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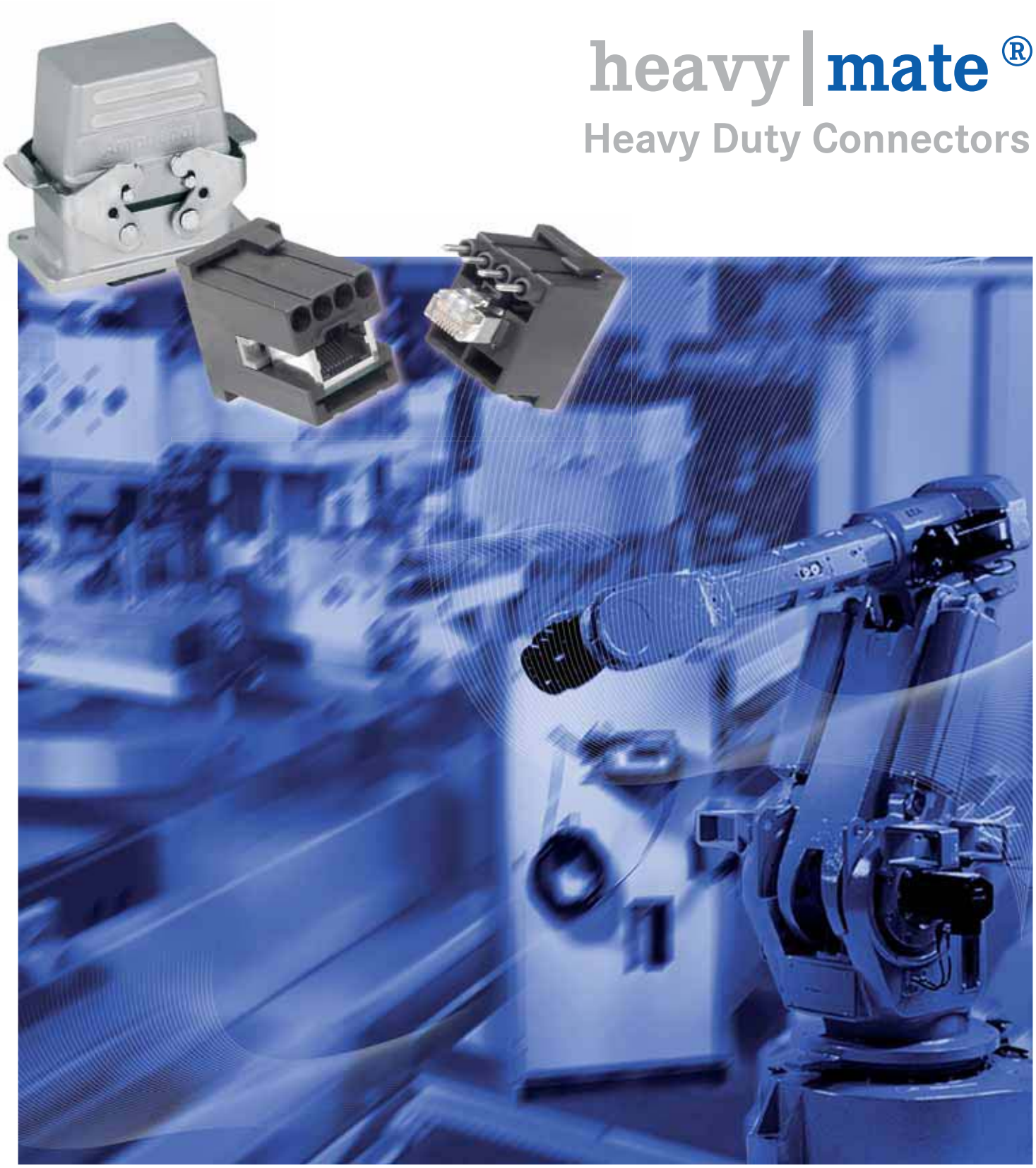
Amphenol
Amphenol-Tuchel Electronics GmbH

heavy|mate®

Heavy Duty Connectors



www.industrial-amphenol.com

Note from the CEO

Ladies and Gentlemen,

For over 75 years Amphenol has enjoyed success as the interconnection technology provider of choice to industry-leading companies around the world. One of our key strategic areas of focus has been and is the Industrial market. Our organization works with leading manufacturers across a wide range of applications - including Energy Generation & Distribution, Transportation, Heavy Equipment, Factory Automation, Wireless Outdoor, ChipCard Readers - enabling smarter, faster and better technologies to connect products to customer solutions.

The Industrial market footprint of Amphenol covers over facilities in more than 12 different European countries and more than 30 countries worldwide. Our successful expansion into new regions as well as new industrial applications is a direct reflection of our agile, entrepreneurial management team and our unwavering commitment to execute Amphenol‘s strategies for the benefit of our customers, shareholders and employees.

Thank you for partnering with Amphenol. Our entire organization is at your service.

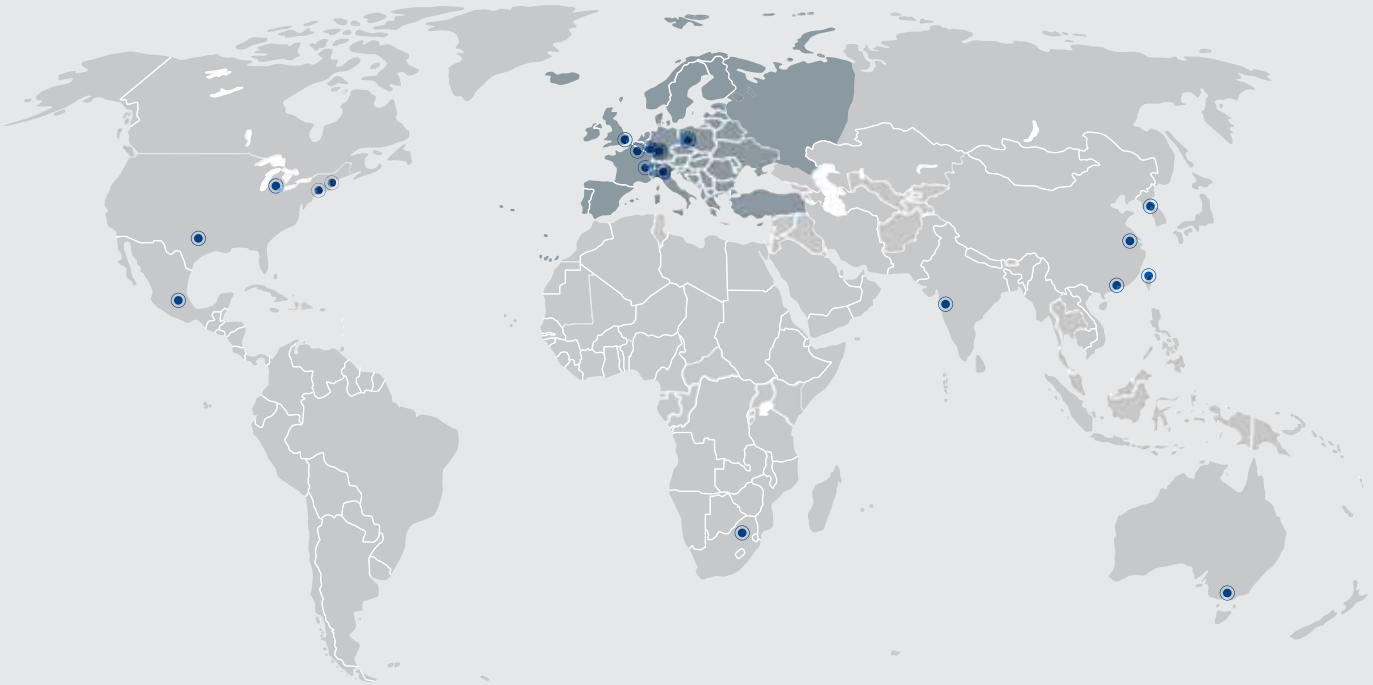
R. Adam Norwitt
President and CEO, Amphenol Corporation

Make use of the best
Use our global resources

“Think global, act local!” Independently from where you are in Europe, we offer you our global expertise and great variety of products and technologies. And in comfort with your personal contact. Our numerous European offices are your access to our global resources.

◉ OUR OFFICES IN EUROPE AND WORLDWIDE

FRANCE	CHINA	AUSTRALIA	SOUTH AFRICA
GERMANY	KOREA	MEXICO	INDIA
UNITED KINGDOM	TAIWAN	USA	ITALY



SECURITY, RELIABILITY AND COMFORTABLE SERVICE FROM ONE SOURCE.

More time for important things: benefit from our service and diversity

Enjoy security, reliability and comfortable service from one source. INDUSTRIAL@AMPHENOL offers one of the most individual and most diversified service programmes in the market – exclusively for industrial customers. Access all possibilities of the Amphenol group through your personal expert adviser.

WIDE PRODUCT RANGE

Take advantage of a choice of Amphenol products. Our broad product portfolio offers individual solutions from more than 85 member companies in the global Amphenol group.

EXCLUSIVENESS AND FLEXIBILITY

One face to the customer: every inquiry is handled on an individual service level by your personal key account service partner. This ensures maximum transparency and best-in-class flexibility in the whole process.

QUALITY

Interconnect systems need reliability, speed and flawless data transmission. We continuously test and guarantee the required standard in our products – and also in our personal services.

INDIVIDUAL SOLUTIONS

Your project requires an individual solution that is not available off-the-shelf? As your think tank and discussion partner we provide engineering support and solution-oriented development for your tailor-made Amphenol product.

SPEED AND AVAILABILITY

Smart and intelligent processes are the secret behind our service programme. Flexible planning and distribution, perfect logistics and highest availability are our key factors for best customer service.

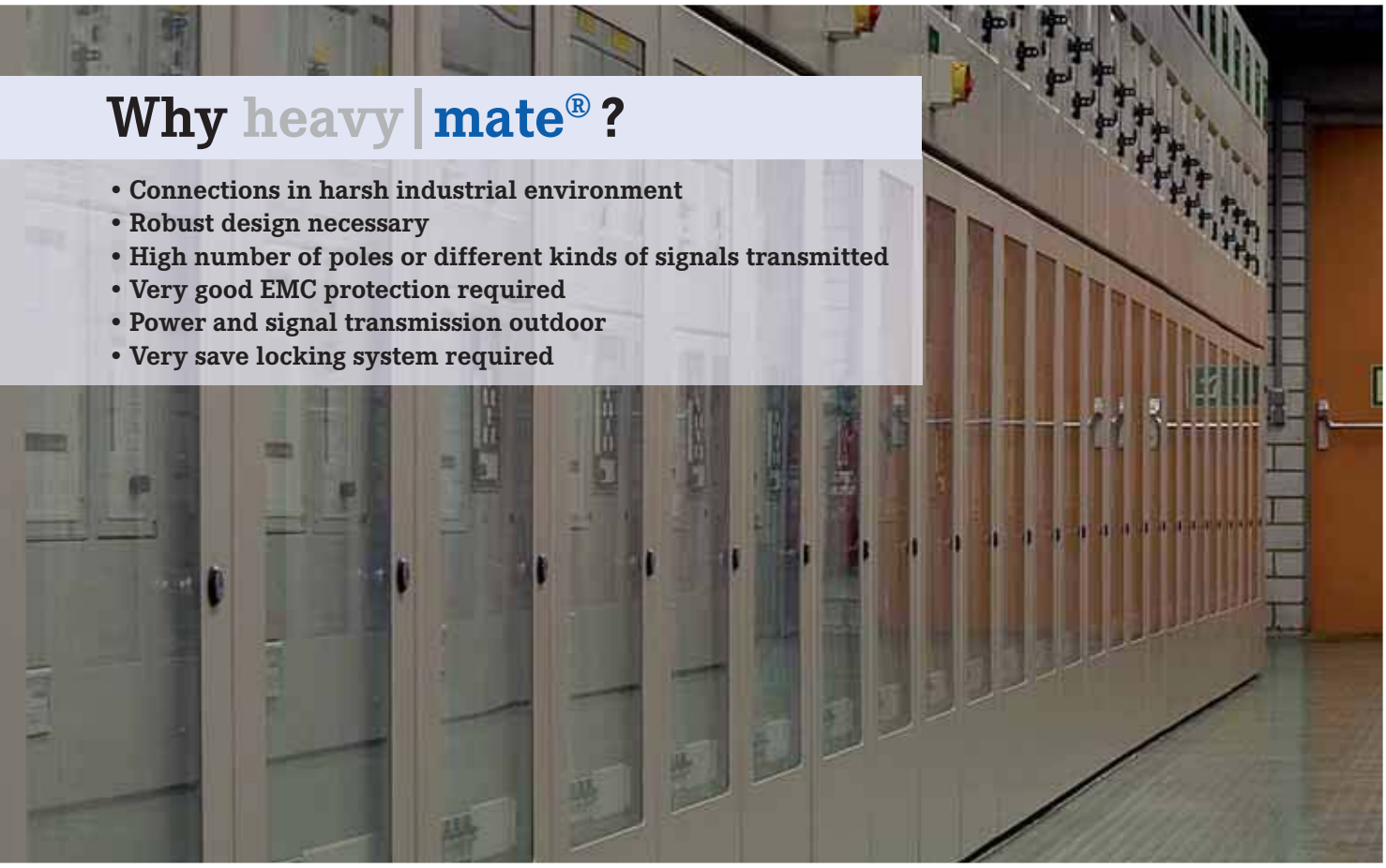
GLOBAL KEY ACCOUNT SERVICE

Our key account service is your individual entrance to global know-how, products and services. More than 85 Amphenol companies around the world offer an extensive range of technologies and products. We offer access to our worldwide resources through one individual contact person.

heavy|mate® is a Modular Metal Connector Line

What is heavy|mate® ?

heavy|mate® is a modular connector line, consisting of:
- Hoods & Housings
- Inserts
- Contacts



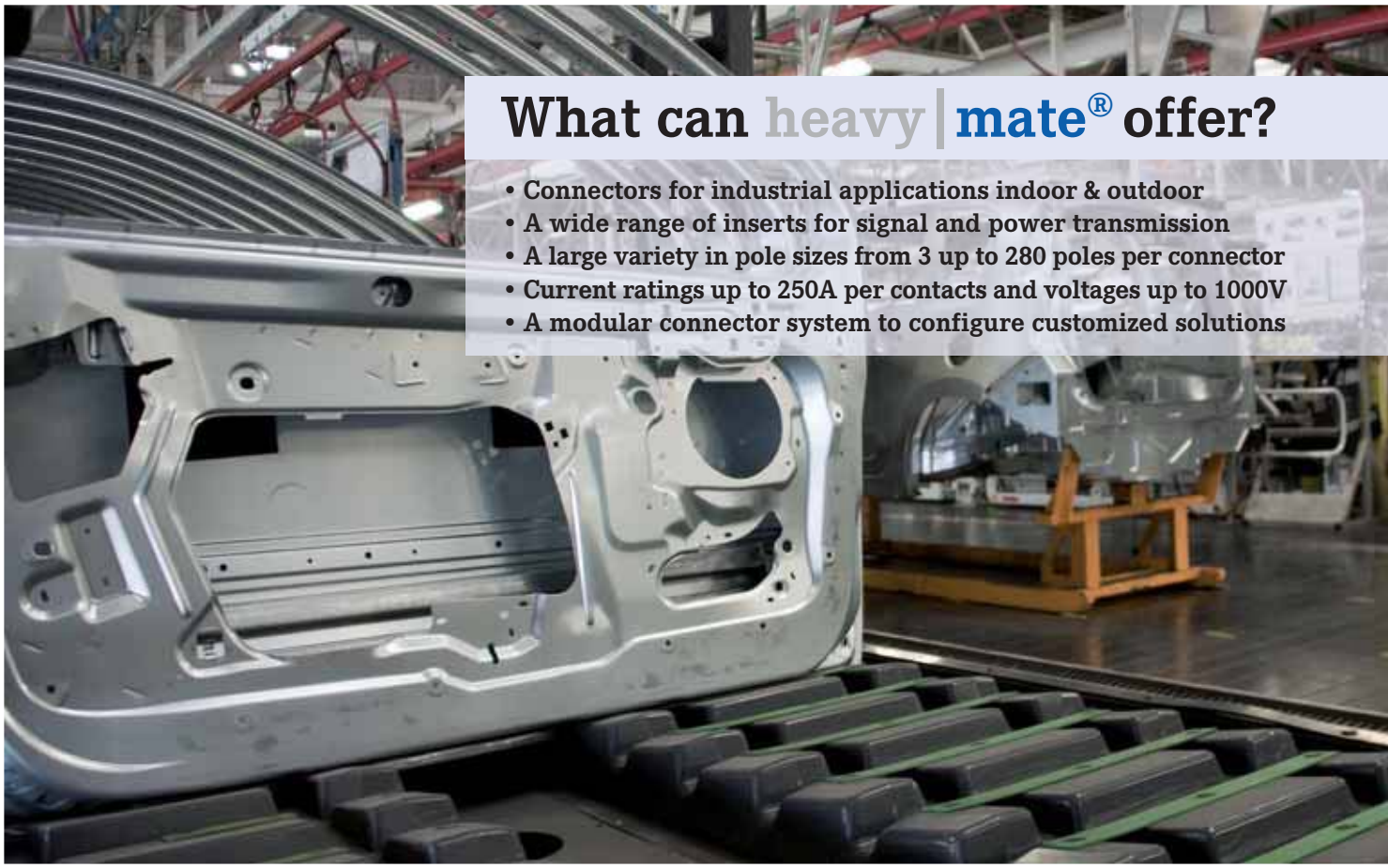
Why heavy|mate® ?

- Connections in harsh industrial environment
- Robust design necessary
- High number of poles or different kinds of signals transmitted
- Very good EMC protection required
- Power and signal transmission outdoor
- Very save locking system required

for Applications in Industrial Environments.

Major product features

- Hybrid interconnections
- Good costs
- Voltage up to 1000V
- VDE, UL, CSA approvals
- Vibration proof
- High current
- Signal transmission
- High pole sizes
- IP65 to IP68
- Corrosion resistance
- Robust



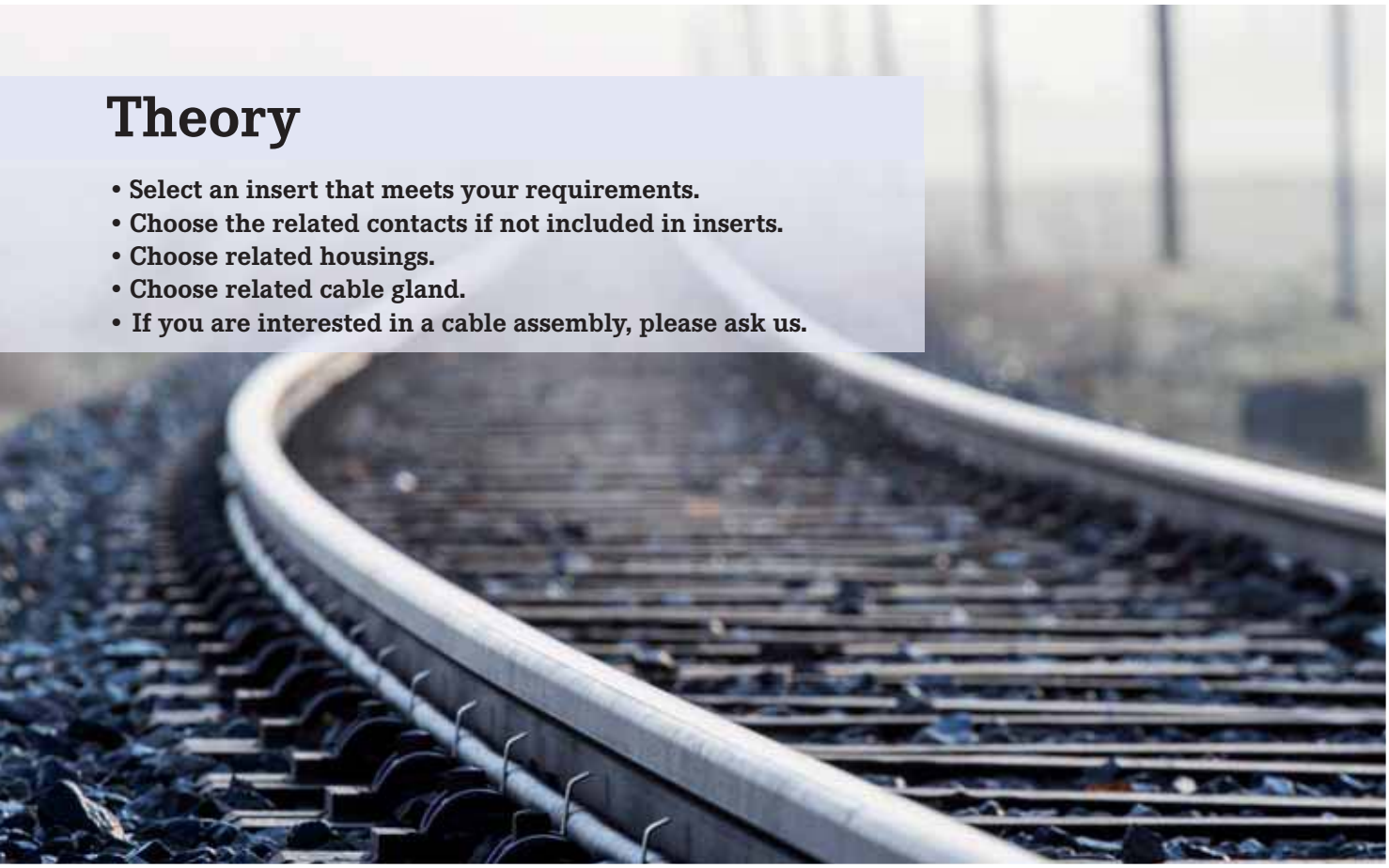
What can heavy|mate® offer?

- Connectors for industrial applications indoor & outdoor
- A wide range of inserts for signal and power transmission
- A large variety in pole sizes from 3 up to 280 poles per connector
- Current ratings up to 250A per contacts and voltages up to 1000V
- A modular connector system to configure customized solutions

How to select a solution with series heavy|mate®.

Theory

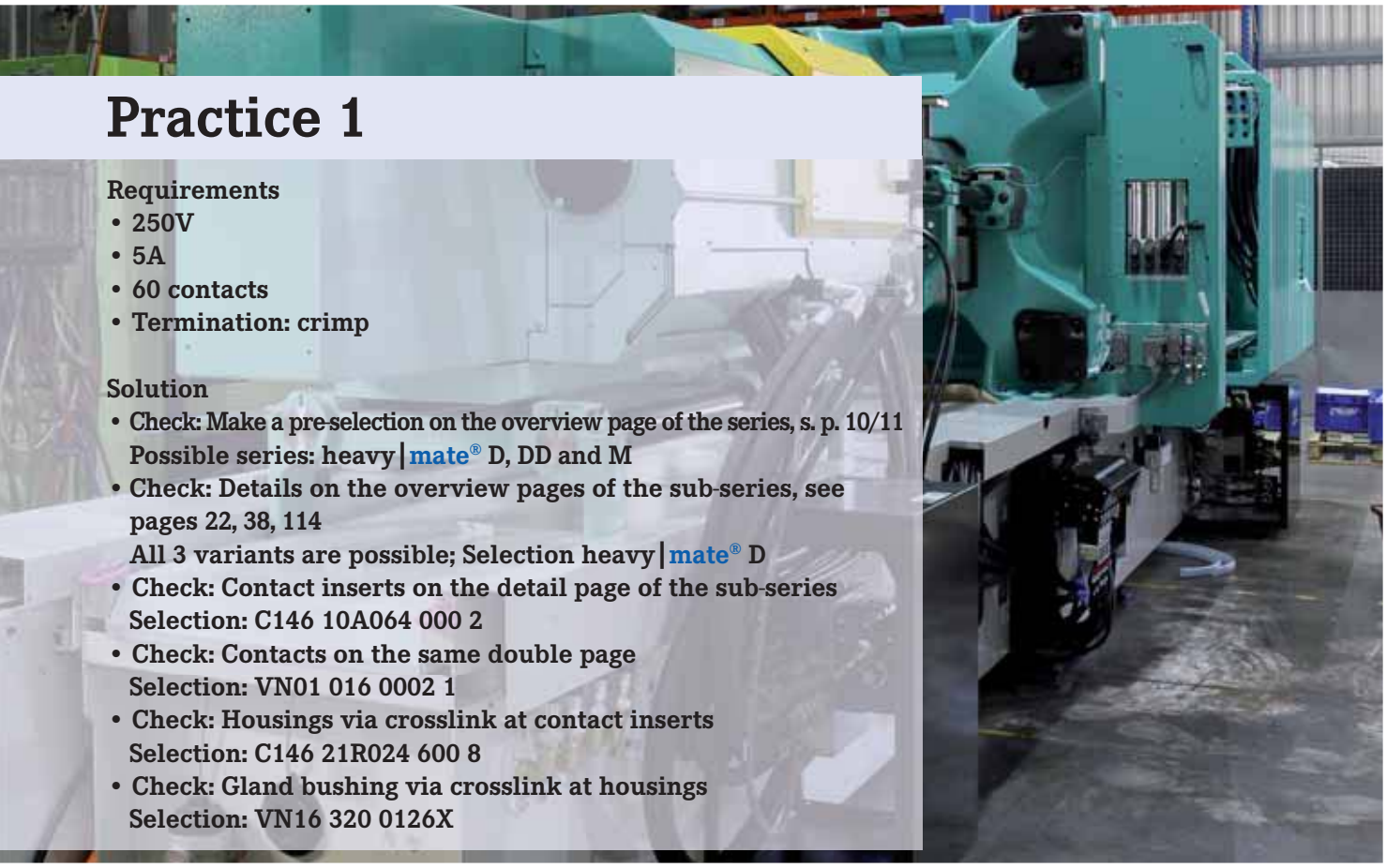
- Select an insert that meets your requirements.
- Choose the related contacts if not included in inserts.
- Choose related housings.
- Choose related cable gland.
- If you are interested in a cable assembly, please ask us.



Practice 1

Requirements
- 250V
- 5A
- 60 contacts
- Termination: crimp

Solution
- Check: Make a pre-selection on the overview page of the series, s. p. 10/11
  Possible series: heavy|mate® D, DD and M
- Check: Details on the overview pages of the sub-series, see pages 22, 38, 114
  All 3 variants are possible; Selection heavy|mate® D
- Check: Contact inserts on the detail page of the sub-series
  Selection: C146 10A064 000 2
- Check: Contacts on the same double page
  Selection: VN01 016 0002 1
- Check: Housings via crosslink at contact inserts
  Selection: C146 21R024 600 8
- Check: Gland bushing via crosslink at housings
  Selection: VN16 320 0126X



Practice 2

Requirements

- 3 x 400V; 50A; 6mm² wire gauge
- 8 x 250V; 8A; 1.5mm² wire gauge
- 5 x 400V; 15A; 4mm² wire gauge

Solution

- Check: Make a pre-selection on the overview page of the series, see pages 10/11
  Possible series: heavy|mate® M
- Check: How 16 contacts can be realized, see modules overview on page 118
  Possible selection: a) 1 x 20 contacts
  b) 2 x 10 contacts
  c) 1 x 10 contacts + 1 x 5 contacts
  d) 1 x 3 contacts + 1 x 5 contacts + 1 x 10 contacts
- Check: Technical parameters / solution, see detail pages of the modules on page 126
  Possible selection: a) not possible due to voltage
  b) not possible due to voltage
  c) not possible due to current
  d) POSSIBLE
- Check: Choose matching contact, see detail page of the modules on page 126
  Possible selection: a) C146 A03 001 E8 – VN01 036 0002 1C
  b) C146 A0 001 E8 – VN01 025 0033 1C
  c) C146 A10 001 E8 – VN01 016 0027 1XC
- Check: Choose matching frame, see frames on page 124
  Solution: C146 P10 001 G8
- Check: Choose matching housing, see housings on page 162
  Solution: C146 21R010 600 8

Make your selection out of the heavy | mate® series!

Series / Characteristic	A page 14	D page 22	DD page 38	E page 44	EE page 62	E /FE / KO page 68	F page 74
Voltage							
250V	●	●	●	●	●	●	●
400V	●			●	●	●	●
500V				●	●		●
690V							●
830V							●
1000V							
Current							
10A	●	●	●	●	●	●	●
16A	●			●	●		●
35A							●
80A							●
100A							
200A							
Numbers of contacts							**Modules for**
	3 4 10 16	7 8 15 25 40 64	24 42 72 108	6 10 16 24	10 18 32 46	6 10 16 24	3 6 8 12 17 20
Termination							
Crimp		●	●	●	●		●
Screw	●			●		●	
Tension spring				●			

Cross reference list see www.amphenol.de/xref/

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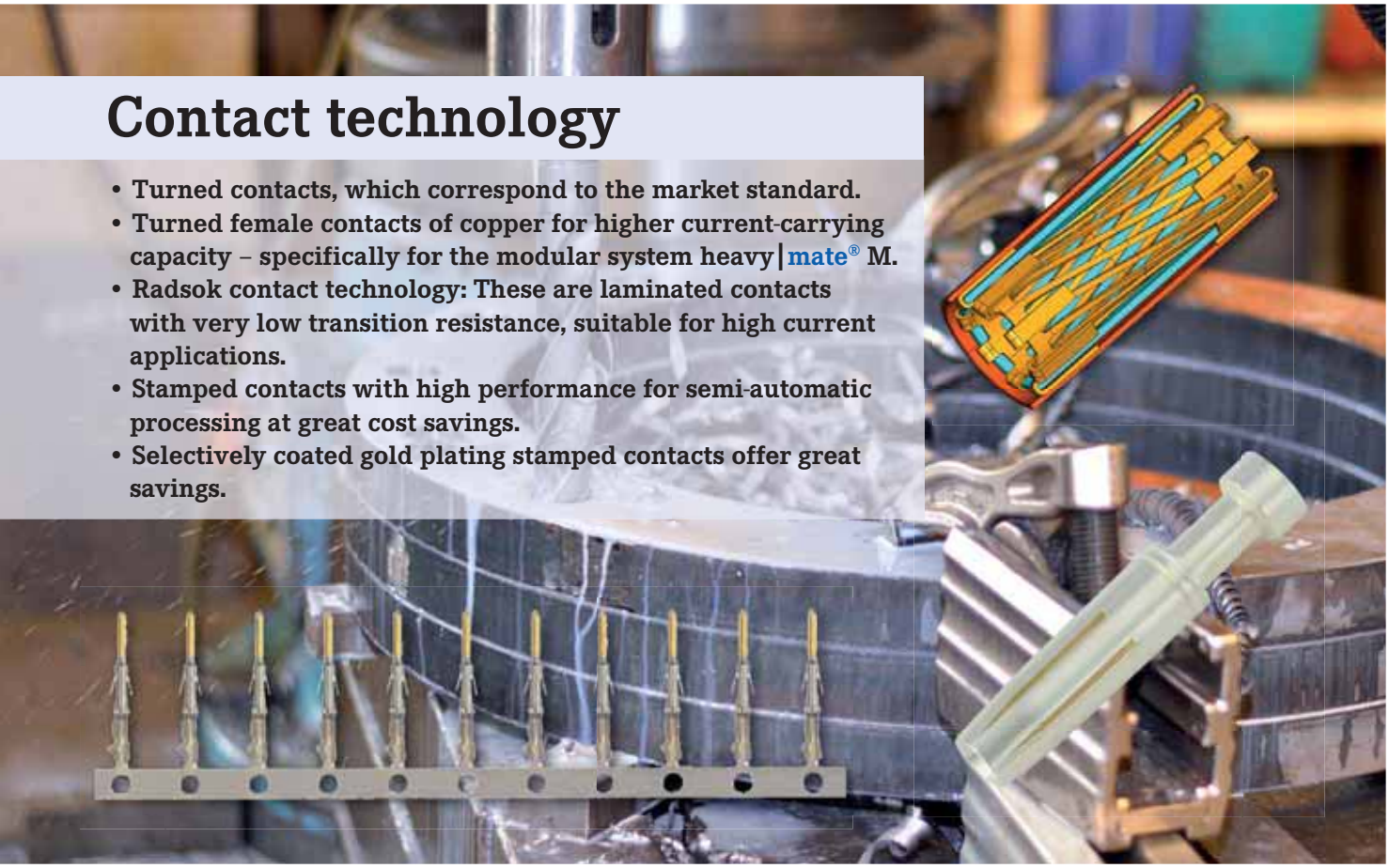
HSE page 94	HvE page 98	K page 108	M page 114	Q page 156	Housings page 162	Accessories page 223	Series / Characteristic
							Voltage
●	●	●	●	●			250V
●	●	●	●	●			400V
	●	●	●	●			500V
	●	●	●				690V
		●	●				830V
			●				1000V
							Current
●	●	●	●	●			10A
●	●	●	●	●			16A
●		●	●				35A
		●	●				80A
			●				100A
			●				200A
			Modules for				Numbers of contacts
6	3+2 6+2 10+2 16+2	4 / 0 4 / 2 6 /36	1 2 3 4 5 10 20	5 7			
							Termination
		●	●	●			Crimp
●	●	●					Screw
							Tension spring

The highlights of the series heavy|mate®.

Contact technology

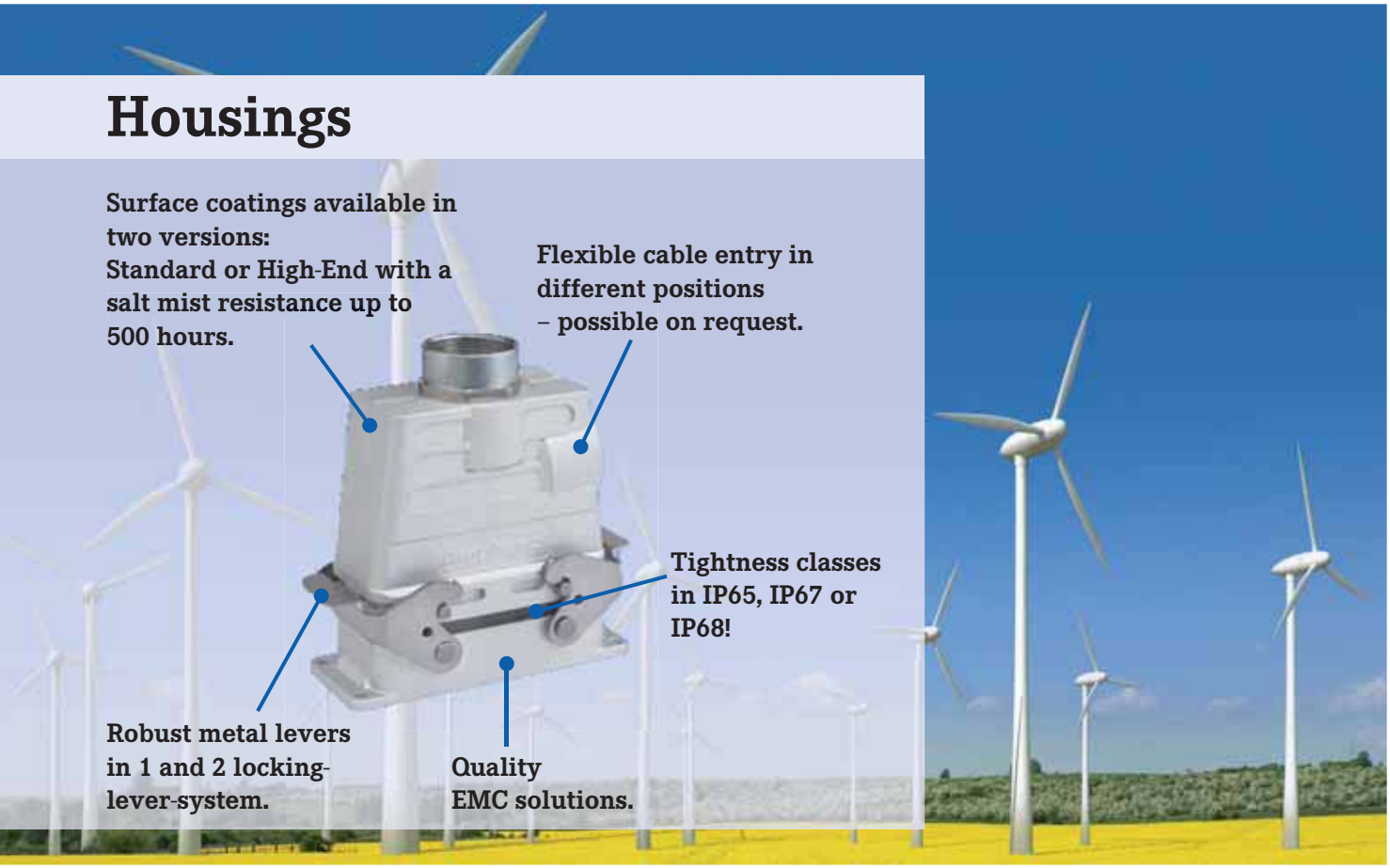
- Turned contacts, which correspond to the market standard.
- Turned female contacts of copper for higher current-carrying capacity – specifically for the modular system heavy|mate® M.
- Radsok contact technology: These are laminated contacts with very low transition resistance, suitable for high current applications.
- Stamped contacts with high performance for semi-automatic processing at great cost savings.
- Selectively coated gold plating stamped contacts offer great savings.



Housings

Surface coatings available in two versions:
Standard or High-End with a salt mist resistance up to 500 hours.

Flexible cable entry in different positions – possible on request.



Tightness classes in IP65, IP67 or IP68!

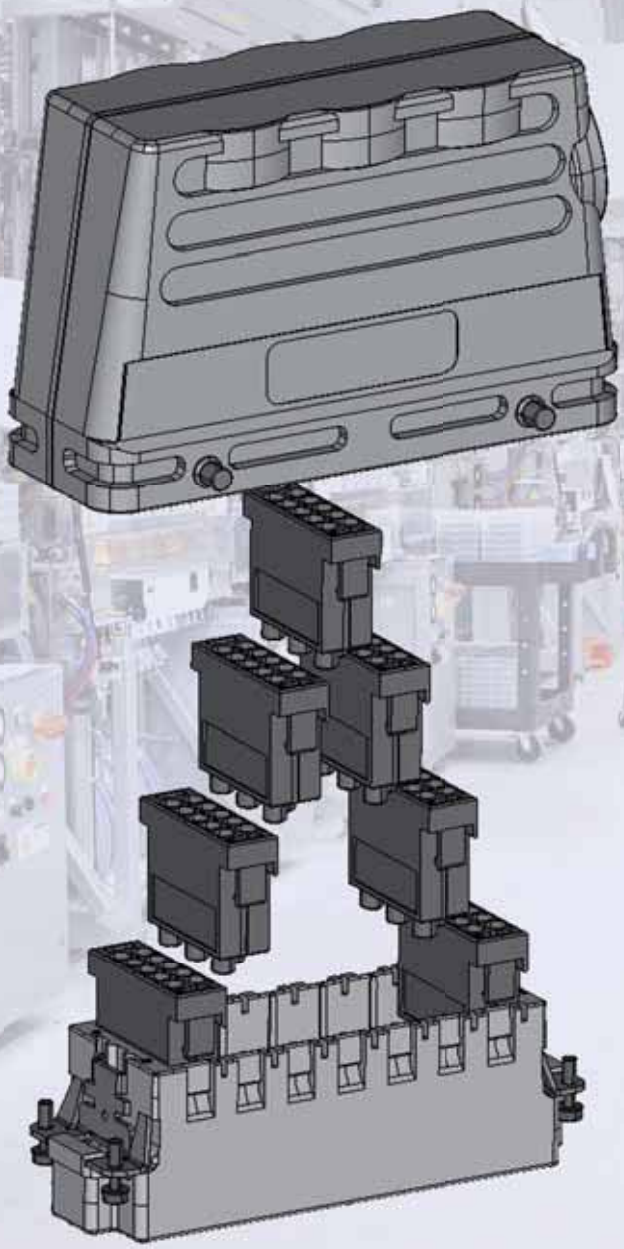
Robust metal levers in 1 and 2 locking-lever-system.

Quality EMC solutions.

Modular system

With the new series heavy|mate® F Amphenol offers a new modular system that is compatible with the market leader. With the series heavy|mate® M Amphenol offers a system with many benefits:

- **More module slots in the connector.**
- **Large selection of contact-safe male contacts**
- **Stamped contacts and the Radsok contact technology**
- **Great cost savings potential**



heavy | mate® A

- Rated voltage 250 / 400 V
- Rated current 14 A ... 18 A
- Termination: screw
- Number of contacts: 3, 4, 10, 16, 32

Approvals, Testhouse	Characteristics	Approval-Number
SEV	250 V, 10 A	
UL	600 V, 14 A	E 63093
CSA	600 V, 10 A; 16 A; 20 A	LR 700721

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

General information

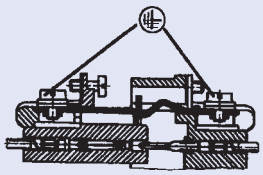
- For series heavy|mate® A connectors may be engaged or disengaged when live but without electrical load.
  If these connectors are used as plug and socket device, the load shall be reduced to 10 % of the rated current.
- Low and high profile housing for heavy|mate® A series inserts for 10 and 16 contacts.

