03.09

Number of contacts	15, 26, 44, 62, 78 UL recognized
Working current Stamped contacts	2 A max.
Test voltage $U_{r.m.s.}$	1 kV
Clearance and creepage	≥ 1.0 mm
Contact resistance Insulation resistance	≤ 20 m Ω $\geq 5 \times 10^9$ Ω
Temperature range The higher temperature limit includes the local ambient and heating effect of the contacts under load	-55 °C ... + 105 °C
Terminations	a) Solder pins $\varnothing$ 0.65 mm for P.C.B. holes $\varnothing$ 1.02 mm b) Solder pins, angled 90° $\varnothing$ 0.7 mm for P.C.B. holes $\varnothing$ 1.02 mm c) Crimp contacts 0.14 - 0.22 mm ² AWG 26 - 24
Materials	
Mouldings	Thermoplastic resin, glass- fibre filled (PBTP), UL 94-V0
Contacts	Copper alloy
Contact surface ¹⁾	<u>Contact zone</u> : selectively gold-plated according to performance level ¹⁾ <u>Termination zone</u> : SnPb
Metal shell	Tinned steel
Mating force	15 way ≤ 46 N 26 way ≤ 77 N 44 way ≤ 127 N 62 way ≤ 177 N 78 way ≤ 222 N



¹⁾ Performance level 3 as per DIN 41 652, part 2, ≥ 50 mating cycles, no gas test
Performance level S4, plating ≥ 0.76 μ m Au (30 μ inch)

Number of contacts

15–78

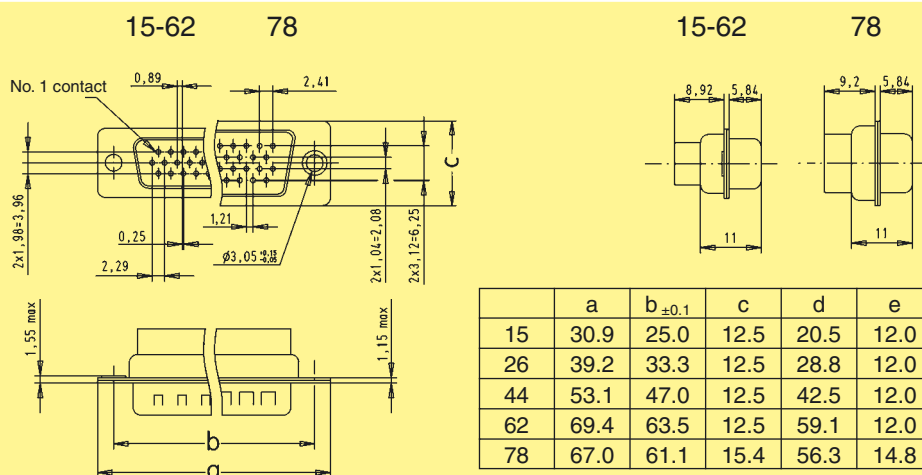


High density crimp terminal

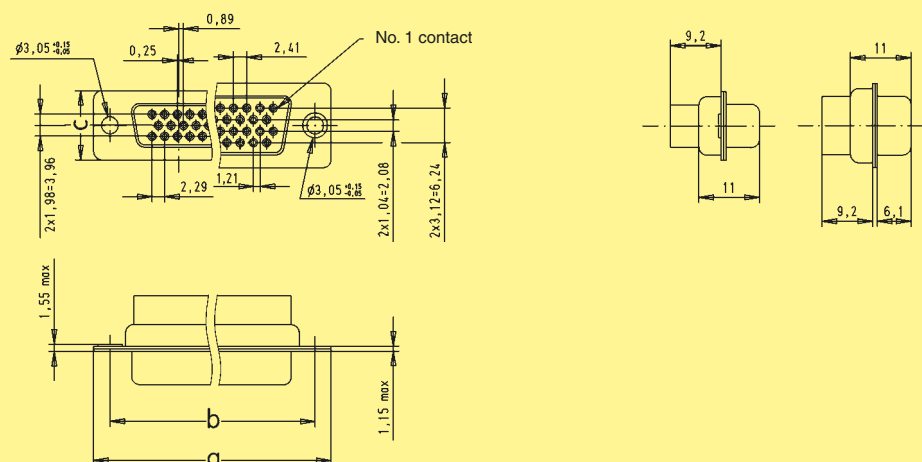
Identification	No. of contacts	Part No.
Male connector Order contacts separately tinned metal shell with dimples	15	09 56 100 5601
	26	09 56 200 5601
	44	09 56 300 5601
	62	09 56 400 5601
	78	09 56 500 5601
Female connector Order contacts separately tinned metal shell	15	09 56 100 4701
	26	09 56 200 4701
	44	09 56 300 4701
	62	09 56 400 4701
	78	09 56 500 4701

D-Sub - HD

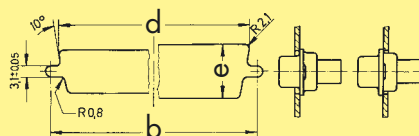
Male connector



Female connector



Panel cut out



Dimensions in mm

Crimp contacts for high density connectors



Identification

Wire gauge
(mm²)

Part No.

Performance levels

Explanations see page 03.02
Other performance levels
on request



stamped male contacts

stamped female contacts

Performance level
3Performance level
S4¹⁾Performance level
3Performance level
S4¹⁾

500 pieces/box

0.14-0.22
AWG
26-24

09 56 000 8177

09 56 000 8175

09 56 000 8277

09 56 000 8275

500 pieces/reel
Unrolling left

09 56 000 8167

09 56 000 8165

09 56 000 8267

09 56 000 8265

10 000 pieces/reel
Unrolling left

09 56 000 8157

09 56 000 8155

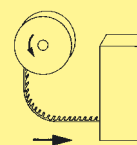
09 56 000 8257

09 56 000 8255

Unrolling direction



500 pieces/reel
Unrolling
left



10 000 pieces/reel
Unrolling
left

for HARTING tools

Crimp contacts for high density connectors



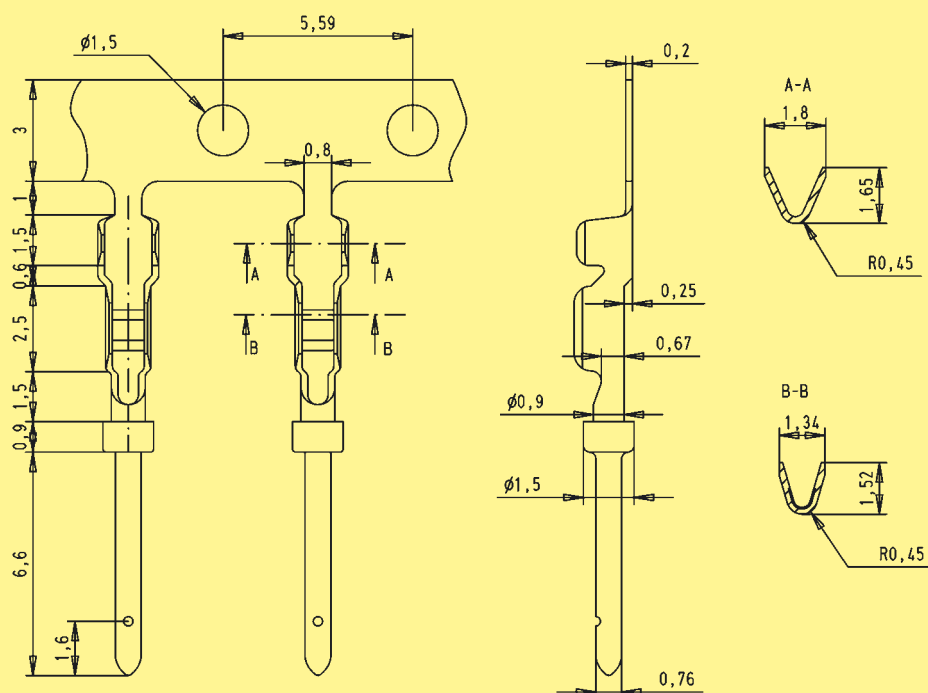
Identification

Drawing

Dimensions in mm

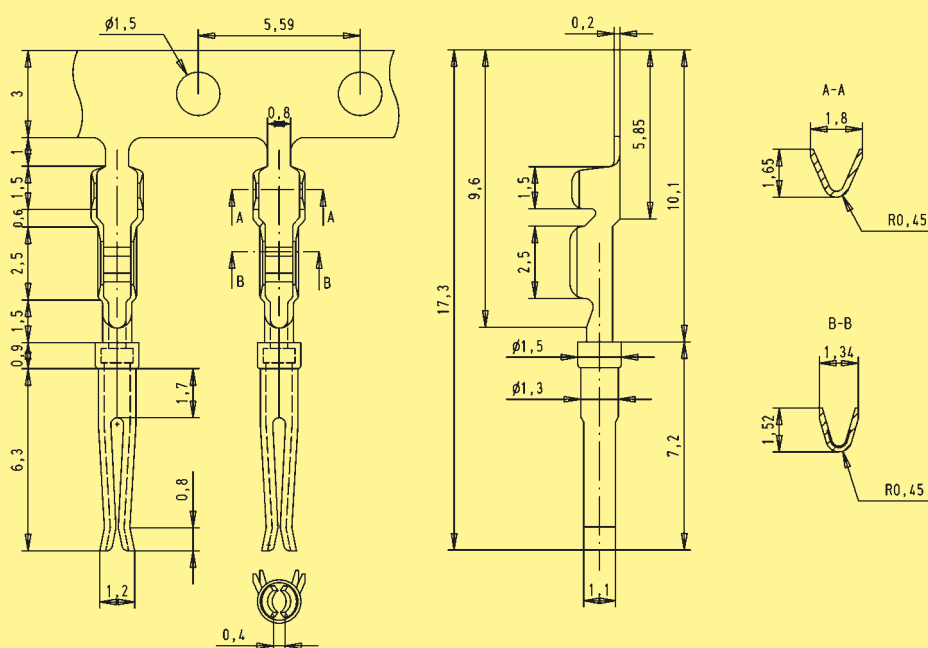
Male contacts

wire gauge AWG 26-24



Female contacts

wire gauge AWG 26-24



Number of contacts

15–78



High density with stamped solder pins, angled with grounding board locks

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 03.02 Other performance levels on request		Performance level 3	
Male connector tinned metal shell with dimples		Performance level S4 ¹⁾	
Female connector tinned metal shell			
Please insert digit for flange thread or fitted female screw locks 4-40 UNC ► 2 fitted screw locks 4-40 UNC ► 3			

D-Sub - HD

¹⁾ S4: $\geq 0.76 \mu\text{m Au}$ (30 μinch)

Number of contacts

15-78



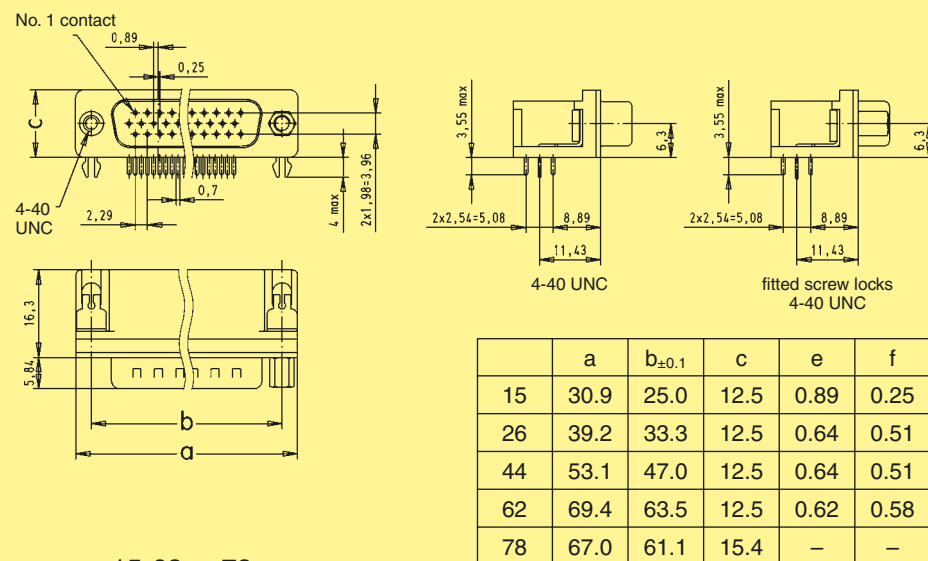
High density with stamped solder pins, angled with grounding board locks

Identification

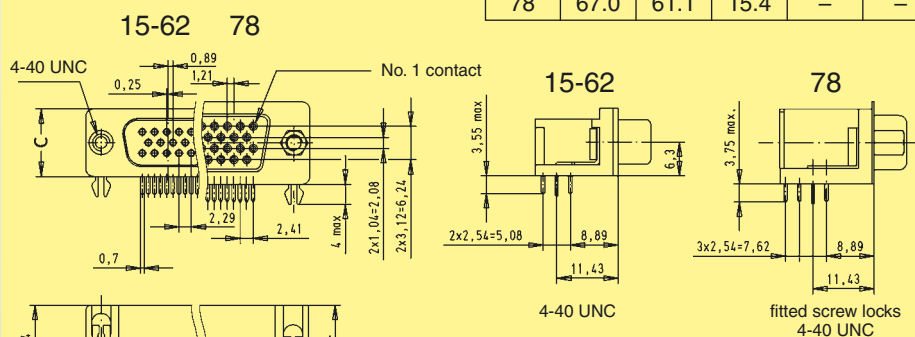
Drawing

Dimensions in mm

Male connector

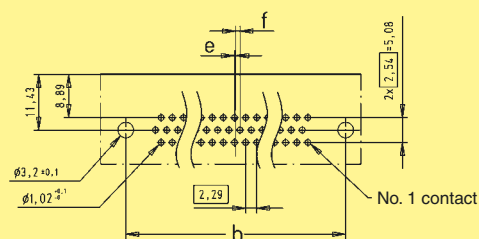


Female connector

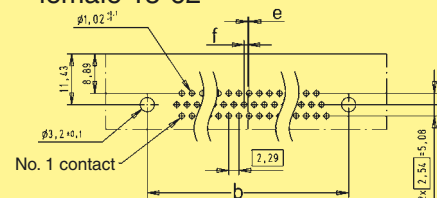


Board drillings

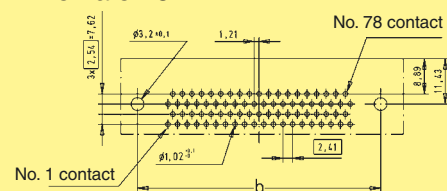
male



female 15-62



female 78

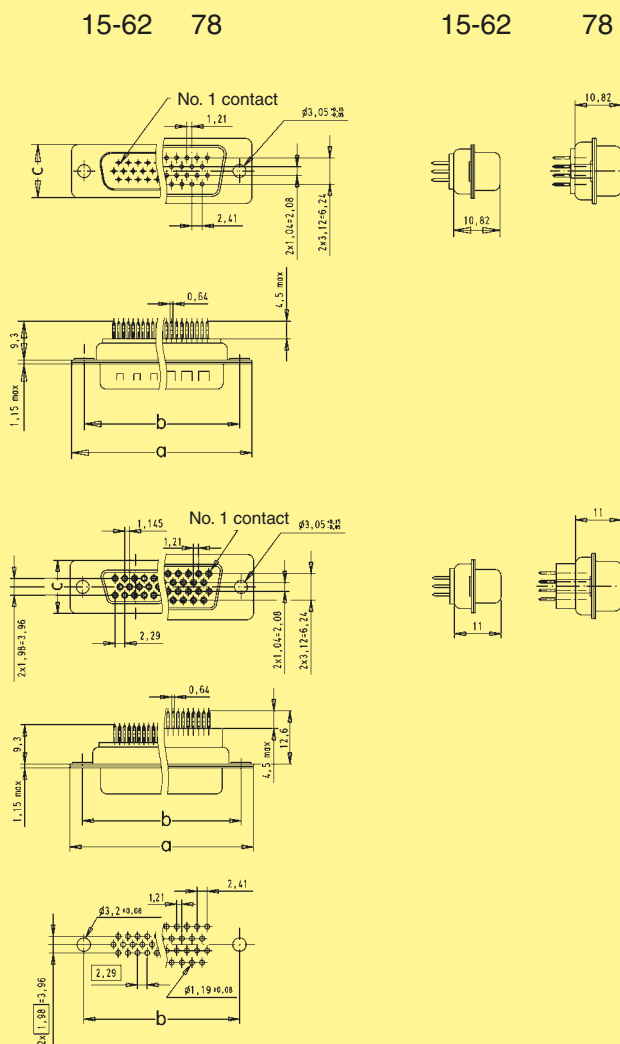


15-78



Identification	No. of contacts	Part No.	
Performance levels Explanations see page 03.02 Other performance levels on request		Performance level 3	Performance level S4 ¹⁾
Male connector tinned metal shell with dimples	15	09 56 161 7700	09 56 161 5700
	26	09 56 261 7700	09 56 261 5700
	44	09 56 361 7700	09 56 361 5700
	62	09 56 461 7700	09 56 461 5700
	78	09 56 561 7700	09 56 561 5700
Female connector tinned metal shell	15	09 56 151 7500	09 56 151 5500
	26	09 56 251 7500	09 56 251 5500
	44	09 56 351 7500	09 56 351 5500
	62	09 56 451 7500	09 56 451 5500
	78	09 56 551 7500	09 56 551 5500

Board drillings



	a	b _{±0.1}	c
15	30.9	25.0	12.5
26	39.2	33.3	12.5
44	53.1	47.0	12.5
62	69.4	63.5	12.5
78	67.0	61.1	15.4

Dimensions in mm

Number of contacts

15–78



High density with stamped solder pins, straight with grounding board locks

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 03.02 Other performance levels on request		Performance level 3	
Male connector tinned metal shell with dimples		Performance level S4 ¹⁾	
Female connector tinned metal shell			
Please insert digit for flange thread or fitted female screw locks 4-40 UNC ► 2 fitted screw locks 4-40 UNC ► 3			

D-Sub - HD

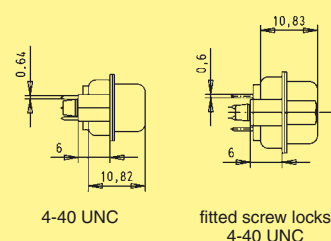
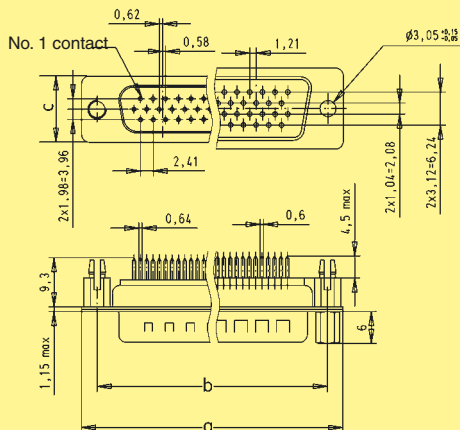
¹⁾ S4: $\geq 0.76 \mu\text{m Au}$ (30 μinch)

15-78



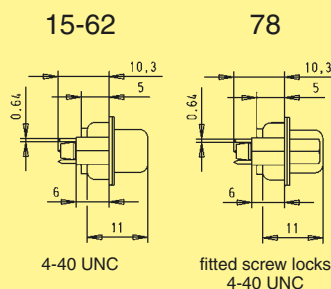
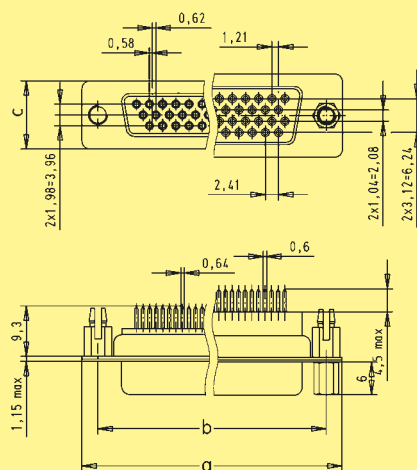
Dimensions in mm

15-62 78

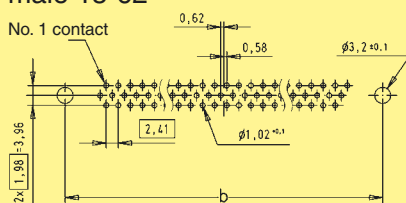


	a	b _{±0.1}	c
15	30.9	25.0	12.5
26	39.2	33.3	12.5
44	53.1	47.0	12.5
62	69.4	63.5	12.5
78	67.0	61.1	15.4

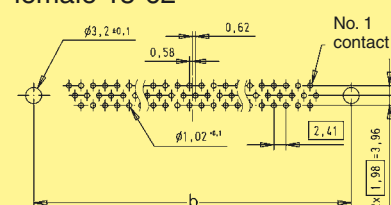
15-62 78



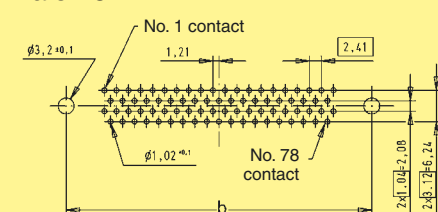
male 15-62



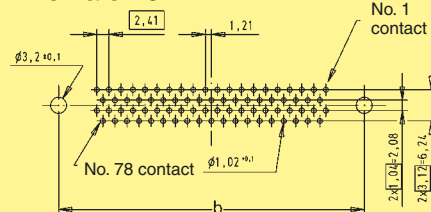
female 15-62



male 78



female 78



**D-Sub – Mixed subminiature D connectors**

Page

D-Sub mixed connector system – general information	04.02
Contact arrangements	04.03
Connectors for pcb applications – general information	04.04
Connectors for cable applications – general information	04.05
Technical characteristics for shells	04.06
Mixed shells with pre-mounted signal solder cup contacts	04.07
Shells without signal contacts for cable applications ..	04.11
Coded shells without signal contacts for cable applications	04.12
Mixed shells for signal crimp contacts	04.14
Technical characteristics for special contacts	04.17
Straight signal crimp contacts for cable applications	04.18
High voltage contacts for cable applications	04.19
Straight power contacts for cable applications	04.20
Coaxial contacts for cable applications	04.22
Pcb hole patterns for power contacts	04.25
Board drillings for connectors with straight pcb contacts	04.26
Board drillings for connectors with right angled pcb contacts	04.28
Customer request form for pcb connectors	04.30
Customer request form for cable connectors	04.32



HARTINGs' mixed D-Sub range brings the advantage of an industry standard I/O inter-connect product with the possibility to customise for any application.

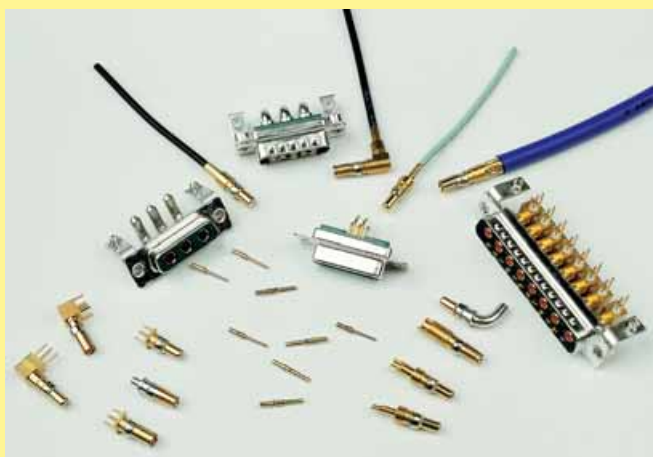
The range is designed around **the standard D-Sub shell sizes** with **the possibility to have a blend of contacts** such as signals with coaxial, power or high voltage contacts. Due to its construction, the product is **fully shielded** and helps reducing the EMI/RFI leakage.

All contacts are machined with a standard plating for 500 mating cycles. A lower cost version can be supplied upon request which has a 200 mating cycles performance.

When hot plug-in is required, **first mate last break** contacts can also be supplied.

For connectors to be fitted on a board with SMT components, they can be supplied in an **SMC (PiHIR) version** which is assembled in the reflow solder process, thus reducing assembly cost.

In addition, a complete range of accessories such as clinch nut, spacers, board locks, female screw lock, etc. ... meeting the requirements of virtually any application, including a blind mate feature, makes this product range very attractive thanks to its versatility, reliability and cost effectiveness.

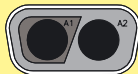
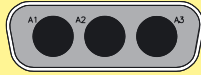
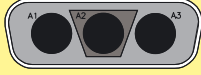
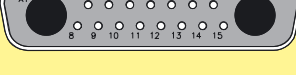
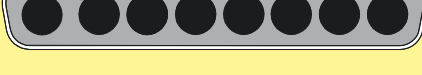
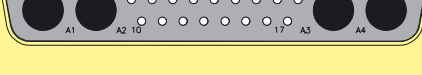


Contact arrangements

The table shows the standard range supported by HARTING. Two versions are special since they allow to mix in the same shell male and female contacts: 2W2C and 3W3C. The purpose of these versions is to have a 100 % mating proof feature (the insulator shape prevents a 180° reversed mating).

The structure of the connectors' identification is so that the left side digits give the total number of contacts and the right side digits the number of special contacts which can be either power, coaxial or high voltage style.

Example: 13W3 stands for 13 contacts in total with 10 signal contacts and 3 special contacts.

2W2C	
3W3	
3W3C	
7W2	
5W5	
9W4	
13W3	
17W2	
8W8	
21WA4	

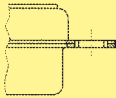
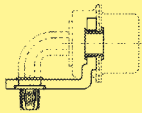
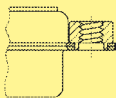
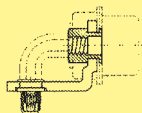
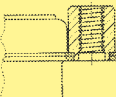
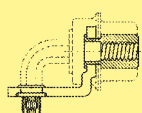
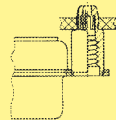
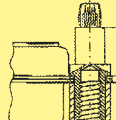
Note:
for any other layout please consult your HARTING representative.

Connectors for pcb applications – general information

The range of pcb connectors available at HARTING is summarised in the table under. For each of the basic connector versions, the available contact styles are documented with termination process, pitch, plating, rating for power contacts and impedance for coaxial contact etc..., as well as the accessory configuration.

Pcb connectors are delivered fully loaded thus providing a very good positioning of the contacts in their cavities for an easy and safe insertion of the pins in the pcb holes particularly crucial in the right angled versions.

Due to the numerous possibilities offered with the pcb connectors, suggested method is to contact your local HARTING representative to determine the part number to order; see customer request form on pages 04.30 and 04.31.

	Straight		Right angled	
Insulator body	• Standard • SMC: Solder Reflow Compatible		• Standard • SMC: Solder Reflow Compatible	
Signal contacts	Solder termination • Pitch: 2.84 mm • Plating: 0.8 µm Au over Ni • Pcb thickness from 1.6 to 3.2 mm		Solder termination • Pitch: 2.54 mm • Plating: 0.8 µm Au over Ni • Pcb thickness from 1.6 to 3.2 mm	
Power contacts	Solder termination • Rating: 20, 30, 40 A • Plating: 0.8 µm Au over Ni Press fit termination • Rating: 30 A • Plating: 0.8 µm Au over Ni		Solder termination • Rating: 20, 30, 40 A • Plating: 0.8 µm Au over Ni	
Coaxial contacts	Solder termination • 50 or 75 Ω • Plating: 1.3 µm Au over Ni inner conductor 0.8 µm Au over Ni outer ring		Solder termination • 50 or 75 Ω • Plating: 1.3 µm Au over Ni inner conductor 0.8 µm Au over Ni outer ring	
Accessories	Through hole		Metal bracket with board lock and through hole	
	Nut: M3 or UNC 4-40		Metal bracket with board lock and clinch nut M3 or UNC 4-40	
	Spacer: M3 or UNC 4-40		Metal bracket with board lock and female screw lock UNC 4-40	
	Spacer (M3 or UNC 4-40) with board lock			
	Spacer + board lock + female screw lock M3 or UNC 4-40			

Connectors for cable applications – general information

Two termination processes are available: crimp or solder

Shell		
Signal contacts	Crimp termination - For wire gauge: AWG 20-24 or 26-28 - Plating: 0.8 µm or 0.2 µm Au over Ni	Pre-mounted solder cup contacts Plating: 0.8 µm Au over Ni
Power contacts	Crimp - Rating: 20, 30, 40 A - Plating: 0.8 µm or 0.2 µm Au over Ni Solder cup - Rating: 20, 30, 40 A - Plating: 0.8 µm or 0.2 µm Au over Ni	Crimp - Rating: 20, 30, 40 A - Plating: 0.8 µm or 0.2 µm Au over Ni Solder cup - Rating: 20, 30, 40 A - Plating: 0.8 µm or 0.2 µm Au over Ni
Coaxial contacts¹⁾	Solder/crimp termination 50 or 75 Ω - Plating: 1.3 µm or 0.2 µm Au over Ni inner conductor 0.8 µm or 0.2 µm Au over Ni outer ring - Cables: RG 178, 179 ... Crimp/crimp termination 50 or 75 Ω - Plating: 1.3 µm or 0.2 µm Au over Ni inner conductor 0.8 µm or 0.2 µm Au over Ni outer ring - Cables: RG 178, 179 ...	Solder/crimp termination 50 or 75 Ω - Plating: 1.3 µm or 0.2 µm Au over Ni inner conductor 0.8 µm or 0.2 µm Au over Ni outer ring - Cables: RG 178, 179 ... Crimp/crimp termination 50 or 75 Ω - Plating: 1.3 µm or 0.2 µm Au over Ni inner conductor 0.8 µm or 0.2 µm Au over Ni outer ring - Cables: RG 178, 179 ...
High voltage contacts	Solder termination - Plating: 1.3 µm Au over Ni terminating and mating side	Solder termination - Plating: 1.3 µm Au over Ni terminating and mating side

¹⁾ Coaxial contacts are provided in two versions:

- Inner conductor soldered and outer part crimped (solder/crimp termination)
- Both inner and outer part crimped (crimp/crimp termination); this version is recommended for medium or large size volume since crimping is faster than soldering.

Number of contacts 2, 3, 5, 7, 8, 9, 13, 17, 21

Approvals DIN 41 652, part 1
MIL-C 24 308

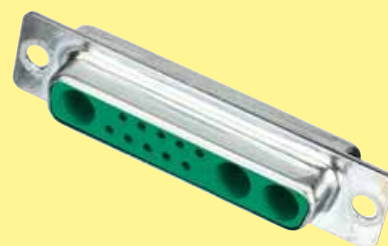
Working current 5 A for signal contacts

Temperature range -55 °C ... + 125 °C
The higher temperature limit includes the ambient and heating effect of the contacts under load

Materials
Mouldings Thermoplastic resin, glass-fibre filled (Polyester)
UL 94-V0
color: green for standard
black for crimp

Shell Steel

Plating Tin



7-21



Identification	No. of contacts ¹⁾	Part No.	
	7W2	male connectors	female connectors
		09 69 211 5072	09 69 201 5072
	17W2	09 69 311 5172	09 69 301 5172
	21WA4	09 69 411 5214	09 69 401 5214

Solder cup termination for AWG 20 (0.5 mm²)

	a	b	c	d	e
7W2	24.6	39.1	27.5	33.30	25.2
17W2	38.3	53.0	41.3	47.04	38.9
21WA4	54.8	69.3	57.7	63.50	55.3

Technical drawings of a solder cup termination for AWG 20 (0.5 mm²). The drawings include a side view, a top view, and a detail view of the solder cup. Dimensions are given in millimeters with tolerances.

- Side View:**
 - Length: 12.5 ± 0.4
 - Diameter: $6.3_{-0.2}^{0.0}$
 - Height: $7.8_{-0.2}^{0.0}$
- Top View:**
 - Length: 10.8 ± 0.3
 - Diameter: $6.3_{-0.2}^{0.0}$
 - Height: $7.8_{-0.2}^{0.0}$
- Detail View:**
 - Diameter: $6.3_{-0.2}^{0.0}$
 - Height: $7.8_{-0.2}^{0.0}$

Dimensions in mm

Number of contacts

9-13

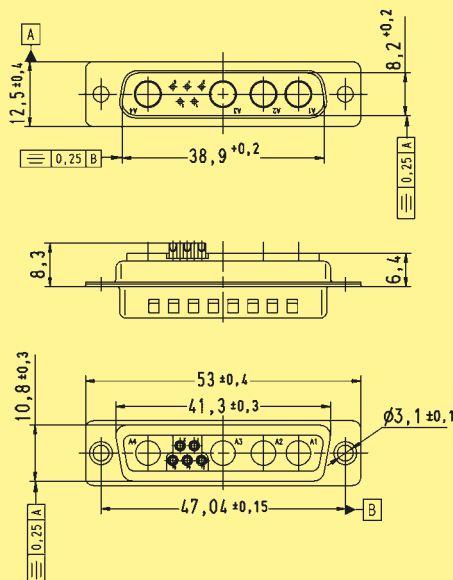


Mixed shells with pre-mounted solder cup contacts

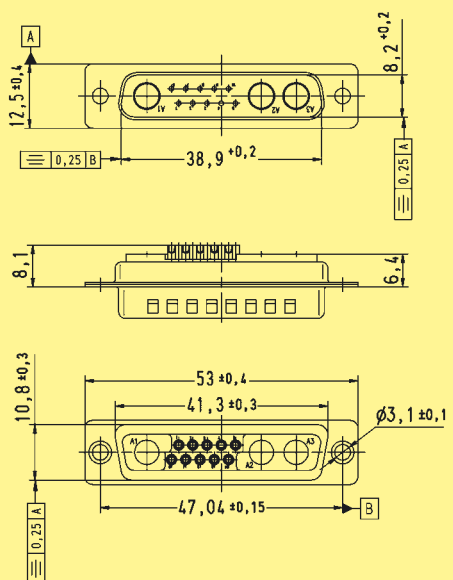
Identification	No. of contacts ¹⁾	Part No.
	9W4	09 69 311 5094
	13W3	09 69 311 5133

Male connectors

9W4

Solder cup termination for AWG 20 (0.5 mm²)

13W3

Solder cup termination for AWG 20 (0.5 mm²)

Dimensions in mm

¹⁾ Explanations see page 04.03
Board drillings see pages 04.25 ff

Drawings for female connectors see page 04.09
Order special contacts separately. See pages 04.17 ff

Number of contacts

9-13



Mixed shells with pre-mounted signal solder cup contacts

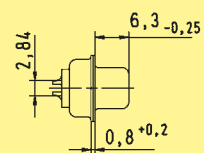
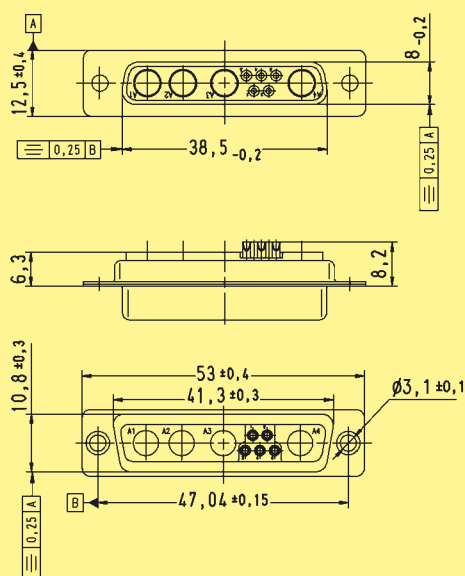
Identification

Drawing

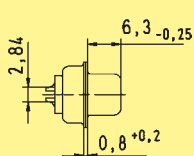
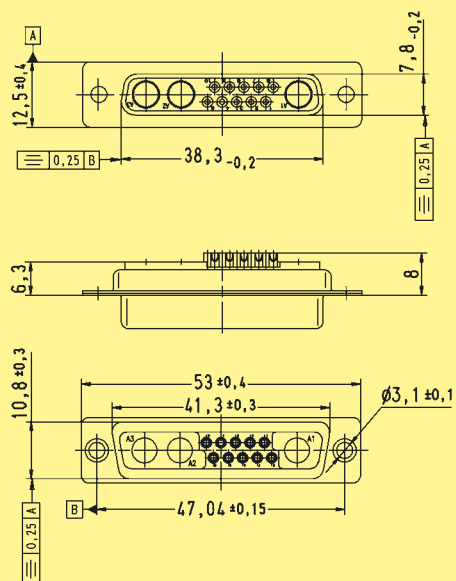
Dimensions in mm

Female connectors

9W4

Solder cup termination for AWG 20 (0.5 mm²)

13W3

Solder cup termination for AWG 20 (0.5 mm²)

Number of contacts

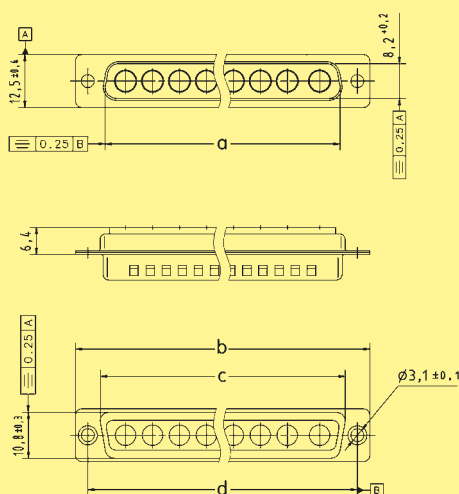
3–8



Shells without signal contacts for cable applications

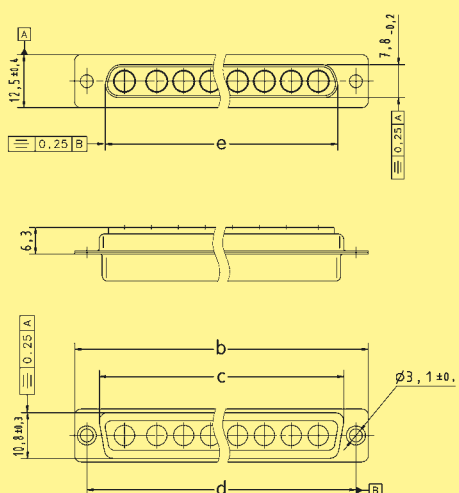
Identification	No. of contacts ¹⁾	Part No.
		male connectors
		female connectors
	3W3	09 69 210 0033
	5W5	09 69 310 0055
		09 69 300 0055
	8W8	09 69 410 0088
		09 69 400 0088

Male connectors



	a	b	c	d	e
3W3	25.2	39.1	27.5	33.30	24.6
5W5	38.9	53.0	41.3	47.04	38.3
8W8	55.3	69.3	57.7	63.50	54.8

Female connectors



Dimensions in mm

¹⁾ Explanations see page 04.03
 Board drillings see pages 04.25 ff
 Order special contacts separately. See pages 04.17 ff

Number of contacts

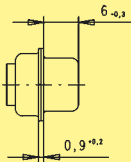
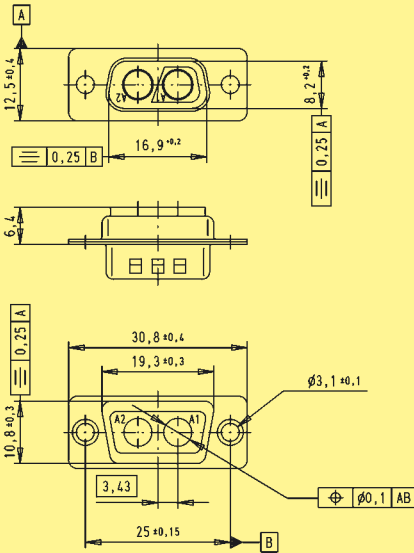
2



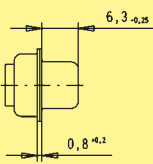
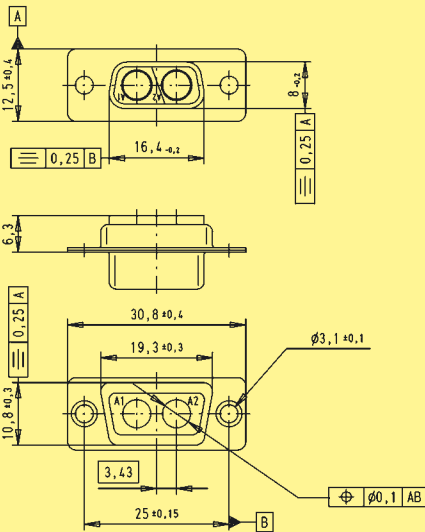
Coded shells without signal contacts for cable applications

Identification	No. of contacts ¹⁾	Part No.	
		male connector	female connector
	2W2C	09 69 110 0022	09 69 100 0022

Male connectors



Female connectors



Dimensions in mm

¹⁾ Explanations see page 04.03
Board drillings see pages 04.25 ff
Order special contacts separately. See pages 04.17 ff

Number of contacts

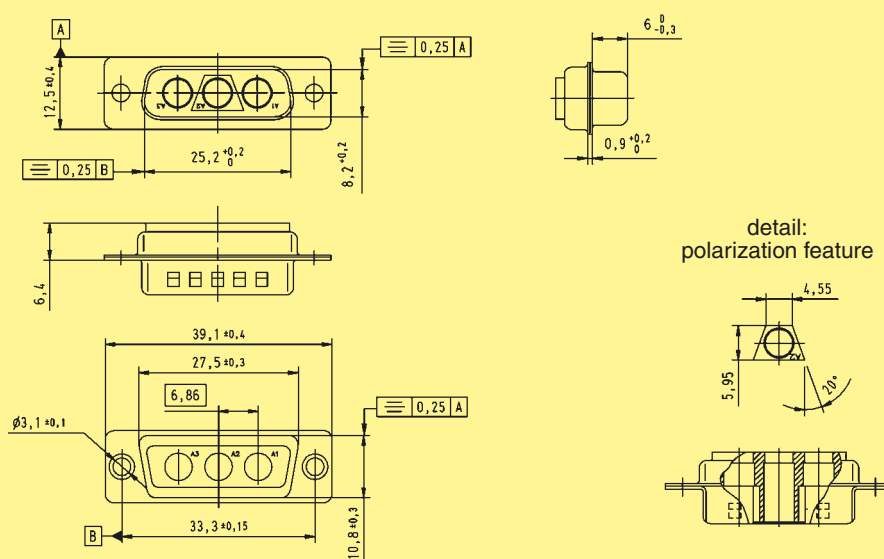
3



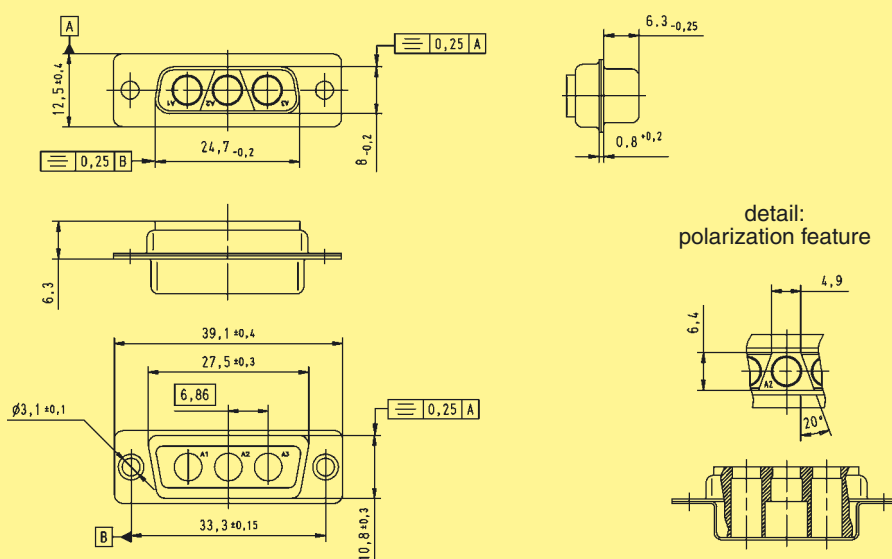
Coded shells without signal contacts for cable applications

Identification	No. of contacts ¹⁾	Part No.
		male connector
	3W3C	09 69 210 0633
		female connector
		09 69 200 0633

Male connectors



Female connectors



Dimensions in mm

¹⁾ Explanations see page 04.03
 Board drillings see pages 04.25 ff
 Order special contacts separately. See pages 04.17 ff

Number of contacts

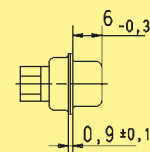
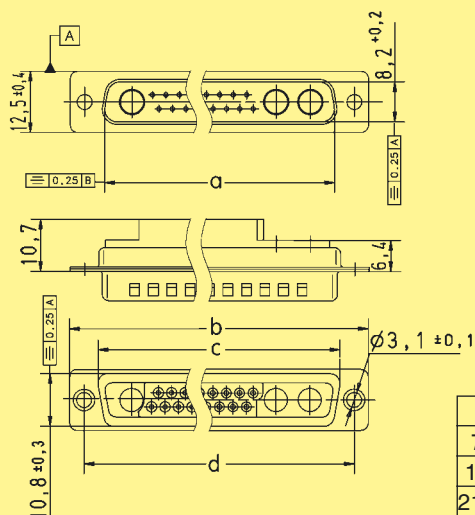
7-21



Mixed shells for signal crimp contacts

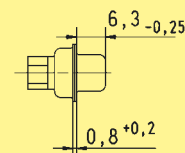
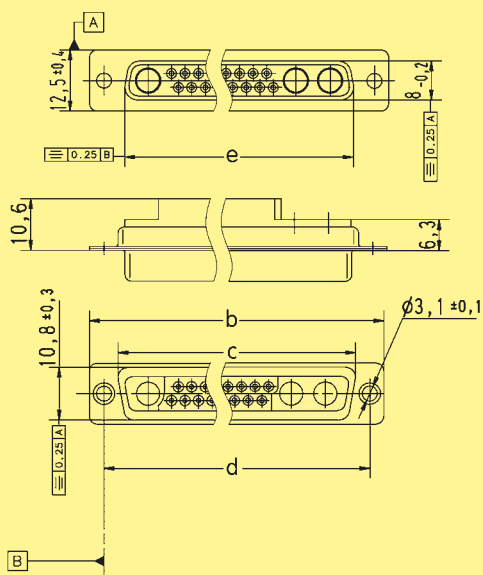
Identification	No. of contacts ¹⁾	Part No.	
		male connectors	female connectors
	7W2	09 69 212 0072	09 69 202 0072
	17W2	09 69 312 0172	09 69 302 0172
	21WA4	09 69 412 0214	09 69 402 0214

Male connectors



	a	b	c	d	e
7W2	25.2	39.1	27.5	33.30	24.7
17W2	38.9	53.0	41.3	47.04	38.5
21WA4	55.3	69.3	57.7	63.50	54.9

Female connectors



Dimensions in mm

¹⁾ Explanations see page 04.03
 Board drillings see pages 04.25 ff
 Order special contacts separately. See pages 04.17 ff

Number of contacts

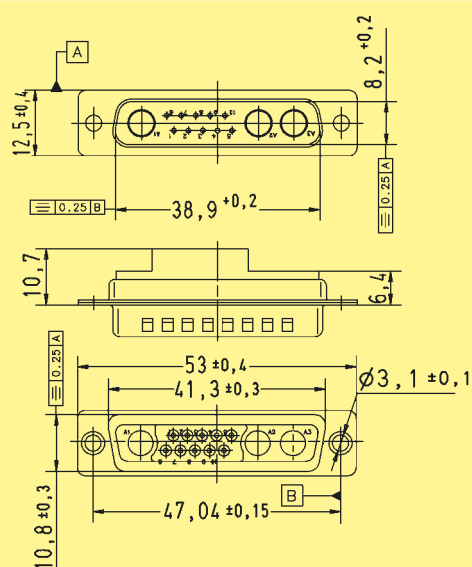
13



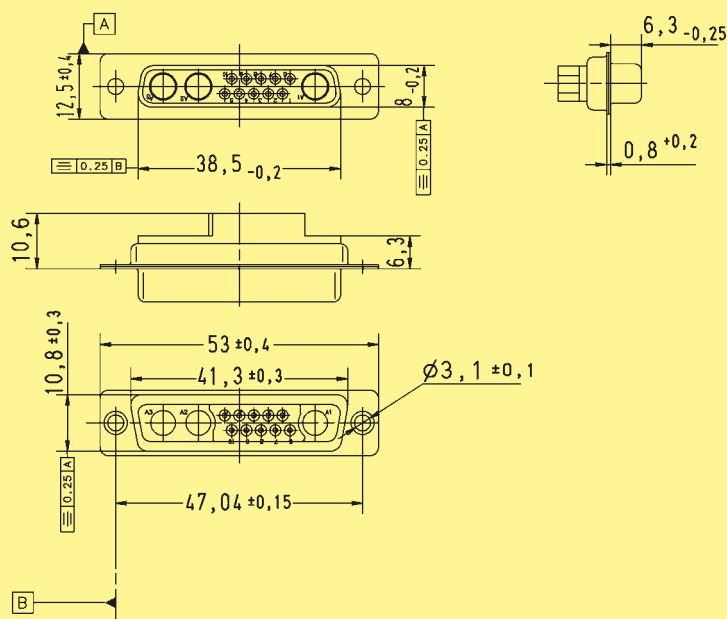
Mixed shells for signal crimp contacts

Identification	No. of contacts ¹⁾	Part No.	
		male connector	female connector
	13W3	09 69 312 0133	09 69 302 0133

Male connectors



Female connectors



Dimensions in mm

¹⁾ Explanations see page 04.03
 Board drillings see pages 04.25 ff
 Order special contacts separately. See pages 04.17 ff

	Signal contacts see page 04.18	Coaxial contacts see pages 04.22 + 04.23	Power contacts see pages 04.20 + 04.21	High voltage contacts see page 04.19
Working current	5 A	2 A	20 A, 30 A or 40 A	2 A DC
Test voltage $U_{r.m.s.}$	–	750 V / 50 Hz	–	4 kV / 50 Hz
Operating voltage	–	–	–	≤ 3 kV
Contact resistance	–	≤ 2.7 m Ω (inner and outer conductor)	≤ 1 m Ω	≤ 3 m Ω (outer conductor)
Impedance	–	50 / 75 Ω	–	–
Frequency range	–	0 - 2 GHz	–	–
Temperature range	–	-55 °C ... + 135 °C	-55 °C ... + 155 °C	-55 °C ... + 125 °C
Mating cycles				
high performance level	≥ 500	≥ 500	≥ 500	–
standard performance level	≥ 200	≥ 200	≥ 200	≥ 500
Mating force	≤ 3.4 N	≤ 7 N/mated pair	≤ 7 N/mated pair	≤ 5 N
Unmating force	≥ 0.2 N	≤ 7 N/mated pair	appr. 5 N	appr. 2.5 N
Materials				
Contacts	Copper alloy	Copper alloy	Copper alloy	Copper alloy
Plating*				
Mating side / terminating side	0.8 μm Au / 0.8 μm Au or 0.2 μ m Au / 0.2 μ m Au		0.8 μm Au / 0.2 μm Au or 0.2 μ m Au / 5 μ m Sn	1.3 μm Au / 1.3 μm Au
Inner conductor mating side / terminating side	–	1.3 μm Au / 1.3 μm Au or 0.2 μ m Au / 0.2 μ m Au	–	–
Outer conductor mating side / terminating side	–	0.8 μm Au / 0.8 μm Au or 0.2 μ m Au / 5 μ m Sn	–	–
Retaining clip	–	Copper alloy	Copper alloy	PI
Insulator	–	PBFE/PBTP/PI	–	PTFE

Technical characteristics for shells see page 04.06

* **High performance** or standard performance level



Straight signal crimp contacts for cable applications

Identification		Wire gauge (mm²)	Part No.	
			Performance level 3	Performance level S4
Male contact		0.09 - 0.14 AWG 28 - 26	09 69 282 7311	09 69 282 5311
		0.25 - 0.56 AWG 24 - 20	09 69 282 7310	09 69 282 5310
Female contact		0.09 - 0.14 AWG 28 - 26	09 69 182 7311	09 69 182 5311
		0.25 - 0.56 AWG 24 - 20	09 69 182 7310	09 69 182 5310

Male contact	
Female contact	

Dimensions in mm



High voltage contacts for cable applications

Identification	Wire gauge (mm ²)	Part No.	
Straight versions	0.25 - 0.56 AWG 24 - 20	Male contacts Plating: 1.3 µm Au ¹⁾	Female contacts Plating: 1.3 µm Au ¹⁾
		09 69 281 2550	09 69 181 2550
Right angled versions	0.25 - 0.56 AWG 24 - 20	09 69 681 2550	09 69 581 2550
Straight versions	Male contacts		Female contacts
Right angled versions			

Dimensions in mm

¹⁾ for mating and terminating side



Straight power contacts for cable applications

Identification		Rating (A)	Part No.	
Performance levels 			Performance level 3	Performance level S4
D-Sub - M	Solder version			
	Male contacts	20 30 40	09 69 281 7421 09 69 281 7422 09 69 281 7423	09 69 281 5421 09 69 281 5422 09 69 281 5423
	Female contacts	20 30 40	09 69 181 7421 09 69 181 7422 09 69 181 7423	09 69 181 5421 09 69 181 5422 09 69 181 5423
	Crimp version			
	Male contacts	20 30 40	09 69 282 7421 09 69 282 7422 09 69 282 7423	09 69 282 5421 09 69 282 5422 09 69 282 5423
	Female contacts	20 30 40	09 69 182 7421 09 69 182 7422 09 69 182 7423	09 69 182 5421 09 69 182 5422 09 69 182 5423



Straight power contacts for cable applications

Identification

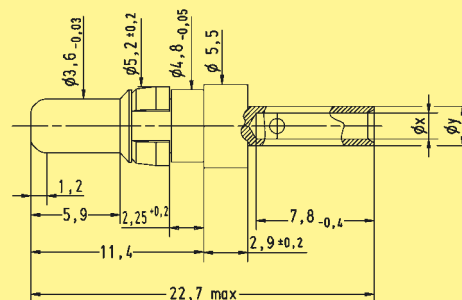
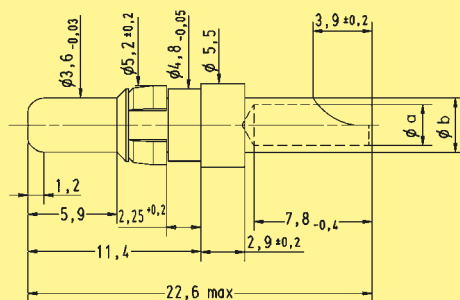
Drawing

Dimensions in mm

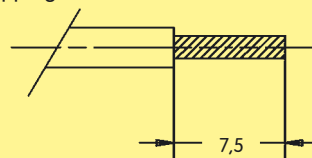
Male contacts

solder

crimp



stripping dimensions



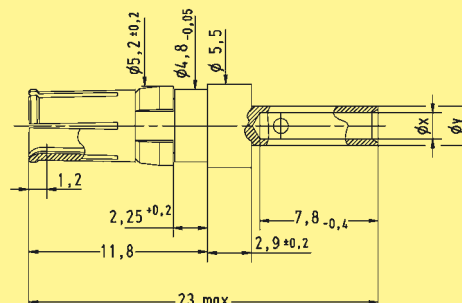
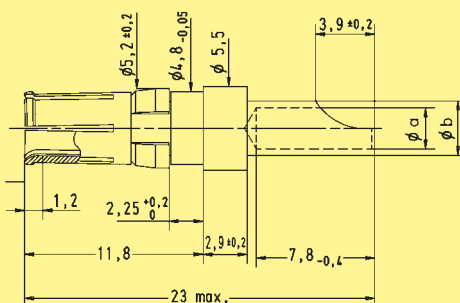
Rating (A)	$\varnothing a -0.1$	$\varnothing b \pm 0.05$
20	2.7	3.63
30	3.5	4.40
40	4.8	5.50

Rating (A)	$\varnothing x -0.1$	$\varnothing y \pm 0.05$	AWG
20	2.6	3.6	12 - 14
30	3.7	4.7	10 - 12
40	4.6	5.8	8 - 10

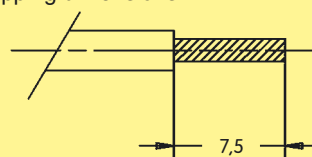
Female contacts

solder

crimp



stripping dimensions



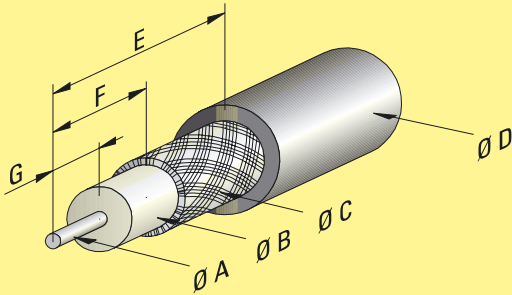


Coaxial contacts for cable applications

D-Sub - M

Identification	Impedance (Ω)	Part No.			
		Straight male contacts		Straight female contacts	
		Performance level 3	Performance level S4	Performance level 3	Performance level S4
Solder / crimp contact for cables RG 174 U, 188 AU, 316 U for cables RG 178 BU, 196 AU, 404 U for cables RG 179 BU, 187 AU	50	09 69 281 7140	09 69 281 5140	09 69 181 7140	09 69 181 5140
	50	09 69 281 7141	09 69 281 5141	09 69 181 7141	09 69 181 5141
	75	09 69 281 7230	09 69 281 5230	09 69 181 7230	09 69 181 5230
Crimp / crimp contact for cables RG 174 U, 188 AU, 316 U for cables RG 179 BU, 187 AU	50	09 69 282 7140	09 69 282 5140	09 69 182 7140	09 69 182 5140
	75	09 69 282 7230	09 69 282 5230	09 69 182 7230	09 69 182 5230

Harnessing dimensions (mm)



Part No.	Ø A	Ø B	Ø C	Ø D	E	F	G
09 69 181 5140 09 69 281 5140	0.85	1.9	2.3	3.2	9.5	5.0	3.0
09 69 181 5141 09 69 281 5141	0.85	1.2	1.4	2.3	9.5	5.0	3.0
09 69 181 5230 09 69 281 5230	0.50	1.9	2.3	3.2	9.5	5.0	3.0
09 69 182 5140 09 69 282 5140	0.60	1.9	2.4	3.2	9.0	4.3	3.0
09 69 182 5230 09 69 282 5230	0.60	1.9	2.4	3.2	9.0	4.3	3.0



Coaxial contacts for cable applications

Identification

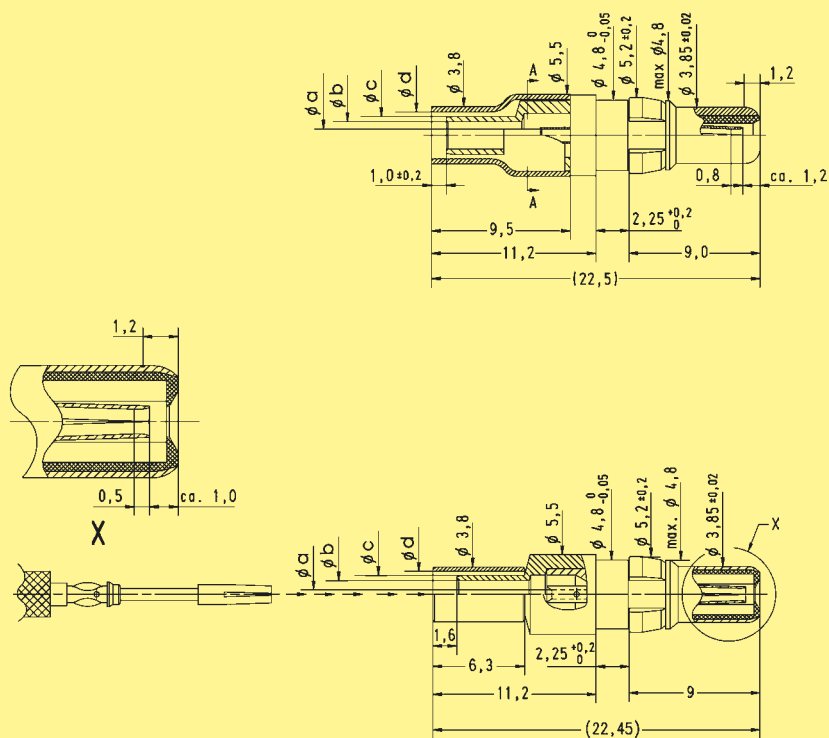
Drawing

Dimensions in mm

Male contacts

Part No.	$\varnothing a$	$\varnothing b$	$\varnothing c$	$\varnothing d$
09 69 281 5140	0.85	1.9	2.6	3.2
09 69 281 5141	0.85	1.2	1.7	2.3
09 69 281 5230	0.50	1.9	2.6	3.2

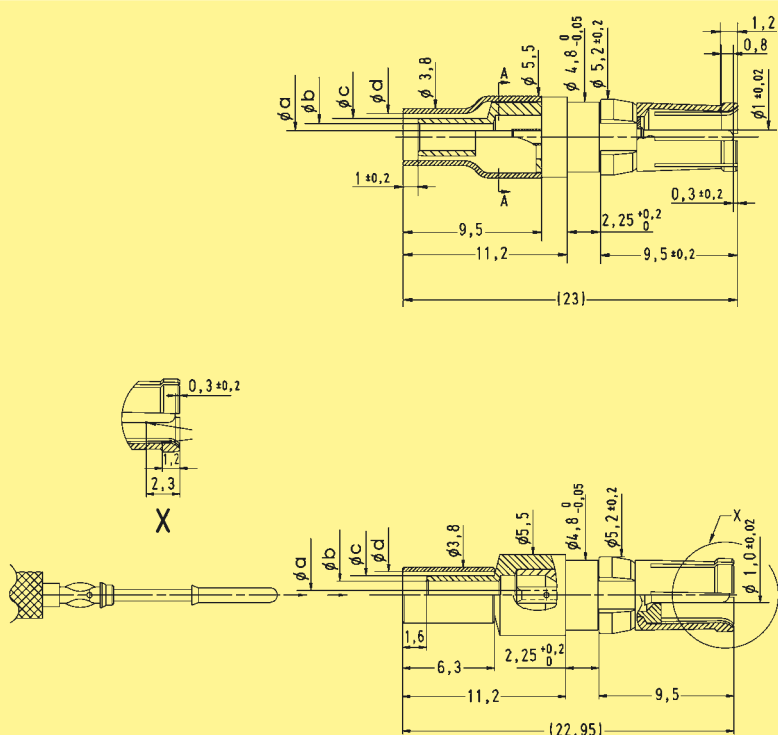
Part No.	$\varnothing a$	$\varnothing b$	$\varnothing c$	$\varnothing d$
09 69 282 5140	0.6	1.9	2.6	3.2
09 69 282 5230	0.6	1.9	2.6	3.2



Female contacts

Part No.	$\varnothing a$	$\varnothing b$	$\varnothing c$	$\varnothing d$
09 69 181 5140	0.85	1.9	2.6	3.2
09 69 181 5141	0.85	1.2	1.7	2.3
09 69 181 5230	0.50	1.9	2.6	3.2

Part No.	$\varnothing a$	$\varnothing b$	$\varnothing c$	$\varnothing d$
09 69 182 5140	0.6	1.9	2.6	3.2
09 69 182 5230	0.6	1.9	2.6	3.2



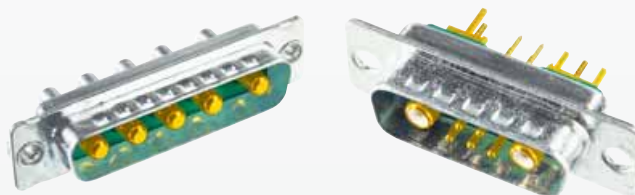


Pcb hole patterns for power contacts

In the next pages, the pcb hole pattern is given for the power and the coaxial contact per connector layout. In the case of the power contact, the drilling hole dimension is not mentioned; the table here under provides relevant information according to the current rating of the contact and its version.

Power contact diameter and pcb related drilling diameter

	Straight connectors		Right angled connectors	
Rating	Pin Ø (mm)	Pcb drilling Ø (mm)	Pin Ø (mm)	Pcb drilling Ø (mm)
20 A	2.6	2.9	2.85	3.15
30 A	–	–	3.20	3.50
40 A	3.75	4.0	3.75	4.05



Board drillings for connectors with straight pcb contacts

Identification

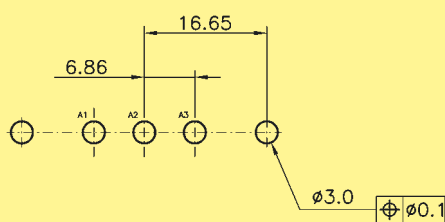
Drawing

Dimensions in mm

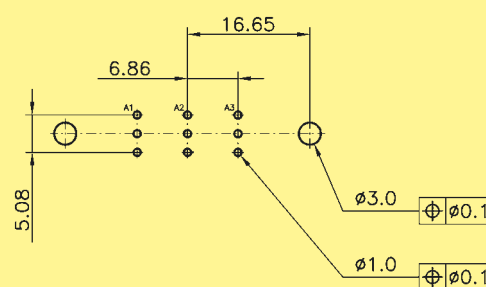
Male connector*

3W3 / 3W3C

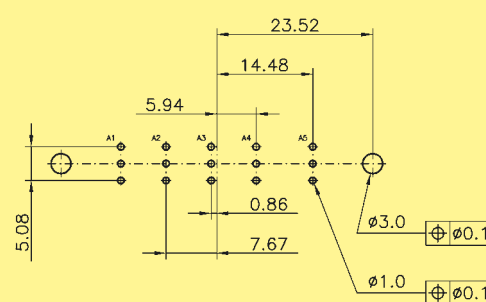
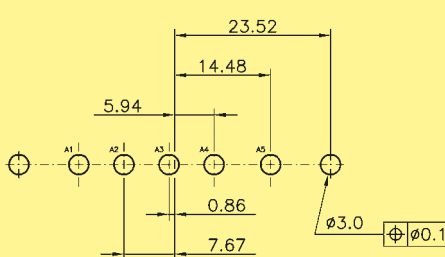
Power contact



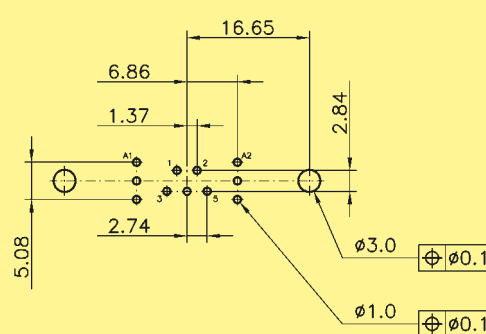
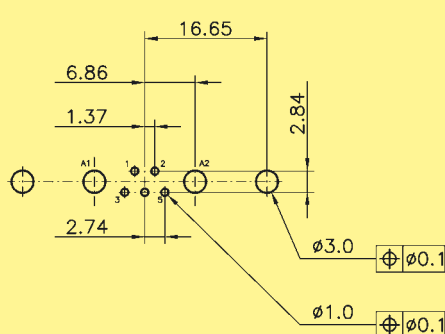
Coaxial contact



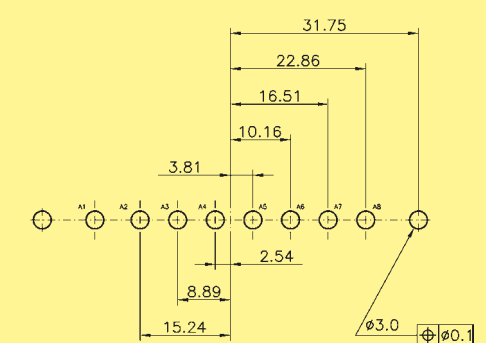
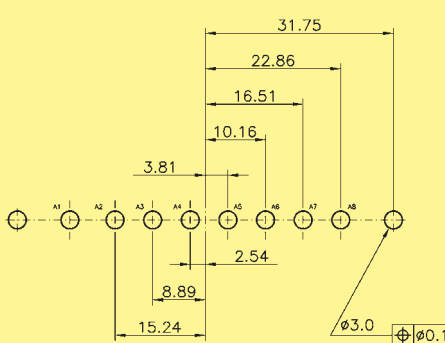
5W5



7W2



8W8



* When using a female connector with straight pcb contacts the board drilling pattern must be mirrored in the Y axis.



Board drillings for connectors with straight pcb contacts

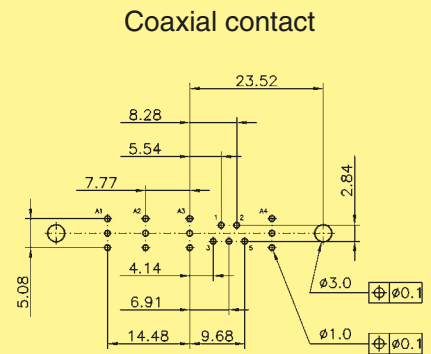
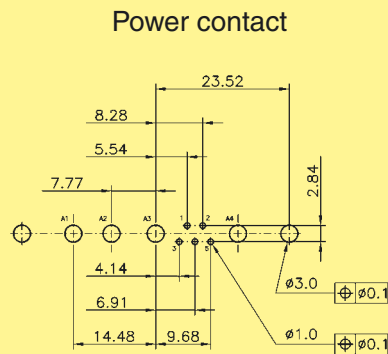
Identification

Drawing

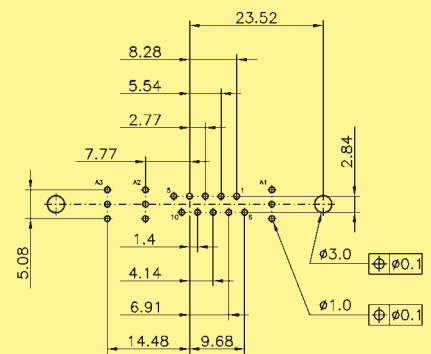
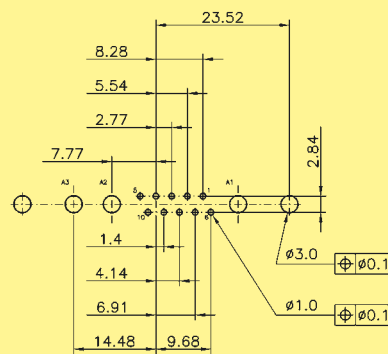
Dimensions in mm

Male connector*

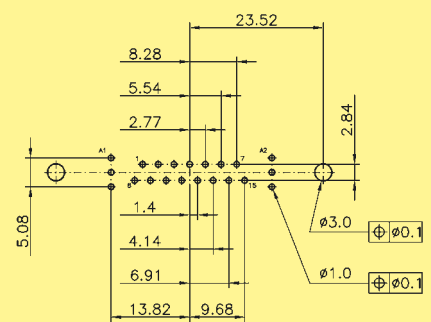
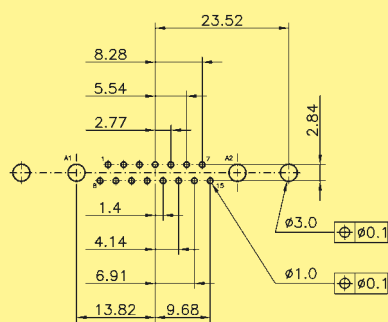
9W4



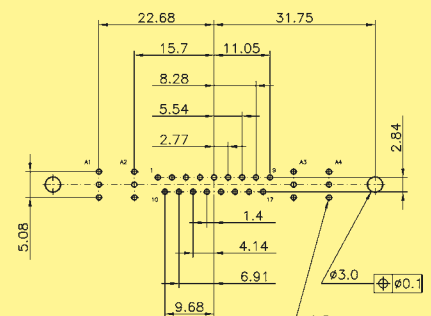
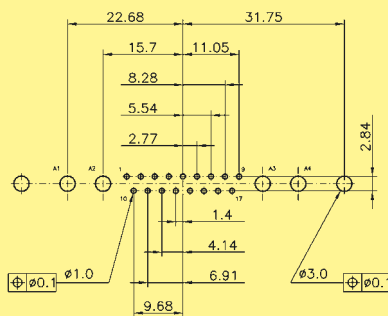
13W3



17W2



21WA4



* When using a female connector with straight pcb contacts the board drilling pattern must be mirrored in the Y axis.



Board drillings for connectors with right angled pcb contacts

Identification

Drawing

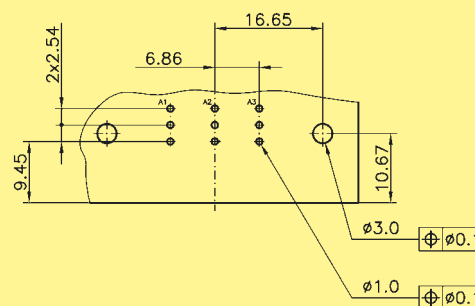
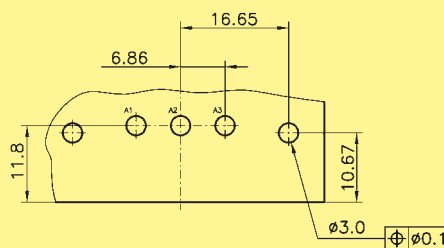
Dimensions in mm

Male connector*

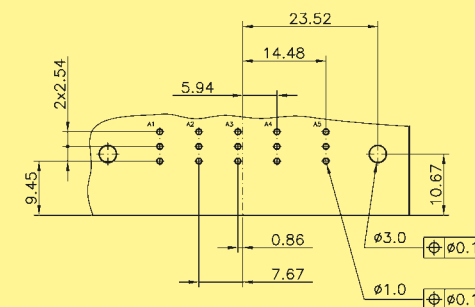
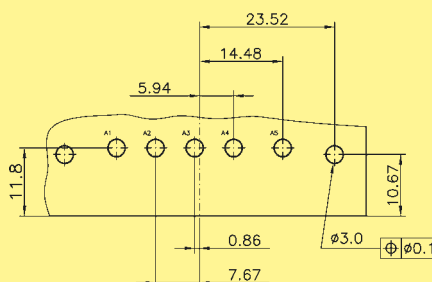
3W3 / 3W3C

Power contact

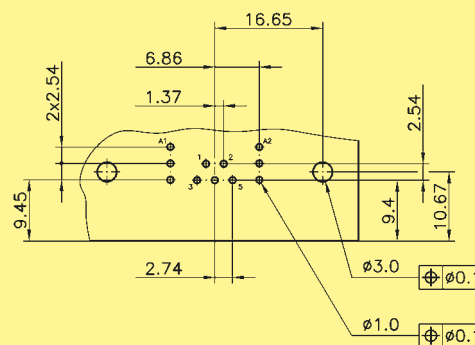
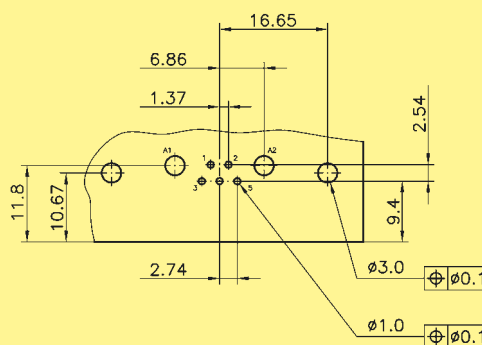
Coaxial contact



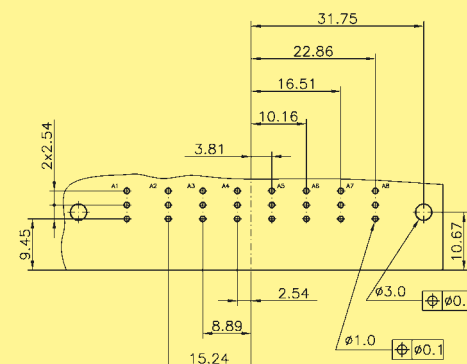
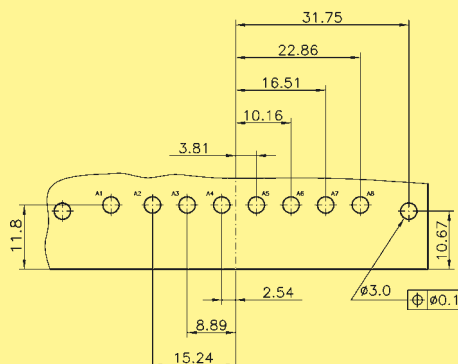
5W5



7W2



8W8



* When using a female connector with right angled pcb contacts the board drilling pattern must be mirrored in the Y axis.



Identification	Drawing	Dimensions in mm
----------------	---------	------------------

Coaxial contact

Technical drawing of a mechanical part with dimensions and labels. The drawing shows a side view of a component with a curved top surface and a flat base. Key dimensions include:

- Overall width: 23.52
- Overall height: 10.67
- Top surface radius: 7.77
- Base thickness: 2.54
- Internal hole diameter: $\phi 3.0$
- External hole diameter: $\phi 1.0$
- Internal hole position: 1.4, 4.14, 6.91, 14.48, 9.68
- External hole position: 8.28, 5.54, 2.77
- Internal hole offset: 2x2.54
- Internal hole offset: 9.45
- Internal hole offset: 9.4
- Internal hole offset: 10.67

Labels A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z are used to identify specific features and points on the drawing.

Technical drawing of a mechanical part with dimensions and tolerances. The drawing shows a cross-section of a part with a central hole and two side holes. The dimensions are as follows:

- Overall width: 23.52
- Distance from left edge to center of left hole: 8.28
- Distance from center of left hole to center of central hole: 5.54
- Distance from center of central hole to center of right hole: 2.77
- Distance from center of right hole to right edge: 2.54
- Overall height: 9.45
- Distance from top edge to center of central hole: 2x2.54
- Distance from bottom edge to center of central hole: 10.67
- Distance from left edge to center of left hole: 1.4
- Distance from center of left hole to center of central hole: 4.14
- Distance from center of central hole to center of right hole: 6.91
- Distance from center of right hole to right edge: 13.82
- Distance from center of central hole to right edge: 9.68
- Central hole diameter: $\varnothing 3.0$
- Left hole diameter: $\varnothing 0.1$
- Right hole diameter: $\varnothing 0.1$
- Inner hole diameter: $\varnothing 1.0$

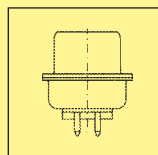
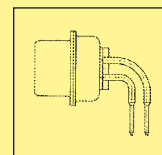
Technical drawing of a mechanical part with dimensions and tolerances. The drawing shows a side view of a component with a central section and two end sections. The central section has a length of 22.68 and a diameter of $\phi 3.0$ with a tolerance of $\Phi \pm 0.1$. The end sections have a length of 31.75 and a diameter of $\phi 1.0$ with a tolerance of $\Phi \pm 0.1$. The total length of the part is 54.43. The drawing also shows various other dimensions and tolerances, including 15.7, 11.05, 8.28, 5.54, 2.77, 2.54, 9.45, 9.4, 10.67, 1.4, 4.14, 6.91, and 9.68. The drawing is labeled with 'A1', 'A2', '1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24', '25', '26', '27', '28', '29', '30', '31', '32', '33', '34', '35', '36', '37', '38', '39', '40', '41', '42', '43', '44', '45', '46', '47', '48', '49', '50', '51', '52', '53', '54', '55', '56', '57', '58', '59', '60', '61', '62', '63', '64', '65', '66', '67', '68', '69', '70', '71', '72', '73', '74', '75', '76', '77', '78', '79', '80', '81', '82', '83', '84', '85', '86', '87', '88', '89', '90', '91', '92', '93', '94', '95', '96', '97', '98', '99', '100'.

D-Sub - M

HARTING customer request form for pcb connectors

1 Connector gender and type

- ☐ Male
- ☐ Female


☐ Straight

☐ Right angled

2 Contact arrangement

Standard

- ☐ 3W3 ☐ 8W8 ☐ 21WA4 ☐ Other configuration
☐ 5W5 ☐ 13W3 ☐ 24W7 _____
☐ 7W2 ☐ 17W2 ☐ 36W4 _____

Special configurations
(mixed contact genders)

- ☐ 2W2C ☐ 3W3C

2.1 Any signal contacts?

- ☐ Yes (fill in questions below) ☐ No (go directly to item 2.2)
☐ Right angled 2.54 mm pitch
☐ Other pitch: _____

2.2 Any power contacts?

- ☐ Yes (fill in questions below) ☐ No (go directly to item 2.3)

Current rating

- ☐ 10 A ☐ 30 A
☐ 20 A ☐ 40 A

Termination type

- ☐ Solder pin for pcb
☐ Press in for pcb (30A)

Performance level

[mating side / termination side]

- ☐ S4 [0.8 µm Au / 0.2 µm Au]
☐ PL 3 [0.2 µm Au / 5.0 µm Sn]

2.3 Any coaxial contacts?

- ☐ Yes (fill in questions below) ☐ No (go directly to item 3)

Impedance

- ☐ 50 Ω
☐ 75 Ω

Performance level

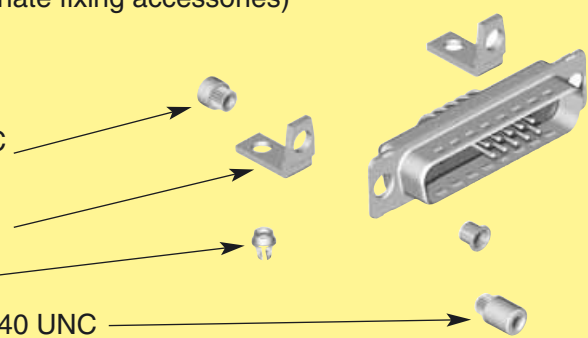
[mating side inner / outer conductor]

- ☐ S4 [1.3 µm Au / 0.8 µm Au]
☐ PL 3 [0.2 µm Au / 0.2 µm Au]

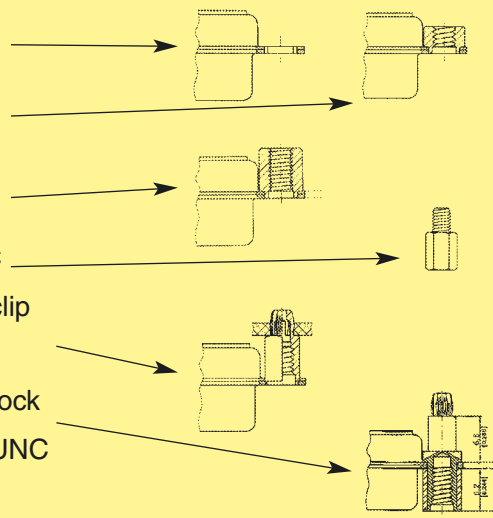
HARTING customer request form for pcb connectors

3 Pcb mounting accessories (select appropriate fixing accessories)

3.1 Right angled version

- ☐ Through hole
 - ☐ Nut 4-40 UNC
 - ☐ Nut M3
 - ☐ Metal bracket
 - ☐ Snap clip
 - ☐ Screw lock 4-40 UNC
- 

3.2 Straight version

- ☐ Through hole
 - ☐ Nut 4-40 UNC
 - ☐ Nut M3
 - ☐ Spacer 4-40 UNC
 - ☐ Spacer M3
 - ☐ Screw lock 4-40 UNC
 - ☐ Spacer 4-40 UNC + clip
 - ☐ Spacer M3 + clip
- Spacer + clip and screw lock
- ☐ M3 ☐ 4-40 UNC
- 

4 Additional information

Pcb thickness:

(if possible provide pcb layout with plating specifications)

Operating temperature:

☐ standard

☐ SMC compatible

Is hot plugging required

☐ No

☐ Yes

Short description: _____

Is a vacuum pick and place process considered?

☐ No

☐ Yes

Is blind mating feature required?

☐ No

☐ Yes (provide precise requirements)

Name: _____

Drawing: ☐ no ☐ yes

Company: _____

Samples: ☐ no ☐ yes, quantity

Address: _____

Volume (pcs./year): _____

Phone: _____

Special requirements: _____

Fax: _____

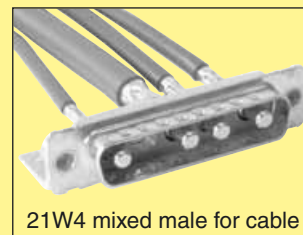
E-Mail: _____

HARTING customer request form for cable connectors

1 Connector gender

Note: for a right angled configuration please consult us

- ☐ Straight plug (male contacts)
☐ Straight receptacle (female contacts)



21W4 mixed male for cable

2 Contact arrangement

Standard

- ☐ 3W3 ☐ 8W8 ☐ 21WA4
☐ 5W5 ☐ 13W3 ☐ 24W7
☐ 7W2 ☐ 17W2 ☐ 36W4
☐ Other configuration _____

Special configurations
(mixed contact genders)

- ☐ 2W2C ☐ 3W3C

2.1 Any signal contacts?

- ☐ Yes (fill in questions below) ☐ No (go directly to item 2.2)

Termination type

- ☐ Crimp ☐ Solder cup S4 [0.8 µm Au]

Signal cable size for crimp contact

- ☐ AWG 20-24 ☐ AWG 26-28

Crimp contact performance level

- ☐ S4 [0.8 µm Au / 0.2 µm Au]
☐ PL3 [0.2 µm Au / 5.0 µm Sn]

2.2 Any power contacts?

- ☐ Yes (fill in questions below) ☐ No (go directly to item 2.3)

Current rating

- ☐ 10 A ☐ 20 A ☐ 30 A ☐ 40 A

Termination type

- ☐ Crimp ☐ Solder cup

Performance level

[mating side / termination side]

- ☐ S4 [0.8 µm Au / 0.2 µm Au]
☐ PL3 [0.2 µm Au / 5.0 µm Sn]

2.3 Any coaxial contacts?

- ☐ Yes (fill in questions below) ☐ No

Impedance

- ☐ 50 Ω ☐ 75 Ω

Termination type

- ☐ Crimp/crimp
☐ Crimp/solder [inner conductor is soldered, outer crimped]

Performance level

[mating side inner / outer conductor]

- ☐ S4 [1.3 µm Au / 0.8 µm Au]
☐ PL3 [0.2 µm Au / 0.2 µm Au]

Cable reference (e.g. RG 178): _____

Name: _____

Drawing: _____

- ☐ no ☐ yes

Company: _____

Samples: _____

- ☐ no ☐ yes, quantity

Address: _____

Volume (pcs./year): _____

Phone: _____

Special requirements: _____

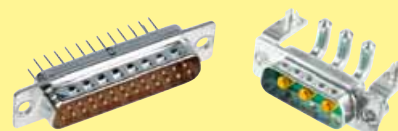
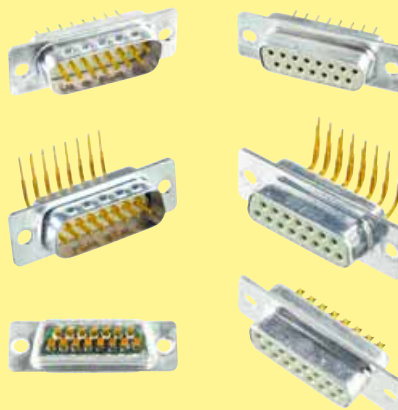
Fax: _____

E-Mail: _____


New
D-Sub – Filter subminiature D connectors, 2.54 mm pitch

Page

General information	05.02
Technical characteristics	05.03
Attenuation characteristics	05.04
Connectors with turned solder pins, straight	05.06
Connectors with turned solder pins, right angled (European footprint)	05.08
Connectors with solder buckets	05.10
Flange thread and board locking options	
General information	05.12
For connectors with straight solder pins	05.13
For connectors with right angled solder pins	05.14
For connectors with solder buckets	05.15
Board drillings	05.17
Panel cut outs / panel mountings	05.18
Customized solutions	
General information	05.19
HARTING customer request form	05.22



HARTING filter D connectors are distinguished by their high performance and offer optimal filtering. The filtering element incorporates a multi-layer printed circuit board and surface mount components, all within the standard D-Sub shell.

The HARTING filter D range consists of:

- A standard range of products (available from stock for pcb and cable applications):
 - male and female connectors
 - various terminations such as solder buckets, straight and right angled solder pins
 - 9, 15, 25 and 37 contact versions
 - a large range of accessories

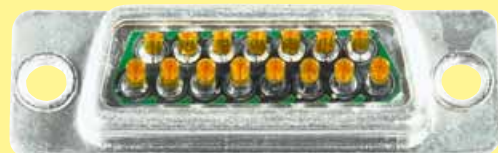
- **Customized solutions:**

The innovative technical solution of filtering enables customers to select the optimum filter on a contact by contact approach. This flexible technology allows not only to segregate the filtering per contact but also to mix the type of filter in a single competitive product. Please contact your local HARTING representative. Customized possibilities are explained on pages 05.19 ff.

These products are designed to enable systems to meet and comply with FCC-part 15, IEC 1000 and EN 5502 specifications.

HARTING filtered D connectors are suitable for military, aerospace, industrial, medical, telecom and computers applications.

HARTING filter D connectors can also take advantage of reflow soldering and the cost savings it brings.



Number of contacts 9, 15, 25, 37
UL recognized

Working current 7.5 A max.

Test voltage $U_{r.m.s.}$ 1 kV

Contact resistance $\leq 10 \text{ m}\Omega$
Insulation resistance $\geq 1000 \text{ M}\Omega$

Temperature range -55 °C ... + 125 °C
during reflow soldering max. + 230 °C for 60 s

Terminations
a) Solder buckets max. 0.8 mm²
b) Solder pins $\varnothing 0.6 \text{ mm}$ for P.C.B. holes $\varnothing 0.8/1 \text{ mm}$
c) Solder pins, angled 90° $\varnothing 0.6 \text{ mm}$ for P.C.B. holes $\varnothing 0.8/1 \text{ mm}$

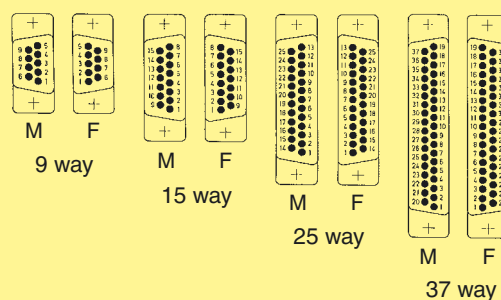
Materials
Mouldings and hoods Polyester two part moulding, glass-fibre re-inforced, flame retardant acc. to UL 94-V0

Contacts Copper alloy
Male and female contacts are turned

Contact surface Contact zone: selectively gold-plated over nickel to allow 200 mating cycles
Termination zone: gold-plated

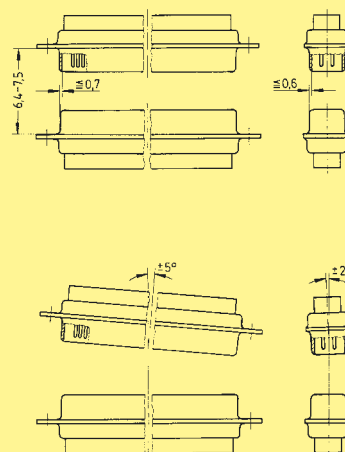
Metal shell Steel surface, tinned

Contact arrangement
View from termination side



M = Male connector
F = Female connector

Mating conditions as per DIN 41 652



Attenuation characteristics

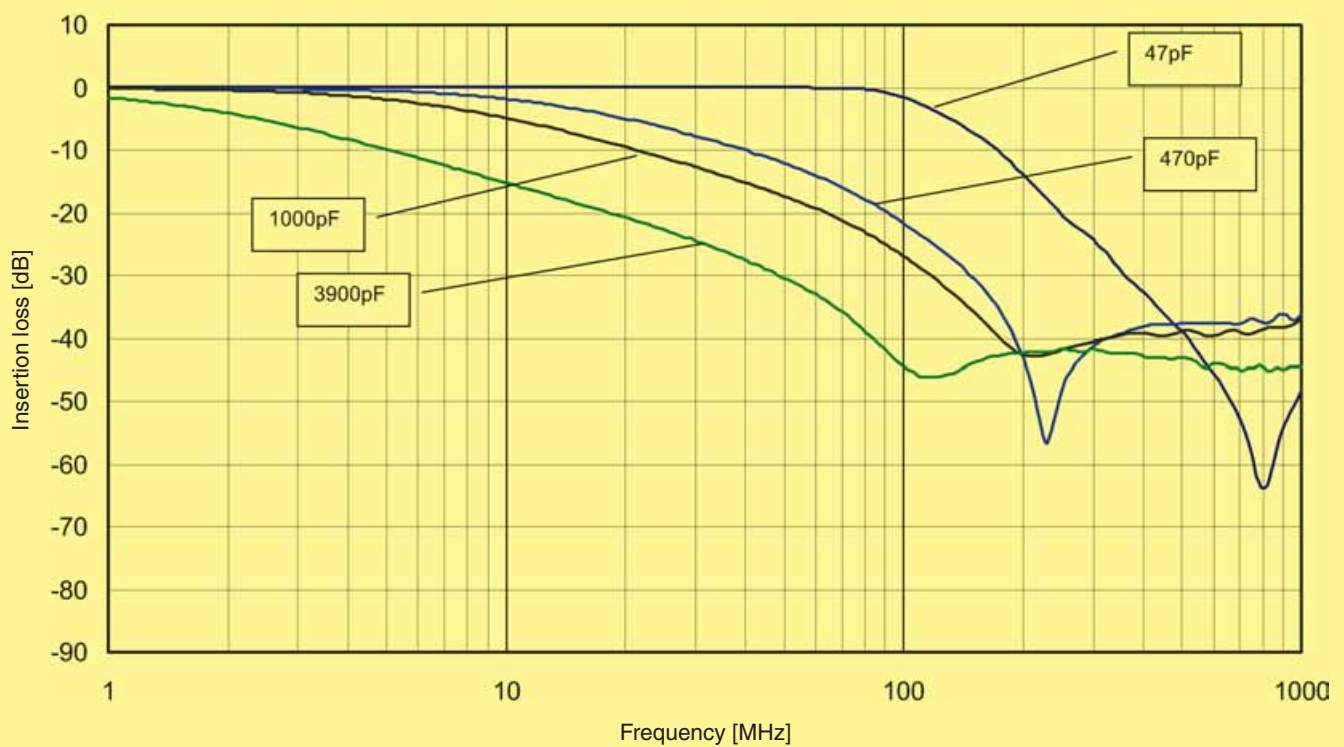
Min. insertion loss

Capacitance [pF] ¹⁾	Attenuation (in dB) vs. frequency [MHz]						
	1	5	10	50	100	500	1000
47						30	35
470			1	11	16	35	32
1000		1	3	12	24	38	30
3900	1	6	11	25	35	38	32

¹⁾ Capacitance tolerance = $\pm 20\%$ (For other capacitor values see pages 05.20 ff).

Measured in 50 Ω system according to MIL-STD-220, no load.

Typical insertion loss for different filters (measured)



Number of contacts

9–37



Turned solder pins, straight

Identification	No. of contacts	Part No.	
		male connectors	female connectors
Connectors with 47 pF C filter	9	09 64 122 721 .	09 64 112 721 .
	15	09 64 222 721 .	09 64 212 721 .
	25	09 64 322 721 .	09 64 312 721 .
	37	09 64 422 721 .	09 64 412 721 .
Connectors with 470 pF C filter	9	09 64 122 722 .	09 64 112 722 .
	15	09 64 222 722 .	09 64 212 722 .
	25	09 64 322 722 .	09 64 312 722 .
	37	09 64 422 722 .	09 64 412 722 .
Connectors with 1000 pF C filter	9	09 64 122 723 .	09 64 112 723 .
	15	09 64 222 723 .	09 64 212 723 .
	25	09 64 322 723 .	09 64 312 723 .
	37	09 64 422 723 .	09 64 412 723 .
Connectors with 3900 pF C filter	9	09 64 122 724 .	09 64 112 724 .
	15	09 64 222 724 .	09 64 212 724 .
	25	09 64 322 724 .	09 64 312 724 .
	37	09 64 422 724 .	09 64 412 724 .
Please insert digit for flange thread and board locking options.			
For detailed information see pages 05.12 ff			

Number of contacts

9-37



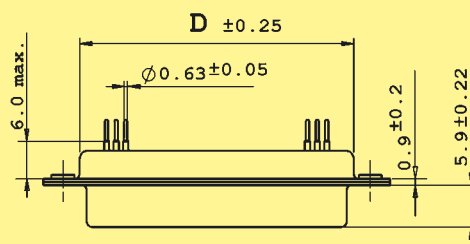
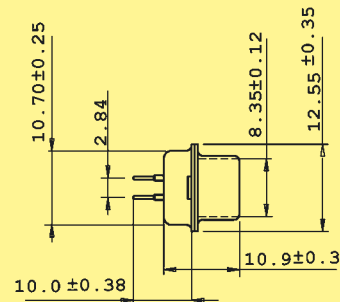
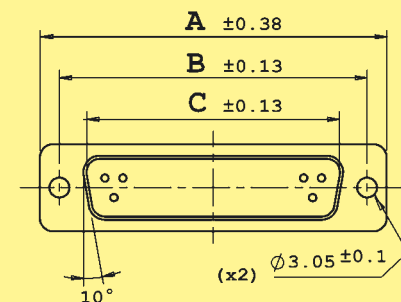
Turned solder pins, straight

Identification

Drawing

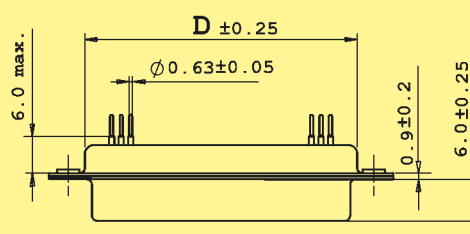
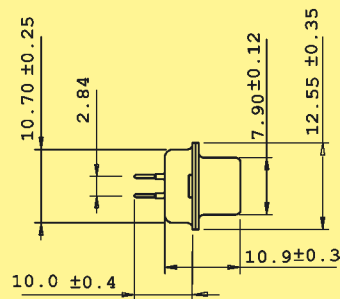
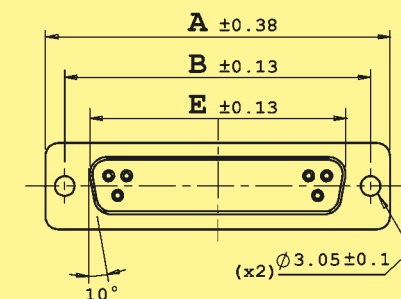
Dimensions in mm

Male connector



No. of contacts	A	B	C	D	E
9	30.81	24.99	16.92	19.28	16.33
15	39.14	33.32	25.25	27.51	24.66
25	53.04	47.04	38.96	41.30	38.38
37	69.32	63.50	55.42	57.71	54.84

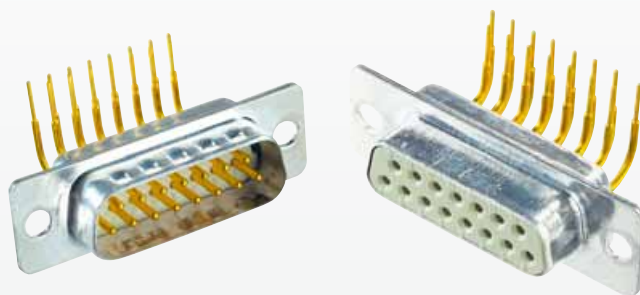
Female connector



D-Sub - F

Number of contacts

9–37



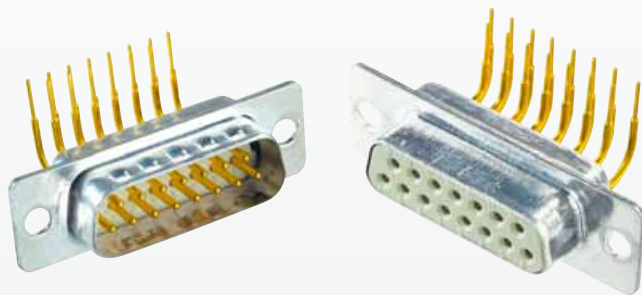
Turned solder pins, right angled

Identification	No. of contacts	Part No.	
		male connectors	female connectors
Connectors with 47 pF C filter	9	09 64 124 721 .	09 64 114 721 .
	15	09 64 224 721 .	09 64 214 721 .
	25	09 64 324 721 .	09 64 314 721 .
	37	09 64 424 721 .	09 64 414 721 .
Connectors with 470 pF C filter	9	09 64 124 722 .	09 64 114 722 .
	15	09 64 224 722 .	09 64 214 722 .
	25	09 64 324 722 .	09 64 314 722 .
	37	09 64 424 722 .	09 64 414 722 .
Connectors with 1000 pF C filter	9	09 64 124 723 .	09 64 114 723 .
	15	09 64 224 723 .	09 64 214 723 .
	25	09 64 324 723 .	09 64 314 723 .
	37	09 64 424 723 .	09 64 414 723 .
Connectors with 3900 pF C filter	9	09 64 124 724 .	09 64 114 724 .
	15	09 64 224 724 .	09 64 214 724 .
	25	09 64 324 724 .	09 64 314 724 .
	37	09 64 424 724 .	09 64 414 724 .
Please insert digit for flange thread and board locking options.			
For detailed information see pages 05.12 ff			

Number of contacts

9-37

Turned solder pins, right angled

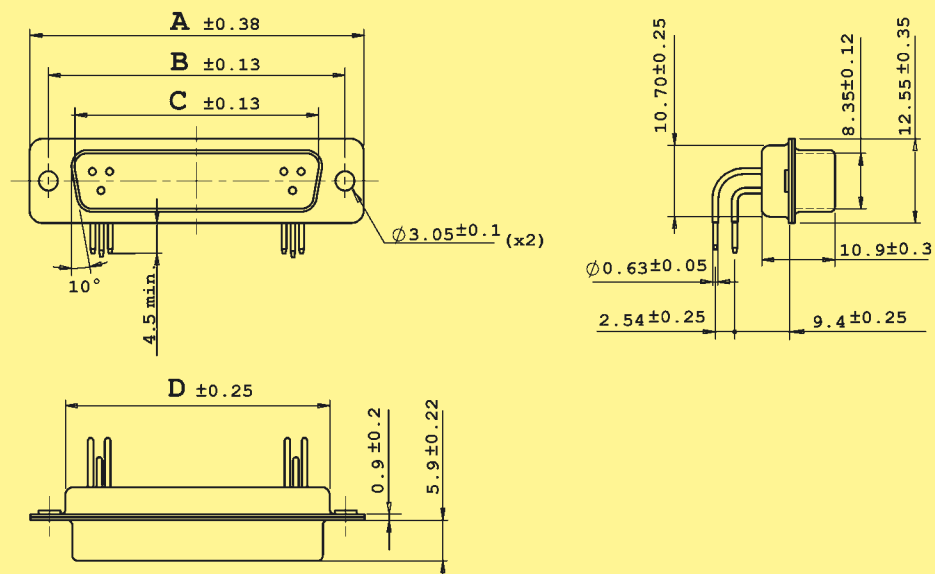


Identification

Drawing

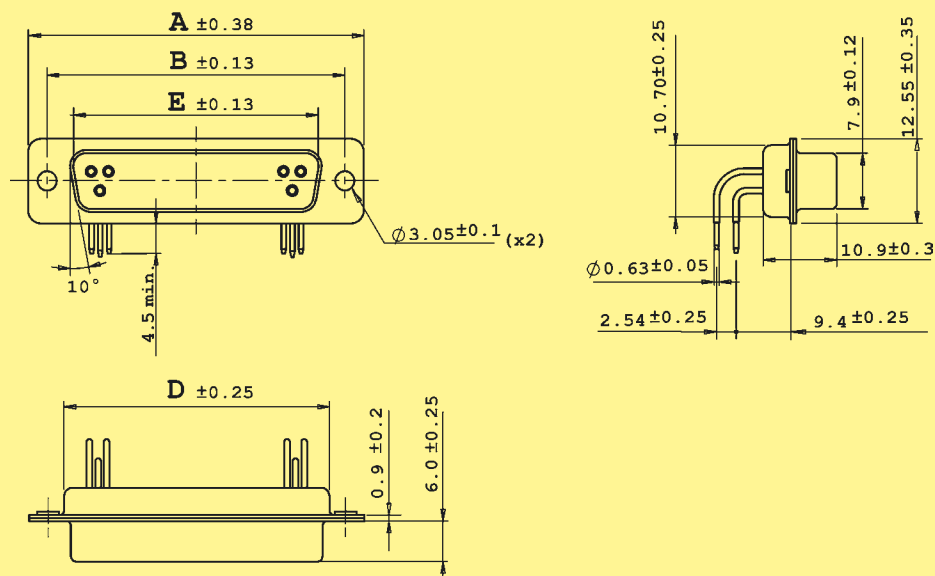
Dimensions in mm

Male connector



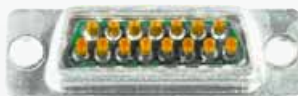
No. of contacts	A	B	C	D	E
9	30.81	24.99	16.92	19.28	16.33
15	39.14	33.32	25.25	27.51	24.66
25	53.04	47.04	38.96	41.30	38.38
37	69.32	63.50	55.42	57.71	54.84

Female connector



Number of contacts

9–37

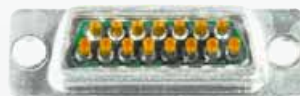


Solder buckets

Identification	No. of contacts	Part No.	
		male connectors	female connectors
Connectors with 47 pF C filter	9	09 64 121 721 .	09 64 111 721 .
	15	09 64 221 721 .	09 64 211 721 .
	25	09 64 321 721 .	09 64 311 721 .
	37	09 64 421 721 .	09 64 411 721 .
Connectors with 470 pF C filter	9	09 64 121 722 .	09 64 111 722 .
	15	09 64 221 722 .	09 64 211 722 .
	25	09 64 321 722 .	09 64 311 722 .
	37	09 64 421 722 .	09 64 411 722 .
Connectors with 1000 pF C filter	9	09 64 121 723 .	09 64 111 723 .
	15	09 64 221 723 .	09 64 211 723 .
	25	09 64 321 723 .	09 64 311 723 .
	37	09 64 421 723 .	09 64 411 723 .
Connectors with 3900 pF C filter	9	09 64 121 724 .	09 64 111 724 .
	15	09 64 221 724 .	09 64 211 724 .
	25	09 64 321 724 .	09 64 311 724 .
	37	09 64 421 724 .	09 64 411 724 .
Please insert digit for flange thread and board locking options.			
For detailed information see pages 05.12 ff			

Number of contacts

9-37



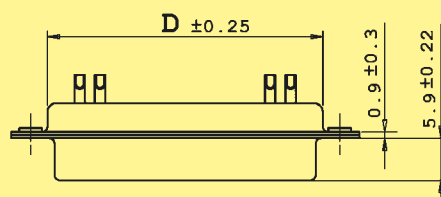
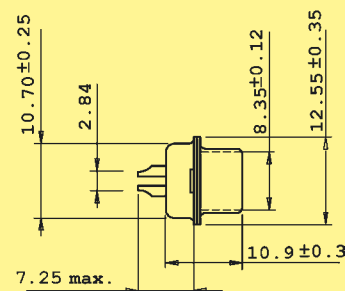
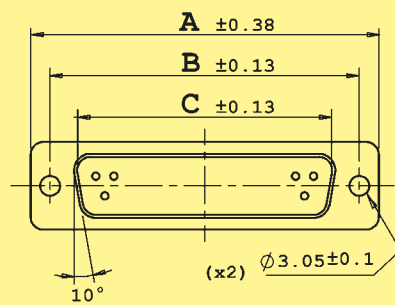
Solder buckets

Identification

Drawing

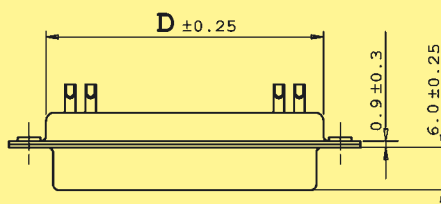
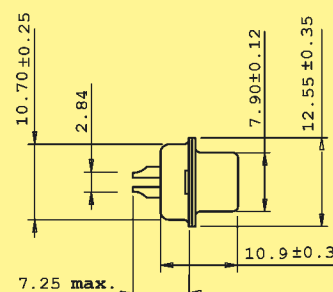
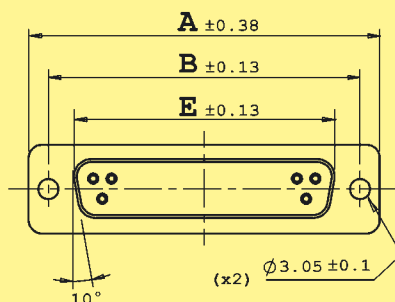
Dimensions in mm

Male connector



No. of contacts	A	B	C	D	E
9	30.81	24.99	16.92	19.28	16.33
15	39.14	33.32	25.25	27.51	24.66
25	53.04	47.04	38.96	41.30	38.38
37	69.32	63.50	55.42	57.71	54.84

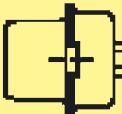
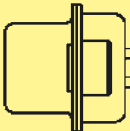
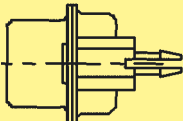
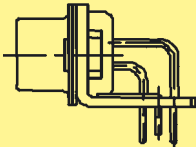
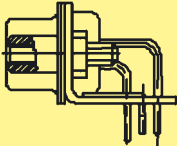
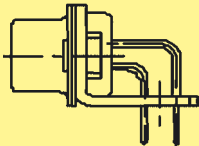
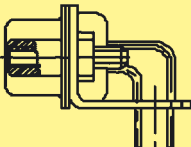
Female connector



General information

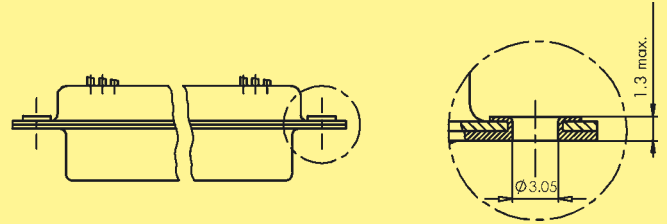
09 64 xxx xxx ■

Insert digit for

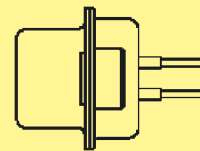
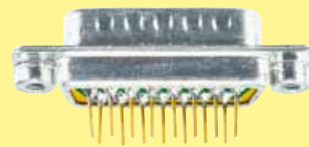
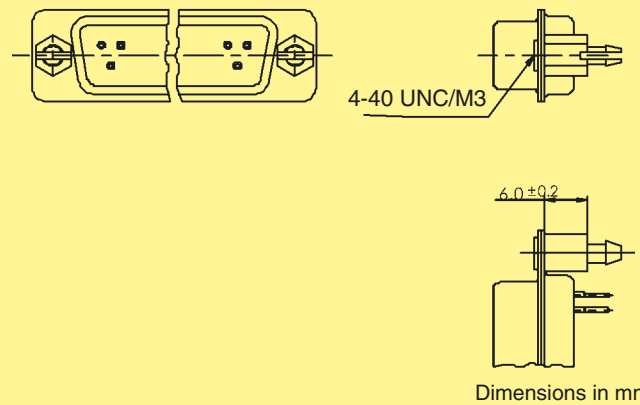
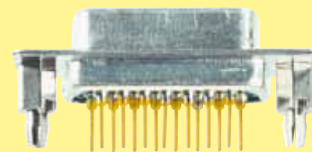
			straight versions	right angled versions	solder bucket versions
Through hole		TH	0	0	0
Clinch nut M3 or 4-40 UNC		4-40 UNC	7		7
		M3	8		8
Straight board clip M3 or 4-40 UNC		4-40 UNC	5		
		M3	6		
Board lock + clinch nut through hole, M3 or 4-40 UNC		TH		1	
		4-40 UNC		2	
		M3		3	
Board lock + female screw lock M3 or 4-40 UNC		4-40 UNC		4	
		M3		5	
Without board lock + clinch nut M3 or 4-40 UNC		4-40 UNC		6	
		M3		7	
Without board lock + female screw lock M3 or 4-40 UNC		4-40 UNC		8	
		M3		9	

Detailed information for straight connectors

Digit = 0

Through hole
(3.05 mm diameter)Digit = 7 4-40 UNC
Digit = 8 M3

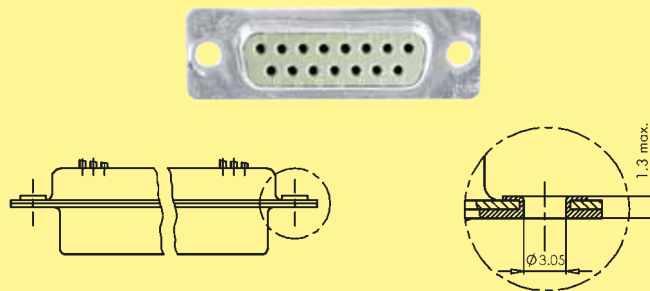
Clinch nut

Digit = 5 4-40 UNC
Digit = 6 M3Straight board
clip

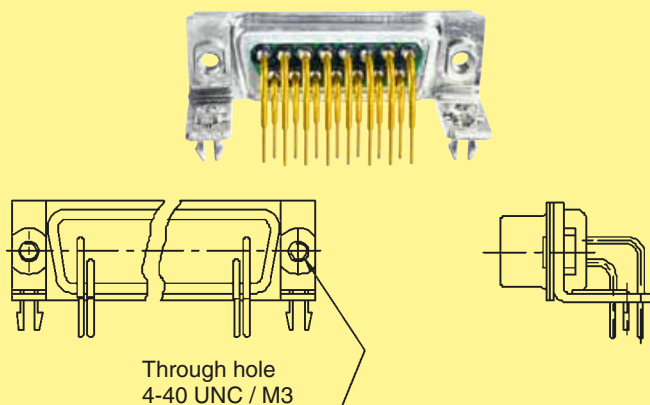
Dimensions in mm

Detailed information for right angled connectors

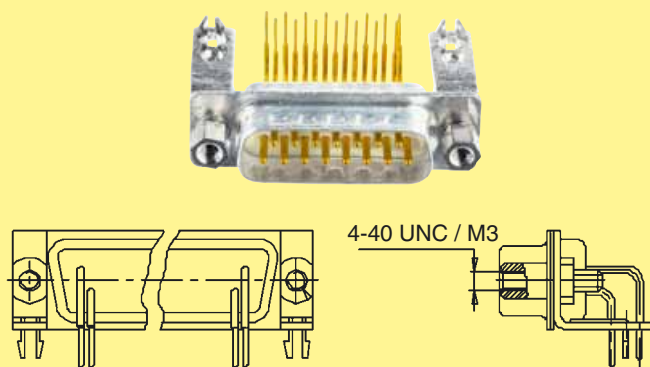
Digit = 0

Through hole
(3.05 mm diameter)

Digit = 1 Through hole
 Digit = 2 4-40 UNC
 Digit = 3 M3

Right angled
metal bracket
with board lock
and clinch nut

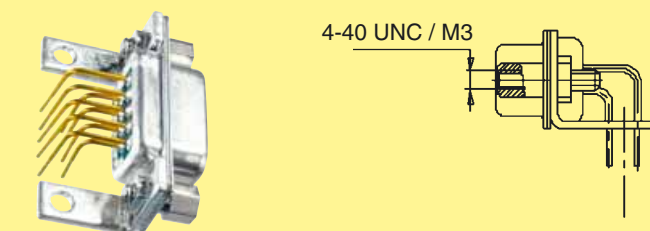
Digit = 4 4-40 UNC
 Digit = 5 M3

Right angled
metal bracket
with board lock
and female screw lock

Digit = 6 4-40 UNC
 Digit = 7 M3

Right angled
metal bracket
with clinch nut
without board lock

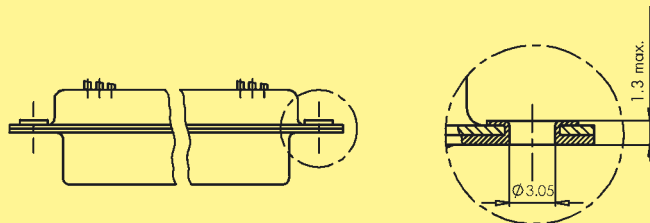
Digit = 8 4-40 UNC
 Digit = 9 M3

Right angled
metal bracket
with female screw lock
without board lock

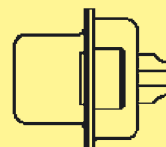
Dimensions in mm

Detailed information for connectors with solder buckets

Digit = 0

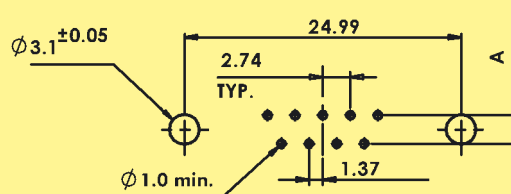
Through hole
(3.05 mm diameter)Digit = 7 4-40 UNC
Digit = 8 M3

Clinch nut

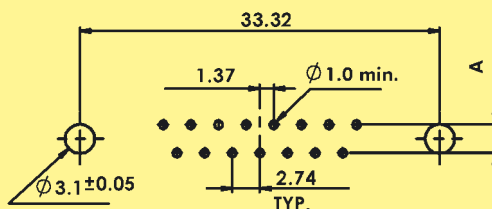


Board drillings

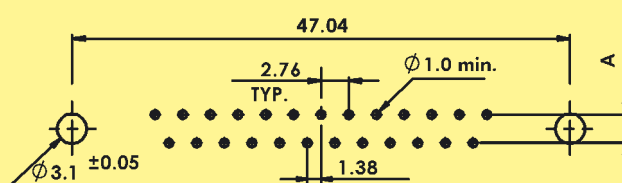
9 contacts



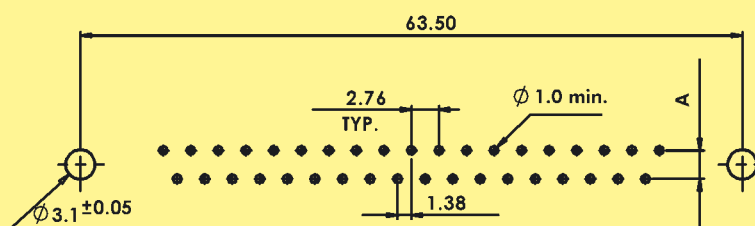
15 contacts



25 contacts



37 contacts

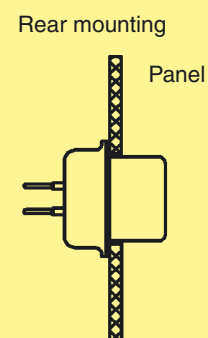
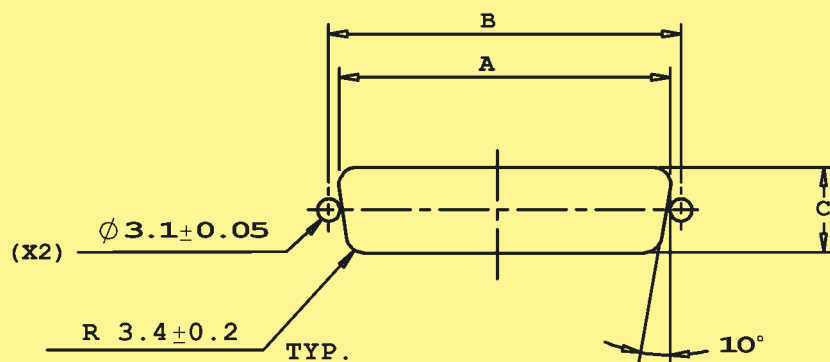
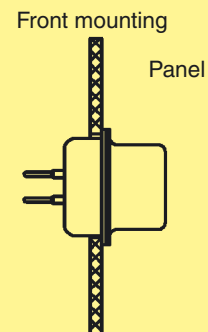
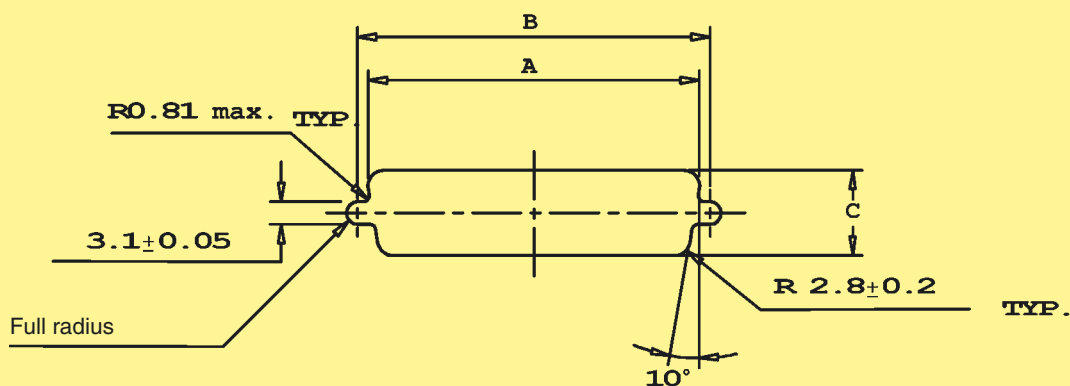


Dimensions in mm

For straight configuration dimension A is 2.84 mm and for right angled configuration dimension A is 2.54 mm.