No standard for this series, but:

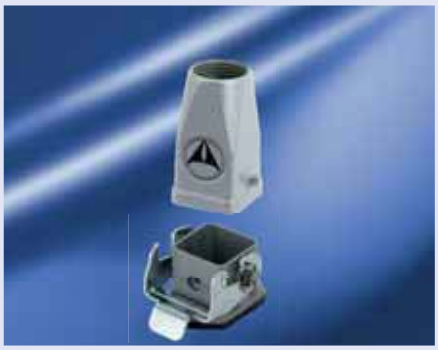
- Interchangeable with other makes
  a) contact insert to contact insert
  b) contact insert to housing 10 ,16 contacts

Housings are designed according to DIN EN 175 301 - 801

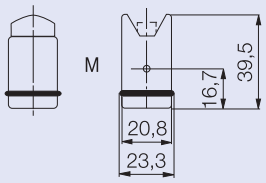
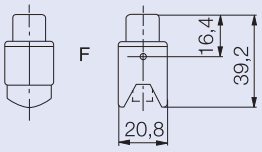
First-to-mate last-to-break protective ground contact



Range of housings

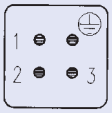
Size A3/4	Size A10	Size A16
		

General Characteristics	Standard	Value			
Number of contacts		3/4 + ⏚	10 + ⏚	16 + ⏚	32 + ⏚
Termination technique		screw			
Wire gauge		0.25 - 2.5 mm^2			
Flammability	UL 94	V-0			
Electrical Characteristics					
Rated voltage	IEC 60664-1	400 V	250 V		
Pollution degree	IEC 60664-1	3			
Installation (overvoltage) category	IEC 60664-1	III			
Material group	IEC 60664-1	III b			
Rated impulse withstand voltage	IEC 60664-1	4 KV			
Current carrying capacity	IEC 60512-5-2	see derating curves			
Rated current T_{amp} = 40 °C		18 A	16 A	14 A	14 A
Contact resistance	IEC 60512-2-1	≤ 5 m Ω			
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω			
Climatical Characteristics					
Climatic category	IEC 60068-1	40 / 100 / 21			
Upper temperature	IEC 60512-11-9	+ 100 °C			
Lower temperature	IEC 60512-11-10	- 40 °C			
Mechanical Characteristics					
IP-degree of protection pin insert [1)]	IEC 60529	unmated IP00		mated IP20	
IP-degree of protection socket insert [1)]	IEC 60529	unmated IP20		mated IP20	
Weight pin insert		13 g	48 g	68 g	136 g
Weight socket insert		13 g	52 g	73 g	146 g
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles			
Materials					
Insert		PA	PBT	PBT	PBT
Contacts		Cu Zn (brass)			
Contact plating		Ag (silver)			

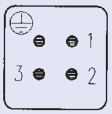
Description	Part Number	Drawing	Figure
Contact insert 3 + ⏚			
Male insert for screw termination	C146 10A003 002 4		
Female insert for screw termination	C146 10B003 002 4		

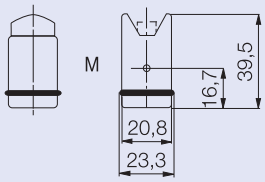
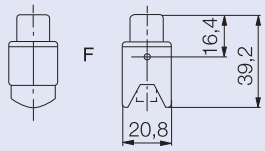
Pin layout

Male insert



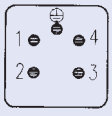
Female insert



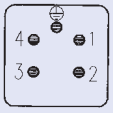
Description	Part Number	Drawing	Figure
Contact insert 4 + ⏚			
Male insert for screw termination	C146 10A004 002 4		
Female insert for screw termination	C146 10B004 002 4		

Pin layout

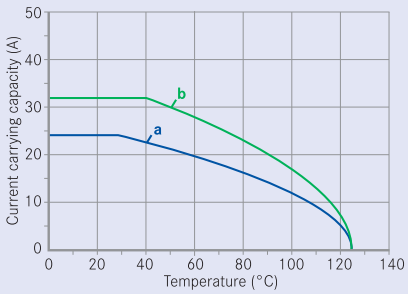
Male insert



Female insert



Derating curves



Curve	Wire gauge
a	1.5 mm²
b	2.5 mm²

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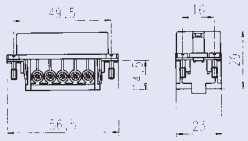
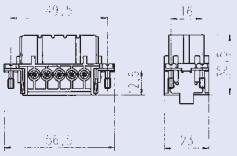
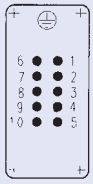
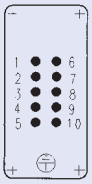
Description	Part Number	Drawing	Figure
Contact insert 10 + ⏚			
Male insert for screw termination	C146 10A010 002 4		
Male insert with wire protection for screw termination	C146 10A010 102 4		
Female insert for screw termination	C146 10B010 002 4		
Female insert with wire protection for screw termination	C146 10B010 102 4		

Pin layout

Male insert

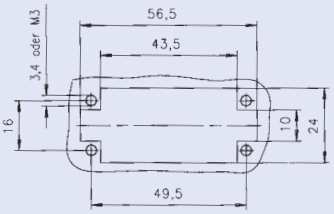


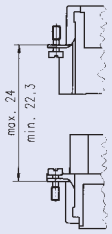
Female insert



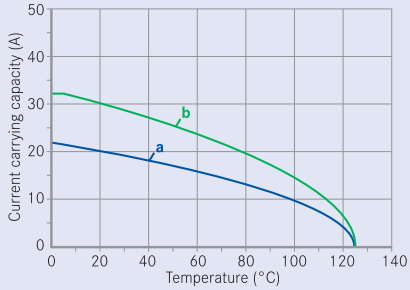
Assembly instruction

Panel cut out (insert)

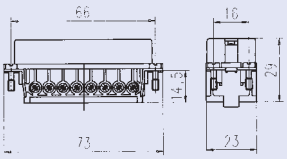
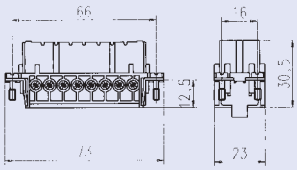




Derating curves

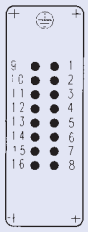


Curve	Wire gauge
a	1.5 mm²
b	2.5 mm²

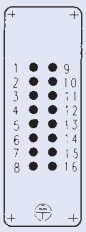
Description	Part Number	Drawing	Figure
Contact insert 16 + ⏚			
Male insert for screw termination	C146 10A016 002 4		
Male insert with wire protection for screw termination	C146 10A016 102 4		
Female insert for screw termination	C146 10B016 002 4		
Female insert with wire protection for screw termination	C146 10B016 102 4		

Pin layout

Male insert

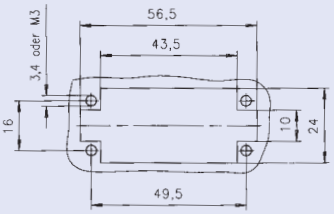


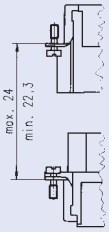
Female insert



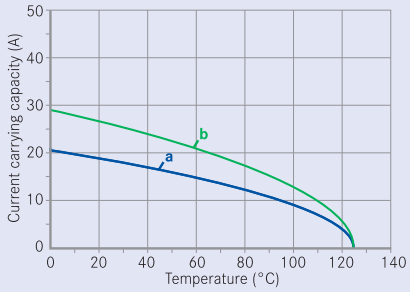
Assembly instruction

Panel cut out (insert)

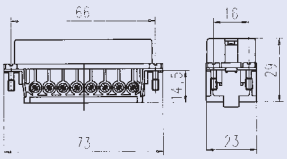
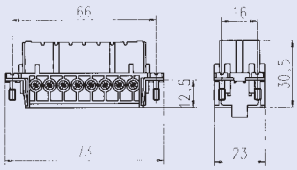




Derating curves

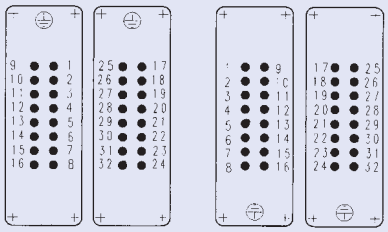


Curve	Wire gauge
a	1.5 mm²
b	2.5 mm²

Description	Part Number	Drawing	Figure
Contact insert 32 + ⏚			
Male insert for screw termination	C146 10A016 002 4 (1 - 16) + C146 10A016 004 4 (17 - 32)		
Male insert with wire protection for screw termination	C146 10A016 102 4 (1 - 16) + C146 10A016 104 4 (17 - 32)		
Female insert for screw termination	C146 10B016 002 4 (1 - 16) + C146 10B016 004 4 (17 - 32)		
Female insert with wire protection for screw termination	C146 10B016 102 4 (1 - 16) + C146 10B016 104 4 (17 - 32)		

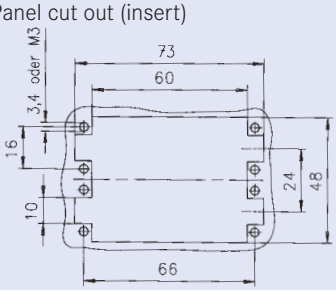
Pin layout

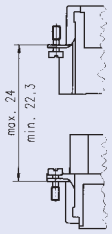
Male insert Female insert



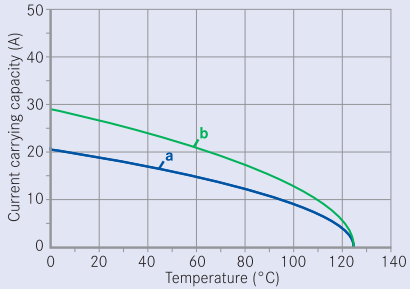
Assembly instruction

Panel cut out (insert)

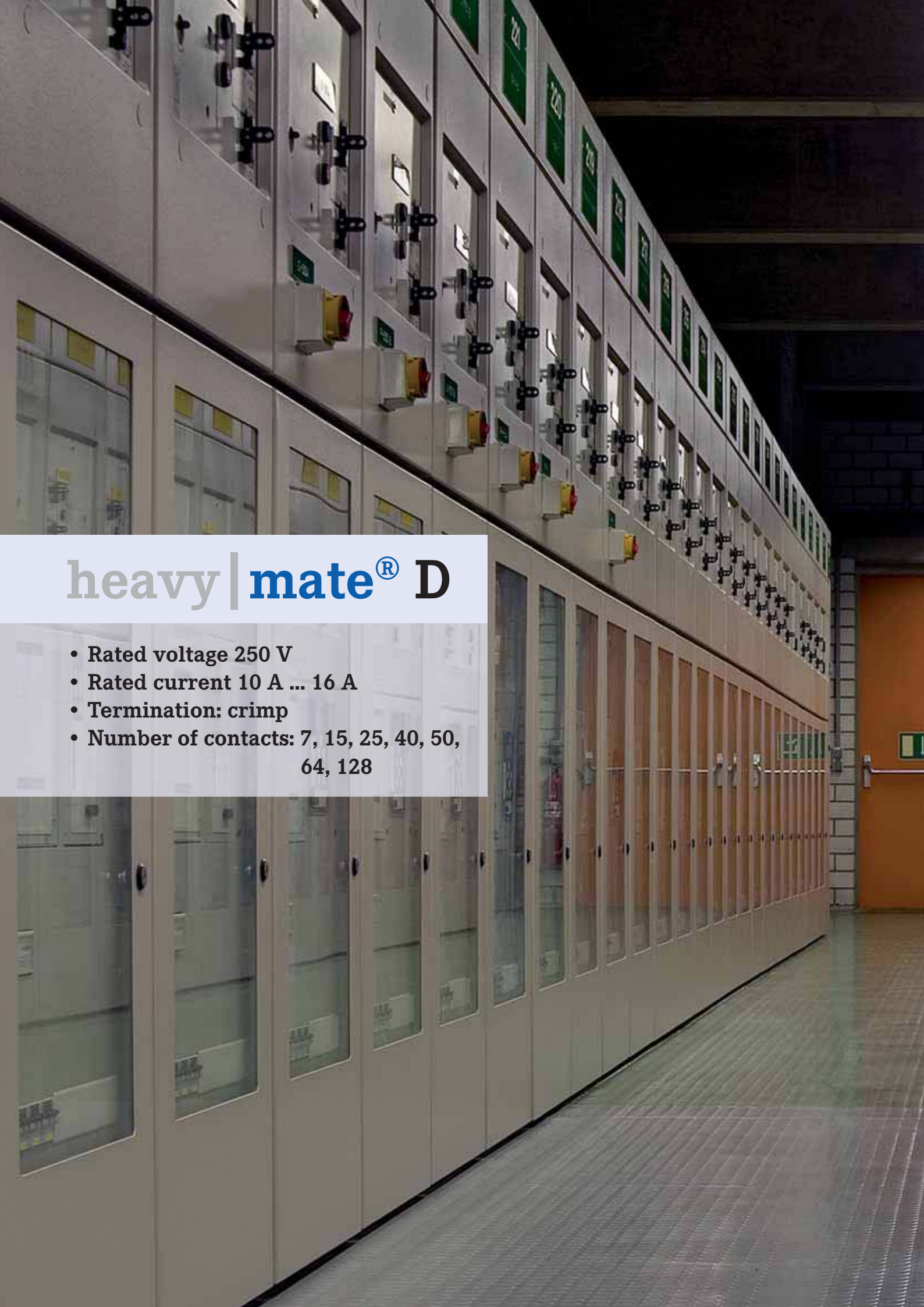




Derating curves



Curve	Wire gauge
a	1.5 mm²
b	2.5 mm²



heavy | mate® D

- Rated voltage 250 V
- Rated current 10 A ... 16 A
- Termination: crimp
- Number of contacts: 7, 15, 25, 40, 50, 64, 128

Approvals, Testhouse	Characteristics	Approval-Number
SEV	250 V, 10 A	
UL	600 V, 14 A 600 V, 15 A (high current)	E 63093
CSA	600 V, 10 A	48932

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

General information

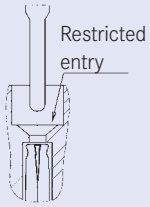
- Contact inserts without crimp contacts, crimping tools see separate catalogue „Tools“.
- Contacts must be ordered separately, processing instructions see catalogue „Tools“.
- We recommend using the high profile housings / hoods for the heavy|mate® D inserts.
- Connectors series heavy|mate® D may be engaged or disengaged when live but without electrical load.
  If these connectors are mated or unmated under load, the load shall be reduced to 10 % of the rated current.
- For contact inserts for turned contacts, guide pins and guide socket are recommended (see page 226).
- By using contact inserts with two PE-connections without hoods, it is necessary to connect the facing of each PE-connection.
- If connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.

Standardised connectorsaccording to DIN EN 175 301 - 801 (DIN 43652)

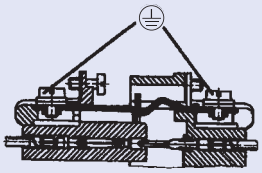
Interchangeable with all other products which are according to the standard.
a) Contact insert to contact insert 15, 25, 40, 64 way.
b) Contact insert to housing 15, 25, 40, 64 way.

High protection against mismating

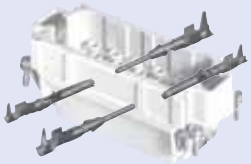
- Female inserts with funnel shaped contact entry avoids mismating with stamped contacts.



First-to-mate last-to-break protective ground contact



Contact inserts for stamped contacts and for turned contacts



Range of housings

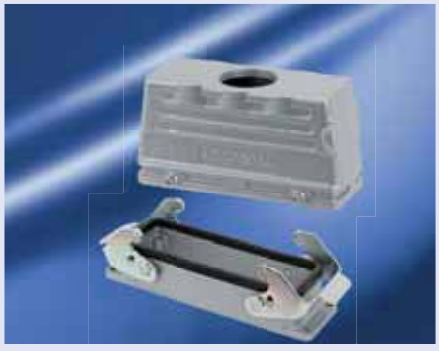
Size A3/4

Size A10

Size A16

Size E16

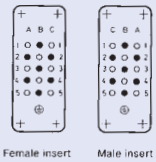
Size E24



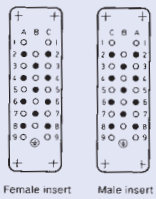
Size E48

Modified contact arrangement for rated voltages of 400 V

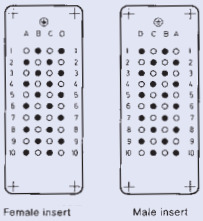
(15) ➛ 7 + ⏚



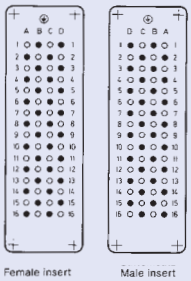
(25) ➛ 11 + ⏚



(40) ➛ 20 + ⏚



(64) ➛ 32 + ⏚

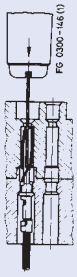


- ● full load contact
- ○ unoccupied

Removal of contacts, front releas

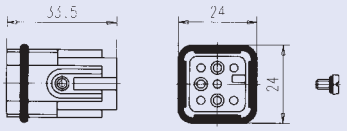
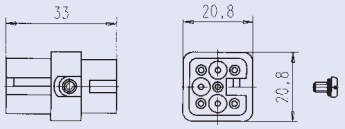
stamped male contacts
all turned contacts

stamped female contacts

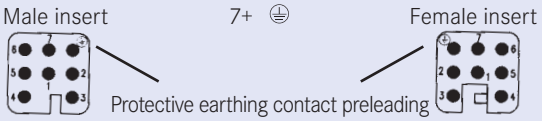


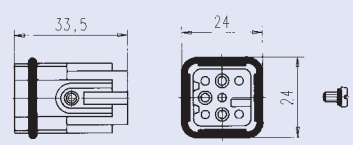
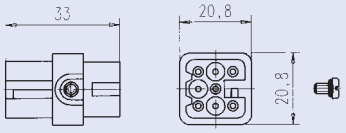
General Characteristics	Standard	Value						
Number of contacts		7	15	25	40	50 2x25	64	128 2x64
Contact arrangement	DIN EN 175 301-801 (DIN 43652)		•	•	•		•	
Termination technique		crimp, wire wrap						
Max. wire diameter		4.1 mm						
Flammability	UL 94	V-0						
Electrical Characteristics								
Rated voltage [1]	IEC 60664-1	250 V~ (400 V~ [2]) (600 V UL / CSA [3])						
Pollution degree	IEC 60664-1	3						
Installation (overvoltage) category	IEC 60664-1	III						
Material group	IEC 60664-1	III b						
Rated impulse withstand voltage	IEC 60664-1	4 kV						
Rated current	IEC 60512-5-2	see derating curves						
Rated current T_{amp} = 40 °C		16 A	12 A	12 A	10 A	10 A	10 A	10 A
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω						
Climatical Characteristics								
Climatic category	IEC 60068-1	40/125/21						
Upper temperature	IEC 60512-11-9	+ 125°C						
Lower temperature	IEC 60512-11-10	- 40°C						
Mechanical Characteristics								
IP-degree of protection pin insert	IEC 60529	unmated IP00				mated IP20		
IP-degree of protection socket insert	IEC 60529	unmated IP20				mated IP20		
Weight pin insert		8 g	28 g	34 g	53 g	68 g	65 g	130 g
Weight socket insert		8 g	30 g	38 g	64 g	76 g	82 g	164 g
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles						
Materials								
Insert	IEC 60664-1	PBTP	PC GV [4]					
Colour insert	IEC 60664-1	grey						

[1] Restriction for 8 contacts in metal housing see page 27 [2] Modified contact arrangement, see page 25 [3] Label for CSA application see page 228 [4] Polycarbonat-glas fibre filled

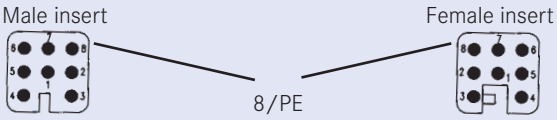
Description	Part Number	Drawing	Figure
Contact insert 7 + ⏚, 42 V~ in metal housings/250 V in thermoplastic housings (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A007 000 2		
Male insert for turned crimp contacts	C146 10A007 500 2		
Female insert for stamped crimp contacts	C146 10B007 000 2		
Female insert for turned crimp contacts	C146 10B007 500 2		

Pin layout



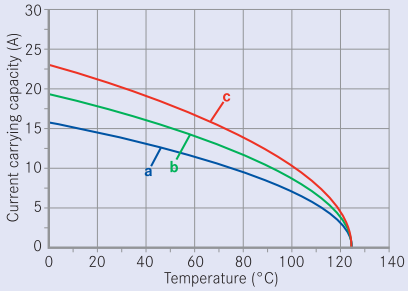
Description	Part Number	Drawing	Figure
Contact insert 8, 42 V~ in metal housings/250 V in thermoplastic housings (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A008 000 2		
Male insert for turned crimp contacts	C146 10A008 500 2		
Female insert for stamped crimp contacts	C146 10B008 000 2		
Female insert for turned crimp contacts	C146 10B008 500 2		

Pin layout (Note: For use up to 42 V~, the PE contact can be used as regular contact.)



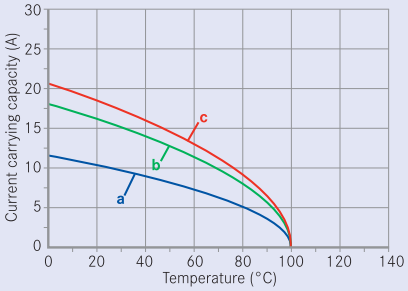
Derating curves

Stamped contacts

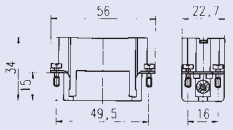
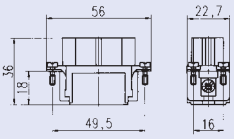
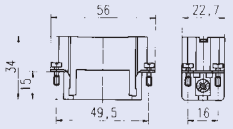
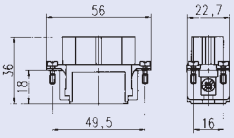


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm² & 2.5 mm²
c	1.5 mm² - 2.5 mm² (High current)

Turned contacts

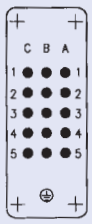


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²

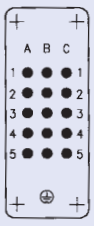
Description	Part Number	Drawing	Figure
Contact insert 15 + ⏚ (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A015 000 2		
Male insert for turned crimp contacts	C146 10A015 500 2		
Female insert for stamped crimp contacts	C146 10B015 000 2		
Female insert for turned crimp contacts	C146 10B015 500 2		
Contact insert 15 + ⏚, 2 x PE-termination (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A015 060 2		
Female insert for stamped crimp contacts	C146 10B015 060 2		

Pin layout

Male insert

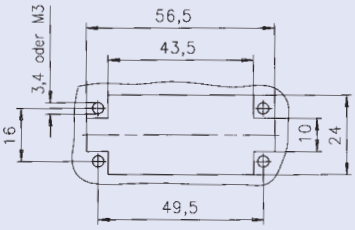


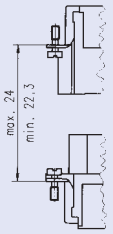
Female insert



Assembly instruction

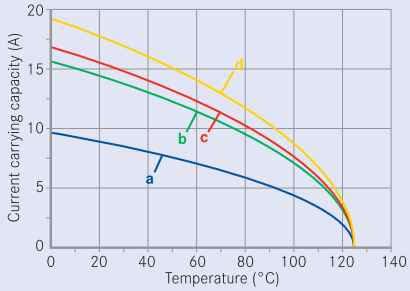
Panel cut out (insert)





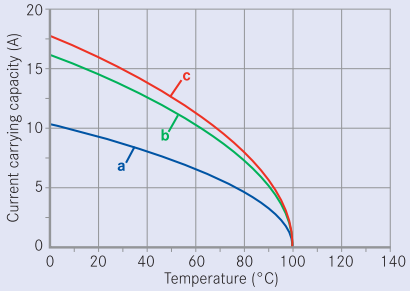
Derating curves

Stamped contacts

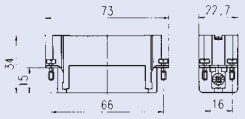
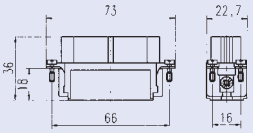
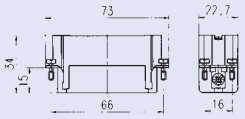
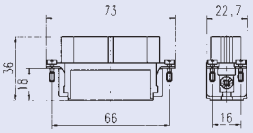


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²
d	1.5 mm² - 2.5 mm² (High current)

Turned contacts

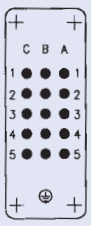


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²

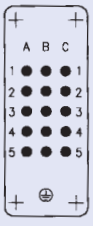
Description	Part Number	Drawing	Figure
Contact insert 25 + ⏚ (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A025 000 2		
Male insert for turned crimp contacts	C146 10A025 500 2		
Female insert for stamped crimp contacts	C146 10B025 000 2		
Female insert for turned crimp contacts	C146 10B025 500 2		
Contact insert 25 + ⏚, 2 x PE-termination (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A025 060 2		
Female insert for stamped crimp contacts	C146 10B025 060 2		

Pin layout

Male insert

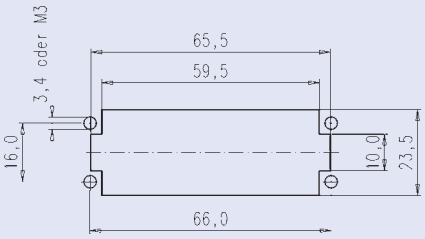


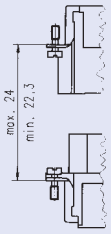
Female insert



Assembly instruction

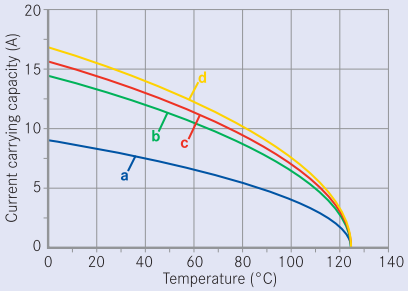
Panel cut out (insert)





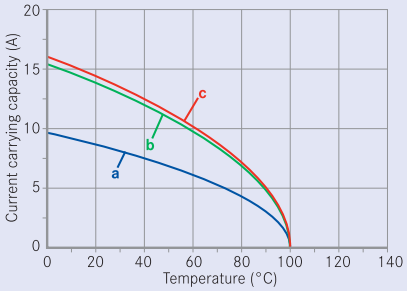
Derating curves

Stamped contacts

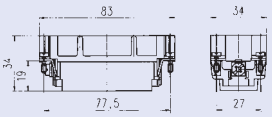
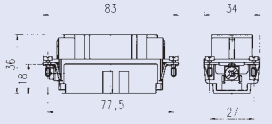
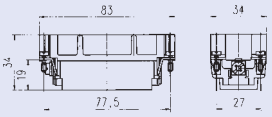
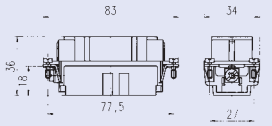


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²
d	1.5 mm² - 2.5 mm² (High current)

Turned contacts

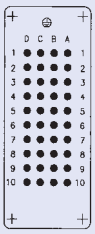


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²

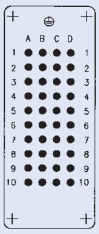
Description	Part Number	Drawing	Figure
Contact insert 40 + ⏚ (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A040 000 2		
Male insert for turned crimp contacts	C146 10A040 500 2		
Female insert for stamped crimp contacts	C146 10B040 000 2		
Female insert for turned crimp contacts	C146 10B040 500 2		
Contact insert 40 + ⏚, 2 x PE-termination (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A040 060 2		
Female insert for stamped crimp contacts	C146 10B040 060 2		

Pin layout

Male insert

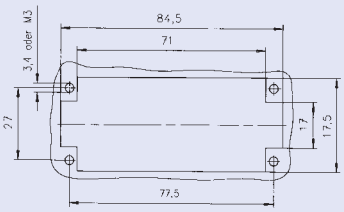


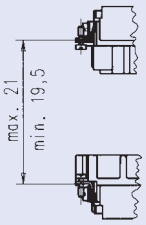
Female insert



Assembly instruction

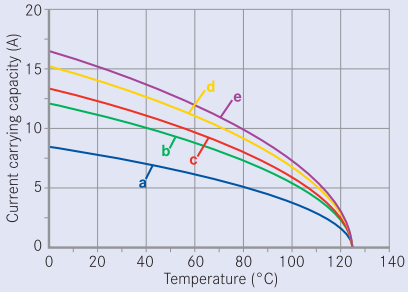
Panel cut out (insert)





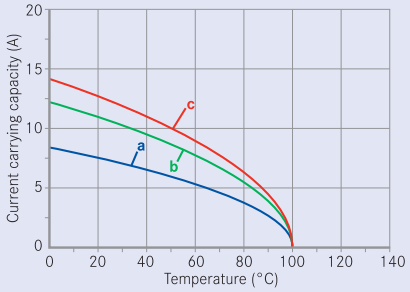
Derating curves

Stamped contacts

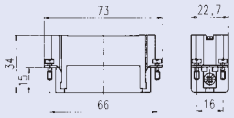
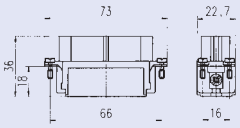


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²
d	1.5 mm² (High current)
e	2.5 mm² (High current)

Turned contacts

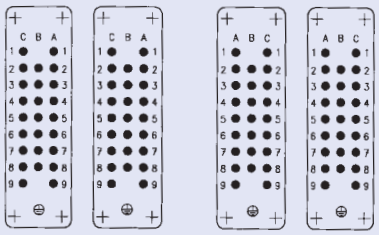


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²

Description	Part Number	Drawing	Figure
Contact insert 50 + ⏚ (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A025 000 2 + C146 10A025 005 2		
Male insert for turned crimp contacts	C146 10A025 500 2 + C146 10A025 505 2		
Female insert for stamped crimp contacts	C146 10B025 000 2 + C146 10B025 005 2		
Female insert for turned crimp contacts	C146 10B025 500 2 + C146 10B025 505 2		

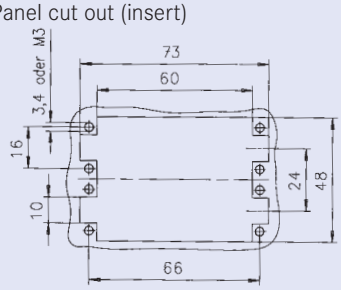
Pin layout

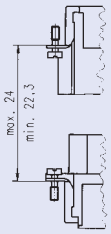
Male insert Female insert



Assembly instruction

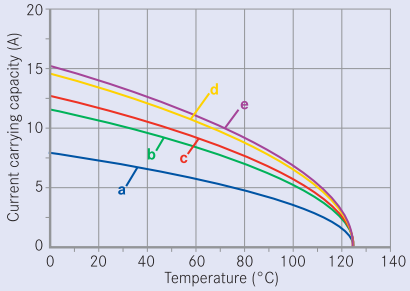
Panel cut out (insert)





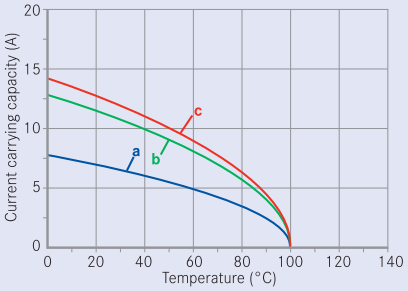
Derating curves

Stamped contacts

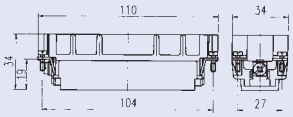
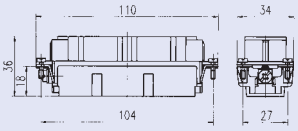
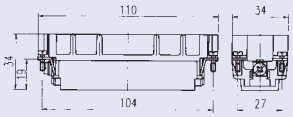
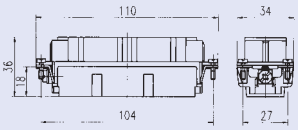


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²
d	1.5 mm² (High current)
e	2.5 mm² (High current)

Turned contacts

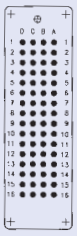


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²

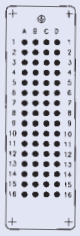
Description	Part Number	Drawing	Figure
Contact insert 64 + ⏚ (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A064 000 2		
Male insert for turned crimp contacts	C146 10A064 500 2		
Female insert for stamped crimp contacts	C146 10B064 000 2		
Female insert for turned crimp contacts	C146 10B064 500 2		
Contact insert 64 + ⏚, 2 x PE-termination (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A064 060 2		
Female insert for stamped crimp contacts	C146 10B064 060 2		

Pin layout

Male insert

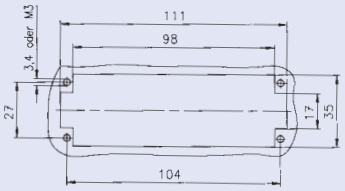


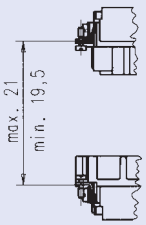
Female insert



Assembly instruction

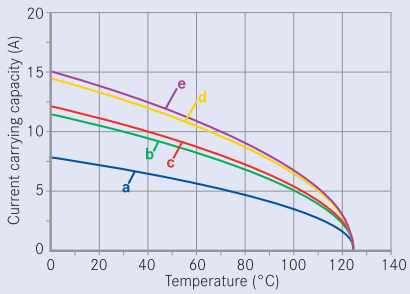
Panel cut out (insert)





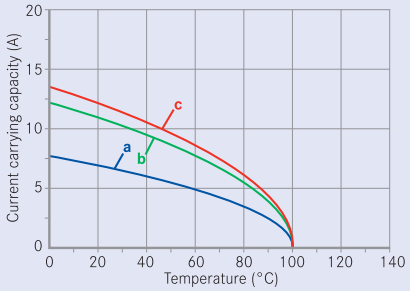
Derating curves

Stamped contacts

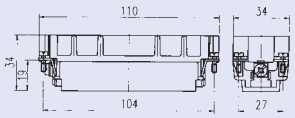
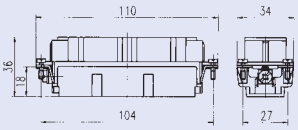


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²
d	1.5 mm² (High current)
e	2.5 mm² (High current)

Turned contacts

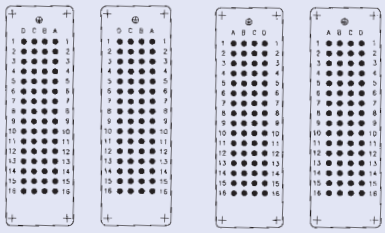


Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²

Bezeichnung	Bestellnummer	Maßzeichnung	Abbildung
Contact insert 128 + ⏚ (Please order contacts separately, see page 34)			
Male insert for stamped crimp contacts	C146 10A064 000 2 + C146 10A064 005 2		
Male insert for turned crimp contacts	C146 10A064 500 2 + C146 10A064 505 2		
Female insert for stamped crimp contacts	C146 10B064 000 2 + C146 10B064 005 2		
Female insert for turned crimp contacts	C146 10B064 500 2 + C146 10B064 505 2		

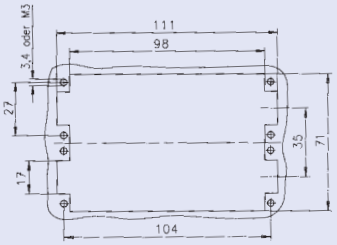
Pin layout

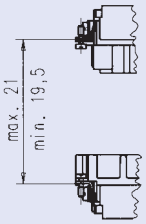
Male insert Female insert



Assembly instruction

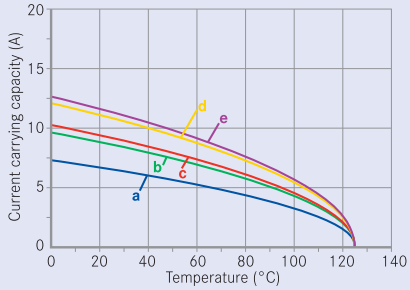
Panel cut out (insert)





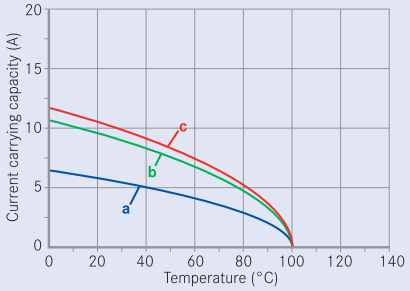
Derating curves

Stamped contacts



Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²
d	1.5 mm² (High current)
e	2.5 mm² (High current)

Turned contacts



Curve	Wire gauge
a	0.5 mm²
b	1.5 mm²
c	2.5 mm²

Large range of wire gauges

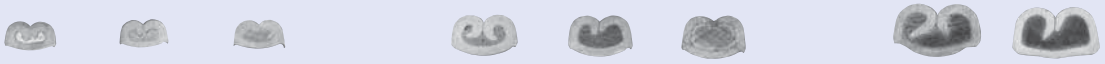
.N01 016 0003 (1)

.N01 016 0002 (1)

.N01 016 0005 (1)

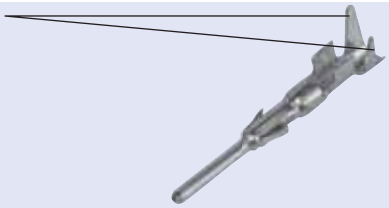
Gas-tight (coldwelding)

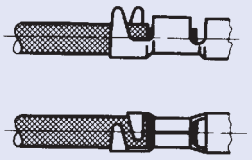
0.14	0.25	0.5	0.5	1.0	1.5	1.5	2.5



Stamped crimp contacts with insulation crimp, to absorbe mechanical stress from the crimped connection

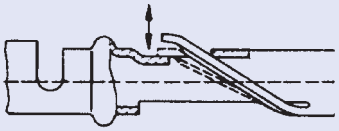
Insulation grip



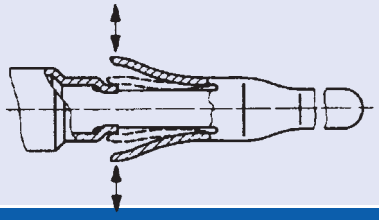


Mechanical retention spring stop on female and male contact

Female contact

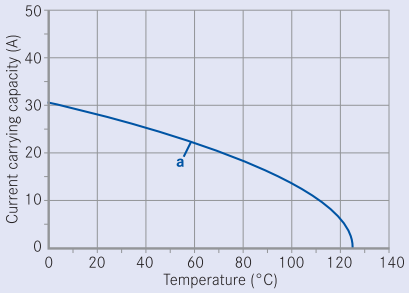


Male contact

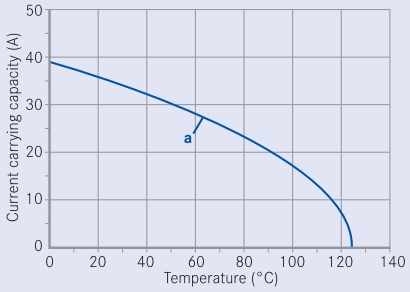


High current carrying capacity

Example single contact



Curve a: 2.5 mm² Standard contact. wire gauge



Curve a: 2.5 mm2 High current contact, wire gauge

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Stamped crimp contacts		
Electrical Characteristics		
Contact resistance	IEC 60512-2-1	≤ 5 m Ω
Climatical Characteristics		
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Male contact		Cu Zn (brass)
Female contact		Cu Sn (tin bronce)
Contact plating		Ag (silver) / Au (gold)
Turned crimp contacts		
Electrical Characteristics		
Contact resistance	IEC 60512-2-1	≤ 5 m Ω
Climatical Characteristics		
Upper temperature	IEC 60512-11-9	+ 100 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Male contact		Cu Zn (brass)
Female contact		Cu Zn (brass)
Contact plating		Ag (silver) / Au (gold)

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Stamped single contacts						
silver plating standard	0.14 - 0.5 mm²	26 - 20	100	VN01 016 0003 (1)	VN02 016 0003 (1)	
	0.5 - 1.5 mm²	20 - 16	100	VN01 016 0002 (1)	VN02 016 0002 (1)	
	1.5 - 2.5 mm²	16 - 14	100	VN01 016 0005 (1)	VN02 016 0005 (1)	
silver plating high current	0.5 - 1.5 mm²	20 - 16	100	VN01 016 0015 (1)	VN02 016 0015 (1)	
	1.5 - 2.5 mm²	16 - 14	100	VN01 016 0016 (1)	VN02 016 0016 (1)	
gold plating standard	0.14 - 0.5 mm²	26 - 20	100	VN01 016 0003 (2)	VN02 016 0003 (2)	
	0.5 - 1.5 mm²	20 - 16	100	VN01 016 0002 (2)	VN02 016 0002 (2)	
	1.5 - 2.5 mm²	16 - 14	100	VN01 016 0005 (2)	VN02 016 0005 (2)	
Stamped Contacts on reel for hand crimp tools						
silver plating standard	0.14 - 0.5 mm²	26 - 20	200	ZN01 016 0003 (1)	ZN02 016 0003 (1)	
	0.5 - 1.5 mm²	20 - 16	200	ZN01 016 0002 (1)	ZN02 016 0002 (1)	
	1.5 - 2.5 mm²	16 - 14	200	ZN01 016 0005 (1)	ZN02 016 0005 (1)	
silver plating high current	0.5 - 1.5 mm²	20 - 16	200	ZN01 016 0015 (1)	ZN02 016 0015 (1)	
	1.5 - 2.5 mm²	16 - 14	100	ZN01 016 0016 (1)	ZN02 016 0016 (1)	
gold plating standard	0.14 - 0.5 mm²	26 - 20	200	ZN01 016 0003 (2)	ZN02 016 0003 (2)	
	0.5 - 1.5 mm²	20 - 16	200	ZN01 016 0002 (2)	ZN02 016 0002 (2)	
	1.5 - 2.5 mm²	16 - 14	200	ZN01 016 0005 (2)	ZN02 016 0005 (2)	
Stamped contacts on reel for crimp machines contact feeding left hand side						
silver plating standard	0.14 - 0.5 mm²	26 - 20	2000	TN01 016 0003 (1)	TN02 016 0003 (1)	
	0.5 - 1.5 mm²	20 - 16	2000	TN01 016 0002 (1)	TN02 016 0002 (1)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 016 0005 (1)	TN02 016 0005 (1)	
silver plating high current	0.5 - 1.5 mm²	20 - 16	2000	TN01 016 0015 (1)	TN02 016 0015 (1)	
	1.5 - 2.5 mm²	18 - 14	2000	TN01 016 0016 (1)	TN02 016 0016 (1)	
gold plating standard	0.14 - 0.5 mm²	26 - 20	2000	TN01 016 0003 (2)	TN02 016 0003 (2)	
	0.5 - 1.5 mm²	20 - 16	2000	TN01 016 0002 (2)	TN02 016 0002 (2)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 016 0005 (2)	TN02 016 0005 (2)	

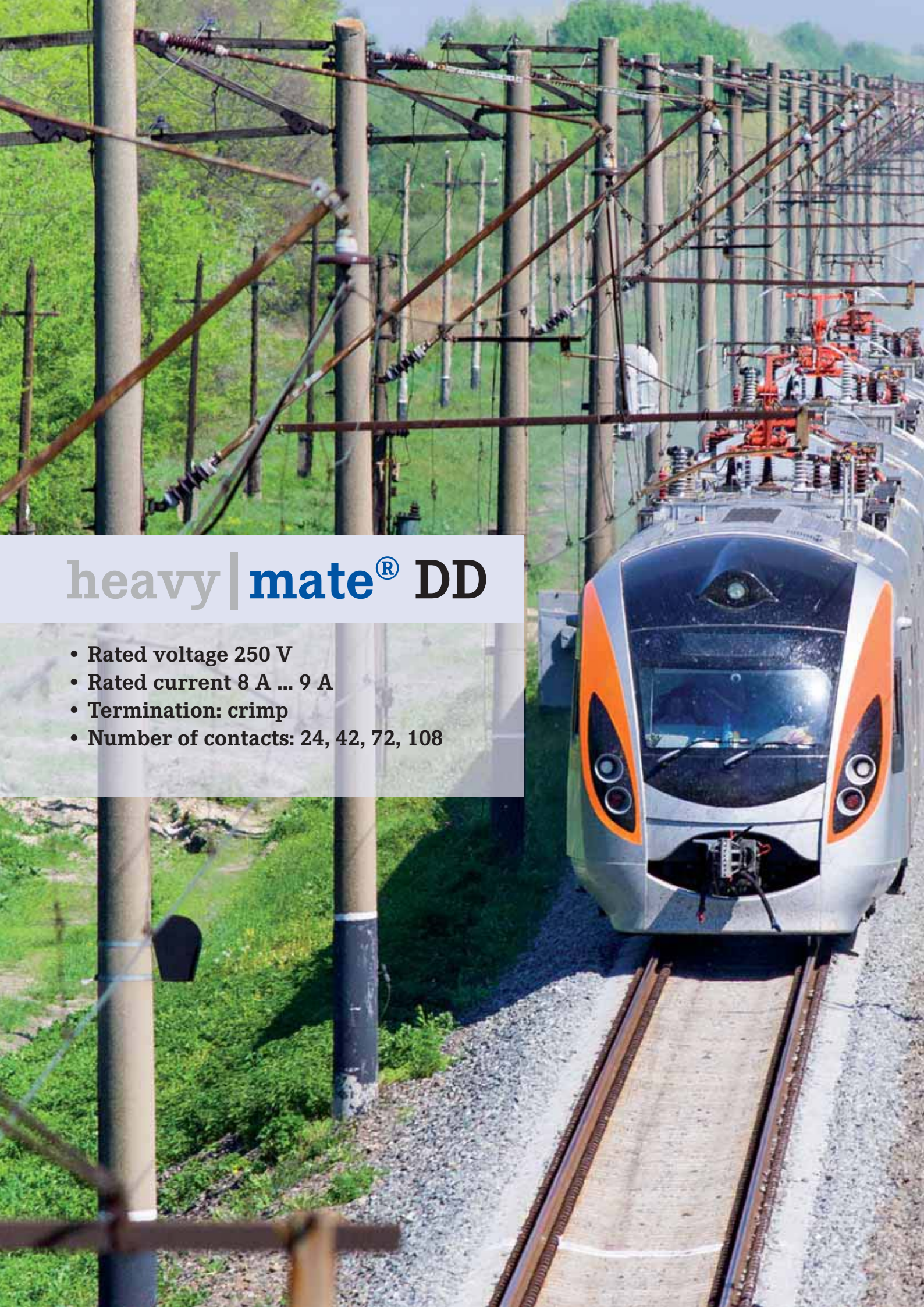
Tools for stamped crimp contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 1
Service crimping tool	0.14 - 0.5 mm² 0.5 - 1.5 mm²	-	-	TA 0100 146
Crimping tool for single contacts	0.14 - 0.5 mm² 0.5 - 1.5 mm² 1.5 - 2.5 mm²	TA 0001 146 000 1 TA 0002 146 000 1 TA 0007 146 000 3	TA 0000 202 TA 0000 163 TA 0000 141	TA 0000 TA 0500

Further tools see catalogue "Tools"

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned crimp contacts single contact						
silver plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (1)C	VN02 016 0024 (1)C	
	0.5 mm²	20	100	VN01 016 0025 (1)C	VN02 016 0025 (1)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (1)C	VN02 016 0026 (1)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (1)C	VN02 016 0027 (1)C	
	2.5 mm²	14	100	VN01 016 0028 (1)C	VN02 016 0028 (1)C	
gold plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (2)C	VN02 016 0024 (2)C	
	0.5 mm²	20	100	VN01 016 0025 (2)C	VN02 016 0025 (2)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (2)C	VN02 016 0026 (2)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (2)C	VN02 016 0027 (2)C	
	2.5 mm²	14	100	VN01 016 0028 (2)C	VN02 016 0028 (2)C	

Tools for turned crimp contacts				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 1
Service crimping tool	0.14 - 0.5 mm² 0.5 - 1.5 mm²	-	-	TA 0100 146
Further tools see catalogue "Tools"				



heavy | mate® DD

- Rated voltage 250 V
- Rated current 8 A ... 9 A
- Termination: crimp
- Number of contacts: 24, 42, 72, 108

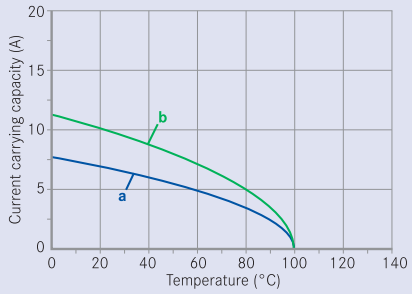
Approvals, Testhouse	Characteristics	Approval-Number
SEV	250 V, 10 A	
UL	600 V, 8,5 A	E 63093
CSA	600 V, 10 A	LR 700721

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

General Characteristics	Standard	Value			
Number of contacts		24 + ⏚	42 + ⏚	72 + ⏚	108 + ⏚
Termination technique		crimp			
Wire gauge		0.14 mm² - 2.5 mm²			
Flammability	UL 94	V-0			
Electrical Characteristics					
Rated voltage	IEC 60664-1	250 V (600 V UL / CSA)			
Pollution degree	IEC 60664-1	2 (3 mated and locked)			
Installation (overvoltage) category	IEC 60664-1	III			
Material group	IEC 60664-1	III b			
Rated impulse withstand voltage	IEC 60664-1	4 kV			
Current carrying capacity	IEC 60512-5-2	see derating curves			
Contact resistance	IEC 60512-2-1	≤ 5 m Ω			
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω			
Climatical Characteristics					
Climatic category	IEC 60068-1	40 / 100 / 21			
Upper temperature	IEC 60512-11-9	+ 100 °C			
Lower temperature	IEC 60512-11-10	- 40 °C			
Mechanical Characteristics					
Weight pin insert		44 g	50 g	63 g	86 g
IP-degree of protection pin insert	IEC 60529	unmated IP00		mated IP20	
IP-degree of protection socket insert	IEC 60529	unmated IP20		mated IP20	
Weight socket insert		41 g	50 g	67 g	88 g
Mechanical operation	IEC 60512-9-1	> 500 mating cycles			
Materials					
Insert		PBTP			
Colour insert		grey			
Contacts		CuZn (brass)			
Contact plating		Ag (silver)			

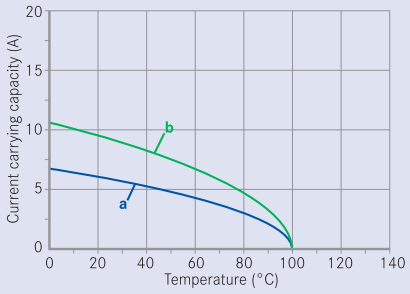
Derating curves

24 + ⏚



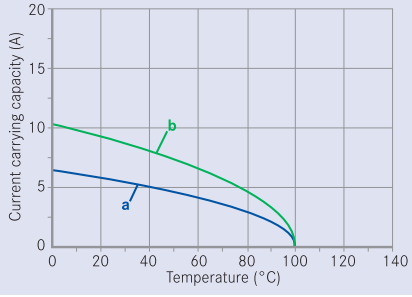
Curve	Wire gauge
a	0.75 mm²
b	1.5 mm²

42 + ⏚



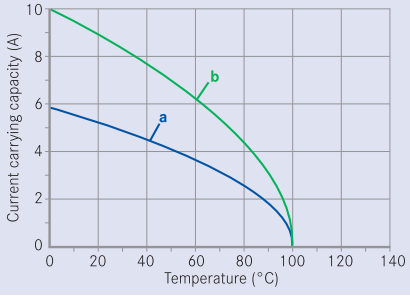
Curve	Wire gauge
a	0.75 mm²
b	1.5 mm²

72 + ⏚

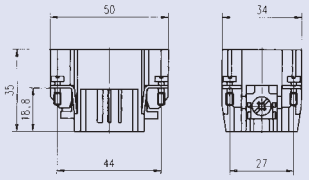
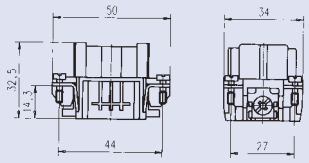
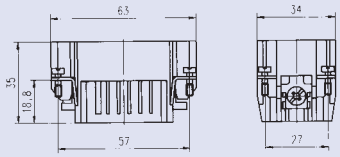
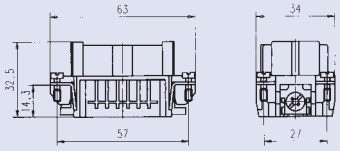
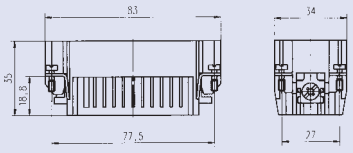
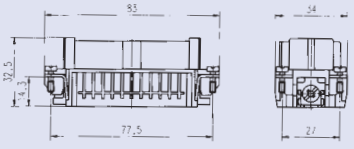