Panel cut outs / panel mountings

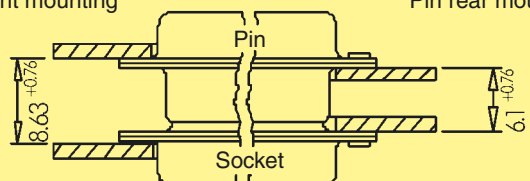
Panel cut outs



No. of contacts	Mounting assembly	A ± 0.2	B ± 0.2	C ± 0.2
9	Front	22.2	25.0	13.0
	Rear	20.5	25.0	11.4
15	Front	30.5	33.3	13.0
	Rear	28.8	33.3	11.4
25	Front	44.3	47.0	13.0
	Rear	42.5	47.0	11.4
37	Front	60.7	63.5	13.0
	Rear	59.1	63.5	11.4

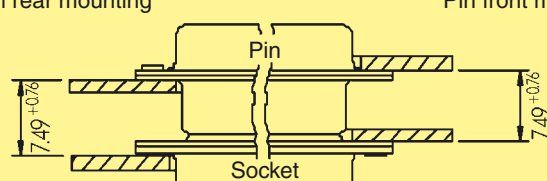
Panel mountings

Pin front mounting



Pin rear mounting

Pin rear mounting



Pin front mounting

Socket front mounting

Socket rear mounting

Socket front mounting

Socket rear mounting

For float mounting option please contact your local HARTING representative.

Dimensions in mm

General information

With the innovative EMC platform approach, this enables customers to select their optimum filter requirements, contact per contact. Allowing not only to segregate the filtering per contact but also to mix the type of filter used. This is then cast in a single competitive product (in a standard D-Sub shell).

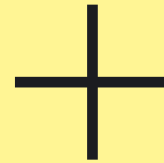
The biggest advantage of the HARTING technology is that multiple filter assemblies can be configured to create different filter designs: C, Pi, L and T types. Since any value of capacitor can be placed on any contact, a wide range of configurations can be built, it is even possible to have an individual pin unfiltered if necessary.

Furthermore, ***Pi filters can be supplied in a standard connector size shell.*** In addition, protection against lightening and transient voltage can be included upon request.

In the next few pages, you will find all the necessary information plus a selection guide to help you to choose your appropriate solution.



or



- C filter
- L filter
- Pi filter
- Ferrite filter
- ESD protection
- Lightening protection
- Combination



With any capacitance on any pin in a **standard D-Sub shell.**

General information

Filter possibilities

C filter possibilities:

*Working voltage vs. capacitance
(This table reflects also L filters)*

Higher values are available with non-standard (larger) dimensions. Please contact your local HARTING representative for availability.

Rated voltage (VDC)	Capacitance (pF)							
	47	100	470	1,000	4,700	10,000	47,000	100,000
25								
50								
100								
200								
500								
1000								
1500								
2000								

	Applicable working voltage
	N / A
	Please contact technical support

Pi filter possibilities:

Working voltage vs. capacitance

Rated voltage (VDC)	Capacitance (pF)						
	100	540	1,000	5,400	10,000	54,000	100,000
25							
50							
100							
200							
500							

	Applicable working voltage
	N / A
	Please contact technical support

Ferrite filter possibilities

Inductance (μH) ¹⁾	Min. insertion loss						
	Attenuation vs. frequency [MHz]						
	1	5	10	50	100	500	1000
0.2	—	—	—	—	2 dB	2 dB	15 dB

¹⁾ Measured at 0.1 V_{rms} @ 1 KHz
Measured in 50 Ω system according to MIL-STD-220, no load.

General information

Other protection possibilities

ESD protection

(Electro Static Discharge protection)

For equipment to comply with:

- IEC-1000-4-2; levels 1 to 4 (Contact discharge test)
- RTCA-160 D; section 25

Typical parasitic capacitance (pF)	Max. clamp voltage (V)	Working voltage (V)
0.5 V _{rms} @ 1 KHz	@ I = 1 A @ 8/20 μS	@ I = 10 μA
1750	7.5	3
1250	13	5
650	22	12
430	33	18
220	48	26
200	51	30

EMP protection

(Electro Magnetic Pulse protection)

For equipment to comply with:

- MIL-STD-461 C: requirements CS 06, CS 10, CS 11, RS 05
- IEC-1000-4-4; EFT TESTS
- RTCA-160 D; section 17

Typical parasitic capacitance (pF)	Max. clamp voltage (V)	Working voltage (V)
0.5 V _{rms} @ 1 KHz	@ I = 10 A @ 8/20 μS	@ I = 10 μA
5675	9	3
3620	15	5
1500	26	14
820	34	18
275	50	26

Lightening protection

For equipment to comply with:

- IEC-1000-4-5; levels 1 and 2 (1.2 μ / 50 μS)
- RTCA-160 D; section 22 (pin injection, level 1)

Typical parasitic capacitance (pF)	Max. clamp voltage (V)	Working voltage (V)
0.5 V _{rms} @ 1 KHz	@ I = 30 A @ 8/20 μS	@ I = 10 μA
5500	12	3
3175	18	5
2000	21	9
1680	30	14
900	38	18
720	60	26
600	63	30

HARTING customer request form

Our innovative technology offers all the possibilities you may need.
For customer solutions, please contact your local HARTING representative.
Here is a summary of the information we need to develop a customer solution:

Connector

Standard D-Sub Gender ☐ Male ☐ Female
 No. of contacts ☐ 9 ☐ 15 ☐ 25 ☐ 37 ☐ 50
 Termination ☐ Solder bucket ☐ Straight pcb
 ☐ R/A Eur, 2.54 mm ☐ R/A US, 2.84 mm

Mixed D-Sub Gender ☐ Male ☐ Female
 Contact arrangement ☐ 3W3 ☐ 3W3C ☐ Other _____
 Power contact rating ☐ 10 A ☐ 20 A ☐ 30 A ☐ 40 A
 Termination ☐ Solder bucket ☐ Straight pcb
 ☐ R/A pcb

Flange thread and board locking options (for details see pages 05.12 ff)

Filter

What working voltage is used? _____

Type of filter _____ (C filter, Pi filter, L filter ...)

Capacitance _____

Are there other protections needed? ☐ No
 ☐ Yes ☐ ESD ☐ Transient
 ☐ EMP ☐ Lightning

If a pin-to-pin selection has to be done, please state the details Pin 1: ?, Pin 2: ?, ...

Name: _____

Drawing: ☐ no ☐ yes

Company: _____

Samples: ☐ no ☐ yes, quantity

Address: _____

Volume (pcs./year): _____

Phone: _____

Special requirements: _____

Fax: _____

E-Mail: _____

D-Sub – Housing range for subminiature D connectors

Page

General information – hoods for screw locking **06.02**

Thermoplastic top and side entry hoods
with knurled screws **06.04**



Thermoplastic side entry hoods
with knurled screws **06.05**



Thermoplastic top entry hoods
with knurled or locking screws **06.06**



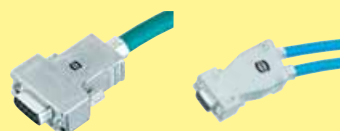
Full metal top and side entry hoods
with knurled screws **06.07**



Full metal top and side entry hoods with short screws ... **06.08**



Full metal top and side entry hoods
with different screw options **06.09**

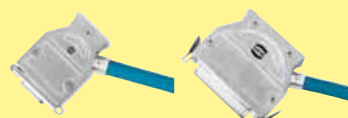


General information – hoods for spring or slide locking **06.10**

Thermoplastic top and side entry hoods
for spring or slide locking **06.11**



Full metal top and side entry hoods
for spring or slide locking **06.13**



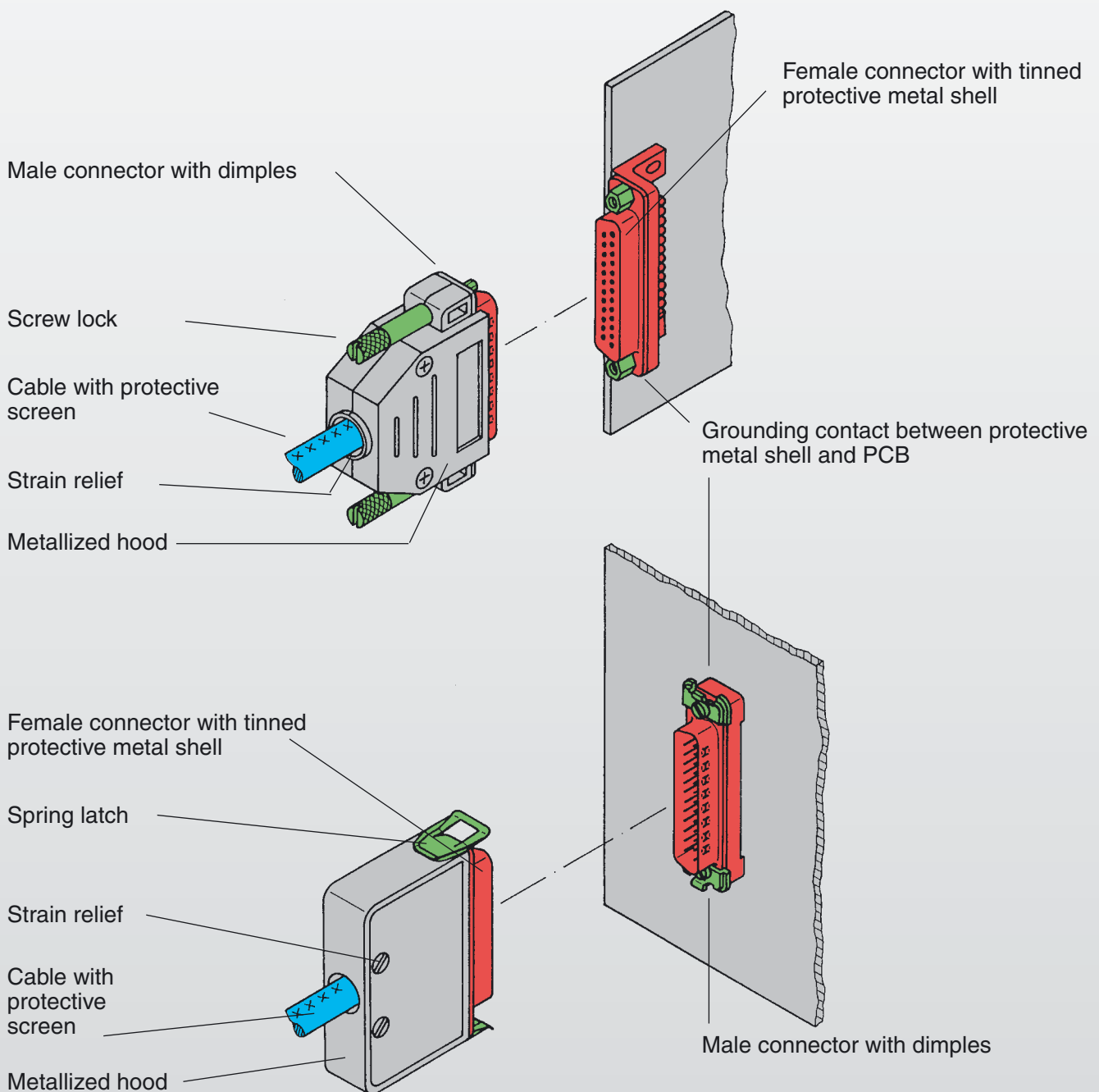
HARTING – Guarantee a secure connection

Modern electronic applications demand a high degree of mechanical and electrical security. To meet these requirements, continuous screening from the cable to the PCB via the connector is achieved by using state of the art components to DIN 41 652.

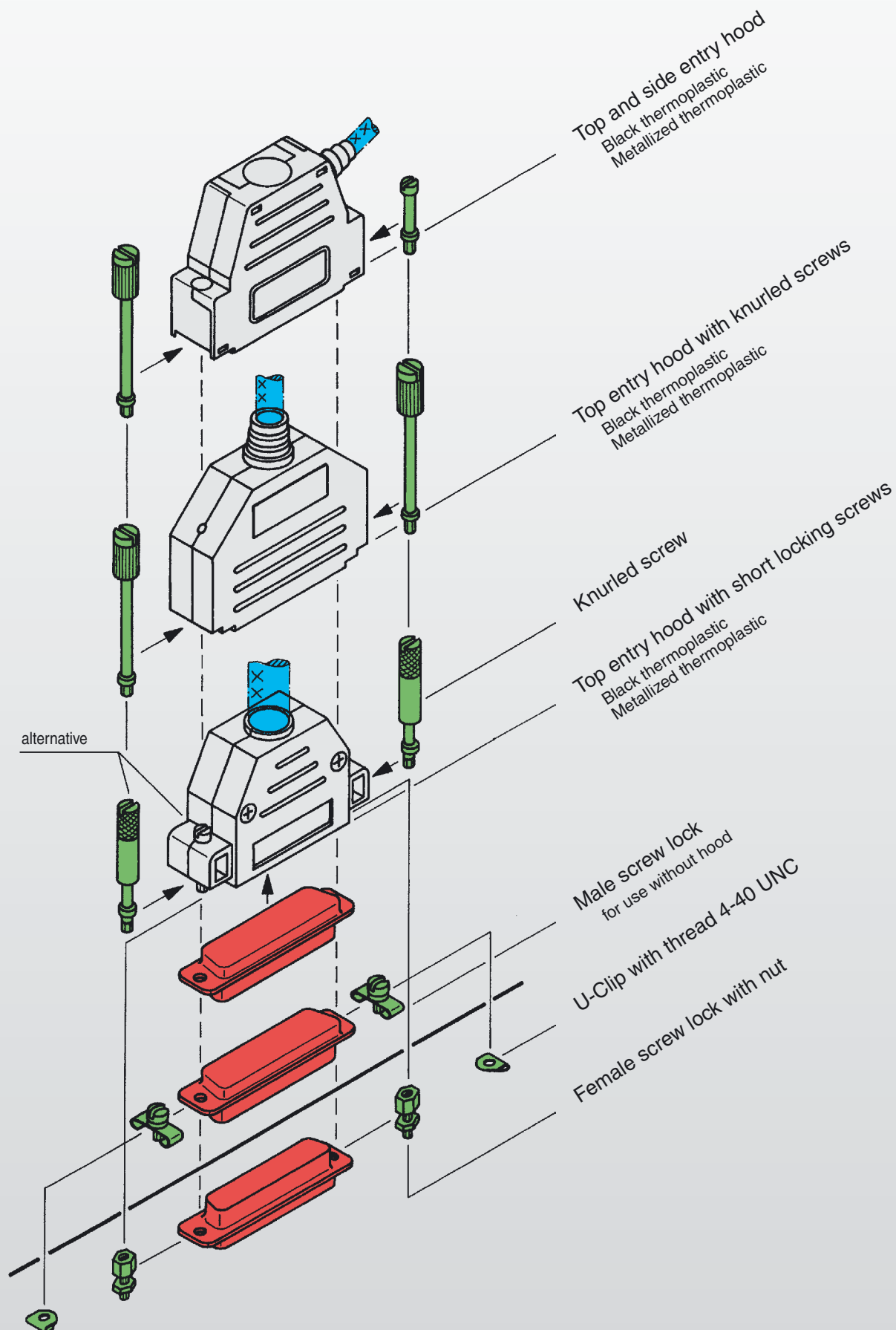
HARTING offer many solutions. These utilise various combinations of male and female connectors with hoods, featuring either screw locking or latching facilities.

Only 2 examples are shown:

- Continuous security screening and grounding with screw locking and metallized hood.
- Continuous grounding and vibration proof latching system with metallized hood.

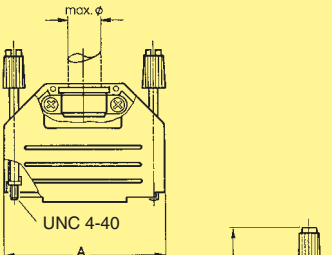
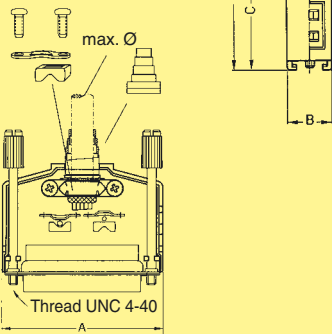
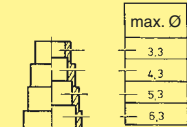
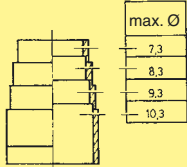
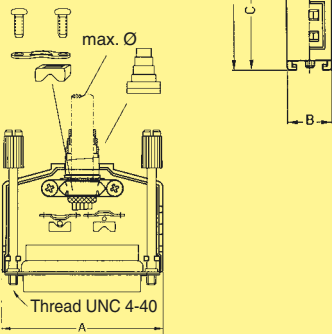
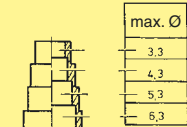
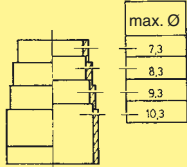
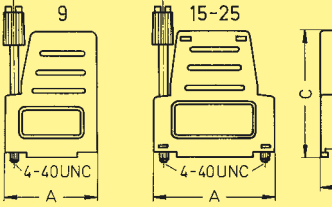
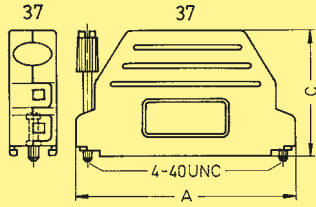
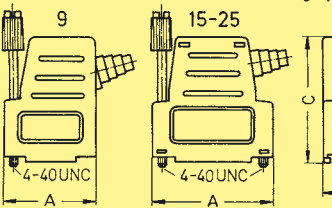
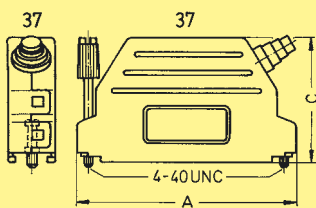
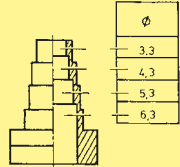


Connector hoods for screw locking





Top and side entry hoods with knurled screws

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																																				
Top entry hood Black thermoplastic	9 15 25 37 50	09 67 009 0424 09 67 015 0424 09 67 025 0424 09 67 037 0424 09 67 050 0424	 	<table><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>max. Ø</th></tr><tr><td>9</td><td>30.5</td><td>15</td><td>38</td><td>49</td><td>8.5</td></tr><tr><td>15</td><td>41.0</td><td>15</td><td>38</td><td>49</td><td>11.5</td></tr><tr><td>25</td><td>54.5</td><td>15</td><td>40</td><td>49</td><td>11.5</td></tr><tr><td>37</td><td>71.0</td><td>15</td><td>40</td><td>49</td><td>11.5</td></tr><tr><td>50</td><td>67.5</td><td>19</td><td>40</td><td>49</td><td>14.0</td></tr></table>  		A	B	C	D	max. Ø	9	30.5	15	38	49	8.5	15	41.0	15	38	49	11.5	25	54.5	15	40	49	11.5	37	71.0	15	40	49	11.5	50	67.5	19	40	49	14.0
	A	B	C	D	max. Ø																																			
9	30.5	15	38	49	8.5																																			
15	41.0	15	38	49	11.5																																			
25	54.5	15	40	49	11.5																																			
37	71.0	15	40	49	11.5																																			
50	67.5	19	40	49	14.0																																			
Top entry hood Metallized thermoplastic	9 15 25 37	09 67 009 0425 09 67 015 0425 09 67 025 0425 09 67 037 0425		  Cut appropriate cable entry to fit actual cable diameter																																				
Top and side entry hood Black thermoplastic	9 15 25 37	09 67 009 0434 09 67 015 0434 09 67 025 0434 09 67 037 0434 ²⁾	 	<table><tr><th></th><th>A</th><th>B</th><th>C</th></tr><tr><td>9</td><td>31.5</td><td>15</td><td>40.0</td></tr><tr><td>15</td><td>40.0</td><td>15</td><td>40.0</td></tr><tr><td>25</td><td>53.5</td><td>15</td><td>43.0</td></tr><tr><td>37</td><td>71.3</td><td>15</td><td>42.5</td></tr></table>		A	B	C	9	31.5	15	40.0	15	40.0	15	40.0	25	53.5	15	43.0	37	71.3	15	42.5																
	A	B	C																																					
9	31.5	15	40.0																																					
15	40.0	15	40.0																																					
25	53.5	15	43.0																																					
37	71.3	15	42.5																																					
Top and side entry hood ¹⁾ Metallized thermoplastic	9 15 25 37	09 67 009 0435 09 67 015 0435 09 67 025 0435 09 67 037 0435 ²⁾	 																																					
Grommet for top and side entry black thermoplastic hood (15, 25, 37 ways)		09 67 001 9968																																						

¹⁾ Not normally kept in stock²⁾ 37 ways is only side entry



Side entry hoods with knurled screws

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																									
Hood¹⁾ grey thermoplastic RAL 7032	9 15 25 37 50	09 67 009 0571 09 67 015 0571 09 67 025 0571 09 67 037 0571 09 67 050 0571																											
grey thermoplastic with internal tin-plate screening	9 15 25 37 50	09 67 009 0573 09 67 015 0573 09 67 025 0573 09 67 037 0573 09 67 050 0573																											
9-37 way for packaging density of 3 TE (15.24 mm)			<table border="1"> <thead> <tr> <th></th><th>a max.</th><th>b</th><th>c</th><th>d max.</th></tr> </thead> <tbody> <tr> <td>15</td><td>39.62</td><td>33.3</td><td>15</td><td>Ø 9.1</td></tr> <tr> <td>25</td><td>53.52</td><td>47.0</td><td>15</td><td>Ø 11.5</td></tr> <tr> <td>37</td><td>69.80</td><td>63.5</td><td>15</td><td>Ø 12.8</td></tr> <tr> <td>50</td><td>67.41</td><td>61.1</td><td>19</td><td>Ø 14.5</td></tr> </tbody> </table>		a max.	b	c	d max.	15	39.62	33.3	15	Ø 9.1	25	53.52	47.0	15	Ø 11.5	37	69.80	63.5	15	Ø 12.8	50	67.41	61.1	19	Ø 14.5	
	a max.	b	c	d max.																									
15	39.62	33.3	15	Ø 9.1																									
25	53.52	47.0	15	Ø 11.5																									
37	69.80	63.5	15	Ø 12.8																									
50	67.41	61.1	19	Ø 14.5																									
Knurled screw for grey hoods Thread UNC Thread M3	9-50	09 67 000 9971 ⁴⁾ 09 67 001 9965*	Grey head / Tinned metal part																										
Tooling⁶⁾ for assembly of hoods Top part Bottom part		09 99 000 0215* 09 99 000 0216*																											

* Not normally kept in stock

¹⁾ Order knurled screw separately²⁾ Before assembling the hood, the knurled screws must be inserted into the lower hood part.³⁾ For retained nut when using slide lock or female screw lock⁴⁾ 9 way 1 per hood – 15-50 way 2 per hood⁵⁾ Screw driver type ISO PH 1 for philips screw No 1 ISO norm 4757⁶⁾ Additional tooling (bench press) see chapter 32



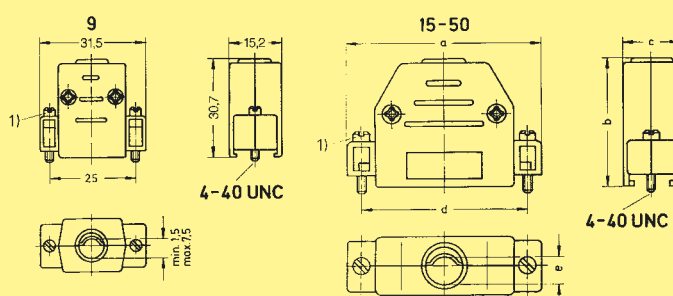
Top entry hoods with knurled or locking screws

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

Hood

Black thermoplastic with short locking screws

9	09 67 009 0442
15	09 67 015 0442
25	09 67 025 0442
37	09 67 037 0442
50	09 67 050 0442

**Hood**

Metallized thermoplastic with short locking screws

9	09 67 009 0443
15	09 67 015 0443
25	09 67 025 0443
37	09 67 037 0443
50	09 67 050 0443

	a	b	c	d	e	
					min.	max.
15	40.0	34.7	15.2	33.3	3.3	8.5
25	53.2	39.7	15.2	47.0	3.5	11.0
37	70.0	39.7	15.2	63.5	3.5	11.0
50	67.5	39.7	18.2	61.1	9.3	12.0

Knurled screw

for black hood

Thread UNC

9-50 09 67 000 9926²⁾

Thread M3

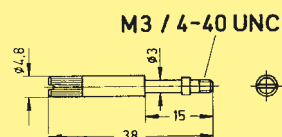
9-50 09 67 000 9931²⁾

for metallized hood

Thread UNC

9-50 09 67 000 9925²⁾

Thread M3

9-50 09 67 000 9930²⁾¹⁾ Use of knurled screws is possible. Please order separately²⁾ Order 2 for each hood



Full metal top and side entry hoods with knurled screws

Identification

No. of
contacts

Part No.

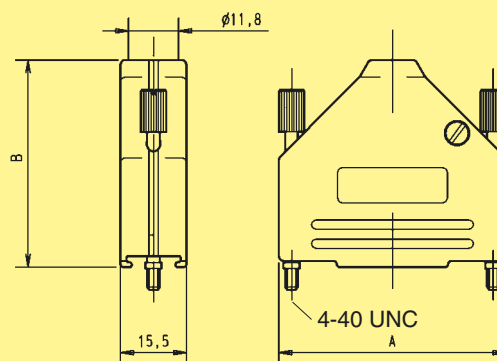
Drawing

Dimensions in mm

Top entry hood

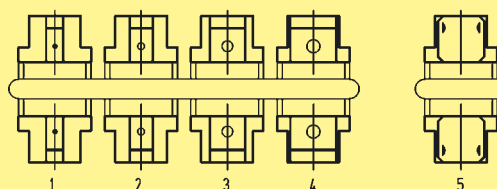
9
15
25
37

09 67 009 0343
09 67 015 0343
09 67 025 0343
09 67 037 0343



Poles	A	B
9	31.2	39.9
15	39.5	41.5
25	53.4	48.6
37	69.7	53.6

Grommet set halves

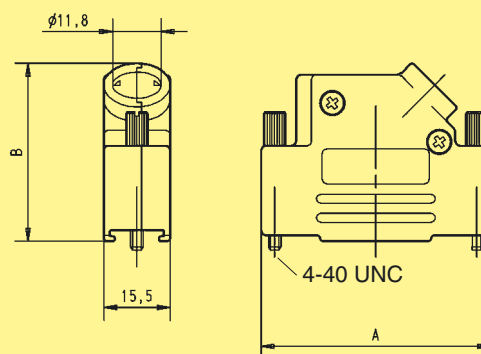


Grommet dimensions	
Number	Diameter
1	3.8
2	5.0
3	7.8
4	9.8
5	10.2

Side entry hood

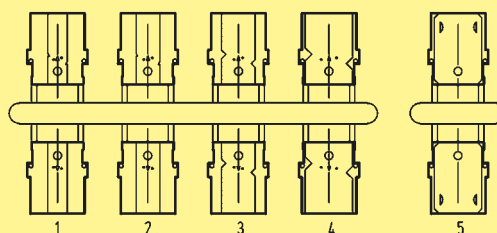
9
15
25
37

09 67 009 0333
09 67 015 0333
09 67 025 0333
09 67 037 0333



Poles	A	B
9	31.0	38.0
15	40.5	41.1
25	53.7	41.8
37	69.8	41.8

Grommet set halves



Grommet dimensions	
Number	Diameter
1	4.0
2	5.0
3	7.0
4	9.8
5	10.2

Full metal top and side entry hoods
with short screws



Identification

No. of
contacts

Part No.

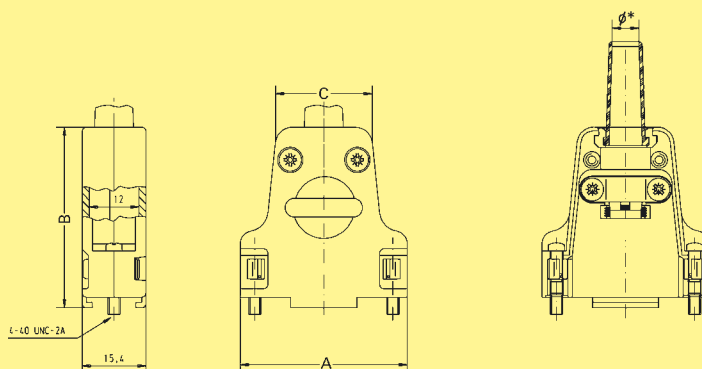
Drawing

Dimensions in mm

Top entry hood

9
15
25
37

09 67 009 0344
09 67 015 0344
09 67 025 0344
09 67 037 0344



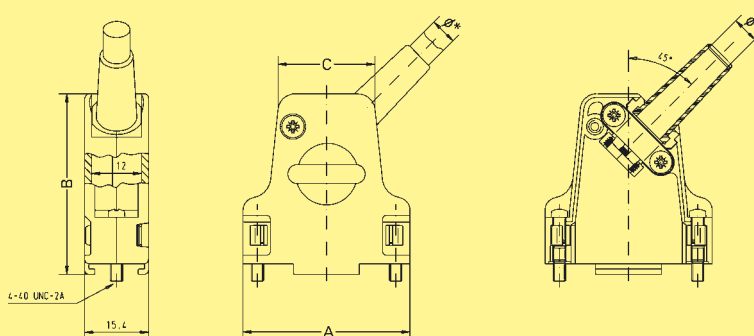
Poles	A	B	C	Ø F1		Ø F2
				Min.	Max.	
9	31.8	42.4	20.8	3.0	9.5	6.5
15	40.3	43.5	23.3	3.0	8.5	6.5
25	54.0	47.7	31.7	3.0	8.5	8.0
37	70.2	50.4	48.2	3.0	12.0	9.0

* Cable diameter without rubber bushing = Ø F1 and
Cable diameter with rubber bushing = Ø F2

Side entry hood

9
15
25
37

09 67 009 0334
09 67 015 0334
09 67 025 0334
09 67 037 0334



Poles	A	B	C	Ø F1		Ø F2
				Min.	Max.	
9	31.8	42.4	20.8	3.0	9.5	6.5
15	40.3	43.5	23.3	3.0	8.5	6.5
25	54.0	47.7	31.7	3.0	8.5	8.0
37	70.2	50.4	48.2	3.0	12.0	9.0

* Cable diameter without rubber bushing = Ø F1 and
Cable diameter with rubber bushing = Ø F2

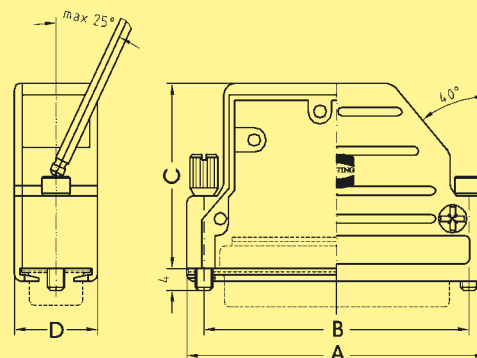


Full metal top and side entry hoods
with different screw options

Identification No. of contacts Part No. Drawing Dimensions in mm

Side entry hood

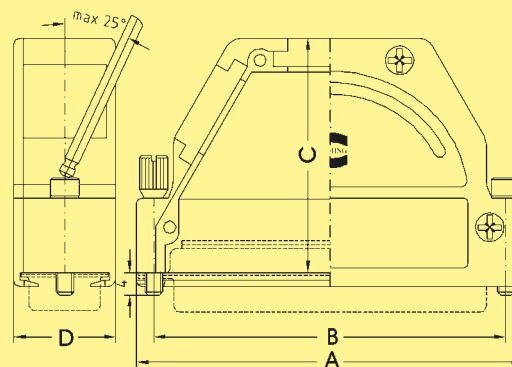
9	61 03 001	013
15	61 03 001	014
25	61 03 001	015



No. of contacts	A	B	C	D
9	31.0	25.0	35.0	15.0
15	39.3	33.3	35.0	15.0
25	53.0	47.0	35.0	15.0

Top/side entry hood

9	61 03 001	010 ¹⁾
15	61 03 001	016 ¹⁾
25	61 03 001	017 ²⁾
37	61 03 001	018 ²⁾
50	61 03 001	019 ²⁾



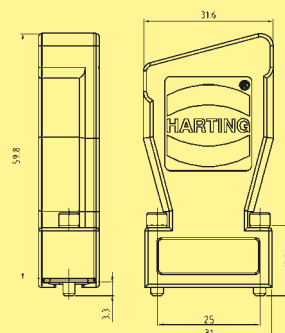
No. of contacts	No. of cable entries	A	B	C	D
9	1 (top)	31.0	25.0	38.0	15.0
15	1 (top)	39.5	33.3	35.0	15.0
25	3	53.0	47.0	43.0	15.0
37	3	69.5	63.5	43.0	15.0
50	3	67.2	61.6	43.0	17.8

Please insert digit for screw option

Knurled screw, thread 4-40 UNC	0
Hexagonal screw, thread M3 with captive washer	1
Hexagonal screw, thread 4-40 UNC with captive washer	2
Knurled screw, thread M3	3

Top entry hood for InduCom 9

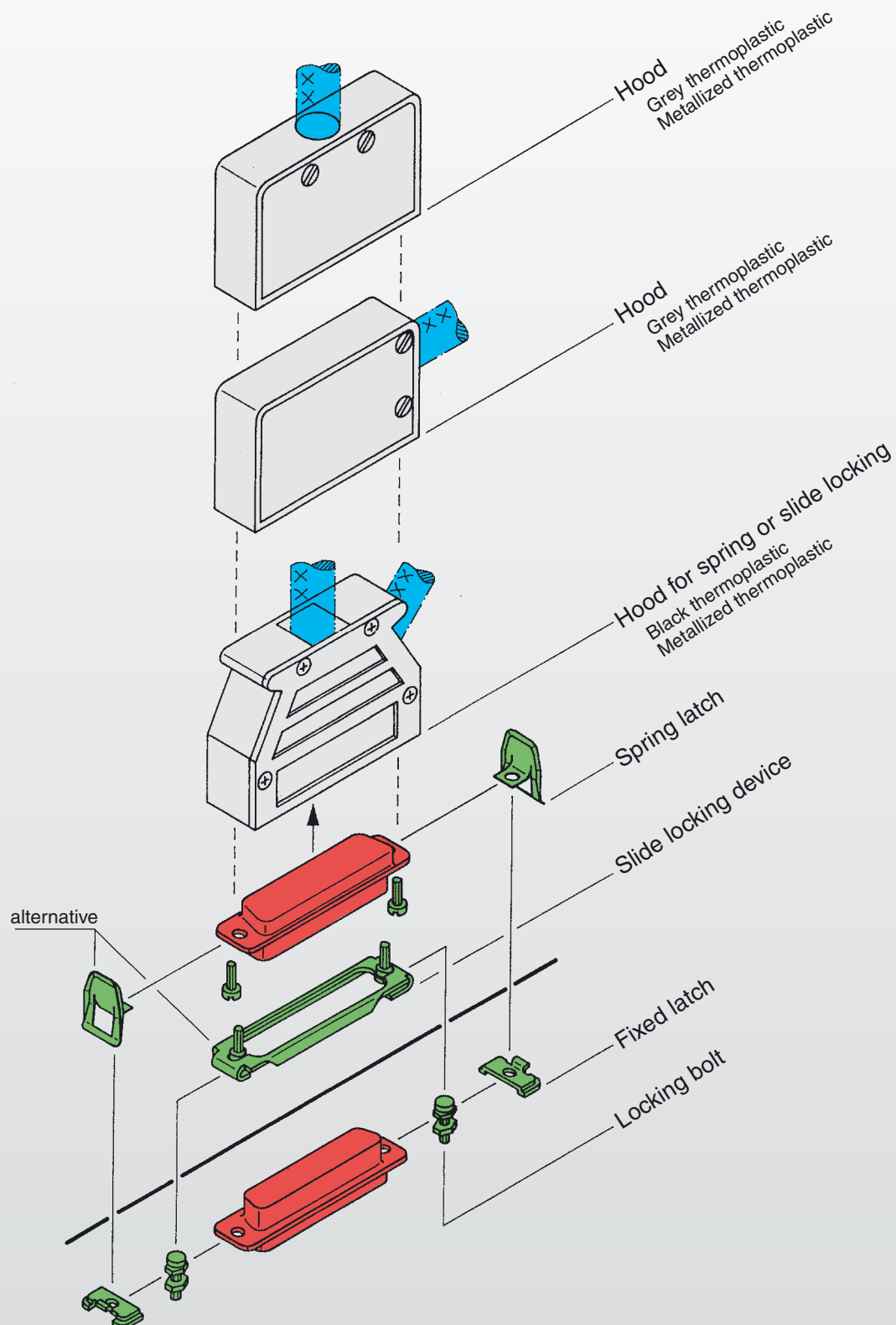
Hexagonal screw, thread 4-40 UNC	9	09 67 009 0346
Hexagonal screw, thread M3	9	09 67 009 0347



2 cable entries

¹⁾ Part no. contains one blanking piece
²⁾ Part no. contains two blanking pieces

Connector hoods for spring or slide locking





Thermoplastic top
and side entry hoods
for spring or slide locking and accessories

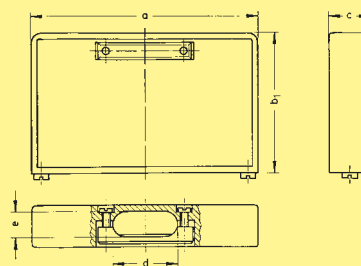
Identification No. of contacts Part No. Drawing Dimensions in mm

Top entry hood

9
15
25
37
50

Thermoplastic
grey
09 67 009 0411
09 67 015 0411
09 67 025 0411
09 67 037 0411
09 67 050 0411

Thermoplastic
metallized
09 67 009 0413
09 67 015 0413
09 67 025 0413
09 67 037 0413
09 67 050 0413



9-37 way
for packaging density
of 3 TE (15.24 mm)

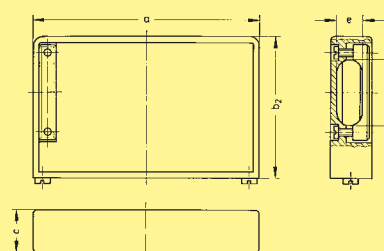
	a	b ₁	b ₂	c	d	e	
						min.	max.
9	31.0	23	28	12.8	10	5.75	9.0
15	39.4	28	28	12.8	10	5.75	9.0
25	53.3	34	34	12.8	14	5.75	9.0
37	69.7	43	43	12.8	20	5.75	9.0
50	67.1	41	41	15.8	20	5.75	11.6

Side entry hood

9
15
25
37
50

Thermoplastic
grey
09 67 009 0511
09 67 015 0511
09 67 025 0511
09 67 037 0511
09 67 050 0511

Thermoplastic
metallized
09 67 009 0513
09 67 015 0513
09 67 025 0513
09 67 037 0513
09 67 050 0513



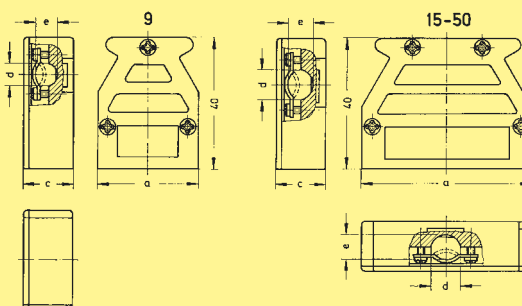
9-37 way
for packaging density
of 3 TE (15.24 mm)

Top and side entry hood¹⁾

9
15
25
37
50

Thermoplastic
black
09 67 009 0452
09 67 015 0452
09 67 025 0452
09 67 037 0452
09 67 050 0452

Thermoplastic
metallized
09 67 009 0453
09 67 015 0453
09 67 025 0453
09 67 037 0453
09 67 050 0453

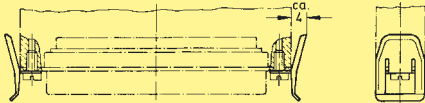
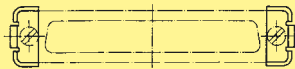
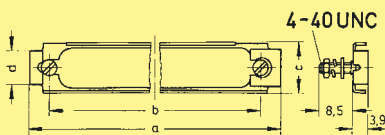
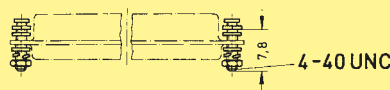


	a	c	d	e	
				min.	max.
9	31.0	15.4	7	1.7	7.5
15	39.4	15.4	7	1.7	8.0
25	53.2	15.4	9	1.5	8.0
37	69.5	15.4	9	1.5	8.0
50	67.0	17.9	9	1.5	8.0

¹⁾ 9 poles is only side entry
Accessories see page 06.12



Thermoplastic top
and side entry hoods
for spring or slide locking and accessories

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																														
Spring latch	9-50	corrosion resistant steel 09 67 000 9907 ¹⁾																																
Fixed latch	9-37 50	corrosion resistant steel 09 67 001 9971 ¹⁾ 09 67 001 9972 ¹⁾																																
Slide locking device	9 15 25 37 50	corrosion resistant steel 09 67 000 9914 09 67 000 9915 09 67 000 9916 09 67 000 9917 09 67 000 9918	 <table border="1" data-bbox="909 1512 1252 1691"> <thead> <tr> <th></th><th>a</th><th>b</th><th>c</th><th>d</th></tr> </thead> <tbody> <tr> <td>9</td><td>35.6</td><td>25.0</td><td>12.0</td><td>10.0</td></tr> <tr> <td>15</td><td>44.0</td><td>33.3</td><td>12.0</td><td>10.0</td></tr> <tr> <td>25</td><td>57.8</td><td>47.0</td><td>12.0</td><td>10.0</td></tr> <tr> <td>37</td><td>74.3</td><td>63.5</td><td>12.0</td><td>10.0</td></tr> <tr> <td>50</td><td>72.0</td><td>61.1</td><td>14.8</td><td>13.5</td></tr> </tbody> </table>		a	b	c	d	9	35.6	25.0	12.0	10.0	15	44.0	33.3	12.0	10.0	25	57.8	47.0	12.0	10.0	37	74.3	63.5	12.0	10.0	50	72.0	61.1	14.8	13.5	
	a	b	c	d																														
9	35.6	25.0	12.0	10.0																														
15	44.0	33.3	12.0	10.0																														
25	57.8	47.0	12.0	10.0																														
37	74.3	63.5	12.0	10.0																														
50	72.0	61.1	14.8	13.5																														
Locking bolt	9-50	tinned 09 67 001 9973 ¹⁾																																

¹⁾ Order 2 for each connector

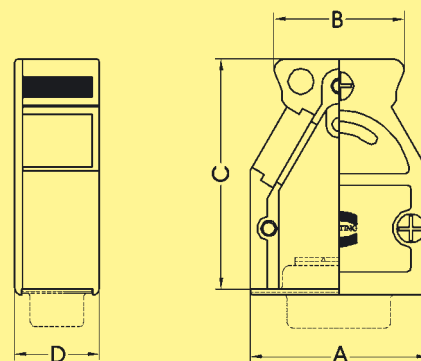


Full metal top and side entry hoods
for spring or slide locking and accessories

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

Top/side entry hood

9	61 03 001 0022 ¹⁾
15	61 03 001 0011 ²⁾
25	61 03 001 0012 ²⁾
37	61 03 001 0021 ²⁾
50	61 03 001 0020 ²⁾



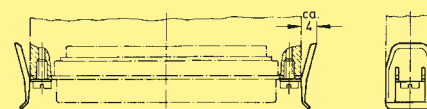
No. of contacts	No. of cable entries	A	B	C	D
9	2	31.0	22.6	40.0	14.8
15	3	39.0	30.6	40.0	14.8
25	3	53.0	42.6	40.0	14.8
37	3	69.5	59.2	40.0	14.8
50	3	67.0	55.0	40.0	17.6

Spring latch

corrosion resistant steel

9-50

09 67 000 9907³⁾



Fixed latch

corrosion resistant steel

9-37
50

09 67 001 9971³⁾
09 67 001 9972³⁾

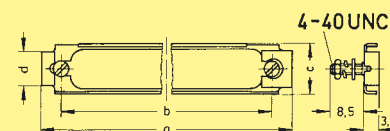


Slide locking device

corrosion resistant steel

9
15
25
37
50

09 67 000 9914
09 67 000 9915
09 67 000 9916
09 67 000 9917
09 67 000 9918



	a	b	c	d
9	35.6	25.0	12.0	10.0
15	44.0	33.3	12.0	10.0
25	57.8	47.0	12.0	10.0
37	74.3	63.5	12.0	10.0
50	72.0	61.1	14.8	13.5

Locking bolt

tinned

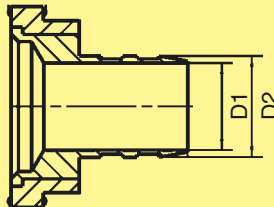
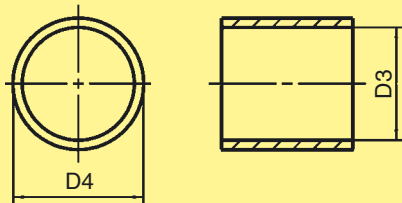
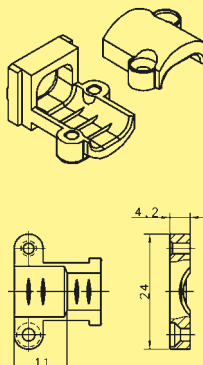
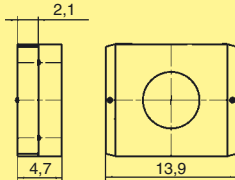
9-50

09 67 001 9973³⁾



¹⁾ Part no. contains one blanking piece
²⁾ Part no. contains two blanking pieces
³⁾ Order two for each connector

Accessories for hoods

Identification	Part No.		Drawing	Dimensions in mm																																						
Crimp flange	9-37 contacts	50 contacts	<table><tr><th>D1</th><th>D2</th></tr><tr><td>3.0</td><td>4.0</td></tr><tr><td>3.5</td><td>4.5</td></tr><tr><td>4.0</td><td>5.0</td></tr><tr><td>4.5</td><td>5.5</td></tr><tr><td>5.0</td><td>6.0</td></tr><tr><td>5.5</td><td>6.5</td></tr><tr><td>6.0</td><td>7.0</td></tr><tr><td>6.5</td><td>7.5</td></tr><tr><td>7.0</td><td>8.0</td></tr><tr><td>7.5</td><td>8.5</td></tr><tr><td>8.0</td><td>9.0</td></tr><tr><td>9.0</td><td>10.0</td></tr></table> 	D1	D2	3.0	4.0	3.5	4.5	4.0	5.0	4.5	5.5	5.0	6.0	5.5	6.5	6.0	7.0	6.5	7.5	7.0	8.0	7.5	8.5	8.0	9.0	9.0	10.0													
	D1	D2																																								
	3.0	4.0																																								
	3.5	4.5																																								
	4.0	5.0																																								
	4.5	5.5																																								
	5.0	6.0																																								
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	6.0	7.0																																								
	6.5	7.5																																								
	7.0	8.0																																								
	7.5	8.5																																								
	8.0	9.0																																								
9.0	10.0																																									
Crimp ferrule	61 03 000 0045 61 03 000 0046 61 03 000 0047 61 03 000 0048 61 03 000 0049 61 03 000 0050 61 03 000 0051 61 03 000 0052 61 03 000 0053 61 03 000 0054 61 03 000 0055 61 03 000 0056 61 03 000 0057 61 03 000 0058 61 03 000 0059 61 03 000 0127 61 03 000 0060 61 03 000 0061		<table><tr><th>D3</th><th>D4</th></tr><tr><td>5.0</td><td>6.0</td></tr><tr><td>5.5</td><td>6.5</td></tr><tr><td>6.0</td><td>7.0</td></tr><tr><td>6.5</td><td>7.5</td></tr><tr><td>7.0</td><td>8.0</td></tr><tr><td>7.5</td><td>8.5</td></tr><tr><td>8.0</td><td>9.0</td></tr><tr><td>8.5</td><td>9.5</td></tr><tr><td>9.0</td><td>10.0</td></tr><tr><td>9.5</td><td>10.5</td></tr><tr><td>10.0</td><td>11.0</td></tr><tr><td>10.5</td><td>11.5</td></tr><tr><td>11.0</td><td>12.0</td></tr><tr><td>11.5</td><td>12.5</td></tr><tr><td>12.5</td><td>13.5</td></tr><tr><td>13.0</td><td>14.0</td></tr><tr><td>13.5</td><td>15.0</td></tr><tr><td>14.0</td><td>15.0</td></tr></table> 	D3	D4	5.0	6.0	5.5	6.5	6.0	7.0	6.5	7.5	7.0	8.0	7.5	8.5	8.0	9.0	8.5	9.5	9.0	10.0	9.5	10.5	10.0	11.0	10.5	11.5	11.0	12.0	11.5	12.5	12.5	13.5	13.0	14.0	13.5	15.0	14.0	15.0	
	D3	D4																																								
	5.0	6.0																																								
	5.5	6.5																																								
	6.0	7.0																																								
	6.5	7.5																																								
	7.0	8.0																																								
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	8.0	9.0																																								
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	9.5	10.5																																								
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10.5	11.5																																									
11.0	12.0																																									
11.5	12.5																																									
12.5	13.5																																									
13.0	14.0																																									
13.5	15.0																																									
14.0	15.0																																									
Cable clamp for hoods	61 03 000 0044	61 03 000 0043																																								
	61 03 000 0042	61 03 000 0041																																								

D-Sub – Accessories for subminiature D connectors

Page

Accessories

07.02

Accessories

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm															
Male screw locks for use without hood	9-37 50	09 67 001 9969 ¹⁾ 09 67 001 9970 ¹⁾																	
Female screw locks with nut Thread UNC/UNC Thread UNC/M3	9-50 9-50	09 67 000 9922 ¹⁾²⁾ 09 67 000 9924 ¹⁾²⁾																	
Female screw lock with nut Thread UNC/UNC	9-50	09 67 000 9973 ¹⁾																	
Female screw locks without nut Thread UNC/UNC Thread UNC/M3	9-50 9-50	09 67 000 9972 ¹⁾²⁾ 09 67 000 9974 ¹⁾²⁾																	
Female screw locks without nut for press-in connectors with grounding-pins or straight solder with grounding-clips. Thread UNC/UNC Thread UNC/M3	9-50 9-50	09 66 000 9972 ¹⁾ 09 66 000 9974 ¹⁾²⁾																	
Female screw lock with captive washer Thread UNC/UNC	9-50	09 67 001 9957 ¹⁾																	
U-Clip with thread 4-40 UNC	9-50	09 67 001 9928																	
Dust cap black thermoplastic for male connector	9 15 25 37	09 67 009 0611 09 67 015 0611 09 67 025 0611 09 67 037 0611		<table><tr><th></th><th>A</th><th>B</th></tr><tr><td>9</td><td>17.0</td><td>22.40</td></tr><tr><td>15</td><td>25.3</td><td>30.80</td></tr><tr><td>25</td><td>38.9</td><td>44.40</td></tr><tr><td>37</td><td>55.4</td><td>60.75</td></tr></table>		A	B	9	17.0	22.40	15	25.3	30.80	25	38.9	44.40	37	55.4	60.75
	A	B																	
9	17.0	22.40																	
15	25.3	30.80																	
25	38.9	44.40																	
37	55.4	60.75																	
for female connector	9 15 25 37	09 67 009 0711 09 67 015 0711 09 67 025 0711 09 67 037 0711		<table><tr><th></th><th>A</th><th>B</th></tr><tr><td>9</td><td>16.0</td><td>22.5</td></tr><tr><td>15</td><td>24.4</td><td>31.0</td></tr><tr><td>25</td><td>37.8</td><td>44.3</td></tr><tr><td>37</td><td>54.3</td><td>60.8</td></tr></table>		A	B	9	16.0	22.5	15	24.4	31.0	25	37.8	44.3	37	54.3	60.8
	A	B																	
9	16.0	22.5																	
15	24.4	31.0																	
25	37.8	44.3																	
37	54.3	60.8																	

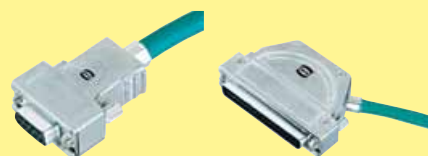
¹⁾ Order 2 for each connector

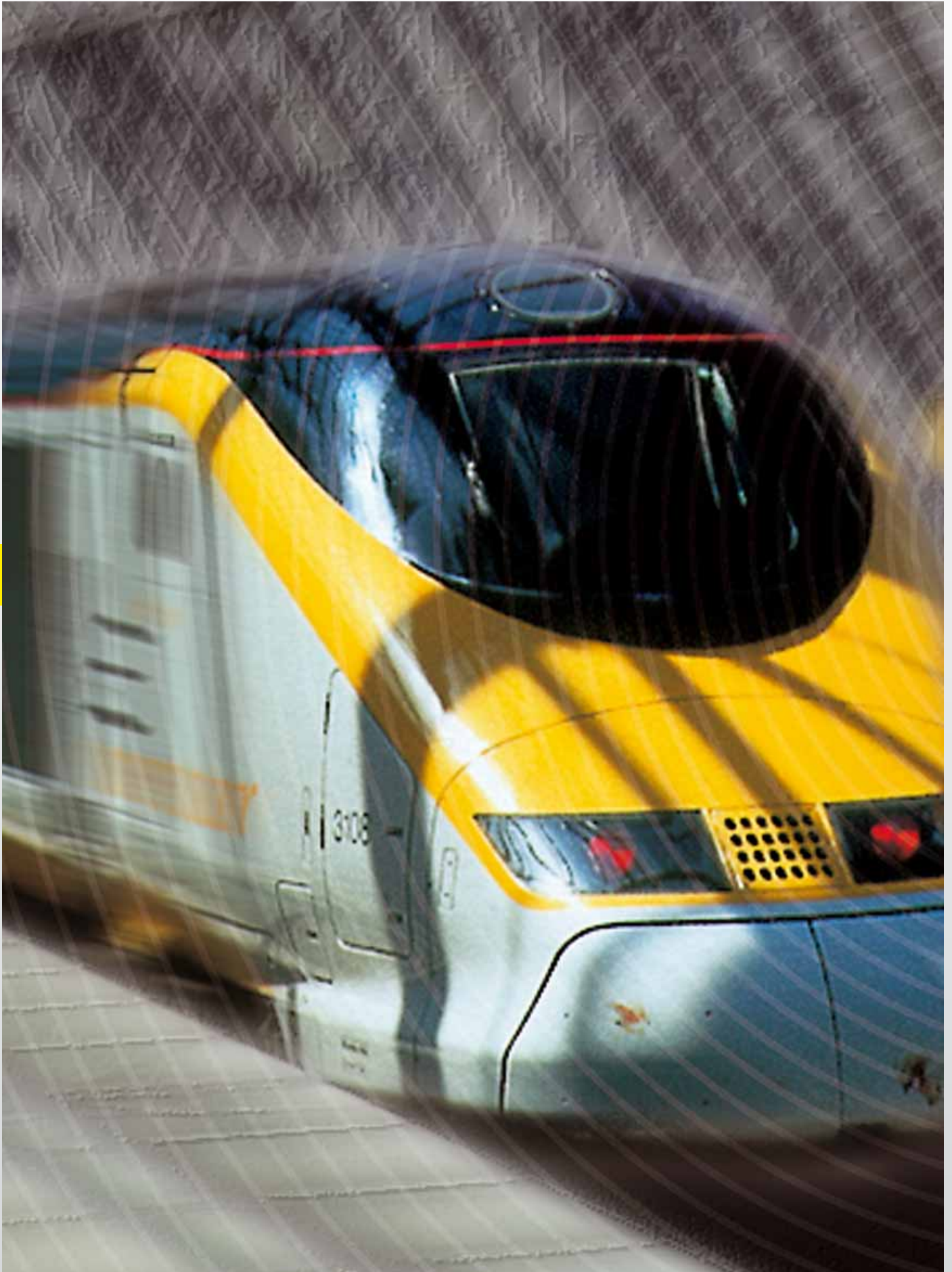
²⁾ M3 inner thread available on request


New
InduCom – Robust and EMI protected D-Sub interfaces

Page

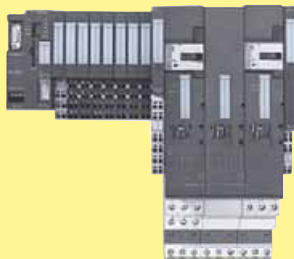
General information	08.02
Mounting details	08.05
Full metal top and side entry hoods	08.06
Accessories for hoods	08.08
Technical characteristics for connectors	08.09
Connectors with solder buckets/crimp terminal ...	08.10
Crimp contacts	08.13
InduCom 9	08.14
Tooling	08.15





Robust and EMI protected D-Sub interfaces made of zinc die-cast.

Specially designed for industrial applications in Transportation, Factory Automation and Machinery, where good EMC performance, mechanical strength and easy handling is required.



Factory Automation



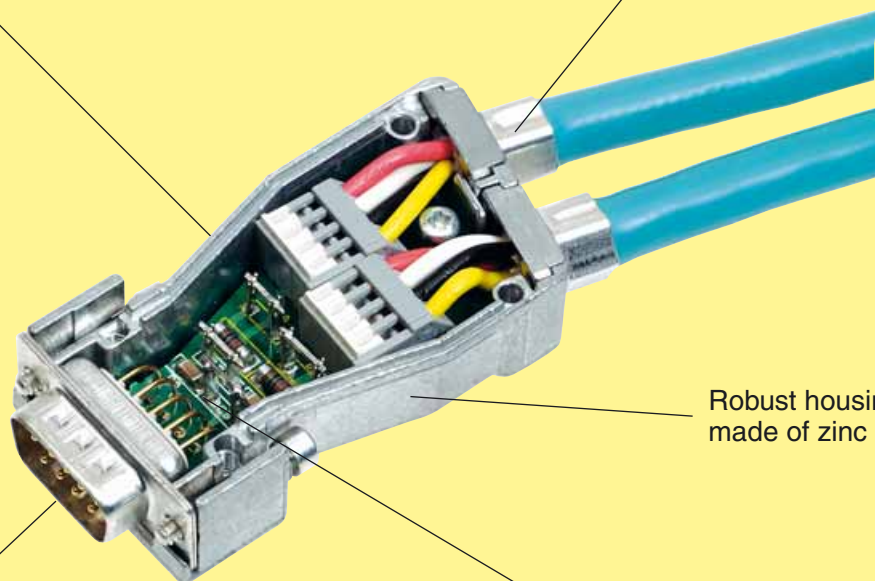
Transportation



Machinery

Special labyrinth design for good RF shielding

Cable assembly with reliable and vibration protected crimp technology



Robust housing in IP 40, made of zinc die-cast

Industrial proven D-Sub connectors with high performance level, available in 9 to 50 poles

InduCom 9 version with large space inside for bus interfaces and customised pcb's

D-Sub industrial bus interface systems

This family of D-Sub connectors and RF shielded die-cast hoods according to DIN 41652, MIL-C-24-308, IEC 60 807 is specially designed for communication in industrial field bus applications and transportation solutions where good EMC performance, mechanical strength and easy handling is required. The hoods are available in 9 to 50 ways D-Sub, with 1, 2 or 3 cable entries. The large space inside the InduCom 9 version allows the integration of pcb's, e.g. for bus systems and customised solutions.

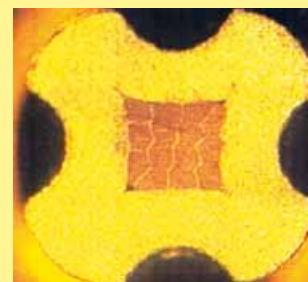
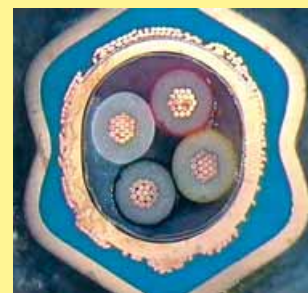
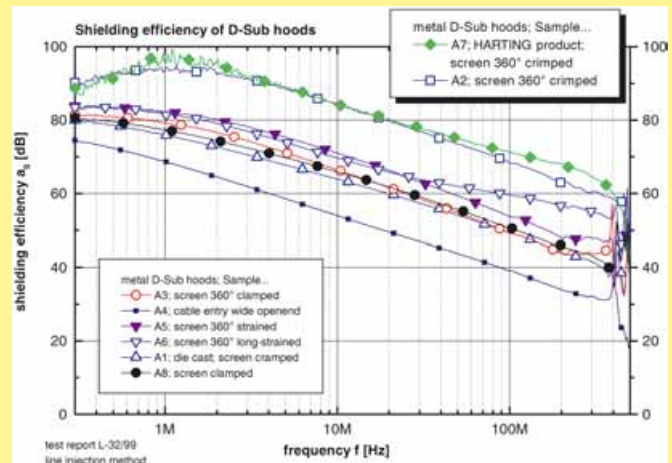
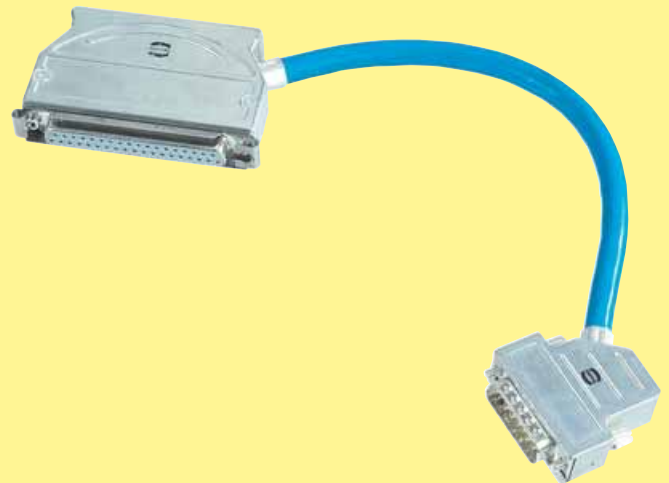
The labyrinth design of the InduCom 9 metal hood, made of zinc die-cast, guarantees together with its crimp flange technology a good EMC/RF performance with very high shielding attenuation greater than 60 dB up to 500MHz. Low resistance is achieved due to the co-action of the crimp flange and the crimp ferrule which are connected to the hood. Also there is an excellent 360° low resistance connection between the cable shield and the hood.

Furthermore this technique provides continuous pressure on the cable after the crimp process for good mechanical strength with good strain relief and pull out resistance as well as anti rotation security for harsh industrial environments. Another advantage is the possibility to connect thicker cables with the crimp flange, for instance, you can connect a 9-pole hood with a cable of approx. 13.5 mm diameter.

With this technique, it is possible to reproduce consistent production quality either in the field or in the plant, which is very important for a bus structure with many interfaces.

Turned and stamped male and female crimp contacts guarantee an optimised electrical and mechanical connection between the cable and the crimp contact. In order to fulfil the required 500 mating cycles for transportation applications most of the contacts are available in performance level 1.

For turned contacts HARTING offers an ultra precision hand crimp tool with an 8-impression crimp, which assures maximum tensile strength. This crimp tool is suitable for wire sizes from AWG 18 to AWG 28.



Crimp flange termination instruction

1. Strip the cable sheath to the correct length (approx. 35 to 40 mm, depending on interface type).
2. Place the crimp ferrule over the cable sheath. Bend the outer screen backwards over the cable sheath. Cut screen approx. 2 mm from the end of the cable sheath.
3. Place the crimp flange over the wires covered by the remaining foil shield. Push and twist the crimp flange under the outer screen and cable sheath until the end of the cable sheath touches the crimp flange. HARTING has developed a special tool for optimised installation of the shielding over the crimp flange, part number 61 03 600 0017.
4. Move the crimp ferrule back onto the crimp flange and crimp the two parts together with the special service crimp tool part number 61 03 600 0020. For an optimised crimp process the tool should be positioned as close as possible to the crimp flange shoulder.
5. Cut off the internal screen foil and push the crimp flange inside the metal hood.



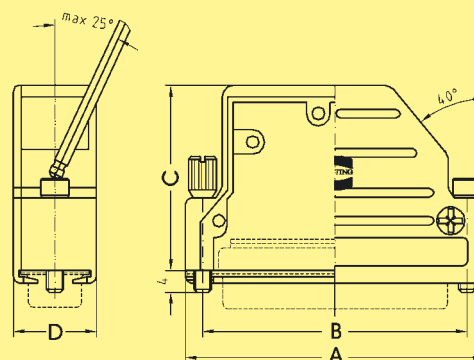


Full metal top and side entry hoods with screws

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

Side entry hood

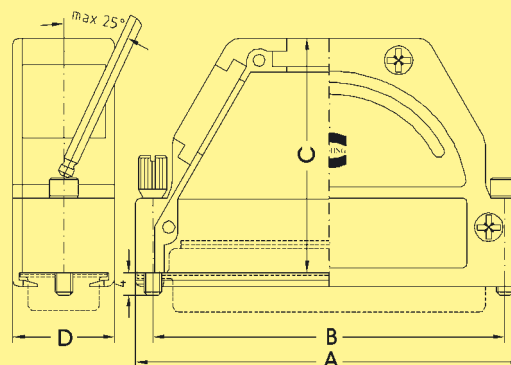
9	61 03 001	013
15	61 03 001	014
25	61 03 001	015



No. of contacts	A	B	C	D
9	31.0	25.0	35.0	15.0
15	39.3	33.3	35.0	15.0
25	53.0	47.0	35.0	15.0

Top/side entry hood

9	61 03 001	010 ¹⁾
15	61 03 001	016 ¹⁾
25	61 03 001	017 ²⁾
37	61 03 001	018 ²⁾
50	61 03 001	019 ²⁾



No. of contacts	No. of cable entries	A	B	C	D
9	1 (top)	31.0	25.0	38.0	15.0
15	1 (top)	39.5	33.3	35.0	15.0
25	3	53.0	47.0	43.0	15.0
37	3	69.5	63.5	43.0	15.0
50	3	67.2	61.6	43.0	17.8

Please insert digit for screw option

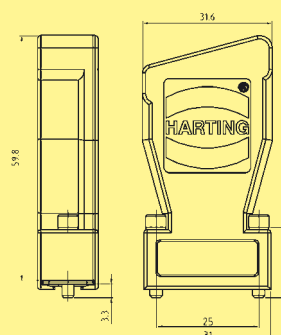
Knurled screw, thread 4-40 UNC	0
Hexagonal screw, thread M3 with captive washer	1
Hexagonal screw, thread 4-40 UNC with captive washer	2
Knurled screw, thread M3	3

Top entry hood

for InduCom 9

Hexagonal screw, thread 4-40 UNC 9 09 67 009 0346

Hexagonal screw, thread M3 9 09 67 009 0347



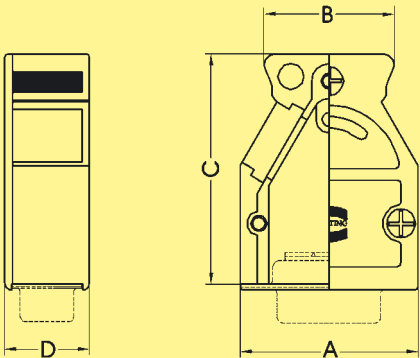
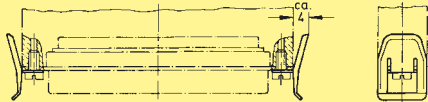
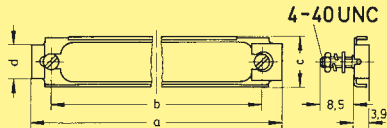
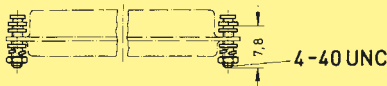
2 cable entries

¹⁾ Part no. contains one blanking piece

²⁾ Part no. contains two blanking pieces

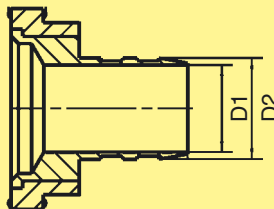
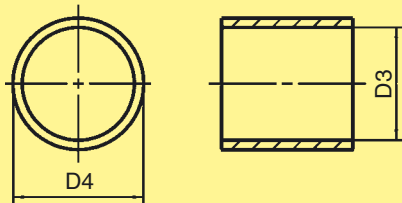
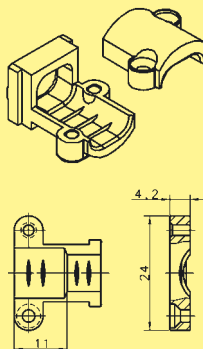
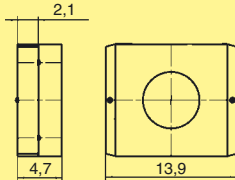


Full metal top and side entry hoods
for spring or slide locking and accessories

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																																				
Top/side entry hood	9 15 25 37 50	61 03 001 0022 ¹⁾ 61 03 001 0011 ²⁾ 61 03 001 0012 ²⁾ 61 03 001 0021 ²⁾ 61 03 001 0020 ²⁾	 <table><tr><th>No. of contacts</th><th>No. of cable entries</th><th>A</th><th>B</th><th>C</th><th>D</th></tr><tr><td>9</td><td>2</td><td>31.0</td><td>22.6</td><td>40.0</td><td>14.8</td></tr><tr><td>15</td><td>3</td><td>39.0</td><td>30.6</td><td>40.0</td><td>14.8</td></tr><tr><td>25</td><td>3</td><td>53.0</td><td>42.6</td><td>40.0</td><td>14.8</td></tr><tr><td>37</td><td>3</td><td>69.5</td><td>59.2</td><td>40.0</td><td>14.8</td></tr><tr><td>50</td><td>3</td><td>67.0</td><td>55.0</td><td>40.0</td><td>17.6</td></tr></table>	No. of contacts	No. of cable entries	A	B	C	D	9	2	31.0	22.6	40.0	14.8	15	3	39.0	30.6	40.0	14.8	25	3	53.0	42.6	40.0	14.8	37	3	69.5	59.2	40.0	14.8	50	3	67.0	55.0	40.0	17.6	
No. of contacts	No. of cable entries	A	B	C	D																																			
9	2	31.0	22.6	40.0	14.8																																			
15	3	39.0	30.6	40.0	14.8																																			
25	3	53.0	42.6	40.0	14.8																																			
37	3	69.5	59.2	40.0	14.8																																			
50	3	67.0	55.0	40.0	17.6																																			
Spring latch corrosion resistant steel	9-50	09 67 000 9907 ³⁾																																						
Fixed latch corrosion resistant steel	9-37 50	09 67 001 9971 ³⁾ 09 67 001 9972 ³⁾																																						
Slide locking device corrosion resistant steel	9 15 25 37 50	09 67 000 9914 09 67 000 9915 09 67 000 9916 09 67 000 9917 09 67 000 9918	 <table><tr><th></th><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>9</td><td>35.6</td><td>25.0</td><td>12.0</td><td>10.0</td></tr><tr><td>15</td><td>44.0</td><td>33.3</td><td>12.0</td><td>10.0</td></tr><tr><td>25</td><td>57.8</td><td>47.0</td><td>12.0</td><td>10.0</td></tr><tr><td>37</td><td>74.3</td><td>63.5</td><td>12.0</td><td>10.0</td></tr><tr><td>50</td><td>72.0</td><td>61.1</td><td>14.8</td><td>13.5</td></tr></table>		a	b	c	d	9	35.6	25.0	12.0	10.0	15	44.0	33.3	12.0	10.0	25	57.8	47.0	12.0	10.0	37	74.3	63.5	12.0	10.0	50	72.0	61.1	14.8	13.5							
	a	b	c	d																																				
9	35.6	25.0	12.0	10.0																																				
15	44.0	33.3	12.0	10.0																																				
25	57.8	47.0	12.0	10.0																																				
37	74.3	63.5	12.0	10.0																																				
50	72.0	61.1	14.8	13.5																																				
Locking bolt tinned	9-50	09 67 001 9973 ³⁾																																						

¹⁾ Part no. contains one blanking piece
²⁾ Part no. contains two blanking pieces
³⁾ Order two for each connector

Accessories for hoods

Identification	Part No.		Drawing	Dimensions in mm																																						
Crimp flange	9-37 contacts	50 contacts	<table><tr><th>D1</th><th>D2</th></tr><tr><td>3.0</td><td>4.0</td></tr><tr><td>3.5</td><td>4.5</td></tr><tr><td>4.0</td><td>5.0</td></tr><tr><td>4.5</td><td>5.5</td></tr><tr><td>5.0</td><td>6.0</td></tr><tr><td>5.5</td><td>6.5</td></tr><tr><td>6.0</td><td>7.0</td></tr><tr><td>6.5</td><td>7.5</td></tr><tr><td>7.0</td><td>8.0</td></tr><tr><td>7.5</td><td>8.5</td></tr><tr><td>8.0</td><td>9.0</td></tr><tr><td>9.0</td><td>10.0</td></tr></table> 	D1	D2	3.0	4.0	3.5	4.5	4.0	5.0	4.5	5.5	5.0	6.0	5.5	6.5	6.0	7.0	6.5	7.5	7.0	8.0	7.5	8.5	8.0	9.0	9.0	10.0													
	D1	D2																																								
	3.0	4.0																																								
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	7.0	8.0																																								
	7.5	8.5																																								
	8.0	9.0																																								
	9.0	10.0																																								
	Crimp ferrule	61 03 000 0045 61 03 000 0046 61 03 000 0047 61 03 000 0048 61 03 000 0049 61 03 000 0050 61 03 000 0051 61 03 000 0052 61 03 000 0053 61 03 000 0054 61 03 000 0055 61 03 000 0056 61 03 000 0057 61 03 000 0058 61 03 000 0059 61 03 000 0127 61 03 000 0060 61 03 000 0061		<table><tr><th>D3</th><th>D4</th></tr><tr><td>5.0</td><td>6.0</td></tr><tr><td>5.5</td><td>6.5</td></tr><tr><td>6.0</td><td>7.0</td></tr><tr><td>6.5</td><td>7.5</td></tr><tr><td>7.0</td><td>8.0</td></tr><tr><td>7.5</td><td>8.5</td></tr><tr><td>8.0</td><td>9.0</td></tr><tr><td>8.5</td><td>9.5</td></tr><tr><td>9.0</td><td>10.0</td></tr><tr><td>9.5</td><td>10.5</td></tr><tr><td>10.0</td><td>11.0</td></tr><tr><td>10.5</td><td>11.5</td></tr><tr><td>11.0</td><td>12.0</td></tr><tr><td>11.5</td><td>12.5</td></tr><tr><td>12.5</td><td>13.5</td></tr><tr><td>13.0</td><td>14.0</td></tr><tr><td>13.5</td><td>15.0</td></tr><tr><td>14.0</td><td>15.0</td></tr></table> 	D3	D4	5.0	6.0	5.5	6.5	6.0	7.0	6.5	7.5	7.0	8.0	7.5	8.5	8.0	9.0	8.5	9.5	9.0	10.0	9.5	10.5	10.0	11.0	10.5	11.5	11.0	12.0	11.5	12.5	12.5	13.5	13.0	14.0	13.5	15.0	14.0	15.0
D3		D4																																								
5.0		6.0																																								
5.5		6.5																																								
6.0		7.0																																								
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12.5		13.5																																								
13.0		14.0																																								
13.5		15.0																																								
14.0		15.0																																								
Cable clamp for hoods		61 03 000 0044	61 03 000 0043		for cable diameter 7 - 10 mm																																					
Blanking piece for hoods		61 03 000 0042	61 03 000 0041																																							

Number of contacts 9, 15, 25, 37, 50
UL recognized

Working current
see current carrying capacity chart
Turned contacts 7.5 A max.
Stamped contacts 6.5 A max.

Test voltage $U_{r.m.s.}$ 1 kV

Clearance and creepage ≥ 1.0 mm

Contact resistance ≤ 10 m Ω
Insulation resistance $\geq 10^{10}$ Ω

Temperature range -55 °C ... + 125 °C

Terminations
a) Solder buckets
max. 0.5 mm²
b) Crimp contacts

Materials
Mouldings Thermoplastic resin, glass-fibre filled (PBTP)
UL 94-V0

Contacts Copper alloy

Contact surface¹⁾
Contact zone: selectively gold-plated according to performance level¹⁾
Termination zone: SnPb

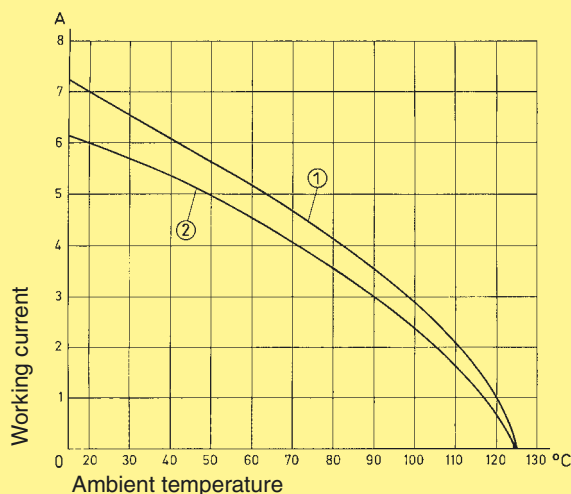
Metal shell Tinned steel

Mating force
9 way ≤ 30 N
15 way ≤ 50 N
25 way ≤ 83 N
37 way ≤ 123 N
50 way ≤ 167 N

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.

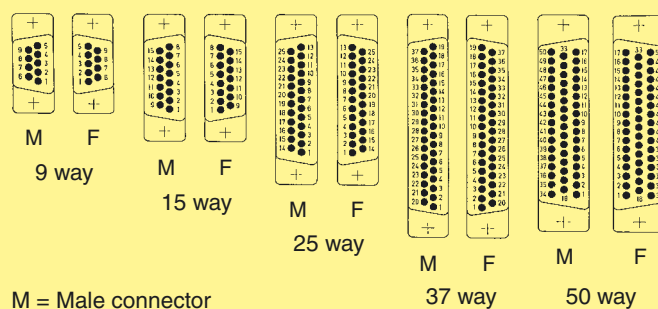
Control and test procedures according to DIN IEC 60 512.



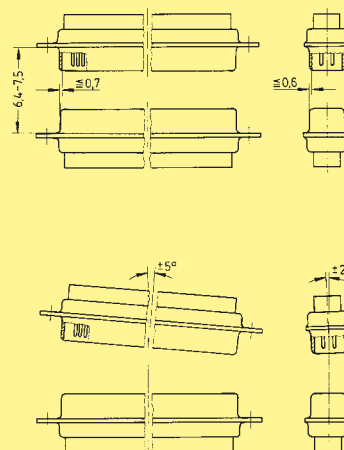
Example: 25 way connector

- ① Turned contacts
- ② Stamped contacts

Contact arrangement View from termination side



Mating conditions as per DIN 41 652



¹⁾ Performance level 3 as per DIN 41 652, part 2, ≥ 50 mating cycles, no gas test
Performance level 2 as per DIN 41 652, part 2, ≥ 200 mating cycles, 4 days gas test using 10 ppm SO₂
Other performance levels on request

Number of contacts

9–50



Solder buckets

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 08.09 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples		turned contacts 9 09 67 009 5604 15 09 67 015 5604 25 09 67 025 5604 37 09 67 037 5604 50 09 67 050 5604 ¹⁾	turned contacts 09 67 009 5615 09 67 015 5615 09 67 025 5615 09 67 037 5615 09 67 050 5615
		stamped contacts 9 09 67 209 5604 15 09 67 215 5604 25 09 67 225 5604 37 09 67 237 5604 50 09 67 250 5604 ¹⁾	stamped contacts 09 67 209 5615 09 67 215 5615 09 67 225 5615 09 67 237 5615 09 67 250 5615 ¹⁾
Female connector tinned metal shell		turned contacts 9 09 67 009 4704 15 09 67 015 4704 25 09 67 025 4704 37 09 67 037 4704 50 09 67 050 4704 ¹⁾	turned contacts 09 67 009 4715 09 67 015 4715 09 67 025 4715 09 67 037 4715 09 67 050 4715
		stamped contacts 9 09 67 209 4704 15 09 67 215 4704 25 09 67 225 4704 37 09 67 237 4704 50 09 67 250 4704 ¹⁾	stamped contacts 09 67 209 4715 09 67 215 4715 09 67 225 4715 09 67 237 4715 09 67 250 4715 ¹⁾

Number of contacts

9-50



Solder buckets

Identification

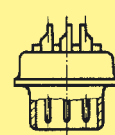
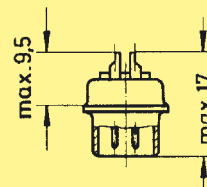
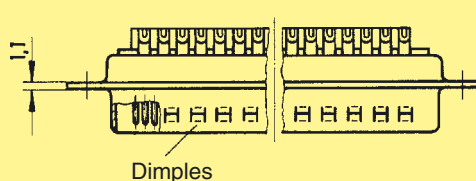
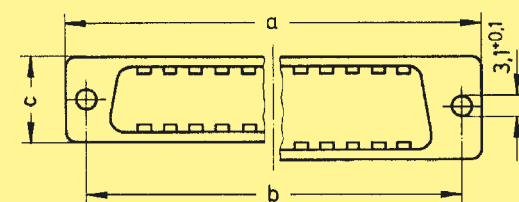
Drawing

Dimensions in mm

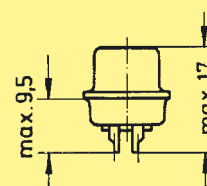
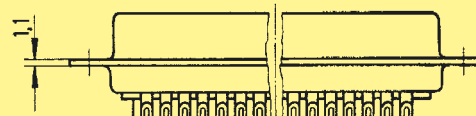
Male connector

9-37

50

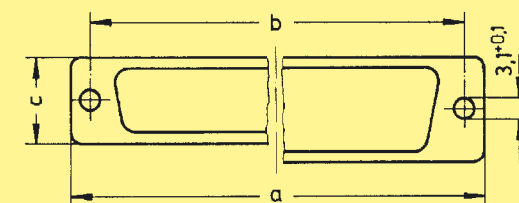


Female connector

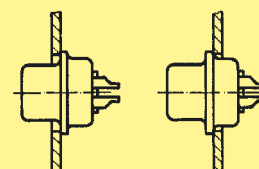
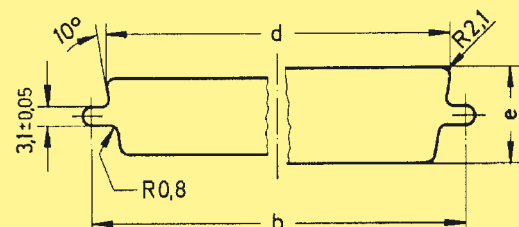


9-37

50



Panel cut out



	a	b _{±0.15}	c	d	e
9	30.9	25.0	12.5	20.5	12.0
15	39.2	33.3	12.5	28.8	12.0
25	53.1	47.0	12.5	42.5	12.0
37	69.4	63.5	12.5	59.1	12.0
50	67.0	61.1	15.4	56.3	14.8

Mating conditions see page 08.09

Number of contacts

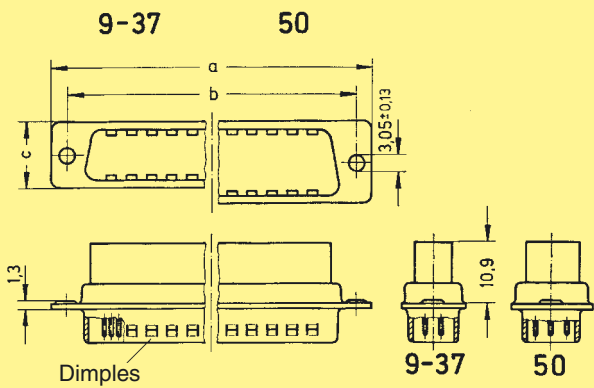
9–50



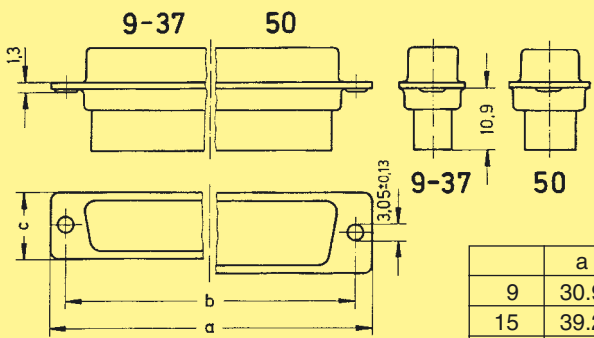
Crimp terminal

Identification	No. of contacts	Part No.
Male connector Order contacts separately tinned metal shell with dimples	9	09 67 009 5601
	15	09 67 015 5601
	25	09 67 025 5601
	37	09 67 037 5601
	50	09 67 050 5601
Female connector Order contacts separately tinned metal shell	9	09 67 009 4701
	15	09 67 015 4701
	25	09 67 025 4701
	37	09 67 037 4701
	50	09 67 050 4701

Male connector

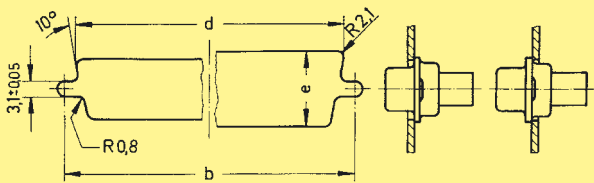


Female connector



	a	b ±0.15	c	d	e
9	30.9	25.0	12.5	20.5	12.0
15	39.2	33.3	12.5	28.8	12.0
25	53.1	47.0	12.5	42.5	12.0
37	69.4	63.5	12.5	59.1	12.0
50	67.0	61.1	15.4	56.3	14.8

Panel cut out



Dimensions in mm

Crimp contacts see page 08.13
Mating conditions see page 08.09



Crimp contacts

Identification	Wire gauge (mm ²)	Part No.	
		stamped male contacts	stamped female contacts
		Performance level 1	Performance level 1
Individual contacts	AWG 20-24 0.50-0.20	61 03 000 0083	61 03 000 0085
500 pieces/reel		61 03 000 0082	61 03 000 0084
Individual contacts	AWG 24-28 0.20-0.08	61 03 000 0087	61 03 000 0089
500 pieces/reel		61 03 000 0086	61 03 000 0088
Identification	Wire gauge (mm ²)	Part No.	
		turned male contacts	turned female contacts
		Performance level 1	Performance level 1
Individual contacts	AWG 18-20 0.75-0.50	61 03 000 0112	61 03 000 0113
	AWG 20-22 0.50-0.37	61 03 000 0073	61 03 000 0074
	AWG 22-26 0.37-0.14	61 03 000 0094	61 03 000 0096
	AWG 24-28 0.20-0.08	61 03 000 0078	61 03 000 0080

Stamped contacts for size AWG 28-32 on request



InduCom 9 – Industrial bus interface system

Identification

Part no.

General information

Set for MVB-cable



09 63 009 5013

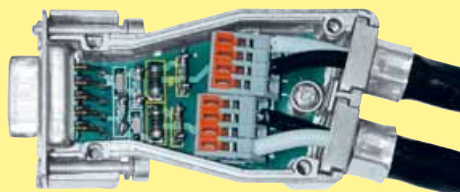
MVB backbone interface set

The Multifunctional Vehicle Bus (MVB) backbone interface set is specially designed for communication cables in Train Control Networks (TCN). With this interface set it is possible to realise a T-bus structure with MVB-cable with which you can disconnect the bus interface from the control unit without any interruption of the complete bus communication. On the pcb you will have load resistors and test capacitors which can be activated with solder bridges. The wires are terminated with the proven vibration resistant cage clamp technology. These MVB interface set is approved for use with 2 types of cables (**Nexan 459 530 50 and 459 110 19**).

Components of the MVB interface set:

- 1 metal housing with 2 cable entries
- 2 hexagonal screws with UNC 4-40 threads
- 1 pcb with 9 way D-Sub male connector and cage clamps
- 2 crimp flanges for the MVB cable
- 2 crimp ferrules for the MVB cable
- 1 blanking piece

Set for WTB-cable



09 63 009 5014

MVB backbone interface set

The Multifunctional Vehicle Bus (MVB) backbone interface set is specially designed for backbone cables in Train Control Networks (TCN). With this interface set it is possible to realise a T-bus structure with WTB-cable with which you can disconnect the bus interface from the control unit without any interruption of the complete bus communication. On the pcb you will have load resistors and test capacitors which can be activated with solder bridges. The wires are terminated with the proven vibration resistant cage clamp technology. These MVB interface set is approved for use with 1 type of cable (**HEW 15 366**).

Components of the MVB interface set:

- 1 metal housing with 2 cable entries
- 2 hexagonal screws with UNC 4-40 threads
- 1 pcb with 9 way D-Sub male connector and cage clamps
- 2 crimp flanges for the WTB cable
- 2 crimp ferrules for the WTB cable
- 1 blanking piece

Tools

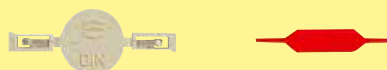
Identification	Part No	Drawing																				
Hexagonal head screwdriver for hoods with hexagonal screws	61 03 600 0021																					
Crimp tool for flange and ferrule	61 03 600 0020																					
Inserts for crimp tool	61 03 000 0179 61 03 000 0180 61 03 000 0098 61 03 000 0099 61 03 000 0100 61 03 000 0101 61 03 000 0102 61 03 000 0103 61 03 000 0104 61 03 000 0105 61 03 000 0174 61 03 000 0172 61 03 000 0168 61 03 000 0169 61 03 000 0175 61 03 000 0176 61 03 000 0177 61 03 000 0178 61 03 000 0173	<table><tr><th>Width of hexagonal nut [mm]</th></tr><tr><td>5.0</td></tr><tr><td>5.5</td></tr><tr><td>6.0</td></tr><tr><td>6.5</td></tr><tr><td>7.0</td></tr><tr><td>7.5</td></tr><tr><td>8.0</td></tr><tr><td>8.5</td></tr><tr><td>9.0</td></tr><tr><td>9.5</td></tr><tr><td>10.0</td></tr><tr><td>10.5</td></tr><tr><td>11.0</td></tr><tr><td>11.5</td></tr><tr><td>12.0</td></tr><tr><td>12.5</td></tr><tr><td>13.0</td></tr><tr><td>13.5</td></tr><tr><td>14.0</td></tr></table>	Width of hexagonal nut [mm]	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0
Width of hexagonal nut [mm]																						
5.0																						
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12.5																						
13.0																						
13.5																						
14.0																						
Mounting tool for flange 9-37 contacts 50 contacts	61 03 600 0017 61 03 600 0018																					
Insertion and removal tool for contacts	09 99 000 0171																					

Tools

Identification	Part No	Drawing																											
Crimp tool for turned contacts AWG 18-28	61 03 600 0022	 <table><tr><th>Part No. contact</th><th>Part No. locator</th><th>Crimp tool selection no.</th></tr><tr><td>61 03 000 0112</td><td>61 03 600 0024</td><td>7</td></tr><tr><td>61 03 000 0113</td><td>61 03 600 0024</td><td>7</td></tr><tr><td>61 03 000 0073</td><td>61 03 600 0023</td><td>7</td></tr><tr><td>61 03 000 0074</td><td>61 03 600 0023</td><td>7</td></tr><tr><td>61 03 000 0094</td><td>61 03 600 0023</td><td>7</td></tr><tr><td>61 03 000 0096</td><td>61 03 600 0023</td><td>7</td></tr><tr><td>61 03 000 0078</td><td>61 03 600 0023</td><td>7</td></tr><tr><td>61 03 000 0080</td><td>61 03 600 0023</td><td>7</td></tr></table>	Part No. contact	Part No. locator	Crimp tool selection no.	61 03 000 0112	61 03 600 0024	7	61 03 000 0113	61 03 600 0024	7	61 03 000 0073	61 03 600 0023	7	61 03 000 0074	61 03 600 0023	7	61 03 000 0094	61 03 600 0023	7	61 03 000 0096	61 03 600 0023	7	61 03 000 0078	61 03 600 0023	7	61 03 000 0080	61 03 600 0023	7
Part No. contact	Part No. locator	Crimp tool selection no.																											
61 03 000 0112	61 03 600 0024	7																											
61 03 000 0113	61 03 600 0024	7																											
61 03 000 0073	61 03 600 0023	7																											
61 03 000 0074	61 03 600 0023	7																											
61 03 000 0094	61 03 600 0023	7																											
61 03 000 0096	61 03 600 0023	7																											
61 03 000 0078	61 03 600 0023	7																											
61 03 000 0080	61 03 600 0023	7																											
Locator for crimp tool AWG 20-28 AWG 18-20	61 03 600 0023 61 03 600 0024																												
Crimp tool for stamped contacts AWG 20-28	09 99 000 0175																												

SEK – Insulation Displacement Connector system (IDC), 2.54 mm pitch

Page

General information **09.02****Solder board connectors**Technical characteristics **09.04**Male standard connectors **09.06**Male standard connectors with board lock **09.10**Male low profile connectors **09.12**Accessories **09.14****Wrap post connectors**Technical characteristics **09.15**Male standard connectors **09.16**Accessories **09.18****Cable connectors**Technical characteristics for female connectors **09.19**Female connectors **09.20**Technical characteristics for pcb transition connectors, 2 rows **09.22**Pcb transition connectors, 2 rows **09.23**Technical characteristics for pcb transition connectors, 4 rows **09.24**Pcb transition connectors, 4 rows **09.25**Technical characteristics for DIP connectors **09.26**DIP connectors **09.27**Technical characteristics for DIN 41 612 connectors **09.28**DIN 41 612 connectors **09.29**

Declaration of conformity

This Declaration of Conformity is suitable to the European Standard EN 45 014, „General criteria for suppliers declaration of conformity“.

The basis for the criteria has been found in international documentation, particularly in ISO/IEC Guide 22, 1982, „Information on manufacturers declaration of conformity with standards or other technical specifications“.

We

HARTING KgaA
Postfach 1133
32325 Espelkamp

declare under our own responsibility that the product

Flat Cable Connector System

is in conformity with the following standard(s) or other normative documents.

The products fulfill the requirements acc. to:

Connectors for frequencies below 3 MHz for use with printed boards-Part 13:

Detail specification or two-part connectors of assessed quality, for printed boards for basic grid of 2,54mm, with free connectors for non-accessible insulation displacement terminations (ID)
DIN EN 60603-13

This declaration of conformity refers to the series:

SEK



DAT-P-041/94-00

DAT-P-041/94-20
 TTI-P-G-086/97-00

Our testing laboratory is accredited and monitored by the German Accreditation Body Technology/ (DATEch).
 Reg.-Nr. DAT-P-041/94-20 and TTI-P-G086/97-00

QUALITY SYSTEM

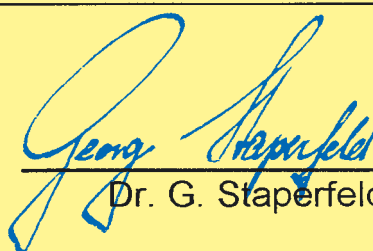


certified by DQS acc. to
 ISO 9001 - Reg.-Nr. 2204

Our quality system is certified and monitored by DQS in conformity with the standard DIN EN ISO 9001.
 Cert.-Nr. 2204-02

Espekkamp, 22.10.1999

Place and date of publication


 Dr. G. Staperfeld

Name and signature

The HARTING Insulation Displacement Connector system

Economic and reliable connections

The flat cable and connector can be pre-assembled and used as a component with predetermined functional characteristics.

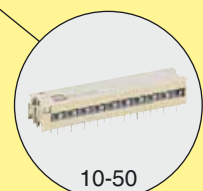
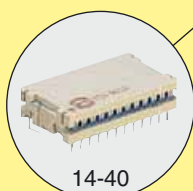
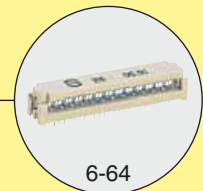
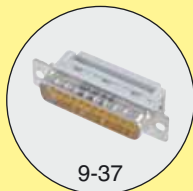
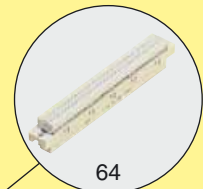
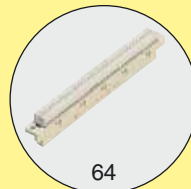
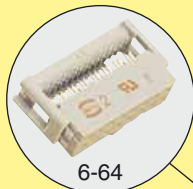
The HARTING insulation displacement contacts pierce the insulation on the flat cable to provide a durable gastight connection with the wire.

The HARTING¹⁾ insulation displacement technique constitutes the ideal solution to your wiring problems.

¹⁾ The HARTING insulation displacement system meets all the characteristics, specifications and test conditions of DIN 41 611/part 6.

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

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



Cable assemblies

- HARTING can supply cable assemblies to customer specifications.
- A wide range of connector types available with various contact arrangements constitute the ideal solution to your wiring problems.
- Cables of all types in economic reel lengths are available.

Quality

- Cables professionally assembled on HARTING work stations ensure reliable connections.
- Finished harnesses are subject to 100% quality checks on a HARTING test device.
- Insulation test.
- Contact resistance test.

Economy

- The tested assembly of connectors and flat cables from one manufacturer guarantees a high degree of economy and reliability.
- Investment for work stations and test devices are not required.
- Stocks of piece parts are reduced.

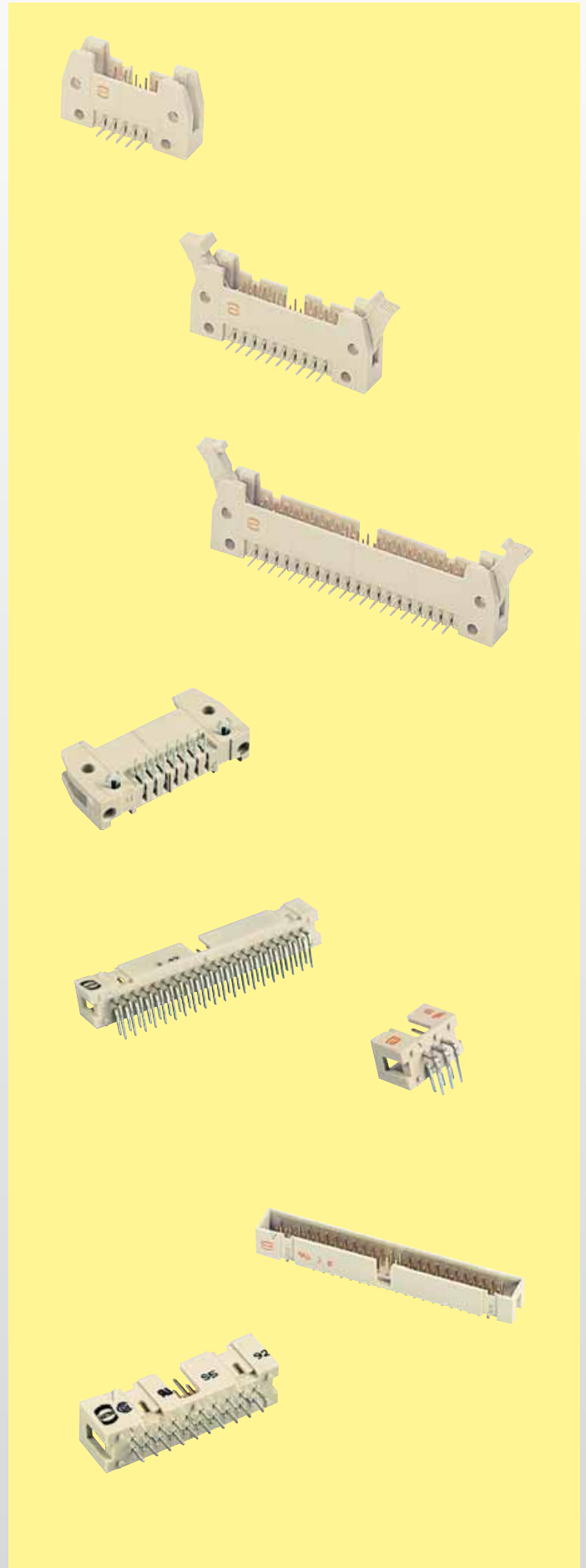
General information

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

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

This catalogue must not be used in any form or manner without our prior approval in writing (Copyright Law, Fair Trading Law, Civil Code). We are bound by the English version only.

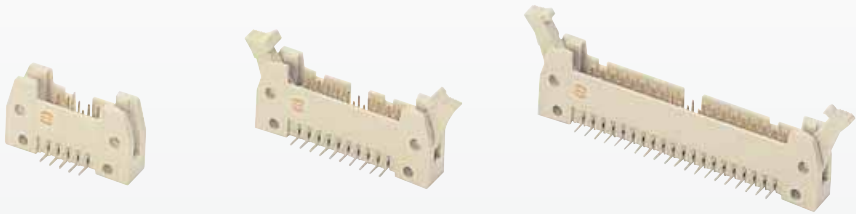
Number of contacts	6, 10, 14, 16, 20, 26, 30*, 34, 40, 50, 60, 64
Contact arrangement	straight, angled
Contact length	2.9 mm, 4.5 mm
Approvals	IEC 60 603-13 DIN EN 60 603-13 D 2632 BT 224 NFC 93-428 (HE 10) UL recognized: E102079 CSA: 98267 comply with MIL-C 83 503
Pitch	2.54 mm [0.100"]
Working current	1 A
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance Insulation resistance	$\leq 20 \text{ m}\Omega$ $\geq 10^9 \Omega$
Temperature range	-55 °C ... + 125 °C The maximum temperature includes heating of contacts and ambient temperature
Terminations	For pcb hole $\varnothing 0.9 \text{ mm}$ DIN IEC 52 141 Diagonal: 0.79 mm
Materials	
Moulding	Thermoplastic resin (PBTP) UL 94-V0
Contact surface ¹⁾	<u>Contact zone</u> : gold-plated according to performance level ¹⁾ <u>Termination zone</u> : tinned



¹⁾ Performance level 3 as per IEC 603-13, ≥ 50 mating cycles, no gas test
Performance level 2 as per IEC 603-13, ≥ 200 mating cycles, 4 days gas test
as per MIL-C 83 503, $> 0.76 \mu\text{m Au}$ (30 μ inch), other performance levels on request

Number of contacts

6-64



Male header with angled solder pins

Identification	No. of contacts	Part No.					
		Without levers		With short levers		With long levers	
Male header with angled solder pins Length: 2.9 mm	6	09 18 506	└ 923	09 18 506	└ 913	09 18 506	└ 903
	10	09 18 510	└ 923	09 18 510	└ 913	09 18 510	└ 903
	14	09 18 514	└ 923	98 18 514	└ 913	09 18 514	└ 903
	16	09 18 516	└ 923	09 18 516	└ 913	09 18 516	└ 903
	20	09 18 520	└ 923	09 18 520	└ 913	09 18 520	└ 903
	26	09 18 526	└ 923	09 18 526	└ 913	09 18 526	└ 903
	34	09 18 534	└ 923	09 18 534	└ 913	09 18 534	└ 903
	40	09 18 540	└ 923	09 18 540	└ 913	09 18 540	└ 903
	50	09 18 550	└ 923	09 18 550	└ 913	09 18 550	└ 903
	60	09 18 560	└ 923	09 18 560	└ 913	09 18 560	└ 903
	64	09 18 564	└ 923	09 18 564	└ 913	09 18 564	└ 903
30 contacts and kinked version on request							
Male header with angled solder pins Length: 4.5 mm	6	09 18 506	└ 921*	09 18 506	└ 911*	09 18 506	└ 901*
	10	09 18 510	└ 921*	09 18 510	└ 911*	09 18 510	└ 901*
	14	09 18 514	└ 921*	98 18 514	└ 911*	09 18 514	└ 901*
	16	09 18 516	└ 921*	09 18 516	└ 911*	09 18 516	└ 901*
	20	09 18 520	└ 921*	09 18 520	└ 911*	09 18 520	└ 901*
	26	09 18 526	└ 921*	09 18 526	└ 911*	09 18 526	└ 901*
	34	09 18 534	└ 921*	09 18 534	└ 911*	09 18 534	└ 901*
	40	09 18 540	└ 921*	09 18 540	└ 911*	09 18 540	└ 901*
	50	09 18 550	└ 921*	09 18 550	└ 911*	09 18 550	└ 901*
	60	09 18 560	└ 921*	09 18 560	└ 911*	09 18 560	└ 901*
	64	09 18 564	└ 921*	09 18 564	└ 911*	09 18 564	└ 901*
30 contacts and kinked version on request							

SEK

* Not normally kept in stock
For accessories see page 09.14
For dimensions see page 09.07

For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request

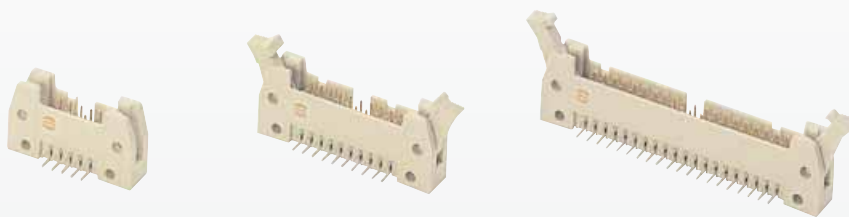
7*
6
5*

7*
6
5*

7*
6
5*

Number of contacts

6-64



Male header with angled solder pins

Identification

Drawing

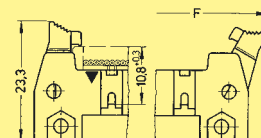
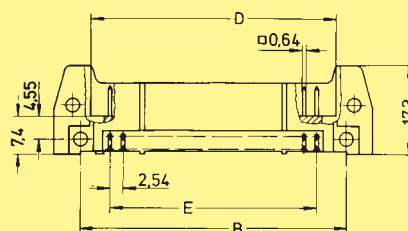
Dimensions in mm

Male header

No. of contacts	A	B	D	E	F	G
6	26.9	16.76	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	21.84	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	26.92	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	29.46	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	34.54	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	42.16	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	52.32	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	59.94	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	72.64	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	85.34	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	90.42	86.11	2.54 x 31 = 78.74	110.6	113.9

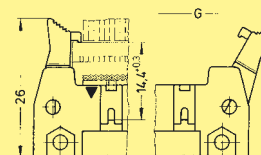
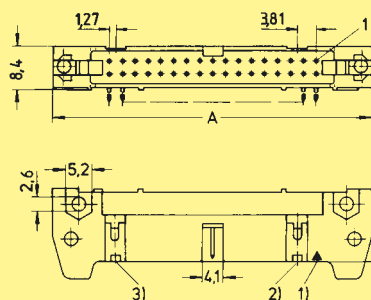
Short levers

for use with female connector without strain relief clamp



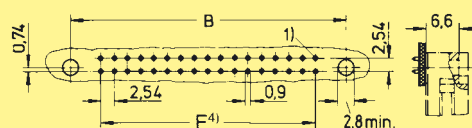
Long levers

for use with female connector with strain relief clamp



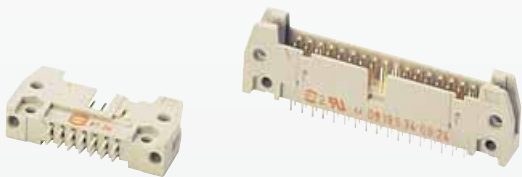
a) Solder pins for 0.9 mm dia. hole

Board drillings



Number of contacts

6-64



Male header with straight solder pins

Identification	No. of contacts	Part No.					
		Without levers		With short levers		With long levers	
Male header with straight solder pins Length: 2.9 mm	6	09 18 506	└ 924	09 18 506	└ 914	09 18 506	└ 904
	10	09 18 510	└ 924	09 18 510	└ 914	09 18 510	└ 904
	14	09 18 514	└ 924	98 18 514	└ 914	09 18 514	└ 904
	16	09 18 516	└ 924	09 18 516	└ 914	09 18 516	└ 904
	20	09 18 520	└ 924	09 18 520	└ 914	09 18 520	└ 904
	26	09 18 526	└ 924	09 18 526	└ 914	09 18 526	└ 904
	34	09 18 534	└ 924	09 18 534	└ 914	09 18 534	└ 904
	40	09 18 540	└ 924	09 18 540	└ 914	09 18 540	└ 904
	50	09 18 550	└ 924	09 18 550	└ 914	09 18 550	└ 904
	60	09 18 560	└ 924	09 18 560	└ 914	09 18 560	└ 904
	64	09 18 564	└ 924	09 18 564	└ 914	09 18 564	└ 904
30 contacts and kinked version on request							
Male header with straight solder pins Length: 4.5 mm	6	09 18 506	└ 922*	09 18 506	└ 912*	09 18 506	└ 902*
	10	09 18 510	└ 922*	09 18 510	└ 912*	09 18 510	└ 902*
	14	09 18 514	└ 922*	98 18 514	└ 912*	09 18 514	└ 902*
	16	09 18 516	└ 922*	09 18 516	└ 912*	09 18 516	└ 902*
	20	09 18 520	└ 922*	09 18 520	└ 912*	09 18 520	└ 902*
	26	09 18 526	└ 922*	09 18 526	└ 912*	09 18 526	└ 902*
	34	09 18 534	└ 922*	09 18 534	└ 912*	09 18 534	└ 902*
	40	09 18 540	└ 922*	09 18 540	└ 912*	09 18 540	└ 902*
	50	09 18 550	└ 922*	09 18 550	└ 912*	09 18 550	└ 902*
	60	09 18 560	└ 922*	09 18 560	└ 912*	09 18 560	└ 902*
	64	09 18 564	└ 922*	09 18 564	└ 912*	09 18 564	└ 902*
30 contacts and kinked version on request							

* Not normally kept in stock
For accessories see page 09.14
For dimensions see page 09.09

For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request

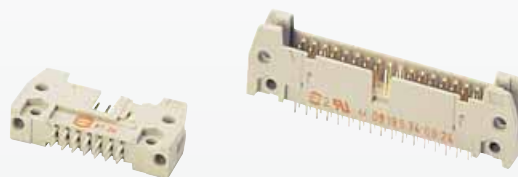
7*
6
5*

7*
6
5*

7*
6
5*

Number of contacts

6-64



Male header with straight solder pins

Identification

Drawing

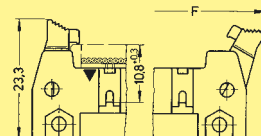
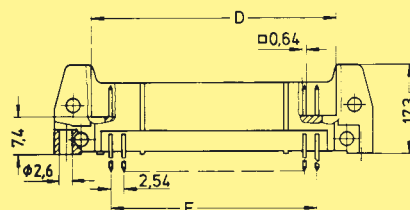
Dimensions in mm

Male header

No. of contacts	A	C	D	E	F	G
6	26.9	22.86	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	27.94	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	33.02	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	35.56	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	40.64	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	48.26	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	58.42	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	66.04	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	78.74	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	91.44	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	96.52	86.11	2.54 x 31 = 78.74	110.6	113.9

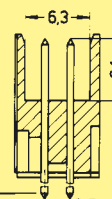
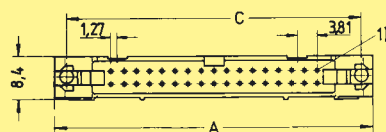
Short levers

for use with female connector without strain relief clamp

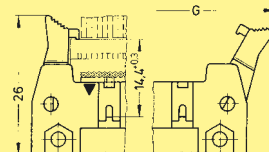


Long levers

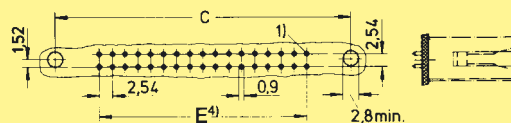
for use with female connector with strain relief clamp



a) Solder pins for 0.9 mm dia. hole

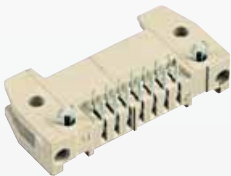


Board drillings



Number of contacts

6-64



Male header with angled solder pins and board lock

Identification	No. of contacts	Part No.					
		Without levers		With short levers		With long levers	
Male header with angled solder pins and pcb board lock Length: 2.9 mm for 1.6 mm pcb thickness	6	09 18 506	└ 973*	09 18 506	└ 963*	09 18 506	└ 953*
	10	09 18 510	└ 973*	09 18 510	└ 963*	09 18 510	└ 953*
	14	09 18 514	└ 973*	98 18 514	└ 963*	09 18 514	└ 953*
	16	09 18 516	└ 973*	09 18 516	└ 963*	09 18 516	└ 953*
	20	09 18 520	└ 973*	09 18 520	└ 963*	09 18 520	└ 953*
	26	09 18 526	└ 973*	09 18 526	└ 963*	09 18 526	└ 953*
	34	09 18 534	└ 973*	09 18 534	└ 963*	09 18 534	└ 953*
	40	09 18 540	└ 973*	09 18 540	└ 963*	09 18 540	└ 953*
	50	09 18 550	└ 973*	09 18 550	└ 963*	09 18 550	└ 953*
	60	09 18 560	└ 973*	09 18 560	└ 963*	09 18 560	└ 953*
	64	09 18 564	└ 973*	09 18 564	└ 963*	09 18 564	└ 953*

To hold the connector on the pcb before the soldering process, two board locks have been added on the male header with angled solder pins.

* Not normally kept in stock
30 contacts on request

For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request 5

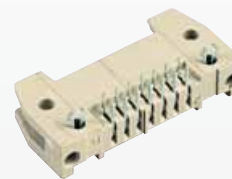
7
6
5

7
6
5

7
6
5

Number of contacts

6-64



Male header with angled solder pins and board lock

Identification

Drawing

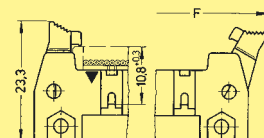
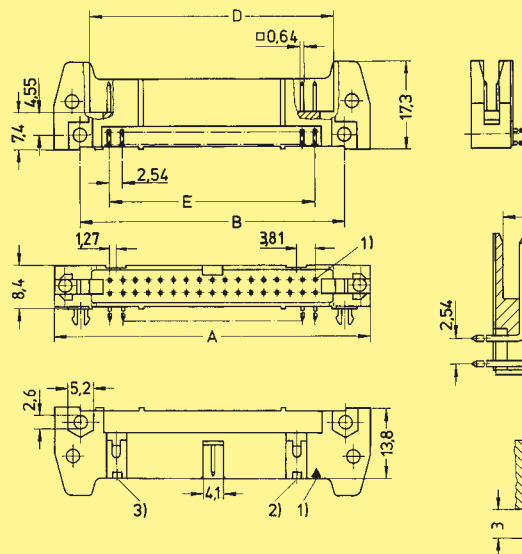
Dimensions in mm

Male header

No. of contacts	A	B	D	E	F	G
6	26.9	16.76	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	21.84	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	26.92	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	29.46	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	34.54	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	42.16	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	52.32	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	59.94	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	72.64	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	85.34	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	90.42	86.11	2.54 x 31 = 78.74	110.6	113.9

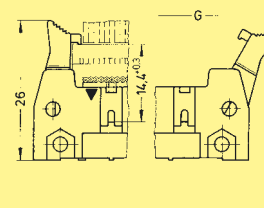
Short levers

for use with female connector without strain relief clamp

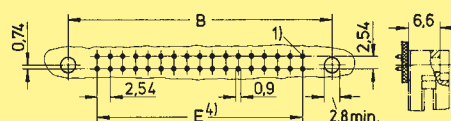


Long levers

for use with female connector with strain relief clamp

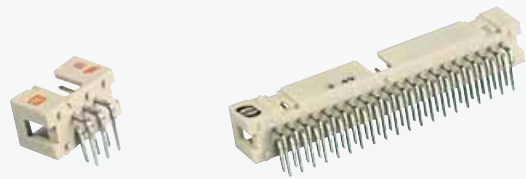


Board drillings



Number of contacts

6-64



Low-profile male header, angled solder pins

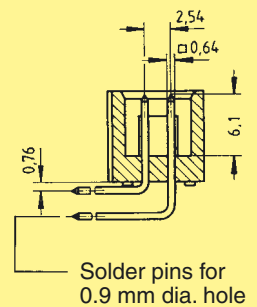
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
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Male header with angled solder pins

Length: 2.9 mm

6	09 18 506	323
10	09 18 510	323
14	09 18 514	323
16	09 18 516	323
20	09 18 520	323
26	09 18 526	323
34	09 18 534	323
40	09 18 540	323
50	09 18 550	323
60	09 18 560	323
64	09 18 564	323

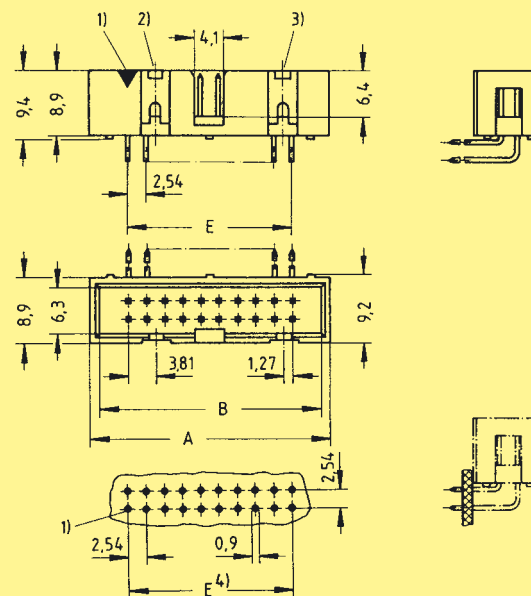
No. of contacts	A	B	E
6	15.2	12.78	2.54 x 2 = 5.08
10	20.3	17.86	2.54 x 4 = 10.16
14	25.4	22.94	2.54 x 6 = 15.24
16	27.9	25.48	2.54 x 7 = 17.78
20	33.0	30.56	2.54 x 9 = 22.86
26	40.6	38.18	2.54 x 12 = 30.48
34	50.8	48.34	2.54 x 16 = 40.64
40	58.4	55.96	2.54 x 19 = 48.26
50	71.3	68.66	2.54 x 24 = 60.96
60	84.0	81.36	2.54 x 29 = 73.66
64	89.1	86.44	2.54 x 31 = 78.74



Male header with angled solder pins

Length: 4.5 mm

6	09 18 506	321*
10	09 18 510	321*
14	09 18 514	321*
16	09 18 516	321*
20	09 18 520	321*
26	09 18 526	321*
34	09 18 534	321*
40	09 18 540	321*
50	09 18 550	321*
60	09 18 560	321*
64	09 18 564	321*



For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request

7
6
5 *

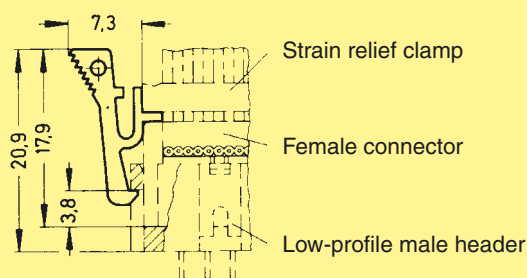
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
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Locking lever for female connector with strain relief

in conjunction with low-profile male header

When the security of latching is required and space is a premium, these locking levers can be fitted onto the strain relief of the HARTING female connector.