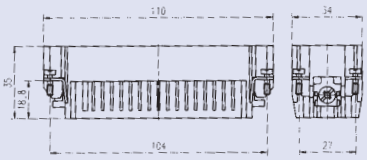
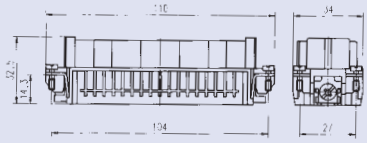
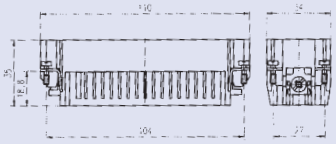
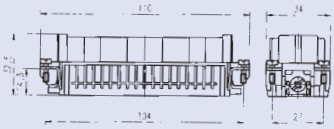
Curve	Wire gauge
a	0.75 mm²
b	1.5 mm²

108 + ⏚

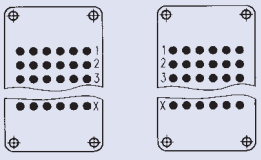


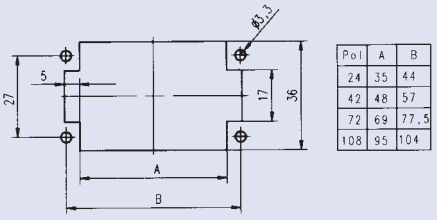
Curve	Wire gauge
a	0.75 mm²
b	1.5 mm²

Description	Part Number	Drawing	Figure
Contact insert 24 + ⏚ for turned contacts Size E 6 (Please order contacts separately, see page 43)			
Male insert for turned crimp contacts	C146 10A024 000 9		
Female insert for turned crimp contacts	C146 10B024 000 9		
Contact insert 42 + ⏚ for turned contacts Size E 10 (Please order contacts separately, see page 43)			
Male insert for turned crimp contacts	C146 10A042 000 9		
Female insert for turned crimp contacts	C146 10B042 000 9		
Contact insert 72 + ⏚ for turned contacts Size E 16 (Please order contacts separately, see page 43)			
Male insert for turned crimp contacts	C146 10A072 000 9		
Female insert for turned crimp contacts	C146 10B072 000 9		

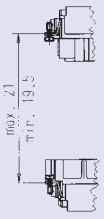
Description	Part Number	Drawing	Figure
Contact insert 108 + ⏚ for turned contacts Size E 24 (Please order contacts separately, see page 43)			
Male insert for turned crimp contacts	C146 10A108 000 9		
Female insert for turned crimp contacts	C146 10B108 000 9		
Contact insert 216 + ⏚ for turned contacts Size E 48 (Please order contacts separately, see page 43)			
Male insert for turned crimp contacts	C146 10A108 000 9 + C146 10A108 005 9		
Female insert for turned crimp contacts	C146 10B108 000 9 + C146 10B108 005 9		

Pin layout	Assembly instruction
Male insert Female insert	Panel cut out (insert)





Pol	A	B
24	35	44
42	48	57
72	69	77.5
108	95	104



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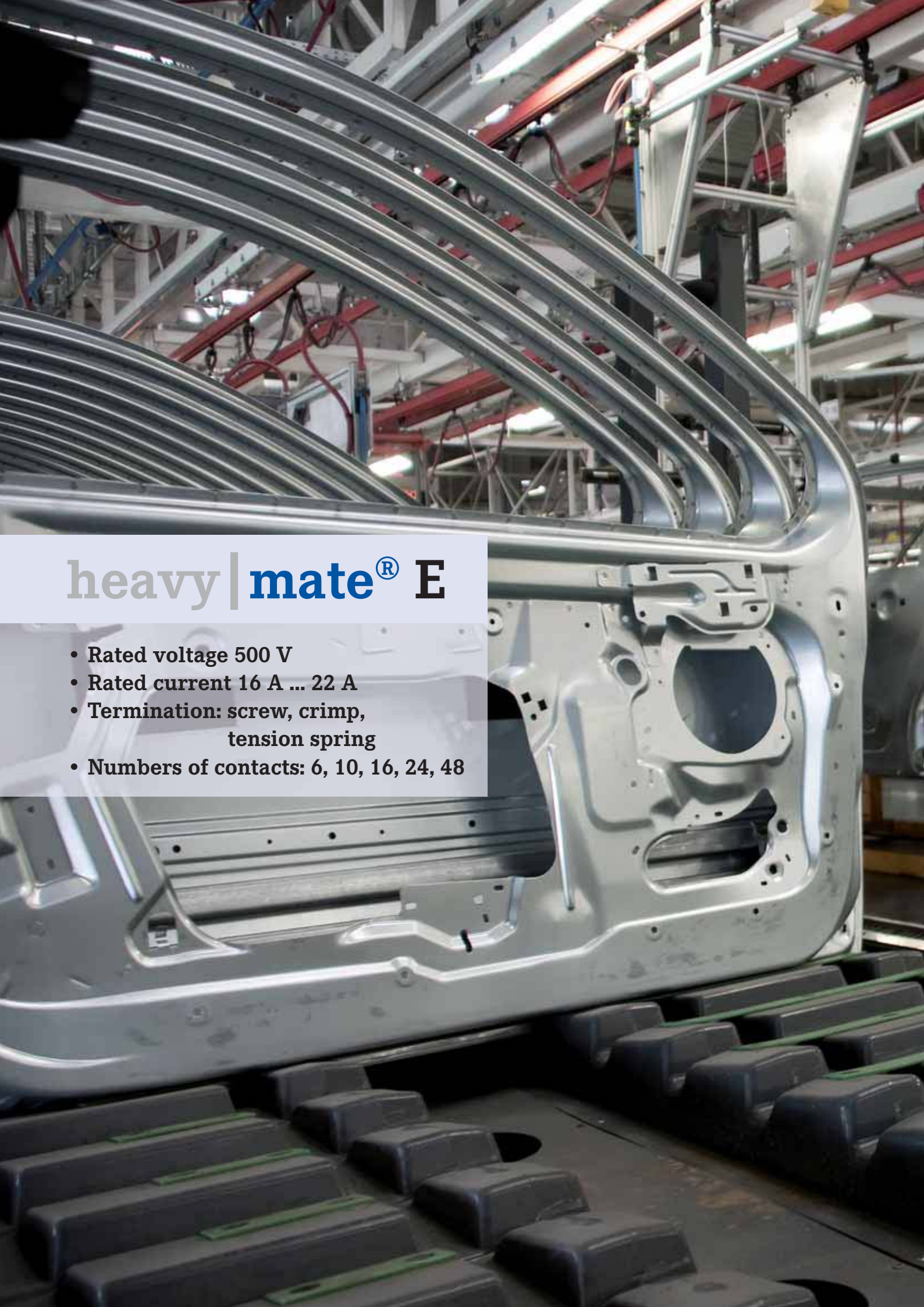
Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned crimp contacts single contact 1.6mm						
silver plating	0.14 - 0,37 mm²	26 - 22	100	VN01 016 0024 (1)C	VN02 016 0024 (1)C	
	0.5 mm²	20	100	VN01 016 0025 (1)C	VN02 016 0025 (1)C	
	0.75 - 1,0 mm²	20 - 16	100	VN01 016 0026 (1)C	VN02 016 0026 (1)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (1)C	VN02 016 0027 (1)C	
	2.5 mm²	14	100	VN01 016 0028 (1)C	VN02 016 0028 (1)C	
gold plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (2)C	VN02 016 0024 (2)C	
	0.5 mm²	20	100	VN01 016 0025 (2)C	VN02 016 0025 (2)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (2)C	VN02 016 0026 (2)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (2)C	VN02 016 0027 (2)C	
	2.5 mm²	14	100	VN01 016 0028 (2)C	VN02 016 0028 (2)C	

Tools for turned crimp contacts				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 1
Service crimping tool	0.14 - 0.5 mm² 0.5 - 1.5 mm²	-	-	TA 0100 146
Further tools see catalogue “Tools”				



heavy | mate® E

- Rated voltage 500 V
- Rated current 16 A ... 22 A
- Termination: screw, crimp, tension spring
- Numbers of contacts: 6, 10, 16, 24, 48

Approvals, Testhouse	Characteristics	Approval-Number
SEV	400 V, 16 A	
UL	600 V, 16 A	E 63093
CSA	600 V, 16 A	48932

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

General information

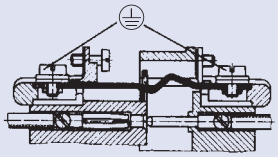
- Contact inserts without crimp contacts.
- Connectors series heavy|mate® E may be engaged or disengaged when live but without electrical load. If these connectors are mated or unmated under load, the load shall be reduced to 10 % of the rated current.
- Crimping tools and processing instructions see separate catalogue „Tools“.
- Low and high profile housings are usable.
- If wire ferrule are used, screw terminals without wire protection are preferred.

No standard for this series, but:

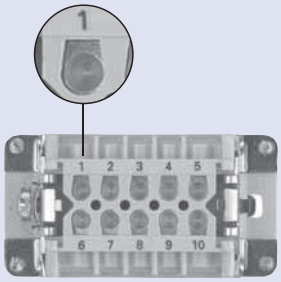
Interchangeable with other products
a) contact insert to contact insert 6, 10, 16, 24 contacts
b) contact insert to housing 6, 10 ,16, 24 contacts

Housings are designed according to DIN EN 175 301 - 801

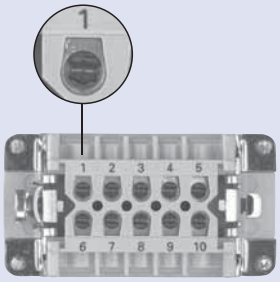
First-to-mate last-to-break protective ground contact



Contact inserts for screw termination, screw termination with wire protection and for crimp termination



Screw termination



Screw termination with wire protection

Crimp termination

Range of housings

Size E6

Size E10

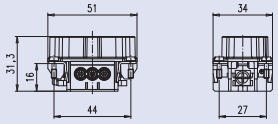
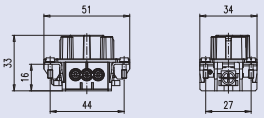
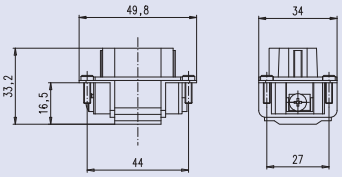
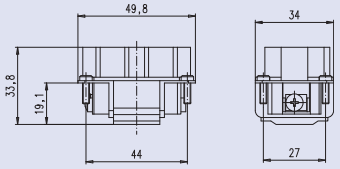
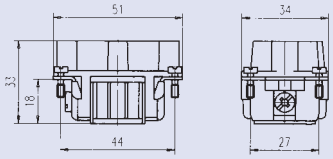
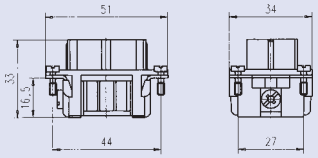
Size E16

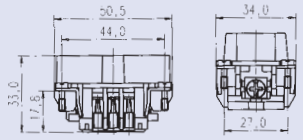
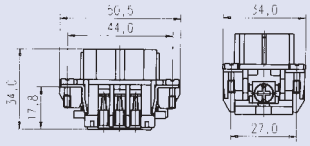
Size E24

Size E48

General Characteristics	Standard	Value				
Number of contacts		6 + ⏚	10 + ⏚	16 + ⏚	24 + ⏚	48 + ⏚
Termination technique		crimp / screw / tension spring				
Wire gauge		0.5 - 4 mm^2				
Flammability	UL 94	V-0				
Electrical Characteristics						
Rated voltage	IEC 60664-1	max. 500 V (600 V UL / CSA [1])				
Pollution degree	IEC 60664-1	3				
Material group	IEC 60664-1	III b				
Installation (overvoltage) category	IEC 60664-1	III				
Rated impulse withstand voltage	IEC 60664-1	6,0 kV				
Current carrying capacity	IEC 60512-5-2	see derating curves				
Rated current T_{amp} = 40 °C		22 A	19 A	19 A	18 A	18 A
Contact resistance	IEC 60512-2-1	< 5 mΩ				
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω				
Climatical Characteristics						
Climatic category	IEC 60068-1	40 / 125 / 21				
Upper temperature	IEC 60512-11-9	+ 125 °C				
Lower temperature	IEC 60512-11-10	- 40°C				
Mechanical Characteristics						
IP-degree of protection pin insert [2]	IEC 60529	unmated IP00			mated IP20	
IP-degree of protection socket insert [2]	IEC 60529	unmated IP20			mated IP20	
Weight: male insert crimp (for stamped contacts) female insert crimp (for stamped contacts) male insert screw female insert screw		 33 g 33 g 43 g 43 g	 39 g 39 g 57 g 57 g	 45 g 49 g 78 g 78 g	 55 g 62 g 105 g 106 g	 110 g 124 g 210 g 212 g
Mechanical operation	IEC 60512-9-1	> 500 mating cycles				
Materials						
Insert		PC GV (Polycarbonat)				
Colour insert		grey				
Screw contacts		CuZn (brass)				
Contact plating		Ag (silver) / Au (gold)				

[1] Label for CSA application see page 228
[2] IP-degree of protection on termination side of screw version IP 10

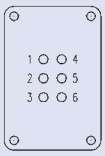
Description	Part Number	Drawing	Figure
Screw termination			
Male insert for screw termination	C146 10A006 002 1		
Male insert with wire protection for screw termination	C146 10A006 102 1		
Female insert for screw termination	C146 10B006 002 1		
Female insert with wire protection for screw termination	C146 10B006 102 1		
Tension spring			
Male insert with Tension spring	C146 10A006 400 1		
Female insert with Tension spring	C146 10B006 400 1		
Stamped crimp contacts (Please order contacts separately, see page 58)			
Male insert for stamped crimp contacts	C146 10A006 000 1		
Female insert for stamped crimp contacts	C146 10B006 000 1		

Description	Part Number	Drawing	Figure
Turned crimp contacts (Please order contacts separately, see page 58)			
Male insert for turned crimp contacts	C146 10A006 500 1		
Female insert for turned crimp contacts	C146 10B006 500 1		

Pin layout

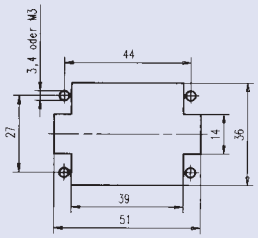
Male insert

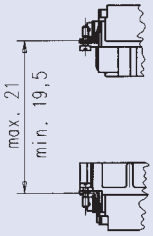
Female insert



Assembly instruction

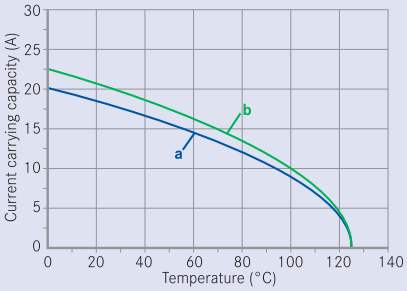
Panel cut out (insert)



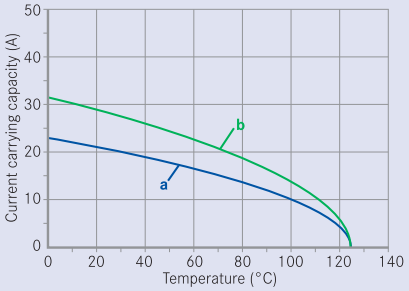


Derating curves

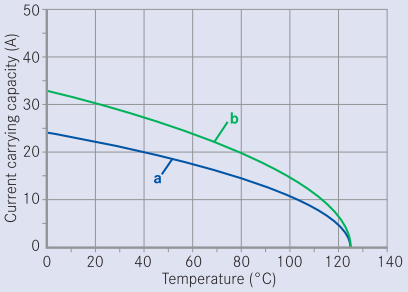
Stamped contacts



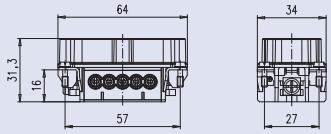
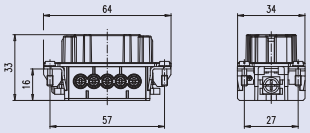
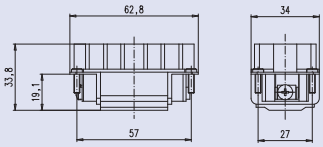
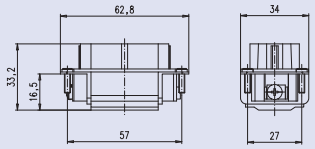
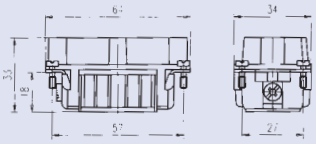
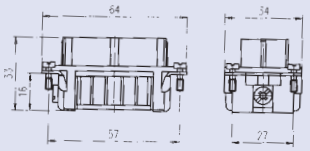
Turned contacts

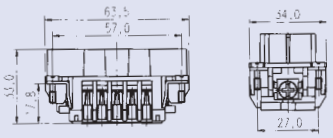
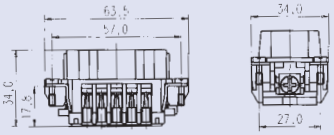


Screw termination



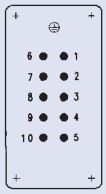
Curve a: 1.5 mm² wire gauge Curve b: 2.5 mm² wire gauge

Description	Part Number	Drawing	Figure
Screw termination			
Male insert for screw termination	C146 10A010 002 1		
Male insert with wire protection for screw termination	C146 10A010 102 1		
Female insert for screw termination	C146 10B010 002 1		
Female insert with wire protection for screw termination	C146 10B010 102 1		
Tension spring			
Male insert with Tension spring	C146 10A010 400 1		
Female insert with Tension spring	C146 10B010 400 1		
Stamped crimp contacts (Please order contacts separately, see page 58)			
Male insert for stamped crimp contacts	C146 10A010 000 1		
Female insert for stamped crimp contacts	C146 10B010 000 1		

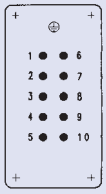
Description	Part Number	Drawing	Figure
Turned crimp contacts (Please order contacts separately, see page 58)			
Male insert for turned crimp contacts	C146 10A010 500 1		
Female insert for turned crimp contacts	C146 10B010 500 1		

Pin layout

Male insert

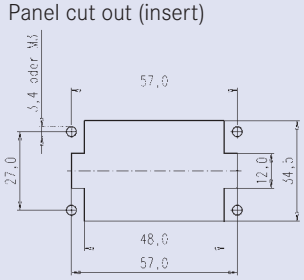


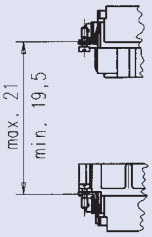
Female insert



Assembly instruction

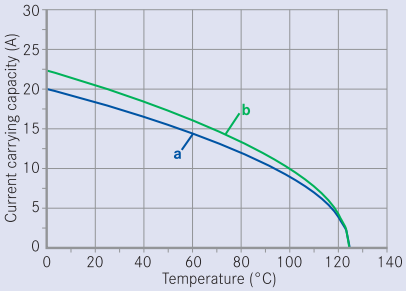
Panel cut out (insert)



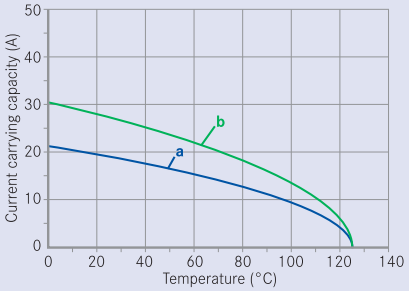


Derating curves

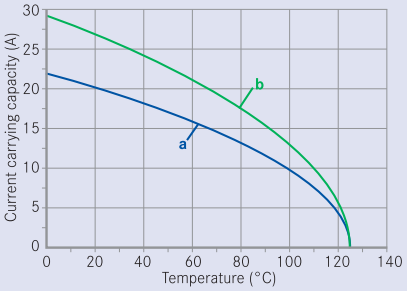
Stamped contacts



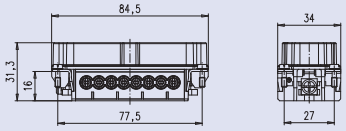
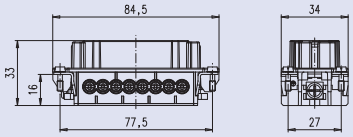
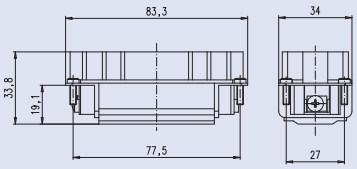
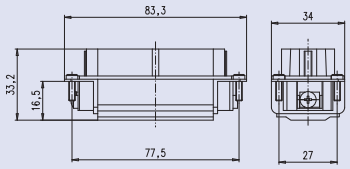
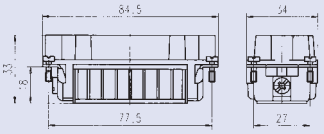
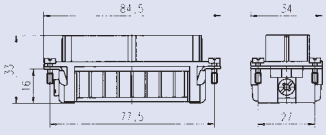
Turned contacts

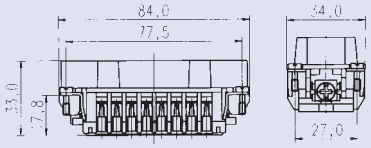
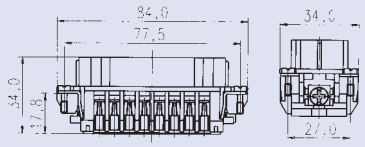


Screw termination



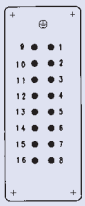
Curve a: 1.5 mm² wire gauge Curve b: 2.5 mm² wire gauge

Description	Part Number	Drawing	Figure
Screw termination			
Male insert for screw termination	C146 10A016 002 1		
Male insert with wire protection for screw termination	C146 10A016 102 1		
Female insert for screw termination	C146 10B016 002 1		
Female insert with wire protection for screw termination	C146 10B016 102 1		
Tension spring			
Male insert with Tension spring	C146 10A016 400 1		
Female insert with Tension spring	C146 10B016 400 1		
Stamped crimp contacts (Please order contacts separately, see page 58)			
Male insert for stamped crimp contacts	C146 10A016 000 1		
Female insert for stamped crimp contacts	C146 10B016 000 1		

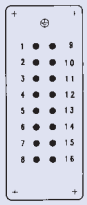
Description	Part Number	Drawing	Figure
Turned crimp contacts (Please order contacts separately, see page 58)			
Male insert for turned crimp contacts	C146 10A016 500 1		
Female insert for turned crimp contacts	C146 10B016 500 1		

Pin layout

Male insert

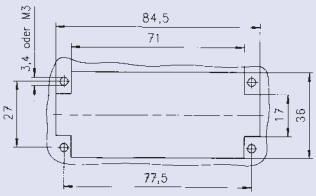


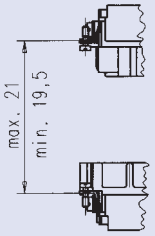
Female insert



Assembly instruction

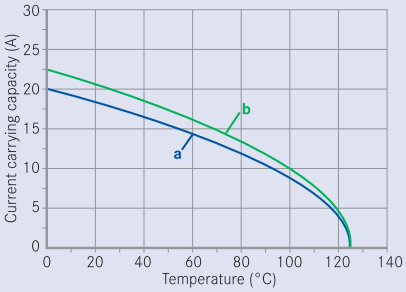
Panel cut out (insert)



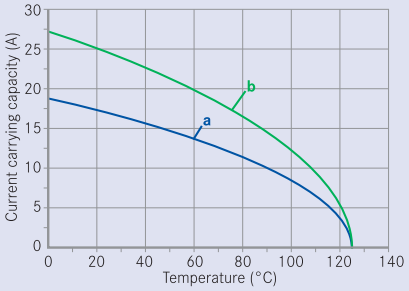


Derating curves

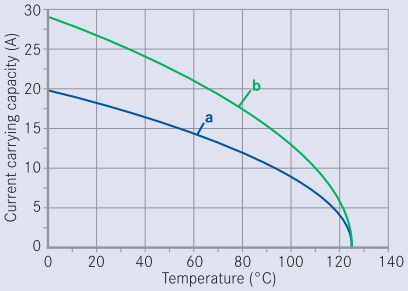
Stamped contacts



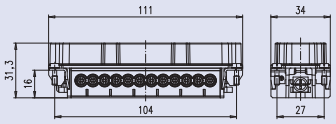
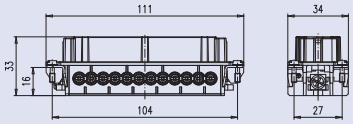
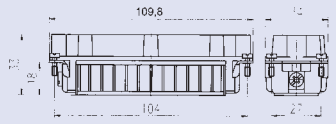
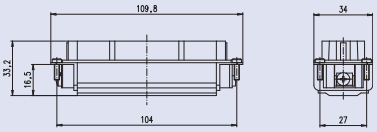
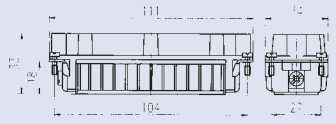
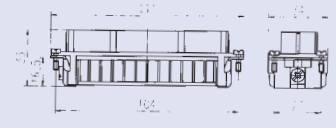
Turned contacts

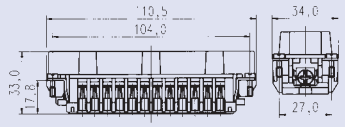
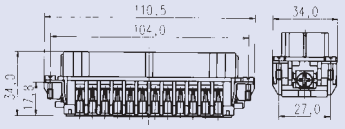


Screw termination



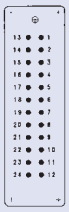
Curve a: 1.5 mm² wire gauge Curve b: 2.5 mm² wire gauge

Description	Part Number	Drawing	Figure
Screw termination			
Male insert for screw termination	C146 10A024 002 1		
Male insert with wire protection for screw termination	C146 10A024 102 1		
Female insert for screw termination	C146 10B024 002 1		
Female insert with wire protection for screw termination	C146 10B024 102 1		
Tension spring			
Male insert with Tension spring	C146 10A024 400 1		
Female insert with Tension spring	C146 10B024 400 1		
Stamped crimp contacts (Please order contacts separately, see page 58)			
Male insert for stamped crimp contacts	C146 10A024 000 1		
Female insert for stamped crimp contacts	C146 10B024 000 1		

Description	Part Number	Drawing	Figure
Turned crimp contacts (Please order contacts separately, see page 58)			
Male insert for turned crimp contacts	C146 10A024 500 1		
Female insert for turned crimp contacts	C146 10B024 500 1		

Pin layout

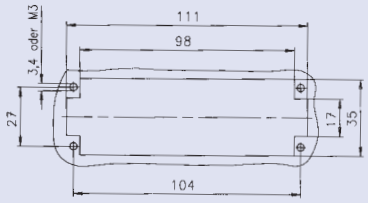
Male insert

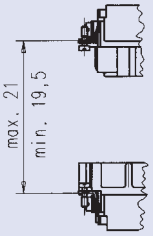


Female insert

Assembly instruction

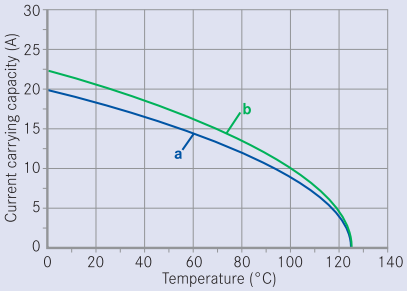
Panel cut out (insert)



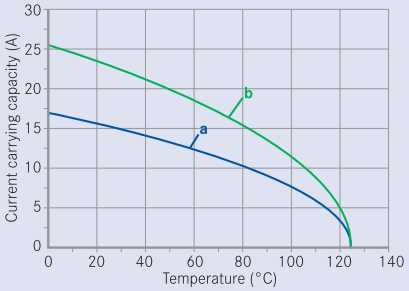


Derating curves

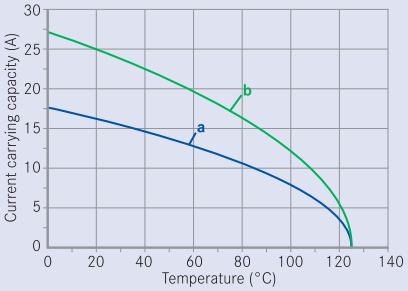
Stamped contacts



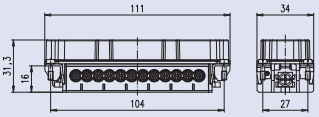
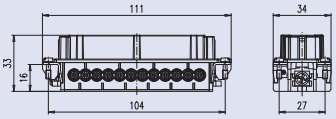
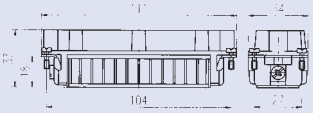
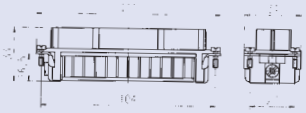
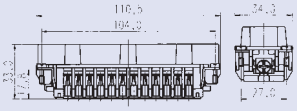
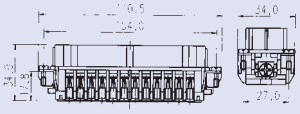
Turned contacts



Screw termination

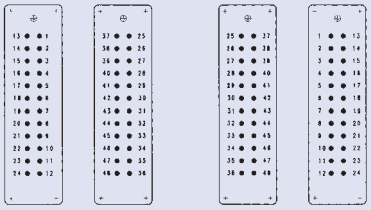


Curve a: 1.5 mm² wire gauge Curve b: 2.5 mm² wire gauge

Description	Part Number	Drawing	Figure
Screw termination			
Male insert for screw termination	C146 10A024 002 1 + C146 10A024 002 1		
Male insert with wire protection for screw termination	C146 10A024 102 1 + C146 10A024 102 1		
Female insert for screw termination	C146 10B024 002 1 + C146 10B024 002 1		
Female insert with wire protection for screw termination	C146 10B024 102 1 + C146 10B024 102 1		
Stamped crimp contacts (Please order contacts separately, see page 58)			
Male insert for stamped crimp contacts	C146 10A024 000 1 + C146 10A024 005 1		
Female insert for stamped crimp contacts	C146 10B024 000 1 + C146 10B024 005 1		
Turned crimp contacts (Please order contacts separately, see page 58)			
Male insert for turned crimp contacts	C146 10A024 500 1 + C146 10A024 505 1		
Female insert for turned crimp contacts	C146 10B024 500 1 + C146 10B024 505 1		

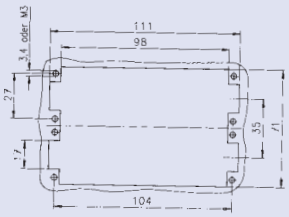
Pin layout

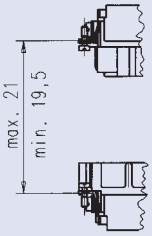
Male insert Female insert



Assembly instruction

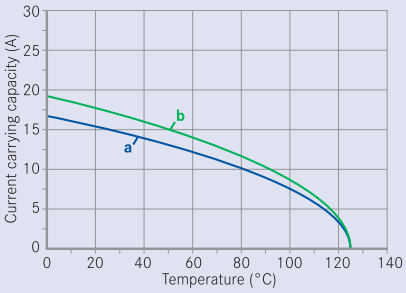
Panel cut out (insert)



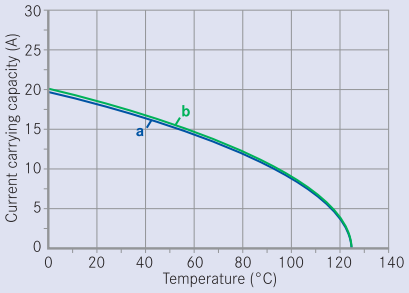


Derating curves

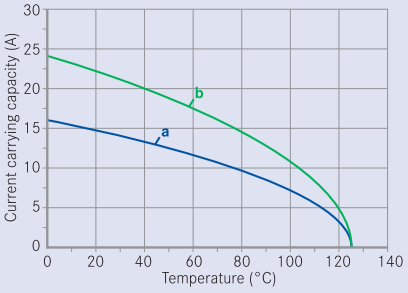
Stamped contacts



Turned contacts



Screw termination



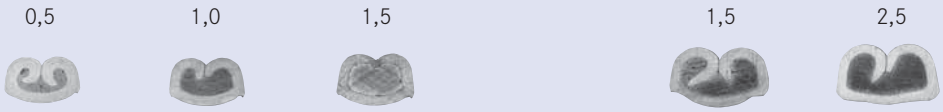
Curve a: 1.5 mm² wire gauge Curve b: 2.5 mm² wire gauge

Large range of wire gauges

N01 025 0001 (1)

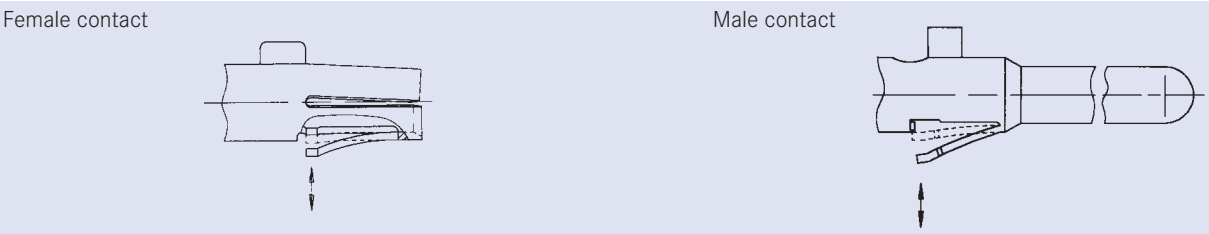
N01 025 0010 (1)

Gas-tight (coldwelding)



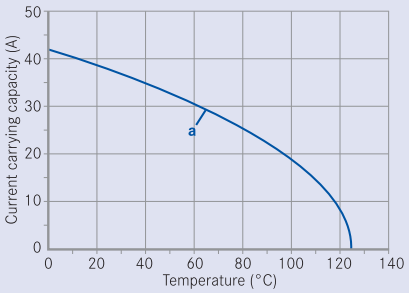
Stamped crimp contacts with insulation crimp, to absorbe mechanical stress from the crimped connection

Mechanical retention spring stop on female and male contact



High current carrying capacity

Example single contact



Curve a: 2.5 mm² wire gauge

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Stamped crimp contacts		
Electrical Characteristics		
Contact resistance	IEC 60512-2-1	< 5 m Ω
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Male contact		Cu Zn (brass)
Female contact		Cu Sn (tin bronce)
Contact plating		Ag (silver) / Au (gold)
Turned crimp contacts		
Electrical Characteristics		
Contact resistance	IEC 60512-2-1	≤ 5 m Ω
Climatical Characteristics		
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Male contact		Cu Zn (brass)
Female contact		Cu Zn (brass)
Contact plating		Ag (silver) / Au (gold)

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Stamped single contacts						
silver plating	0.5 - 1.5 mm²	20 - 16	100	VN01 025 0001 (101)	VN02 025 0001 (101)	
	1.5 - 2.5 mm²	16- 14	100	VN01 025 0010 (101)	VN02 025 0010 (101)	
gold plating	0.5 - 1.5 mm²	20 - 16	100	VN01 025 0001 (102)	VN02 025 0001 (102)	
	1.5 - 2.5 mm²	16- 14	100	VN01 025 0010 (102)	VN02 025 0010 (102)	
Stamped Contacts on reel for hand crimp tools						
silver plating	0.5 - 1.5 mm²	20 - 16	200	ZN01 025 0001 (1)	ZN02 025 0001 (1)	
	1.5 - 2.5 mm²	16 - 14	100	ZN01 025 0010 (1)	ZN02 025 0010 (1)	
gold plating	0.5 - 1.5 mm²	20 - 16	200	ZN01 025 0001 (2)	ZN02 025 0001 (2)	
	1.5 - 2.5 mm²	16 - 14	100	ZN01 025 0010 (2)	ZN02 025 0010 (2)	
Stamped contacts on reel for crimp machines contact feeding left hand side						
silver plating	0.5 - 1.5 mm²	20 - 16	2000	TN01 025 0001 (1)	TN02 025 0001 (1)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 025 0010 (1)	TN02 025 0010 (1)	

Tools for turned crimp contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0200 146 1
Crimping tool for stamped single contacts	0.5 - 1.5 mm² 1.5 - 2.5 mm²	TA 0004 146 000 1 TA 0005 146 000 3	TA 0000 163 TA 0000 141	TA 0000
4-indent crimping tool for turned contacts	0.5 - 4.0 mm²	-	-	TB 0600 146

Further tools see catalogue “Tools”

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned crimp contacts single contact						
silver plating	0.5 mm²	20	100	VN01 025 0035 (1)C	VN02 025 0035 (1)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (1)C	VN02 025 0036 (1)C	
	1.5 mm²	16	100	VN01 025 0037 (1)C	VN02 025 0037 (1)C	
	2.5 mm²	14	100	VN01 025 0038 (1)C	VN02 025 0038 (1)C	
	4.0 mm²	12	100	VN01 025 0039 (1)C	VN02 025 0039 (1)C	
gold plating	0.5 mm²	20	100	VN01 025 0035 (2)C	VN02 025 0035 (2)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (2)C	VN02 025 0036 (2)C	
	1.5 mm²	16	100	VN01 025 0037 (2)C	VN02 025 0037 (2)C	
	2.5 mm²	14	100	VN01 025 0038 (2)C	VN02 025 0038 (2)C	
	4.0 mm²	12	100	VN01 025 0039 (2)C	VN02 025 0039 (2)C	

Tools for turned crimp contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts				FG 0300 146 7
Crimping tool for stamped single contacts	0.5 - 2.5 mm² 4 mm²	TA 0010 146 000 6 TA 0010 146 000 7	TA 0000 144 TA 0000 124	TA 0000 TA 0500
4-indent crimping tool for turned contacts				TB 0600 146
Further tools see catalogue “Tools”				

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- Rated voltage 500 V (600 V UL / CSA)
- Rated current 16 A
- Termination: crimp
- Numbers of contacts: 10, 18, 32, 46

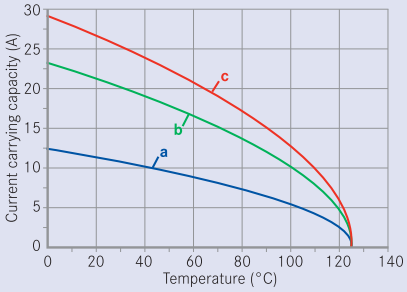
Approvals, Testhouse	Characteristics	Approval-Number
UL	600 V, 15 A	E 63093
CSA	600 V, 16 A	172062-1027396 (LR 48323-2)

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

General Characteristics	Standard	Value			
Number of contacts		10 + ⏚	18 + ⏚	32 + ⏚	46 + ⏚
Termination technique		crimp			
Wire gauge		0.5 mm² - 4.0 mm²			
Flammability	UL 94	V-0			
Electrical Characteristics					
Rated voltage	IEC 60664-1	500 V (600 V UL / CSA)			
Pollution degree	IEC 60664-1	3			
Installation (overvoltage) category	IEC 60664-1	III			
Material group	IEC 60664-1	III b			
Rated impulse withstand voltage	IEC 60664-1	6 kV			
Current carrying capacity	IEC 60512-5-2	see derating curves			
Contact resistance	IEC 60512-2-1	≤ 5 m Ω			
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω			
Climatical Characteristics					
Climatic category	IEC 60068-1	40 / 100 / 21			
Upper temperature	IEC 60512-11-9	+ 100 °C			
Lower temperature	IEC 60512-11-10	- 40 °C			
Mechanical Characteristics					
Mechanical operation	IEC 60512-9-1	> 500 mating cycles			
IP-degree of protection pin insert	IEC 60529	unmated IP00		mated IP20	
IP-degree of protection socket insert	IEC 60529	unmated IP20		mated IP20	
Materials					
Insert		PC			
Colour insert		grey			
Contacts		CuZn (brass)			
Contact plating		Ag (silver) / Au (gold)			

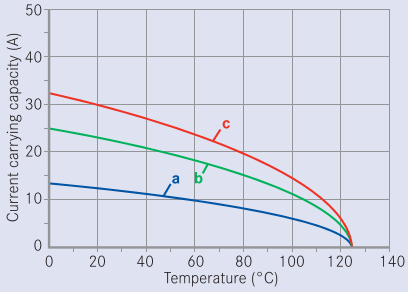
Derating curves

10 + ⏚



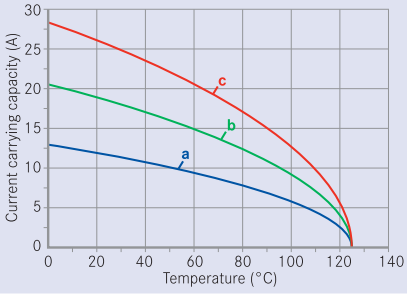
Curve	Wire gauge
a	0.5 mm²
b	2.5 mm²
c	4.0 mm²

18 + ⏚



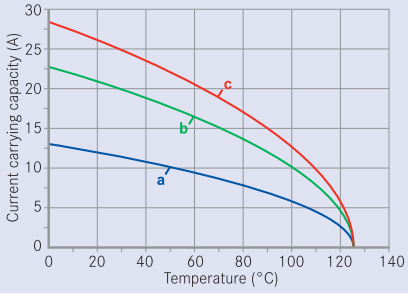
Curve	Wire gauge
a	0.5 mm²
b	2.5 mm²
c	4.0 mm²

32 + ⏚

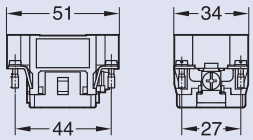
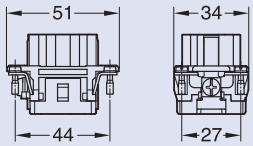


Curve	Wire gauge
a	0.5 mm²
b	2.5 mm²
c	4.0 mm²

46 + ⏚

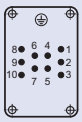


Curve	Wire gauge
a	0.5 mm²
b	2.5 mm²
c	4.0 mm²

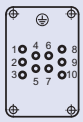
Description	Part Number	Drawing	Figure
Contact insert 10 + ⏚ Size E 6 (Please order contacts separately, see page 67)			
Male insert for turned crimp contacts	C146 10A010 500 10		
Female insert for turned crimp contacts	C146 10B010 500 10		

Pin layout

Male insert

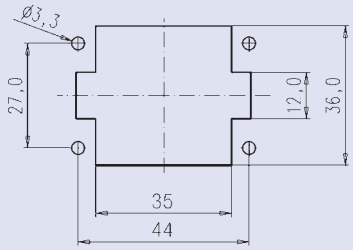


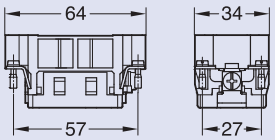
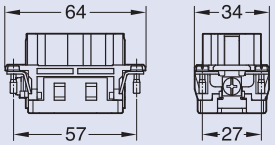
Female insert



Assembly instruction

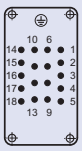
Panel cut out (insert)



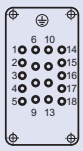
Description	Part Number	Drawing	Figure
Contact insert 18 + ⏚ Size E 10 (Please order contacts separately, see page 67)			
Male insert for turned crimp contacts	C146 10A018 500 10		
Female insert for turned crimp contacts	C146 10B018 500 10		

Pin layout

Male insert

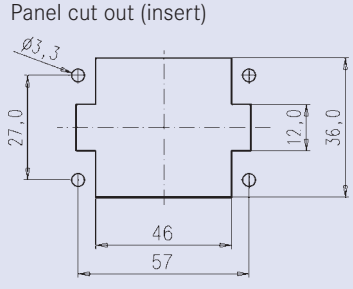


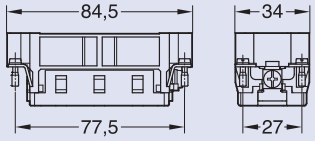
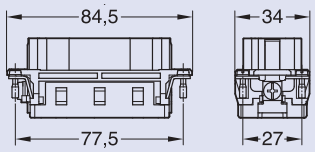
Female insert



Assembly instruction

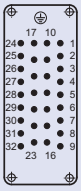
Panel cut out (insert)



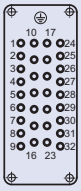
Description	Part Number	Drawing	Figure
Contact insert 32 + ⏚ Size E 16 (Please order contacts separately, see page 67)			
Male insert for turned crimp contacts	C146 10A032 500 10		
Female insert for turned crimp contacts	C146 10B032 500 10		

Pin layout

Male insert

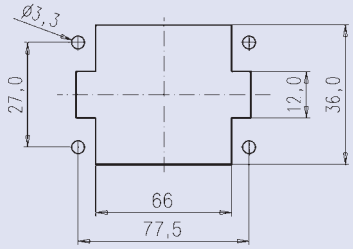


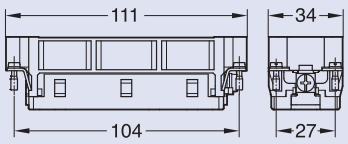
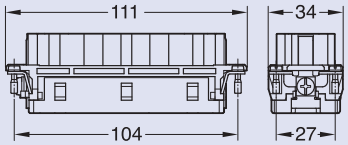
Female insert



Assembly instruction

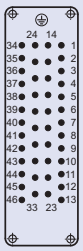
Panel cut out (insert)



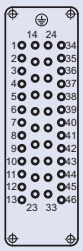
Description	Part Number	Drawing	Figure
Contact insert 46 + ⏚ Size E 24 (Please order contacts separately, see page 67)			
Male insert for turned crimp contacts	C146 10A046 500 10		
Female insert for turned crimp contacts	C146 10B046 500 10		

Pin layout

Male insert

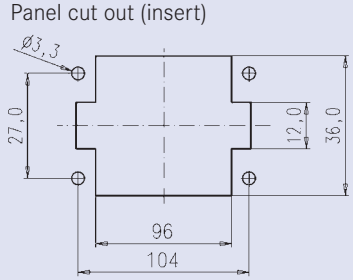


Female insert



Assembly instruction

Panel cut out (insert)



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Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned crimp contacts single contact 2.5mm						
silver plating	0.5 mm²	20	100	VN01 025 0035 (1)C	VN02 025 0035 (1)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (1)C	VN02 025 0036 (1)C	
	1.5 mm²	16	100	VN01 025 0037 (1)C	VN02 025 0037 (1)C	
	2.5 mm²	14	100	VN01 025 0038 (1)C	VN02 025 0038 (1)C	
	4.0 mm²	12	100	VN01 025 0039 (1)C	VN02 025 0039 (1)C	
gold plating	0.5 mm²	20	100	VN01 025 0035 (2)C	VN02 025 0035 (2)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (2)C	VN02 025 0036 (2)C	
	1.5 mm²	16	100	VN01 025 0037 (2)C	VN02 025 0037 (2)C	
	2.5 mm²	14	100	VN01 025 0038 (2)C	VN02 025 0038 (2)C	
	4.0 mm²	12	100	VN01 025 0039 (2)C	VN02 025 0039 (2)C	

Tools for turned crimp contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts				FG 0300 146 7
Crimping tool for stamped single contacts	0.5 - 2.5 mm² 4 mm²	TA 0010 146 000 6 TA 0010 146 000 7	TA 0000 144 TA 0000 124	TA 0000 TA 0500
4-indent crimping tool for turned contacts				TB 0600 146
Further tools see catalogue “Tools”				

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- Rated voltage 400 V
- Material contacts: iron-constantan
- Rated current 10 A
- Number of contacts: 6, 10, 16, 24

Connectors with iron (FE) and constantan (CO) contacts

are basically used in measuring and control circuits to serve as interface between FE/CO thermocouples and control unit, i. e. temperature control of moulds in injection moulding machines. Through the use of FE/CO connectors in the thermocouple circuit the measuring results are more accurate, thus the tolerance of the temperature control is much narrower.