09 18 000 9905⁵⁾



¹⁾ Contact number 1

²⁾ No polarization slot for 6, 10 or 14 way male header

³⁾ No polarization slot for 6 way male header

⁴⁾ Pitch tolerance: ± 0.1

* Not normally kept in stock

⁵⁾ Order 2 per female connector

Number of contacts

6-64


Low-profile male header, straight solder pins

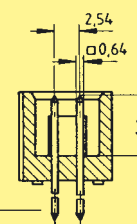
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
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Male header with straight solder pins

Length: 2.9 mm

6	09 18 506	324
10	09 18 510	324
14	09 18 514	324
16	09 18 516	324
20	09 18 520	324
26	09 18 526	324
34	09 18 534	324
40	09 18 540	324
50	09 18 550	324
60	09 18 560	324
64	09 18 564	324

No. of contacts	A	B	E
6	15.2	12.78	2.54 x 2 = 5.08
10	20.3	17.86	2.54 x 4 = 10.16
14	25.4	22.94	2.54 x 6 = 15.24
16	27.9	25.48	2.54 x 7 = 17.78
20	33.0	30.56	2.54 x 9 = 22.86
26	40.6	38.18	2.54 x 12 = 30.48
34	50.8	48.34	2.54 x 16 = 40.64
40	58.4	55.96	2.54 x 19 = 48.26
50	71.3	68.66	2.54 x 24 = 60.96
60	84.0	81.36	2.54 x 29 = 73.66
64	89.1	86.44	2.54 x 31 = 78.74

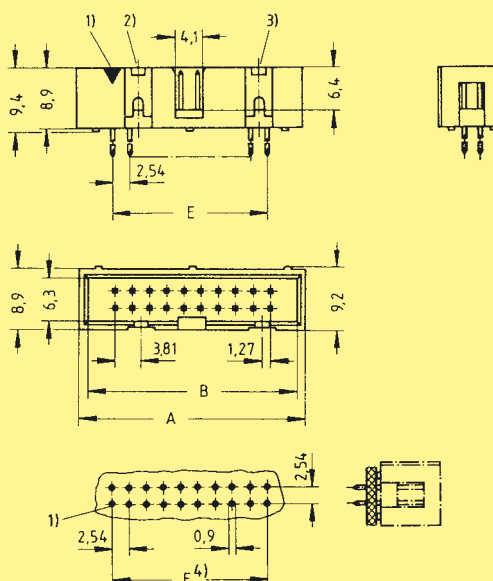


Solder pins for 0.9 mm dia. hole

Male header with straight solder pins

Length: 4.5 mm

6	09 18 506	322*
10	09 18 510	322*
14	09 18 514	322*
16	09 18 516	322*
20	09 18 520	322*
26	09 18 526	322*
34	09 18 534	322*
40	09 18 540	322*
50	09 18 550	322*
60	09 18 560	322*
64	09 18 564	322*



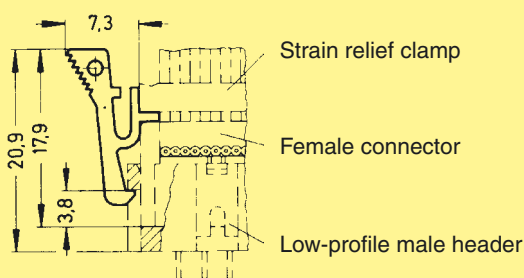
For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request 5 *

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
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Locking lever for female connector with strain relief

in conjunction with low-profile male header

When the security of latching is required and space is a premium, these locking levers can be fitted onto the strain relief of the HARTING female connector.

09 18 000 9905⁵⁾


* Not normally kept in stock
5) Order 2 per female connector

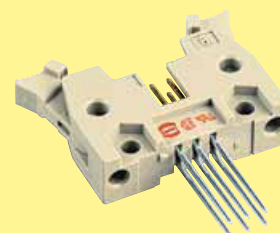
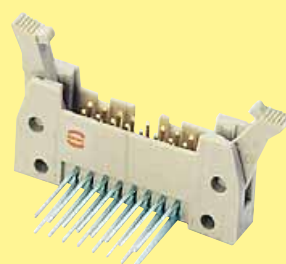
1) Contact number 1
2) No polarization slot for 6, 10 or 14 way male header

3) No polarization slot for 6 way male header
4) Pitch tolerance: ± 0.1

Accessories

Identification	Part No.	Drawing	Dimensions in mm
Polarization key ¹⁾ Part No. comprises 2 keys	09 18 500 9902 ¹⁾		
Locking lever (snaps into place, can be fitted whenever required)	Long: 09 18 000 9903 ²⁾ Short: 09 18 000 9904 ²⁾	Long Short For use with female connector <u>with</u> strain relief clamp For use with female connector <u>without</u> strain relief clamp	
Fixing screws for 1.6 mm P.C. board	09 18 000 9906 ³⁾		
Coding system with loss of contact	Code pin 09 18 000 9901 ⁴⁾ Removal tool for male contacts 09 99 000 0133	To avoid cross-plugging adjacent connectors a coding system is required. A code pin is inserted into the appropriate cavity in the female connector. The corresponding male contact is removed by a special removal tool.	

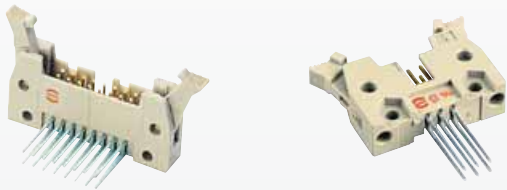
Number of contacts	6, 10, 14, 16, 20, 26, 34, 40, 50, 60, 64
Contact arrangement	straight, angled
Contact length	15 mm
Approvals	IEC 60 603-13 DIN EN 60 603-13 D 2632 BT 224 NFC 93-428 (HE 10) comply with MIL-C 83 503
Pitch	2.54 mm [0.100"]
Working current	1 A
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance Insulation resistance	$\leq 20 \text{ m}\Omega$ $\geq 10^9 \Omega$
Temperature range	-55 °C ... + 125 °C The maximum temperature includes heating of contacts and ambient temperature
Terminations	0.6 mm x 0.6 mm Diagonal: 0.86 mm
Materials	
Moulding	Thermoplastic resin (PBTP) UL 94-V0
Contact surface ¹⁾	<u>Contact zone</u> : gold-plated according to performance level ¹⁾ <u>Termination zone</u> : tinned



¹⁾ Performance level 3 as per IEC 603-13, ≥ 50 mating cycles, no gas test
Performance level 2 as per IEC 603-13, ≥ 200 mating cycles, 4 days gas test
as per MIL-C 83 503, $> 0.76 \mu\text{m Au}$ (30 μ inch), other performance levels on request

Number of contacts

6-64



Male header with wrap posts

Identification	No. of contacts	Part No.					
		Without levers		With short levers		With long levers	
Male header with angled wrap posts Length: 15 mm □ 0.6 mm	6	09 18 506	└ 926*	09 18 506	└ 916*	09 18 506	└ 906*
	10	09 18 510	└ 926*	09 18 510	└ 916*	09 18 510	└ 906*
	14	09 18 514	└ 926*	98 18 514	└ 916*	09 18 514	└ 906*
	16	09 18 516	└ 926*	09 18 516	└ 916*	09 18 516	└ 906*
	20	09 18 520	└ 926*	09 18 520	└ 916*	09 18 520	└ 906*
	26	09 18 526	└ 926*	09 18 526	└ 916*	09 18 526	└ 906*
	34	09 18 534	└ 926*	09 18 534	└ 916*	09 18 534	└ 906*
	40	09 18 540	└ 926*	09 18 540	└ 916*	09 18 540	└ 906*
	50	09 18 550	└ 926*	09 18 550	└ 916*	09 18 550	└ 906*
	60	09 18 560	└ 926*	09 18 560	└ 916*	09 18 560	└ 906*
	64	09 18 564	└ 926*	09 18 564	└ 916*	09 18 564	└ 906*
Male header with straight wrap posts Length: 15 mm □ 0.6 mm	6	09 18 506	└ 927*	09 18 506	└ 917*	09 18 506	└ 907*
	10	09 18 510	└ 927*	09 18 510	└ 917*	09 18 510	└ 907*
	14	09 18 514	└ 927*	98 18 514	└ 917*	09 18 514	└ 907*
	16	09 18 516	└ 927*	09 18 516	└ 917*	09 18 516	└ 907*
	20	09 18 520	└ 927*	09 18 520	└ 917*	09 18 520	└ 907*
	26	09 18 526	└ 927*	09 18 526	└ 917*	09 18 526	└ 907*
	34	09 18 534	└ 927*	09 18 534	└ 917*	09 18 534	└ 907*
	40	09 18 540	└ 927*	09 18 540	└ 917*	09 18 540	└ 907*
	50	09 18 550	└ 927*	09 18 550	└ 917*	09 18 550	└ 907*
	60	09 18 560	└ 927*	09 18 560	└ 917*	09 18 560	└ 907*
	64	09 18 564	└ 927*	09 18 564	└ 917*	09 18 564	└ 907*

* Not normally kept in stock
For accessories see page 09.18
For dimensions see page 09.17

For performance level 3 please specify digit
For performance level 2 please specify digit
> 0.76 µm Au (30 µinch) on request

└ 926*
└ 916*
└ 906*

└ 927*
└ 917*
└ 907*

└ 927*
└ 917*
└ 907*

Number of contacts

6-64



Male header with wrap posts

Identification

Drawing

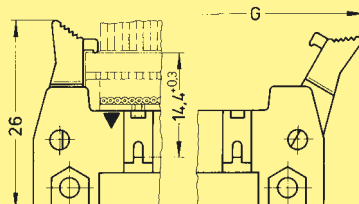
Dimensions in mm

Male header

No. of contacts	A	B	C	D	E	F	G
6	26.9	16.76	22.86	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	21.84	27.94	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	26.92	33.02	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	29.46	35.56	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	34.54	40.64	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	42.16	48.26	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	52.32	58.42	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	59.94	66.04	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	72.64	78.74	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	85.34	91.44	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	90.42	96.52	86.11	2.54 x 31 = 78.74	110.6	113.9

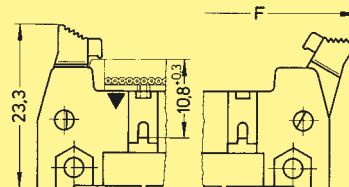
Long levers

for use with female connector
with strain relief clamp

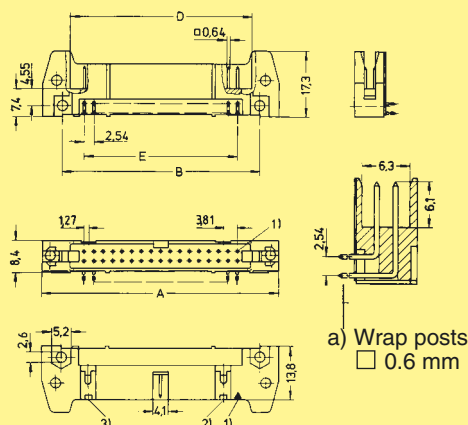


Short levers

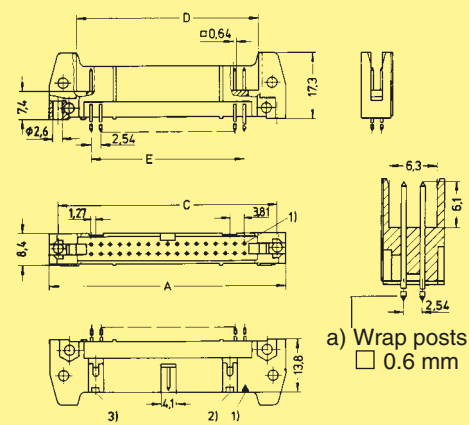
for use with female connector
without strain relief clamp



Angled versions



Straight versions



Board drillings



For accessories see page 09.18

1) Contact number 1

2) No polarization slot
for 6, 10 or 14 way male header

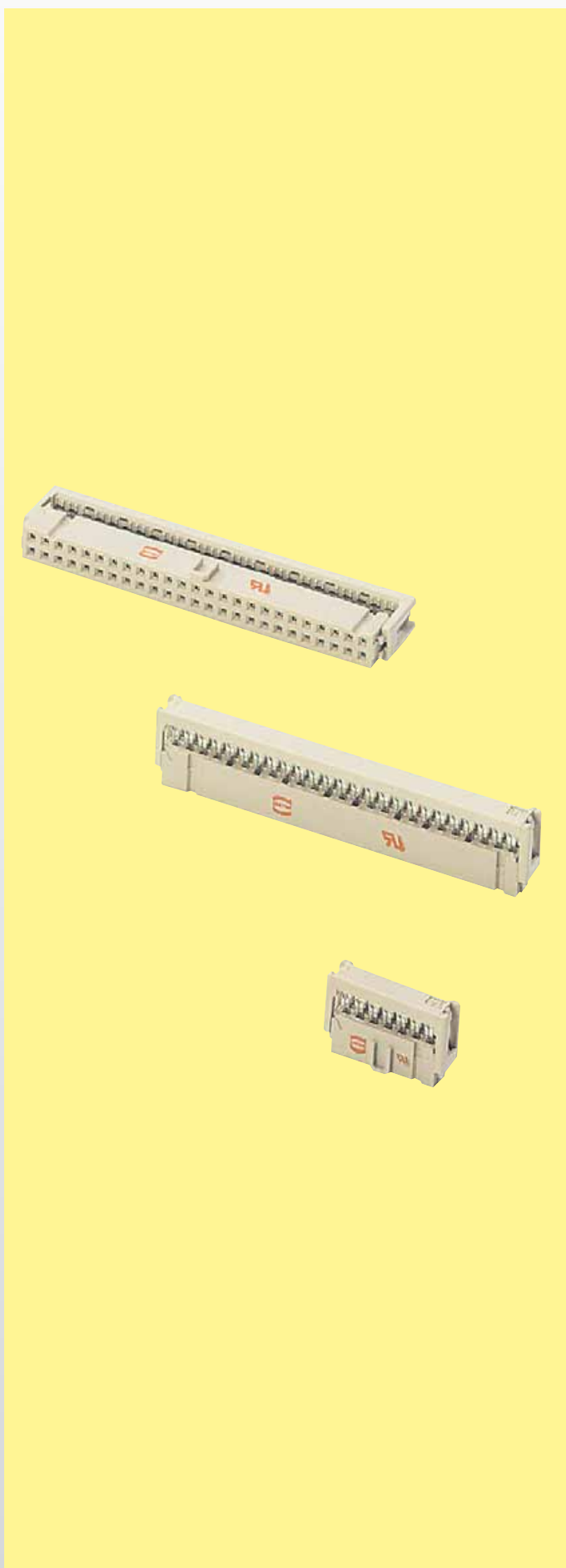
3) No polarization slot
for 6 way male header

4) Pitch tolerance: ± 0.1

Accessories

Identification	Part No.	Drawing	Dimensions in mm
Polarization key ¹⁾ Part No. comprises 2 keys	09 18 500 9902 ¹⁾		
Locking lever (snaps into place, can be fitted whenever required)	Long: 09 18 000 9903 ²⁾ Short: 09 18 000 9904 ²⁾	Long Short For use with female connector <u>with</u> strain relief clamp For use with female connector <u>without</u> strain relief clamp	
Fixing screws for 1.6 mm P.C. board	09 18 000 9906 ³⁾		
Coding system with loss of contact	Code pin 09 18 000 9901 ⁴⁾ Removal tool for male contacts 09 99 000 0133	To avoid cross-plugging adjacent connectors a coding system is required. A code pin is inserted into the appropriate cavity in the female connector. The corresponding male contact is removed by a special removal tool.	

Number of contacts	6, 10, 14, 16, 20, 26, 30*, 34, 40, 50, 60, 64
Approvals	IEC 60 603-13 DIN EN 60 603-13 D 2632 BT 224 NFC 93-428 (HE 10) UL recognized: E102079 CSA: 98267 comply with MIL-C 83 503
Pitch	2.54 mm [0.100"]
Working current	1 A
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance Insulation resistance	$\leq 20 \text{ m}\Omega$ $\geq 10^9 \Omega$
Temperature range	-55 °C ... + 125 °C The maximum temperature includes heating of contacts and ambient temperature
Terminations	IDC flat cable: AWG 26/7 – AWG 28/7
Materials	
Moulding	Thermoplastic resin (PBTP) UL 94-V0
Contact surface ¹⁾	<u>Contact zone</u> : gold-plated according to performance level ¹⁾ <u>Termination zone</u> : tinned



¹⁾ Performance level 3 as per IEC 603-13, ≥ 50 mating cycles, no gas test
Performance level 2 as per IEC 603-13, ≥ 200 mating cycles, 4 days gas test
as per MIL-C 83 503, $> 0.76 \mu\text{m Au}$ (30 μ inch), other performance levels on request

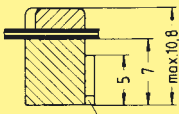
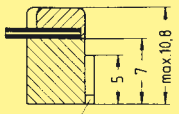
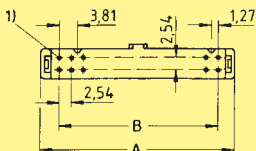
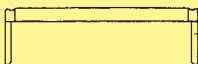
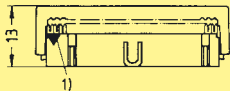
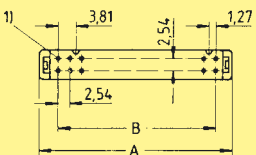
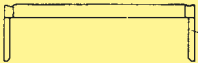
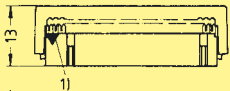
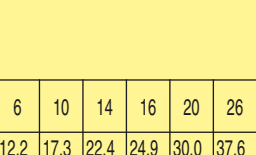
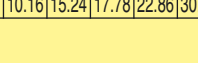
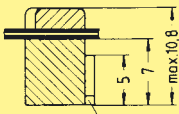
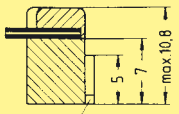
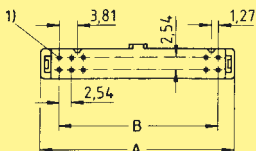
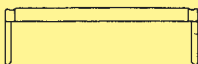
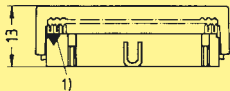
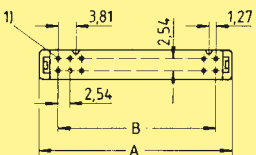
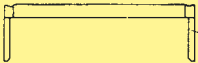
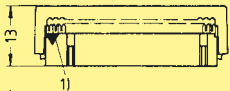
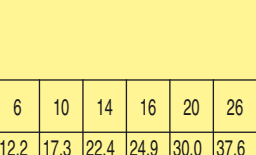
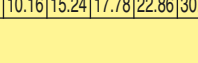
* on request

Number of contacts

6-64



Female connector

Identification	No. of contacts	Part No.		Drawing	Dimensions in mm																																				
Female connector with central polarization		open end cover	closed end cover	open end cover	closed end cover																																				
	without strain relief clamp																																								
				option																																					
																																									
					Strain relief clamp option																																				
																																									
																																									
																																									
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	Female connector without central polarization		open end cover	closed end cover	open end cover	closed end cover																																			
without strain relief clamp																																									
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<table><tr><td>No. of contacts</td><td>6</td><td>10</td><td>14</td><td>16</td><td>20</td><td>26</td><td>34</td><td>40</td><td>50</td><td>60</td><td>64</td></tr><tr><td>A</td><td>12.2</td><td>17.3</td><td>22.4</td><td>24.9</td><td>30.0</td><td>37.6</td><td>47.8</td><td>55.4</td><td>68.1</td><td>80.8</td><td>85.9</td></tr><tr><td>B</td><td>5.08</td><td>10.16</td><td>15.24</td><td>17.78</td><td>22.86</td><td>30.48</td><td>40.64</td><td>48.26</td><td>60.96</td><td>73.66</td><td>78.74</td></tr></table>						No. of contacts	6	10	14	16	20	26	34	40	50	60	64	A	12.2	17.3	22.4	24.9	30.0	37.6	47.8	55.4	68.1	80.8	85.9	B	5.08	10.16	15.24	17.78	22.86	30.48	40.64	48.26	60.96	73.66	78.74
No. of contacts	6	10	14	16	20	26	34	40	50	60	64																														
A	12.2	17.3	22.4	24.9	30.0	37.6	47.8	55.4	68.1	80.8	85.9																														
B	5.08	10.16	15.24	17.78	22.86	30.48	40.64	48.26	60.96	73.66	78.74																														

For performance level 3 please specify digit
 For performance level 2 please specify digit
 > 0.76 µm Au (30 pinch) on request

[7]
[6]
[5]

[7]
[6]
[5]

1) Contact number 1
 2) Pitch tolerance: ± 0.1

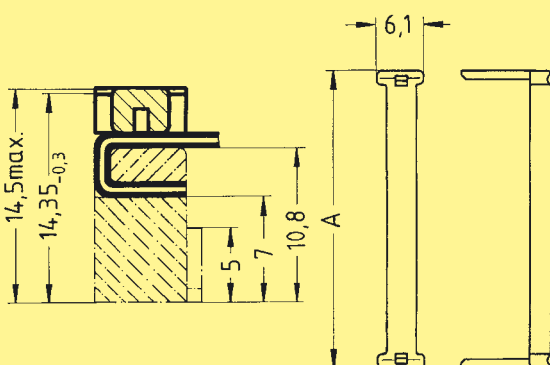
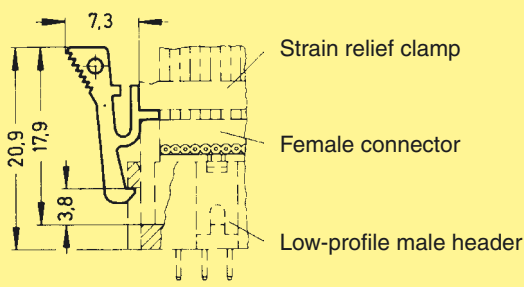
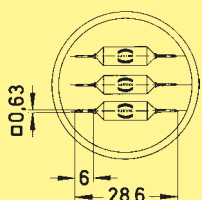
* Not normally kept in stock

Number of contacts

6-64



Strain relief clamp/Locking lever

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm																								
Strain relief clamp	6	09 18 506 9002	<table><tr><th>No. of contacts</th><th>A</th></tr><tr><td>6</td><td>12.2</td></tr><tr><td>10</td><td>17.3</td></tr><tr><td>14</td><td>22.4</td></tr><tr><td>16</td><td>24.9</td></tr><tr><td>20</td><td>30.0</td></tr><tr><td>26</td><td>37.6</td></tr><tr><td>34</td><td>47.8</td></tr><tr><td>40</td><td>55.4</td></tr><tr><td>50</td><td>68.1</td></tr><tr><td>60</td><td>80.8</td></tr><tr><td>64</td><td>85.9</td></tr></table> 	No. of contacts	A	6	12.2	10	17.3	14	22.4	16	24.9	20	30.0	26	37.6	34	47.8	40	55.4	50	68.1	60	80.8	64	85.9	
	No. of contacts	A																										
	6	12.2																										
	10	17.3																										
	14	22.4																										
	16	24.9																										
	20	30.0																										
	26	37.6																										
	34	47.8																										
	40	55.4																										
	50	68.1																										
	60	80.8																										
	64	85.9																										
10	09 18 510 9002																											
14	09 18 514 9002																											
16	09 18 516 9002																											
20	09 18 520 9002																											
26	09 18 526 9002																											
34	09 18 534 9002																											
40	09 18 540 9002																											
50	09 18 550 9002																											
60	09 18 560 9002																											
64	09 18 564 9002																											
30 contacts on request																												
Locking lever for female connector																												
Only in conjunction with low-profile male header and strain relief		09 18 000 9905 ¹⁾																										
When the security of latching is required and space is a premium, these locking levers can be fitted onto the strain relief of the HARTING female connector. This can then be used in conjunction with male low profile headers (see pages 09.12 and 09.13).																												
Coding system with loss of contact																												
To avoid cross-plugging adjacent connectors a coding system is required. A code pin is inserted into the appropriate cavity in the female connector. The corresponding male contact is removed by a special removal tool.																												
Code pin		09 18 000 9901 ²⁾																										
Removal tool for male contacts		09 99 000 0133																										

¹⁾ Order 2 per female connector
²⁾ Part No. comprises 6 code pins

Number of contacts 6, 10, 14, 16, 20, 26, 30*, 34, 40, 50, 60, 64

Pitch
On pcb side: 2.54 mm [0.100"]
On cable side: 1.27 mm [0.050"]

Working current 1 A

Test voltage $U_{r.m.s.}$ 1 kV

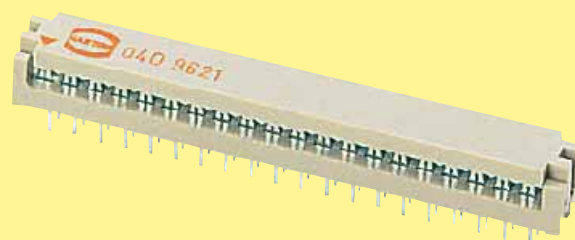
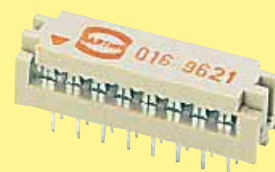
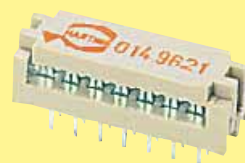
Contact resistance $\leq 20 \text{ m}\Omega$
Insulation resistance $\geq 10^9 \Omega$

Temperature range -55 °C ... + 125 °C
The maximum temperature includes heating of contacts and ambient temperature

Terminations
Solder pins
0.45 mm x 0.35 mm
for pcb hole $\varnothing 0.8 \text{ mm}$
Diagonal: 0.58 mm
IDC flat cable
1.27 mm [0.050"] pitch:
AWG 26/7 – AWG 28/7

Materials
Moulding Thermoplastic resin (PBTP) UL 94-V0

Contact surface Contact and termination zone:
tinned



Number of contacts

6-64



Pcb transition connector, 2 rows

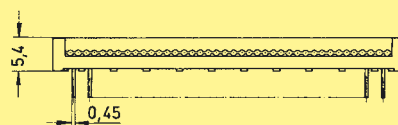
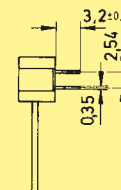
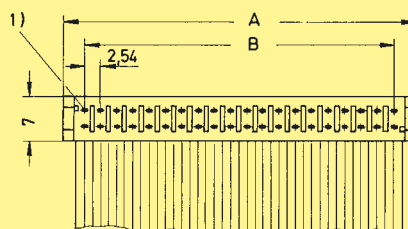
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
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Pcb transition connector

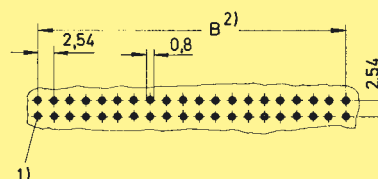
2 rows

6	09 18 106 9621
10	09 18 110 9621
14	09 18 114 9621
16	09 18 116 9621
20	09 18 120 9621
26	09 18 126 9621
34	09 18 134 9621
40	09 18 140 9621
50	09 18 150 9621
60	09 18 160 9621
64	09 18 164 9621

No. of contacts	A	B
6	11.9	$2.54 \times 2 = 5.08$
10	17.0	$2.54 \times 4 = 10.16$
14	22.1	$2.54 \times 6 = 15.24$
16	24.6	$2.54 \times 7 = 17.78$
20	29.7	$2.54 \times 9 = 22.86$
26	37.3	$2.54 \times 12 = 30.48$
34	47.5	$2.54 \times 16 = 40.64$
40	55.1	$2.54 \times 19 = 48.26$
50	67.8	$2.54 \times 24 = 60.96$
60	80.5	$2.54 \times 29 = 73.66$
64	85.6	$2.54 \times 31 = 78.74$



Board drillings



1) Lead number 1
2) Pitch tolerance: ± 0.1

Number of contacts* 10, 16, 20, 26, 34, 40, 50

Pitch
On pcb side: 2.54 mm [0.100"]
On cable side: 1.27 mm [0.050"]

Working current 1 A

Test voltage $U_{r.m.s.}$ 500 V

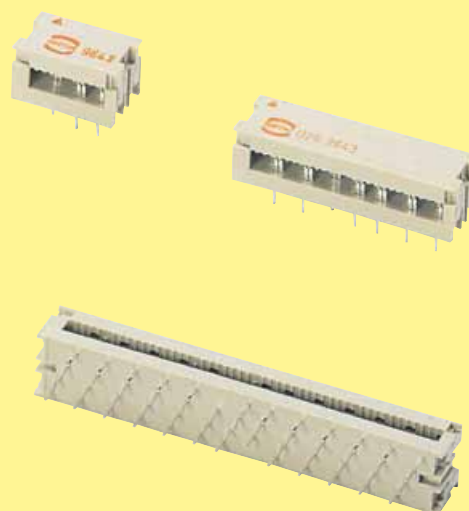
Contact resistance $\leq 20 \text{ m}\Omega$
Insulation resistance $\geq 10^{12} \Omega$

Temperature range -40 °C ... + 125 °C
The maximum temperature includes heating of contacts and ambient temperature

Terminations
Solder pins
0.45 mm x 0.35 mm
for pcb hole $\varnothing 0.8 \text{ mm}$
Diagonal: 0.58 mm
IDC flat cable
1.27 mm [0.050"] pitch:
AWG 26/7 – AWG 28/7 – AWG 30/1

Materials
Moulding Thermoplastic resin (PC)
UL 94-V0

Contact surface Contact and termination zone:
tinned



Number of contacts

10-50



Pcb transition connector, 4 rows

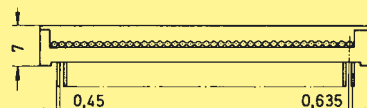
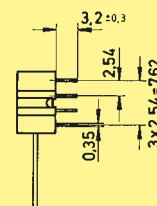
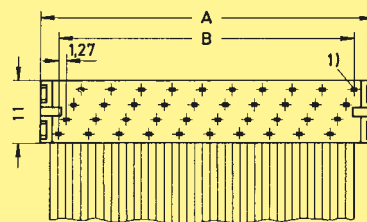
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
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Pcb transition connector

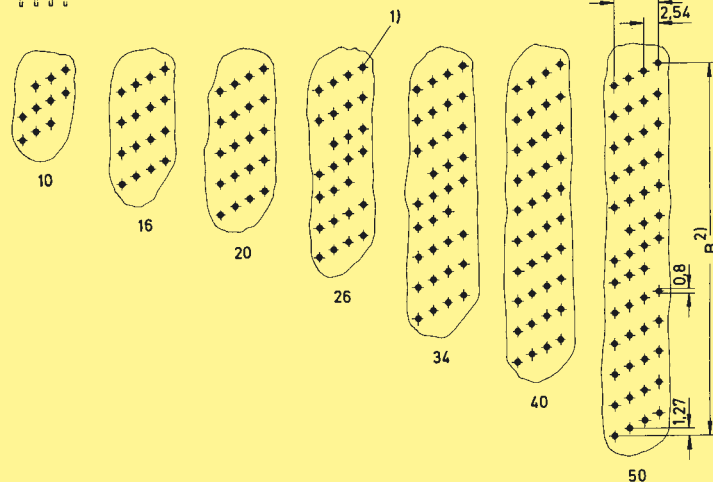
4 rows

10	09 19 010 9643*
16	09 19 016 9643*
20	09 19 020 9643*
26	09 19 026 9643*
34	09 19 034 9643*
40	09 19 040 9643*
50	09 19 050 9643*

No. of contacts	A	B
10	17.78	$1.27 \times 9 = 11.43$
16	25.40	$1.27 \times 15 = 19.05$
20	30.48	$1.27 \times 19 = 24.13$
26	38.10	$1.27 \times 25 = 31.75$
34	48.26	$1.27 \times 33 = 41.91$
40	55.88	$1.27 \times 39 = 49.53$
50	68.58	$1.27 \times 49 = 62.23$



Board drillings

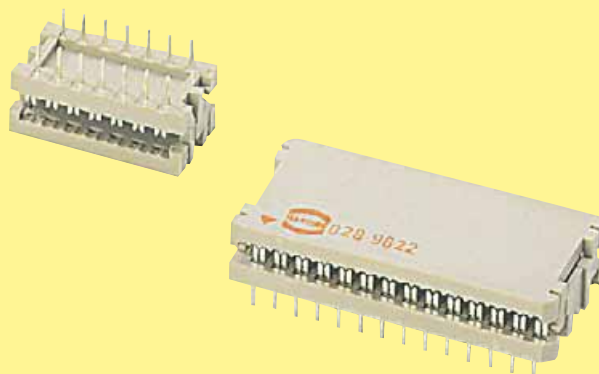


* Not normally kept in stock.

¹⁾ Lead number 1

²⁾ Pitch tolerance: ± 0.1

Number of contacts*	14, 16, 24, 28, 40
Pitch	On pcb side: 2.54 mm [0.100"] On cable side: 1.27 mm [0.050"]
Working current	1 A
Test voltage $U_{r.m.s.}$	500 V
Contact resistance Insulation resistance	$\leq 20 \text{ m}\Omega$ $\geq 10^{12} \Omega$
Temperature range	-40 °C ... + 125 °C The maximum temperature includes heating of contacts and ambient temperature
Terminations	Solder pins 0.45 mm x 0.35 mm for pcb hole $\varnothing 0.8 \text{ mm}$ Diagonal: 0.58 mm IDC flat cable 1.27 mm [0.050"] pitch: AWG 26/7 – AWG 28/7
Materials	Thermoplastic resin (PC) UL 94-V0
Contact surface	<u>Contact and termination zone:</u> tinned



Number of contacts

14-40



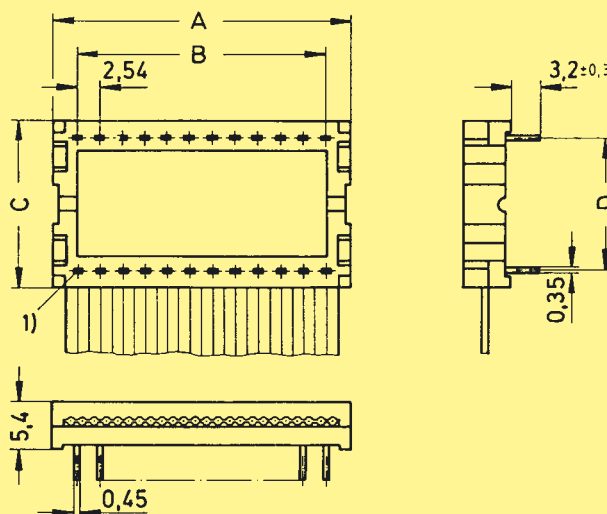
DIP connector for IC base or for soldering into pcb

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
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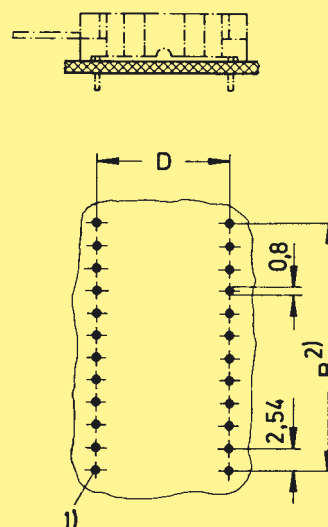
DIP connector

14	09 17 014 9622*
16	09 17 016 9622*
24	09 17 024 9622*
28	09 17 028 9622*
40	09 17 040 9622*

No. of contacts	A	B	C	D
14	20.5	2.54 x 6 = 15.24	11	7.62
16	23.0	2.54 x 7 = 17.78	11	7.62
24	33.0	2.54 x 11 = 27.94	18.7	15.24
28	38.1	2.54 x 13 = 33.02	18.7	15.24
40	53.3	2.54 x 19 = 48.26	18.7	15.24



Board drillings

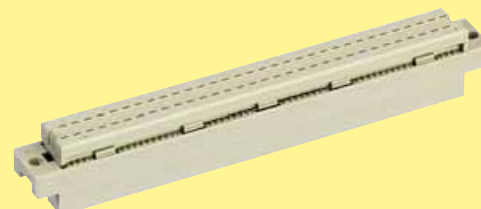
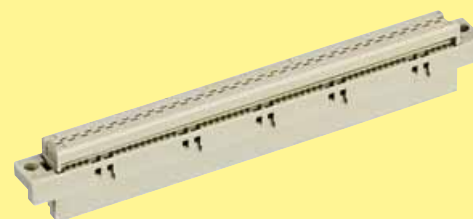


* Not normally kept in stock

1) Lead number 1

2) Pitch tolerance: ± 0.1

Number of contacts	64
Pitch	2.54 mm [0.100"]
Working current	1 A max.
Clearance Creepage	≥ 1.2 mm ≥ 1.2 mm
Working voltage	according to the safety regulations of the equipment
The working voltage also depends on the clearance and creepage dimensions of the pcb itself, and the associated wiring	
Test voltage $U_{r.m.s.}$	1 kV



Contact resistance	≤ 20 m Ω
Insulation resistance	$\geq 10^{12}$ Ω
Temperature range	-65 °C ... + 125 °C The maximum temperature includes heating of contacts and ambient temperature

Termination	
Female connector	Insulation displacement: AWG 28/7

Insertion and withdrawal force	≤ 60 N
--------------------------------	-------------

Materials	
Moulding	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	<u>Contact zone</u> : selectively plated according to performance level <u>Termination zone</u> : tinned

Number of contacts

64



Female connectors for insulation displacement

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm									
Female connector for insulation displacement													
Type B	64	performance level 2 09 02 264 6828	Lead number 1 of flat cable on contact 1 b Contact arrangement View from termination side										
		performance level 3 09 02 264 7828											
Type C	64	performance level 2 09 03 264 6828	Lead number 1 of flat cable on contact 1 c Contact arrangement View from termination side										
		performance level 3 09 03 264 7828											
Mateable with 3-row male connector Type C. No female contact in middle row.													
Panel cut out													
				<table><tr><td></td><td>a</td><td>b</td></tr><tr><td>Type B</td><td>8.3</td><td>10.16</td></tr><tr><td>Type C</td><td>10.8</td><td>12.7</td></tr></table>		a	b	Type B	8.3	10.16	Type C	10.8	12.7
	a	b											
Type B	8.3	10.16											
Type C	10.8	12.7											

SEK

Press-in – Technology and board connectors

Page

General information **20.02**

harmik®

Technical characteristics **20.05**

I/O connectors, straight **20.06**



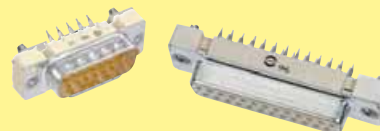
Intra cabinet connectors, straight **20.07**



D-Sub – S

Technical characteristics **20.08**

Press-in connectors, straight **20.10**



SEK

Technical characteristics **20.14**

Low profile press-in connectors, straight **20.15**



Press-in
technology

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

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

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

Due to variety of different connector contact designs, the press-in zone has been designed to fit perfectly to the contact metal thickness and the plated through hole dimensions and tolerances.

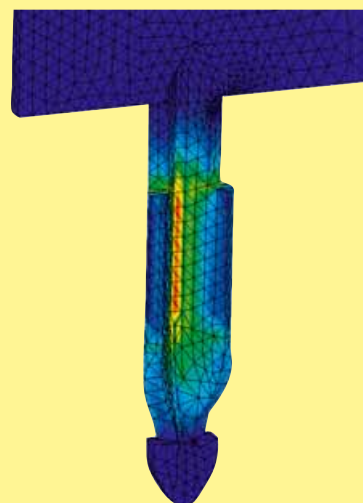
harmik®

The patented contact design allows 20 % more tolerance on the plated through hole of 0.6 mm than the standard tolerance of $0.6^{+0.07}_{-0.05}$ mm.



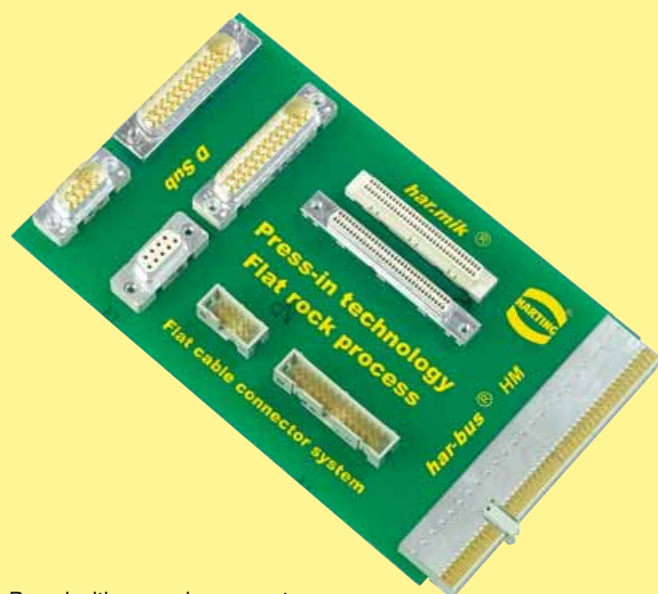
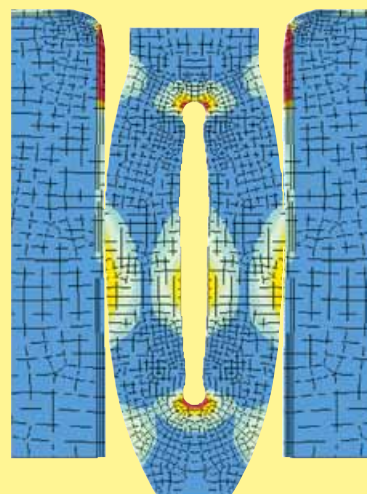
D-Sub

The terminating spoon shape of the contact provides a reliable vertical position of the connector for better alignment during insertion.



SEK

The renowned needle eye allows for compensation of tolerances of pcb surface properties. The excessive material is displaced within the plated through hole whereby a gastight connection is assured.



Board with press-in connectors

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

Today tinned surfaces are widely used as a standard, the pcb technology trends are moving to low tin or tin free surfaces. Cu, Pd, Au and Ag are the important alternatives. Specific parameters and particularly different friction factors of these surfaces make high demands on press-in zones.

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

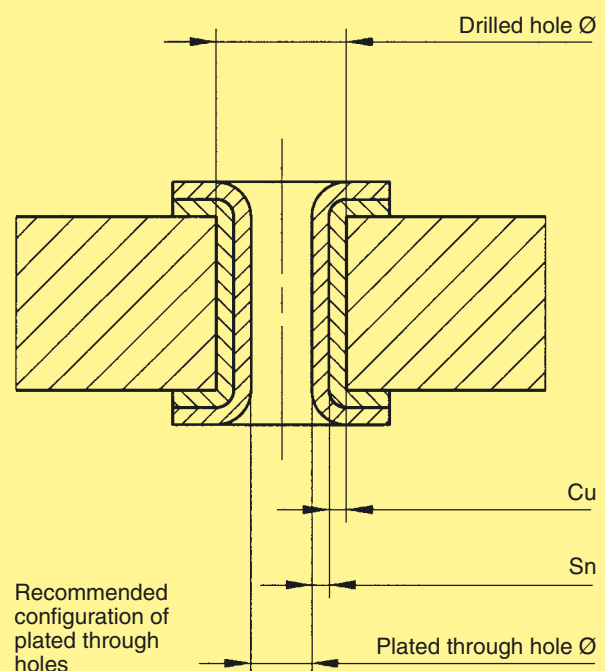
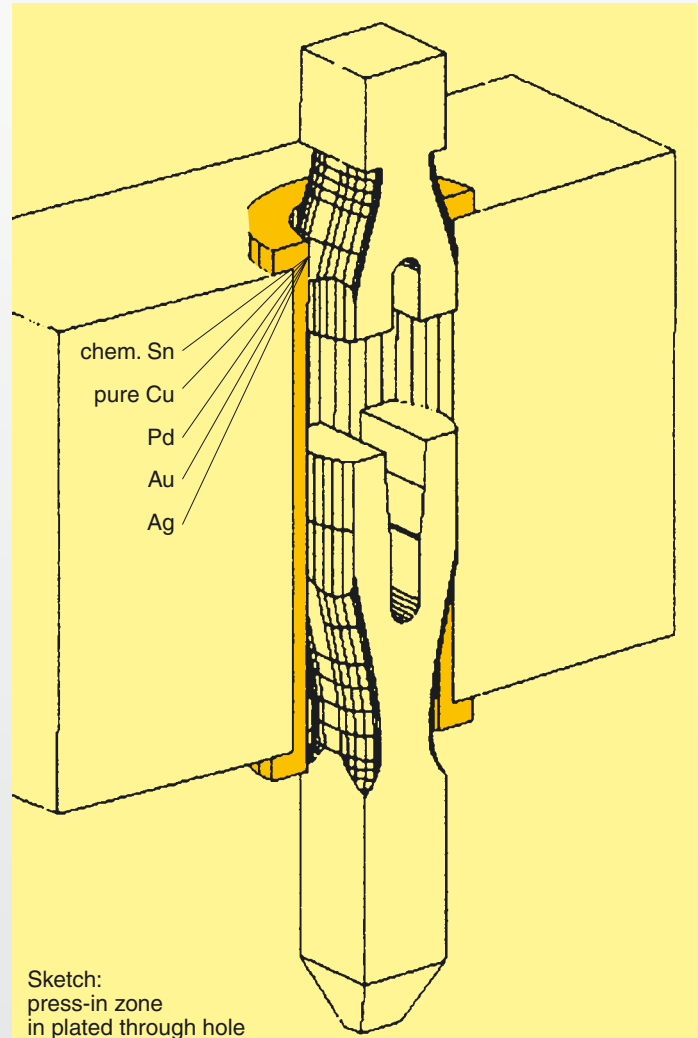
Please contact us for detailed test reports.

Benefits of the press-in technology

- Thermal shocks associated with the soldering process and the risk of the board malfunction are avoided.
- No need for the subsequent cleaning of the assembled pcb's

Recommended configuration chart for tinned plated through holes

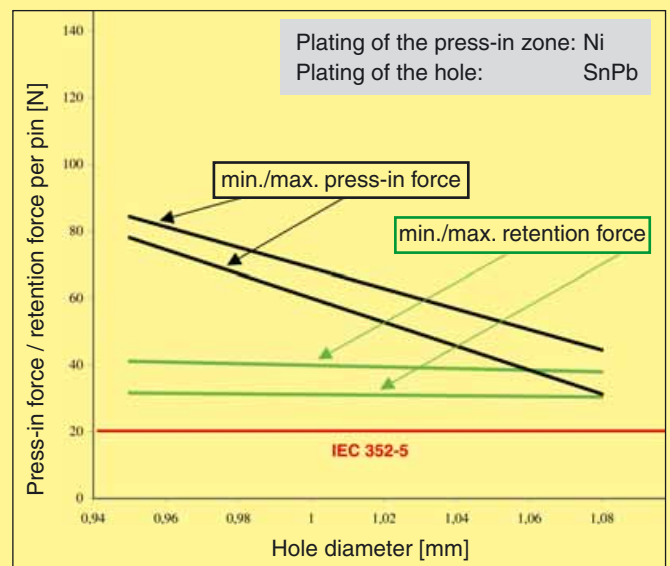
	Plated through hole	
	0.6 mm	1 mm
Drilled hole Ø [mm]	0.71 - 0.74	1.12 - 1.15
Cu thickness [µm]	30 - 60	25 - 75
Sn thickness [µm]	5 - 20	5 - 15
Plated hole Ø [mm]	0.55 - 0.67	0.94 - 1.09
Board thickness [mm]	1.6 - 3.2	1.6 - 3.2
Connector range	har-mik	SEK and D-Sub



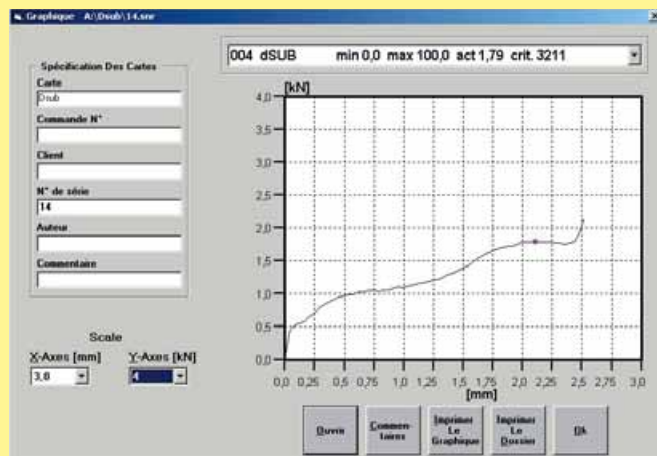
Quality control of the press-in termination

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

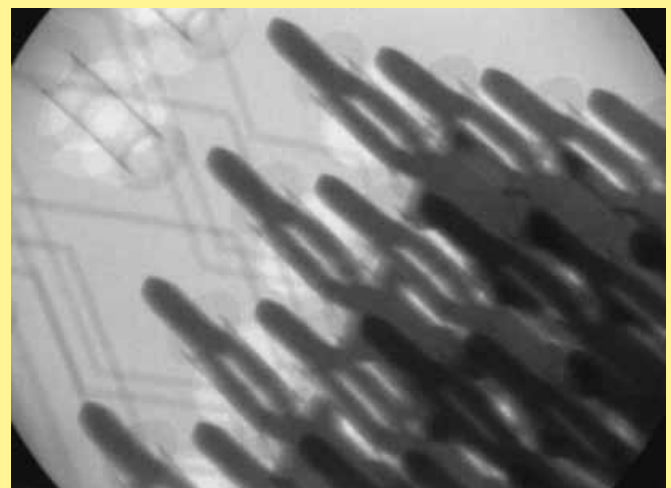
The retention force, as an indirect measure of the normal force, serves to qualify the process or random tests



Typical press-in and retention forces for the D-Sub press-in zone



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



X-ray photo of a pressed-in connector

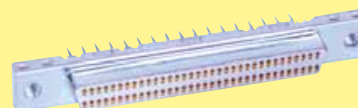
Number of contacts	68
Pitch	1.27 mm
Working current	1 A
Working voltage	240 V ~
Test voltage $U_{r.m.s.}$	750 V
Contact resistance	$\leq 30 \text{ m}\Omega$
Insulation resistance	$\geq 10^3 \text{ M}\Omega$
Temperature range	-55 °C ... + 105 °C

Materials

Moulding	Thermoplastic resin glass-fibre filled UL 94-V0
Contacts	Copper alloy
Contact surface	Selectively gold-plated
Metal shell	Die cast zamac or stamped steel, nickel-plated

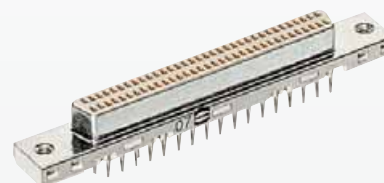
Press-in

Insertion process	Flat rock
Maximum press-in force per contact	100 N
Minimum push out force per contact	15 N
Number of repairs	2
Diameter of pcb plated through holes	$\varnothing 0.6^{+0.07}_{-0.05} \text{ mm}$
Recommended pcb holes for press-in process	Hole : $\varnothing 0.71 - 0.74 \text{ mm}$ Cu : 30 – 60 μm Sn : 5 – 20 μm
Pcb thickness	1.6 – 3.2 mm



Number of contacts

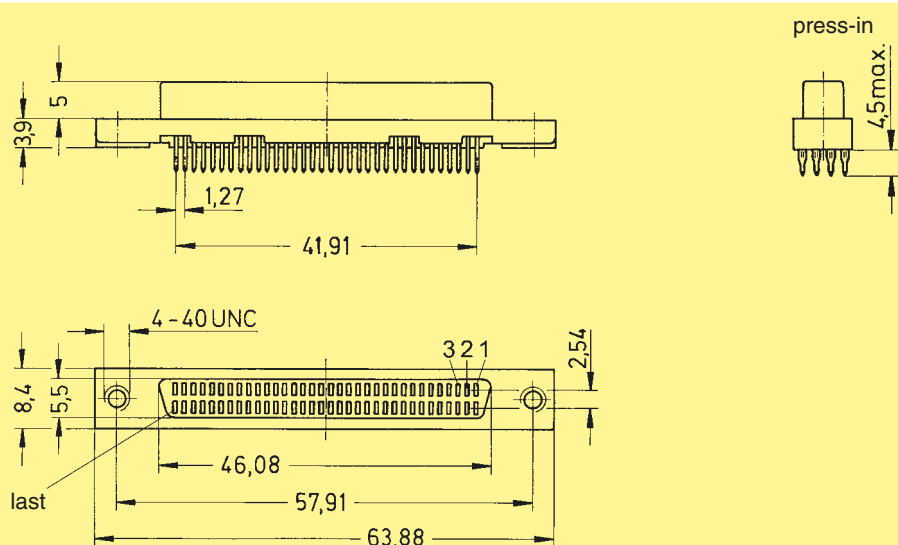
68



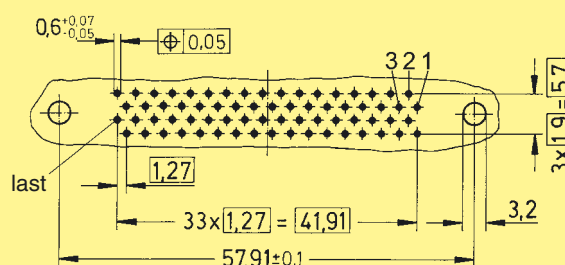
Female connectors, straight

Identification	No. of contacts	Part No.
Female connector with straight press-in pins	68	60 02 068 5322

Dimensions



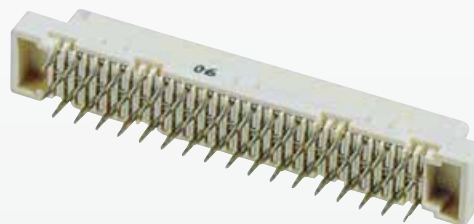
Board drillings
(Components side)



Dimensions in mm

Number of contacts

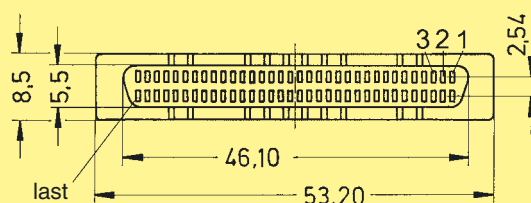
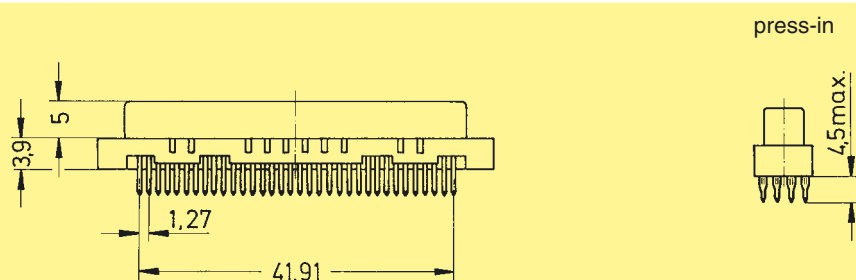
68



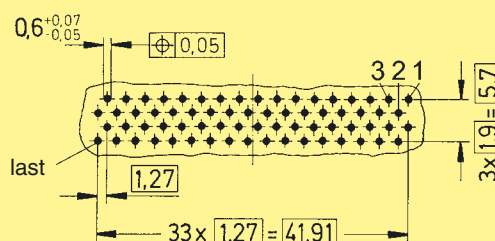
Female connectors, straight

Identification	No. of contacts	Part No.
Female connector with straight press-in pins	68	60 05 068 5322

Dimensions



Board drillings
(Components side)



Dimensions in mm

Number of contacts 9, 15, 25, 37, 50
UL recognized

Working current
see current carrying capacity chart
Stamped contacts 6.5 A max.

Test voltage $U_{r.m.s.}$ 1 kV

Clearance and creepage ≥ 1.0 mm

Contact resistance ≤ 10 m Ω
Insulation resistance $\geq 10^{10}$ Ω

Temperature range -55 °C ... + 125 °C
The higher temperature limit includes the local ambient and heating effect of the contacts under load

Terminations	Recommended PCB through holes		
		Press-in pin	Grounding pin
<i>Tin-lead plated PCB</i>	Hole	1.15 $\pm$ 0.03	3.15 $\pm$ 0.025
	Cu	25-75 μ m	25-75 μ m
	Sn	5-15 μ m	4-10 μ m
	Plated hole	0.94-1.09 mm	3.0-3.15 mm
<i>Chemical tin-plated PCB</i>	Hole	1.15 $\pm$ 0.03	3.15 $\pm$ 0.025
	Sn	25-50 μ m	25-50 μ m
	Plated hole	1.00-1.10 mm	3.0-3.15 mm
<i>Au / Ni plated PCB</i>	Hole	1.15 $\pm$ 0.03	3.15 $\pm$ 0.025
	Cu	25-50 μ m	25-50 μ m
	Ni	3-7 μ m	4-7 μ m
	Au	0.05-0.12 μ m	0.05-0.12 μ m
	Plated hole	1.00-1.10 mm	3.0-3.15 mm
<i>Silver plated PCB</i>	Hole	1.15 $\pm$ 0.03	3.15 $\pm$ 0.025
	Cu	25-50 μ m	25-50 μ m
	Ag	0.1-0.3 μ m	0.1-0.3 μ m
	Plated hole	1.00-1.10 mm	3.0-3.15 mm
<i>OSP copper plated PCB</i>	Hole	1.15 $\pm$ 0.03	3.15 $\pm$ 0.025
	Cu	25-50 μ m	25-50 μ m
	Plated hole	1.00-1.10 mm	3.0-3.15 mm

PCB board thickness: 1.6-3.2 mm

Materials	
Mouldings and hoods	Liquid Crystal Polymer (LCP) UL 94-V0
Contacts	Copper alloy
Contact surface ¹⁾	Contact zone: selectively gold-plated acc. to performance level ¹⁾ Termination zone: Ni
Metal shell	Tinned steel

Insertion and withdrawal force

Connector on P.C.B.

Press-in without grounding pins

– insertion max. per contact: 120 N
– withdrawal min. per contact: 20 N

Press-in with grounding pins

– insertion max. per grounding pin: 250 N
– withdrawal min. per grounding pin: 30 N

Mating force

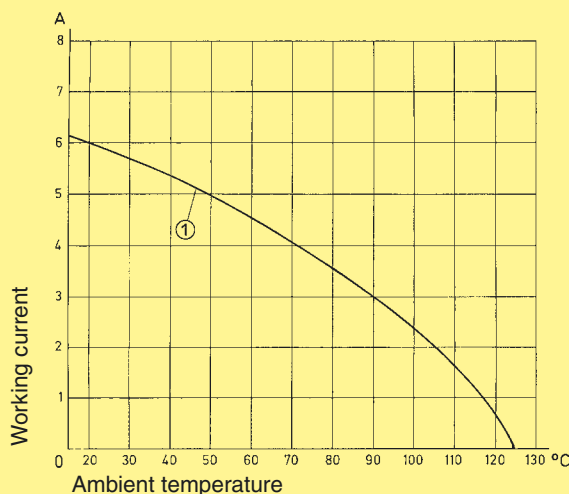
9 way	≤ 30 N
15 way	≤ 50 N
25 way	≤ 83 N
37 way	≤ 123 N
50 way	≤ 167 N

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.

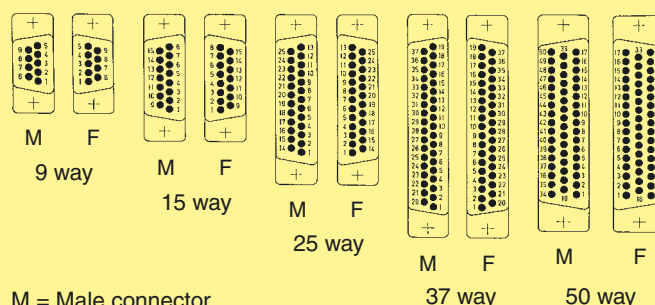
Control and test procedures according to DIN IEC 60 512.