Amphenol's Industial Connectors with iron (FE) an Contantan (CO) contacts are used to connect FE/CO thermocouples with electronic signal amplifiers in measuring and control circuits, i. e. for temperature control of moulding machines.

Errors with various combinations

The connection of unlike metals (FE/Brass and CO/Brass) generate thermoelectric voltage errors in the mesuring circuit caused by the flow from iron wire to the brass contact or by temperature changes at the contact elements.

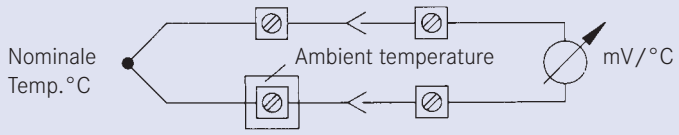
Contact Material / Nominal Temp.	without Thermo Contacts		with Thermo Contacts	
	MS/FE	MS/KO	FE/FE	KO/KO
100 °C	+ 4 %	- 16 %	- 4 %	- 2 %
200 °C	+ 2.5 %	- 8 %	- 3 %	- 1.5 %
300 °C	+ 1.3 %	- 12.7 %	- 1.3 %	0 %
400 °C	+ 1.5 %	- 4.5 %	- 1.0 %	0 %

By using FE/CO contacts respectively these deviations will be minimized.

Material / Temperature Range

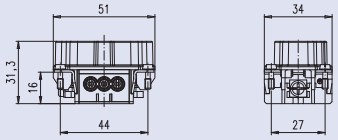
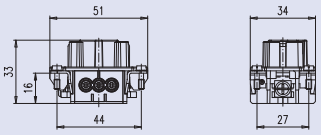
Temperatur range	Material/measurement procedure
< 150 °C	any/Resistance measurement
150 °C - 450 °C	FE-CO (iron/Constantan)
450 °C - approx. 1000 °C	Ni/Cr-Ni (Nickel/Chrome/Nickel)

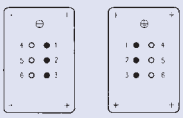
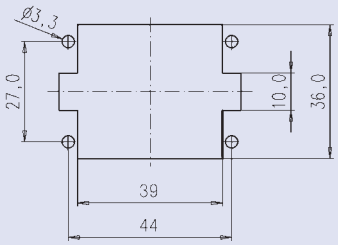
Temperature changes cause errors

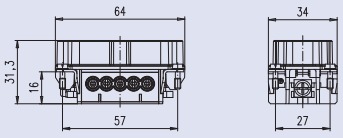
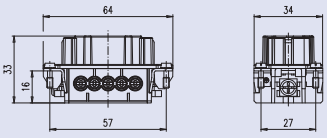


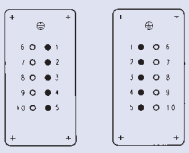
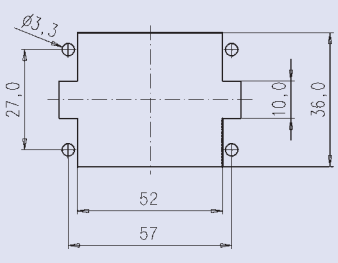
General Characteristics	Standard	Value			
Number of contacts		6 + ⏚	10 + ⏚	16 + ⏚	24 + ⏚
Termination technique		screw			
Wire gauge		0.25 mm^2 - 2.5 mm^2			
Flammability	UL 94	V-0			
Electrical Characteristics					
Rated voltage	IEC 60664-1	500 V			
Pollution degree	IEC 60664-1	3			
Installation (overvoltage) category	IEC 60664-1	III			
Material group	IEC 60664-1	III b			
Current carrying capacity	IEC 60664-1	6 kV			
Rated current T_{amp} = 40 °C		10 A			
Contact resistance	IEC 60512-2-1	≤ 10 m Ω			
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω			
Climatical Characteristics					
Climatic category	IEC 60068-1	40 / 100 / 21			
Upper temperature	IEC 60512-11-9	+ 100 °C			
Lower temperature	IEC 60512-11-10	- 40 °C			
Mechanical Characteristics					
IP-degree of protection pin insert [1)]	IEC 60529	unmated IP00		mated IP20	
IP-degree of protection socket insert [1)]	IEC 60529	unmated IP20		mated IP20	
Weight pin insert		45 g	60 g	78 g	105 g
Weight socket insert		45 g	60 g	78 g	105 g
Mechanical operation	IEC 60512-9-1	≥ 100 mating cycles			
Materials					
Insert		PA, GV (Polyamid)			
Colour insert		grey			
Contacts		iron; gal cd 4 constantan = without plating			

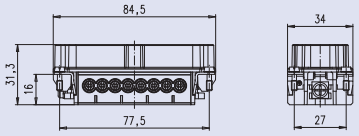
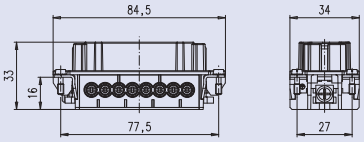
[1)] IP-degree of protection on termination side of screw version IP 10

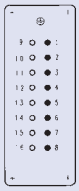
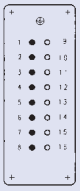
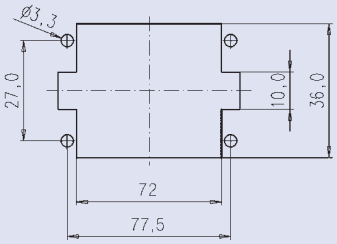
Description	Part Number	Drawing	Figure
Contact insert 6 + ⏚ with iron-constantan contacts			
Male insert with wire protection	C146 10A006 810 1		
Female insert with wire protection	C146 10B006 810 1		

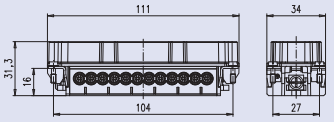
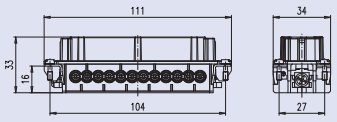
Pin layout	Assembly instruction
Male insert Female insert	Panel cut out (insert)
	

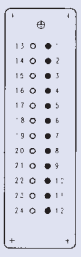
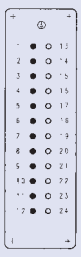
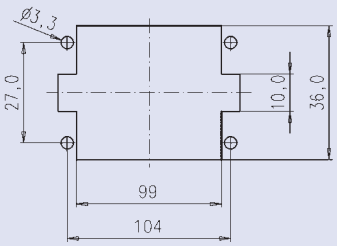
Description	Part Number	Drawing	Figure
Contact insert 10 + ⏚ with iron-constantan contacts			
Male insert with wire protection	C146 10A010 810 1		
Female insert with wire protection	C146 10B010 810 1		

Pin layout	Assembly instruction
Male insert Female insert	Panel cut out (insert)
	

Description	Part Number	Drawing	Figure
Contact insert 16 + ⏚ with iron-constantan contacts			
Male insert with wire protection	C146 10A016 810 1		
Female insert with wire protection	C146 10B016 810 1		

Pin layout	Assembly instruction
Male insert  Female insert 	Panel cut out (insert) 

Description	Part Number	Drawing	Figure
Contact insert 24 + ⏚ with iron-constantan contacts			
Male insert with wire protection	C146 10A024 810 1		
Female insert with wire protection	C146 10B024 810 1		

Pin layout	Assembly instruction
Male insert  Female insert 	Panel cut out (insert) 

heavy | mate® F

- Modular connector
- Compatible with market standard
- Rated voltage up to 830 V
- Rated current up to 40 A
- Termination: crimp
- Numbers of contacts: 2 - 102

Approvals, Testhouse	Characteristics	Approval-Number
UL	in preparation	in preparation
CSA	in preparation	in preparation

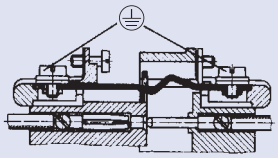
General information

- Modules inserts without crimp contacts, crimping tools see separate catalogue “Tools”.
- Contacts must be ordered separatly, processing instructions see catalogue “Tools”.
- Connectors series heavy|mate® F may be engaged or disengaged when live but without electrical load.
  If these connectors are mated or unmated under load, the load shall be reduced to 10 % of rated current.
- We recommend using the high profile housings / hoods for the heavy|mate® F inserts.
- Empty modul spaces have to be filled with blind modules.
- Torque for PE connection 1.2 Nm

Advantages of the system

- No standard but interchangeable with competitive products.
- Housings are designed according to DIN EN 175 301 801
- Simply connecting of the modules and frames.

First-to-mate last-to-break protective ground contact



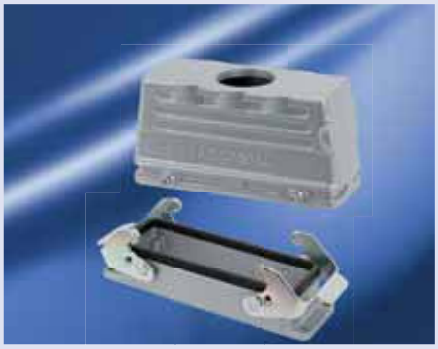
Range of housings

Size E6

Size E10

Size E16

Size E24



Size E48

Requirements

- 3 x 400V; 50A; 6mm² wire gauge
- 8 x 250V; 8A; 1.5mm² wire gauge
- 5 x 400V; 15A; 4mm² wire gauge

Solution

1. Check how 16 contacts can be realized; see modules overview on page 78

Possible selection:
a) 1 x 17 contacts
b) 2 x 12 contacts
c) 1 x 6 contacts + 1 x 12 contacts
d) 1 x 3 contacts + 1 x 6 contacts + 1 x 12 contacts

2. Check technical parameters / solution, see detail pages of the modules from page 82

Possible selection:
a) not possible due to voltage
b) not possible due to voltage
c) not possible due to current
d) POSSIBLE

3. Choose matching contact, see detail page of the modules on page 82

Possible selection:
a) 3 contacts = C146 10A003 500 15 → contacts = VN01 040 0013 1C
b) 6 contacts = C146 10A006 500 15 → contacts = VN01 025 0039 1C
c) 12 contacts = C146 10A012 500 15 → contacts = VN01 016 0027 1C

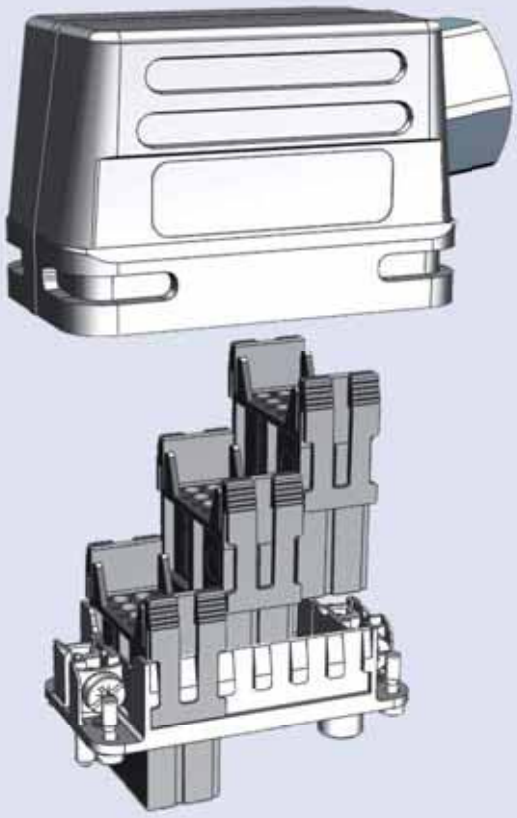
4. Choose matching frame, see frames on page 80

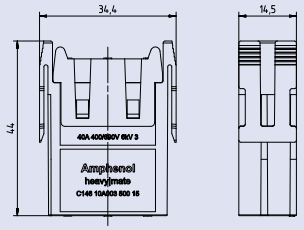
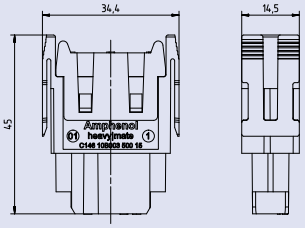
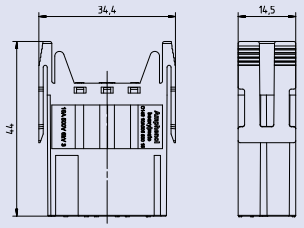
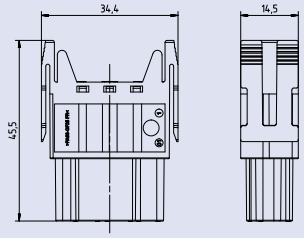
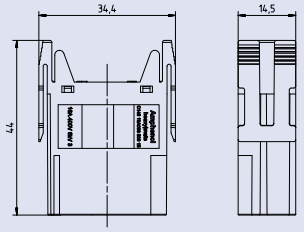
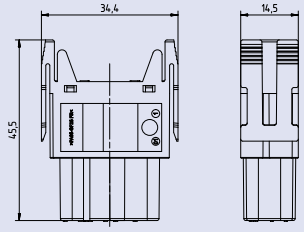
Solution: C146 10P10 000 15

5. Choose matching housing, see housings on page 162

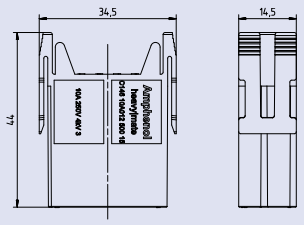
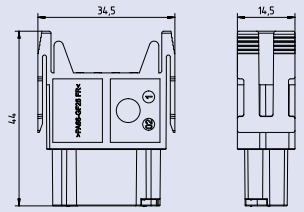
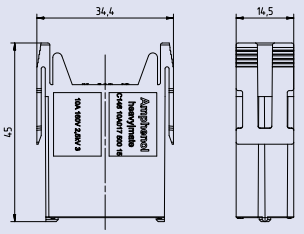
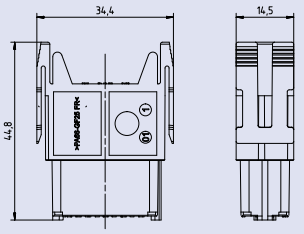
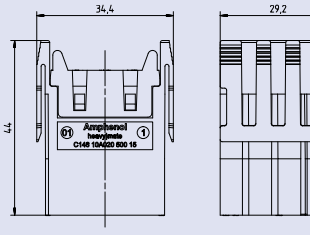
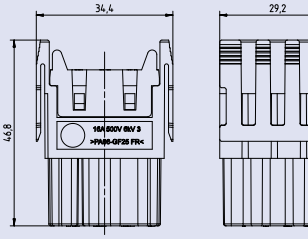
Solution: C146 21R010 600 8

Schematic construction

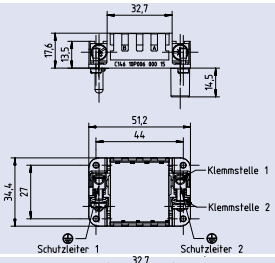
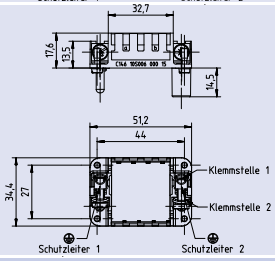
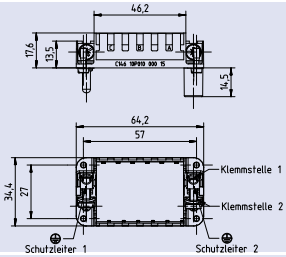
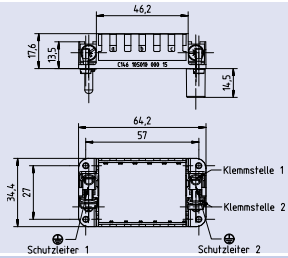
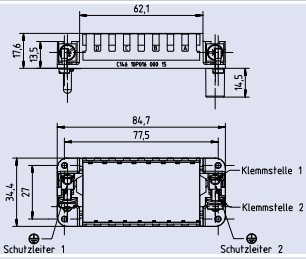
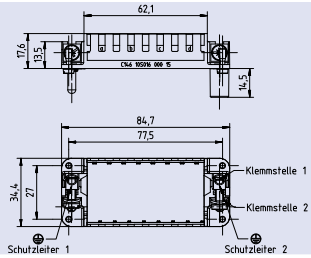


Description	Part Number	Drawing	Figure
3 contacts module for turned contacts, details see page 82			
Pin modules	C146 10A003 500 15		
Socket modules	C146 10B003 500 15		
6 contacts module for turned contacts, 500V, details see page 84			
Pin modules	C146 10A006 500 15		
Socket modules	C146 10B006 500 15		
8 contacts module for turned contacts, 400V, details see page 86			
Pin modules	C146 10A008 500 15		
Socket modules	C146 10B008 500 15		

[1] If connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.

Description	Part Number	Drawing	Figure
12 contacts module for turned contacts. 250V, details see page 88			
Pin modules	C146 10A012 500 15		
Socket modules	C146 10B012 500 15		
17 contacts module for turned contacts, 160V, details see page 90			
Pin modules	C146 10A017 500 15		
Socket modules	C146 10B017 500 15		
20 contacts module for turned contacts 500V, details see page 92			
Pin modules	C146 10A020 500 15		
Socket modules	C146 10B020 500 15		

[1] If connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.

Description	Part Number	Drawing	Figure
Frames for 2 modules			
Frame for pin modules	C146 10P006 000 15		
Frame for socket modules	C146 10S006 000 15		
Frames for 3 modules			
Frame for pin modules	C146 10P010 000 15		
Frame for socket modules	C146 10S010 000 15		
Frames for 4 modules			
Frame for pin modules	C146 10P016 000 15		
Frame for socket modules	C146 10S016 000 15		

It is possible to mount socket modules in frames for pin modules (possibility of inverse configuration).

[1)] If connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.

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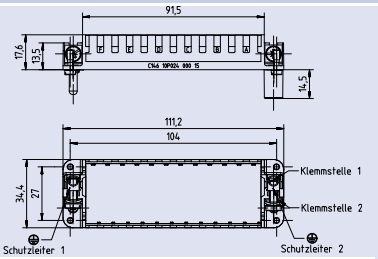
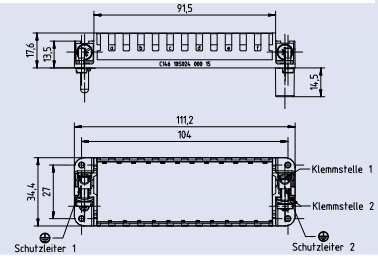
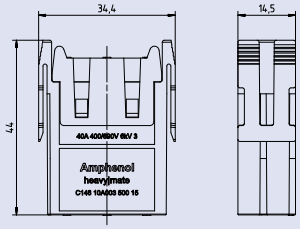
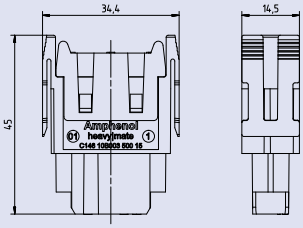
Description	Part Number	Drawing	Figure
Frames for 6 modules			
Frame for pin modules	C146 10P024 000 15		
Frame for socket modules	C146 10S024 000 15		

[1] If connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.

Characteristics 3 contacts module

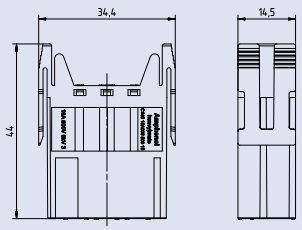
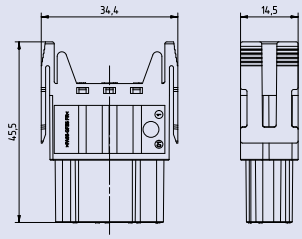
General Characteristics	Standard	Value
Number of contacts		3
Termination technique		crimp
Wire Gauge		1.5 –6.0 mm² (AWG 16-10)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	400 V (conductor – earth) 690 V (conductor – conductor)
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	6 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/125/21
Upper temperature	IEC 60512-11-9	+125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
IP-degree of protection	IEC 60529	IP00 (pin insert) / IP20 (socket insert)
Materials		
Module		PA6.6 GF
Colour module		black
Contact		CuZn (brass)
Contact plating		Ag (silver) / Au (gold)
Derating Curves		
In preparation		

Description	Part Number	Drawing	Figure
3 contacts module (Please order contacts separately)			
Pin module	C146 10A003 500 15		
Socket module	C146 10B003 500 15		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 4 mm crimp contacts single contact						
silver plating	1.5 mm²	16	100	VN01 040 0010 1C	VN02 040 0010 1C	
	2.5 mm²	14	100	VN01 040 0011 1C	VN02 040 0011 1C	
	4 mm²	12	100	VN01 040 0012 1C	VN02 040 0012 1C	
	6 mm²	10	100	VN01 040 0013 1C	VN02 040 0013 1C	

Characteristics 6 contacts module

General Characteristics	Standard	Value
Number of contacts		6
Termination technique		crimp
Wire Gauge		0.5 –4.0 mm² (AWG 20-12)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	500 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	6 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/125/21
Upper temperature	IEC 60512-11-9	+125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
IP-degree of protection	IEC 60529	IP00 (pin insert) / IP20 (socket insert)
Materials		
Module		PA6.6 GF
Colour module		black
Contact		CuZn (brass)
Contact plating		Ag (silver) / Au (gold)
Derating Curves		
In preparation		

Description	Part Number	Drawing	Figure
6 contacts module (Please order contacts separately)			
Pin module	C146 10A006 500 15		
Socket module	C146 10B006 500 15		

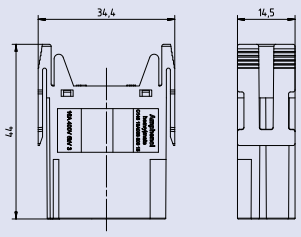
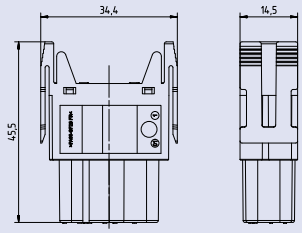
Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 2.5 mm crimp contacts single contact						
silver plating	0.5 mm²	20	100	VN01 025 0035 (1)C	VN02 025 0035 (1)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (1)C	VN02 025 0036 (1)C	
	1.5 mm²	16	100	VN01 025 0037 (1)C	VN02 025 0037 (1)C	
	2.5 mm²	14	100	VN01 025 0038 (1)C	VN02 025 0038 (1)C	
	4.0 mm²	12	100	VN01 025 0039 (1)C	VN02 025 0039 (1)C	
gold plating	0.5 mm²	20	100	VN01 025 0035 (2)C	VN02 025 0035 (2)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (2)C	VN02 025 0036 (2)C	
	1.5 mm²	16	100	VN01 025 0037 (2)C	VN02 025 0037 (2)C	
	2.5 mm²	14	100	VN01 025 0038 (2)C	VN02 025 0038 (2)C	
	4.0 mm²	12	100	VN01 025 0039 (2)C	VN02 025 0039 (2)C	

Tools for turned contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts				FG 0300 146 7
Crimping tool for turned single contacts	0.5 - 2.5 mm² 4 mm²	TA 0010 146 000 6 TA 0010 146 000 7	TA 0000 144 TA 0000 124	TA 0000 TA 0500
4-indet crimping tool for turned contacts				TB 0600 146
Further tools see catalogue “Tools”				

Characteristics 8 contacts module

General Characteristics	Standard	Value
Number of contacts		8
Termination technique		crimp
Wire Gauge		0.5 – 4.0 mm² (AWG 20-12)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	400 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	6 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/125/21
Upper temperature	IEC 60512-11-9	+125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
IP-degree of protection	IEC 60529	IP00 (pin insert) / IP20 (socket insert)
Materials		
Module		PA6.6 GF
Colour module		black
Contact		CuZn (brass)
Contact plating		Ag (silver) / Au (gold)
Derating Curves		
In preparation		

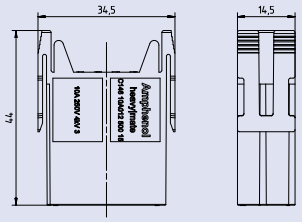
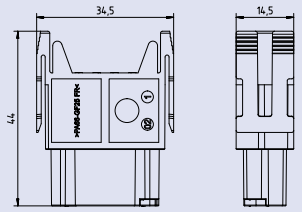
Description	Part Number	Drawing	Figure
38contacts module (Please order contacts separately)			
Pin module	C146 10A008 500 15		
Socket module	C146 10B008 500 15		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 2.5 mm crimp contacts single contact						
silver plating	0.5 mm²	20	100	VN01 025 0035 (1)C	VN02 025 0035 (1)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (1)C	VN02 025 0036 (1)C	
	1.5 mm²	16	100	VN01 025 0037 (1)C	VN02 025 0037 (1)C	
	2.5 mm²	14	100	VN01 025 0038 (1)C	VN02 025 0038 (1)C	
	4.0 mm²	12	100	VN01 025 0039 (1)C	VN02 025 0039 (1)C	
gold plating	0.5 mm²	20	100	VN01 025 0035 (2)C	VN02 025 0035 (2)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (2)C	VN02 025 0036 (2)C	
	1.5 mm²	16	100	VN01 025 0037 (2)C	VN02 025 0037 (2)C	
	2.5 mm²	14	100	VN01 025 0038 (2)C	VN02 025 0038 (2)C	
	4.0 mm²	12	100	VN01 025 0039 (2)C	VN02 025 0039 (2)C	

Tools for turned contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts				FG 0300 146 7
Crimping tool for turned single contacts	0.5 - 2.5 mm² 4 mm²	TA 0010 146 000 6 TA 0010 146 000 7	TA 0000 144 TA 0000 124	TA 0000 TA 0500
4-indet crimping tool for turned contacts				TB 0600 146
Further tools see catalogue “Tools”				

General Characteristics	Standard	Value
Number of contacts		12
Termination technique		crimp
Wire Gauge		0.14 – 2.5 mm² (AWG 26-14)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	250 V (conductor – earth) 400 V (conductor – conductor)
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	4 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/100/21
Upper temperature	IEC 60512-11-9	+100°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
IP-degree of protection	IEC 60529	IP00 (pin insert) / IP20 (socket insert)
Materials		
Module		PA6.6 GF
Colour module		black
Contact		CuZn (brass)
Contact plating		Ag (silver) / Au (gold)
Derating Curves		
In preparation		

Description	Part Number	Drawing	Figure
12 contacts module (Please order contacts separately)			
Pin module	C146 10A012 500 15		
Socket module	C146 10B012 500 15		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned crimp contacts single contact						
silver plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (1)C	VN02 016 0024 (1)C	
	0.5 mm²	20	100	VN01 016 0025 (1)C	VN02 016 0025 (1)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (1)C	VN02 016 0026 (1)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (1)C	VN02 016 0027 (1)C	
	2.5 mm²	14	100	VN01 016 0028 (1)C	VN02 016 0028 (1)C	
gold plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (2)C	VN02 016 0024 (2)C	
	0.5 mm²	20	100	VN01 016 0025 (2)C	VN02 016 0025 (2)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (2)C	VN02 016 0026 (2)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (2)C	VN02 016 0027 (2)C	
	2.5 mm²	14	100	VN01 016 0028 (2)C	VN02 016 0028 (2)C	

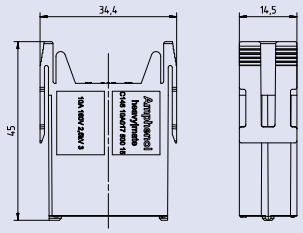
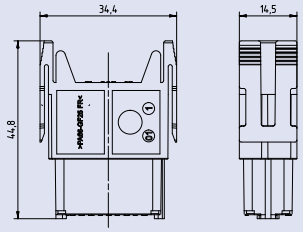
Tools for turned contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 1
Service crimping tool	0.14 - 0.5 mm² 0.5 - 1.5 mm²	-	-	TA 0100 146

Further tools see catalogue “Tools”

Characteristics 17 contacts module

General Characteristics	Standard	Value
Number of contacts		17
Termination technique		crimp
Wire Gauge		0.14 –2.5mm² (AWG 26-14)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	160 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	2.5 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/100/21
Upper temperature	IEC 60512-11-9	+100°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
IP-degree of protection	IEC 60529	IP00 (pin insert) / IP20 (socket insert)
Materials		
Module		PA6.6 GF
Colour module		black
Contact		CuZn (brass)
Contact plating		Ag (silver) / Au (gold)
Derating Curves		
In preparation		

Description	Part Number	Drawing	Figure
17 contacts module (Please order contacts separately)			
Pin module	C146 10A017 500 15		
Socket module	C146 10B017 500 15		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned crimp contacts single contact						
silver plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (1)C	VN02 016 0024 (1)C	
	0.5 mm²	20	100	VN01 016 0025 (1)C	VN02 016 0025 (1)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (1)C	VN02 016 0026 (1)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (1)C	VN02 016 0027 (1)C	
	2.5 mm²	14	100	VN01 016 0028 (1)C	VN02 016 0028 (1)C	
gold plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (2)C	VN02 016 0024 (2)C	
	0.5 mm²	20	100	VN01 016 0025 (2)C	VN02 016 0025 (2)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (2)C	VN02 016 0026 (2)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (2)C	VN02 016 0027 (2)C	
	2.5 mm²	14	100	VN01 016 0028 (2)C	VN02 016 0028 (2)C	

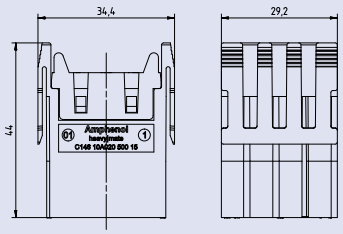
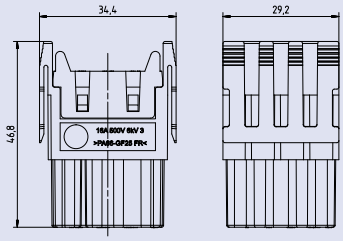
Tools for turned contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 1
Service crimping tool	0.14 - 0.5 mm² 0.5 - 1.5 mm²	-	-	TA 0100 146

Further tools see catalogue “Tools”

Characteristics 20 contacts module

General Characteristics	Standard	Value
Number of contacts		20
Termination technique		crimp
Wire Gauge		0.5 –4.0 mm² (AWG 20-12)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	500 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	6 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/125/21
Upper temperature	IEC 60512-11-9	+125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
IP-degree of protection	IEC 60529	IP00 (pin insert) / IP20 (socket insert)
Materials		
Module		PA6.6 GF
Colour module		black
Contact		CuZn (brass)
Contact plating		Ag (silver) / Au (gold)
Derating Curves		
In preparation		

Description	Part Number	Drawing	Figure
20 contacts module (Please order contacts separately)			
Pin module	C146 10A020 500 15		
Socket module	C146 10B020 500 15		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 2.5 mm crimp contacts single contact						
silver plating	0.5 mm²	20	100	VN01 025 0035 (1)C	VN02 025 0035 (1)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (1)C	VN02 025 0036 (1)C	
	1.5 mm²	16	100	VN01 025 0037 (1)C	VN02 025 0037 (1)C	
	2.5 mm²	14	100	VN01 025 0038 (1)C	VN02 025 0038 (1)C	
	4.0 mm²	12	100	VN01 025 0039 (1)C	VN02 025 0039 (1)C	
gold plating	0.5 mm²	20	100	VN01 025 0035 (2)C	VN02 025 0035 (2)C	
	0.75 - 1.0 mm²	18	100	VN01 025 0036 (2)C	VN02 025 0036 (2)C	
	1.5 mm²	16	100	VN01 025 0037 (2)C	VN02 025 0037 (2)C	
	2.5 mm²	14	100	VN01 025 0038 (2)C	VN02 025 0038 (2)C	
	4.0 mm²	12	100	VN01 025 0039 (2)C	VN02 025 0039 (2)C	

Tools for turned contacts

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts				FG 0300 146 7
Crimping tool for turned single contacts	0.5 - 2.5 mm² 4 mm²	TA 0010 146 000 6 TA 0010 146 000 7	TA 0000 144 TA 0000 124	TA 0000 TA 0500
4-indet crimping tool for turned contacts				TB 0600 146
Further tools see catalogue “Tools”				

heavy | mate® HSE

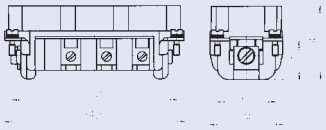
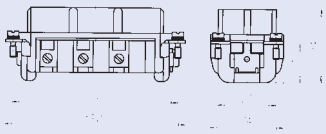
- Rated voltage 400 V
- Rated current 42 A
- Termination: screw
- Number of contacts: 6

Approvals, Testhouse	Characteristics	Approval-Number
UL	600 V, 35 A	48932
CSA	600 V, 35 A	E 63093

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

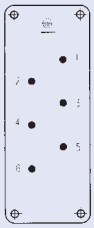
General Characteristics	Standard	Value	
Number of contacts		6 + ⏚	
Termination technique		screw	
Wire gauge		0.5 - 6.0 mm² (Ø 3.4 mm)	
Flammability	UL 94	V-0	
Electrical Characteristics			
Rated voltage	IEC 60664-1	400 V (600 V UL / CSA[1)])	
Pollution degree	IEC 60664-1	3	
Installation (overvoltage) category	IEC 60664-1	III	
Material group	IEC 60664-1	II	
Rated impulse withstand voltage	IEC 60664-1	6 kV	
Rated current	IEC 60512-5-2	see derating curves	
Rated current T_{amp} = 40 °C		42 A	
Contact resistance	IEC 60512-2-1	≤ 1 m Ω	
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω	
Climatical Characteristics			
Climatic category	IEC 60068-1	40 / 125 / 21	
Upper temperature	IEC 60512-11-9	+ 125 °C	
Lower temperature	IEC 60512-11-10	- 40 °C	
Mechanical Characteristics			
IP-degree of protection pin insert	IEC 60529	unmated IP00	mated IP20
IP-degree of protection socket insert	IEC 60529	unmated IP20	mated IP20
Weight pin insert		80 g	
Weight socket insert		80 g	
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles	
Werkstoffe			
Insert		PA, GV	
Colour insert		black	
Contacts		Cu Zn (brass)	
Contact plating		Ag (silver)	

[1)] Label for CSA application see page 228
[2)] IP-degree of protection on termination side IP 10

Description	Part Number	Drawing	Figure
Contact insert 6 + ⏚			
Male insert with wire protection for screw termination	C146 10A006 102 5		
Female insert with wire protection for screw termination	C146 10B006 102 5		

Pin layout

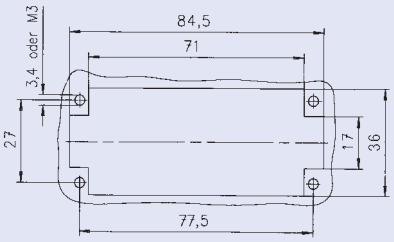
Male insert

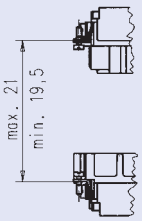


Female insert

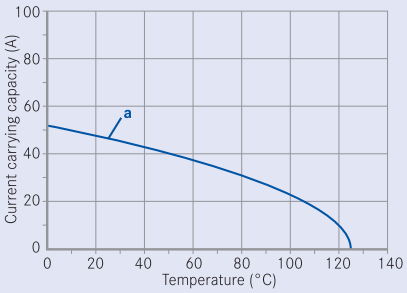
Assembly instruction

Panel cut out (insert)





Derating curves



Curve a: 6 mm² screw contact

heavy | mate® HvE

- Rated voltage 660 V
- Rated current 16 A ... 22 A
- Termination: screw
- 2 delayed mating contacts
- Number of contacts: 3, 6, 10, 16, 20, 26, 32

Approvals, Testhouse	Characteristics	Approval-Number
UL	600 V, 16 A	E 63093
CSA	600 V, 16 A	48932

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

Construction of connectors Type HvE

The connectors of series heavy|mate® HvE are based on series heavy|mate® E with the following deviations:

Inserts

The HVE-inserts with 3, 6 and 10 contacts are basically the same as the 10, 16 and 24-contacts inserts of series heavy|mate® E. However they are only partly loaded with contacts and have two delayed mating pilot duty contacts.
Only type 16 HVE has special inserts with a different contact arrangement. The mounting dimensions are however identical with the 24 contacts version of heavy|mate® E.
The delayed mating contacts are intended for switching a relay coil for electrically locking in order to have unloaded socket contacts in an unmated condition.

If connectors without breaking capacity are used as connectors with breaking capacity the electrical power data must be reduced in accordance with the manufacturer's specification. These specifications are available from the manufacturer.

heavy|mate® E inserts with pin contacts are not intermatable with heavy|mate® HvE inserts with socket contacts due to
a) two empty contact holes are closed at 3, 6 and 10 contact inserts.
b) the 16 contacts HVE insert has a different contact arrangement.

Housings: (made of aluminium)

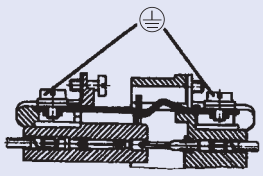
heavy|mate® E housings with an inside insulation (plastic foil) are used for the 16-contacts insert.
The inside barriers at the narrow sides preventing mounting of 660 V-inserts in 400 V housings are removed and the 16-contacts insert is now mountable.

No standard for this series,but:

Intermateable and exchangeable
with other makes
a) Contact insert to contact insert
b) Contact insert to housing 6, 10 ,16, 24 pin

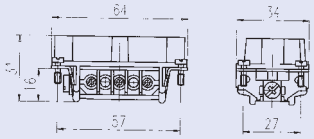
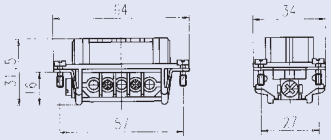
Housings are designed according to
DIN EN 175 301-801

First-to-mate last-to-break protective ground contact



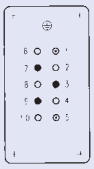
General Characteristics	Standard	Value						
Number of contacts		3	6	10	16	20	26 [3]	32
Termination technique		screw						
Wire gauge		0.25 - 2.5 mm²						
Flammability	UL 94	V-0						
Electrical Characteristics								
Rated voltage	IEC 60664-1	660 V [1] (600 V UL / CSA[2])						
Pollution degree	IEC 60664-1	3						
Installation (overvoltage) category	IEC 60664-1	III						
Material group	IEC 60664-1	III a			II	IIIa	[3]	II
Rated impulse withstand voltage	IEC 60664-1	8 kV						
Current carrying capacity	IEC 60512-5-2	see derating curves						
Contact resistance	IEC 60512-2-1	≤ 5 mΩ						
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω						
Climatical Characteristics								
Climatic category	IEC 60068-1	40/125/21						
Upper temperature	IEC 60512-11-9	+ 125°C						
Lower temperature	IEC 60512-11-10	- 40°C						
Mechanical Characteristics								
IP-degree of protection pin insert [4]	IEC 60529	unmated IP00				mated IP20		
IP-degree of protection socket insert [4]	IEC 60529	unmated IP20				mated IP20		
Weight pin insert		49 g	63 g	81 g	107 g	162 g	189 g	214 g
Weight socket insert		49 g	63 g	81 g	107 g	162 g	189 g	214 g
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles						
Materials								
Insert		PC, GV			PA,GV	PC,GV	[3]	PA,GV
Colour insert		grey			black	grey	[3]	black
Contacts		Cu Zn (brass)						
Contact plating		Ag (silver)						

[1] for working contacts, 400 V for mating contacts [2] Label for CSA application see page 228
[3] Combination 10 and 16 ways, i.e. material PC and PA [4] IP-degree of protection on termination side IP 10

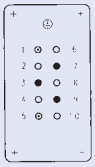
Description	Part Number	Drawing	Figure
Contact insert 3 + ⏚ + 2 (delayed mating contacts)			
Male insert with wire protection for screw termination	C146 10A003 102 3		
Female insert with wire protection for screw termination	C146 10B003 102 3		

Pin layout

Male insert



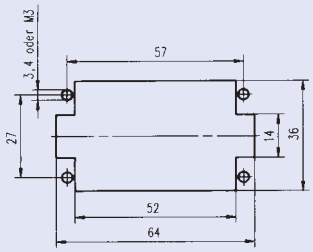
Female insert

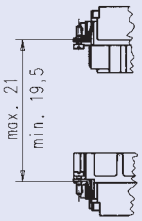


- ● Working contact
- ⊙ Mating contact
- ○ Without contact

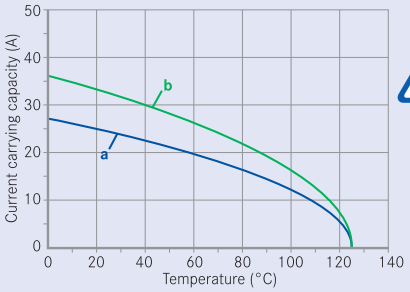
Assembly instruction

Panel cut out (insert)





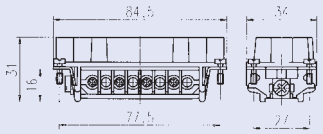
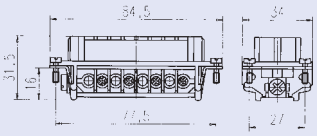
Derating curves



Notice restriction of wire

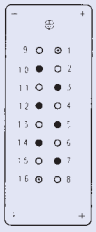
Curve a: 1.5 mm² screw contacts

Curve b: 2.5 mm² screw contacts

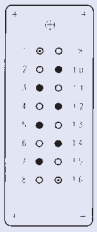
Description	Part Number	Drawing	Figure
Contact insert 6 + ⏚ + 2 (delayed mating contacts)			
Male insert with wire protection for screw termination	C146 10A006 102 3		
Female insert with wire protection for screw termination	C146 10B006 102 3		

Pin layout

Male insert



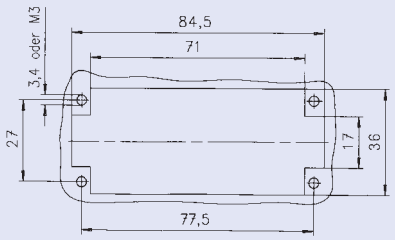
Female insert

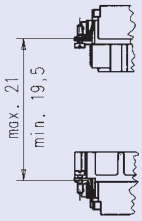


- ● Working contact
- ⊙ Mating contact
- ○ Without contact

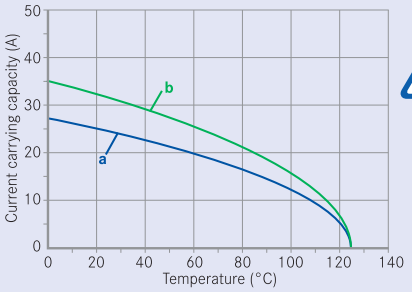
Assembly instruction

Panel cut out (insert)





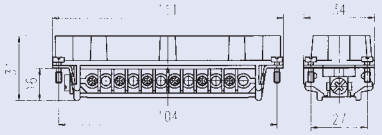
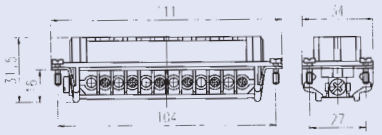
Derating-Kurven



Notice restriction of wire

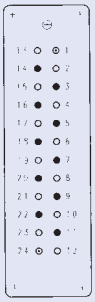
Curve a: 1.5 mm² screw contacts

Curve b: 2.5 mm² screw contacts

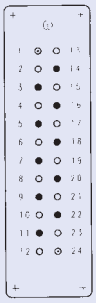
Description	Part Number	Drawing	Figure
Contact insert 10 + ⏚ + 2 (delayed mating contacts)			
Male insert with wire protection for screw termination	C146 10A010 102 3		
Female insert with wire protection for screw termination	C146 10B010 102 3		

Pin layout

Male insert



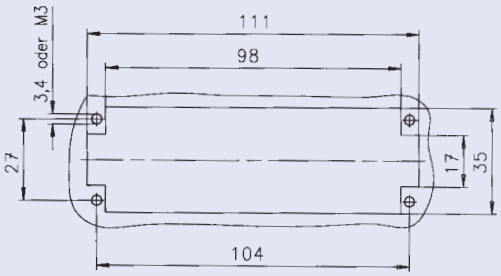
Female insert

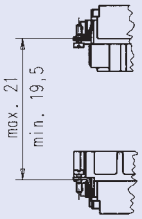


- ● Working contact
- ⊙ Mating contact
- ○ Without contact

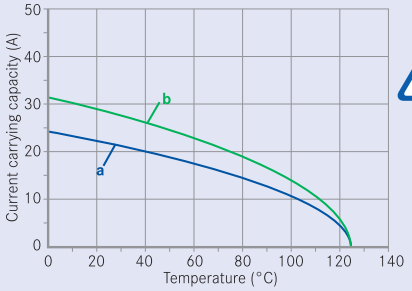
Assembly instruction

Panel cut out (insert)





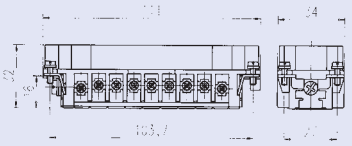
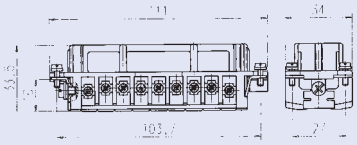
Derating curves



Notice restriction of wire

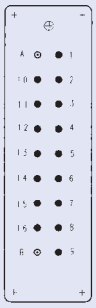
Curve a: 1.5 mm² screw contacts

Curve b: 2.5 mm² screw contacts

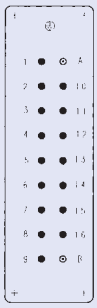
Description	Part Number	Drawing	Figure
Contact insert 16 + ⏚+ 2 (delayed mating contacts)			
Male insert with wire protection for screw termination	C146 10A016 102 3		
Male insert without wire protection for screw termination	C146 10A016 002 3		
Female insert with wire protection for screw termination	C146 10B016 102 3		
Female insert without wire protection for screw termination	C146 10B016 002 3		