Example: 25 way connector

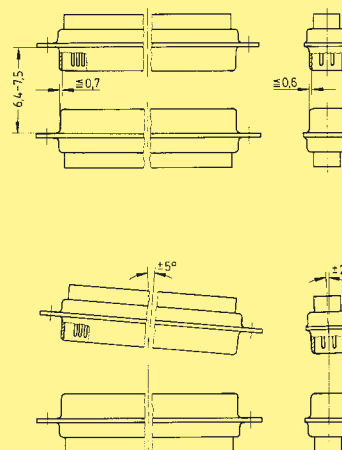
① Stamped contacts

Contact arrangement View from termination side



M = Male connector
F = Female connector

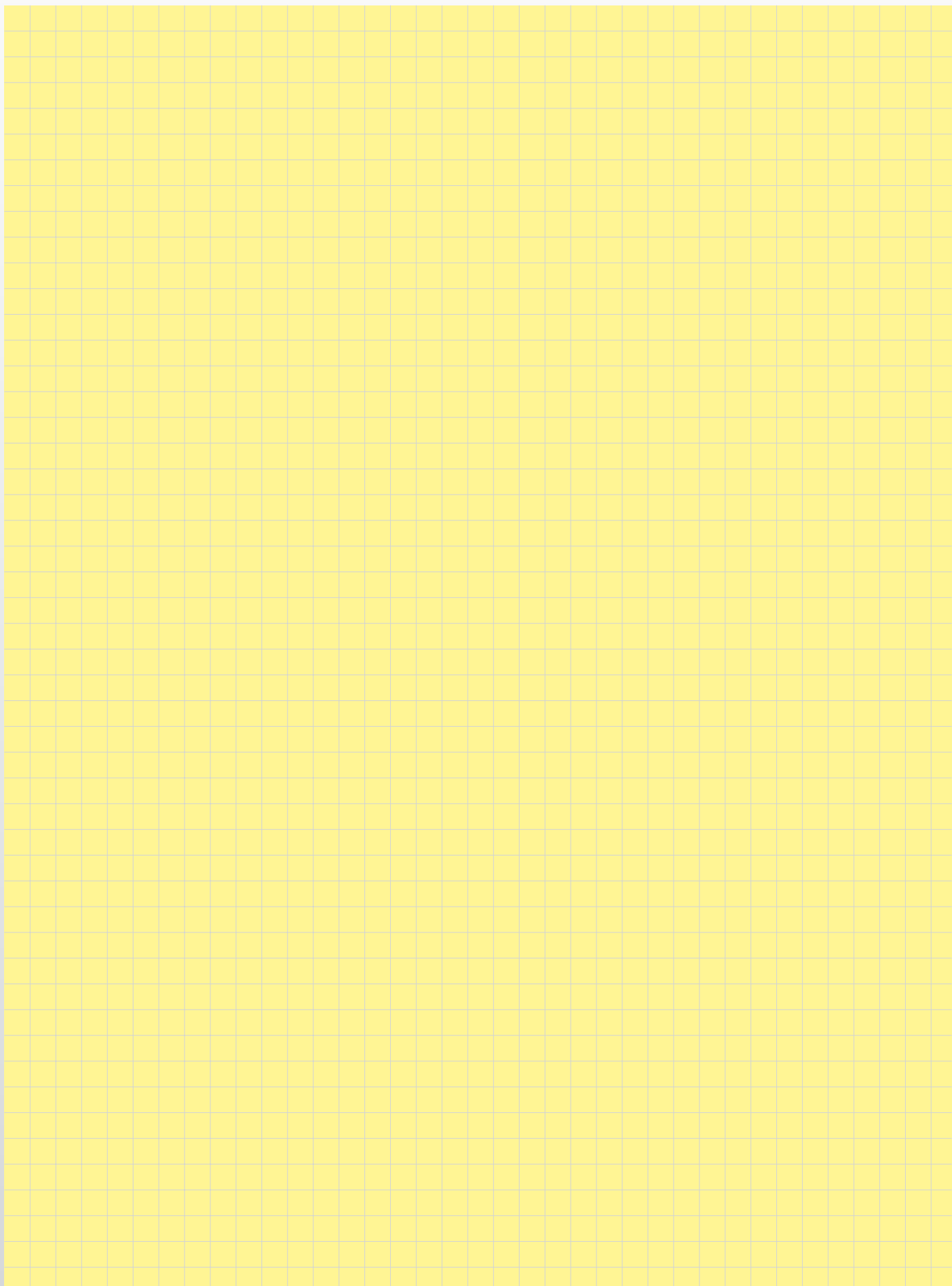
Mating conditions as per DIN 41 652



¹⁾ Performance level 3 as per DIN 41 652, part 2, ≥ 50 mating cycles, no gas test

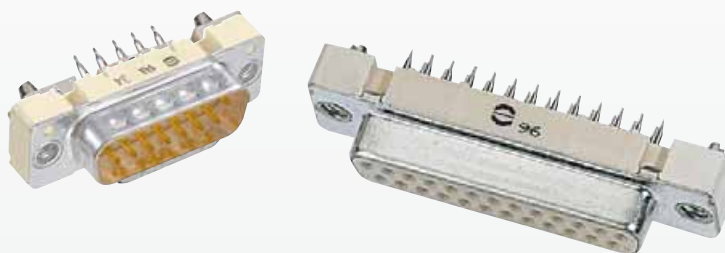
Performance level 2 as per DIN 41 652, part 2, ≥ 200 mating cycles, 4 days gas test using 10 ppm SO₂

Other performance levels on request



Number of contacts

9–50



Press-in, straight with grounding press-in board locks

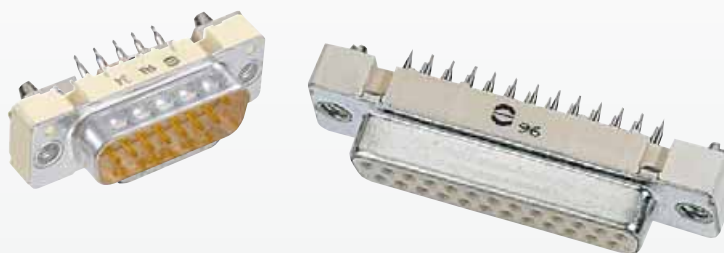
Identification	No. of contacts	Part No.	
Performance levels Explanations see page 20.08 Other performance levels on request		Performance level 3	Performance level 2
Male connector Flange height x = 5.7 mm			
tinned metal shell with dimples	9 15 25	09 66 164 771 09 66 264 771 09 66 364 771	09 66 164 671 09 66 264 671 09 66 364 671
Please insert digit for flange thread or fitted female screw locks			
M3 ▶	5		
4-40 UNC ▶	6		
fitted screw locks 4-40 UNC ▶	7 ¹⁾		
Female connector Flange height x = 5.7 mm			
tinned metal shell	9 15 25 37	09 66 154 751 09 66 254 751 09 66 354 751 09 66 454 751	09 66 154 651 09 66 254 651 09 66 354 651 09 66 454 651
Please insert digit for flange thread or fitted female screw locks			
M3 ▶	5		
4-40 UNC ▶	6		
fitted screw locks 4-40 UNC ▶	7 ¹⁾		
Female connector Flange height x = 6 mm			
tinned metal shell	9 15 25 37 50	09 66 154 751 09 66 254 751 09 66 354 751 09 66 454 751 09 66 554 751	09 66 154 651 09 66 254 651 09 66 354 651 09 66 454 651 09 66 554 651
Please insert digit for flange thread or fitted female screw locks			
M3 ▶	1		
4-40 UNC ▶	2		
fitted screw locks 4-40 UNC ▶	3 ¹⁾		

Press-in
technology20
10

¹⁾ Fitted screw locks 4-40 UNC not normally kept in stock for performance level 3
 Connector dimensions see page 20.11. Mating conditions see page 20.08.

Number of contacts

9–50



Press-in, straight with grounding press-in board locks

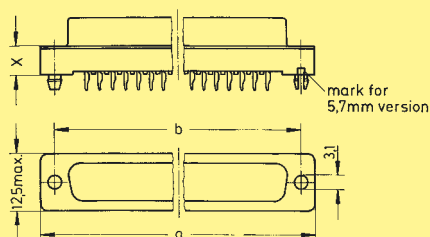
Identification

Drawing

Dimensions in mm

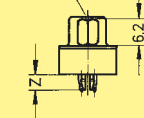
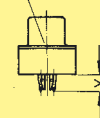
Male connector

9 – 25 contacts



M 3 or
4 - 40 UNC

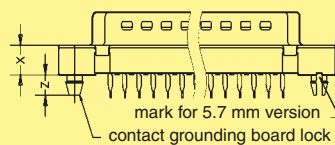
fitted screw locks
4 - 40 UNC



X	Y	Z
6.0 ± 0.2	4.20 ± 0.2	3.5 max.
5.7 ± 0.2	4.35 ± 0.2	3.9 max.

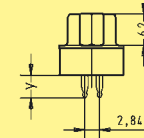
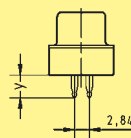
Female connector

9 – 37 contacts

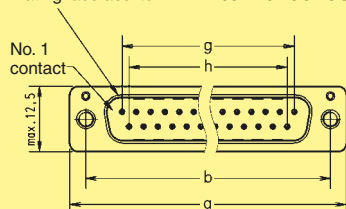


M 3 or
4 - 40 UNC

fitted screw locks
4 - 40 UNC



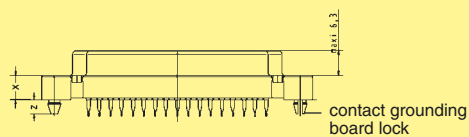
Mating face acc. to: DIN 41 652 · CECC 75 301-802 · IEC 60 807



	a	b	g	h
9	31.00	24.90	4 x [2.74] = 10.96	3 x [2.76] = 8.22
15	39.30	33.20	7 x [2.74] = 19.18	6 x [2.76] = 16.44
25	53.10	47.00	12 x [2.76] = 33.12	11 x [2.76] = 30.36
37	69.65	63.55	18 x [2.76] = 49.68	17 x [2.76] = 46.92
50	67.00	61.10	16 x [2.76] = 44.16	15 x [2.76] = 41.40

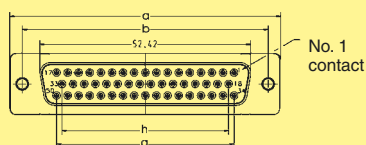
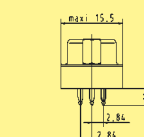
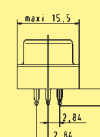
Female connector

50 contacts

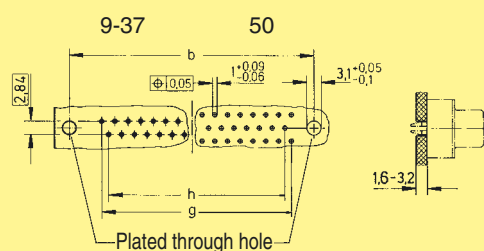


M 3 or
4 - 40 UNC

fitted screw locks
4 - 40 UNC

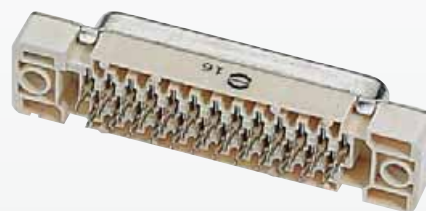


Board drillings



Number of contacts

9–50



Press-in, straight without grounding press-in board locks

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 20.08 Other performance levels on request		Performance level 3	Performance level 2
Male connector Flange height x = 5.7 mm			
tinned metal shell with dimples	9	09 66 124 770 .	09 66 124 670 .
	15	09 66 224 770 .	09 66 224 670 .
	25	09 66 324 770 .	09 66 324 670 .
Please insert digit for flange thread or fitted female screw locks			
ø 3.1 mm hole ▶ 4 ¹⁾			
M3 ▶ 5			
4-40 UNC ▶ 6			
fitted screw locks 4-40 UNC ▶ 7 ²⁾			
Female connector Flange height x = 5.7 mm			
tinned metal shell	9	09 66 114 750 .	09 66 114 650 .
	15	09 66 214 750 .	09 66 214 650 .
	25	09 66 314 750 .	09 66 314 650 .
	37	09 66 414 750 .	09 66 414 650 .
Please insert digit for flange thread or fitted female screw locks			
ø 3.1 mm hole ▶ 4 ¹⁾			
M3 ▶ 5			
4-40 UNC ▶ 6			
fitted screw locks 4-40 UNC ▶ 7 ²⁾			
Female connector Flange height x = 6 mm			
tinned metal shell	9	09 66 114 750 .	09 66 114 650 .
	15	09 66 214 750 .	09 66 214 650 .
	25	09 66 314 750 .	09 66 314 650 .
	37	09 66 414 750 .	09 66 414 650 .
	50	09 66 514 750 .	09 66 514 650 .
Please insert digit for flange thread or fitted female screw locks			
ø 3.1 mm hole ▶ 0 ¹⁾			
M3 ▶ 1			
4-40 UNC ▶ 2			
fitted screw locks 4-40 UNC ▶ 3 ²⁾			

¹⁾ Not normally kept in stock²⁾ Fitted screw locks 4-40 UNC not normally kept in stock for performance level 3

Connector dimensions see page 20.13. Mating conditions see page 20.08.

Number of contacts

9–50



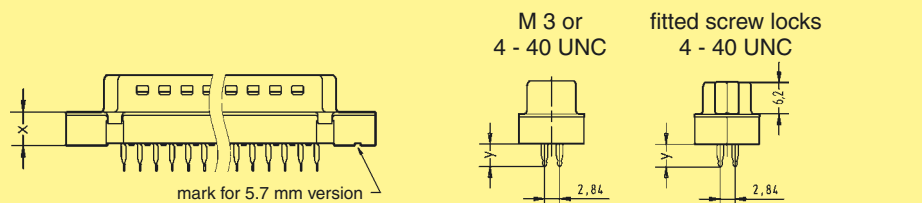
Press-in, straight without grounding press-in board locks

Identification

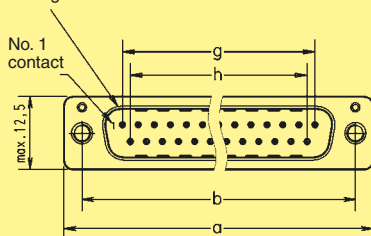
Drawing

Dimensions in mm

Male connector
9 – 25 contacts

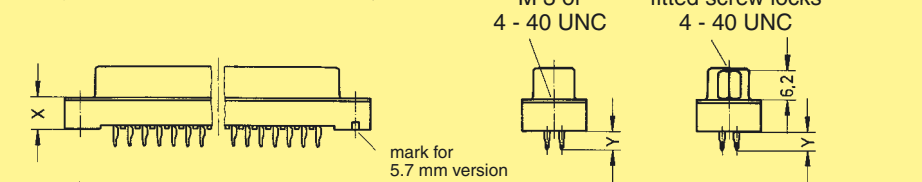


Mating face acc. to: DIN 41 652 · CECC 75 301-802 · IEC 60 807

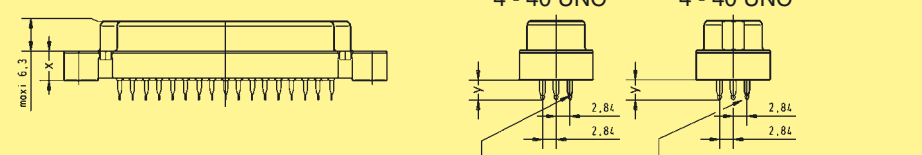


X	Y
6.0 ± 0.2	4.20 ± 0.2
5.7 ± 0.2	4.35 ± 0.2

Female connector
9 – 37 contacts

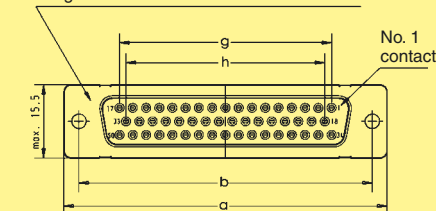


Female connector
50 contacts



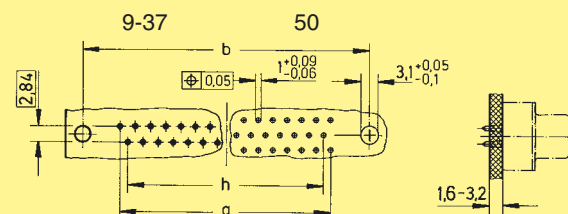
Press-in pins from position 34 to 50 are reversed 180 degrees

Mating face acc. to: DIN 41 652 · CECC 75 301-802 · IEC 60 807



	a	b	g	h
9	31.00	24.90	4 x [2.74] = 10.96	3 x [2.74] = 8.22
15	39.30	33.20	7 x [2.74] = 19.18	6 x [2.74] = 16.44
25	53.10	47.00	12 x [2.76] = 33.12	11 x [2.76] = 30.36
37	69.65	63.55	18 x [2.76] = 49.68	17 x [2.76] = 46.92
50	67.00	61.10	16 x [2.76] = 44.16	15 x [2.76] = 41.40

Board drillings



Number of contacts 6, 10, 14, 16, 20, 26, 34, 40, 50, 60, 64

Contact arrangement straight

Contact length 5.5 mm

Approvals IEC 60 603-13
DIN EN 60 603-13
D 2632
BT 224
NFC 93-428 (HE 10)

UL recognized: E102079
CSA: 98267

comply with MIL-C 83 503

Pitch 2.54 mm [0.100"]

Working current 1 A

Test voltage $U_{r.m.s.}$ 1 kV

Contact resistance $\leq 20 \text{ m}\Omega$
Insulation resistance $\geq 10^9 \Omega$

Temperature range -55 °C ... + 105 °C
The maximum temperature includes heating of contacts and ambient temperature

Press-in

Diameter of pcb plated through holes $\varnothing 1.0^{+0.09}_{-0.06} \text{ mm}$

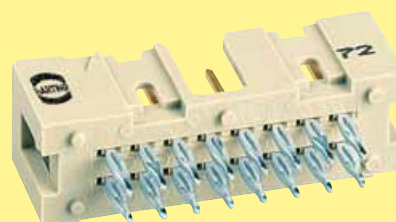
Recommended pcb holes for press-in process
Hole: $\varnothing 1.12 - 1.15 \text{ mm}$
Cu : 25 – 75 μm
Sn : 5 – 15 μm

Pcb thickness 1.6 – 3.2 mm

Materials

Moulding Thermoplastic resin (PBTP)
UL 94-V0

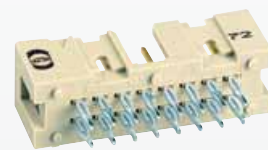
Contact surface¹⁾
Contact zone: gold-plated according to performance level¹⁾
Termination zone: tinned



¹⁾ Performance level 3 as per IEC 603-13, ≥ 50 mating cycles, no gas test
Performance level 2 as per IEC 603-13, ≥ 200 mating cycles, 4 days gas test
as per MIL-C 83 503, $> 0.76 \mu\text{m Au}$ (30 μ inch), other performance levels on request

Number of contacts

6-64



Male header, straight press-in pins

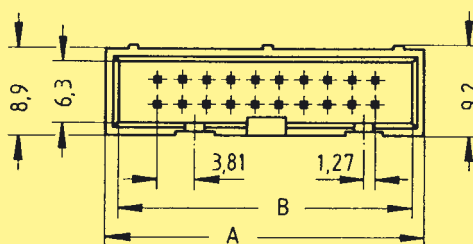
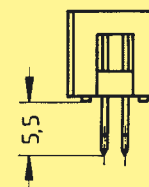
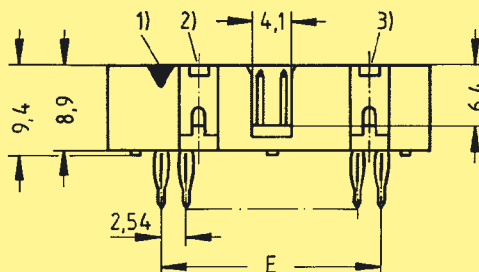
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

Male header with straight press-in terminations

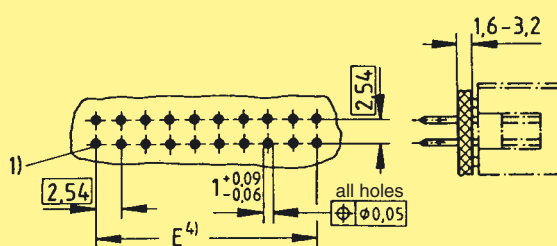
Length: 5.5 mm

6	09 18 506	329
10	09 18 510	329
14	09 18 514	329
16	09 18 516	329
20	09 18 520	329
26	09 18 526	329
34	09 18 534	329
40	09 18 540	329
50	09 18 550	329
60	09 18 560	329
64	09 18 564	329

No. of contacts	A	B	E
6	15.2	12.78	2.54 x 2 = 5.08
10	20.3	17.86	2.54 x 4 = 10.16
14	25.4	22.94	2.54 x 6 = 15.24
16	27.9	25.48	2.54 x 7 = 17.78
20	33.0	30.56	2.54 x 9 = 22.86
26	40.6	38.18	2.54 x 12 = 30.48
34	50.8	48.34	2.54 x 16 = 40.64
40	58.4	55.96	2.54 x 19 = 48.26
50	71.3	68.66	2.54 x 24 = 60.96
60	84.0	81.36	2.54 x 29 = 73.66
64	89.1	86.44	2.54 x 31 = 78.74



Board drillings



For Performance Level 3 please specify digit
For Performance Level 2 please specify digit
> 0.76 µm Au (30 pinch) on request

7
6
5 Not normally kept in stock

1) Contact number 1
2) No polarization slot for 6, 10 or 14 way

3) No polarization slot for 6 way
4) Pitch tolerance: ± 0.1

Press-in technology

SMC* – Technology and board connectors

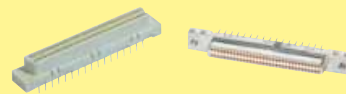
Page

General information 21.02

harmik®

Technical characteristics 21.05

Pin and socket, female connectors 21.06



D-Sub – S

Technical characteristics 21.08

Mounting details 21.09

Straight versions 21.10

Standard versions 21.12

Low profile versions 21.14



SEK

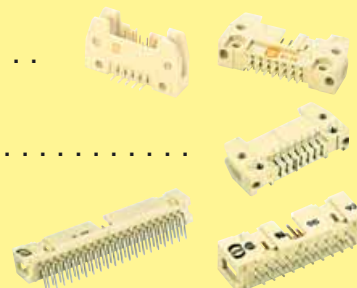
Technical characteristics 21.16

Male standard connectors 21.18

Male standard connectors with board lock 21.22

Male low profile connectors 21.24

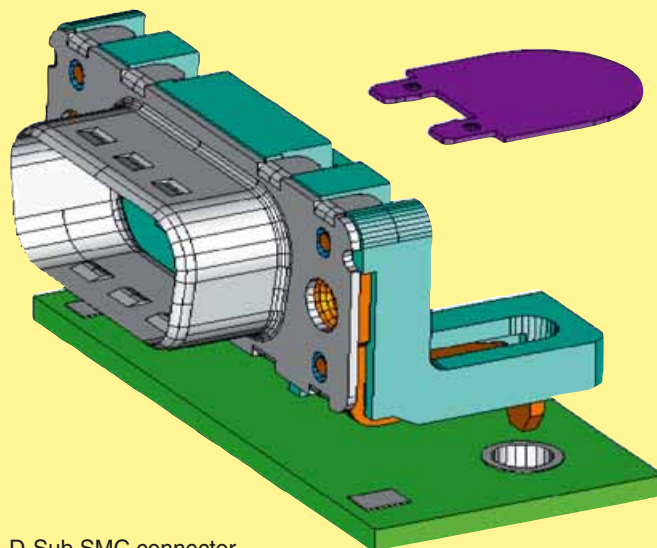
Accessories 21.26



* Also known as Pin-in-Paste or Through Hole Reflow (THR)

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

Today, typical components such as ICs, resistors, capacitors, inductors, and connectors with straight terminal pins are almost exclusively fitted using SMD (Surface Mount Device) technology in mass production. In contrast, angled SMD connectors at the edge of the board have not been successful because of tolerance problems (co-planarity) and stresses during mating.



D-Sub SMC connector

“Pin in Hole Intrusive Reflow”*

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

The components are positioned using pick-and-place machines. These automatic assembly machines differ according to whether the components are small, light-weight or bulky. Connectors, compared to ICs, are considered bulky (odd form). They are more difficult to grip, due to their comparatively heavy weight and larger size. But machines for odd form components, provide the higher insertion power, necessary to fit the components into pcb holes, which are filled with solder paste. Generally modern SMC production lines

are equipped with both types of machine. Therefore the “Pin in Hole Intrusive Reflow” process entails no extra investment costs for the user.

Conventional assembly process:

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

“Pin in Hole Intrusive Reflow” assembly:

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



D-Sub in pick and place machine equipped with vacuum nozzle

Interface connectors were designed for Pin in Hole Intrusive Reflow with features like an inspection friendly black colour, tape and reel packaging for automated handling and it is self retaining on pcb via kinked pin. The open design – moulded from high temperature resistant material – ensures good heat distribution, so that current solder temperature profiles can be used. The special material of the insulation body withstands also the higher temperatures of lead free soldering.

Advantages for using interface connectors are:

- Partial dip soldering or press fitting is no longer required
- High mechanical stability
- Complete compatibility with Surface Mount Technology
- Savings through integration into the automated assembly process
- Reduced floor space in the production plant

Application of solder paste

Before the components are assembled, solder paste is applied to all the solder pads and the plated through holes. Usually a screen printing process is used for this purpose. A squeegee moves across the pcb, which is masked with screens and presses the solder paste into all unmasked areas. A good solder joint is basically determined by the amount of the applied solder paste. Only a few parameters (illustrated on the right) will lead to the right quantity.

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



Dispenser in operation

Solder paste volume

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

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

in which:

V_{Paste} = Required volume of solder paste

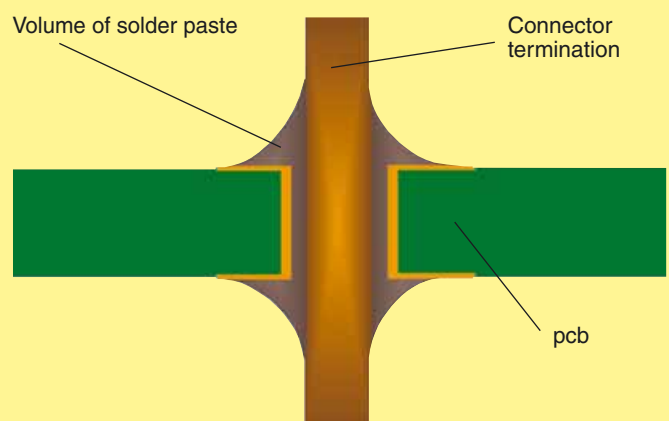
V_H = Volume of the plated through hole

V_P = Volume of the connector termination in the hole

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

Requirements for the solder connection

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



Plated through hole with connector termination

SMC connectors

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

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

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

HARTING SMC technology

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

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

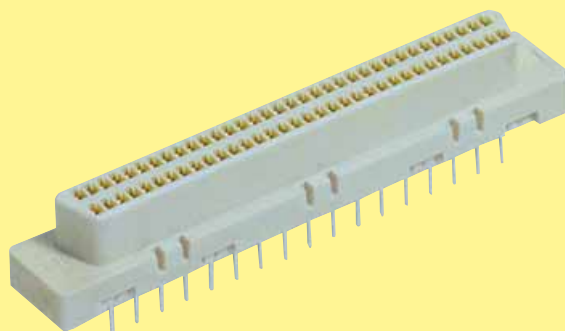
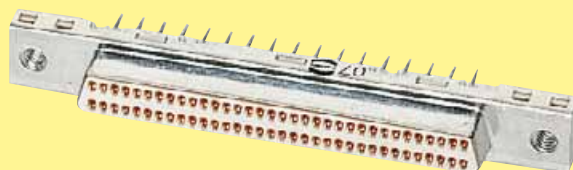
Advantages of the “Pin in Hole Intrusive Reflow” process:

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

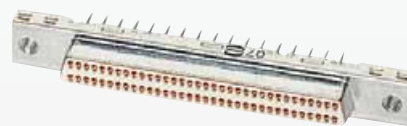


SEK connector mounted in a tape ready for placement using an odd form assembly station.

Number of contacts	68
Pitch	1.27 mm
Working current	1 A
Working voltage	240 V ~
Test voltage $U_{r.m.s.}$	750 V
Contact resistance	$\leq 30 \text{ m}\Omega$
Insulation resistance	$\geq 10^3 \text{ M}\Omega$
Temperature range during reflow soldering	-55 °C ... + 105 °C max. + 240 °C for 60 s
Terminations	
Solder pins	Straight for pcb holes min. $\varnothing 0.74 \text{ mm}$
Materials	
Moulding	Thermoplastic resin glass-fibre filled UL 94-V0 Liquid Chrystal Polymer (LCP)
Contacts	Copper alloy
Contact surface	Selectively gold-plated
Metal shell	Die cast zamac or stamped steel, nickel-plated



68



SMC female connectors, straight

Identification	No. of contacts	Part No.
SMC female connector with straight solder pins	68	60 02 068 5120

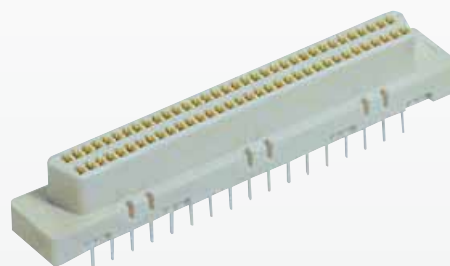
Technical drawings of the 100-pin connector. The top drawing is a side view showing a length of 41.91 mm, a pitch of 1.27 mm, and a total length of 57.91 mm. The bottom drawing is a top view showing a width of 3.2 mm, a pitch of 1.27 mm, and a total width of 33 x 1.27 = 41.91 mm. A detail view shows the solder connection with a maximum height of 3.5 mm.

Board drillings

(Components side)

Number of contacts

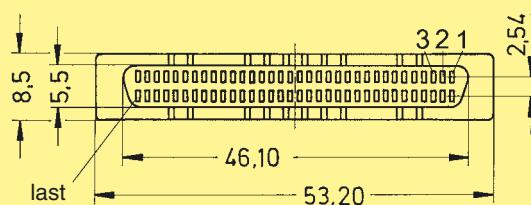
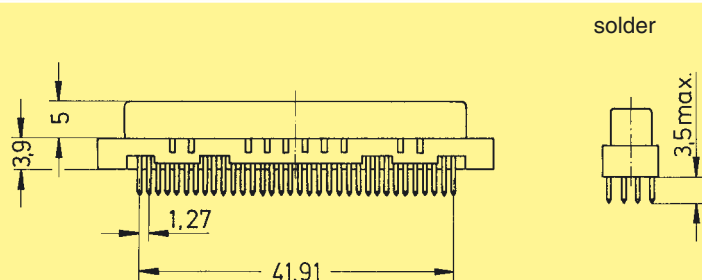
68



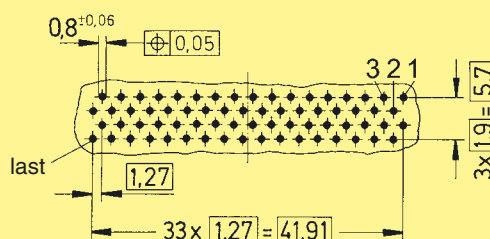
SMC female connectors, straight

Identification	No. of contacts	Part No.
SMC female connector with straight solder pins	68	60 05 068 5100

Dimensions



Board drillings
(Components side)



Dimensions in mm

Number of contacts 9, 15, 25, 37
UL recognized

Working current
see current carrying capacity chart
Stamped contacts 6.5 A max.

Test voltage $U_{r.m.s.}$ 1 kV

Clearance and creepage ≥ 1.0 mm

Contact resistance ≤ 10 m Ω
Insulation resistance $\geq 10^{10}$ Ω

Temperature range -55 °C ... + 125 °C
during reflow soldering max. + 240 °C for 60 s
The higher temperature limit includes the local ambient and heating effect of the contacts under load

Terminations
a) Solder pins $\varnothing$ 0.6 mm for P.C.B. holes $\varnothing$ 0.8/1 mm
b) Solder pins, angled 90° $\varnothing$ 0.6 mm for P.C.B. holes $\varnothing$ 1 mm

Materials
Mouldings Thermoplastic resin, glass-fibre filled (PCT), UL 94-V0

Contacts Copper alloy

Contact surface¹⁾ Contact zone: selectively gold-plated according to performance level¹⁾
Termination zone: SnPb

Metal shell Tinned steel

Insertion and withdrawal force

Connector on P.C.B.

Solder, straight with clips

– insertion max. per connector: 60 N
– withdrawal min. per connector: 10 N

Mating force

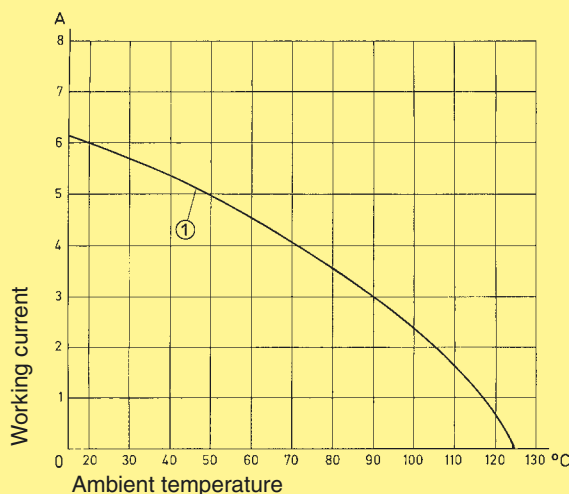
9 way ≤ 30 N
15 way ≤ 50 N
25 way ≤ 83 N
37 way ≤ 123 N

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.

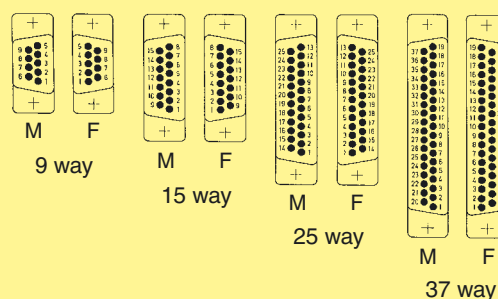
Control and test procedures according to DIN IEC 60 512.



Example: 25 way connector

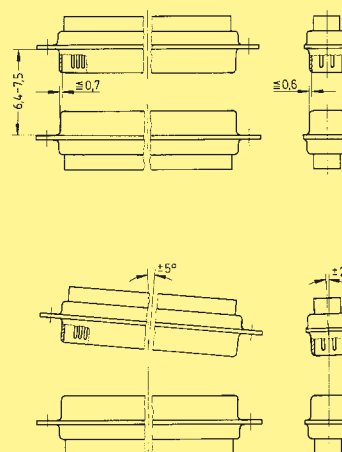
① Stamped contacts

Contact arrangement View from termination side



M = Male connector
F = Female connector

Mating conditions as per DIN 41 652



¹⁾ Performance level 3 as per DIN 41 652, part 2, ≥ 50 mating cycles, no gas test

Performance level 2 as per DIN 41 652, part 2, ≥ 200 mating cycles, 4 days gas test using 10 ppm SO₂

Other performance levels on request

Identification

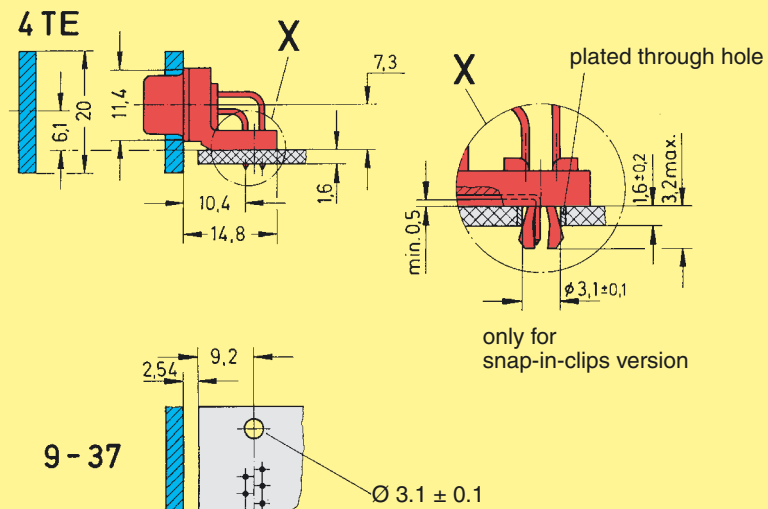
Drawing

Dimensions in mm

Standard Versions

Mounting height 7.3 mm

9-37 way
for front panel
4 units of width (TE)

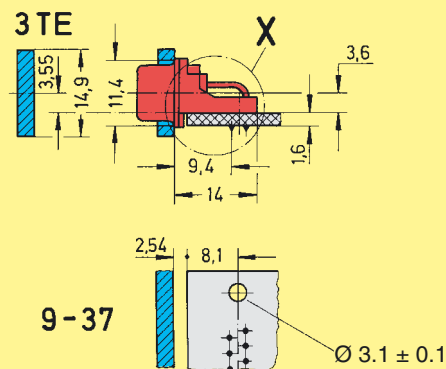


for connectors see pages 21.12 – 21.13

Low Profile Versions

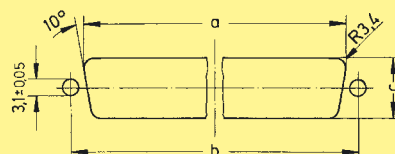
Mounting height 3.6 mm

9-37 way
for front panel
3 units of width (TE)



for connectors see pages 21.14 – 21.15

Panel cut out
for front panel



	a	b ± 0.1	c
9	20.5	25.0	11.4
15	28.8	33.3	11.4
25	42.5	47.0	11.4
37	59.1	63.5	11.4

Number of contacts

9–37



SMC stamped solder pins, straight with/without grounding board locks

Identification	No. of contacts	Part No.			
Performance levels Explanations see page 21.08 Other performance levels on request		Performance level 3		Performance level 2	
Male connector tinned metal shell with dimples					
Without grounding board locks	9	09 65 129 770 .		09 65 129 670 .	
	15	09 65 229 770 .		09 65 229 670 .	
	25	09 65 329 770 .		09 65 329 670 .	
	37	09 65 429 770 .		09 65 429 670 .	
With grounding board locks	9	09 65 169 771 .		09 65 169 671 .	
	15	09 65 269 771 .		09 65 269 671 .	
	25	09 65 369 771 .		09 65 369 671 .	
	37	09 65 469 771 .		09 65 469 671 .	
Female connector tinned metal shell					
Without grounding board locks	9	09 66 115 750 .		09 66 115 650 .	
	15	09 66 215 750 .		09 66 215 650 .	
	25	09 66 315 750 .		09 66 315 650 .	
	37	09 66 415 750 .		09 66 415 650 .	
With grounding board locks	9	09 66 155 751 .		09 66 155 651 .	
	15	09 66 255 751 .		09 66 255 651 .	
	25	09 66 355 751 .		09 66 355 651 .	
	37	09 66 455 751 .		09 66 455 651 .	
Please insert digit for flange thread or fitted female screw locks					
Ø 3.1 mm hole ▶ 0 ¹⁾ M3 ▶ 1 4-40 UNC ▶ 2 fitted screw locks 4-40 UNC ▶ 3 ²⁾					

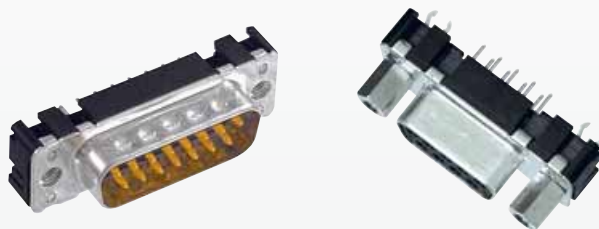
¹⁾ Option 0 is only available for male and female connectors without grounding board locks. Not normally kept in stock.

²⁾ Fitted screw locks 4-40 UNC not normally kept in stock for performance level 3

Connector dimensions see page 21.11. Mating conditions see page 21.08.

Number of contacts

9–37



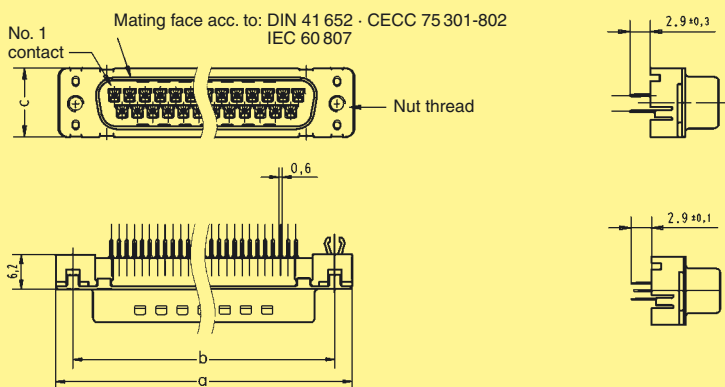
SMC stamped solder pins, straight with/without grounding board locks

Identification

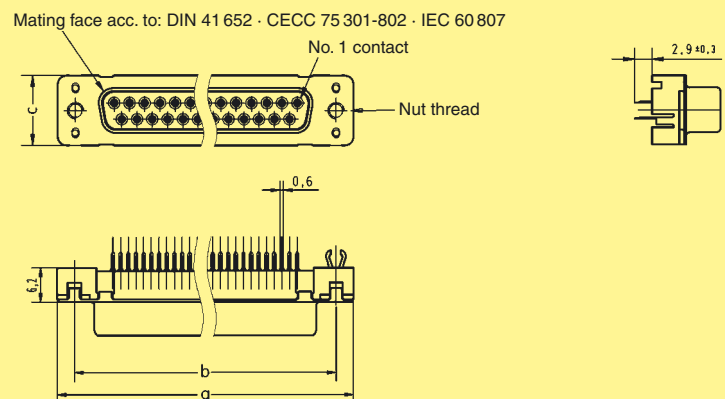
Drawing

Dimensions in mm

Male connector

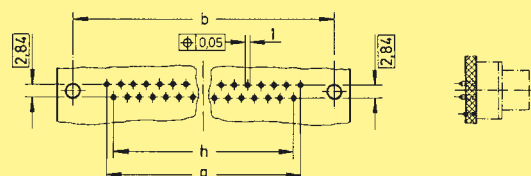


Female connector



	a	b _{±0.1}	c	g	h
9	30.9	25.0	12.5	4 x 2.74 = 10.96	3 x 2.74 = 8.22
15	39.2	33.3	12.5	7 x 2.74 = 19.18	6 x 2.74 = 16.44
25	53.1	47.0	12.5	12 x 2.76 = 33.12	11 x 2.76 = 30.36
37	69.4	63.5	12.5	18 x 2.76 = 49.68	17 x 2.76 = 46.92

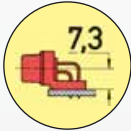
Board drillings



Number of contacts

9–37

Mounting height



Standard Versions

SMC stamped solder pins, angled with grounding board locks

Identification	No. of contacts	Part No.	
Performance levels Explanations see page 21.08 Other performance levels on request		Performance level 3	Performance level 2
Male connector tinned metal shell with dimples		2.84 mm pitch	2.84 mm pitch
	9	09 65 167 781 . 1)	09 65 167 681 . 1)
	15	09 65 267 781 . 1)	09 65 267 681 . 1)
	25	09 65 367 781 . 1)	09 65 367 681 . 1)
	37	09 65 467 781 . 1)	09 65 467 681 . 1)
		2.54 mm pitch	2.54 mm pitch
	9	09 65 166 781 .	09 65 166 681 .
	15	09 65 266 781 .	09 65 266 681 .
	25	09 65 366 781 .	09 65 366 681 .
	37	09 65 466 781 .	09 65 466 681 .
		2.84 mm pitch	2.84 mm pitch
	9	09 66 157 761 . 1)	09 66 157 661 . 1)
	15	09 66 257 761 . 1)	09 66 257 661 . 1)
	25	09 66 357 761 . 1)	09 66 357 661 . 1)
	37	09 66 457 761 . 1)	09 66 457 661 . 1)
		2.54 mm pitch	2.54 mm pitch
	9	09 66 156 761 .	09 66 156 661 .
	15	09 66 256 761 .	09 66 256 661 .
	25	09 66 356 761 .	09 66 356 661 .
	37	09 66 456 761 .	09 66 456 661 .
Female connector tinned metal shell		2.84 mm pitch	2.84 mm pitch
	9	09 66 157 761 . 1)	09 66 157 661 . 1)
	15	09 66 257 761 . 1)	09 66 257 661 . 1)
	25	09 66 357 761 . 1)	09 66 357 661 . 1)
	37	09 66 457 761 . 1)	09 66 457 661 . 1)
		2.54 mm pitch	2.54 mm pitch
	9	09 66 156 761 .	09 66 156 661 .
	15	09 66 256 761 .	09 66 256 661 .
	25	09 66 356 761 .	09 66 356 661 .
	37	09 66 456 761 .	09 66 456 661 .
Please insert digit for flange thread or fitted female screw locks			
	Ø 3.1 mm hole ▶ 0 ¹⁾		
	M3 ▶ 1		
	4-40 UNC ▶ 2		
fitted screw locks 4-40 UNC ▶ 3			

¹⁾ Not normally kept in stock

Number of contacts

9–37

Mounting height



Standard Versions

SMC stamped solder pins, angled with grounding board locks

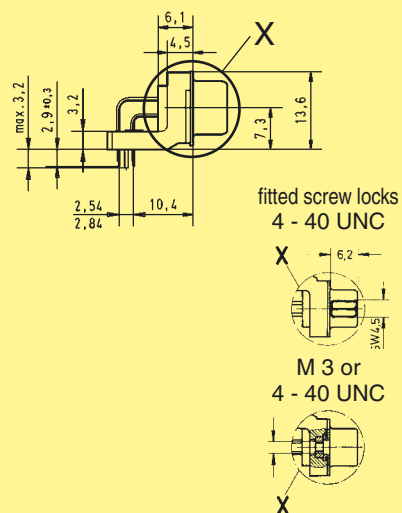
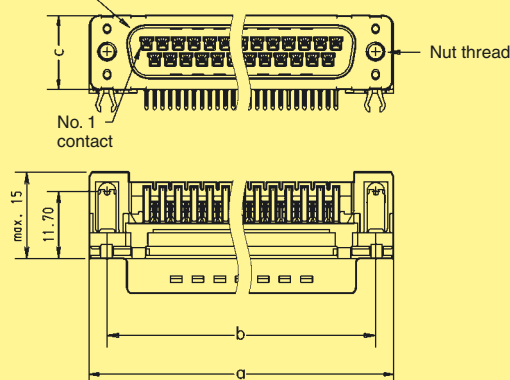
Identification

Drawing

Dimensions in mm

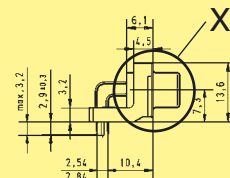
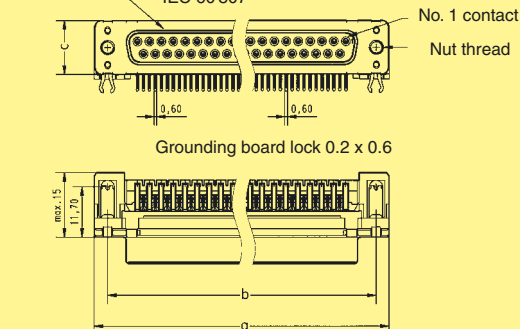
Male connector

Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807

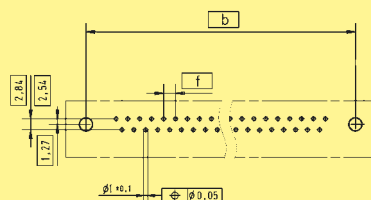


Female connector

Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807



Board drillings

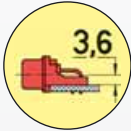


	a	b ± 0.1	c	f
9	30.90	25.00	12.50	2.74
15	39.20	33.30	12.50	2.74
25	53.10	47.00	12.50	2.76
37	69.40	63.50	12.50	2.76

Number of contacts

9–37

Mounting height



Low Profile Versions

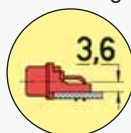
SMC stamped solder pins, angled with grounding board locks

Identification	No. of contacts	Part No.			
Performance levels Explanations see page 21.08 Other contact surfaces on request		Performance level 3		Performance level 2	
Male connector tinned metal shell with dimples	9	09 65 166 781 .		09 65 166 681 .	
	15	09 65 266 781 .		09 65 266 681 .	
	25	09 65 366 781 .		09 65 366 681 .	
	37	09 65 466 781 .		09 65 466 681 .	
Female connector tinned metal shell	9	09 66 156 761 .		09 66 156 661 .	
	15	09 66 256 761 .		09 66 256 661 .	
	25	09 66 356 761 .		09 66 356 661 .	
	37	09 66 456 761 .		09 66 456 661 .	
Please insert digit for flange thread or fitted female screw locks	M3 ▶	5			
	4-40 UNC ▶	6			
	fitted screw locks 4-40 UNC ▶	7			

Number of contacts

9–37

Mounting height



Low Profile Versions

SMC stamped solder pins, angled with grounding board locks

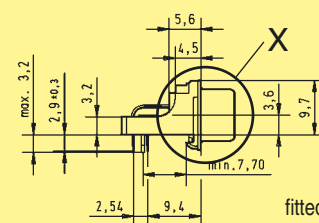
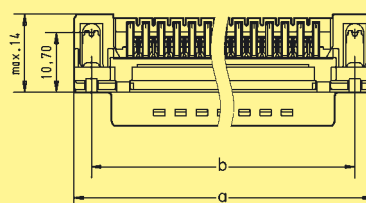
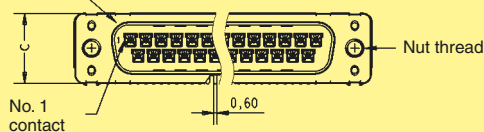
Identification

Drawing

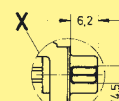
Dimensions in mm

Male connector

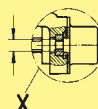
Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807



fitted screw locks
4 - 40 UNC

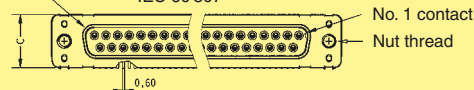


M 3 or
4 - 40 UNC

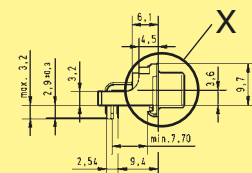
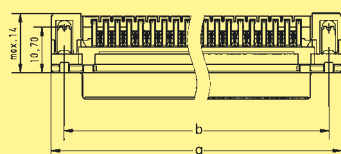


Female connector

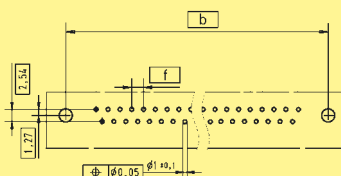
Mating face acc. to: DIN 41 652 · CECC 75 301-802
IEC 60 807



Grounding board lock 0.2 x 0.6



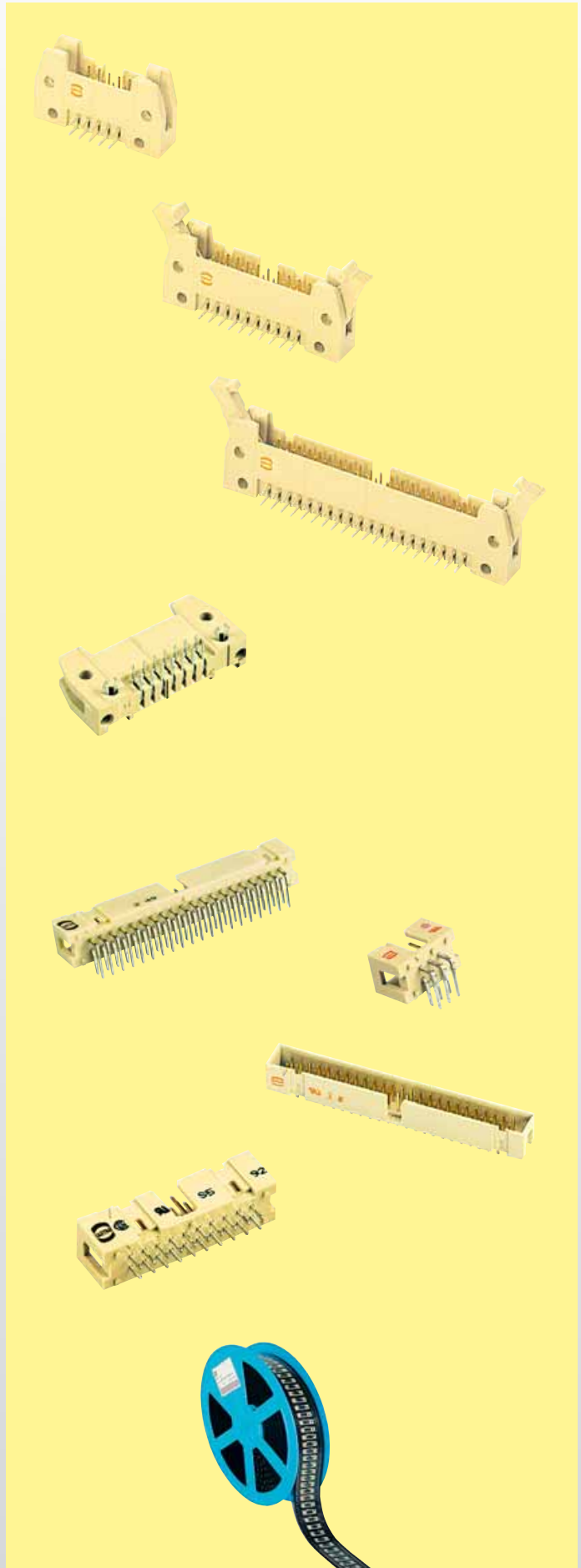
Board drillings



	a	b ± 0.1	c	f
9	30.90	25.00	12.50	2.74
15	39.20	33.30	12.50	2.74
25	53.10	47.00	12.50	2.76
37	69.40	63.50	12.50	2.76

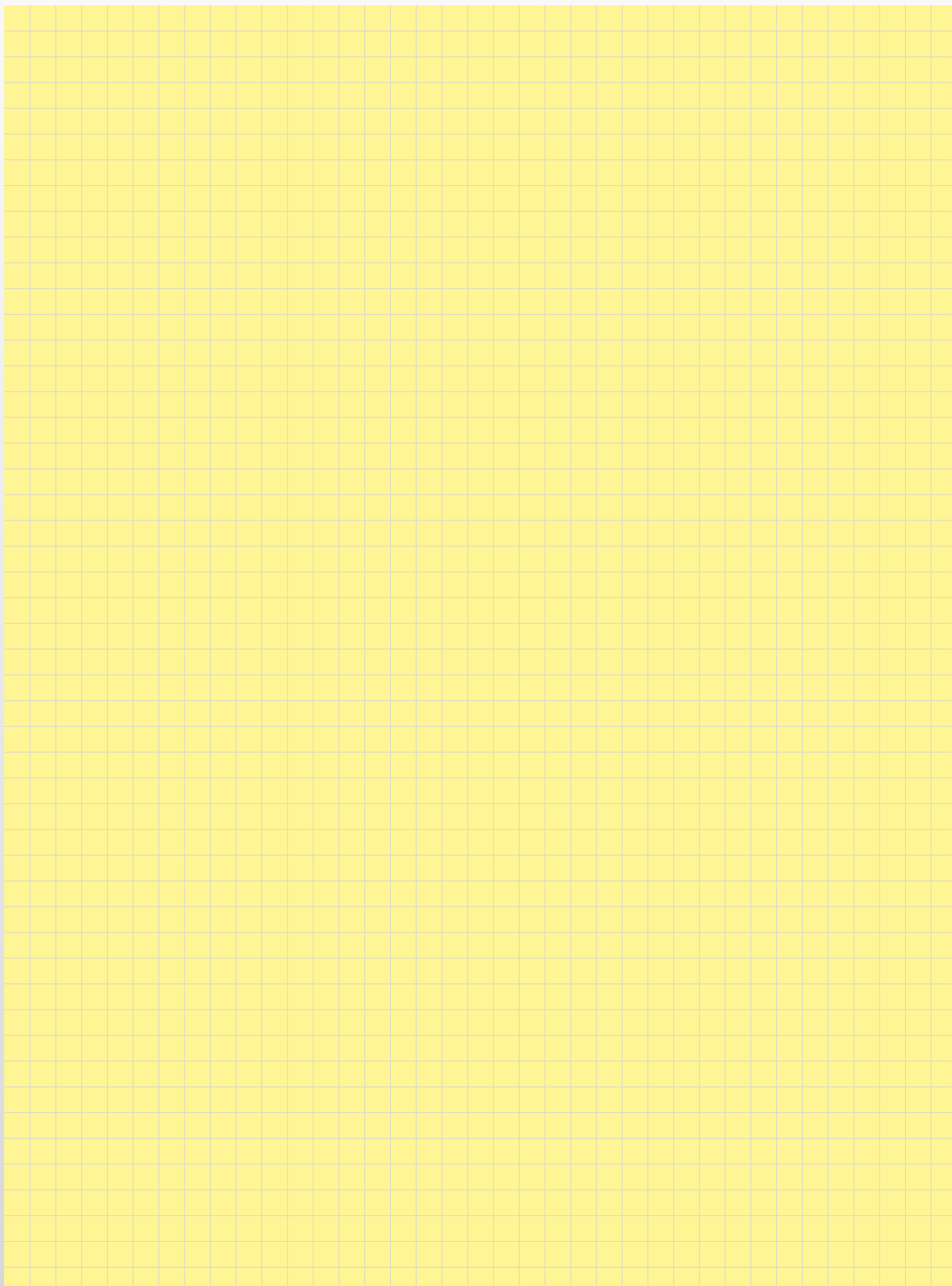
Number of contacts	6, 10, 14, 16, 20, 26, 30*, 34, 40, 50, 60, 64
Contact arrangement	straight, angled
Contact length	2.9 mm, 4.5 mm
Approvals	IEC 60 603-13 DIN EN 60 603-13 D 2632 BT 224 NFC 93-428 (HE 10) comply with MIL-C 83 503
Pitch	2.54 mm [0.100"]
Working current	1 A
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	$\leq 20 \text{ m}\Omega$
Insulation resistance	$\geq 10^9 \Omega$
Temperature range	-55 °C ... + 125 °C during reflow soldering max. + 240 °C for 60 s The higher temperature limit includes the local ambient and heating effect of the contacts under load
Terminations	For pcb hole $\varnothing 0.9 \text{ mm}$ DIN IEC 52 141 Diagonal: 0.79 mm
Materials	
Moulding	Thermoplastic resin (PCT) UL 94-V0
Contact surface ¹⁾	<u>Contact zone</u> : gold-plated according to performance level ¹⁾ <u>Termination zone</u> : tinned
Options on request	
Colour of connectors	black
For pick & place process	Tape & Reel packaging with/without vacuum cover Tube packaging with/without vacuum cover



New


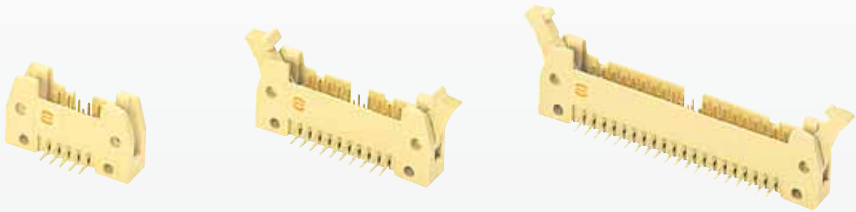
¹⁾ Performance level 3 as per IEC 603-13, ≥ 50 mating cycles, no gas test
Performance level 2 as per IEC 603-13, ≥ 200 mating cycles, 4 days gas test
as per MIL-C 83 503, $> 0.76 \mu\text{m Au}$ (30 μ inch), other performance levels on request