Pin layout

Male insert



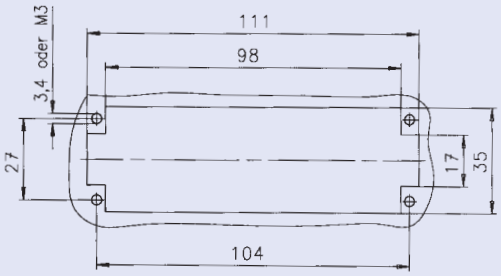
Female insert

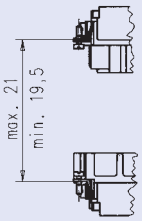


- Working contact
- Mating contact
  Without contact

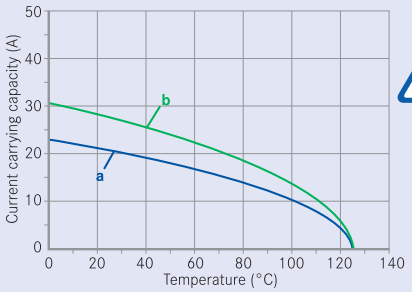
Assembly instruction

Panel cut out (insert)





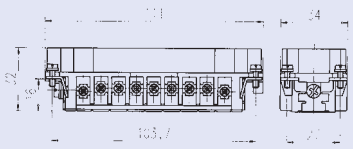
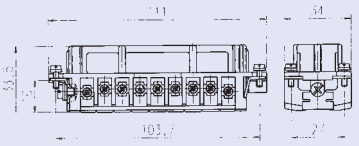
Derating curves



Notice restriction of wire

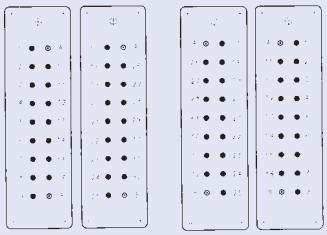
Curve a: 1.5 mm² screw contacts

Curve b: 2.5 mm² screw contacts

Description	Part Number	Drawing	Figure
Contact insert 32 + ⏚ + 4 (delayed mating contacts)			
Male insert with wire protection for screw termination	C146 10A016 102 3 (1 - 16) + C146 10A016 104 3 (17 - 32)		
Female insert with wire protection for screw termination	C146 10B016 102 3 (1 - 16) + C146 10B016 104 3 (17 - 32)		

Pin layout

Male insert Female insert



- ● Working contact
- ⊙ Mating contact
- ○ Without contact

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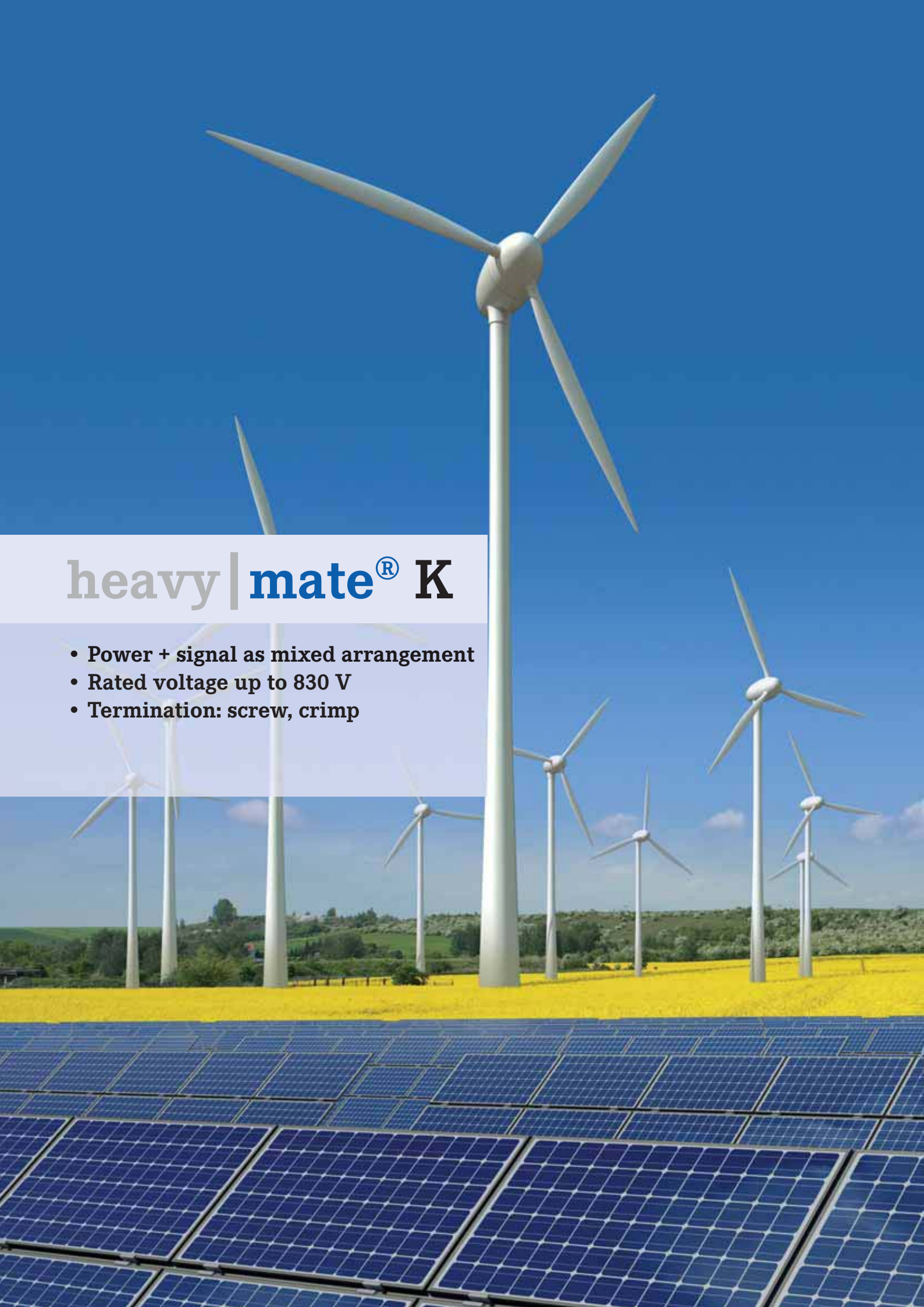


heavy | mate® K

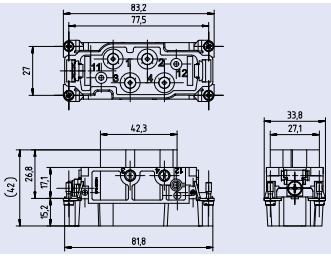
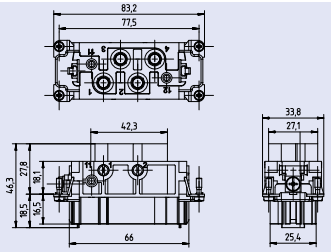
- Power + signal as mixed arrangement
- Rated voltage up to 830 V
- Termination: screw, crimp

Approvals, Testhouse	Characteristics	Approval-Number
UL	In preparation	In preparation
CSA	In preparation	In preparation

General Characteristics	Standard	Value
Number of contacts		4 / 0 (4 Power) 4 / 2 + PE (4 Power + 2 Signal)
Termination technique		screw
Wire gauge		1.5 – 16 mm² (AWG 16-6)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	830 V/400 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	3b
Rated impulse withstand voltage	IEC 60664-1	8.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/125/21
Upper temperature	IEC 60512-11-9	+125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
Materials		
Insert		PC
Colour insert		grey
Contacts		Cu-alloy
Contact plating		Ag (silver)

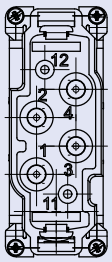
Derating Curves

In preparation

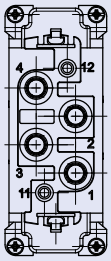
Description	Part Number	Drawing	Figure
Contact insert 4/0			
Male insert	C146 10A004 100 13		
Female insert	C146 10B004 100 13		

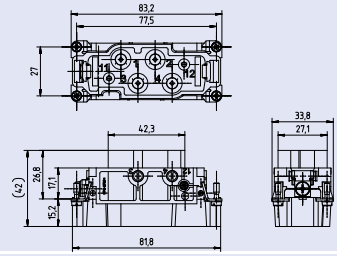
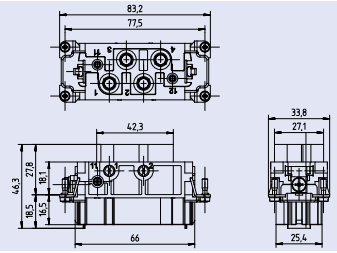
Pin layout

Male insert



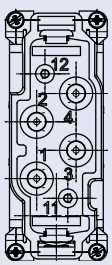
Female insert



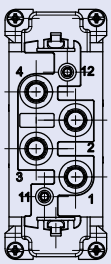
Description	Part Number	Drawing	Figure
Contact insert 4+2+PE			
Male insert	C146 10A006 100 13		
Female insert	C146 10B006 100 13		

Pin layout

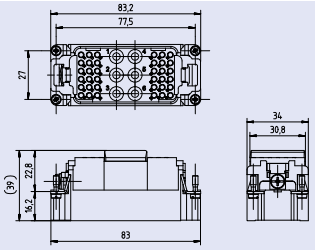
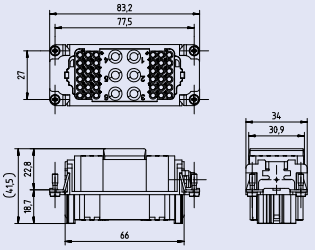
Male insert



Female insert

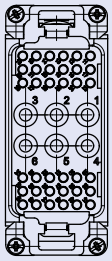


General Characteristics	Standard	Value
Number of contacts		6/36 + PE
Termination technique		crimp
Wire gauge		1.5 – 6.0mm² (AWG 16-10) 0.14 – 2.5mm² (AWG 26-14)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	690 / 160V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	3b
Rated impulse withstand voltage	IEC 60664-1	8.0 / 2.5 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
Materials		
Insert		PC
Colour insert		grey
Contacts		Cu-alloy
Contact plating		Ag (silver) /Au (gold)
Derating Curves		
In preparation		

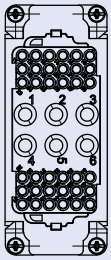
Description	Part Number	Drawing	Figure
Contact insert 6 / 36 + PE (Please order contacts separately)			
Male insert	C146 10A042 500 13		
Female insert	C146 10B042 500 13		

Pin layout

Male insert



Female insert



Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 4 mm crimp contacts single contact						
silver plating	1.5 mm²	16	100	VN01 040 0010 1C	VN02 040 0010 1C	
	2.5 mm²	14	100	VN01 040 0011 1C	VN02 040 0011 1C	
	4 mm²	12	100	VN01 040 0012 1C	VN02 040 0012 1C	
	6 mm²	10	100	VN01 040 0013 1C	VN02 040 0013 1C	
Turned 1.6 mm crimp contacts single contact						
silver plating	0.14 - 0.37 mm²	26-22	100	VN01 016 0024 1C	VN02 016 0024 1C	
	0.5 mm²	20	100	VN01 016 0025 1C	VN02 016 0025 1C	
	0.75 – 1.0 mm²	20-16	100	VN01 016 0026 1C	VN02 016 0026 1C	
	1.5 mm²	16-15	100	VN01 016 0027 1C	VN02 016 0027 1C	
	2.5 mm²	14	100	VN01 016 0028 1C	VN02 016 0028 1C	

heavy|mate® M

- Modular connector
- More module slots than heavy|mate® F and market standard
- Rated voltage 63 - 1000 V
- Rated current 5 A ... 250 A
- Termination: crimp

Approvals, Testhouse	Characteristics	Approval-Number
VDE	Characteristics see rated voltage and rated current of each module	56 79 ÜG
SEV		
UL		E 63093
CSA		48932

In general approvals refer to representative versions of the connector series. Extent and specification of tests upon request.

General information

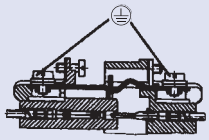
- Modules inserts without crimp contacts, crimping tools see separate catalogue “Tools”.
- Contacts must be ordered separatly, processing instructions see catalogue “Tools”.
- Connectors series heavy|mate® M may be engaged or disengaged when live but without electrical load. If these connectors are mated or unmated under load, the load shall be reduced to 10 % of rated current.
- We recommend using the high profile housings / hoods for the heavy|mate® M inserts.
- Empty modul spaces have to be filled with blind modules.
- Torque for PE connection 1.8 Nm

Advantages of the system

- High combination possibilities
- Possibility of inverse configuration
- Rated voltage up to 1000 V
- Low cost

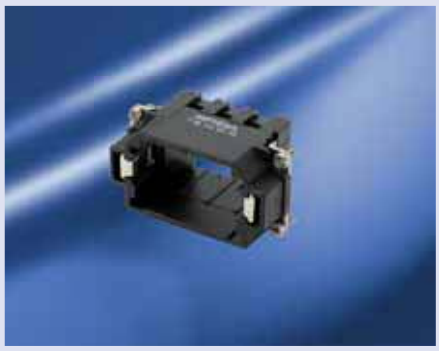
First-to-mate last-to-break protective ground contact

Minimum wire size 0.5 mm²



Modules

Frames



Range of housings

Requirements

- 3 x 400V; 50A; 6mm² wire gauge
- 8 x 250V; 8A; 1.5mm² wire gauge
- 5 x 400V; 15A; 4mm² wire gauge

Solution

1. Check how 16 contacts can be realized; see modules overview on page 118

Possible selection:
a) 1 x 20 contacts
b) 2 x 10 contacts
c) 1 x 10 contacts+ 1 x 5 contacts
d) 1 x 3 contacts + 1 x 5 contacts + 1 x 10 contacts

2. Check technical parameters / solution, see detail pages of the modules on pag 126

Possible selection:
a) not possible due to voltage
b) not possible due to voltage
c) not possible due to current
d) POSSIBLE

3. Choose matching contact, see detail page of the modules on page 126

Possible selection:
a) 3 contacts = C146 A03 001 E8 → contacts = VN01 036 0002 1C
b) 5 contacts = C146 A05 001 E8 → contacts = VN01 025 0033 1C
c) 10 contacts = C146 A10 001 E8 → contacts = VN01 016 0027 1XC

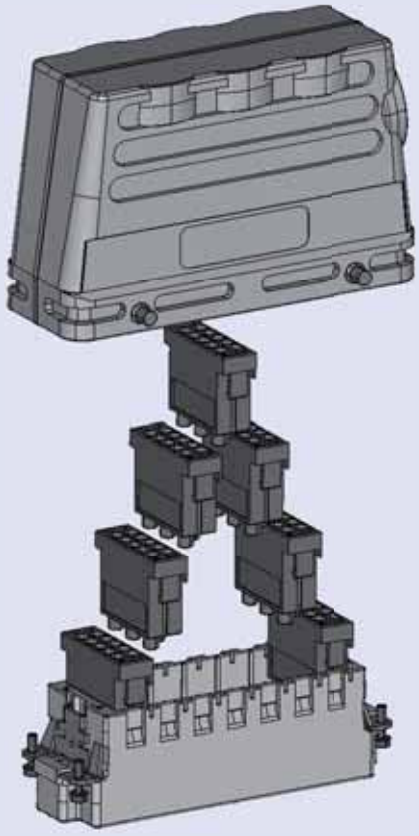
4. Choose matching frame, see frames on page 124

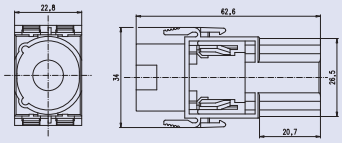
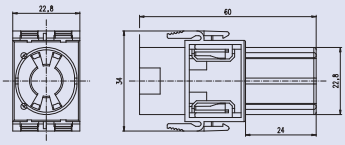
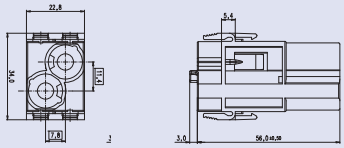
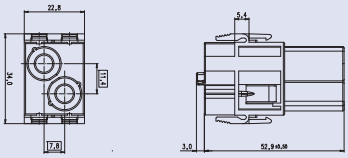
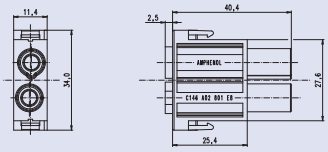
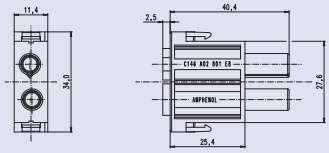
Solution: C146 P10 001 G8

5. Choose matching housing, see housings from page 162

Solution: C146 21R010 600 8

Schematic construction



Description	Part Number	Drawing	Figure
1 contact, Details see page 126			
Pin Module	C146 A01 001 E8		
Socket Module	C146 B01 004 E1		
2 contacts for turned contacts, Details see page 128			
Pin Module	C146 A02 001 E8		
Socket Module	C146 B02 001 E8		
2 contacts Powermodule, Details see page 130			
Pin Module	C146 A02 801 E8		
Socket Module	C146 B02 801 E8		

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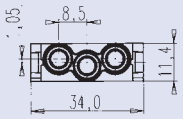
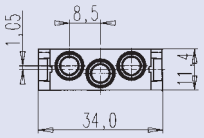
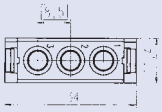
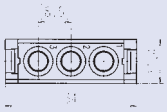
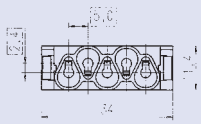
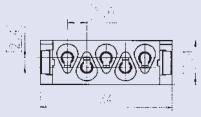
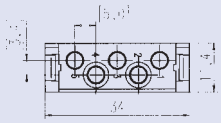
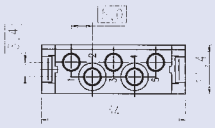
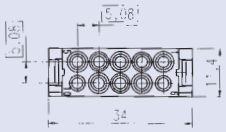
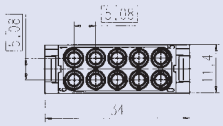
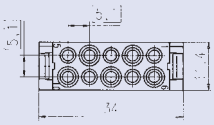
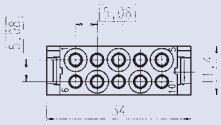
Description	Part Number	Drawing	Figure
3 contacts for turned contacts, 1000 V, Details see page 132			
Pin Module	C146 A03 801 E8		
Socket Module	C146 B03 801 E8		
3 contacts for turned contacts, 690 V, Details see page 134			
Pin Module	C146 A03 001 E8		
Socket Module	C146 B03 001 E8		
5 contacts for stamped contacts, 1000 V, Details see page 136			
Pin Module	C146 D04 001 E8 (4 pol) C146 D05 001 E8 (4 + PE) C146 D05 801 E8 (5 pol)		
Socket Module	C146 C04 001 E8 (4 pol) C146 C05 001 E8 (4 + PE) C146 C05 801 E8 (5 pol)		

Description	Part Number	Drawing	Figure
5 contacts for turned contacts, 400 V, Details see page 138			
Pin Module	C146 A05 001 E8		
Socket Module	C146 B05 001 E8		
10 contacts for stamped contacts, 400 V, Details see page 140			
Pin Module	C146 D10 001 E8		
Socket Module	C146 C10 001 G8		
10 contacts for turned contacts, 400 V, Details see page 142			
Pin Module	C146 A10 001 E8		
Socket Module	C146 B10 001 E8		

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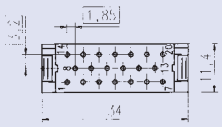
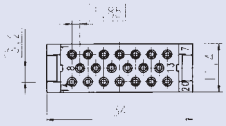
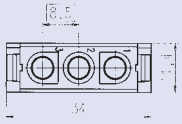
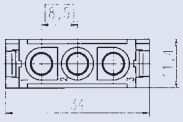
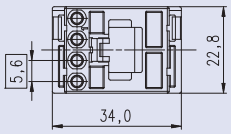
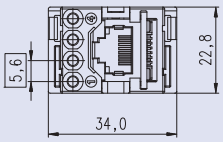
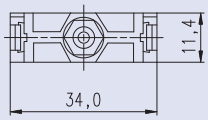
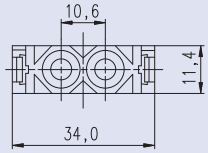
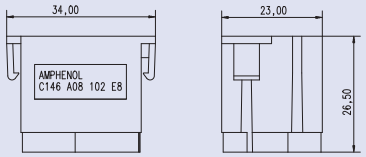
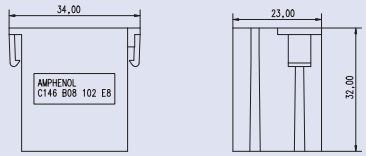
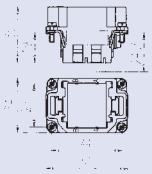
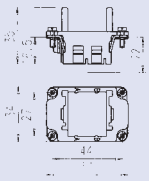
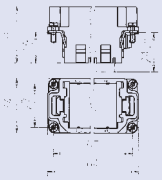
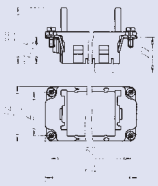
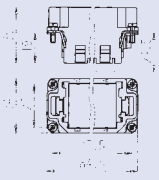
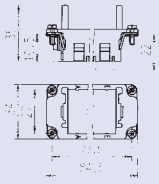
Description	Part Number	Drawing	Figure
20 contacts for stamped contacts, 100 V, Details see page 144			
Pin Module	C146 A20 001 G8		
Socket Module	C146 B20 001 G8		
3 contacts for coax contacts , Details see page 146			
Pin Module	C146 A03 501 E8		
Socket Module	C146 B20 001 G8		
RJ module, 400 V, Details see page 148			
Pin Module	C146 E12 001 E8		
Socket Module	C146 F12 001 G8		

Description	Part Number	Drawing	Figure
Pneumatic module, 1 or 2 connections, Details see page 150			
Pin Module	C146 G01 014 G8 (2.5 mm) C146 G01 024 G8 (4.0 mm) C146 G02 014 G8 (2.5 mm) C146 G02 024 G8 (4.0 mm)		
Socket Module	C146 H01 034 G8 (2.5 mm) C146 H01 044 G8 (4.0 mm) C146 H02 034 G8 (2.5 mm) C146 H02 044 G8 (4.0 mm)		
Shielded module 2x4 contacts for bus signals, 50 V, Details see page 152			
Pin Module	C146 A08 102 E8 C146 A05 100 G8		
Socket Module	C146 B08 102 E8 C146 B05 100 G8		

Description	Part Number	Drawing	Figure
Frame for 2 modules | Size 6			
Frame for pin modules	C146 P06 001 G8 C146 P06 002 G8 (2 x PE)		
Frame for socket modules	C146 S06 001 G8 C146 S06 002 G8 (2 x PE)		
Frame for 3 modules | Size 10			
Frame for pin modules	C146 P10 001 G8 C146 P10 002 G8 (2 x PE)		
Frame for socket modules	C146 S10 001 G8 C146 S10 002 G8 (2 x PE)		
Frame for 5 modules | Size 16			
Frame for pin modules	C146 P16 001 G8 C146 P16 002 G8 (2 x PE)		
Frame for socket modules	C146 S16 001 G8 C146 S16 002 G8 (2 x PE)		

It is possible to mount socket modules in frames for pin modules (possibility of inverse configuration).

[1] If connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.

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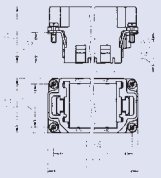
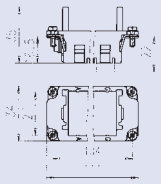
Housings from page 162

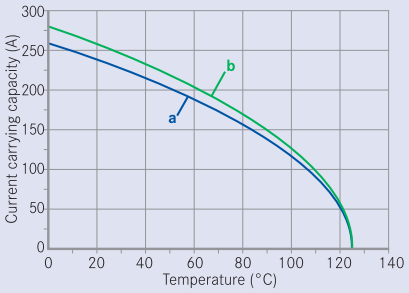
Description	Part Number	Drawing	Figure
Frame for 7 modules | Size 24			
Frame for pin modules	C146 P24 001 G8 C146 P24 002 G8 (2 x PE)		
Frame for pin modules	C146 P24 101 G8 C146 P24 102 G8 (2 x PE)		
Frame for socket modules	C146 S24 001 G8 C146 S24 002 G8 (2 x PE)		
Frame for socket modules	C146 S24 101 G8 C146 S24 102 G8 (2 x PE)		

[1)] If connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.

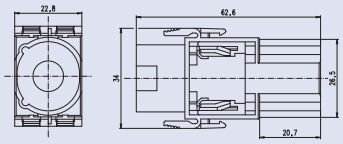
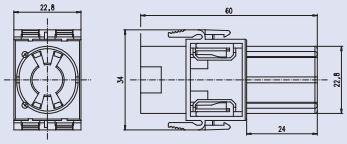
General Characteristics	Standard	Value
Number of contacts		1
Termination technique		crimp
Wire gauge		50 / 70 / 95 mm² (AWG 1/00/000)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	1000 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	2
Rated impulse withstand voltage	IEC 60664-1	8.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 1 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
IP-degree of protection	IEC 60529	20
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		Cu-alloy
Contact plating		Ag (silver)

Derating Curves

95 mm²



Curve	Frame
a	3 Modules
b	1 Modules

Description	Part Number	Drawing	Figure
1 contact module (Please order contacts separately)			
Pin module	C146 A01 001 E8		
Socket module	C146 B01 004 E8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 10 mm crimp contacts						
Single contact	50 mm²	1	1	N01 100 6001 001	N02 100 6121 002	
	70 mm²	00	1	N01 100 6002 001	N02 100 6122 002	
	95 mm²	000	1	N01 100 6003 001	N02 100 6123 002	

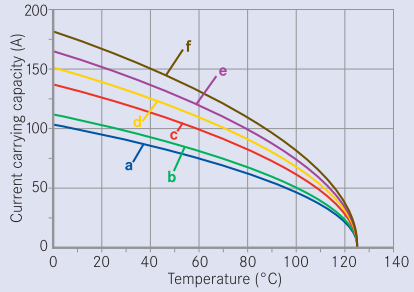
Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Crimping dies	50 mm²		TE 0500 103	
	70 mm²		TE 0500 201	
	95 mm²		TE 0500 301	

For use in pneumatic crimping tool EK12042 by Klauke or AHPW 400C by Neko .
Further tools see catalogue “Tools”

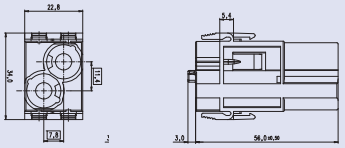
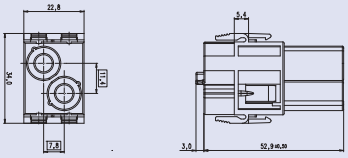
General Characteristics	Standard	Value
Number of contacts		2
Termination technique		crimp
Wire gauge		16 / 25 / 35 mm² (AWG 6/4/2)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	1000 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	2
Rated impulse withstand voltage	IEC 60664-1	8.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 1 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
IP-degree of protection	IEC 60529	20
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		Cu-alloy
Contact plating		Ag (silver)

Derating Curves

16 mm² / 25 mm² / 35 mm²



Curve	Frame
a	6 contacts 16 mm²
b	2 contacts 16 mm²
c	6 contacts 25 mm²
d	2 contacts 25 mm²
e	6 contacts 35 mm²
f	2 contacts 35 mm²

Description	Part Number	Drawing	Figure
2 contacts module for turned contacts (Please order contacts separately)			
Pin module	C146 A02 001 E8		
Socket module	C146 B02 001 E8		

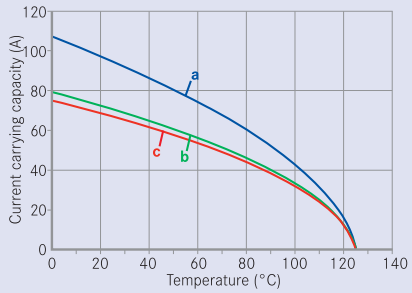
Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 6 mm crimp contacts						
Single contact	16 mm²	6	1	N01 060 0007 1	N02 060 6117 001	
	25 mm²	4		N01 060 0004 1	N02 060 6114 001	
	35 mm²	2		N01 060 0008 1	N02 060 6118 001	
Cable lug for earth connection						
Single contact	16 mm²	6	1	N15 043 0003 003		

Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Crimping dies	16 mm²	-	TE 0600 062	-
	25 mm²	-	TE 0600 042	-
	35 mm²	-	TE 0600 022	-
Further tools see catalogue “Tools”				

General Characteristics	Standard	Value
Number of contacts		2
Termination technique		crimp
Wire gauge		16 mm² (AWG 6)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	1000 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	2
Rated impulse withstand voltage	IEC 60664-1	8.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 1 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
IP-degree of protection	IEC 60512-9-1	≥ 500 Steckzyklen
Mechanical operation	IEC 60529	20
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		Cu-alloy
Contact plating		Ag (silver)

Derating Curves

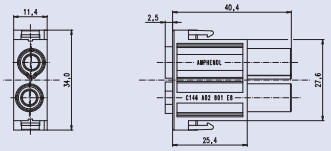
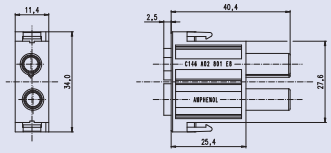
16 mm²



Curve	Frame
a	1 Modules
b	3 Modules
c	7 Modules

General requirements

- Due to reduced cross sections at PE contacts of frames, the PE contact has to be additionally protected against short circuits by using a protection circuit offering a sufficiently short breaking time (<0.25s).
- Parts to be used as connectors, not as plug devices (connector with breaking capacity). Do not mate under current or voltage!

Description	Part Number	Drawing	Figure
2 contacts module (Please order contacts separately)			
Pin module	C146 A02 801 E8		
Socket module	C146 B02 801 E8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 3.6 mm crimp contacts						
Single contact	16 mm²	6	100	VN01 036 0021 1C	VN02 036 0021 1C	
Cable lug for earth connection						
Single contact	16 mm²	6	1	N 15 043 0003 003		

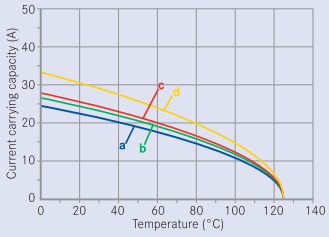
Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Crimping dies	16 mm²	-	-	TE 0600 063 [1]
Removal tool for contacts		-	-	FG 0300 146 3
Removal tool for modules		-	-	FG 1000 146
Further tools see catalogue “Tools”				

[1] For use in pneumatic crimping tool EK12042 by Klauke or AHPW 400C by Neko .

General Characteristics	Standard	Value
Number of contacts		3
Termination technique		crimp
Wire gauge		1.5 - 10 mm² (AWG 16 - 8)
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	1000 V [1)]
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II
Rated impulse withstand voltage	IEC 60664-1	8.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 1 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
IP-degree of protection	IEC 60529	20
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		Cu-alloy
Contact plating		Ag (silver)

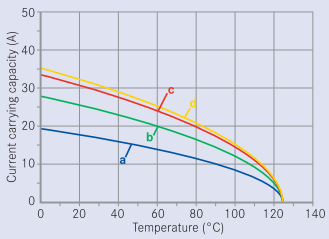
Derating Curves

1.5 mm²



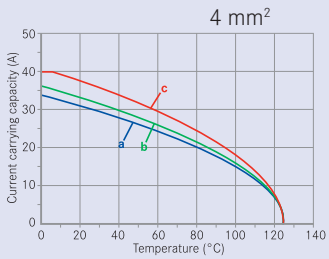
Curve	Frame
a	7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

2.5 mm²



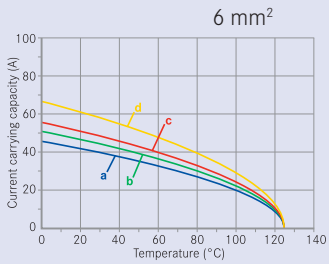
Curve	Frame
a	7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

4 mm²



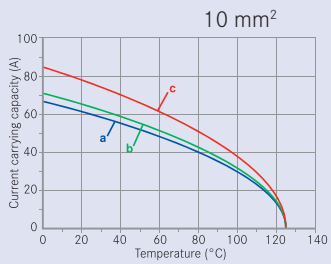
Curve	Frame
a	7 Modules
b	3 Modules
c	1 Modules

6 mm²



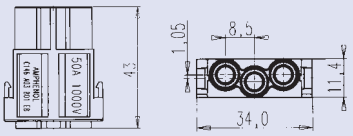
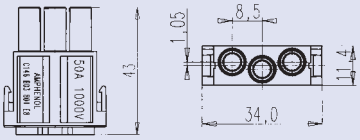
Curve	Frame
a	5-7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

10 mm²



Curve	Frame
a	3-7 Modules
b	2 Modules
c	1 Modules

[1)] 630 V if the modules are used as plug and socket device

Description	Part Number	Drawing	Figure
3 contacts module (Please order contacts separately)			
Pin module	C146 A03 801 E8		
Socket module	C146 B03 801 E8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 3.6 mm crimp contacts (All contacts 2mm first-to-mate to other modules)						
	1.5 mm^2	16	100	VN01 036 0004 (1)C	VN02 036 0004 (1)C	
	2.5 mm^2	14	100	VN01 036 0005 (1)C	VN02 036 0005 (1)C	
	4.0 mm^2	12	100	VN01 036 0001 (1)C	VN02 036 0001 (1)C	
	6.0 mm^2	10	100	VN01 036 0002 (1)C [1]	VN02 036 0002 (1)C [1]	
	10.0 mm^2	8	100	VN01 036 0003 (1)C [1]	VN02 036 0003 (1)C [1]	

Tools

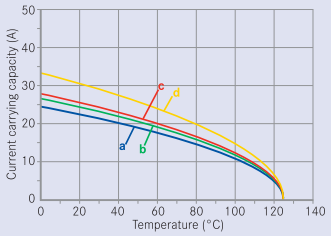
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 3
Removal tool for modules	-	-	-	FG 1000 146
Crimping tool for single contacts	1.5 - 2.5 mm^2 4.0 mm^2 6.0 mm^2	TA 0010 146 000 2 TA 0010 146 000 4 TA 0010 146 000 4	TA 0000 144 TA 0000 124 TA 0000 124	TA 0000
4-ondet crimping tool [2]	1.5 -10.0 mm^2	-	-	TB 0200 146
Crimping tool for cable lugs	6.0 mm^2 10.0 mm^2	-	TA 0000 180	TA 0000
Cable lugs for PE connection			**Pieces**	**Part Number**
Cable lug	6.0 mm^2 10.0 mm^2	-	20 20	N15 006 000 9Z N15 010 000 7Z
Further tools see catalogue “Tools”				

[1] For wire gauges 6 + 10 mm2 cable lugs have to be used for PE connection
[2] Incl. calibration pin set, locator

General Characteristics	Standard	Value
Number of contacts		3
Termination technique		crimp
Wire gauge		1.5 - 10 mm² (AWG 16 - 8)
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	630 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	8.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 1 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 6051211-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		Cu-alloy
Contact plating		Ag (silver)

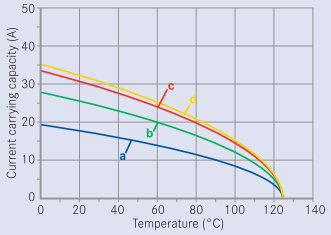
Derating Curves

1.5 mm²



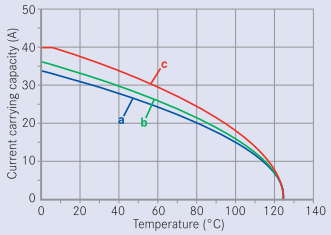
Curve	Frame
a	7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

2.5 mm²



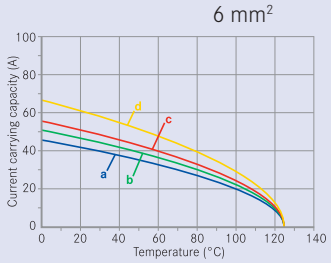
Curve	Frame
a	7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

4 mm²



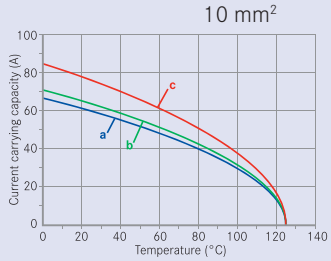
Curve	Frame
a	7 Modules
b	3 Modules
c	1 Modules

6 mm²



Curve	Frame
a	5-7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

10 mm²



Curve	Frame
a	3-7 Modules
b	2 Modules
c	1 Modules

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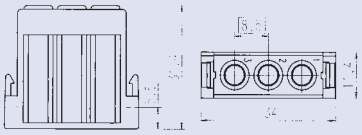
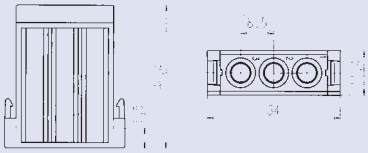
Description	Part Number	Drawing	Figure
3 contacts module (Please order contacts separately)			
Pin module	C146 A03 001 E8		
Socket module	C146 B03 001 E8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 3.6 mm crimp contacts single contact						
silver plating	1.5 mm²	16	100	VN01 036 0004 (1)C	VN02 036 0004 (1)C	
	2.5 mm²	14	100	VN01 036 0005 (1)C	VN02 036 0005 (1)C	
	4.0 mm²	12	100	VN01 036 0001 (1)C	VN02 036 0001 (1)C	
	6.0 mm²	10	100	VN01 036 0002 (1)C [1]	VN02 036 0002 (1)C [1]	
	10.0 mm²	8	100	VN01 036 0003 (1)C [1]	VN02 036 0003 (1)C [1]	

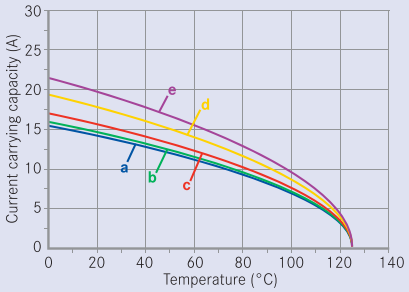
Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 3
Removal tool for modules	-	-	-	FG 1000 146
Crimping tool for single contacts	1.5 - 2.5 mm² 4.0 mm² 6.0 mm²	TA 0010 146 000 5 TA 0010 146 000 4 TA 0010 146 000 4	TA 0000 144 TA 0000 124 TA 0000 124	TA 0000
4-indet crimping tool [2]	1.5 -10.0 mm²	-	-	TB 0200 146
Crimping tool for cable lugs	6.0 mm² 10.0 mm²	-	TA 0000 180	TA 0000
Cable lugs for PE connection			**Pieces**	**Part Number**
Cable lug	6.0 mm² 10.0 mm²	-	20 20	N15 006 000 9Z N15 010 000 7Z
Further tools see catalogue “Tools”				

Stripping length see page 249-251 [1] For wire gauges 6 + 10 mm2 cable lugs have to be used for PE connection [2] Incl. calibration pin set, locator

General Characteristics	Standard	Value
Number of contacts		4 + ⏚ / 5
Termination technique		crimp
Wire gauge		0.5 - 4.0 mm² (AWG 20 - 12)
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	1000 V [1)]
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II
Rated impulse withstand voltage	IEC 60664-1	8.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
IP-degree of protection	IEC 60529	20
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Male contacts		CuZn (brass)
Female contacts		CuSn (bronce)
Contact plating		Ag (silver)

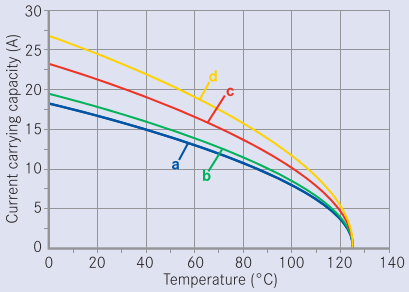
Derating Curves

1.5 mm²



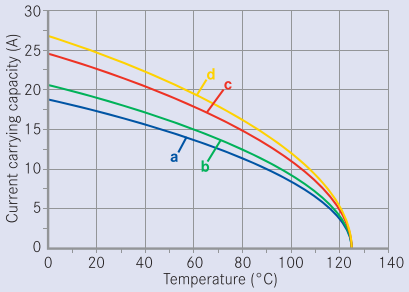
Curve	Frame
a	7 Modules
b	5 Modules
c	3 Modules
d	2 Modules
d	1 Modules

2.5 mm²



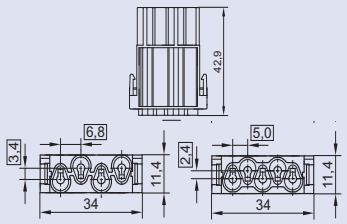
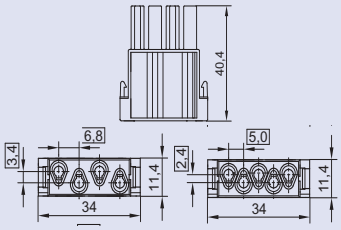
Curve	Frame
a	7 Modules
b	3-5 Modules
c	2 Modules
d	1 Modules

4 mm²



Curve	Frame
a	7 Modules
b	5 Modules
c	3 Modules
d	1+2 Modules

[1)] 630 V if the modules are used as plug and socket device

Description	Part Number	Drawing	Figure
4 contacts, 4 + ⏚ , 5 contacts module, PE contact 2 mm first-to-mate (Please order contacts separately)			
Pin module	C146 D04 001 E8 (4 pol) C146 D05 001 E8 (4 +PE) C146 D05 801 E8 (5 pol)		
Socket module	C146 C04 001 E8 (4 pol) C146 C05 001 E8 (4 + PE) C146 C05 801 E8 (5 pol)		

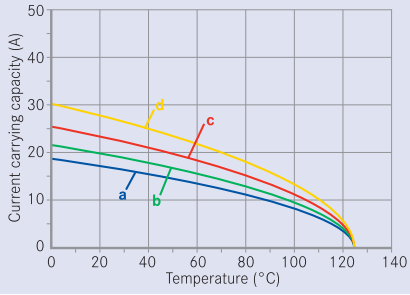
Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Stamped single contacts						
silver plating	0.5 - 1.5 mm²	20 - 16	100	VN01 025 0001 (101)	VN02 025 0001 (101)	
	1.5 - 2.5 mm²	16 - 14	100	VN01 025 0010 (101)	VN02 025 0010 (101)	
	2.5 - 4.0 mm²	12	100	VN01 025 0043 (1)	VN02 025 0043 (1)	
gold plating	0.5 - 1.5 mm²	20 - 16	100	VN01 025 0001 (102)	VN02 025 0001 (102)	
	1.5 - 2.5 mm²	16 - 14	100	VN01 025 0010 (102)	VN02 025 0010 (102)	
Stamped Contacts on reel for hand crimp tools						
silver plating	0.5 - 1.5 mm²	20 - 16	2000	TN01 025 0001 (1)	TN02 025 0001 (1)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 025 0010 (1)	TN02 025 0010 (1)	
gold plating	0.5 - 1.5 mm²	20 - 16	2000	TN01 025 0001 (2)	TN02 025 0001 (2)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 025 0010 (2)	TN02 025 0010 (2)	
Contacts on reel for crimp machines contact feeding left hand side						
silver plating	0.5 - 1.5 mm²	20 - 16	2000	TN01 025 0001 (1)	TN02 025 0001 (1)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 025 0010 (1)	TN02 025 0010 (1)	
	2.5 - 4 mm²	12	2000	TN01 025 0043 (1)	TN02 025 0043 (1)	

Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0200 146 1
Removal tool for modules	-	-	-	FG 1000 146
Crimping tool for single contacts	0.5 - 1.5 mm² 1.5 - 2.5 mm² 2.5 - 4.0 mm²	TA 0004 146 000 1 TA 0005 146 000 3 TA 0003 146 000 1	TA 0000 163 TA 0000 141 TA 0000 121	TA 0000
Further tools see catalogue “Tools”				

General Characteristics	Standard	Value
Number of contacts		5
Termination technique		crimp
Wire gauge		0.5 - 4.0 mm² (AWG 20 - 12)
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	400 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II
Rated impulse withstand voltage	IEC 60664-1	6.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 2 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		Cu-alloy
Contact plating		Ag (silver)

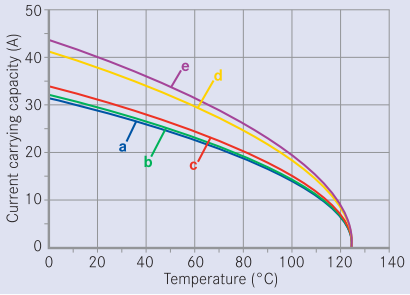
Derating Curves

2.5 mm²



Curve	Frame
a	7 Modules
b	5 Modules
c	3 Modules
d	1+2 Modules

4 mm²



Curve	Frame
a	7 Modules
b	5 Modules
c	3 Modules
d	2 Modules
d	1 Modules

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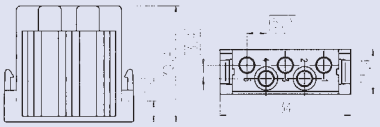
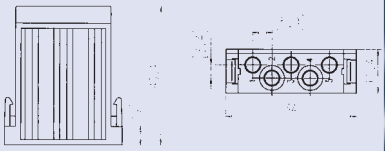
Description	Part Number	Drawing	Figure
5 contacts module (Please order contacts separately)			
Pin module	C146 A05 001 E8		
Socket module	C146 B05 001 E8		

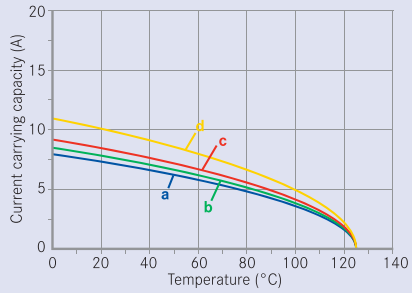
Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 2.5 mm crimp contacts single contact						
silver plating	0.5 mm^2	20	100	VN01 025 0029 (1)C	VN02 025 0029 (1)C	
	0.75 - 1.0 mm^2	18	100	VN01 025 0030 (1)C	VN02 025 0030 (1)C	
	1.5 mm^2	16	100	VN01 025 0031 (1)C	VN02 025 0031 (1)C	
	2.5 mm^2	14	100	VN01 025 0032 (1)C	VN02 025 0032 (1)C	
	4.0 mm^2	12	100	VN01 025 0033 (1)C	VN02 025 0033 (1)C	

Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 4
Removal tool for modules	-	-	-	FG 1000 146
Crimping tool for single contacts	0.5 - 2.5 mm^2 4.0 mm^2	TA 0010 146 000 2 TA 0010 146 000 3	TA 0000 144 TA 0000 124	TA 0000
Further tools see catalogue “Tools”				

General Characteristics	Standard	Value
Number of contacts		10
Termination technique		crimp
Wire gauge		0.14 - 2.5 mm² (AWG 26 - 14)
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	400 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II
Rated impulse withstand voltage	IEC 60664-1	6.0 KV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Male contacts		CuZn (brass)
Female contacts		CuSn (bronce)
Contact plating		Ag (silver)

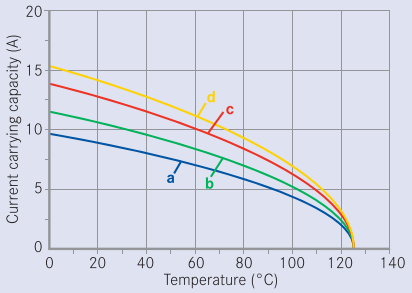
Derating Curves

0.5 mm²

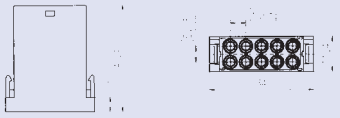


Curve	Frame
a	5-7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

1.5 mm²



Curve	Frame
a	5-7 Modules
b	3 Modules
c	2 Modules
d	1 Modules

Description	Part Number	Drawing	Figure
10 contacts module (Please order contacts separately)			
Pin module	C146 D10 001 E8		
Socket module	C146 C10 001 G8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Stamped 1.6 mm single contact						
silver plating	0.14 - 0.5 mm²	26 - 20	100	VN01 016 0003 (1)	VN02 016 0003 (1)	
	0.5 - 1.5 mm²	20 - 16	100	VN01 016 0002 (1)	VN02 016 0002 (1)	
	1.5 - 2.5 mm²	16 - 14	100	VN01 016 0005 (1)	VN02 016 0005 (1)	
gold plating	0.14 - 0.5 mm²	26 - 20	100	VN01 016 0003 (2)	VN02 016 0003 (2)	
	0.5 - 1.5 mm²	20 - 16	100	VN01 016 0002 (2)	VN02 016 0002 (2)	
	1.5 - 2.5 mm²	16 - 14	100	VN01 016 0005 (2)	VN02 016 0005 (2)	
Stamped Contacts on reel for hand crimp tools						
silver plating Standard	0.14 - 0.5 mm²	26 - 20	200	ZN01 016 0003 (1)	ZN02 016 0003 (1)	
	0.5 - 1.5 mm²	20 - 16	200	ZN01 016 0002 (1)	ZN02 016 0002 (1)	
	1.5 - 2.5 mm²	16 - 14	200	ZN01 016 0005 (1)	ZN02 016 0005 (1)	
silver plating High current	0.5 - 1.5 mm²	20 - 16	200	ZN01 016 0015 (1)	ZN02 016 0015 (1)	
	1.5 - 2.5 mm²	16 - 14	200	ZN01 016 0016 (1)	ZN02 016 0016 (1)	
gold plating Standard	0.14 - 0.5 mm²	26 - 20	200	ZN01 016 0003 (2)	ZN02 016 0003 (2)	
	0.5 - 1.5 mm²	20 - 16	200	ZN01 016 0002 (2)	ZN02 016 0002 (2)	
	1.5 - 2.5 mm²	16 - 14	200	ZN01 016 0005 (2)	ZN02 016 0005 (2)	
Stamped Contacts on reel for crimp machines contact feeding left hand side						
silver plating Standard	0.14 - 0.5 mm²	26 - 20	2000	TN01 016 0003 (1)	TN02 016 0003 (1)	
	0.5 - 1.5 mm²	20 - 16	2000	TN01 016 0002 (1)	TN02 016 0002 (1)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 016 0005 (1)	TN02 016 0005 (1)	
silver plating High current	0.5 - 1.5 mm²	20 - 16	2000	TN01 016 0015 (1)	TN02 016 0015 (1)	
	1.5 - 2.5 mm²	18 - 14	2000	TN01 016 0016 (1)	TN02 016 0016 (1)	
gold plating Standard	0.14 - 0.5 mm²	26 - 20	2000	TN01 016 0003 (2)	TN02 016 0003 (2)	
	0.5 - 1.5 mm²	20 - 16	2000	TN01 016 0002 (2)	TN02 016 0002 (2)	
	1.5 - 2.5 mm²	16 - 14	2000	TN01 016 0005 (2)	TN02 016 0005 (2)	

Tools

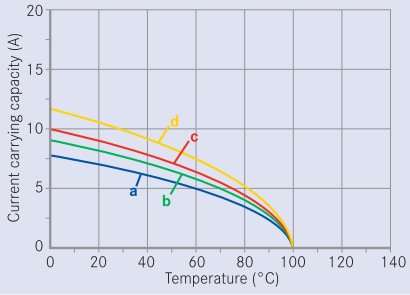
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts/ modules	-	-	-	FG 0300 146 1 / FG 1000 146
Service crimping tool	0.14 - 0.5 mm² 0.5 - 1.5 mm²	-	-	TA 0100 146
Crimping tool for single contacts	0.14 - 0.5 mm² 0.5 - 1.5 mm² 1.5 - 2.5 mm²	TA 0001 146 000 1 TA 0002 146 000 1 TA 0007 146 000 3	TA 0000 202 TA 0000 163 TA 0000 141	TA 0000

Further tools see catalogue “Tools”

General Characteristics	Standard	Value
Number of contacts		10
Termination technique		crimp
Wire gauge		0.14 - 2.5 mm² (AWG 26 - 14)
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	400 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	6.0 kV
Current carrying capacity	IEC 60512-5-2	siehe Derating Kurven
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 100 / 21
Upper temperature	IEC 60512-11-9	+ 100 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 Steckzyklen
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		CuZn (brass)
Contact plating		Ag (silver)

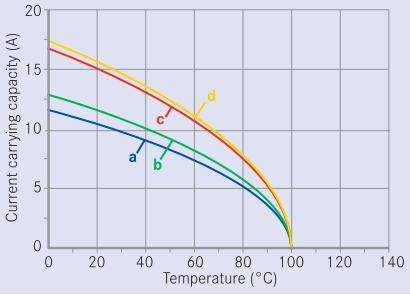
Derating Curves

0.5 mm²

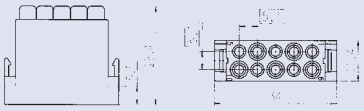
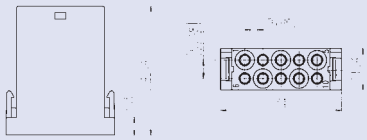


Curve	Frame
a	7 Modules
b	3-5 Modules
c	2 Modules
d	1 Modules

1.5 mm²



Curve	Frame
a	7 Modules
b	3-5 Modules
c	2 Modules
d	1 Modules

Description	Part Number	Drawing	Figure
10 contacts module (Please order contacts separately)			
Pin module	C146 A10 001 E8		
Socket module	C146 B10 001 E8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 1.6 mm crimp contacts single contact						
silver plating	0.14 - 0.37mm²	26 - 22	100	VN01 016 0024 (1)C	VN02 016 0024 (1)C	
	0.5 mm²	20	100	VN01 016 0025 (1)C	VN02 016 0025 (1)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (1)C	VN02 016 0026 (1)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (1)C	VN02 016 0027 (1)C	
	2.5 mm²	14	100	VN01 016 0028 (1)C	VN02 016 0028 (1)C	
gold plating	0.14 - 0.37mm²	26 - 22	100	VN01 016 0024 (2)C	VN02 016 0024 (2)C	
	0.5 mm²	20	100	VN01 016 0025 (2)C	VN02 016 0025 (2)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (2)C	VN02 016 0026 (2)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (2)C	VN02 016 0027 (2)C	
	2.5 mm²	14	100	VN01 016 0028 (2)C	VN02 016 0028 (2)C	
FO contacts						
single contact	1.0 mm POF	–	10	VN01 016 0040 (8) X	VN02 016 0040 (8) X	

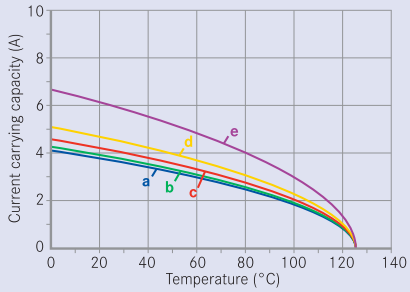
Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	FG 0300 146 1
Removal tool for modules	-	-	-	FG 1000 146
Crimping tool for single contacts	0.14 - 1.0 mm² 1.5 mm² 2.5 mm²	TA 0010 146 000 1	TA 0000 184	TA 0000
Crimpzange für LWL Kontakte [1]	1.0 mm POF/FO	-	-	TB 0500 146
Further tools see catalogue “Tools”				

Stripping length see page 249-251 [1] Incl. stripping tool, locator, abrasive adapter
For small wire sizes, the use of guide elements is recommended (see page 226)

General Characteristics	Standard	Value
Number of contacts		20
Termination technique		crimp
Wire gauge		0.09 - 0.5 mm² (AWG 28 - 20)
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	63 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II (PA)
Rated impulse withstand voltage	IEC 60664-1	4.0 KV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Male contacts		CuZn (brass)
Female contacts		CuSn (bronce)
Contact plating		Au (gold)

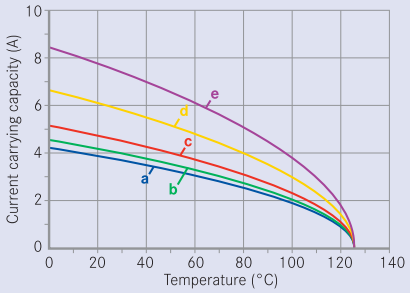
Derating-Kurven

0.25 mm²

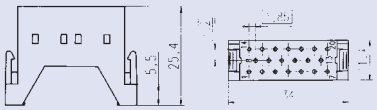
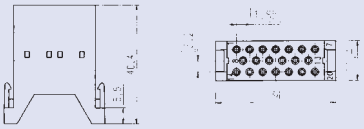


Curve	Frame
a	7 Modules
b	5 Modules
c	3 Modules
d	2 Modules
e	1 Modules

0.5 mm²



Curve	Frame
a	7 Modules
b	5 Modules
c	3 Modules
d	2 Modules
e	1 Modules

Description	Part Number	Drawing	Figure
20 contacts module (Please order contacts separately)			
Pin module	C146 A20 001 G8		
Socket module	C146 B20 001 G8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Stamped 1.0 mm single contacts for hand crimping tools						
gold plating	0.09 - 0.25 mm²	28 - 24	100	VN01 010 0130 (2)	VN02 010 0130 (2)	
	0.25 - 0.50 mm²	24 - 20	100	VN01 010 0131 (2)	VN02 010 0131 (2)	
Stamped Contacts on reel for hand crimp tools						
gold plating	0.09 - 0.25 mm²	28 - 24	350	ZN01 010 0130 (2)	ZN02 010 0130 (2)	
	0.25 - 0.50 mm²	24 - 20	350	ZN01 010 0131 (2)	ZN02 010 0131 (2)	
Stamped contacts on reel for crimp machines contact feeding left hand side						
gold plating	0.09 - 0.25 mm²	28 - 24	2000	TN01 010 0130 (2)	TN02 010 0130 (2)	
	0.25 - 0.50 mm²	24 - 20	2000	TN01 010 0131 (2)	TN02 010 0131 (2)	

Tools

Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Removal tool for contacts	-	-	-	17D 438 SP
Removal tool for modules	-	-	-	FG 1000 146
Service crimping tool	0.09 - 0.25 mm² 0.25 - 0.50 mm²	-	-	TA 0200 146

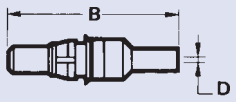
Further tools see catalogue “Tools”

Stripping length see page 249-251
If small wire sizes are used, guide pins and guide sockets should be prefered to use (see page 226)

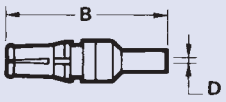
General Characteristics	Standard	Value
Number of contacts		3
Termination technique		crimp, solder
Flammability	UL 94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	250 V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	III
Material group	IEC 60664-1	II
Impedance		50 Ω
Working frequency		2 GHz
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		redbrown
Contact plating		Au (gold)

Contact dimensions

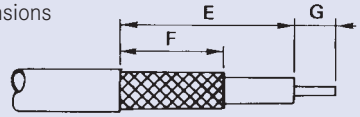
Male contact



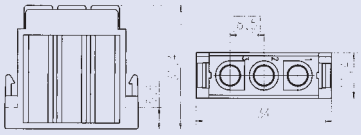
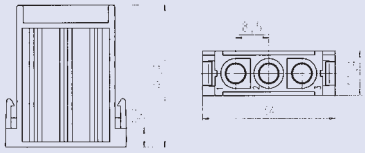
Female contact

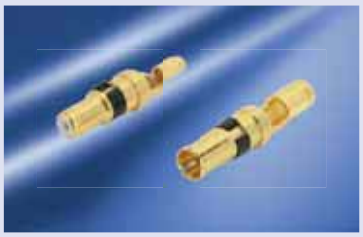


Stripping dimensions



Part Number	B	D	E	F	G
17 DM 537 401	23.6	1.7	7.9	6.3	2
17 DM 537 421	23.6	1.7	7.9	6.3	2
17 DM 537 405	26.3	3.2	9.5	7.9	2
17 DM 537 425	26.3	3.2	9.5	7.9	2

Description	Part Number	Drawing	Figure
3 contacts module for coax contacts (Please order contacts separately)			
Pin module	C146 A03 501 E8		
Socket module	C146 B03 501 E8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Single contacts [1]						
	RG 174, 179, 316		1	17 DM 537 401	17 DM 537 421	
	RG 58		1	17 DM 537 405	17 DM 537 425	

Tools

Description	for cable size	6-hex-size in mm			Part Number	
					Crimping dies	Tool
Removal tool for contacts	-	-			-	FG 0300 146 3
Removal tool for modules	-	-			-	FG 1000 146
Crimping tool for single contacts	RG 58	5.4	(6.5)	(1.7)	TA 0000 401	TA 0000
	RG 174, 179, 316	3.25	(4.5)	(1.7)	TA 0000 402	TA 0000
Further tools see catalogue “Tools”						

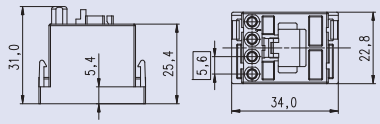
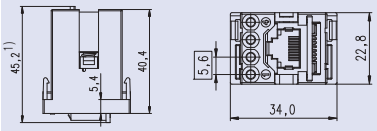
[1] Further contacts on request

Brief information

- For integration of standard RJ45 components
- Worldwide real-time access on machines and facilities
- Easy assembly through the use of standard RJ45 components
- One connector for power, signal and data transmission
- 4 additional power crimp contacts
- Time- and money saving through the use of similar active- and passive components
- Unitary transmission protocol in the office- and production environment.
- Meets CAT 5 for Ethernet acc. ISO/IEC 11801

General Characteristics	Standard	Value module	Value RJ45
Number of contacts		4	8
Termination technique		crimp	mate
Wire gauge		0.14 - 2.5mm^2	
Flammability	UL 94	V-0	V - 0
Electrical Characteristics			
Rated voltage	IEC 60664-1	400 V AC	125 V AC
Rated impulse withstand voltage	IEC 60664-1	6 kV	1.8 kV
Current carrying capacity	IEC 60512-5-2	13 A[1)]	1.5 A
Contact resistance	IEC 60512-2-1	≤ 5 mΩ	≤ 20 mΩ
Insulation resistance	IEC 60512-3-1	10^{10}Ω	5^8Ω
Climatical Characteristics			
Upper temperature	IEC 60512-11-9	+ 100 °C	+ 80 °C
Lower temperature	IEC 60512-11-10		- 20 °C
Mechanical Characteristics			
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles	≥ 500 mating cycles
Materials			
Module		PA 6.6 GF	
Colour module		black	black
Male contacts		CuZn (brass)	CuSn (bronce)
Female contacts		CuZn (brass)	CuSn (bronce)
Contact plating		Ag (silver)	Au (gold)

[1)] 2 Modules, 40°C ambient temperature, 1.5 mm^2 Wire gauge

Description	Part Number	Drawing	Figure
RJ module			
Pin module	C146 E12 001 E8		
Socket module	C146 F12 001 G8		

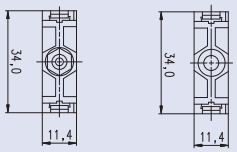
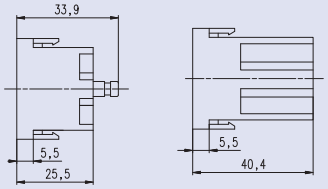
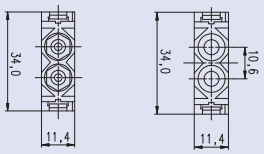
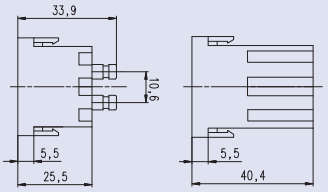
Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 1.6 mm single contacts						
silver plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (1)C	VN02 016 0024 (1)C	
	0.5 mm²	20	100	VN01 016 0025 (1)C	VN02 016 0025 (1)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (1)C	VN02 016 0026 (1)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (1)C	VN02 016 0027 (1)C	
	2.5 mm²	14	100	VN01 016 0028 (1)C	VN02 016 0028 (1)C	
gold plating	0.14 - 0.37 mm²	26 - 22	100	VN01 016 0024 (2)C	VN02 016 0024 (2)C	
	0.5 mm²	20	100	VN01 016 0025 (2)C	VN02 016 0025 (2)C	
	0.75 - 1.0 mm²	20 - 16	100	VN01 016 0026 (2)C	VN02 016 0026 (2)C	
	1.5 mm²	16 - 15	100	VN01 016 0027 (2)C	VN02 016 0027 (2)C	
	2.5 mm²	14	100	VN01 016 0028 (2)C	VN02 016 0028 (2)C	

1) If plug socket receded: 46,8

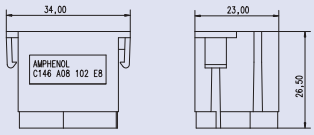
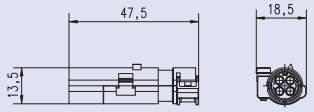
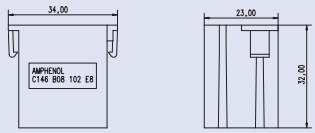
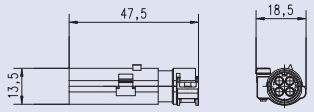
Brief information
• Power, signal and pneumatic within a single connector • Very stable brass contacts • Pneumatic socket contacts with barrier, closes when the connector is open • Available with single or double connections • Connection for 2.5 mm or 4 mm PTFE (Teflon)-tubes • Tubes can be disassembled from the terminations

General Characteristics	Standard	Value
Number of contacts		1 / 2
Termination technique		tube termination
Wire gauge		2.5 mm / 4.0 mm
Flammability	UL 94	V-0
Technical Characteristics		
Operating pressure		8 bar with PTFE tube
Operating path		4.0 mm
Locking		locking on one side
Pneumatic tube		only use PTFE tubes [1)]
Climatical Characteristics		
Upper temperature		+100 °C
Lower temperature		- 20 °C
Mechanical Characteristics		
Mechanical operation		5000 mating cycles
Materials		
Module		PA 6.6 GF
Colour module		black
Contacts		Brass MS 58

[1)] The modules are specifically designed for the use of PTFE tubes and should only be used in conjunction with these. The use of tubes made from other materials is not recommended, as the higher and lower category temperatures will not be achievable.

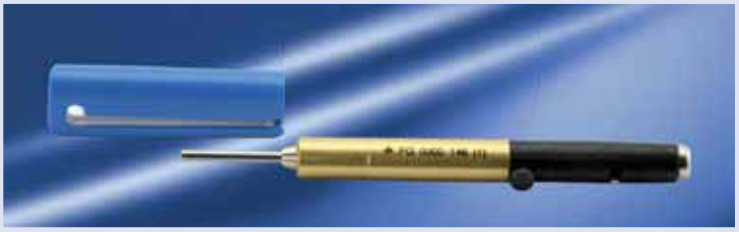
Description	Part Number	Drawing	Figure
Pneumatic module			
Pin module	C146 G01 014 G8 (2.5 mm) C146 G01 024 G8 (4.0 mm)		
Socket module	C146 H01 034 G8 (2.5 mm) C146 H01 044 G8 (4.0 mm)		
Pin module	C146 G02 014 G8 (2.5 mm) C146 G02 024 G8 (4.0 mm)		
Socket module	C146 H02 034 G8 (2.5 mm) C146 H02 044 G8 (4.0 mm)		

General Characteristics	Standard	Value
Number of contacts		2X4
Termination technique		crimp
Wire gauge		0.14 – 2.5 mm² (AWG 26-14)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	50V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	3b
Rated impulse withstand voltage	IEC 60664-1	0.8 kV
Current carrying capacity	IEC 60512-5-2	10A
Contact resistance	IEC 60512-2-1	≤ 5mΩ
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Upper temperature	IEC 60512-11-9	125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Module		PC
Colour module		grey
Contacts		Cu-alloy
Contact plating		Au (gold)

Description	Part Number	Drawing	Figure
Contact insert 2x4 contacts (Please order contacts separately)			
Pin module	C146 A08 102 E8		
Male contact carriers 4 contacts	C146 A05 100 G8		
Socket module	C146 B08 102 E8		
Female contact carriers 4 contacts	C146 B05 100 G8		

Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 1.6mm crimp contacts						
Single contacts	0.14 – 0.37 mm²	26-22	100	VN01 016 0024 2C	VN02 016 0024 2C	
	0.5 mm²	20	100	VN01 016 0025 2C	VN02 016 0025 2C	
	0.75 – 1.0 mm²	20-16	100	VN01 016 0026 2C	VN02 016 0026 2C	
	1.5 mm²	16-15	100	VN01 016 0027 2C	VN02 016 0027 2C	
	2.5 mm²	14	100	VN01 016 0028 2C	VN02 016 0028 2C	

Tools				
Description	for wire gauge	Part Number		
		Contact locator	Crimping dies	Tool
Crimping tool	-	-	-	TA 0000 oder TA 0500
Crimping dies	-	-	-	TA 00000 184
Contact locator	-	-	-	TA 0010 146 000 1
Removal tool for contacts	-	-	-	FG 0300 146 1
Further tools see catalogue “Tools”				

Contact size	Part Number	Figure
1.0 mm	17D 438 SP	
1.6 mm	FG 0300 146 1	
2.5 mm turned	FG 0300 146 4	
2.5 mm stamped	FG 0200 146 1	
3.6 mm	FG 0300 146 3	

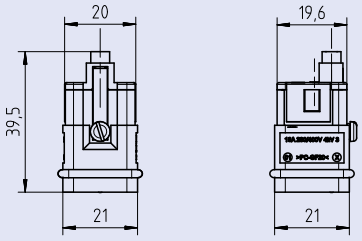
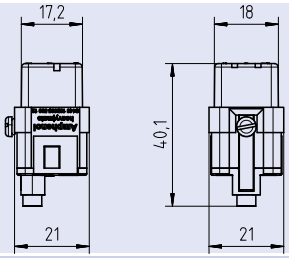
Contact size	Part Number	Figure
Removal tool for modules	FG 1000 146	
Blank modules	C146 A00 001 E8 (pin) C146 B00 001 E8 (socket)	
Module coupler	C146 10Z000 002 8	
Assembly angle	C146 10Z001 001 8	
Strain relief	C146 10Z002 001 8	

heavy | mate® Q

- Compact design
- Even in a metal housing
- Rated voltage up to 500 V
- Numbers of contacts: 5 + PE, 7 + PE

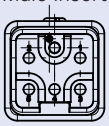
Approvals, Testhouse	Characteristics	Approval-Number
UL	In preparation	In preparation
CSA	In preparation	In preparation

General Characteristics	Standard	Value
Number of contacts		5 + PE
Termination technique		crimp
Wire gauge		0.5 – 4.0 mm² (AWG 20-12)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	400 V (conductor – conductor) 230 V (conductor – earth)
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	3b
Rated impulse withstand voltage	IEC 60664-1	6 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/125/21
Upper temperature	IEC 60512-11-9	+125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
Materials		
Insert		PC
Colour insert		grey
Contacts		Cu-alloy
Contact plating		Ag (silver) /Au (gold)
Derating Curves		
In preparation		

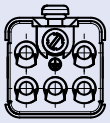
Description	Part Number	Drawing	Figure
Contact insert 5 +PE (Please order contacts separately)			
Male insert	C146 10A005 500 12		
Female insert	C146 10B005 500 12		
Coding element			
Coding element	N17 045 000 1		

Contact arrangement

Male insert



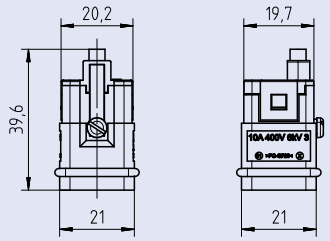
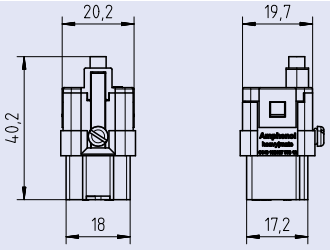
Female insert



Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 2.5 mm crimp contacts single contact						
silver plating	0.5 mm²	20	100	VN01 025 0035 1C	VN02 025 0035 1C	
	0.75 – 1.0 mm²	18	100	VN01 025 0036 1C	VN02 025 0036 1C	
	1.5 mm²	16	100	VN01 025 0037 1C	VN02 025 0037 1C	
	2.5 mm²	14	100	VN01 025 0038 1C	VN02 025 0038 1C	
	4.0 mm²	12	100	VN01 025 0039 1C	VN02 025 0039 1C	
gold plating	0.5 mm²	20	100	VN01 025 0035 2C	VN02 025 0035 2C	
	0.75 – 1.0 mm²	18	100	VN01 025 0036 2C	VN02 025 0036 2C	
	1.5 mm²	16	100	VN01 025 0037 2C	VN02 025 0037 2C	
	2.5 mm²	14	100	VN01 025 0038 2C	VN02 025 0038 2C	
	4.0 mm²	12	100	VN01 025 0039 2C	VN02 025 0039 2C	

Characteristics contact inserts 7 + PE

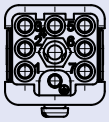
General Characteristics	Standard	Value
Number of contacts		7 + PE
Termination technique		crimp
Wire gauge		0.14 – 2.5mm² (AWG 26-14)
Flammability	UL94	V-0
Electrical Characteristics		
Rated voltage	IEC 60664-1	400V
Pollution degree	IEC 60664-1	3
Installation (overvoltage) category	IEC 60664-1	3
Material group	IEC 60664-1	3b
Rated impulse withstand voltage	IEC 60664-1	6.0 kV
Current carrying capacity	IEC 60512-5-2	see derating curves
Contact resistance	IEC 60512-2-1	≤ 5 mΩ
Insulation resistance	IEC 60512-3-1	≥ 10^{10} Ω
Climatical Characteristics		
Climatic category	IEC 60068-1	40/125/21
Upper temperature	IEC 60512-11-9	+125°C
Lower temperature	IEC 60512-11-10	-40°C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥500 mating cycles
Materials		
Insert		PC
Colour insert		grey
Contacts		Cu-alloy
Contact plating		Ag (silver) /Au (gold)
Derating Curves		
In preparation		

Description	Part Number	Drawing	Figure
Contact insert 7 +PE (Please order contacts separately)			
Male insert	C146 10A007 500 12		
Female insert	C146 10B007 500 12		
Coding element			
Male insert	N17 059 000 1		
Female insert	N17 059 000 2		

Contact arrangement

Male insert

Female insert



Supplied as	for wire gauge	AWG	Pieces	Part Number		Figure
				Male contact	Female contact	
Turned 1.6 mm crimp contacts single contact						
silver plating	0.14 - 0.37 mm²	26-22	100	VN01 016 0024 1C	VN02 016 0024 1C	
	0.5 mm²	20	100	VN01 016 0025 1C	VN02 016 0025 1C	
	0.75 – 1.0 mm²	20-16	100	VN01 016 0026 1C	VN02 016 0026 1C	
	1.5 mm²	16-15	100	VN01 016 0027 1C	VN02 016 0027 1C	
	2.5 mm²	14	100	VN01 016 0028 1C	VN02 016 0028 1C	
gold plating	0.14 - 0.37 mm²	26-22	100	VN01 016 0024 2C	VN02 016 0024 2C	
	0.5 mm²	20	100	VN01 016 0025 2C	VN02 016 0025 2C	
	0.75 – 1.0 mm²	20-16	100	VN01 016 0026 2C	VN02 016 0026 2C	
	1.5 mm²	16-15	100	VN01 016 0027 2C	VN02 016 0027 2C	
	2.5 mm²	14	100	VN01 016 0028 2C	VN02 016 0028 2C	

heavy | mate® Housings

Available Types

- Standard-Housings IP65
- Housings in IP67 and IP68
- EMC-Housings
- Corrosion resistant Housings

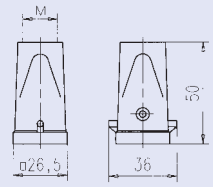
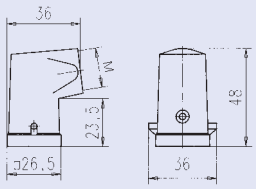
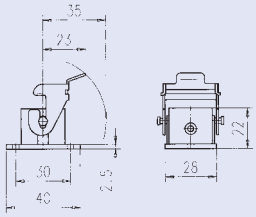
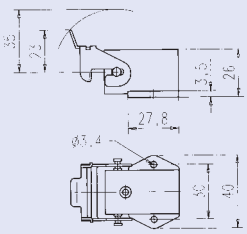
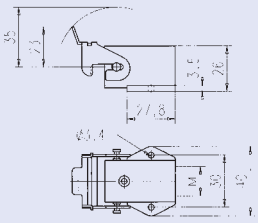
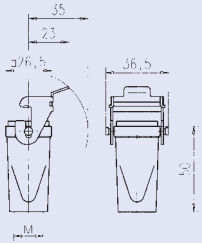
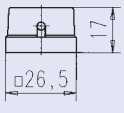
General information

- The connectors of our heavy|mate® series are designed for use in machine tools, general electric installations and applications as well as for industrial control and other electrical equipment. Other applications than the above mentioned are in the responsibility of the user.
- For cable to cable connections a suitable cable clamp has to be used.
- The indicated dimensions with the panel cut-outs represent reference values and are in the concrete application with products to be co-ordinated.
- The sealing area of the housing has to be level and free of burrs.
- Housings in accordance with DIN EN 175 301 - 801 (DIN 43 652) .

Range of housings

Size A3/4	Size A10	Size A16
Size A32	**Size E6**	**Size E10**
Size E16	**Size E24**	**Size E48**

General Characteristics	Standard	Value
Protection class housing		IP 65
Protection class spring cover locked spring loaded		 IP 65 IP 54
Locking system	DIN EN 175 301-801 (DIN 43 652)	1 locking lever 2 locking levers
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Temperature range	IEC 60068-1	- 40 °C / + 125 °C
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Housings	DIN EN 175 301-801 (DIN 43 652)	Aluminium die cast alloy
Thermoplastic housing		PA
Metal housing D 7		Zinc die cast alloy
Protective cover		PA
Rubber gasket		NBR
Locking lever		steel / zinc coated
Surface EMV housings		special surface

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	20	C146 10R003 600 4		
Hood side entry	20	C146 10R003 500 4		
Housings				
Housing bulkhead mounting with gasket	- -	C146 10F003 000 4		
Housing bulkhead end mounting with gasket	-	C146 10F003 004 4		
Housing single side entry with gland bushing	20	C146 10N003 500 4		
Hood cable to cable coupling	20	C146 10R003 804 4		
Protective cover (only in connection with male insert)				
Cover for housings	-	C146 10Z003 100 4		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.

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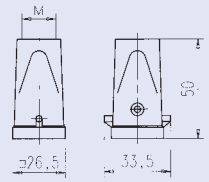
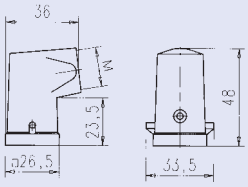
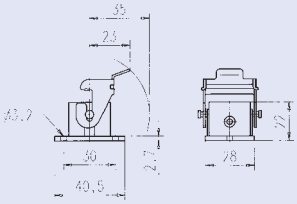
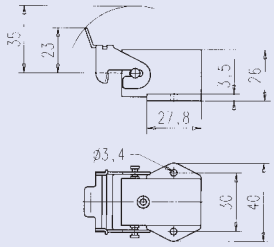
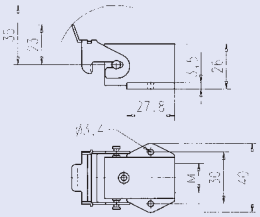
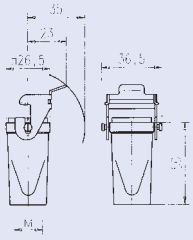
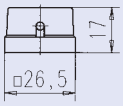
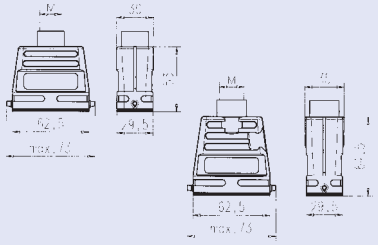
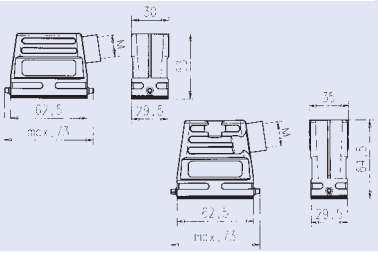
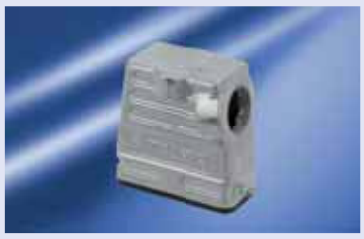
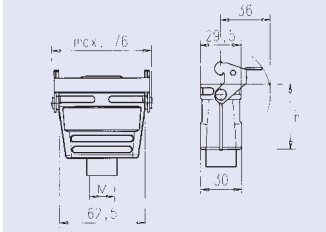
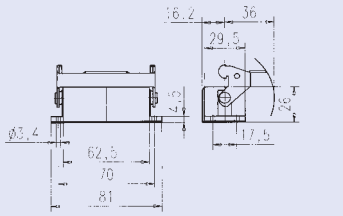
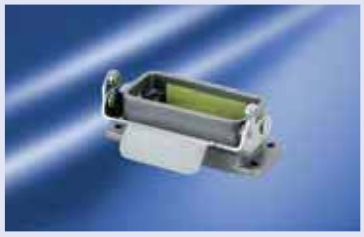
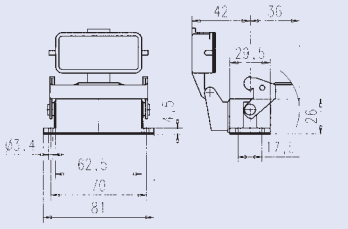
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	20	C146 30R003 600 4		
Hood side entry	20	C146 30R003 500 4		
Housings				
Housing bulkhead mounting with gasket	-	C146 30F003 000 4		
Housing bulkhead end mounting with gasket	-	C146 30F003 004 4		
Housing single side entry with gland bushing	20	C146 30N003 500 4		
Hood cable to cable coupling	20	C146 30R003 804 4		
Protective cover (only in connection with male insert)				
Cover for housings	-	C146 30Z003 100 4		

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	20 25	C146 21R010 650 4 C146 21R010 600 4		
Hood top entry high profile	20 25	C146 21R015 650 2 C146 21R015 600 2		
Hood side entry low profile	20 25	C146 21R010 550 4 C146 21R010 500 4		
Hood side entry high profile	20 25	C146 21R015 550 2 C146 21R015 500 2		
Housings			**h**	
Hood coupling application low profile	20 25	C146 21R010 854 4 C146 21R010 804 4	47.5 47.5	
Hood coupling application high profile	20 25	C146 21R015 854 2 C146 21R015 804 2	59 59	
Housing bulkhead mounting with gasket	-	C146 10F015 000 2		
Housing bulkhead mounting with spring cover with gasket	-	C146 10F015 003 2		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.

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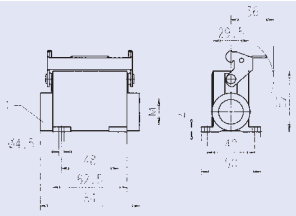
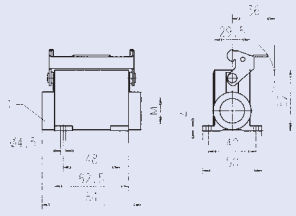
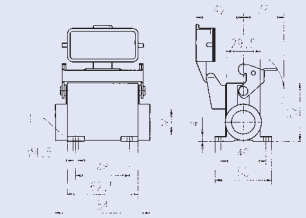
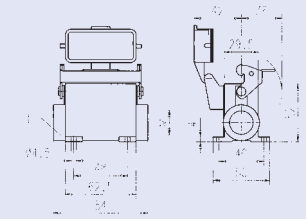
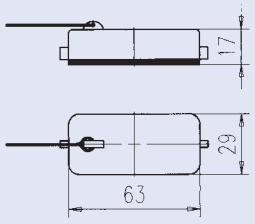
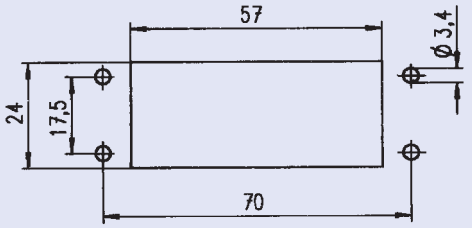
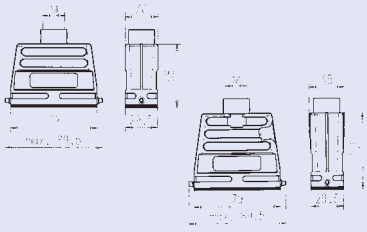
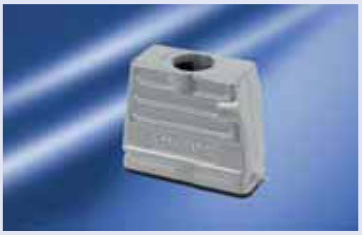
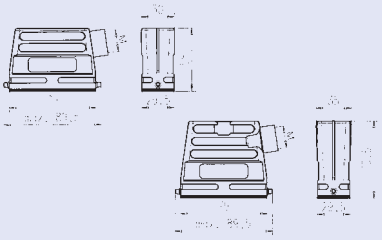
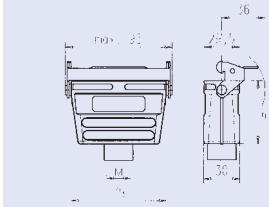
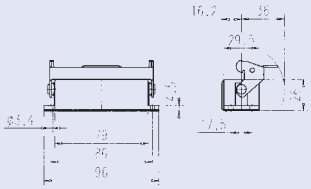
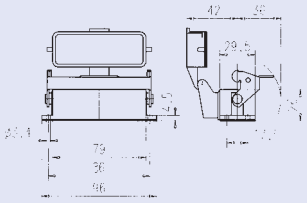
Description	M	Part Number	Drawing	Figure
Housings				
Housing single side entry	25	C146 10N015 500 2	 1 closed if single entry	
Housing double side entry	25	C146 10N015 600 2		
Housing with spring cover single side entry	25	C146 10N015 806 2	 1 closed if single entry	
Housing with spring cover double side entry	20 25	C146 10N015 607 2 C146 10N015 606 2		
Protective cover				
Cover for housings	-	C146 10Z015 100 2		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	20 25	C146 21R016 650 4 C146 21R016 600 4		
Hood top entry high profile	20 25	C146 21R025 650 2 C146 21R025 600 2		
Hood side entry low profile	20 25	C146 21R016 550 4 C146 21R016 500 4		
Hood side entry high profile	20 25	C146 21R025 550 2 C146 21R025 500 2		
Housings			**h**	
Hood coupling application low profile	20 25	C146 21R016 854 4 C146 21R016 804 4	52.5 65	
Hood coupling application high profile	20 25	C146 21R025 854 2 C146 21R025 804 2	52.5 65	
Housing bulkhead mounting with gasket	-	C146 10F025 000 2		
Housing bulkhead mounting with spring cover with gasket	-	C146 10F025 003 2		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.