* on request



Number of contacts

6-64



SMC male header with angled solder pins

Identification	No. of contacts	Part No.					
		Without levers		With short levers		With long levers	
SMC male header with angled solder pins Length: 2.9 mm	6	09 19 506	└ 923	09 19 506	└ 913	09 19 506	└ 903
	10	09 19 510	└ 923	09 19 510	└ 913	09 19 510	└ 903
	14	09 19 514	└ 923	98 19 514	└ 913	09 19 514	└ 903
	16	09 19 516	└ 923	09 19 516	└ 913	09 19 516	└ 903
	20	09 19 520	└ 923	09 19 520	└ 913	09 19 520	└ 903
	26	09 19 526	└ 923	09 19 526	└ 913	09 19 526	└ 903
	34	09 19 534	└ 923	09 19 534	└ 913	09 19 534	└ 903
	40	09 19 540	└ 923	09 19 540	└ 913	09 19 540	└ 903
	50	09 19 550	└ 923	09 19 550	└ 913	09 19 550	└ 903
	60	09 19 560	└ 923	09 19 560	└ 913	09 19 560	└ 903
	64	09 19 564	└ 923	09 19 564	└ 913	09 19 564	└ 903
30 contacts and kinked version on request							
SMC male header with angled solder pins Length: 4.5 mm	6	09 19 506	└ 921*	09 19 506	└ 911*	09 19 506	└ 901*
	10	09 19 510	└ 921*	09 19 510	└ 911*	09 19 510	└ 901*
	14	09 19 514	└ 921*	98 19 514	└ 911*	09 19 514	└ 901*
	16	09 19 516	└ 921*	09 19 516	└ 911*	09 19 516	└ 901*
	20	09 19 520	└ 921*	09 19 520	└ 911*	09 19 520	└ 901*
	26	09 19 526	└ 921*	09 19 526	└ 911*	09 19 526	└ 901*
	34	09 19 534	└ 921*	09 19 534	└ 911*	09 19 534	└ 901*
	40	09 19 540	└ 921*	09 19 540	└ 911*	09 19 540	└ 901*
	50	09 19 550	└ 921*	09 19 550	└ 911*	09 19 550	└ 901*
	60	09 19 560	└ 921*	09 19 560	└ 911*	09 19 560	└ 901*
	64	09 19 564	└ 921*	09 19 564	└ 911*	09 19 564	└ 901*
30 contacts and kinked version on request							

SMC
technology

* Not normally kept in stock
For accessories see page 21.26
For dimensions see page 21.19

For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request

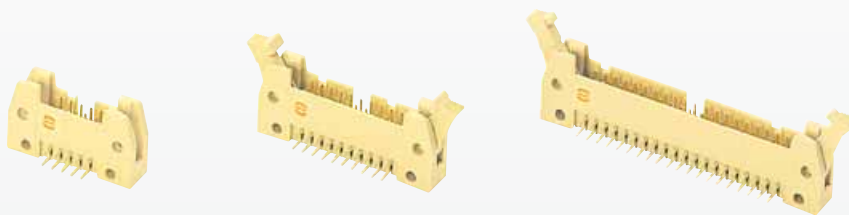
7
6
5

7
6
5

7
6
5

Number of contacts

6-64



SMC male header with angled solder pins

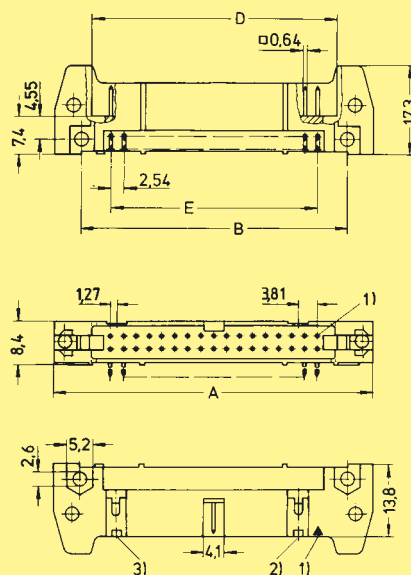
Identification

Drawing

Dimensions in mm

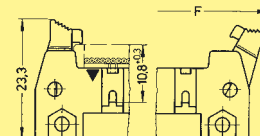
SMC male header

No. of contacts	A	B	D	E	F	G
6	26.9	16.76	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	21.84	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	26.92	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	29.46	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	34.54	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	42.16	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	52.32	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	59.94	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	72.64	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	85.34	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	90.42	86.11	2.54 x 31 = 78.74	110.6	113.9



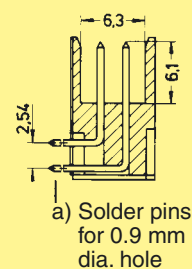
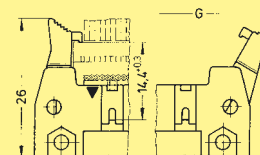
Short levers

for use with female connector without strain relief clamp



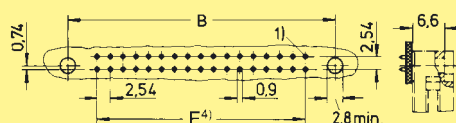
Long levers

for use with female connector with strain relief clamp



a) Solder pins for 0.9 mm dia. hole

Board drillings



¹⁾ Contact number 1

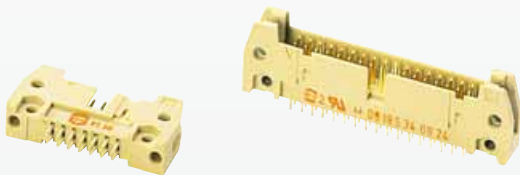
²⁾ No polarization slot for 6, 10 or 14 way male header

³⁾ No polarization slot for 6 way male header

⁴⁾ Pitch tolerance: ± 0.1

Number of contacts

6-64



SMC male header with straight solder pins

Identification	No. of contacts	Part No.					
		Without levers		With short levers		With long levers	
SMC male header with straight solder pins Length: 2.9 mm	6	09 19 506	└ 924	09 19 506	└ 914	09 19 506	└ 904
	10	09 19 510	└ 924	09 19 510	└ 914	09 19 510	└ 904
	14	09 19 514	└ 924	98 19 514	└ 914	09 19 514	└ 904
	16	09 19 516	└ 924	09 19 516	└ 914	09 19 516	└ 904
	20	09 19 520	└ 924	09 19 520	└ 914	09 19 520	└ 904
	26	09 19 526	└ 924	09 19 526	└ 914	09 19 526	└ 904
	34	09 19 534	└ 924	09 19 534	└ 914	09 19 534	└ 904
	40	09 19 540	└ 924	09 19 540	└ 914	09 19 540	└ 904
	50	09 19 550	└ 924	09 19 550	└ 914	09 19 550	└ 904
	60	09 19 560	└ 924	09 19 560	└ 914	09 19 560	└ 904
	64	09 19 564	└ 924	09 19 564	└ 914	09 19 564	└ 904
30 contacts and kinked version on request							
SMC male header with straight solder pins Length: 4.5 mm	6	09 19 506	└ 922*	09 19 506	└ 912*	09 19 506	└ 902*
	10	09 19 510	└ 922*	09 19 510	└ 912*	09 19 510	└ 902*
	14	09 19 514	└ 922*	98 19 514	└ 912*	09 19 514	└ 902*
	16	09 19 516	└ 922*	09 19 516	└ 912*	09 19 516	└ 902*
	20	09 19 520	└ 922*	09 19 520	└ 912*	09 19 520	└ 902*
	26	09 19 526	└ 922*	09 19 526	└ 912*	09 19 526	└ 902*
	34	09 19 534	└ 922*	09 19 534	└ 912*	09 19 534	└ 902*
	40	09 19 540	└ 922*	09 19 540	└ 912*	09 19 540	└ 902*
	50	09 19 550	└ 922*	09 19 550	└ 912*	09 19 550	└ 902*
	60	09 19 560	└ 922*	09 19 560	└ 912*	09 19 560	└ 902*
	64	09 19 564	└ 922*	09 19 564	└ 912*	09 19 564	└ 902*
30 contacts and kinked version on request							

SMC technology

* Not normally kept in stock
For accessories see page 21.26
For dimensions see page 21.21

For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request

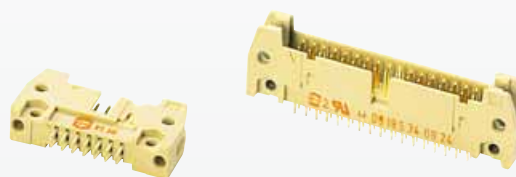
7*
6
5*

7*
6
5*

7*
6
5*

Number of contacts

6-64



SMC male header with straight solder pins

Identification

Drawing

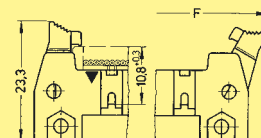
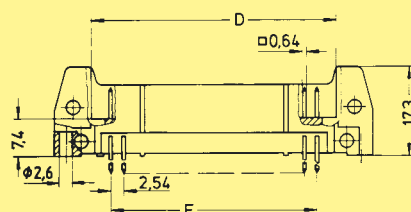
Dimensions in mm

SMC male header

No. of contacts	A	C	D	E	F	G
6	26.9	22.86	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	27.94	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	33.02	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	35.56	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	40.64	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	48.26	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	58.42	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	66.04	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	78.74	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	91.44	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	96.52	86.11	2.54 x 31 = 78.74	110.6	113.9

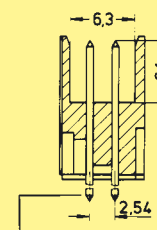
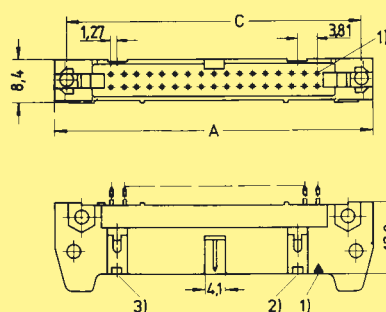
Short levers

for use with female connector without strain relief clamp

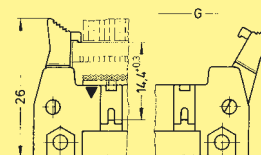


Long levers

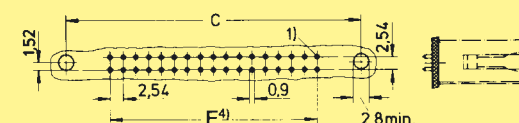
for use with female connector with strain relief clamp



a) Solder pins for 0.9 mm dia. hole



Board drillings



¹⁾ Contact number 1

²⁾ No polarization slot for 6, 10 or 14 way male header

³⁾ No polarization slot for 6 way male header

⁴⁾ Pitch tolerance: ± 0.1

Number of contacts

6-64



SMC male header with angled solder pins and board lock

Identification	No. of contacts	Part No.					
		Without levers		With short levers		With long levers	
SMC male header with angled solder pins and pcb board lock Length: 2.9 mm for 1.6 mm pcb thickness	6	09 19 506	└ 973*	09 19 506	└ 963*	09 19 506	└ 953*
	10	09 19 510	└ 973*	09 19 510	└ 963*	09 19 510	└ 953*
	14	09 19 514	└ 973*	98 19 514	└ 963*	09 19 514	└ 953*
	16	09 19 516	└ 973*	09 19 516	└ 963*	09 19 516	└ 953*
	20	09 19 520	└ 973*	09 19 520	└ 963*	09 19 520	└ 953*
	26	09 19 526	└ 973*	09 19 526	└ 963*	09 19 526	└ 953*
	34	09 19 534	└ 973*	09 19 534	└ 963*	09 19 534	└ 953*
	40	09 19 540	└ 973*	09 19 540	└ 963*	09 19 540	└ 953*
	50	09 19 550	└ 973*	09 19 550	└ 963*	09 19 550	└ 953*
	60	09 19 560	└ 973*	09 19 560	└ 963*	09 19 560	└ 953*
	64	09 19 564	└ 973*	09 19 564	└ 963*	09 19 564	└ 953*

To hold the connector on the pcb before the soldering process, two board locks have been added on the male header with angled solder pins.

* Not normally kept in stock
30 contacts on request

For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request 5

7
6
5

7
6
5

7
6
5

Number of contacts

6-64



SMC male header with angled solder pins and board lock

Identification

Drawing

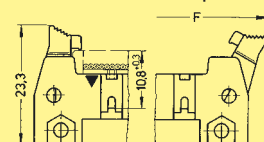
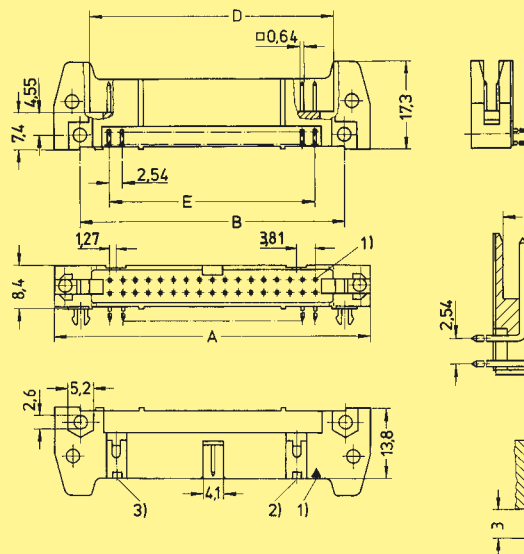
Dimensions in mm

SMC male header

No. of contacts	A	B	D	E	F	G
6	26.9	16.76	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	21.84	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	26.92	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	29.46	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	34.54	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	42.16	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	52.32	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	59.94	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	72.64	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	85.34	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	90.42	86.11	2.54 x 31 = 78.74	110.6	113.9

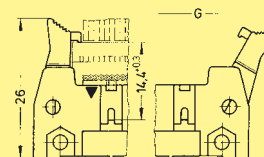
Short levers

for use with female connector without strain relief clamp

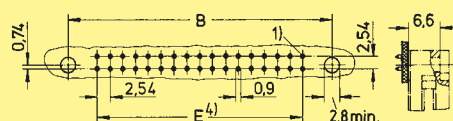


Long levers

for use with female connector with strain relief clamp

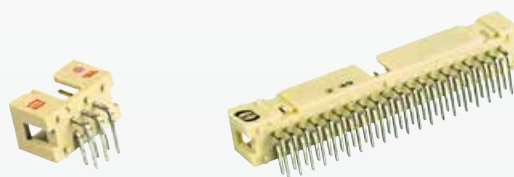


Board drillings



Number of contacts

6-64

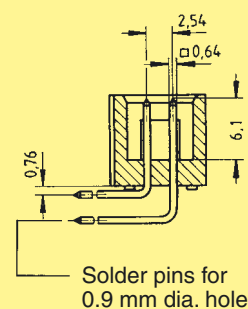
SMC low-profile male header, angled solder pins

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

SMC male header with angled solder pins
Length: 2.9 mm

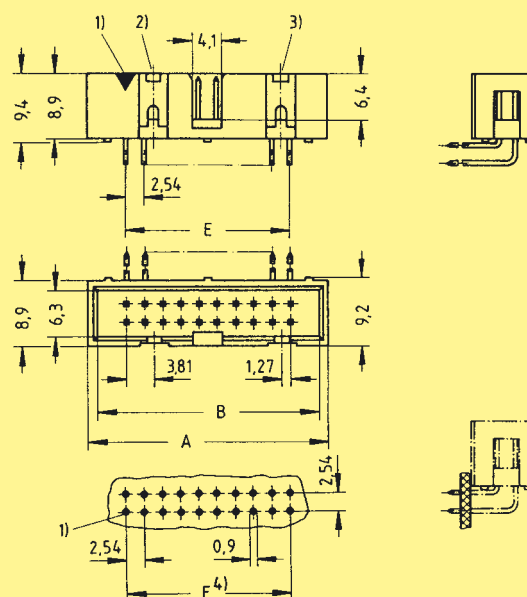
6	09 19 506	323
10	09 19 510	323
14	09 19 514	323
16	09 19 516	323
20	09 19 520	323
26	09 19 526	323
34	09 19 534	323
40	09 19 540	323
50	09 19 550	323
60	09 19 560	323
64	09 19 564	323

No. of contacts	A	B	E
6	15.2	12.78	2.54 x 2 = 5.08
10	20.3	17.86	2.54 x 4 = 10.16
14	25.4	22.94	2.54 x 6 = 15.24
16	27.9	25.48	2.54 x 7 = 17.78
20	33.0	30.56	2.54 x 9 = 22.86
26	40.6	38.18	2.54 x 12 = 30.48
34	50.8	48.34	2.54 x 16 = 40.64
40	58.4	55.96	2.54 x 19 = 48.26
50	71.3	68.66	2.54 x 24 = 60.96
60	84.0	81.36	2.54 x 29 = 73.66
64	89.1	86.44	2.54 x 31 = 78.74



SMC male header with angled solder pins
Length: 4.5 mm

6	09 19 506	321*
10	09 19 510	321*
14	09 19 514	321*
16	09 19 516	321*
20	09 19 520	321*
26	09 19 526	321*
34	09 19 534	321*
40	09 19 540	321*
50	09 19 550	321*
60	09 19 560	321*
64	09 19 564	321*



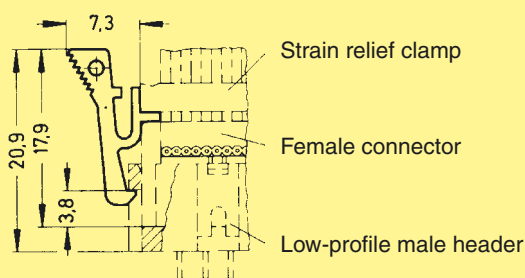
For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 µinch) on request

7
6
5 *

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

Locking lever for female connector with strain relief
in conjunction with low-profile male header

When the security of latching is required and space is a premium, these locking levers can be fitted onto the strain relief of the HARTING female connector.

09 18 000 9905⁵⁾

- 1) Contact number 1
2) No polarization slot for 6, 10 or 14 way male header

- 3) No polarization slot for 6 way male header
4) Pitch tolerance: ± 0.1

* Not normally kept in stock
5) Order 2 per female connector

Number of contacts

6-64



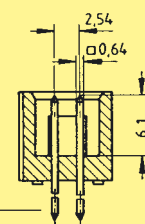
SMC low-profile male header, straight solder pins

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

SMC male header with straight solder pins
Length: 2.9 mm

6	09 19 506	324
10	09 19 510	324
14	09 19 514	324
16	09 19 516	324
20	09 19 520	324
26	09 19 526	324
34	09 19 534	324
40	09 19 540	324
50	09 19 550	324
60	09 19 560	324
64	09 19 564	324

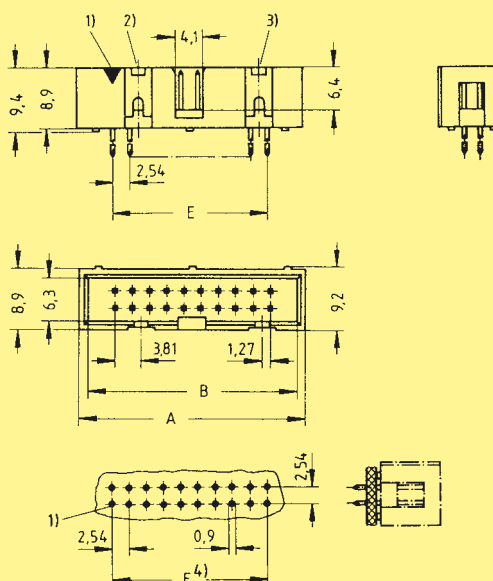
No. of contacts	A	B	E
6	15.2	12.78	2.54 x 2 = 5.08
10	20.3	17.86	2.54 x 4 = 10.16
14	25.4	22.94	2.54 x 6 = 15.24
16	27.9	25.48	2.54 x 7 = 17.78
20	33.0	30.56	2.54 x 9 = 22.86
26	40.6	38.18	2.54 x 12 = 30.48
34	50.8	48.34	2.54 x 16 = 40.64
40	58.4	55.96	2.54 x 19 = 48.26
50	71.3	68.66	2.54 x 24 = 60.96
60	84.0	81.36	2.54 x 29 = 73.66
64	89.1	86.44	2.54 x 31 = 78.74



Solder pins for 0.9 mm dia. hole

SMC male header with straight solder pins
Length: 4.5 mm

6	09 19 506	322*
10	09 19 510	322*
14	09 19 514	322*
16	09 19 516	322*
20	09 19 520	322*
26	09 19 526	322*
34	09 19 534	322*
40	09 19 540	322*
50	09 19 550	322*
60	09 19 560	322*
64	09 19 564	322*



For performance level 3 please specify digit 7
For performance level 2 please specify digit 6
> 0.76 µm Au (30 pinch) on request 5 *

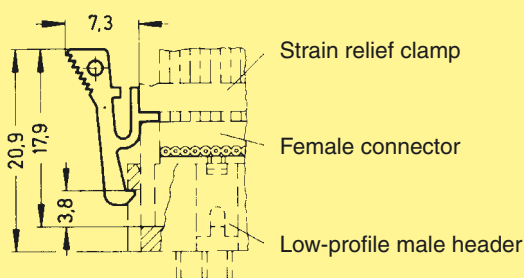
7
6
5 *

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
----------------	-----------------	----------	---------	------------------

Locking lever for female connector with strain relief
in conjunction with low-profile male header

When the security of latching is required and space is a premium, these locking levers can be fitted onto the strain relief of the HARTING female connector.

09 18 000 9905⁵⁾



Strain relief clamp

Female connector

Low-profile male header

* Not normally kept in stock
5) Order 2 per female connector

1) Contact number 1
2) No polarization slot for 6, 10 or 14 way male header

3) No polarization slot for 6 way male header
4) Pitch tolerance: ± 0.1

Accessories

Identification	Part No.	Drawing	Dimensions in mm
Polarization key ¹⁾ Part No. comprises 2 keys	09 18 500 9902 ¹⁾		
Locking lever (saps into place, can be fitted whenever required) ²⁾ Order 2 per male header	Long: 09 19 000 9903 ²⁾ Short: 09 19 000 9904 ²⁾	Long Short For use with female connector <u>with</u> strain relief clamp For use with female connector <u>without</u> strain relief clamp	
Fixing screws for 1.6 mm P.C. board ³⁾ Part No. comprises 50 pieces	09 18 000 9906 ³⁾		
Coding system with loss of contact Code pin 09 18 000 9901 ⁴⁾ Removal tool for male contacts 09 99 000 0133		To avoid cross-plugging adjacent connectors a coding system is required. A code pin is inserted into the appropriate cavity in the female connector. The corresponding male contact is removed by a special removal tool.	

⁴⁾ Part No. comprises 6 code pins

Tooling for press-in technology

Page

General information	30.02
Tooling compatible for complete interface connectors range	30.03
<i>Specific tooling</i>	
<i>harmik®</i>	30.10
<i>D-Sub – S</i>	30.10
<i>SEK</i>	30.11

HARTING modular tooling adapted to customer specific needs

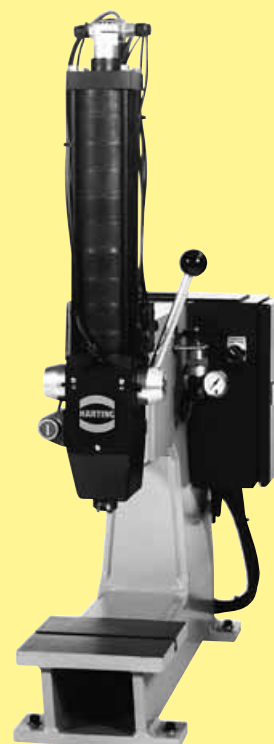


Hand bench press

- Easy to install
- No need of electrical or pneumatic power
- Ideal for prototyping and small series

Pneumatic press

- Easy handling
- Limitation of press-in force adjustable
- Ideal for medium series



CPM *prestige*



The state of the art automatic press-in machine

- Fully programmable press-in machine
- Ideal for volume series



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

Tooling compatible for complete interface connectors range

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

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

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

CPM 2001/s



Part No. 09 89 030 0000

Technical characteristics

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

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

Equipment:

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

Process control:

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

Options:

- Rotatable tool changer
- Insertion removal station

Tooling compatible for complete interface connectors range

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

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

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

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

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

CPM prestige



Part No.

09 89 040 0000

Technical characteristics

Drive	electro-mechanical, servo
Press-in force	100 kN
max. pcb dimensions	600 x 1000 mm
Floor space	1200 x 1150 mm
Weight	980 kg
Power supply	208 / 380 / 400 / 415 V
Consumption	< 1 kW
Colour	on request

CPM prestige

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

Features:

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

Process monitoring and quality assurance:

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

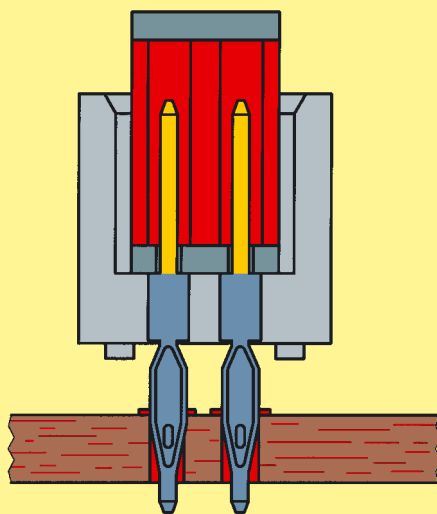
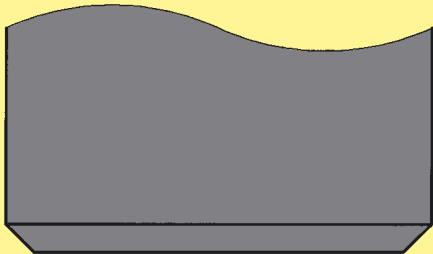
Options:

- Rotatable tool changer
- Insertion removal station

Tooling compatible for complete interface connectors range

Insertion removal station

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

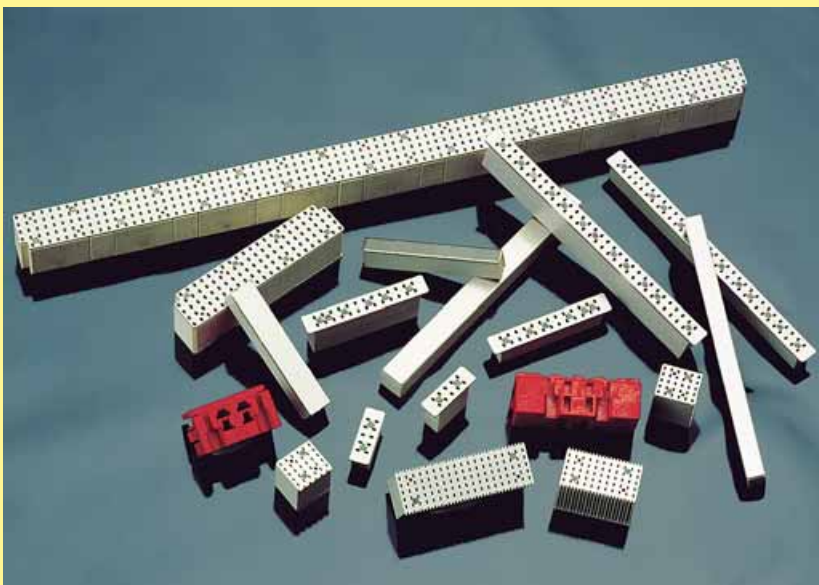


Advantages of press inserts

Robust tooling

No lateral force to pcb hole

No abrasion of the contact mating surface by the press tool



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

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

The additional process for inserting and removing the press-in inserts can be efficiently done with the insertion removal station. This station removes all press-in inserts with a magnetic plate in one operation and inserts them into the next pre-assembled pcb with the necessary precision. (Principle see page 30.06).

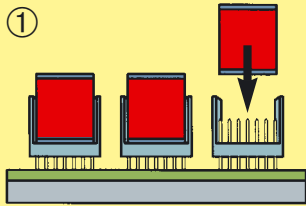
The cycle time for loading all headers is between 4 and 6 seconds, independent from the amount of press-in inserts.

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

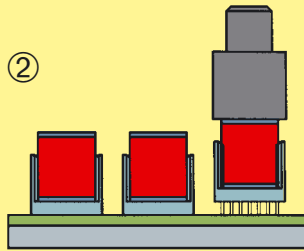
Tooling compatible for complete interface connectors range

Insertion removal station

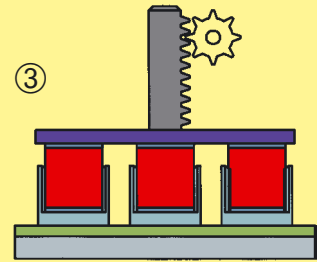
Principle:



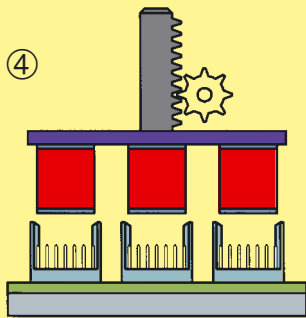
Load all headers with inserts for **one** press-in cycle



Press-in all connectors with a flat die



Position the magnetic plate



Remove all press-in inserts in one operation

Remove the processed pcb from the machine

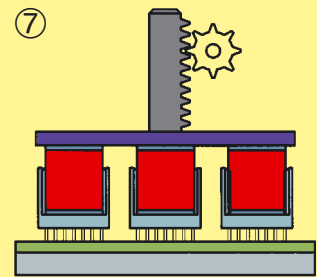


⑤



⑥

Move the next pre-assembled pcb to the insert station



Load all headers in one operation

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

Insertion removal station



Power supply

220 V / 50 Hz

Air pressure

6 bar (15-16 l/min.)

Part No.

09 89 020 0070

for pcb dimensions
of max.
710 mm x 540 mm

Part No.

09 89 020 0060

for pcb dimensions
of max.
1000 mm x 600 mm

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

Tooling compatible for complete interface connectors range

Modular tooling system for starting connector press-in

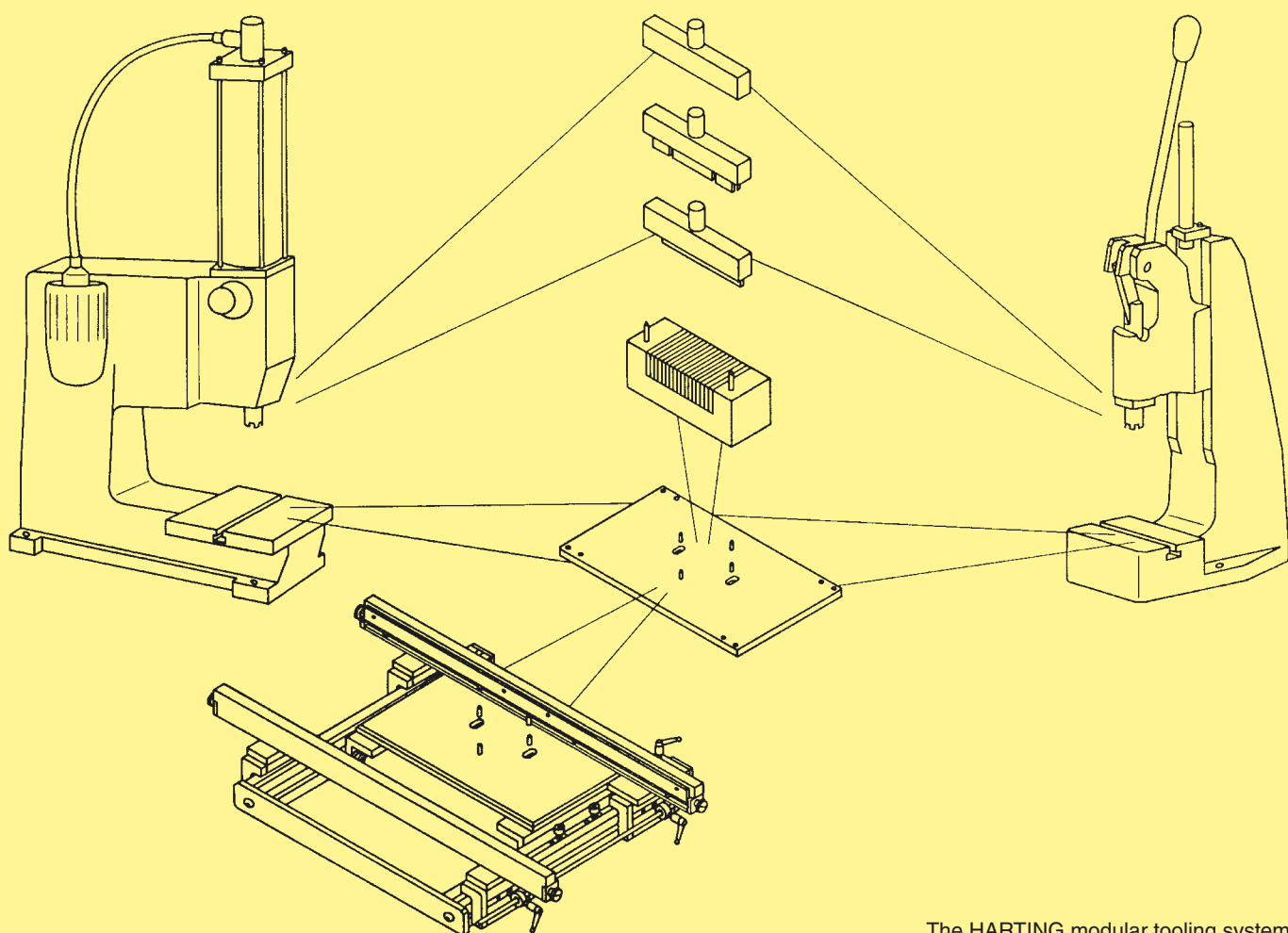
The diversity of connector types with press-in terminations and varying termination styles make it necessary to have a simple, flexible tooling system that can be continuously updated.

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

- Press
- Top tool
- Bottom tool
- Base plate

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

- Guide frame with base plate for accurate positioning of the pcb up to a length of 600 mm
- Guide frame "Standard" for hand bench press and pneumatic press and pcb height of 123.5 up to 309.5 mm
- Guide frame "Long" for pneumatic press and pcb height of 123.5 up to 668.5 mm



Tooling
press-in

The HARTING modular tooling system

Tooling compatible for complete interface connectors range

Handling indications

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

Positioning the bottom tool in relation to the top tool

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

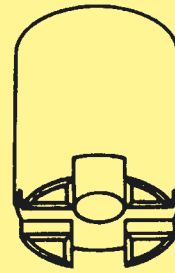
Two guide pins position the bottom tool in relation to the top tool simply and accurately.

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

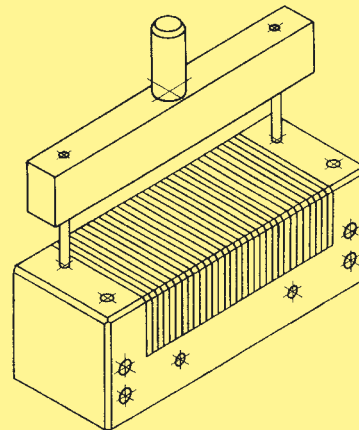
Two pairs of pins on the base plate locate the bottom tool in relation to the top tool in steps of 90°.

Bottom tool (narrow version)

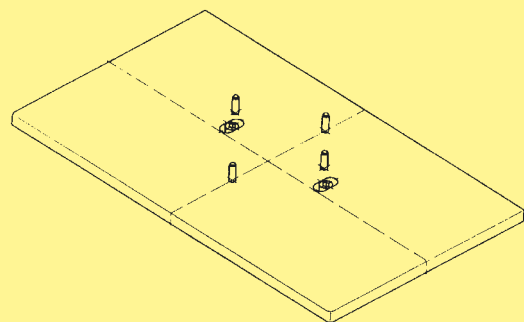
In addition to the square bottom tool with multifunctional properties, HARTING offers the alternative of a narrow bottom tool for assembling connectors with straight press-in terminations. This tool supports the pcb within the press-in connector zone and therefore makes it possible to assemble connectors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



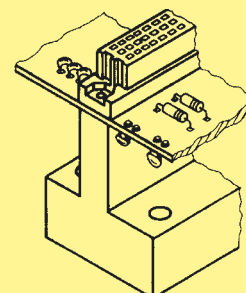
Ram with cross-shaped groove



Positioning the bottom tool in relation to top tool

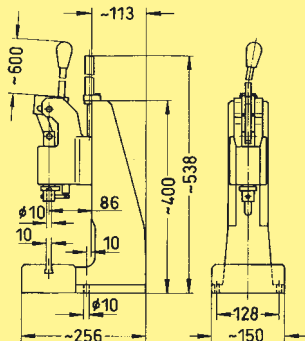
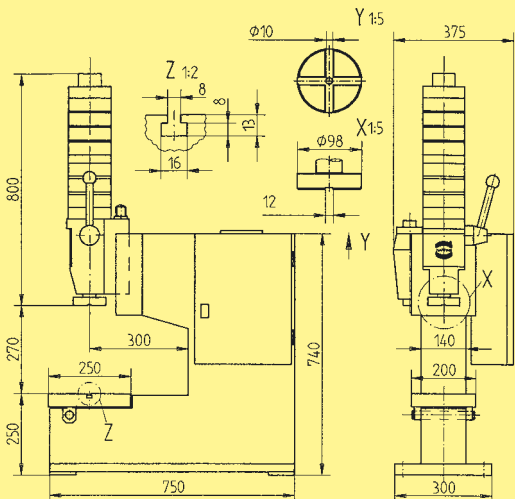
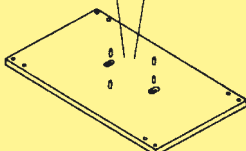
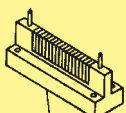


Base plate with pairs of location pins at 90°

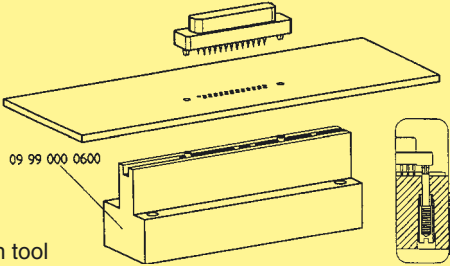


Narrow version of the bottom tool for special applications

Tooling compatible for complete interface connectors range

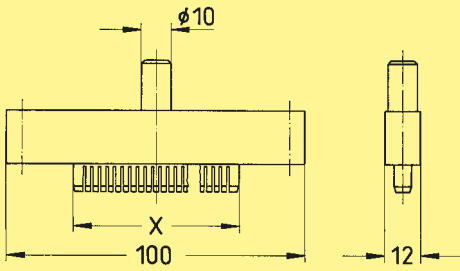
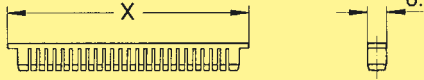
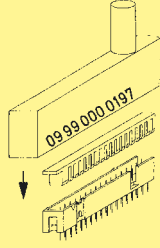
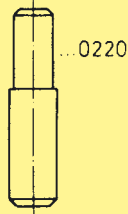
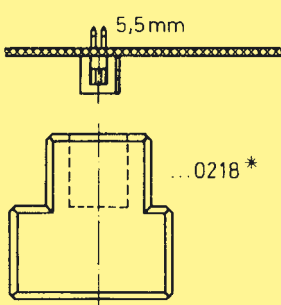
Identification	Part No.	Drawing	Dimensions in mm												
Hand bench press	09 99 000 0201	 Technical characteristics <table><tr><td>Working stroke</td><td>25 mm</td></tr><tr><td>Press force</td><td>15 kN max.</td></tr><tr><td>Hole ø in the ram</td><td>ø 10 mm</td></tr><tr><td>Net weight</td><td>approx. 23 kg</td></tr></table>	Working stroke	25 mm	Press force	15 kN max.	Hole ø in the ram	ø 10 mm	Net weight	approx. 23 kg					
Working stroke	25 mm														
Press force	15 kN max.														
Hole ø in the ram	ø 10 mm														
Net weight	approx. 23 kg														
Pneumatic press 40 kN	09 99 000 0281	 Technical characteristics <table><tr><td>Total stroke</td><td>48 mm</td></tr><tr><td>Working stroke</td><td>0-6 mm</td></tr><tr><td>Press force</td><td>40 kN max.</td></tr><tr><td>Air pressure</td><td>6 bar</td></tr><tr><td>Hole ø in the ram</td><td>ø 10 mm</td></tr><tr><td>Net weight</td><td>approx. 320 kg</td></tr></table>	Total stroke	48 mm	Working stroke	0-6 mm	Press force	40 kN max.	Air pressure	6 bar	Hole ø in the ram	ø 10 mm	Net weight	approx. 320 kg	
Total stroke	48 mm														
Working stroke	0-6 mm														
Press force	40 kN max.														
Air pressure	6 bar														
Hole ø in the ram	ø 10 mm														
Net weight	approx. 320 kg														
Top tool	09 99 000 0197	 Top tool													
Base plate	09 99 000 0255	 Base plate													
		 Bottom tool													

Specific tooling for har-mik and D-Sub

Identification	Part No	
Bottom tool for har-mik	60 99 000 0031	
Press-out tool for har-mik	60 99 000 0032	
Bottom tool narrow for D-Sub Only one tool for all polarities, with or without grounding pins	09 99 000 0600	 Bottom tool
Plastic with metal plate insert tool for D-Sub male	9 way 15 way 25 way	
Other toolings on request		

Tooling
press-in

Specific tooling for SEK

Identification	Part No.	Drawing	Dimensions in mm
Bottom tool narrow for SEK	09 99 000 0256		
Top tool for SEK male low profile connectors	6 way 09 99 000 0 06 10 way 09 99 000 0 10 14 way 09 99 000 0 14 16 way 09 99 000 0 16 20 way 09 99 000 0 20 26 way 09 99 000 0 26 34 way 09 99 000 0 34 40 way 09 99 000 0 40 50 way 09 99 000 0 50 60 way 09 99 000 0 60 64 way 09 99 000 0 64		Top tool including insert  X Length depends on number of contacts
Top tool including insert ➤ 4 Modular insert ➤ 5		Modular insert  	
Press-out tool for complete SEK male connectors with 5.5 mm terminations	09 99 000 0220		
Support block	09 99 000 0218		

* Further versions on request

Tooling for crimp technology

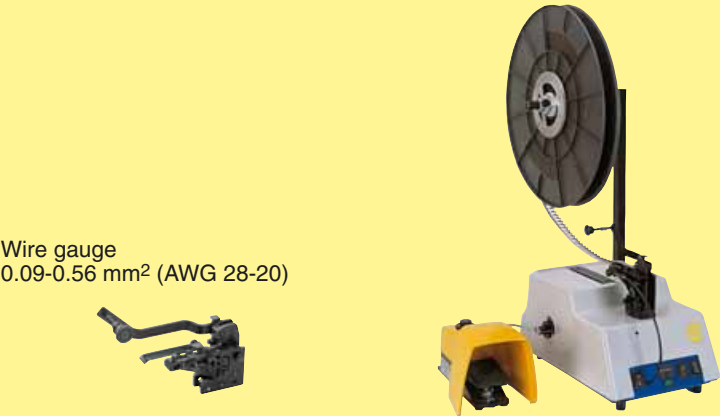
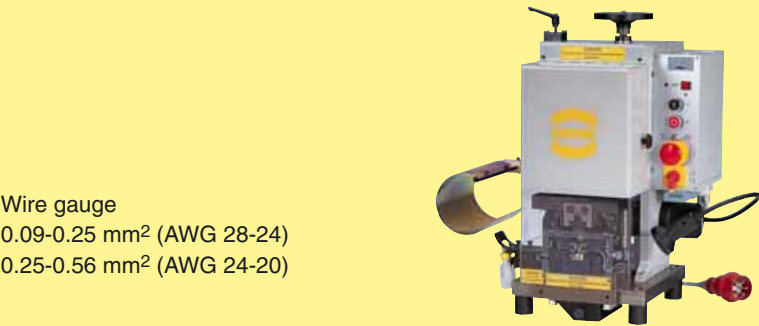
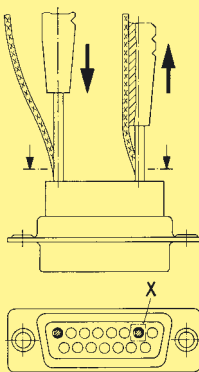
Page

***D-Sub – S* 31.02**

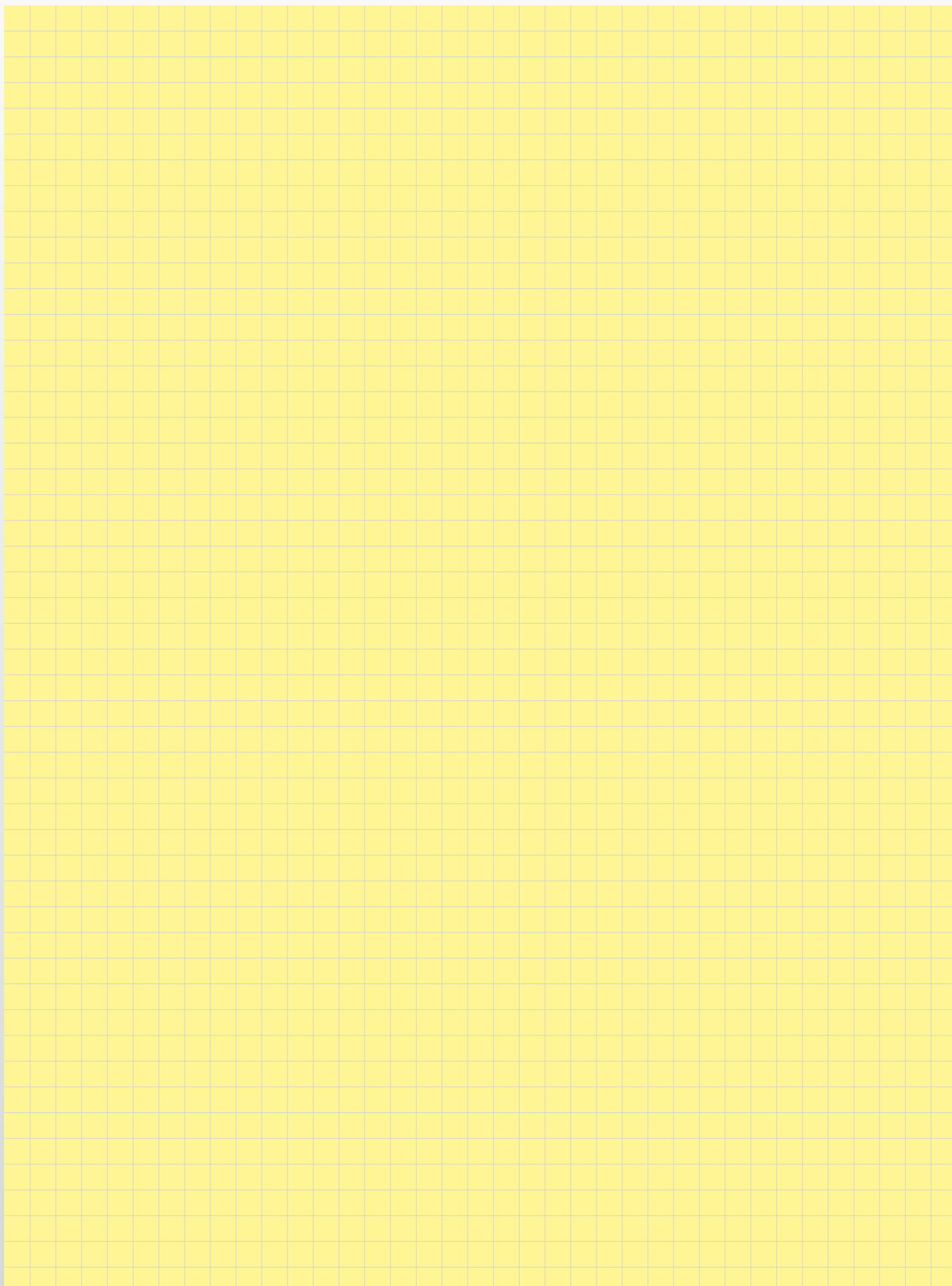
***D-Sub – HD* 31.02**

***D-Sub – M* 31.04**

Tools for crimp termination

Identification	Part No.	
Service crimp tool for single standard contacts for single high density contacts	09 99 000 0175 09 99 000 0596	
HARTING-Crimp tool for 500 bandoliered standard contacts for 500 bandoliered high density contacts	09 99 000 0169 09 99 000 0597	
HARTING-Semi-automatic crimping device Main drive foot-operated 220 V / 50 Hz Crimping head for bandoliered contacts (500 contacts) Reel holder for 10 000 contacts	09 99 000 0246 09 99 000 0253 09 99 000 0158	Wire gauge 0.09-0.56 mm ² (AWG 28-20) 
Automatik BK Crimp machine Electric press Crimp tool	09 98 000 5000 09 98 000 2008 09 98 000 2009	Wire gauge 0.09-0.25 mm ² (AWG 28-24) 0.25-0.56 mm ² (AWG 24-20) 
Insertion and removal tool	09 99 000 0171	  Assembly of crimp contacts After crimping the stranded wire to the contact using a hand tool or automatic crimping device, insert the contact into the chamber with the tool, working from the wiring side. You will hear the contacts snap home and to check that they are securely in place, give the wire a gentle pull. Removing crimp contacts Position the tool from the wiring side as shown in the diagram below and insert into the contact chamber. The contact can then easily be removed from the wiring side together with the wire itself and reinserted in a different chamber. The tool is designed for a maximum insulation diameter of Ø 1.7 mm.  X Tool

Stripping length: 2.5 + 0.5 mm



Tools for crimp termination

Identification	Part No.																						
Hand crimp tool for <i>signal</i> contacts	09 99 000 0501																						
Die	09 99 000 0502	 Wire gauge AWG 18 – 28																					
Hand crimp tool with fixed die for <i>signal</i> contacts	09 99 000 0505	 Wire gauge AWG 20 – 28																					
Hand crimp tool for <i>power</i> contacts	09 99 000 0509																						
Positioner for male and female contacts	09 99 000 0504																						
		<table><tr><th>Contact Part No.</th><th>Gauge</th><th>Tool setting</th></tr><tr><td>09 69 182 5421</td><td>AWG 12, 14</td><td>5 for AWG 12 and 4 for AWG 14</td></tr><tr><td>09 69 282 5421</td><td>AWG 12, 14</td><td>5 for AWG 12 and 4 for AWG 14</td></tr><tr><td>09 69 182 5422</td><td>AWG 10, 12</td><td>7 for AWG 10 and 6 for AWG 12</td></tr><tr><td>09 69 282 5422</td><td>AWG 10, 12</td><td>7 for AWG 10 and 6 for AWG 12</td></tr><tr><td>09 69 182 5423</td><td>AWG 8, 10</td><td>7 for AWG 8 and 6 for AWG 10</td></tr><tr><td>09 69 282 5423</td><td>AWG 8, 10</td><td>7 for AWG 8 and 6 for AWG 10</td></tr></table>	Contact Part No.	Gauge	Tool setting	09 69 182 5421	AWG 12, 14	5 for AWG 12 and 4 for AWG 14	09 69 282 5421	AWG 12, 14	5 for AWG 12 and 4 for AWG 14	09 69 182 5422	AWG 10, 12	7 for AWG 10 and 6 for AWG 12	09 69 282 5422	AWG 10, 12	7 for AWG 10 and 6 for AWG 12	09 69 182 5423	AWG 8, 10	7 for AWG 8 and 6 for AWG 10	09 69 282 5423	AWG 8, 10	7 for AWG 8 and 6 for AWG 10
Contact Part No.	Gauge	Tool setting																					
09 69 182 5421	AWG 12, 14	5 for AWG 12 and 4 for AWG 14																					
09 69 282 5421	AWG 12, 14	5 for AWG 12 and 4 for AWG 14																					
09 69 182 5422	AWG 10, 12	7 for AWG 10 and 6 for AWG 12																					
09 69 282 5422	AWG 10, 12	7 for AWG 10 and 6 for AWG 12																					
09 69 182 5423	AWG 8, 10	7 for AWG 8 and 6 for AWG 10																					
09 69 282 5423	AWG 8, 10	7 for AWG 8 and 6 for AWG 10																					
Hand crimp tool for <i>coaxial</i> contacts, solder/crimp version ¹⁾	09 99 000 0503																						
Die	09 99 000 0508	 <table><tr><th>Contact Part No.</th><th>Cavity</th></tr><tr><td>09 69 181 x230 09 69 281 x230</td><td>B</td></tr><tr><td>09 69 181 x141 09 69 281 x141</td><td>C</td></tr><tr><td>09 69 181 x140 09 69 281 x140</td><td>B</td></tr></table>	Contact Part No.	Cavity	09 69 181 x230 09 69 281 x230	B	09 69 181 x141 09 69 281 x141	C	09 69 181 x140 09 69 281 x140	B													
Contact Part No.	Cavity																						
09 69 181 x230 09 69 281 x230	B																						
09 69 181 x141 09 69 281 x141	C																						
09 69 181 x140 09 69 281 x140	B																						

¹⁾ Only the outer ferrule is crimped (inner conductor is soldered)

Tools for crimp termination

Identification	Part No.							
Hand crimp tool for coaxial contacts, crimp/crimp version ¹⁾ , suitable for inner contact	09 99 000 0501							
Inner contact die	09 99 000 0507	<table><tr><th>Contact Part No.</th></tr><tr><td>09 69 182 x140</td></tr><tr><td>09 69 282 x140</td></tr><tr><td>09 69 182 x230</td></tr><tr><td>09 69 282 x230</td></tr></table>	Contact Part No.	09 69 182 x140	09 69 282 x140	09 69 182 x230	09 69 282 x230	
Contact Part No.								
09 69 182 x140								
09 69 282 x140								
09 69 182 x230								
09 69 282 x230								
Hand crimp tool for coaxial contacts, crimp/crimp version ¹⁾ , suitable for outer fer- rule	09 99 000 0503							
Outer contact die	09 99 000 0508	<table><tr><th>Contact Part No.</th><th>Cavity</th></tr><tr><td>09 69 182 x140 09 69 282 x140</td><td>B</td></tr><tr><td>09 69 182 x230 09 69 282 x230</td><td>B</td></tr></table>	Contact Part No.	Cavity	09 69 182 x140 09 69 282 x140	B	09 69 182 x230 09 69 282 x230	B
Contact Part No.	Cavity							
09 69 182 x140 09 69 282 x140	B							
09 69 182 x230 09 69 282 x230	B							
Insertion and extraction tool for signal contacts	09 99 000 0511							
Extraction tool for coaxial, power and high voltage contacts	09 99 000 0512							

¹⁾ Both inner and outer conductor are crimped

1. Strip the wire.

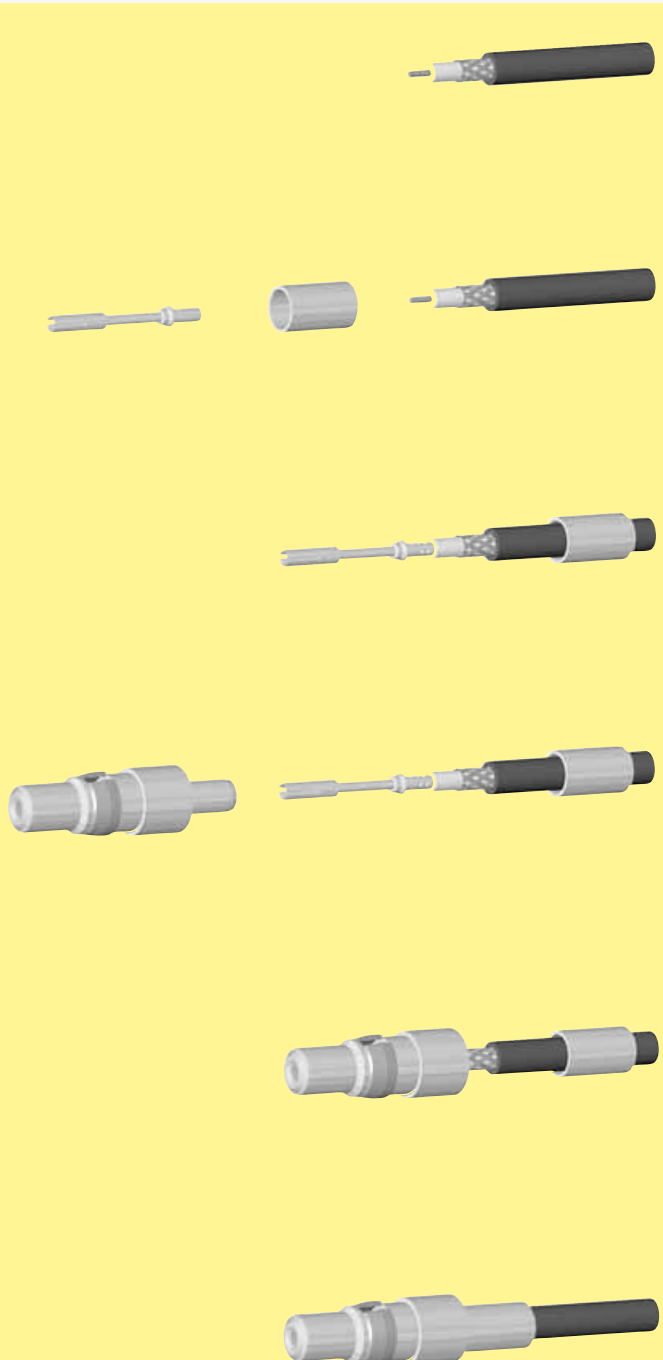
2. Attach the sleeve and inner conductor.

3. Crimp the inner conductor.

4. Snap the inner conductor into the contact.

5. Tap the shield on.

6. Slide the sleeve forwards and crimp.



Tooling for IDC technology

Page

har-link®	32.02
har-mik®	32.02
D-Sub – S	32.07
SEK	32.08

Tools for insulation displacement termination

Identification	Part No.	Drawing	Dimensions [mm]
Cable aligner	27 79 000 0001		
Head and table	27 79 000 0002		
Crimping hand tool	27 99 000 0001		

Tools for insulation displacement termination

Tools

- A comprehensive range of high density Input/Output and Intra-Cabinet connectors is only useful if supported by adequate and efficient termination tooling.
- HARTING has therefore designed a range of tools to offer the most efficient processing solution to satisfy a customer's manufacturing demand:
 - Small to medium size production volume.
Managed with hand tool or semi-automatic tool.
 - Medium to large size production volume managed with highly efficient automatic machines.