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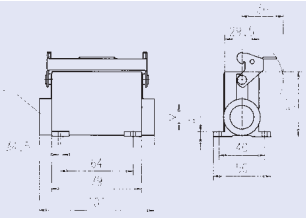
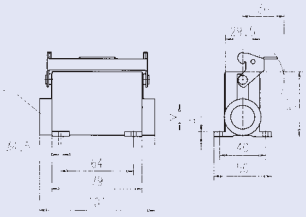
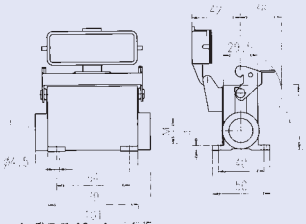
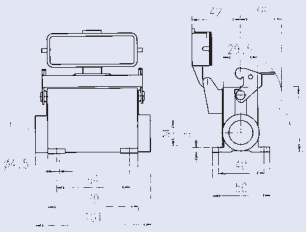
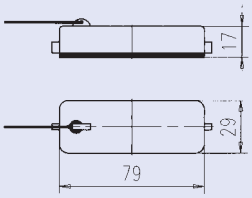
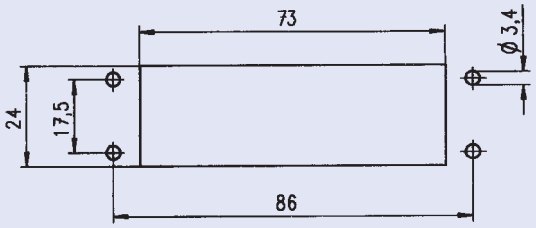
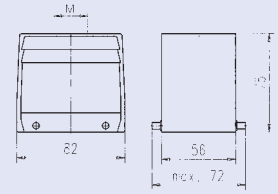
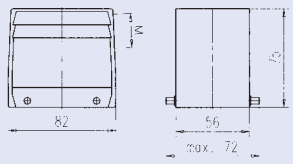
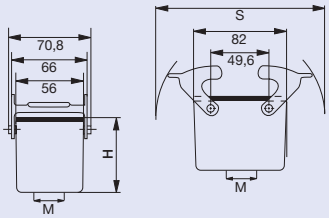
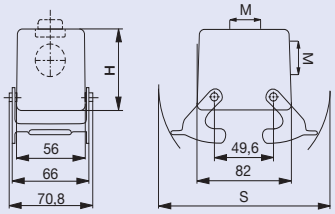
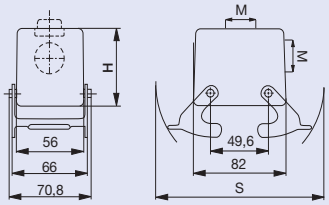
Description	M	Part Number	Drawing	Figure
Housings				
Housing single side entry	25	C146 10N025 500 2	 1 closed if single entry	
Housing double side entry	20 25	C146 10N025 601 2 C146 10N025 600 2		
Housing with spring cover single side entry	25	C146 10N025 806 2	 1 closed if single entry	
Housing with spring cover double side entry	20 25	C146 10N025 607 2 C146 10N025 606 2		
Protective cover				
Cover for housings	-	C146 10Z025 100 2		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	25 32	C146 21R032 650 4 C146 21R032 600 4		
Hood side entry	25 32	C146 21R032 550 4 C146 21R032 500 4		
Hood coupling application	25 32	C146 21R032 852 4 C146 21R032 802 4		
Hood top entry	25 32	C146 21R032 652 4 C146 21R032 602 4		
Hood side entry	25 32	C146 21R032 552 4 C146 21R032 502 4		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.
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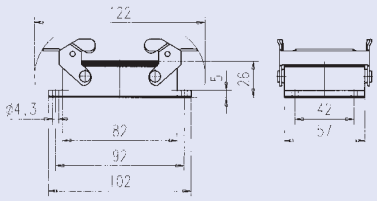
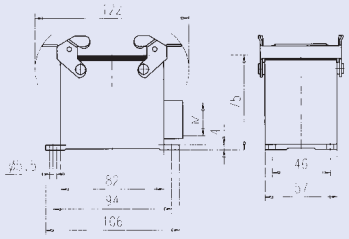
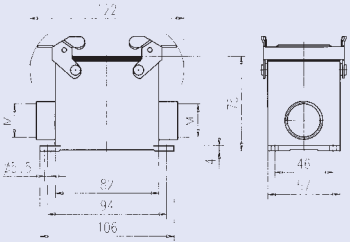
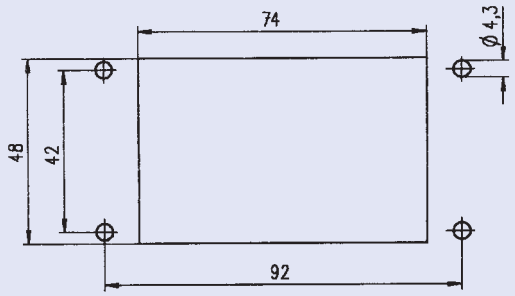
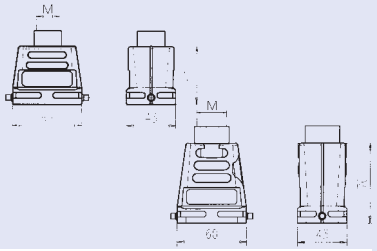
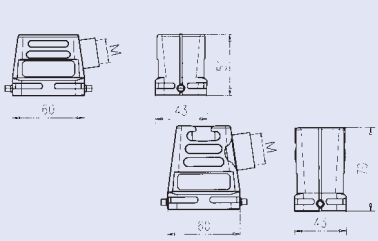
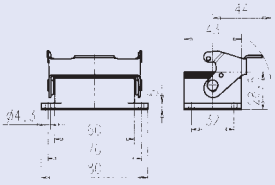
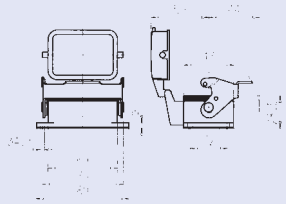
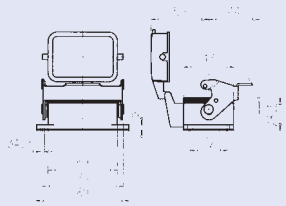
Description	M	Part Number	Drawing	Figure
Housings				
Housing bulkhead mounting with gasket	-	C146 10F032 000 4		
Housing single side entry	25 32	C146 10N032 550 4 C146 10N032 500 4		
Housing double side entry	25 32	C146 10N032 650 4 C146 10N032 600 4		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	16 20	C146 21R006 656 1 C146 21R006 606 1		
Hood top entry high profile	25 32	C146 21R006 656 8 C146 21R006 606 8		
Hood side entry low profile	20 25	C146 21R006 506 1 C146 21R006 507 1		
Hood side entry high profile	25 32	C146 21R006 556 8 C146 21R006 506 8		
Housings			**h**	
Hood coupling application low profile	20	C146 21R006 804 1	52	
Hood coupling application high profile	25	C146 21R006 854 8	70	
Housing bulkhead mounting with gasket	-	C146 10F006 000 1		
Housing bulkhead mounting with thermoplastic spring cover with gasket	-	C146 10F006 003 1		
Housing bulkhead mounting with metal spring cover with gasket	-	C146 30F006 003 1		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.
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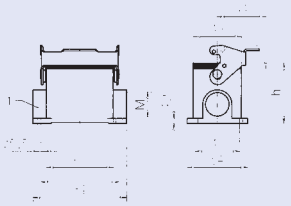
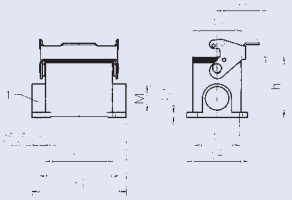
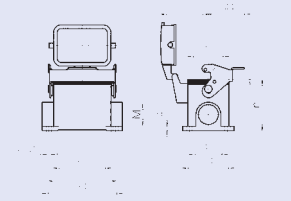
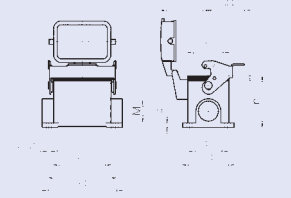
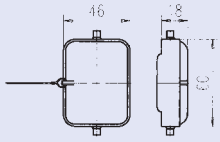
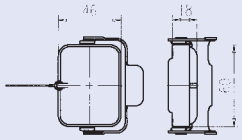
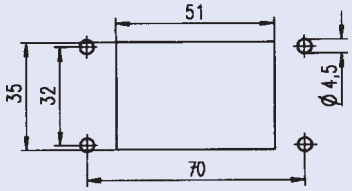
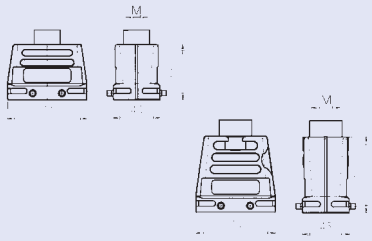
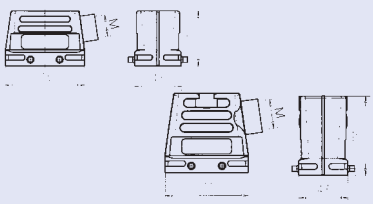
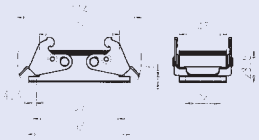
Description	M	Part Number	Drawing	Figure
Housings				
Housing single side entry low profile	20	C146 10N006 803 1	 1 closed if single entry	
Housing single side entry high profile	32	C146 10N006 802 2		
Housing double side entry low profile	20	C146 10N006 603 1		
Housing double side entry high profile	25 32	C146 10N006 603 2 C146 10N006 602 2		
Housing with spring cover single side entry low profile	20 25	C146 10N006 807 1 C146 10N006 806 1	 1 closed if single entry	
Housing with spring cover single side entry high profile	25 32	C146 10N006 807 2 C146 10N006 806 2		
Housing with spring cover double side entry low profile	20	C146 10N006 607 1		
Housing with spring cover double side entry high profile	25 32	C146 10N006 607 2 C146 10N006 606 2		
Protective cover				
Cover for housings	-	C146 10Z006 100 1		
Cover for hoods	-	C146 10Z006 200 1		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	20 25	C146 21R010 650 1 C146 21R010 600 1		
Hood top entry high profile	25 32	C146 21R010 650 8 C146 21R010 600 8		
Hood side entry low profile	20 25	C146 21R010 550 1 C146 21R010 500 1		
Hood side entry high profile	25 32	C146 21R010 550 8 C146 21R010 500 8		
Housings			**h**	
Hood coupling application low profile	20 25	C146 21R010 852 1 C146 21R010 802 1	51 51 51	
Hood coupling application high profile	25 32	C146 21R010 852 8 C146 21R010 802 8	70 70 70	
Housing bulkhead mounting with gasket	-	C146 10F010 000 1		
Right-angled housing with gasket	-	C146 10F010 090 1		

Gland bushings for hoods- und housings see page 224-225.
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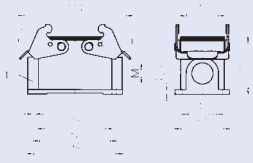
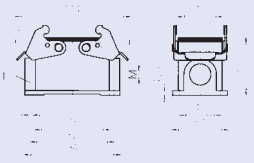
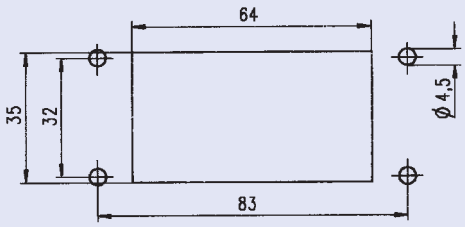
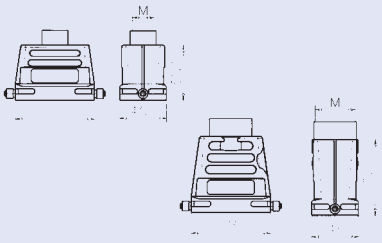
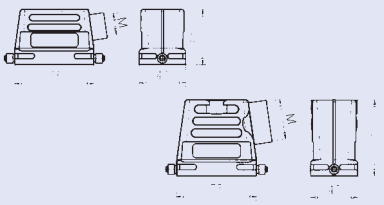
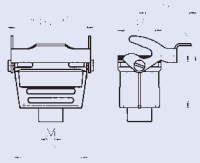
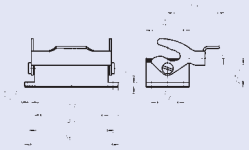
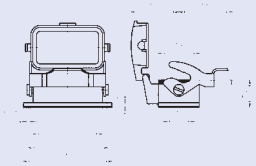
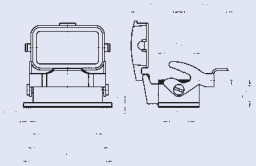
Description	M	Part Number	Drawing		Drawing
Housings			h		
Housing single side entry low profile	20 25	C146 10N010 501 1 C146 10N010 500 1	57 57		
Housing single side entry high profile	25 32	C146 10N010 501 2 C146 10N010 500 2	74 74	Screw plug for one cable entry	
Housing double side entry low profile	20	C146 10N010 601 1	57		
Housing double side entry high profile	25 32	C146 10N010 601 2 C146 10N010 600 2	74 74		
Panel cut out					



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	20 25 32	C146 21R010 656 1 C146 21R010 606 1 C146 21R010 607 1		
Hood top entry high profile	25 32 40	C146 21R010 656 8 C146 21R010 606 8 C146 21R010 607 8		
Hood side entry low profile	20 25	C146 21R010 556 1 C146 21R010 506 1		
Hood side entry high profile	25 32	C146 21R010 556 8 C146 21R010 506 8		
Housings			**h**	
Hood coupling application low profile	20 25 32	C146 21R010 854 1 C146 21R010 804 1 C146 21R010 805 1	51 51 51		
Hood coupling application high profile	25 32 40	C146 21R010 854 8 C146 21R010 804 8 C146 21R010 805 8	70 70 70		
Housing bulkhead mounting with gasket	-	C146 10F010 001 1		
Housing bulkhead mounting with thermoplastic spring cover with gasket	-	C146 10F010 003 1		
Housing bulkhead mounting with metal spring cover with gasket	-	C146 30F010 003 1		

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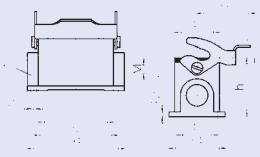
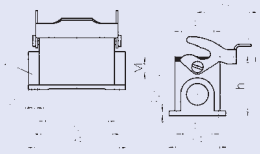
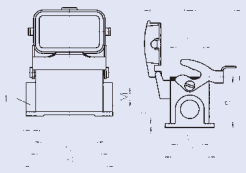
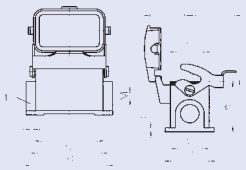
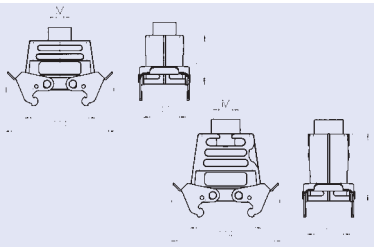
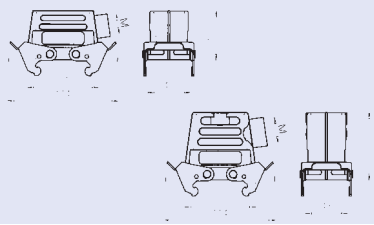
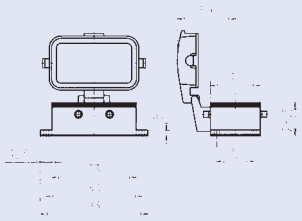
Description	M	Part Number	Drawing	Figure
Housings			h	
Housing single side entry low profile	20	C146 10N010 803 1	57	 1 closed if single entry	
Housing single side entry high profile	25 32	C146 10N010 803 2 C146 10N010 802 2	74 74		
Housing double side entry low profile	20	C146 10N010 603 1	57		
Housing double side entry high profile	25	C146 10N010 603 2	74		
Housing with spring cover single side entry low profile	20	C146 10N010 807 1	57	 1 closed if single entry	
Housing with spring cover single side entry high profile	25 32	C146 10N010 807 2 C146 10N010 806 2	74 74		
Housing with spring cover double side entry low profile	20	C146 10N010 607 1	57		
Housing with spring cover double side entry high profile	25 32	C146 10N010 607 2 C146 10N010 606 2	74 74		

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	20	C146 21R010 652 1		
Hood top entry high profile	25 32	C146 21R010 652 8 C146 21R010 602 8		
Hood side entry low profile	20	C146 21R010 552 1		
Hood side entry high profile	25 32	C146 21R010 552 8 C146 21R010 502 8		
Housings				
Housing with spring cover with gasket	-	C146 10F010 002 1		

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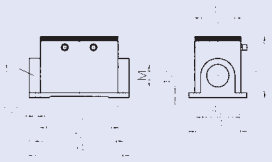
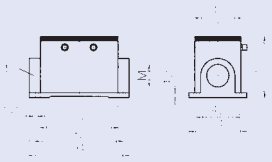
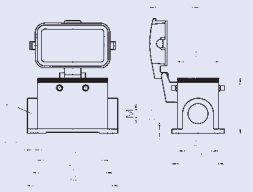
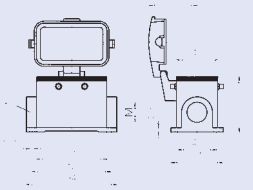
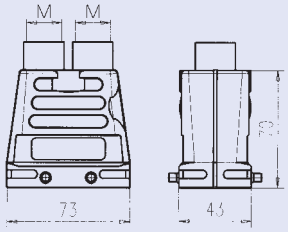
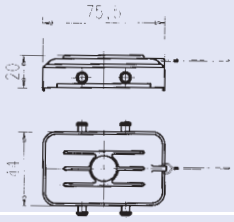
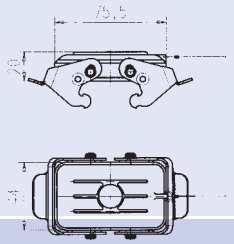
Description	M	Part Number	Drawing	Figure
Housings			h	
Housing single side entry low profile	20	C146 10N010 509 1	57	 1 closed if single entry	
Housing single side entry high profile	32	C146 10N010 508 2	74		
Housing double side entry low profile	20	C146 10N010 609 1	57		
Housing double side entry high profile	25	C146 10N010 609 2	74		
Housing with spring cover single side entry low profile	20	C146 10N010 805 1	57	 1 closed if single entry	
Housing with spring cover single side entry high profile	32	C146 10N010 804 2	74		
Housing with spring cover double side entry low profile	20	C146 10N010 605 1	57		
Housing with spring cover double side entry high profile	32	C146 10N010 604 2	74		

Description	M	Part Number	Drawing	Figure
Hoods				
Hood 2 top entry high profile	25	C146 10R010 902 8		
Protective cover (only in connection with male insert)				
Cover for housings	-	C146 10Z010 100 1		
Cover for hoods	-	C146 10Z010 200 1		
Further special housings on request.				

Gland bushings for hoods- und housings see page 224-225.
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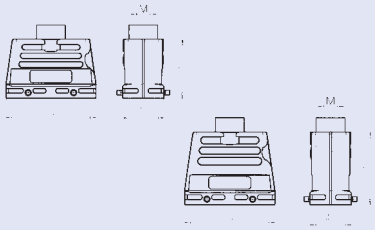
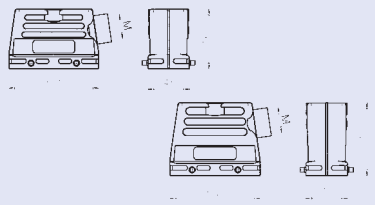
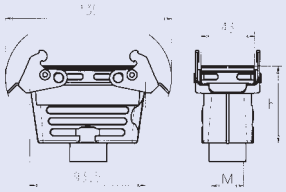
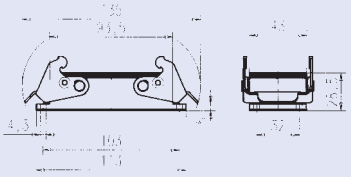
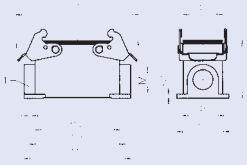
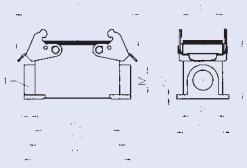
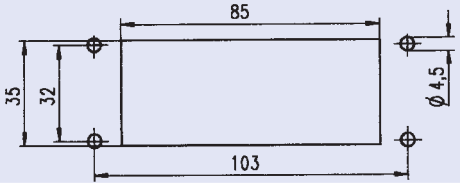
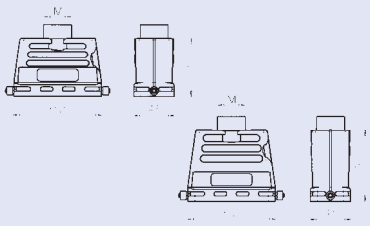
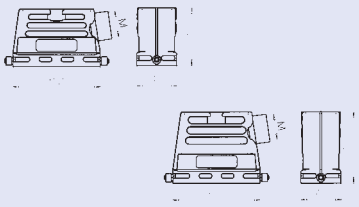
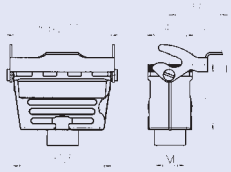
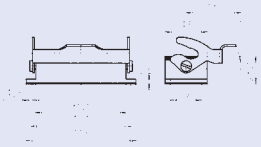
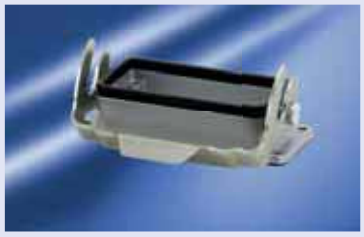
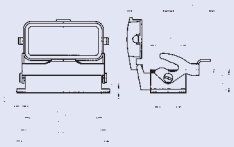
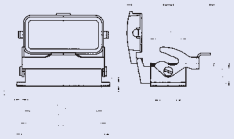
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 21R016 650 1 C146 21R016 600 1		
Hood top entry high profile	32 40	C146 21R016 600 8 C146 21R016 601 8		
Hood side entry low profile	25 32	C146 21R016 550 1 C146 21R016 500 1		
Hood side entry high profile	32 40	C146 21R016 500 8 C146 21R016 501 8		
Housings			**h**	
Hood coupling application low profile	25 32	C146 21R016 852 1 C146 21R016 802 1	62 62	
Hood coupling application high profile	32 40	C146 21R016 802 8 C146 21R016 803 8	76 76	
Housing bulkhead mounting with gasket	-	C146 10F016 000 1		
Housing single side entry low profile	25	C146 10N016 500 1	64	
Housing single side entry high profile	32	C146 10N016 500 2	77	1 closed if single entry
Housing double side entry low profile	25	C146 10N016 600 1	64	
Housing double side entry high profile	25 32	C146 10N016 601 2 C146 10N016 600 2	77 77	
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 21R016 656 1 C146 21R016 606 1		
Hood top entry high profile	32 40	C146 21R016 606 8 C146 21R016 607 8		
Hood side entry low profile	25 32	C146 21R016 556 1 C146 21R016 506 1		
Hood side entry high profile	32 40	C146 21R016 506 8 C146 21R016 507 8		
Housings			**h**	
Hood coupling application low profile	25 32	C146 21R016 854 1 C146 21R016 804 1	62 62	
Hood coupling application high profile	32 40	C146 21R016 804 8 C146 21R016 805 8	76 76	
Housing bulkhead mounting with gasket	-	C146 10F016 001 1		
Housing bulkhead mounting with thermoplastic spring cover with gasket	-	C146 10F016 003 1		
Housing bulkhead mounting with metal spring cover with gasket	-	C146 30F016 003 1		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.
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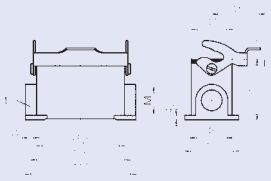
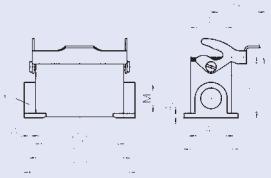
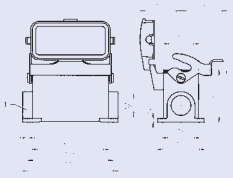
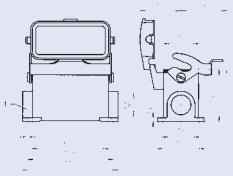
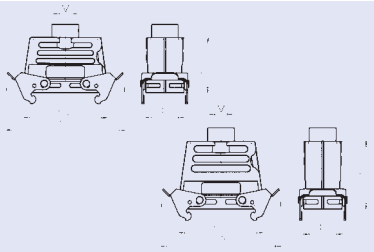
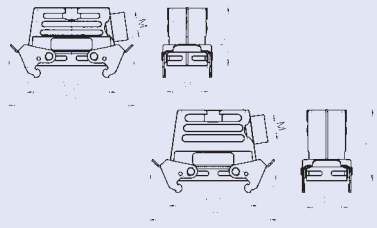
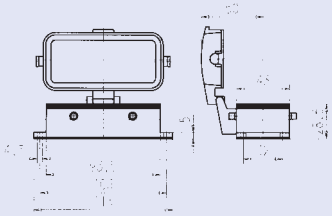
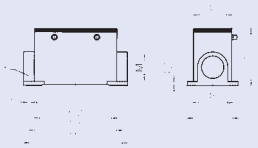
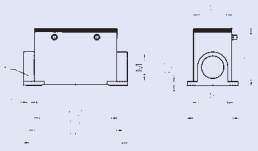
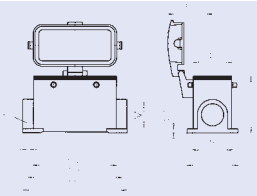
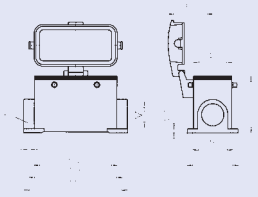
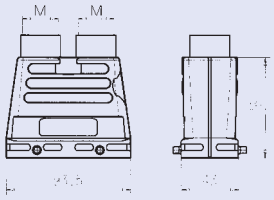
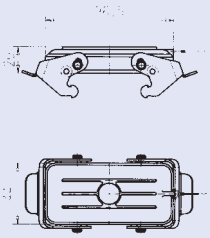
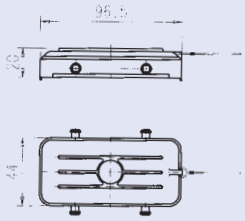
Description	M	Part Number	Drawing	Figure
Housings			h	
Housing single side entry low profile	25	C146 10N016 802 1	64	 1 closed if single entry	
Housing single side entry high profile	32	C146 10N016 802 2	77		
Housing double side entry low profile	25	C146 10N016 602 1	64		
Housing double side entry high profile	25 32	C146 10N016 603 2 C146 10N016 602 2	77 77		
Housing with spring cover single side entry low profile	25	C146 10N016 806 1	64	 1 closed if single entry	
Housing with spring cover single side entry high profile	32	C146 10N016 806 2	77		
Housing with spring cover double side entry low profile	25	C146 10N016 606 1	64		
Housing with spring cover double side entry high profile	25 32	C146 10N016 607 2 C146 10N016 606 2	77 77		

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 21R016 652 1 C146 21R016 602 1		
Hood top entry high profile	32 40	C146 21R016 602 8 C146 21R016 603 8		
Hood side entry low profile	25 32	C146 21R016 552 1 C146 21R016 502 1		
Hood side entry high profile	32 40	C146 21R016 502 8 C146 21R016 503 8		
Housings				
Housing bulkhead mounting with spring cover with gasket	-	C146 10F016 002 1		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.

Description	M	Part Number	Drawing	Figure
Housings			h	
Housing single side entry low profile	25	C146 10N016 508 1	64	 1 closed if single entry	
Housing single side entry high profile	32	C146 10N016 508 2	77	
Housing double side entry low profile	25	C146 10N016 608 1	64		
Housing double side entry high profile	32	C146 10N016 608 2	77	
Housing with spring cover single side entry low profile	25	C146 10N016 804 1	64	 1 closed if single entry	
Housing with spring cover single side entry high profile	32	C146 10N016 804 2	77	
Housing with spring cover double side entry low profile	25	C146 10N016 604 1	64		
Housing with spring cover double side entry high profile	32	C146 10N016 604 2	77	

Description	M	Part Number	Drawing	Figure
Hoods				
Hood 2 top entry high profile	25 32	C146 10R016 910 8 C146 10R016 902 8		
Protective cover (only in connection with male insert)				
Cover for housings	-	C146 10Z016 200 1		
Cover for hoods	-	C146 10Z016 100 1		
Further special housings on request.				

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.
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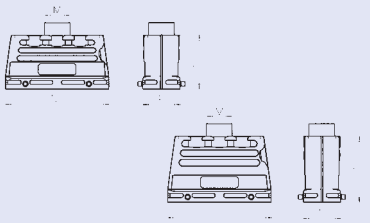
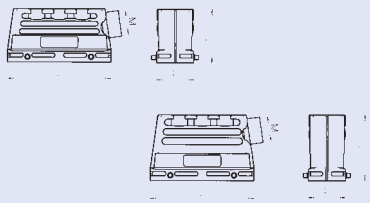
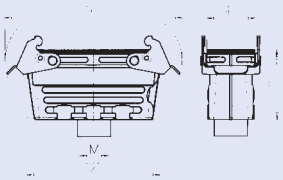
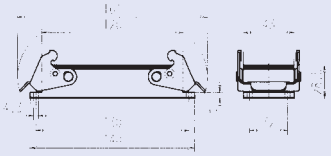
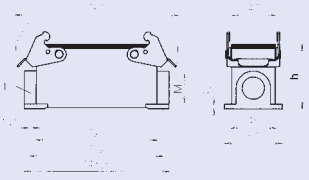
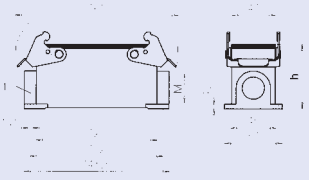
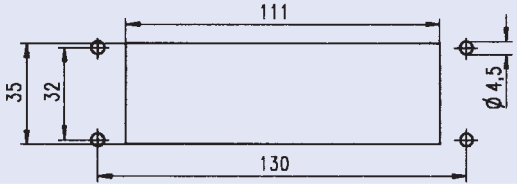
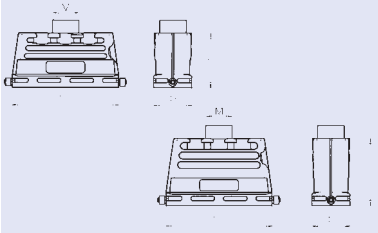
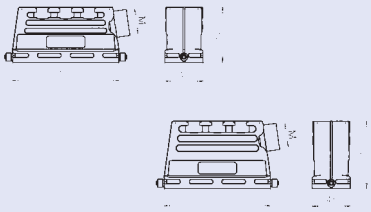
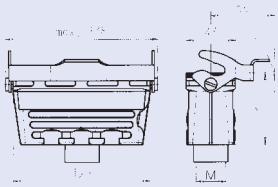
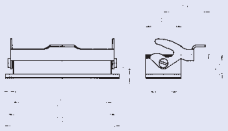
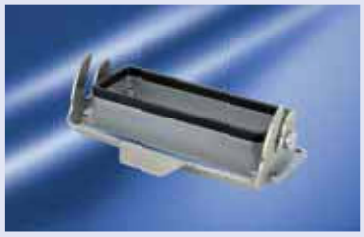
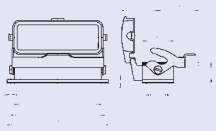
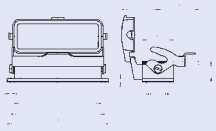
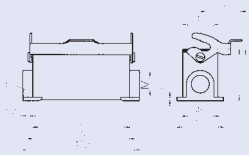
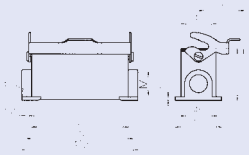
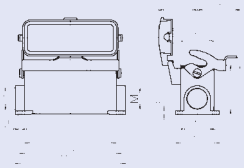
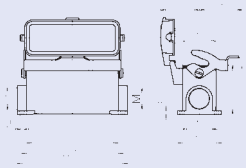
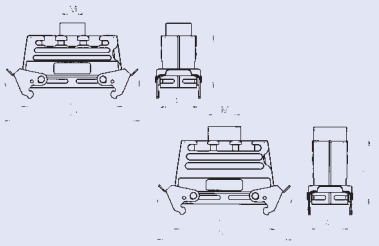
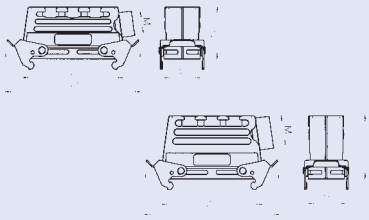
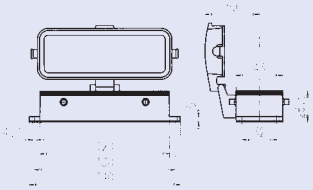
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 21R024 650 1 C146 21R024 600 1		
Hood top entry high profile	32 40	C146 21R024 600 8 C146 21R024 601 8		
Hood side entry low profile	25 32	C146 21R024 550 1 C146 21R024 500 1		
Hood side entry high profile	32 40	C146 21R024 500 8 C146 21R024 501 8		
Housings			**h**	
Hood coupling application low profile	25 32	C146 21R024 852 1 C146 21R024 802 1	62 62	
Hood coupling application high profile	32 40	C146 21R024 802 8 C146 21R024 803 8	76 76	
Housing bulkhead mounting with gasket	-	C146 10F024 000 1		
Housing single side entry low profile	25	C146 10N024 500 1	64	
Housing single side entry high profile	32	C146 10N024 500 2	80	
			1 closed if single entry	
Housing double side entry low profile	25	C146 10N024 600 1	64	
Housing double side entry high profile	25 32	C146 10N024 601 2 C146 10N024 600 2	80 80	
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 21R024 656 1 C146 21R024 606 1		
Hood top entry high profile	32 40	C146 21R024 606 8 C146 21R024 607 8		
Hood side entry low profile	25 32	C146 21R024 556 1 C146 21R024 506 1		
Hood side entry high profile	32 40	C146 21R024 506 8 C146 21R024 507 8		
Housings			**h**	
Hood coupling application low profile	25 32	C146 21R024 854 1 C146 21R024 804 1	62 62	
Hood coupling application high profile	32 40	C146 21R024 804 8 C146 21R024 805 8	76 76	
Housing bulkhead mounting with gasket	-	C146 10F024 001 1		
Housing bulkhead mounting with thermoplastic spring cover with gasket	-	C146 10F024 003 1		
Housing bulkhead mounting with metal spring cover with gasket	-	C146 30F024 003 1		

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.

Description	M	Part Number	Drawing	Figure
Hoods			h	
Housing single side entry low profile	25	C146 10N024 802 1	64	 1 closed if single entry	
Housing single side entry high profile	32	C146 10N024 802 2	80		
Housing double side entry low profile	25	C146 10N024 602 1	64		
Housing double side entry high profile	32	C146 10N024 602 2	80		
Housing with spring cover single side entry low profile	25	C146 10N024 806 1	64	 1 closed if single entry	
Housing with spring cover single side entry high profile	32	C146 10N024 806 2	80		
Housing with spring cover double side entry low profile	25	C146 10N024 606 1	64		
Housing with spring cover double side entry high profile	25 32	C146 10N024 607 2 C146 10N024 606 2	80 80		

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 21R024 652 1 C146 21R024 602 1		
Hood top entry high profile	32 40	C146 21R024 602 8 C146 21R024 603 8		
Hood side entry low profile	25 32	C146 21R024 552 1 C146 21R024 502 1		
Hood side entry high profile	32 40	C146 21R024 502 8 C146 21R024 503 8		
Housings				
Housing bulkhead mounting with spring cover with gasket	-	C146 10F024 002 1		

Gland bushings for hoods- und housings see page 224-225.
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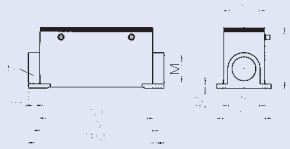
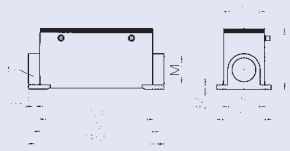
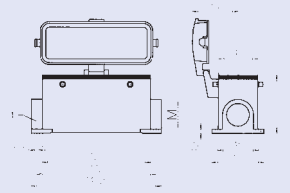
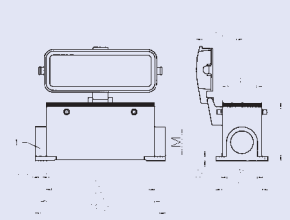
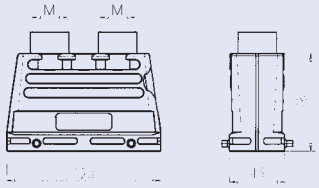
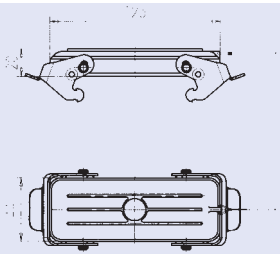
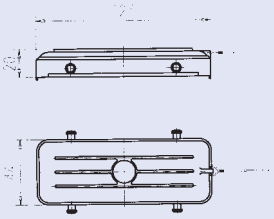
Description	M	Part Number	Drawing	Figure
Housings			h	
Housing single side entry low profile	25	C146 10N024 508 1	64	 1 closed if single entry	
Housing single side entry high profile	32	C146 10N024 508 2	80		
Housing double side entry low profile	25	C146 10N024 608 1	64		
Housing double side entry high profile	32	C146 10N024 608 2	80		
Housing with spring cover single side entry low profile	25	C146 10N024 804 1	64	 1 closed if single entry	
Housing with spring cover single side entry high profile	32	C146 10N024 804 2	80		
Housing with spring cover double side entry low profile	25 25	C146 10N024 604 1 C146 10N024 808 1 (2	64 64		
Housing with spring cover double side entry high profile	25 32	C146 10N024 605 2 C146 10N024 604 2	80 80		

Description	M	Part Number	Drawing	Figure
Hoods				
Hood 2 top entry high profile	32 40	C146 10R024 903 8 C146 10R024 908 8		
Protective cover (only in connection with male insert)				
Cover for housings	-	C146 10Z024 200 1		
Cover for hoods	-	C146 10Z024 100 1		
Further special housings on request.				

Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.
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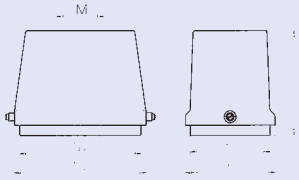
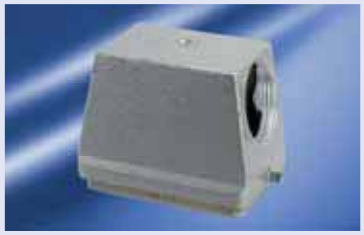
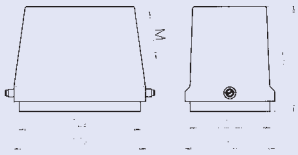
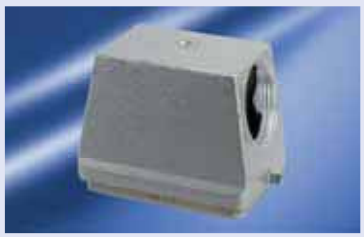
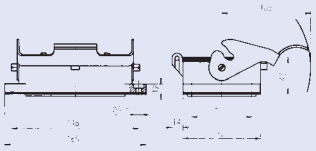
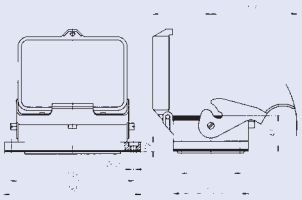
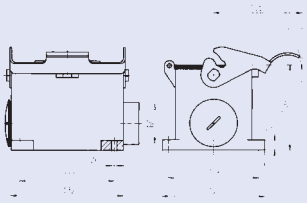
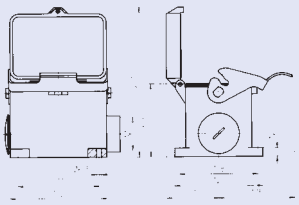
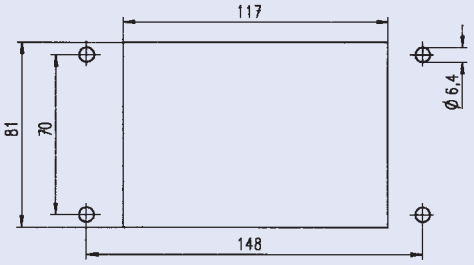
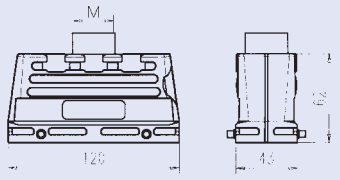
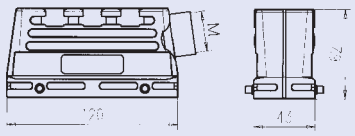
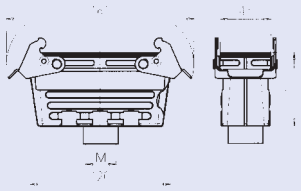
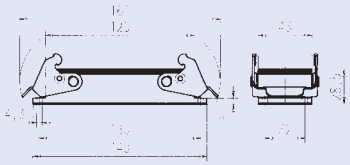
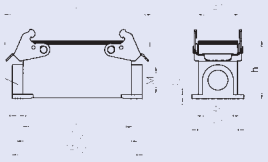
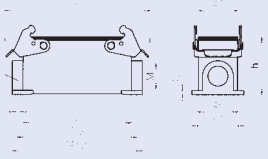
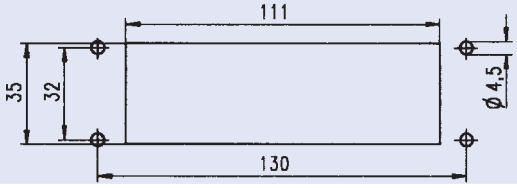
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile Hood top entry high profile	40 50	C146 21R048 607 1 C146 21R048 608 1		
Hood side entry low profile Hood side entry high profile	40 50	C146 21R048 507 1 C146 21R048 508 1		

Description	M	Part Number	Drawing	Figure
Hoods				
Housing bulkhead mounting with gasket	-	C146 10F048 001 1		
Housing bulkhead mounting with spring cover with gasket	-	C146 10F048 003 1		
Housing single side entry	40	C146 10N048 803 1		
Housing with spring cover	40	C146 10N048 807 1		
Panel cut out				

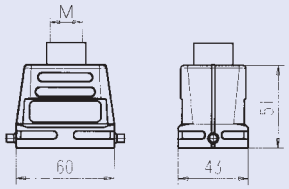
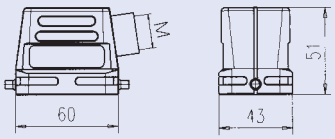
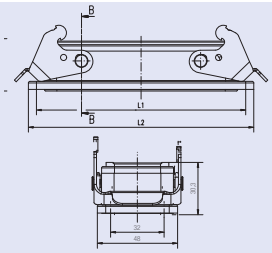


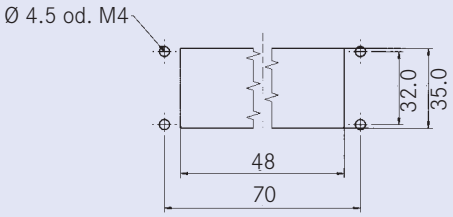
Gland bushings for hoods- und housings see page 224-225.
Further variants and variants with PG thread on www.amphenol.de or on request.

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 10R024 650 3 C146 10R024 600 3		
Hood side entry low profile	25 32	C146 10R024 550 3 C146 10R024 500 3		
Housings				
Hood coupling application low profile	25 32	C146 10R024 852 3 C146 10R024 802 3		
Housing bulkhead mounting with gasket	-	C146 10F024 000 3		
Housing single side entry low profile	25	C146 10N024 500 3	 1 closed if single entry	
Housing double side entry low profile	25	C146 10N024 600 3		
Panel cut out				



General Characteristics	Standard	Value
Protection class housing		IP 67
Locking system		2 locking levers
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Temperature range	IEC 60068-1	- 40 °C / + 125 °C
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Housings		Aluminium die cast alloy
Colour housings		grey
Rubber gasket		CR
Locking lever		steel / zinc coated
Surface		powder coating

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	25	C146 67R006 607 1		
Hood side entry	25	C146 67R006 507 1		
Housings			**L1**	**L2**
Housing bulkhead mounting		C146 67F006 000 8	70	80 	
Panel cut out				



Version A + B

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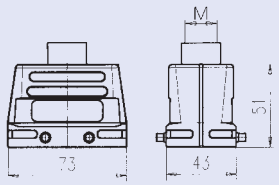
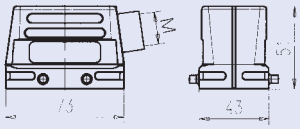
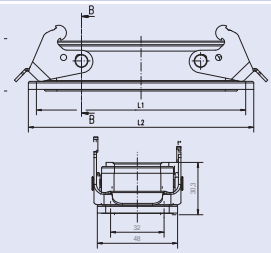
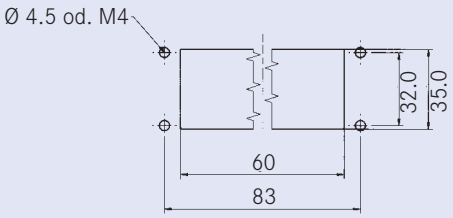
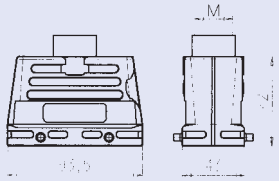
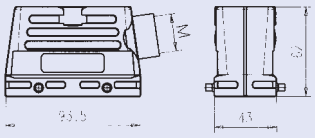
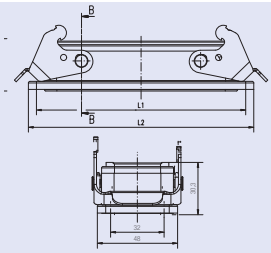
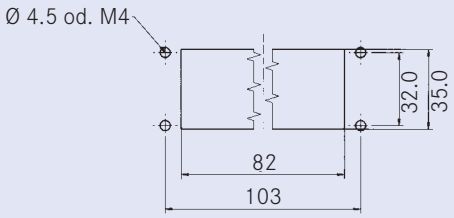
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	25	C146 67R010 600 1		
Hood side entry	25	C146 67R010 500 1		
Housings			**L1** **L2**	
Housing bulkhead mounting		C146 67F010 000 8	83 93 	
Panel cut out				



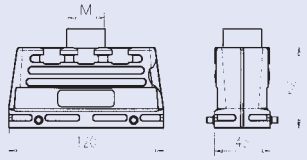
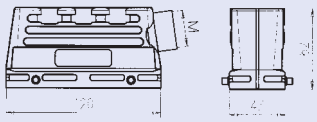
Version A + B

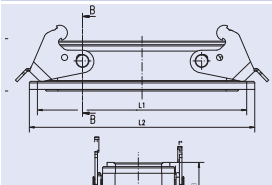
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	32	C146 67R016 600 8		
Hood side entry	32	C146 67R016 500 8		
Housings			**L1** **L2**	
Housing bulkhead mounting		C146 67F016 000 8	103 113 	
Panel cut out				

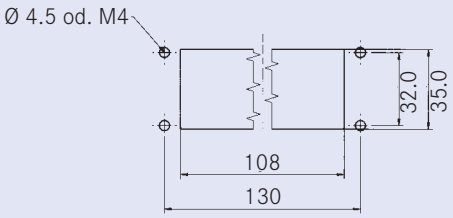


Version A + B

INDUSTRIAL@AMPHENOL TRUSTED GLOBALLY

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	40	C146 67R024 601 8		
Hood side entry	40	C146 67R024 501 8		
Housings			**L1**	**L2**
Housing bulkhead mounting		C146 67F024 000 8	130	140
Panel cut out				

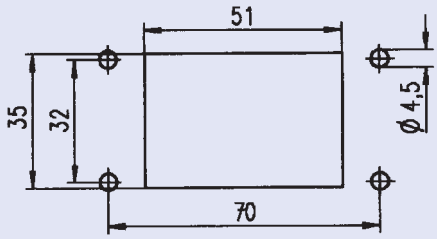


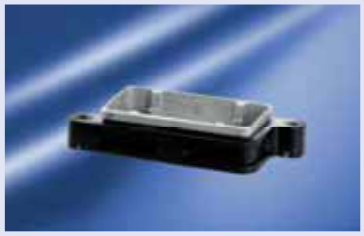


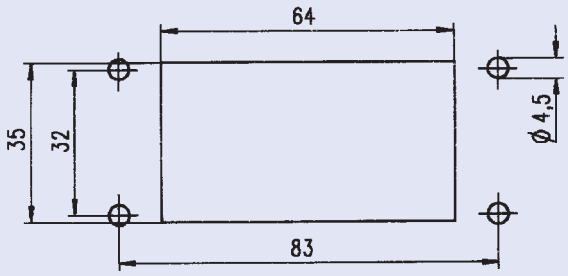
Version A + B

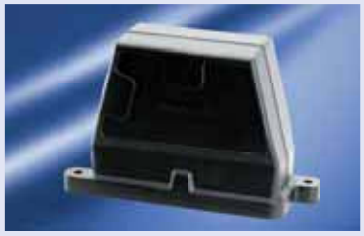
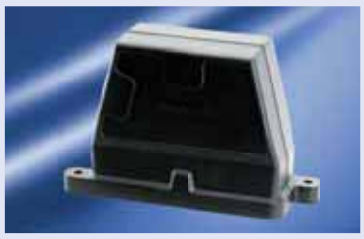
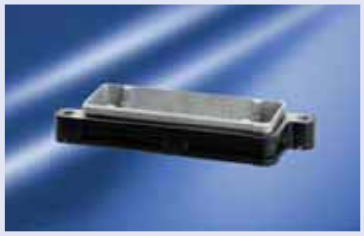
General Characteristics	Standard	Value
Protection class housing		IP 68 / IP69K
Locking system		screw M6
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Temperature range	IEC 60068-1	- 40 °C / + 125 °C
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Housings		Aluminium die cast alloy
Colour housings		black, RAL 9005
Rubber gasket		NBR
Locking lever		stainless steel
Surface		powder coating

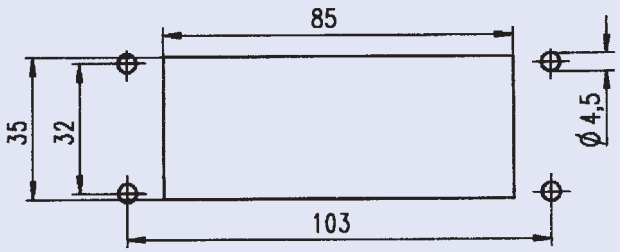
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	32	C146 68R006 600 8		
Hood side entry	32	C146 68R006 500 8		
Housings				
Housing bulkhead mounting		C146 68F006 001 1		
Housing	32	C146 68N006 500 2		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	32	C146 68R010 600 8		
Hood side entry	32	C146 68R010 500 8		
Housings				
Housing bulkhead mounting		C146 68F010 001 1		
Housing	32	C146 68N010 500 2		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	40	C146 68R016 601 8		
Hood side entry	40	C146 68R016 501 8		
Housings				
Housing bulkhead mounting		C146 68F016 001 1		
Housing	32	C146 68N016 501 2		
Panel cut out				



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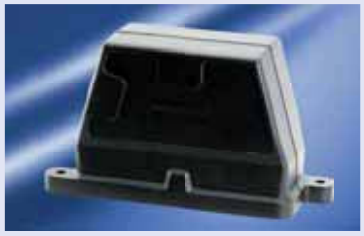
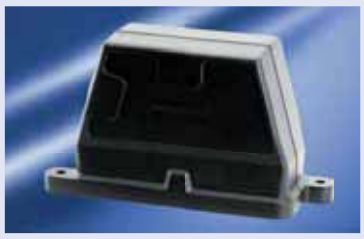
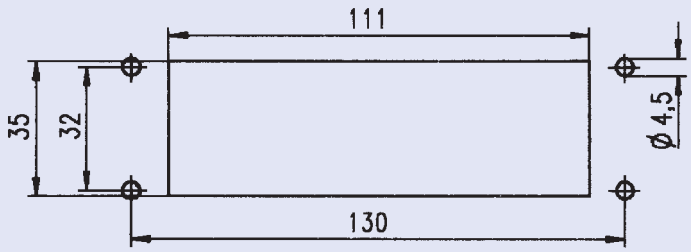
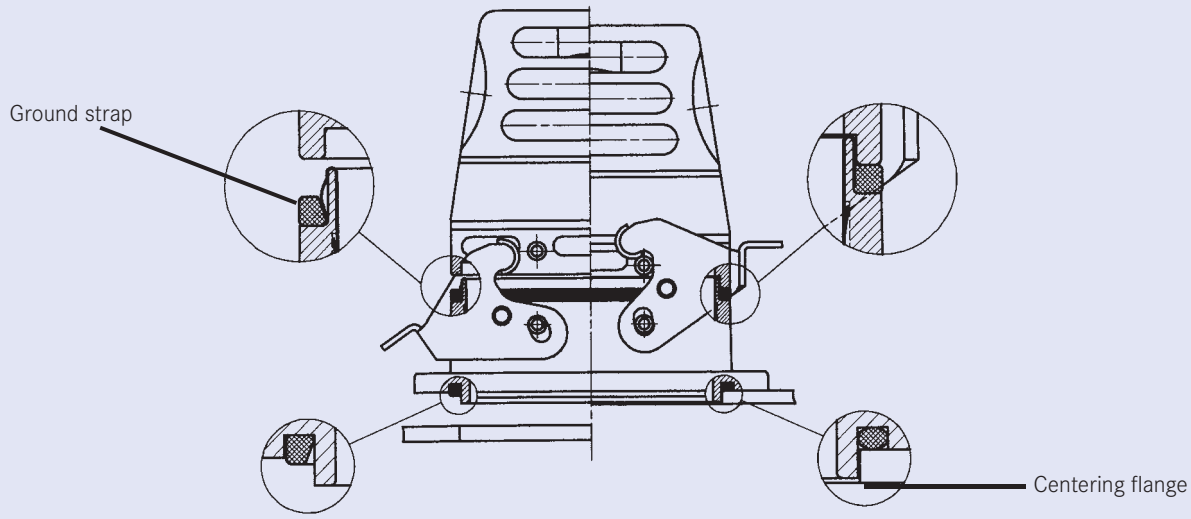
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	40	C146 68R024 601 8		
Hood side entry	40	C146 68R024 501 8		
Housings				
Housing bulkhead mounting		C146 68F024 001 1		
Housing	32	C146 68N024 501 2		
Panel cut out				



General information

- conductive surface
- standard locking levers
- same housing dimensions like standard housings
- two housing sizes
- with or without ground strap
- high attenuation
- protection class IP 65
- mating cycles > 500

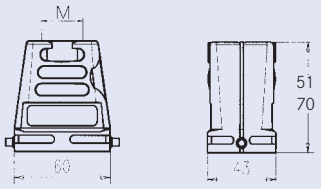
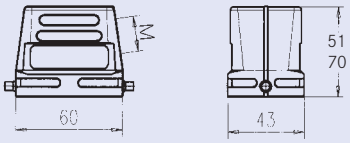
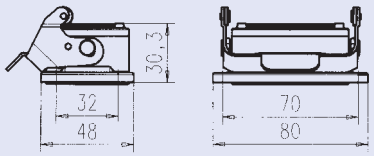
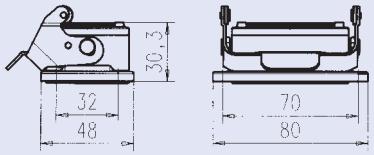
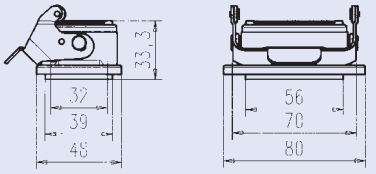
Concept

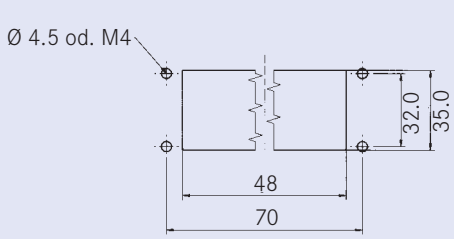


Range of housings in two housing sizes

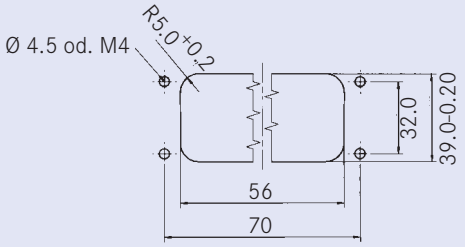
Version A Standard flange without ground strap	Version B Standard flange with ground strap	Version C Centering flange with ground strap

General Characteristics	Standard	Value
Protection class housing		IP 65
Locking system		2 locking levers
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Temperature range	IEC 60068-1	- 40 °C / + 125 °C
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Housings		Aluminium die cast alloy
Colour housings		grey, RAL 9005
Rubber gasket		EPDM
Locking lever		steel / zinc coated
Surface		conducting special surface

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	20 25	C146 11R006 606 1 C146 11R006 607 1		
Hood top entry high profile	25 32	C146 11R006 656 8 C146 11R006 606 8		
Hood side entry low profile	16 20 25	C146 11R006 556 1 C146 11R006 506 1 C146 11R006 507 1		
Hood side entry high profile	25 32	C146 11R006 556 8 C146 11R006 506 8		
Housings				
Housing bulkhead mounting Version A Standard flange without ground strap		C146 11F006 901 8		
Housing bulkhead mounting Version B Standard flange with ground strap		C146 11F006 902 8		
Housing bulkhead mounting Version C Centering flange with ground strap		C146 11F006 001 8		
Panel cut out				



Version A + B



Version C

EMC gland bushings for hoods see page 225.
Further variants and variants with PG thread on www.amphenol.de or on request.