Semi-automatic machine CAT 60

Tools for insulation displacement termination for Pin and socket and Bellows range

Selection chart for semi-automatic assembly machine CAT 60

for connector	Semi automatic machine	Support plates	Adaptator	Head and table	Hand press
Male Pin and socket 60 03 ... 5200 60 03 ... 5210 60 03 ... 5220	60 99 000 0003	60 99 000 0004	60 99 ... 0005	60 99 000 0010	60 99 000 0007
Female Bellows 60 13 ... 5100			60 99 ... 0014	60 99 000 0015	
Male Bellows 60 13 ... 5200		60 99 000 0012	60 99 ... 0013	60 99 000 0016	

Number of contacts

Tools for insulation displacement termination for Pin and socket and Bellows range

Selection chart for hand assembly

for connector	Hand cable aligner	Head and table	Hand press
Male Pin and socket 60 03 ... 5200 60 03 ... 5210 60 03 ... 5220	60 99 000 0011	60 99 000 0010	60 99 000 0007
Female Bellows 60 13 ... 5100		60 99 000 0015	
Male Bellows 60 13 ... 5200	60 99 000 0017	60 99 000 0016	

Number of contacts

Tools for insulation displacement termination

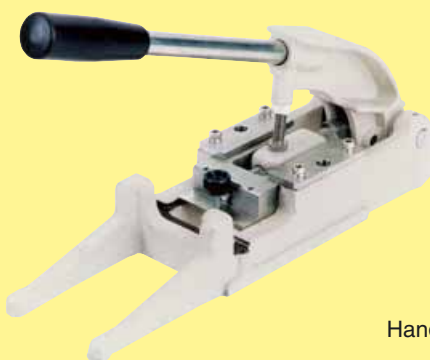
Identification	Part No	
Semi-automatic machine CAT 60	60 99 000 0003	CAT 60
Support plates for Pin and socket and female Bellows connector	60 99 000 0004	Support plates
Support plates for male Bellows connector	60 99 000 0012	
Adaptor for male Pin and socket connector	60 99 ... 0005	
Adaptor for female Bellows connector	60 99 ... 0014	Adaptator
Adaptor for male Bellows connector	60 99 ... 0013	

Tooling

IDC

Number of contacts

Tools for insulation displacement termination

Identification	Part No	
Hand press	60 99 000 0007	 Hand press
Head and table for male Pin and socket connector	60 99 000 0010	
Head and table for female Bellows connector	60 99 000 0015	
Head and table for male Bellows connector	60 99 000 0016	 Head Table
Hand cable aligner for Pin and socket and female Bellows connector	60 99 000 0011	
Hand cable aligner for male Bellows connector	60 99 000 0017	

Tools for insulation displacement termination

Identification	Part No.	Drawing	Dimensions in mm
Bench press for termination of insulation displacement connectors	09 99 000 0114		
Base plate for termination of flat cables	60 99 000 0034		
Cable cutter for flat cables	09 99 000 0116		
Spare parts Blade Cutting plate	09 99 000 0179 09 99 000 0180		

Tools for insulation displacement termination

Identification	Part No.	Drawing	Dimensions in mm
Bench press for termination of insulation displacement connectors	09 99 000 0114	 	
Base plate for termination of flat cables	09 99 000 0135		
Hand tool with base plates (included in tool kit) for termination of insulation displacement connectors	09 99 000 0149	 	
Cable cutter for flat cables	09 99 000 0116		
Spare parts Blade Cutting plate	09 99 000 0179 09 99 000 0180		

Tools for insulation displacement termination

Identification	Part No.	Drawing	Dimensions in mm
Bench press for termination of insulation displacement connectors	09 99 000 0114		
Base plate for termination of flat cables			
suitable for ...			
female	09 99 000 0115		
DIP	09 99 000 0134		
Pcb, 2 rows	09 99 000 0131		
Pcb, 4 rows	09 99 000 0130		
DIN 41 612	09 99 000 0150		
Hand tool with base plates (included in tool kit) for termination of insulation displacement connectors			
suitable for ...			
female	09 99 000 0149		
DIP			
Pcb, 2 rows			
DIN 41 612			
Cable cutter for flat cables	09 99 000 0116		
Spare parts			
Blade	09 99 000 0179		
Cutting plate	09 99 000 0180		



Cables

Page

harlink®	40.02
harmik®	40.02
D-Sub – S	40.04
SEK	40.05

Cables for insulation displacement termination

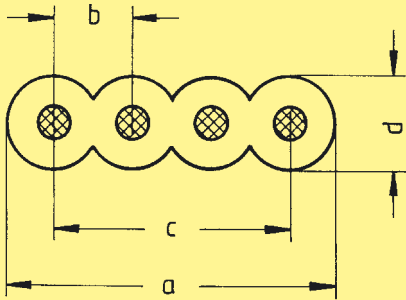
Identification	No. of pairs	Part No.
Twisted pair cable with braid shield AWG 28 Length per reel: 100 m	5	60 90 005 6003
	10	60 90 010 6003
	13	60 90 013 6003
	14	60 90 014 6003
	18	60 90 018 6003
	20	60 90 020 6003
	25	60 90 025 6003
	34	60 90 034 6003
	40	60 90 040 6003
	48	60 90 048 6003
	50	60 90 050 6003

Drawing	No. of pairs	Outside diameter		Dimensions in mm
		Nominal	Max	
	5	5.4	5.6	
	10	6.2	6.5	
	13	6.5	6.8	
	14	6.5	6.8	
	18	7.4	7.7	
	20	7.7	8.2	
	25	8.2	8.5	
	34	8.7	9.0	
	40	9.9	10.4	
	48	10.1	10.6	
	50	13.0	13.5	

Twisted pair Separator Shield Jacket PVC

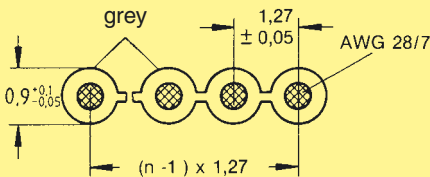
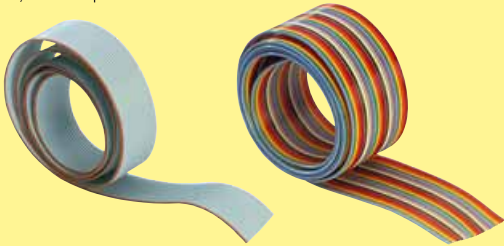
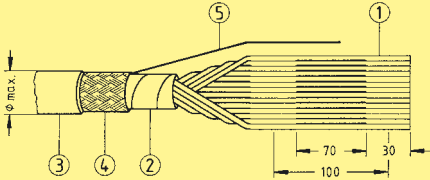
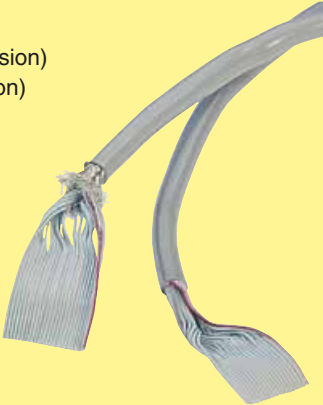
Technical characteristics			
Number of pairs	5, 10, 13, 14, 18, 20, 25, 34, 40, 48, 50	Propagation velocity	60 %
Voltage rating	30 V (style UL 2789)	Temperature range	– 20 °C ... + 105 °C
Maximum conductor resistance (20 °C)	233 Ω/km	Cable materials	
Minimum insulation resistance (20 °C)	1 MΩ/km		
Nominal differential impedance (TDR)	85 Ω		
Nominal differential capacitance (1 kHz)	110 pF/m		
		Conductor	7 x 0.13 mm stranded tinned copper
		Insulation (except 50 pairs) (for 50 pairs)	PVC Ø 0.62 mm PVC Ø 0.65 – 0.80 mm
		Shield	Tinned copper braid, covering ≥ 80 %
		Jacket	PVC

Cables for insulation displacement termination

Identification	No. of wires	Part No.																
Flat cable for IDC connector Pitch 0.635 mm AWG 30 Length per reel: 100 ft 30.48 m	50 68	PVC	FEP															
		60 90 050 6008 60 90 068 6008	60 90 050 6007* 60 90 068 6007*															
Drawing	 <table><tr><td></td><td>a ± 0.25</td><td>b ± 0.05</td><td>c ± 0.2</td><td>d ± 0.05</td></tr><tr><td>50</td><td>31.75</td><td>0.635</td><td>31.12</td><td>0.68</td></tr><tr><td>68</td><td>43.20</td><td>0.635</td><td>42.55</td><td>0.68</td></tr></table> The tolerance b is not cumulative				a ± 0.25	b ± 0.05	c ± 0.2	d ± 0.05	50	31.75	0.635	31.12	0.68	68	43.20	0.635	42.55	0.68
		a ± 0.25	b ± 0.05	c ± 0.2	d ± 0.05													
50	31.75	0.635	31.12	0.68														
68	43.20	0.635	42.55	0.68														
Technical characteristics		PVC	FEP															
Number of wires		50, 68	50, 68															
Voltage rating		150 V	150 V															
Impedance		75 Ω	90 Ω (single end) 130 Ω (differential)															
Nominal differential capacitance (1 kHz)		90 pF/m	48 pF/m															
Pitch		0.635 mm	0.635 mm															
UL style		2 678	20 726															
Temperature range		− 30 °C ... + 105 °C	− 30 °C ... + 150 °C															
Materials																		
Conductor		7 x 0.102 mm regular tinning or Z-bonding AWG 30	Silver plated copper AWG 30 Solid bare copper															
Insulation		PVC	FEP															

* Not kept in stock

Cables for insulation displacement termination

Identification		No. of contacts	Part No.	Drawing	Dimensions in mm																																			
Flat cable AWG 28/7																																								
		9	09 18 009 700 ☐ ¹⁾	Wire (tinned) _____ Cu Gauge _____ AWG 28/7 0.089 mm ² Conductor resistance _____ 225 mΩ/m Capacity _____ 60 pF/m Characteristic impedance _____ 110 Ω Signal delay _____ 5 ns/m Insulation material _____ PVC Temperature rating _____ -30 °C ... + 105 °C Insulation resistance _____ > 50 MΩ/km																																				
		15	09 18 015 700 ☐ ¹⁾																																					
		25	09 18 025 700 ☐																																					
		37	09 18 037 700 ☐																																					
grey	50 m	1																																						
grey	150 m	4																																						
colour coded ²⁾	30.48 m	5																																						
Round flat cable AWG 28/7																																								
		9	09 18 009 70 ☐	Length per reel 30.48 m (100 feet) or 152.40 m (500 feet) ① Flat cable, grey AWG 28/7 ② Barrier tape ③ Outer insulation PVC, grey ④ Tinned copper screen (shielded version) ⑤ Drain Wire AWG 28 (shielded version)																																				
		15	09 18 015 70 ☐																																					
		25	09 18 025 70 ☐																																					
		37	09 18 037 70 ☐																																					
with screening	30 m	07																																						
without screening	30 m	08																																						
with screening	150 m	10																																						
without screening	150 m	11																																						
				<table><tr><th rowspan="2">Part No.</th><th colspan="4">No. of contacts</th><th colspan="4">Ø max.</th></tr><tr><th>9</th><th>15</th><th>25</th><th>37</th><th>9</th><th>15</th><th>25</th><th>37</th></tr><tr><td>09 18 ... 7007/7010</td><td>8.2</td><td>9.1</td><td>11.5</td><td>12.8</td><td></td><td></td><td></td><td></td></tr><tr><td>09 18 ... 7008/7011</td><td>7.7</td><td>8.6</td><td>11.0</td><td>12.2</td><td></td><td></td><td></td><td></td></tr></table>	Part No.	No. of contacts				Ø max.				9	15	25	37	9	15	25	37	09 18 ... 7007/7010	8.2	9.1	11.5	12.8					09 18 ... 7008/7011	7.7	8.6	11.0	12.2					
Part No.	No. of contacts					Ø max.																																		
	9	15	25	37	9	15	25	37																																
09 18 ... 7007/7010	8.2	9.1	11.5	12.8																																				
09 18 ... 7008/7011	7.7	8.6	11.0	12.2																																				

¹⁾ Not available in colour coded version²⁾ For dimensions and characteristics see page 40.05

Cables for insulation displacement termination

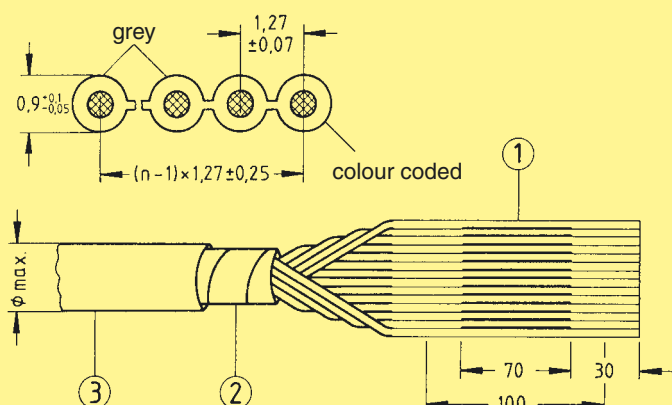
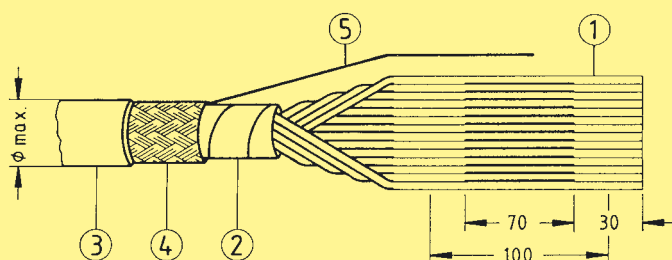
Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
Flat cable grey style UL 2651 IEC 918 NFC 93525				
	6	09 18 006 700		
	9	09 18 009 700		
	10	09 18 010 700		
	14	09 18 014 700		
	15	09 18 015 700		
	16	09 18 016 700		
	20	09 18 020 700		
	24	09 18 024 700		
	25	09 18 025 700		
	26	09 18 026 700		
	28	09 18 028 700		
	34	09 18 034 700		
	37	09 18 037 700		
	40	09 18 040 700		
	50	09 18 050 700		
	60	09 18 060 700		
	64	09 18 064 700		
Length per reel				
50 m (164 feet)	1			
150 m (492 feet)	4			
			Wire (tinned) _____ Cu Gauge _____ AWG 28/7 0.089 mm ² Conductor resistance _____ 225 mΩ/m Capacity _____ 60 pF/m Characteristic impedance _____ 110 Ω Signal delay _____ 5 ns/m Insulation material _____ PVC Temperature rating _____ -30 °C ... + 105 °C Insulation resistance _____ > 50 MΩ/km	
Flat cable colour coded				
Length per reel				
30.48 m (100 feet)				
style UL 2884 IEC 918				
	10	09 18 010 7005		
	14	09 18 014 7005		
	16	09 18 016 7005		
	20	09 18 020 7005		
	24	09 18 024 7005		
	25	09 18 025 7005		
	26	09 18 026 7005		
	34	09 18 034 7005		
	37	09 18 037 7005		
	40	09 18 040 7005		
	50	09 18 050 7005		
	60	09 18 060 7005		
	64	09 18 064 7005		
			Wire (tinned) _____ Cu Gauge _____ AWG 28/7 0.089 mm ² Conductor resistance _____ 230 mΩ/m Capacity _____ 49 pF/m Characteristic impedance _____ 105 Ω Signal delay _____ 4.6 ns/m Insulation material _____ PVC Temperature rating _____ -20 °C ... + 105 °C Insulation resistance _____ 10 ³ MΩ/km	Colour code sequence (in 10 steps) brown, red, orange, yellow, green, blue, violet, grey, white, black

Important: always store reels vertically

Cables for insulation displacement termination

Identification	No. of contacts	Part No.	Drawing	Dimensions in mm
Flat cable twisted pair Length per reel 30.48 m (100 feet) style UL 2693	10 14 16 20 26 34 40 50 60 64	09 18 010 7006 09 18 014 7006 09 18 016 7006 09 18 020 7006 09 18 026 7006 09 18 034 7006 09 18 040 7006 09 18 050 7006 09 18 060 7006 09 18 064 7006		
Round flat cable with screening style UL 2464 Length per reel 30 m 07 150 m 10*	9 10 14 15 16 20 25 26 34 37 40 50 60 64	09 18 009 70 09 18 010 70 09 18 014 70 09 18 015 70 09 18 016 70 09 18 020 70 09 18 025 70 09 18 026 70 09 18 034 70 09 18 037 70 09 18 040 70 09 18 050 70 09 18 060 70 09 18 064 70	Ø max. 8.2 8.2 9.1 9.1 9.1 10.5 11.5 11.5 12.8 12.8 14.1 14.4 15.3 16.2	
without screening style UL 2464 Length per reel 30 m 08 150 m 11*	9 10 14 15 16 20 25 26 34 37 40 50 60 64	09 18 009 70 09 18 010 70 09 18 014 70 09 18 015 70 09 18 016 70 09 18 020 70 09 18 025 70 09 18 026 70 09 18 034 70 09 18 037 70 09 18 040 70 09 18 050 70 09 18 060 70 09 18 064 70	7.7 7.7 8.6 8.6 8.6 10 11 11 12.2 12.2 13.5 13.8 14.7 15.6	

	Flat cable twisted pair	Round flat cable with screening	without screening
Wire (tinned)	Cu		
Gauge	AWG 28/7 0.089 mm²		
Conductor resistance	230 mΩ/m	225 mΩ/m	
Capacity	49 pF/m	95 pF/m	65 pF/m
Characteristic impedance	105 Ω	73 Ω	90 Ω
Signal delay	4.6 ns/m	5.0 ns/m	
Insulation material	PVC	PVC	
Temperature rating	-20 °C ... +105 °C	-20 °C ... +80 °C	
Insulation resistance	10³ MΩ/km	> 50 MΩ/km	



- ① Flat cable, grey AWG 28/7
- ② Barrier tape
- ③ Outer insulation PVC, grey
- ④ Tinned copper screen (shielded version)
- ⑤ Drain Wire AWG 28 (shielded version)



* Not normally kept in stock
Important: always store reels vertically

List of part numbers



Part No.	Page	Part No.	Page	Part No.	Page	Part No.	Page	Part No.	Page	Part No.	Page
09 02 264 6828	09.29	09 18 014 7007	40.06	09 18 034 7001	40.05	09 18 126 9621	09.23	09 18 506 6911	09.06	09 18 510 5904	09.08
09 02 264 7828	09.29	09 18 014 7008	40.06	09 18 034 7004	40.05			09 18 506 6912	09.08	09 18 510 5906	09.16
		09 18 014 7010	40.06	09 18 034 7005	40.05	09 18 134 9621	09.23	09 18 506 6913	09.06	09 18 510 5907	09.16
				09 18 034 7006	40.06			09 18 506 6914	09.08	09 18 510 5911	09.06
		09 18 014 7011	40.06	09 18 034 7007	40.06	09 18 140 9621	09.23	09 18 506 6916	09.16	09 18 510 5912	09.08
09 03 264 6828	09.29	09 18 015 7001	40.04	09 18 034 7008	40.06	09 18 150 9621	09.23	09 18 506 6917	09.16	09 18 510 5913	09.06
09 03 264 7828	09.29	09 18 015 7001	40.05	09 18 034 7010	40.06			09 18 506 6921	09.06	09 18 510 5914	09.08
		09 18 015 7004	40.04	09 18 034 7011	40.06	09 18 160 9621	09.23	09 18 506 6922	09.08	09 18 510 5916	09.16
		09 18 015 7004	40.05					09 18 506 6923	09.06	09 18 510 5917	09.16
		09 18 015 7005	40.04	09 18 037 7001	40.04	09 18 164 9621	09.23	09 18 506 6924	09.08	09 18 510 5921	09.06
09 17 014 9622	09.27	09 18 015 7007	40.04	09 18 037 7001	40.05			09 18 506 6926	09.16	09 18 510 5922	09.08
09 17 016 9622	09.27	09 18 015 7007	40.06	09 18 037 7004	40.04	09 18 500 9902	09.14	09 18 506 6927	09.16	09 18 510 5923	09.06
		09 18 015 7008	40.04	09 18 037 7004	40.05	09 18 500 9902	09.18	09 18 506 6953	09.10	09 18 510 5924	09.08
09 17 024 9622	09.27	09 18 015 7008	40.06	09 18 037 7005	40.04	09 18 500 9902	21.26	09 18 506 6963	09.10	09 18 510 5926	09.16
		09 18 015 7010	40.04	09 18 037 7005	40.05			09 18 506 6973	09.10	09 18 510 5927	09.16
09 17 028 9622	09.27	09 18 015 7010	40.06	09 18 037 7007	40.04	09 18 506 5321	09.12	09 18 506 7321	09.12	09 18 510 5953	09.10
		09 18 015 7011	40.04	09 18 037 7007	40.06	09 18 506 5322	09.13	09 18 506 7322	09.13	09 18 510 5963	09.10
09 17 040 9622	09.27	09 18 015 7011	40.06	09 18 037 7008	40.04	09 18 506 5323	09.12	09 18 506 7323	09.12	09 18 510 5973	09.10
				09 18 037 7008	40.06	09 18 506 5324	09.13	09 18 506 7324	09.13	09 18 510 6321	09.12
		09 18 016 7001	40.05	09 18 037 7010	40.04	09 18 506 5329	20.15	09 18 506 7329	20.15	09 18 510 6322	09.13
		09 18 016 7004	40.05	09 18 037 7010	40.06	09 18 506 5803	09.20	09 18 506 7803	09.20	09 18 510 6323	09.12
		09 18 016 7005	40.05	09 18 037 7011	40.04	09 18 506 5804	09.20	09 18 506 7804	09.20	09 18 510 6324	09.13
09 18 000 9901	09.14	09 18 016 7006	40.06	09 18 037 7011	40.06	09 18 506 5805	09.20	09 18 506 7805	09.20	09 18 510 6329	20.15
09 18 000 9901	09.18	09 18 016 7007	40.06			09 18 506 5806	09.20	09 18 506 7806	09.20	09 18 510 6803	09.20
09 18 000 9901	09.21	09 18 016 7008	40.06	09 18 040 7001	40.05	09 18 506 5813	09.20	09 18 506 7813	09.20	09 18 510 6804	09.20
09 18 000 9901	21.26	09 18 016 7010	40.06	09 18 040 7004	40.05	09 18 506 5814	09.20	09 18 506 7814	09.20	09 18 510 6805	09.20
09 18 000 9903	09.14	09 18 016 7010	40.06	09 18 040 7005	40.05	09 18 506 5815	09.20	09 18 506 7815	09.20	09 18 510 6806	09.20
09 18 000 9903	09.18	09 18 016 7011	40.06	09 18 040 7006	40.06	09 18 506 5901	09.06	09 18 506 7816	09.20	09 18 510 6813	09.20
09 18 000 9904	09.14			09 18 040 7007	40.06	09 18 506 5902	09.08	09 18 506 7901	09.06	09 18 510 6814	09.20
09 18 000 9904	09.18	09 18 020 7001	40.05	09 18 040 7008	40.06	09 18 506 5903	09.06	09 18 506 7902	09.08	09 18 510 6815	09.20
09 18 000 9905	09.12	09 18 020 7004	40.05	09 18 040 7010	40.06	09 18 506 5904	09.08	09 18 506 7903	09.06	09 18 510 6816	09.20
09 18 000 9905	09.13	09 18 020 7005	40.05	09 18 040 7011	40.06	09 18 506 5906	09.16	09 18 506 7904	09.08	09 18 510 6901	09.06
09 18 000 9905	09.21	09 18 020 7006	40.06			09 18 506 5907	09.16	09 18 506 7906	09.16	09 18 510 6902	09.08
09 18 000 9905	21.24	09 18 020 7007	40.06	09 18 050 7001	40.05	09 18 506 5911	09.06	09 18 506 7907	09.16	09 18 510 6903	09.06
09 18 000 9905	21.25	09 18 020 7008	40.06	09 18 050 7004	40.05	09 18 506 5912	09.08	09 18 506 7911	09.06	09 18 510 6904	09.08
09 18 000 9906	09.14	09 18 020 7010	40.06	09 18 050 7005	40.05	09 18 506 5913	09.06	09 18 506 7912	09.08	09 18 510 6906	09.16
09 18 000 9906	09.18	09 18 020 7011	40.06	09 18 050 7006	40.06	09 18 506 5914	09.08	09 18 506 7913	09.06	09 18 510 6907	09.16
09 18 000 9906	21.26			09 18 050 7007	40.06	09 18 506 5916	09.16	09 18 506 7914	09.08	09 18 510 6911	09.06
09 18 006 7001	40.05	09 18 024 7001	40.05	09 18 050 7008	40.06	09 18 506 5917	09.16	09 18 506 7916	09.16	09 18 510 6912	09.08
09 18 006 7004	40.05	09 18 024 7004	40.05	09 18 050 7010	40.06	09 18 506 5921	09.06	09 18 506 7917	09.16	09 18 510 6913	09.06
		09 18 024 7005	40.05	09 18 050 7011	40.06	09 18 506 5922	09.08	09 18 506 7921	09.06	09 18 510 6914	09.08
09 18 009 7001	40.04			09 18 060 7001	40.05	09 18 506 5923	09.06	09 18 506 7922	09.08	09 18 510 6916	09.16
09 18 009 7001	40.05	09 18 025 7001	40.04	09 18 060 7004	40.05	09 18 506 5924	09.08	09 18 506 7923	09.06	09 18 510 6917	09.16
09 18 009 7004	40.04	09 18 025 7001	40.05	09 18 060 7005	40.05	09 18 506 5926	09.16	09 18 506 7924	09.08	09 18 510 6921	09.06
09 18 009 7004	40.05	09 18 025 7004	40.04	09 18 060 7006	40.06	09 18 506 5927	09.16	09 18 506 7926	09.16	09 18 510 6922	09.08
09 18 009 7005	40.04	09 18 025 7005	40.04	09 18 060 7007	40.06	09 18 506 5953	09.10	09 18 506 7927	09.16	09 18 510 6923	09.06
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09 18 009 7007	40.06	09 18 025 7007	40.04	09 18 060 7010	40.06	09 18 506 5973	09.10	09 18 506 7963	09.10	09 18 510 6926	09.16
09 18 009 7008	40.04	09 18 025 7007	40.06	09 18 060 7011	40.06	09 18 506 6321	09.12	09 18 506 7973	09.10	09 18 510 6927	09.16
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		09 18 025 7011	40.06	09 18 064 7007	40.06	09 18 506 6804	09.20	09 18 510 5324	09.13	09 18 510 7323	09.12
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09 18 014 7005	40.05	09 18 028 7004	40.05	09 18 120 9621	09.23	09 18 506 6907	09.16	09 18 510 5903	09.06	09 18 510 7902	09.08
09 18 014 7006	40.06										

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09 18 514 5323	09.12	09 18 514 7323	09.12	09 18 516 5973	09.10	09 18 516 7963	09.10	09 18 520 6926	09.16	09 18 526 5917	09.16
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09 18 514 5953	09.10	09 18 514 7927	09.16	09 18 516 6923	09.06	09 18 520 5917	09.16	09 18 520 7921	09.06	09 18 526 6907	09.16
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09 18 514 5973	09.10	09 18 514 7963	09.10	09 18 516 6926	09.16	09 18 520 5922	09.08	09 18 520 7924	09.08	09 18 526 6912	09.08
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09 18 514 6804	09.20	09 18 516 5324	09.13	09 18 516 7323	09.12	09 18 520 5973	09.10			09 18 526 6963	09.10
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09 18 514 6815	09.20	09 18 516 5806	09.20	09 18 516 7805	09.20	09 18 520 6329	20.15				

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09 18 560 6912	09.08	09 18 564 5906	09.16	09 18 564 7904	09.08	09 19 506 6921	21.18	09 19 510 7323	21.24	09 19 514 7914	21.20
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09 18 560 6916	09.16	09 18 564 5912	09.08	09 18 564 7911	09.06	09 19 506 6924	21.20	09 19 510 7902	21.20	09 19 514 7923	21.18
09 18 560 6917	09.16	09 18 564 5913	09.06	09 18 564 7912	09.08	09 19 506 6953	21.22	09 19 510 7903	21.18	09 19 514 7924	21.20
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09 18 560 7973	09.10	09 18 564 6927	09.16	09 19 506 5914	21.20	09 19 510 6322	21.25	09 19 514 6913	21.18	09 19 516 7321	21.24
09 18 560 9002	09.21	09 18 564 6953	09.10	09 19 506 5921	21.18	09 19 510 6323	21.24	09 19 514 6914	21.20	09 19 516 7322	21.25
		09 18 564 6963	09.10	09 19 506 5922	21.20	09 19 510 6324	21.25	09 19 514 6921	21.18	09 19 516 7323	21.24
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09 18 564 5902	09.08	09 18 564 7901	09.06	09 19 506 6912	21.20	09 19 510 6973	21.22	09 19 514 7911	21.18	09 19 516 7963	21.22
09 18 564 5903	09.06	09 18 564 7902	09.08	09 19 506 6913	21.18	09 19 510 7321	21.24	09 19 514 7912	21.20	09 19 516 7973	21.22

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09 19 564 7973	21.22	09 56 262 7812	03.06	09 56 552 7612	03.06	09 64 114 7228	05.08	09 64 124 7220	05.08	09 64 214 7212	05.08
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09 56 000 8167	03.04	09 56 351 5512	03.10	09 56 561 7712	03.10	09 64 114 7235	05.08	09 64 124 7227	05.08	09 64 214 7219	05.08
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		09 56 461 5713	03.10	09 64 112 7247	05.06	09 64 122 7235	05.06	09 64 212 7216	05.06	09 64 221 7238	05.10
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09 56 251 5512	03.10	09 56 461 7712	03.10			09 64 122 7237	05.06	09 64 212 7218	05.06	09 64 221 7247	05.10
09 56 251 5513	03.10	09 56 461 7713	03.10	09 64 114 7210	05.08	09 64 122 7238	05.06	09 64 212 7220	05.06	09 64 221 7248	05.10
09 56 251 7500	03.09			09 64 114 7211	05.08	09 64 122 7240	05.06	09 64 212 7225	05.06		
09 56 251 7512	03.10	09 56 462 5812	03.06	09 64 114 7212	05.08	09 64 122 7245	05.06	09 64 212 7226	05.06	09 64 222 7210	05.06
09 56 251 7513	03.10	09 56 462 5813	03.06	09 64 114 7213	05.08	09 64 122 7246	05.06	09 64 212 7227	05.06	09 64 222 7215	05.06
		09 56 462 7812	03.06	09 64 114 7214	05.08	09 64 122 7247	05.06	09 64 212 7228	05.06	09 64 222 7216	05.06
09 56 252 5612	03.06	09 56 462 7813	03.06	09 64 114 7215	05.08	09 64 122 7248	05.06	09 64 212 7230	05.06	09 64 222 7217	05.06
09 56 252 5613	03.06			09 64 114 7216	05.08			09 64 212 7235	05.06	09 64 222 7218	05.06
09 56 252 7612	03.06	09 56 500 4701	03.03	09 64 114 7217	05.08	09 64 124 7210	05.08	09 64 212 7236	05.06	09 64 222 7220	05.06
09 56 252 7613	03.06	09 56 500 5601	03.03	09 64 114 7218	05.08	09 64 124 7211	05.08	09 64 212 7237	05.06	09 64 222 7225	05.06
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09 56 261 5712	03.10	09 56 551 5512	03.10	09 64 114 7221	05.08	09 64 124 7214	05.08	09 64 212 7245	05.06	09 64 222 7228	05.06
09 56 261 5713	03.10	09 56 551 5513	03.10	09 64 114 7222	05.08	09 64 124 7215	05.08	09 64 212 7246	05.06	09 64 222 7230	05.06
09 56 261 7700	03.09	09 56 551 7500	03.09	09 64 114 7223	05.08	09 64 124 7216	05.08	09 64 212 7247	05.06	09 64 222 7235	05.06
09 56 261 7712	03.10	09 56 551 7512	03.10	09 64 114 7224	05.08	09 64 124 7217	05.08	09 64 212 7248	05.06	09 64 222 7236	05.06
09 56 261 7713	03.10	09 56 551 7513	03.10	09 64 114 7225	05.08						

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09 64 222 7238	05.06	09 64 312 7225	05.06	09 64 321 7247	05.10	09 64 411 7217	05.10	09 64 414 7245	05.08	09 64 424 7237	05.08
09 64 222 7240	05.06	09 64 312 7226	05.06	09 64 321 7248	05.10	09 64 411 7218	05.10	09 64 414 7246	05.08	09 64 424 7238	05.08
09 64 222 7245	05.06	09 64 312 7227	05.06			09 64 411 7220	05.10	09 64 414 7247	05.08	09 64 424 7239	05.08
09 64 222 7246	05.06	09 64 312 7228	05.06			09 64 411 7227	05.10	09 64 414 7248	05.08	09 64 424 7240	05.08
09 64 222 7247	05.06	09 64 312 7230	05.06	09 64 322 7210	05.06	09 64 411 7228	05.10	09 64 414 7249	05.08	09 64 424 7241	05.08
09 64 222 7248	05.06	09 64 312 7235	05.06	09 64 322 7215	05.06	09 64 411 7230	05.10	09 64 414 7414	05.08	09 64 424 7242	05.08
		09 64 312 7236	05.06	09 64 322 7216	05.06	09 64 411 7237	05.10			09 64 424 7243	05.08
09 64 224 7210	05.08	09 64 312 7237	05.06	09 64 322 7217	05.06	09 64 411 7238	05.10	09 64 421 7210	05.10	09 64 424 7244	05.08
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09 64 224 7212	05.08	09 64 312 7240	05.06	09 64 322 7220	05.06	09 64 411 7247	05.10	09 64 421 7218	05.10	09 64 424 7246	05.08
09 64 224 7213	05.08	09 64 312 7245	05.06	09 64 322 7225	05.06	09 64 411 7248	05.10	09 64 421 7220	05.10	09 64 424 7247	05.08
09 64 224 7214	05.08	09 64 312 7246	05.06	09 64 322 7226	05.06			09 64 421 7227	05.10	09 64 424 7248	05.08
09 64 224 7215	05.08	09 64 312 7247	05.06	09 64 322 7227	05.06	09 64 412 7210	05.06	09 64 421 7228	05.10	09 64 424 7249	05.08
09 64 224 7216	05.08	09 64 312 7248	05.06	09 64 322 7228	05.06	09 64 412 7215	05.06	09 64 421 7230	05.10	09 64 424 7242	05.08
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09 64 224 7218	05.08			09 64 322 7235	05.06	09 64 412 7217	05.06	09 64 421 7238	05.10		
09 64 224 7219	05.08	09 64 314 7210	05.08	09 64 322 7236	05.06	09 64 412 7218	05.06	09 64 421 7240	05.10	09 65 121 6700	02.06
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09 64 224 7221	05.08	09 64 314 7212	05.08	09 64 322 7238	05.06	09 64 412 7225	05.06	09 64 421 7248	05.10	09 65 121 6702	02.06
09 64 224 7222	05.08	09 64 314 7213	05.08	09 64 322 7240	05.06	09 64 412 7226	05.06			09 65 121 6703	02.06
09 64 224 7223	05.08	09 64 314 7215	05.08	09 64 322 7245	05.06	09 64 412 7227	05.06	09 64 422 7210	05.06	09 65 121 6703	02.06
09 64 224 7224	05.08	09 64 314 7216	05.08	09 64 322 7246	05.06	09 64 412 7228	05.06	09 64 422 7215	05.06	09 65 121 7700	02.06
09 64 224 7225	05.08	09 64 314 7217	05.08	09 64 322 7247	05.06	09 64 412 7230	05.06	09 64 422 7216	05.06	09 65 121 7701	02.06
09 64 224 7226	05.08	09 64 314 7218	05.08	09 64 322 7248	05.06	09 64 412 7235	05.06	09 64 422 7217	05.06	09 65 121 7702	02.06
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09 64 224 7228	05.08	09 64 314 7220	05.08			09 64 412 7237	05.06	09 64 422 7220	05.06	09 65 122 6800	02.16
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09 64 224 7239	05.08	09 64 314 7231	05.08	09 64 324 7220	05.08	09 64 414 7213	05.08	09 64 422 7245	05.06	09 65 123 6802	02.16
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09 64 224 7244	05.08	09 64 314 7236	05.08	09 64 324 7226	05.08	09 64 414 7219	05.08	09 64 424 7210	05.08	09 65 123 7803	02.16
09 64 224 7245	05.08	09 64 314 7237	05.08	09 64 324 7227	05.08	09 64 414 7220	05.08	09 64 424 7211	05.08		
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09 64 224 7248	05.08	09 64 314 7240	05.08	09 64 324 7230	05.08	09 64 414 7223	05.08	09 64 424 7214	05.08	09 65 129 6702	21.10
09 64 224 7249	05.08	09 64 314 7241	05.08	09 64 324 7231	05.08	09 64 414 7224	05.08	09 64 424 7215	05.08	09 65 129 6703	21.10
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09 64 311 7210	05.10	09 64 314 7243	05.08	09 64 324 7233	05.08	09 64 414 7226	05.08	09 64 424 7217	05.08	09 65 129 7701	21.10
09 64 311 7217	05.10	09 64 314 7244	05.08	09 64 324 7234	05.08	09 64 414 7227	05.08	09 64 424 7218	05.08	09 65 129 7702	21.10
09 64 311 7218	05.10	09 64 314 7245	05.08	09 64 324 7235	05.08	09 64 414 7228	05.08	09 64 424 7219	05.08	09 65 129 7703	21.10
09 64 311 7220	05.10	09 64 314 7246	05.08	09 64 324 7236	05.08	09 64 414 7229	05.08	09 64 424 7220	05.08		
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09 64 311 7228	05.10	09 64 314 7248	05.08	09 64 324 7238	05.08	09 64 414 7231	05.08	09 64 424 7222	05.08	09 65 161 6712	02.06
09 64 311 7230	05.10	09 64 314 7249	05.08	09 64 324 7239	05.08	09 64 414 7232	05.08	09 64 424 7223	05.08	09 65 161 6713	02.06
09 64 311 7237	05.10	09 64 314 7314	05.08	09 64 324 7240	05.08	09 64 414 7233	05.08	09 64 424 7225	05.08	09 65 161 7711	02.06
09 64 311 7238	05.10			09 64 324 7241	05.08	09 64 414 7234	05.08	09 64 424 7226	05.08	09 65 161 7712	02.06
09 64 311 7240	05.10	09 64 321 7210	05.10	09 64 324 7242	05.08	09 64 414 7235	05.08	09 64 424 7227	05.08	09 65 161 7713	02.06
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09 64 311 7248	05.10	09 64 321 7218	05.10	09 64 324 7244	05.08	09 64 414 7237	05.08	09 64 424 7229	05.08	09 65 162 6811	02.14
		09 64 321 7220	05.10	09 64 324 7245	05.08	09 64 414 7238	05.08	09 64 424 7230	05.08	09 65 162 6812	02.14
09 64 312 7210	05.06	09 64 321 7227	05.10	09 64 324 7246	05.08	09 64 414 7239	05.08	09 64 424 7231	05.08	09 65 162 6813	02.14
09 64 312 7215	05.06	09 64 321 7228	05.10	09 64 324 7247	05.08	09 64 414 7240	05.08	09 64 424 7232	05.08	09 65 162 6815	02.20
09 64 312 7216	05.06	09 64 321 7230	05.10	09 64 324 7248	05.08	09 64 414 7241	05.08	09 64 424 7233	05.08	09 65 162 6816	02.20
09 64 312 7217	05.06	09 64 321 7237	05.10	09 64 324 7249	05.08	09 64 414 7242	05.08	09 64 424 7234	05.08	09 65 162 6817	02.20
09 64 312 7218	05.06	09 64 321 7238	05.10	09 64 324 7324	05.08	09 64 414 7243	05.08	09 64 424 7235	05.08	09 65 162 7810	02.14

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09 65 162 7812	02.14	09 65 223 7801	02.16	09 65 269 6712	21.10	09 65 363 7811	02.14	09 65 429 7702	21.10	09 66 000 9974	07.02
09 65 162 7813	02.14	09 65 223 7802	02.16	09 65 269 6713	21.10	09 65 363 7812	02.14	09 65 429 7703	21.10		
09 65 162 7815	02.20	09 65 223 7803	02.16	09 65 269 7711	21.10	09 65 363 7813	02.14			09 66 108 0000	02.32
09 65 162 7816	02.20			09 65 269 7712	21.10			09 65 461 6711	02.06	09 66 108 0001	02.32
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09 65 163 6810	02.14	09 65 229 6702	21.10	09 65 321 6700	02.06	09 65 366 6812	21.12	09 65 461 7711	02.06	09 66 111 6501	02.06
09 65 163 6811	02.14	09 65 229 6703	21.10	09 65 321 6701	02.06	09 65 366 6813	21.12	09 65 461 7712	02.06	09 66 111 6502	02.06
09 65 163 6812	02.14	09 65 229 7700	21.10	09 65 321 6702	02.06	09 65 366 6815	21.14	09 65 461 7713	02.06	09 66 111 6503	02.06
09 65 163 6813	02.14	09 65 229 7701	21.10	09 65 321 6703	02.06	09 65 366 6816	21.14			09 66 111 7500	02.06
09 65 163 7810	02.14	09 65 229 7702	21.10	09 65 321 7700	02.06	09 65 366 6817	21.14			09 66 111 7501	02.06
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09 65 166 6810	21.12	09 65 261 6713	02.06	09 65 322 6800	02.16	09 65 366 7815	21.14	09 65 462 6815	02.20	09 66 112 6601	02.16
09 65 166 6811	21.12	09 65 261 7711	02.06	09 65 322 6801	02.16	09 65 366 7816	21.14	09 65 462 6816	02.20	09 66 112 6602	02.16
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09 65 166 7810	21.12	09 65 262 6812	02.14	09 65 322 7803	02.16	09 65 367 6813	21.12	09 65 462 7813	02.14		
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09 65 166 7812	21.12	09 65 262 6815	02.20	09 65 323 6800	02.16	09 65 367 7811	21.12	09 65 462 7816	02.20	09 66 113 6601	02.16
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09 65 166 7815	21.14	09 65 262 6817	02.20	09 65 323 6802	02.16	09 65 367 7813	21.12			09 66 113 6603	02.16
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09 65 167 7811	21.12	09 65 263 6810	02.14	09 65 329 6702	21.10	09 65 421 6700	02.06			09 66 114 6503	20.12
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09 65 169 6712	21.10	09 65 263 7811	02.14	09 65 329 7703	21.10	09 65 421 7701	02.06	09 65 466 6815	21.14	09 66 114 7500	20.12
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09 65 222 7802	02.16	09 65 267 6812	21.12	09 65 362 7816	02.20			09 65 469 6711	21.10	09 66 118 6503	02.32
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		09 65 267 7810	21.12			09 65 429 6701	21.10	09 65 469 6713	21.10	09 66 118 7502	02.32
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09 65 223 6801	02.16	09 65 267 7812	21.12	09 65 363 6811	02.14	09 65 429 6703	21.10	09 65 469 7712	21.10	09 66 121 6702	02.05
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09 66 121 7702	02.05	09 66 154 6517	20.10	09 66 211 6501	02.06	09 66 222 6802	02.12	09 66 254 7515	20.10	09 66 311 7500	02.06
09 66 121 7703	02.05	09 66 154 7511	20.10	09 66 211 6502	02.06	09 66 222 6803	02.12	09 66 254 7516	20.10	09 66 311 7501	02.06
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09 66 122 6802	02.12	09 66 154 7515	20.10	09 66 211 7501	02.06	09 66 222 7803	02.12	09 66 255 6511	21.10		
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09 66 152 7617	02.20	09 66 163 6812	02.12	09 66 215 7503	21.10	09 66 253 6612	02.14	09 66 263 7813	02.12	09 66 318 7500	02.32
		09 66 163 6813	02.12			09 66 253 6613	02.14			09 66 318 7501	02.32
09 66 153 6610	02.14	09 66 163 7811	02.12	09 66 218 6500	02.32	09 66 253 7610	02.14	09 66 264 6715	20.10	09 66 318 7502	02.32
09 66 153 6611	02.14	09 66 163 7812	02.12	09 66 218 6501	02.32	09 66 253 7611	02.14	09 66 264 6716	20.10		
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09 66 154 6515	20.10	09 66 208 0001	02.32	09 66 221 7703	02.05	09 66 254 7512	20.10	09 66 311 6502	02.06		

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09 66 322 7802	02.12	09 66 354 7516	20.10	09 66 411 7501	02.06	09 66 423 6802	02.12	09 66 456 6616	21.14	09 66 514 6501	20.12
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09 66 323 6803	02.12	09 66 355 6513	21.10	09 66 412 6601	02.16			09 66 456 7613	21.12	09 66 514 7502	20.12
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09 66 354 6512	20.10	09 66 408 0000	02.32	09 66 421 7703	02.05	09 66 455 7512	21.10	09 66 513 6601	02.16	09 66 562 6812	02.12
09 66 354 6513	20.10	09 66 408 0001	02.32			09 66 455 7513	21.10	09 66 513 6602	02.16	09 66 562 6813	02.12
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09 66 354 6517	20.10	09 66 411 6500	02.06	09 66 422 6802	02.12	09 66 456 6610	21.12	09 66 513 7600	02.16	09 66 562 6816	02.18
09 66 354 7511	20.10	09 66 411 6501	02.06	09 66 422 6803	02.12	09 66 456 6611	21.12	09 66 513 7601	02.16	09 66 562 6817	02.18
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09 66 354 7513	20.10	09 66 411 6503	02.06	09 66 422 7802	02.12	09 66 456 6613	21.12	09 66 513 7603	02.16	09 66 562 7812	02.12
				09 66 422 7803	02.12						

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09 66 562 7815	02.18	09 67 000 9916	08.07	09 67 009 0711	07.02	09 67 015 5604	08.10	09 67 037 0424	06.04	09 67 050 4764	02.10
09 66 562 7816	02.18	09 67 000 9917	06.12	09 67 009 4701	02.28	09 67 015 5607	02.27	09 67 037 0425	06.04	09 67 050 5601	02.28
09 66 562 7817	02.18	09 67 000 9917	06.13	09 67 009 4701	08.12	09 67 015 5615	02.34	09 67 037 0434	06.04	09 67 050 5601	08.12
		09 67 000 9917	08.07	09 67 009 4704	02.34	09 67 015 5615	08.10	09 67 037 0435	06.04	09 67 050 5604	02.34
09 66 563 6811	02.12	09 67 000 9918	06.12	09 67 009 4704	08.10	09 67 015 5616	02.27	09 67 037 0442	06.06	09 67 050 5604	08.10
09 66 563 6812	02.12	09 67 000 9918	06.13	09 67 009 4707	02.27	09 67 015 5654	02.04	09 67 037 0443	06.06	09 67 050 5607	02.27
09 66 563 6813	02.12	09 67 000 9918	08.07	09 67 009 4715	02.34	09 67 015 5655	02.04	09 67 037 0452	06.11	09 67 050 5615	02.34
09 66 563 7811	02.12	09 67 000 9922	07.02	09 67 009 4715	08.10	09 67 015 5657	02.10	09 67 037 0453	06.11	09 67 050 5615	08.10
09 66 563 7812	02.12	09 67 000 9924	07.02	09 67 009 4716	02.27	09 67 015 5658	02.10	09 67 037 0511	06.11	09 67 050 5616	02.27
09 66 563 7813	02.12	09 67 000 9925	06.06	09 67 009 4754	02.04	09 67 015 5663	02.10	09 67 037 0513	06.11	09 67 050 5654	02.04
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		09 67 000 9931	06.06	09 67 009 4758	02.10	09 67 025 0333	06.07	09 67 037 0611	07.02	09 67 050 5658	02.10
09 67 000 7137	02.30	09 67 000 9935	02.11	09 67 009 4763	02.10	09 67 025 0334	06.08	09 67 037 0711	07.02	09 67 050 5663	02.10
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09 67 000 7157	02.30	09 67 000 9972	07.02	09 67 009 5604	02.34	09 67 025 0413	06.11	09 67 037 4704	08.10	09 67 209 4704	08.10
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09 67 000 7238	02.30	09 67 000 9991	02.11	09 67 009 5655	02.04	09 67 025 0452	06.11	09 67 037 4757	02.10		
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09 67 000 7248	02.30	09 67 000 9998	02.11	09 67 009 5658	02.10	09 67 025 0511	06.11	09 67 037 4763	02.10	09 67 215 4704	08.10
09 67 000 7257	02.30			09 67 009 5663	02.10	09 67 025 0513	06.11	09 67 037 4764	02.10	09 67 215 4715	02.34
09 67 000 7258	02.30	09 67 001 9928	07.02	09 67 009 5664	02.10	09 67 025 0571	06.05	09 67 037 5601	02.28	09 67 215 4715	08.10
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09 67 000 8148	02.30	09 67 001 9971	08.07	09 67 015 0424	06.04	09 67 025 4707	02.27	09 67 037 5654	02.04	09 67 225 4715	02.34
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09 67 000 9915	08.07	09 67 009 0571	06.05	09 67 015 5601	02.28	09 67 037 0344	06.08	09 67 050 4757	02.10	09 68 153 5612	02.22
09 67 000 9916	06.12	09 67 009 0573	06.05	09 67 015 5601	08.12	09 67 037 0411	06.11	09 67 050 4758	02.10	09 68 153 5613	02.22

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09 68 153 7612	02.22	09 69 181 7422	04.20	09 69 311 5072	04.07	09 99 000 0197	30.09	27 21 121 8006	00.07	60 03 026 0555	01.18
09 68 153 7613	02.22	09 69 181 7423	04.20	09 69 311 5094	04.08	09 99 000 0201	30.09	27 21 121 8010	00.07	60 03 026 5200	01.10
09 68 163 5811	02.22	09 69 182 5140	04.22	09 69 311 5133	04.08	09 99 000 0215	06.05			60 03 026 5210	01.10
09 68 163 5812	02.22	09 69 182 5230	04.22			09 99 000 0216	06.05			60 03 026 5220	01.10
09 68 163 5813	02.22	09 69 182 5310	04.18	09 69 312 0133	04.15	09 99 000 0218	30.11	27 71 040 0001	00.08	60 03 028 0155	01.17
09 68 163 7811	02.22	09 69 182 5311	04.18	09 69 312 0172	04.14	09 99 000 0220	30.11	27 71 040 0002	00.08	60 03 028 0255	01.17
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09 68 163 7813	02.22	09 69 182 5422	04.20	09 69 401 5072	04.07	09 99 000 0253	31.02			60 03 028 5210	01.10
		09 69 182 5423	04.20			09 99 000 0255	30.09			60 03 028 5220	01.10
09 68 253 5611	02.22	09 69 182 7140	04.22	09 69 402 0214	04.14	09 99 000 0256	30.11	27 79 000 0001	32.02		
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09 68 253 5613	02.22	09 69 182 7310	04.18	09 69 410 0088	04.11	09 99 000 0406	30.11			60 03 036 0255	01.17
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09 68 253 7613	02.22	09 69 182 7422	04.20	09 69 412 0214	04.14	09 99 000 0416	30.11	27 99 000 0001	32.02	60 03 050 0146	01.19
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09 68 263 5811	02.22			09 69 581 2550	04.19	09 99 000 0426	30.11			60 03 050 0255	01.17
09 68 263 5812	02.22	09 69 200 0033	04.11			09 99 000 0434	30.11			60 03 050 0555	01.18
09 68 263 5813	02.22	09 69 200 0633	04.13	09 69 681 2550	04.19	09 99 000 0440	30.11			60 03 050 5200	01.10
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09 68 263 7812	02.22	09 69 201 5072	04.07			09 99 000 0460	30.11	60 01 000 9013	01.20	60 03 050 5220	01.10
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09 68 353 5612	02.22	09 69 210 0633	04.13			09 99 000 0502	31.04	60 01 000 9021	01.20	60 03 068 0146	01.19
09 68 353 5613	02.22			09 89 030 0000	30.03	09 99 000 0503	31.04			60 03 068 0147	01.18
09 68 353 7611	02.22	09 69 211 5072	04.07			09 99 000 0503	31.05	60 01 020 5102	01.05	60 03 068 0155	01.17
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09 68 363 5812	02.22	09 69 281 5140	04.22	09 98 000 2009	31.02	09 99 000 0508	31.04	60 01 026 5132	01.07	60 03 068 5210	01.10
09 68 363 5813	02.22	09 69 281 5141	04.22	09 98 000 5000	31.02	09 99 000 0508	31.05	60 01 026 5140	01.07	60 03 068 5220	01.10
09 68 363 7811	02.22	09 69 281 5230	04.22			09 99 000 0509	31.04				
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09 68 453 5613	02.22	09 69 281 7230	04.22	09 99 000 0114	32.08	09 99 000 0520	30.11	60 01 050 5132	01.07	60 03 100 5210	01.10
09 68 453 7611	02.22	09 69 281 7421	04.20	09 99 000 0115	32.08	09 99 000 0526	30.11	60 01 050 5140	01.07		
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09 68 463 7811	02.22	09 69 282 5311	04.18	09 99 000 0133	09.18	09 99 000 0597	31.02			60 04 068 5344	01.09
09 68 463 7812	02.22	09 69 282 5421	04.20	09 99 000 0133	09.21	09 99 000 0600	30.10	60 02 068 5120	01.06		
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		09 69 282 7140	04.22	09 99 000 0135	32.07	09 99 600 0709	30.10	60 02 068 5150	01.08	60 05 068 5100	01.23
		09 69 282 7230	04.22	09 99 000 0149	32.07	09 99 600 0715	30.10	60 02 068 5322	20.06	60 05 068 5100	21.07
		09 69 282 7310	04.18	09 99 000 0149	32.08	09 99 600 0725	30.10			60 05 068 5143	01.26
		09 69 282 7311	04.18	09 99 000 0150	32.08			60 02 100 5141	01.08	60 05 068 5322	20.07
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		09 69 282 7422	04.20	09 99 000 0169	31.02					60 05 096 5118	01.25
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		09 69 300 0055	04.11	09 99 000 0175	08.16			60 03 ... 5220	32.03		
				09 99 000 0175	31.02						
		09 69 301 5072	04.07	09 99 000 0179	32.06						
		09 69 301 5094	04.08	09 99 000 0179	32.07			60 03 020 0255	01.17	60 06 050 5440	01.27
		09 69 301 5133	04.08	09 99 000 0179	32.07			60 03 020 0555	01.18	60 06 050 9001	01.27
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				09 99 000 0180	32.07	27 21 121 8004	00.07	60 03 020 5220	01.10	60 06 068 9001	01.27

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60 11 020 5132	01.14			61 03 000 0048	06.14	61 03 000 0101	08.15	61 03 001 0020	06.13		
60 11 020 5140	01.14	60 90 014 6003	40.02	61 03 000 0048	08.08	61 03 000 0102	08.15	61 03 001 0020	08.07		
60 11 020 5232	01.14	60 90 018 6003	40.02	61 03 000 0049	06.14	61 03 000 0103	08.15	61 03 001 0021	06.13		
				61 03 000 0049	08.08	61 03 000 0104	08.15	61 03 001 0021	08.07		
60 11 026 5102	01.13	60 90 020 6003	40.02	61 03 000 0050	06.14	61 03 000 0105	08.15	61 03 001 0022	06.13		
60 11 026 5132	01.14			61 03 000 0050	08.08	61 03 000 0112	08.13	61 03 001 0022	08.07		
60 11 026 5140	01.14	60 90 025 6003	40.02	61 03 000 0051	06.14	61 03 000 0113	08.13	61 03 001 1010	06.09		
				61 03 000 0051	08.08	61 03 000 0127	06.14	61 03 001 1010	08.06		
60 11 028 5232	01.14	60 90 034 6003	40.02	61 03 000 0052	06.14	61 03 000 0127	08.08	61 03 001 1013	06.09		
				61 03 000 0052	08.08	61 03 000 0166	06.14	61 03 001 1013	08.06		
60 11 036 5102	01.13	60 90 040 6003	40.02	61 03 000 0053	06.14	61 03 000 0166	08.08	61 03 001 1014	06.09		
60 11 036 5132	01.14			61 03 000 0053	08.08	61 03 000 0168	08.15	61 03 001 1014	08.06		
60 11 036 5140	01.14	60 90 048 6003	40.02	61 03 000 0054	06.14	61 03 000 0169	08.15	61 03 001 1015	06.09		
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		60 90 050 6008	40.03	61 03 000 0055	08.08	61 03 000 0174	08.15	61 03 001 1016	08.06		
60 11 050 5102	01.13			61 03 000 0056	06.14	61 03 000 0175	08.15	61 03 001 1017	06.09		
60 11 050 5132	01.14	60 90 068 6007	40.03	61 03 000 0056	08.08	61 03 000 0176	08.15	61 03 001 1017	08.06		
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60 11 050 5232	01.14			61 03 000 0058	06.14	61 03 000 0179	08.15	61 03 001 1019	06.09		
				61 03 000 0058	08.08	61 03 000 0180	08.15	61 03 001 1019	08.06		
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60 11 068 5132	01.14	60 99 ... 0005	32.04	61 03 000 0059	08.08	61 03 000 5062	08.08	61 03 001 2010	08.06		
60 11 068 5140	01.14	60 99 ... 0013	32.03	61 03 000 0060	06.14	61 03 000 5063	06.14	61 03 001 2013	06.09		
60 11 068 5232	01.14	60 99 ... 0013	32.04	61 03 000 0060	08.08	61 03 000 5063	08.08	61 03 001 2013	08.06		
		60 99 ... 0014	32.03	61 03 000 0061	06.14	61 03 000 5064	06.14	61 03 001 2014	06.09		
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60 11 080 5132	01.14			61 03 000 0062	06.14	61 03 000 5065	06.14	61 03 001 2015	06.09		
60 11 080 5140	01.14	60 99 000 0003	32.03	61 03 000 0062	08.08	61 03 000 5065	08.08	61 03 001 2015	08.06		
60 11 080 5232	01.14	60 99 000 0003	32.04	61 03 000 0063	06.14	61 03 000 5066	06.14	61 03 001 2016	06.09		
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		60 99 000 0007	32.03	61 03 000 0064	08.08	61 03 000 5067	08.08	61 03 001 2017	08.06		
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60 13 ... 5200	32.03	60 99 000 0010	32.03	61 03 000 0065	08.08	61 03 000 5068	08.08	61 03 001 2018	08.06		
		60 99 000 0010	32.05	61 03 000 0066	06.14	61 03 000 5069	06.14	61 03 001 2019	06.09		
60 13 020 0153	01.19	60 99 000 0011	32.03	61 03 000 0066	08.08	61 03 000 5069	08.08	61 03 001 2019	08.06		
60 13 020 5100	01.15	60 99 000 0011	32.05	61 03 000 0067	06.14	61 03 000 5070	06.14	61 03 001 3010	06.09		
60 13 020 5180	01.16	60 99 000 0012	32.03	61 03 000 0067	08.08	61 03 000 5070	08.08	61 03 001 3010	08.06		
60 13 020 5200	01.15	60 99 000 0012	32.04	61 03 000 0068	06.14	61 03 000 5071	06.14	61 03 001 3013	06.09		
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60 13 026 0153	01.19	60 99 000 0015	32.05	61 03 000 0069	06.14	61 03 000 5072	06.14	61 03 001 3014	06.09		
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		60 99 000 0017	32.05	61 03 000 0071	06.14			61 03 001 3016	06.09		
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60 13 036 5200	01.15			61 03 000 0073	08.13	61 03 001 0011	08.07	61 03 001 3018	06.09		
				61 03 000 0074	08.13	61 03 001 0012	06.13	61 03 001 3018	08.06		
60 13 050 0153	01.19			61 03 000 0078	08.13	61 03 001 0012	08.07	61 03 001 3019	06.09		
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60 13 050 5180	01.16	61 03 000 0041	08.08	61 03 000 0082	08.13	61 03 001 0013	08.06				
60 13 050 5200	01.15	61 03 000 0042	06.14	61 03 000 0083	08.13	61 03 001 0014	06.09	61 03 600 0017	08.15		
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60 13 080 0153	01.19	61 03 000 0043	06.14	61 03 000 0085	08.13	61 03 001 0015	06.09	61 03 600 0020	08.15		
60 13 080 5100	01.15	61 03 000 0043	08.08	61 03 000 0086	08.13	61 03 001 0015	08.06	61 03 600 0021	08.15		
60 13 080 5200	01.15	61 03 000 0044	06.14	61 03 000 0087	08.13	61 03 001 0016	06.09	61 03 600 0022	08.16		
		61 03 000 0044	08.08	61 03 000 0088	08.13	61 03 001 0016	08.06	61 03 600 0023	08.16		
		61 03 000 0045	06.14	61 03 000 0089	08.13	61 03 001 0017	06.09	61 03 600 0024	08.16		
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60 90 005 6003	40.02	61 03 000 0046	08.08	61 03 000 0098	08.15	61 03 001 0018	08.06				
60 90 010 6003	40.02	61 03 000 0047	06.14	61 03 000 0099	08.15	61 03 001 0019	06.09				

Production plants – worldwide



Espelkamp / Germany – Plant 1



Espelkamp / Germany – Plant 2



Espelkamp / Germany – Plant 3



Espelkamp / Germany – Plant 4



Espelkamp / Germany – Plant 5



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