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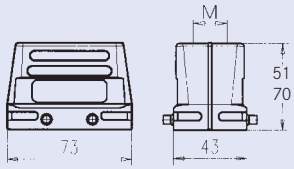
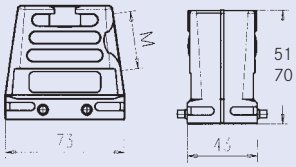
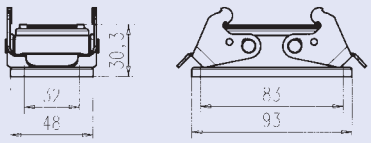
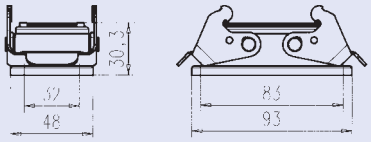
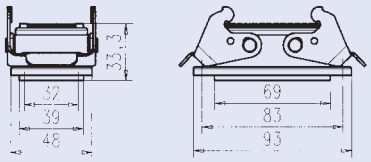
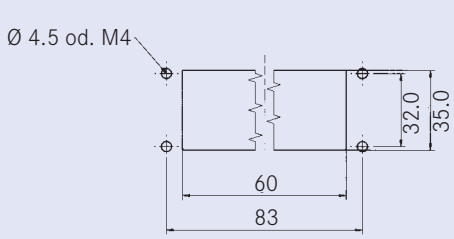
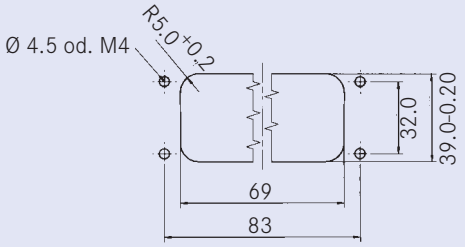
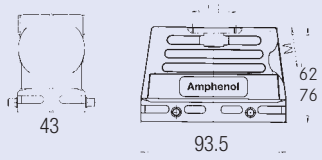
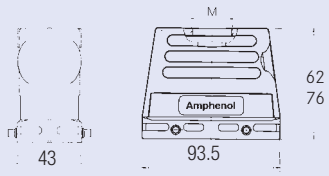
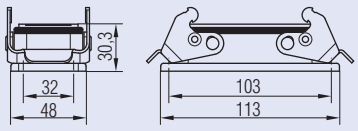
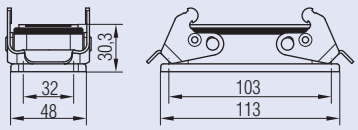
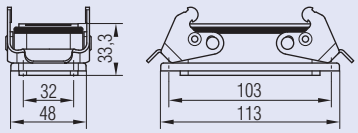
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	20 25 32	C146 11R010 650 1 C146 11R010 600 1 C146 11R010 601 1		
Hood top entry high profile	25 32 40	C146 11R010 650 8 C146 11R010 600 8 C146 11R010 601 8		
Hood side entry low profile	20 25	C146 11R010 550 1 C146 11R010 500 1		
Hood side entry high profile	25 32	C146 11R010 550 8 C146 11R010 500 8		
Housings				
Housing bulkhead mounting Version A Standard flange without ground strap		C146 11F010 901 8		
Housing bulkhead mounting Version B Standard flange with ground strap		C146 11F010 902 8		
Housing bulkhead mounting Version C Centering flange with ground strap		C146 11F010 000 8		
Panel cut out				

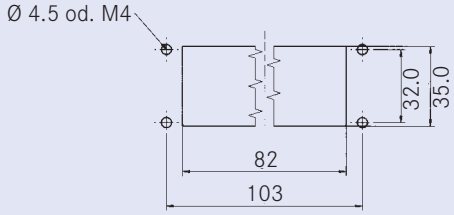


Version A + B

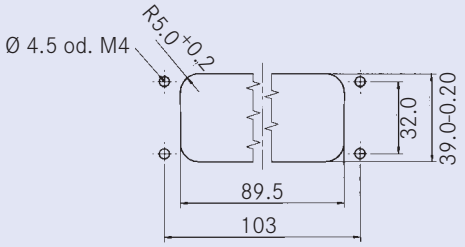


Version C

Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 11R016 650 1 C146 11R016 600 1		
Hood top entry high profile	25 32 40	C146 11R016 650 8 C146 11R016 600 8 C146 11R016 601 8		
Hood side entry low profile	25 32	C146 11R016 500 1		
Hood side entry high profile	25 32 40	C146 11R016 550 8 C146 11R016 500 8 C146 11R016 501 8		
Housings				
Housing bulkhead mounting Version A Standard flange without ground strap		C146 11F016 901 8		
Housing bulkhead mounting Version B Standard flange with ground strap		C146 11F016 902 8		
Housing bulkhead mounting Version C Centering flange with ground strap		C146 11F016 000 8		
Panel cut out				



Version A + B



Version C

EMC gland bushings for hoods see page 225.
Further variants and variants with PG thread on www.amphenol.de or on request.

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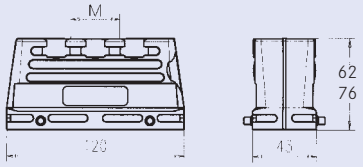
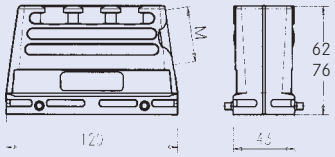
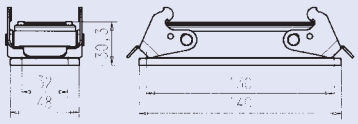
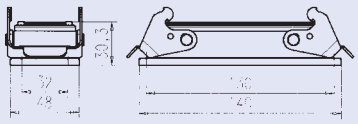
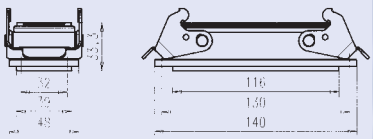
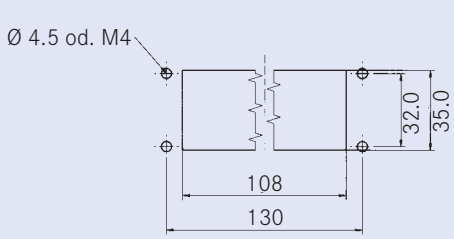
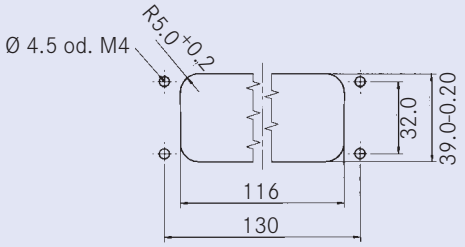
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry low profile	25 32	C146 11R024 650 1 C146 11R024 600 1		
Hood top entry high profile	25 32 40	C146 11R024 650 8 C146 11R024 600 8 C146 11R024 601 8		
Hood side entry low profile	25 32	C146 11R024 550 1 C146 11R024 500 1		
Hood side entry high profile	25 32 40	C146 11R024 550 8 C146 11R024 500 8 C146 11R024 501 8		
Housings				
Housing bulkhead mounting Version A Standard flange without ground strap		C146 11F024 901 8		
Housing bulkhead mounting Version B Standard flange with ground strap		C146 11F024 902 8		
Housing bulkhead mounting Version C Centering flange with ground strap		C146 11F024 000 8		
Panel cut out				



Version A + B



Version C

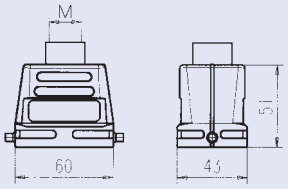
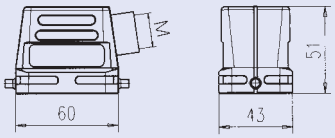
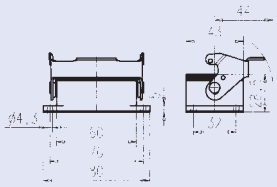
heavy|mate® Housings corrosion resistant Characteristics + Notes

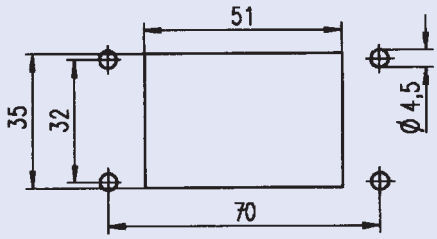
General Characteristics	Standard	Value
Protection class housing		IP 65
Locking system		2 locking levers
Salt mist resistance	IEC 60512-11-6:2002	>500h
Climatical Characteristics		
Climatic category	IEC 60068-1	40 / 125 / 21
Temperature range	IEC 60068-1	- 40 °C / + 125 °C
Upper temperature	IEC 60512-11-9	+ 125 °C
Lower temperature	IEC 60512-11-10	- 40 °C
Mechanical Characteristics		
Mechanical operation	IEC 60512-9-1	≥ 500 mating cycles
Materials		
Housings		Aluminium die cast alloy
Colour housings		grey, RAL 9005
Rubber gasket		NBR
Locking lever		steel / special coated
Surface		conducting special surface

Wichtige Hinweise

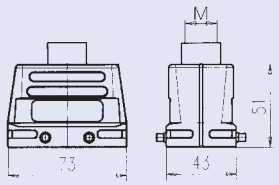
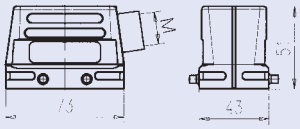
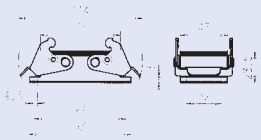
500h salt mist resistance can be achieved when using a plastic cable gland.
When a metal cable gland is required, we recommend to use additionally our special studs on the hoods to achieve this value.

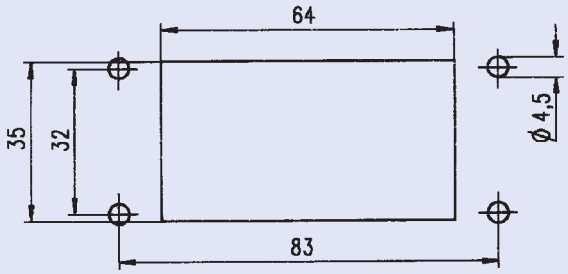
Order codes are:
N16 025 0112 5X Metal stud M25 corrosion resistant
N16 032 0112 5X Metal stud M32 corrosion resistant
N16 040 0112 5X Metal stud M40 corrosion resistant

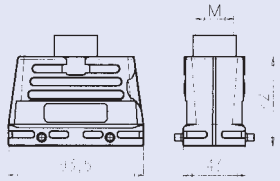
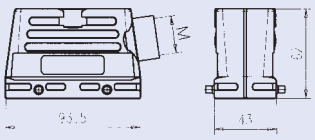
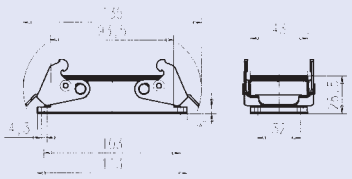
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	25	C146 50R006 607 1		
Hood side entry	25	C146 50R006 507 1		
Housings				
Housing bulkhead mounting		C146 50F006 000 1		
Panel cut out				

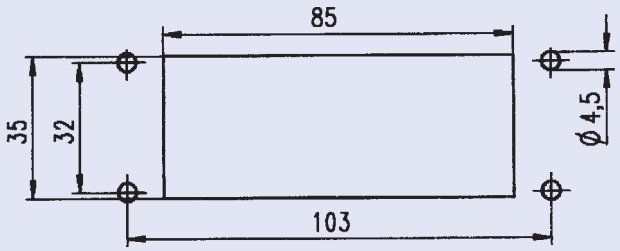


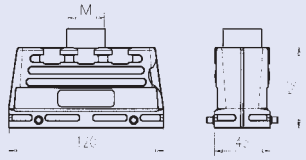
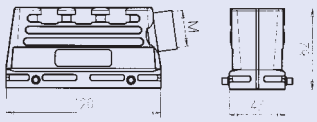
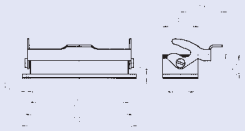
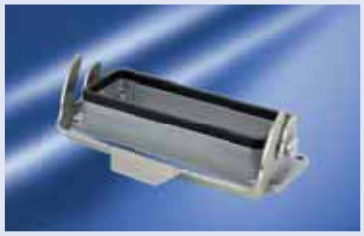
INDUSTRIAL@AMPHENOL TRUSTED GLOBALLY

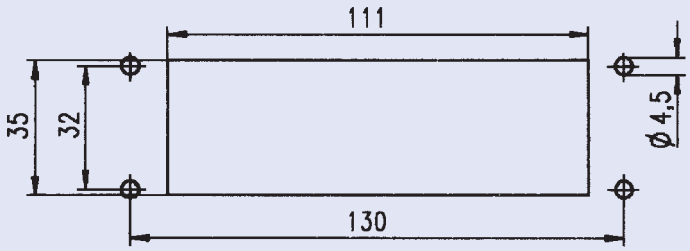
Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	25	C146 50R010 600 1		
Hood side entry	25	C146 50R010 500 1		
Housings				
Housing bulkhead mounting		C146 50F010 000 1		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	32	C146 50R016 600 8		
Hood side entry	32	C146 50R016 500 8		
Housings				
Housing bulkhead mounting		C146 50F016 000 1		
Panel cut out				



Description	M	Part Number	Drawing	Figure
Hoods				
Hood top entry	40	C146 50R024 601 8		
Hood side entry	40	C146 50R024 501 8		
Housings				
Housing bulkhead mounting		C146 50F024 000 1		
Panel cut out				

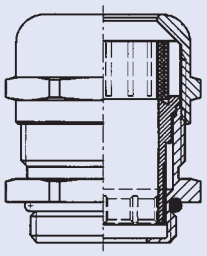


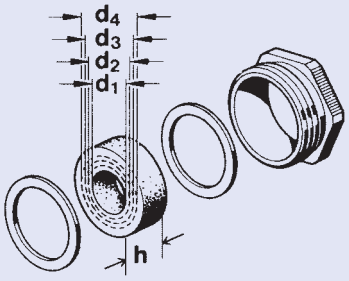
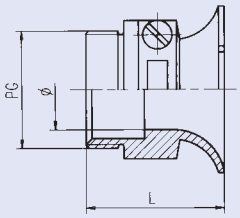
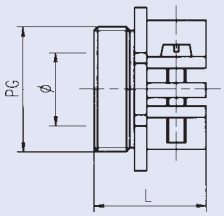
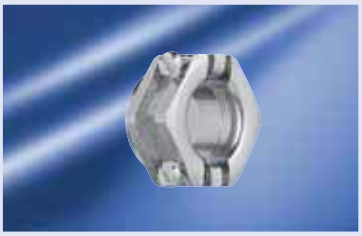
heavy | mate® Accessories

- gland bushings
- EMC gland bushings
- Cable seals with cable clamp
- Key pin
- Guide pin / bush
- D-Sub adaptors
- Foam rubber sealing
- Label for CSA regulation

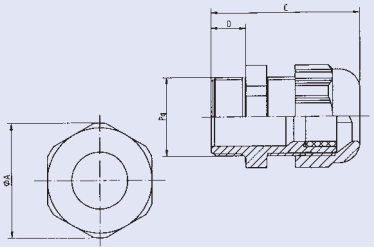
Assembly instructions for metric clamp

- The cable jacket should be removed as far as the underside of the cable clamping; the wire netting is then to be cut down a little further and subsequently must be formed into a circular rim. The protective jacket can remain attached to the cable provided that it passes through the lower opening of the clamp.
- On assembly, while screwing the cable clamp, the circular rim has to be pushed through and pressed on the fins commutator on the base of the underside and settle into a depression. By doing this the EMC security will remain.

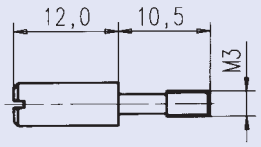
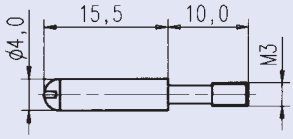
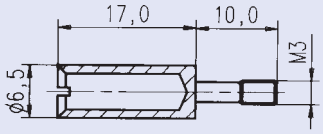
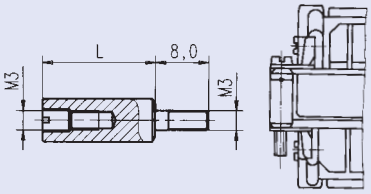
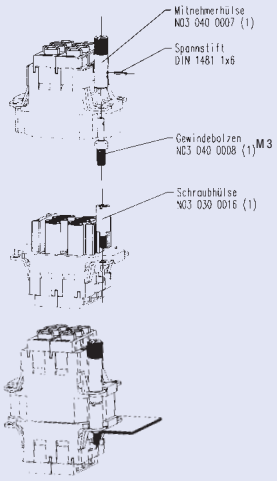


Description	M	Part Number	Drawing	Figure
Gland bushing IP 65[1)]				
Thermoplast clamp with variable inner diameter 10 Pieces	20	VN16 200 0114 X		
Metal with variable inner diameter 10 Pieces	20 25 32 40 50	VN16 200 0114 X VN16 250 0114 X VN16 320 0114 X VN16 400 0114 X VN16 500 0114 X		
Cable clamp without gasket 5 Pieces	16 20 25 32	VN16 160 0102 V VN16 200 0102 V VN16 250 0102 V VN16 320 0102 V		
Cable clamp without gasket 5 Pieces	20 25 32	VN16 200 0103 V VN16 250 0103 V VN16 320 0103 V		

[1)] Attention: not usable for hoods without stud

Description	Clamping range ø in mm	A in mm	M	Part Number	Drawing	Figure
Gland bushing IP 67 (Material PA / - 20 °C + 80 °C)						
Gland bushing with vibration protection 10 Pieces	4 - 10 6 - 12 9 - 16 10 - 21 16 - 28	20 24 28 36 46	16 20 25 32 40	VN16 160 0127 X VN16 200 0127 X VN16 250 0127 X VN16 320 0127 X VN16 400 0127 X		
Plugs brass nickel-plated with recess and o-ring 10 Pieces			20 25 32 40	VN16 020 0113 (1) X VN16 025 0113 (1) X VN16 032 0113 (1) X VN16 040 0113 (1) X		

Description	Clamping range F in mm	M	Part Number	Drawing	Figure
EMV gland bushing IP 68 (Material CuZn / PA / - 30 °C + 120 °C)					
Gland bushing EMV 10 Pieces	5.5 - 10 8 - 13 11 - 18 15 - 21 19 - 27	16 20 25 32 40	VN16 160 0126 X VN16 200 0126 X VN16 250 0126 X VN16 320 0126 X VN16 400 0126 X		

Description	L	Part Number	Drawing	Figure
Key pin with lock washer 10 Pieces		VN17 050 0004 (1)		
Key pin with lock washer 100 Pieces		VN17 050 0004 (101)		
Guide pin 10 Pieces		VN13 040 0009 (1) X		
Guide socket 10 Pieces		VN13 040 0008 (1) X		
Locking screw for contact inserts heavy|mate® D 15, D 25, A 10, A 16 20 Pieces	23	VN03 030 0021		
Locking screw for contact inserts heavy|mate® D 40, D 64, E, M, H 20 Pieces	20	VN03 030 0020		
Locking set 10 Pieces		VN03 030 3000 X		

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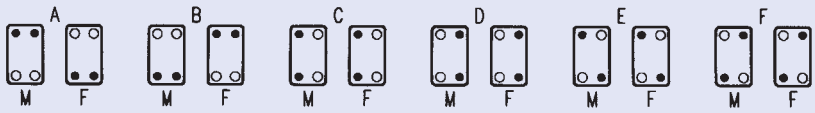
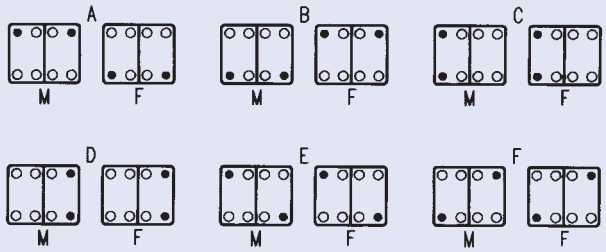
Polarization system with key pin

For housings with one contact insert



For housings with two contact inserts



Descriptions

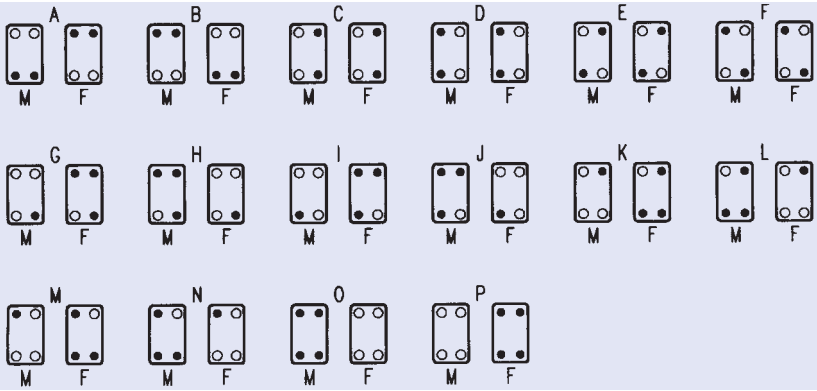
- ● Key pin
- ○ Locking screw

M Male insert

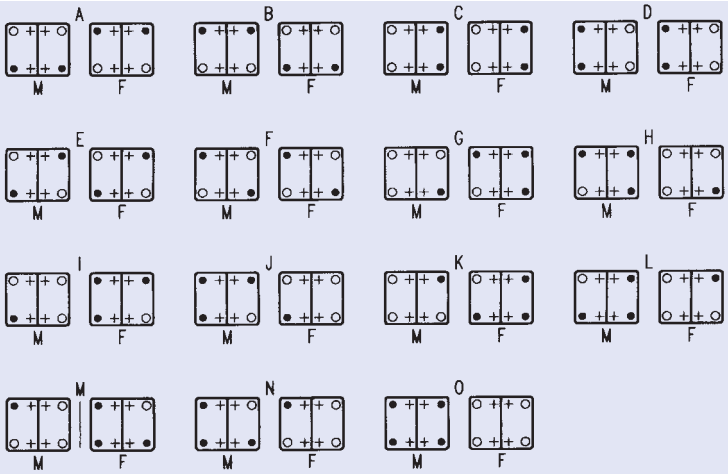
F Female insert

Polarization system with guide pin and guide socket

For housings with one contact insert



For housings with two contact inserts

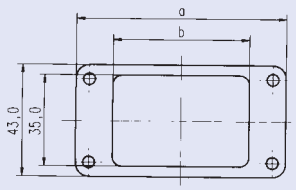
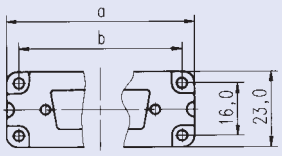
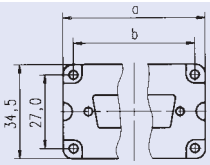
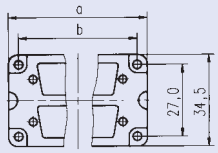


Descriptions

- ● Guide pin
- ○ Guide socket
- \+ Locking screw

M Male insert

F Female insert

Description	Size	Part Number	a	b	D-Sub	Drawing	Figure
Foam rubber sealing 2 mm	6 10 16 24	N06 080 0003 1 N06 080 0003 2 N06 080 0003 3 N06 080 0003 4	80 93 113 140	70 83 103 130			
Adaptor for D-Sub set metal	15 25	C146 N32 015 G2 C146 N32 025 G2	57 57	49,5 49,5	15 25	 2 x adaptor 4 x M3 x 6,5 8 x M3 x 14	
Adaptor for D-Sub set single-row	6 6 10 16 16	C146 N32 009 G1 C146 N32 015 G1 C146 N32 025 G1 C146 N32 037 G1 C146 N32 050 G1	51,5 51,5 64,5 85 85	44 44 57 77,5 77,5	9 15 25 37 50	 2 x adaptor 4 x M3 x 6,5 8 x M3 x 14	
Adaptor for D-Sub set double-row	6 6 10 16 16	C146 N33 009 G1 C146 N33 015 G1 C146 N33 025 G1 C146 N33 037 G1 C146 N33 050 G1	51,5 51,5 64,5 85 85	44 44 57 77,5 77,5	9 15 25 37 50	 2 x adaptor 4 x M3 x 6,5 8 x M3 x 14	
Label for CSA application	N07 045 0001 L						

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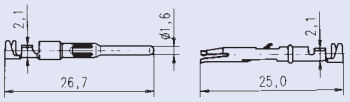
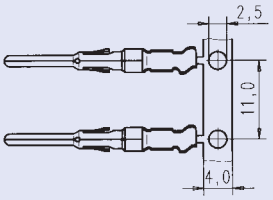
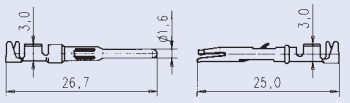
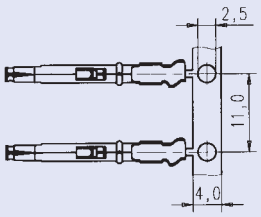
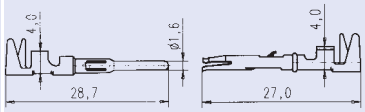
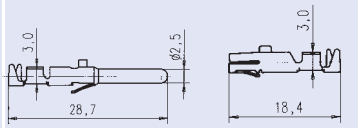
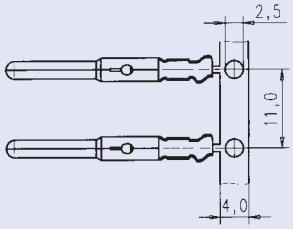
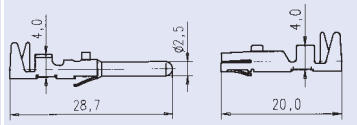
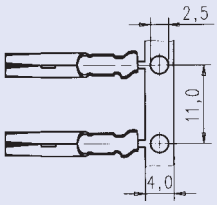
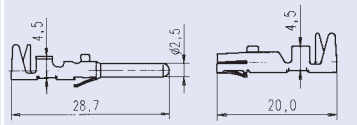
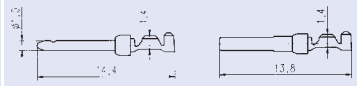
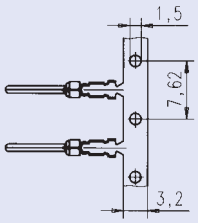
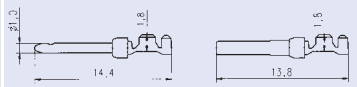
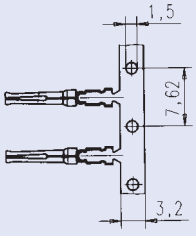
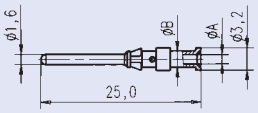
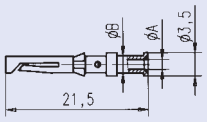
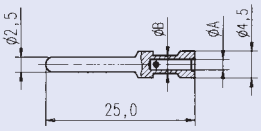
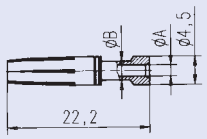
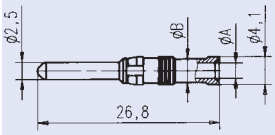
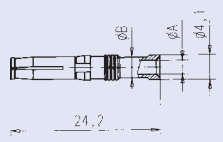
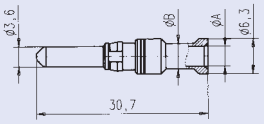
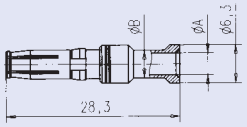
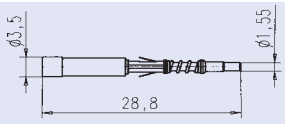
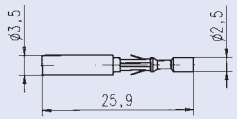
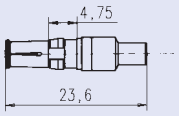
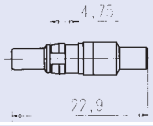
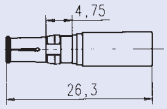
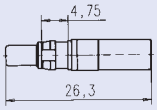
heavy | mate® Information

- Drawings contacts
- Safety classification
- Technical information

Series	Drawing single contact	Drawing contacts on reel	Figure
heavy|mate® D, M	.N01 016 0003 1 .N02 016 0003 1  	 	
	.N01 016 0002 1 .N02 016 0002 1 .N01 016 0015 1[1] .N02 016 0015 1[1]  	 	
	.N01 016 0005 1 .N02 016 0005 1 .N01 016 0016 1[1] .N02 016 0016 1[1]  		
heavy|mate® E, M	.N01 025 0001 1 .N02 025 0001 1  	 	
	.N01 025 0010 1 .N02 025 0010 1  	 	
	.N01 025 0043 1 .N02 025 0043 1  		
heavy|mate® M	.N01 010 0130 2 .N02 010 0130 2  	 	
	.N01 010 0131 2 .N02 010 0131 2  	 	

[1] marked with "H"

Series	Part Number	Wire gauge	A	B	Drawing	Figure
heavy|mate® **D, DD, M** 100 Pieces	VN01 016 0024 (1)C VN01 016 0025 (1)C VN01 016 0026 (1)C VN01 016 0027 (1)C VN01 016 0028 (1)C	0,14 - 0,37 0,5 0,75 - 1,0 1,5 2,5	0,9 1,1 1,45 1,75 2,25	2,6 2,6 2,6 3,0 3,2	.N01 016 002X 	
	VN02 016 0024 (1)C VN02 016 0025 (1)C VN02 016 0026 (1)C VN02 016 0027 (1)C VN02 016 0028 (1)C	0,14 - 0,37 0,5 0,75 - 1,0 1,5 2,5	0,9 1,1 1,45 1,75 2,25	2,6 2,6 2,6 3,0 3,2	.N02 016 002X 	
heavy|mate® **E, EE** 100 Pieces	VN01 025 0035 (1)C VN01 025 0036 (1)C VN01 025 0037 (1)C VN01 025 0038 (1)C VN01 025 0039 (1)C	0,5 0,75 - 1,0 1,5 2,5 4,0	1,1 1,45 1,75 2,3 2,9	2,6 2,6 3,0 3,2 4,0	.N01 025 003X 	
	VN02 025 0035 (1)C VN02 025 0036 (1)C VN02 025 0037 (1)C VN02 025 0038 (1)C VN02 025 0039 (1)C	0,5 0,75 - 1,0 1,5 2,5 4,0	1,1 1,45 1,75 2,3 2,9	2,6 2,6 3,0 3,2 4,0	.N02 025 003X 	
heavy|mate® **M** 100 Pieces	VN01 025 0029 (1)C VN01 025 0030 (1)C VN01 025 0031 (1)C VN01 025 0032 (1)C VN01 025 0033 (1)C	0,5 0,75 - 1,0 1,5 2,5 4,0	1,1 1,45 1,75 2,25 2,85	2,6 2,6 3,0 3,45 3,9	.N01 025 00XX 	
	VN02 025 0029 (1)C VN02 025 0030 (1)C VN02 025 0031 (1)C VN02 025 0032 (1)C VN02 025 0033 (1)C	0,5 0,75 - 1,0 1,5 2,5 4,0	1,1 1,45 1,75 2,25 2,85	2,6 2,6 3,0 3,45 3,9	.N02 025 00XX 	
	VN01 036 0004 (1)C VN01 036 0005 (1)C VN01 036 0001 (1)C VN01 036 0002 (1)C VN01 036 0003 (1)C	1,5 2,5 4,0 6,0 10,0	1,75 2,25 2,85 3,55 4,4	3,0 3,45 3,9 4,9 5,9	.N01 036 000X 	
	VN02 036 0004 (1)C VN02 036 0005 (1)C VN02 036 0001 (1)C VN02 036 0002 (1)C VN02 036 0003 (1)C	1,5 2,5 4,0 6,0 10,0	1,75 2,25 2,85 3,55 4,4	3,0 3,45 3,9 4,9 5,9	.N02 036 000X 	

Series	Part Number	Drawing single contact	Figure
heavy|mate® M, FO	N01 016 0040 8		
	N02 016 0040 8		
heavy|mate® M, Coax	17 DM 537 421		
	17 DM 537 401		
	17 DM 537 425		
	17 DM 537 405		

Style	enclosed	unenclosed	earthing contact	cable clamp	finger safety mated
Hood with pin insert	●		●		●
Pin insert		●	●		
Hood with socket insert	●		●		●
Socket insert		●	●		
Coupling housing with pin insert	●		●		●
Coupling housing with socket insert	●		●		●
Housing with pin insert	●		●		●
Housing with socket insert	●		●		●

If not otherwise stated the contact inserts have to be mounted in metallic conductive housings resp. on bars or mounting boards to complete the protective earth grounding.

[1] When used as connector with braking capacity the load shall be reduced
[2] When using cable seals (from page 224)

finger safety unmated	hand back safety mated	connetor with breaking capacity [1]	rewirable	Cable clamp with [2]	Cable clamp without [3]	Style
	●	●	●	●	●	Hood with pin insert
		●	●	4)	●	Pin insert
●	●	●	●	●	●	Hood with socket insert
		●	●	4)	●	Socket insert
		●	●	●	●	Coupling housing with pin insert
●	●	●	●	●	●	Coupling housing with socket insert
	●	●	●	●	●	Housing with pin insert
●	●	●	●	●	●	Housing with socket insert

[3] When using standard gland bushings
[4] See detail information

General technical information

- The Safty of connectors/connectors with braking capacity (CBC) depends on the right selection of products, the correct installation and a proper assembly.
- Decisions for the application of connectors are the requirements of the equipment specifications. This is especially the case for the definition of the rated voltage and the related clearances and creepage distances.
- All rated data for the connectors listed in this catalogue is based on overvoltage category III and pollution degree 3 (machine tool application).
- All technical data is specified for connectors, which are not under load when mated or disconnected. If in special cases connectors can be used in the sense of plug and socket devices (connector with breaking capacity), this is mentioned in the brief information of the particular section.
- Correct mounting will protect against electrical shock when mating the connectors.
- It connectors are mounted in non conductive housings both protective earthing terminals shall be mounted.
- A detailed connector glossary can be found at the end of this catalogue.
- All mentioned excerpts of standards are for general information only. For specific cases the valid original standards have to be consulted.
- Test methods acc. IEC 60512 camply with test methods acc. DIN EN 60512 or DIN IEC 60512. IEC 60664-1 complies with DIN VDE 0110-1

Termination methods: Screw connection

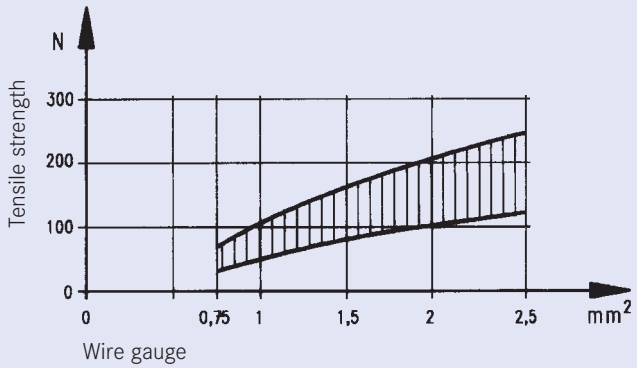
Screw clamps are designed acc. to EN 60999-1/VDE 0609. Chart 1 below shows the screw size depending on wire size and the required clamping and testing torque.

Chart 1

Wire size (mm²)	1	1.5	2.5	4	6	10
Screw size	M 2.6	M 3	M 3	M 3.5	M 4	M 4
Test torque (Ncm)	40	50	50	80	120	120

Diagram 1 below shows the range of tensile strength for a screw connection with a clamp screw M3, fastened with a torque of 50 Ncm, depending on the wire size.

Diagram 1



Crimp connection

A crimp connection is a non-detachable electrical connection between a wire and a crimp contact produced with the crimp technology. Precise crimping dies are matched to the crimp barrel and the wire size and a defined deformation results in a reliable electrical connection. There are open barrels (stamped contacts) and closed crimp barrels (turned contacts).

The main advantages of crimp connections are:
- Efficient termination of contacts.
- Reproduceable electrical and mechanical figures by a constant crimp quality.
  (A detailed description of the crimp technology can be found in our catalogue "tools").

The requirements for crimp connections are defined in DIN EN 60352-2.

An important point for the quality of a crimp connection is the achieved tensile strength of the termination. Measuring the tensile strength is a practible means for quality control purposes. Chart 2 below shows the required minimum tensile strength for open and closed barrels according to the wire size.

Chart 2: Tensile strength for crimp connetions

Wire size		Tensile strength
mm²	AWG [1]	N
0.05	30	6
0.08	28	11
0.12	26	15
0.14		18
0.22	24	28
0.25		32
0.32	22	40
0.5	20	60
0.75		85
0.82	18	90
1.0		108
1.3	16	135
1.5		150
2.1	14	200
2.5		230
3.3	12	275
4.0		310
5.3	10	355
6.0		360
8.4	8	370
10.0		380

Cross reference AWG - mm²

The chart below allows a cross reference between American Wire Gauge (AWG) and metric wire sizes (mm²).

Chart 3

AWG	Wire composition	Leiter-Ø	Wire size	AWG	Wire composition	Leiter-Ø	Wire size
30	1 x 0.25	0.25 mm	0.05 mm²	20	1 x 0.81	0.81 mm	0.52 mm²
	7 x 0.10	0.36 mm	0.06 mm²		7 x 0.32	0.97 mm	0.56 mm²
28	1 x 0.32	0.32 mm	0.08 mm²		19 x 0.20	1.02 mm	0.62 mm²
	7 x 0.13	0.38 mm	0.09 mm²	18	1 x 1.02	1.02 mm	0.79 mm²
26	1 x 0.40	0.40 mm	0.13 mm²		19 x 0.25	1.27 mm	0.96 mm²
	7 x 0.16	0.48 mm	0.14 mm²	16	19 x 0.29	1.44 mm	1.23 mm²
	19 x 0.10	0.51 mm	0.15 mm²	14	19 x 0.36	1.80 mm	1.95 mm²
24	1 x 0.51	0.51 mm	0.21 mm²	12	19 x 0.46	2.29 mm	3.09 mm²
	7 x 0.20	0.61 mm	0.23 mm²	10	37 x 0.40	3.10 mm	4.60 mm²
	19 x 0.13	0.64 mm	0.24 mm²	8	133 x 0.29	4.0 mm	8.80 mm²
22	1 x 0.64	0.64 mm	0.33 mm²	6	133 x 0.36	5.5 mm	13.5 mm²
	7 x 0.25	0.76 mm	0.36 mm²				
	19 x 0.16	0.81 mm	0.38 mm²				

It has to be noted that wires of the same AWG number but with different composition have slightly different mm².

[1] Only for information

Chart 4: Composition and Dimensions of Copper Wires

Wire Size	Wire Composition	Wire diameter
0.09 mm²	12 x 0.10	0.48 mm
0.14 mm²	18 x 0.10	0.50 mm
0.25 mm²	14 x 0.15	0.70 mm
0.34 mm²	7 x 0.25	0.78 mm
0.5 mm²	16 x 0.20	1.0 mm
0.75 mm²	24 x 0.20	1.2 mm
1.0 mm²	32 x 0.20	1.4 mm
1.5 mm²	30 x 0.25	1.6 mm
2.5 mm²	35 x 0.30	2.2 mm
4.0 mm²	56 x 0.30	2.8 mm
6.0 mm²	19 x 0.64	3.4 mm
10 mm²	19 x 0.80	4.3 mm

Current carrying capacity

The current carrying capacity of a connector is shown by a derating curve. The curve shows the currents that the connector can carry continuously and simultaneously through all its contacts. The curve is determined by testing following the standard DIN EN 60512. The upper temperature is limited by the contact and insulation material used . The sum of the ambient temperature and the temperature created by the current flow may not exceed the upper temperature. This means that the current carrying capacity has no fixed value but decreases with increasing ambient temperatures.

As a general example it can be said that a given connector which can carry 16A through all its contacts at 40°C ambient temperature can carry less, e.g. 12A, at an ambient temperature of 80°C.
On the other hand it is often the case that not all contacts carry the whole rated current, which means that some single contacts may carry a higher current than that according to the derating curve. These currents have to be defined by testing.

Diagram 3: Typical derating curve

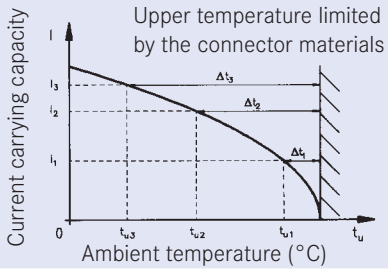
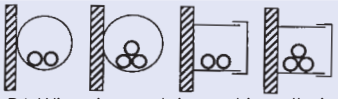
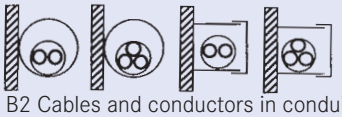


Chart 5: Current carrying capacity of copper wires in (A)

Installation type / Wire size (mm2)	0.25	0.34	0.5	0.75	1	1.5	2.5	4	6	10
 B1 Wires in conduits and installation channels	-	-	-	7.6	10.4	13.5	18.3	25	32	44
 B2 Cables and conductors in conduits or installation channels	-	-	-	-	9.6	12	16.5	23	29	40
C Cables and conductors along walls	4.0	5.0	7.1	9.1	11.7	15.2	21	28	36	50
E Cables and conductors on plank	4.0	5.0	7.1	9.1	11.5	16.1	22	30	37	52

Description according to DIN EN 60204 for PVC insulated copper wires with a working temperature of +40C. For other requirements, such as for other temperatures, mountings, or wires corresponding correction factors are used (see next page).

Reduction values	Chart 6
The values in chart 5 are based on an ambient temperature of 40 °C. For other ambient temperatures the values have to be adjusted using the correction values of chart 6 below. For installations with many cables and conductors under load the current carrying capacity is reduced according to the two following charts 7 and 8.	

Ambient temperature (°C)	Correction value
30	1.15
35	1.03
40	1.00
45	0.91
50	0.82
55	0.71
60	0.58

Chart 7: Reduction values for accumulated conductors

Installation type	Number of cables and conductors / pairs under load			
	2	4	6	9
Threephase cable and conductor				
B1 and B2	0.80	0.85	0.87	0.86
C	0.65	0.75	0.78	0.76
E-one row	0.57	0.72	0.75	0.72
E-multi row	0.50	0.70	0.73	0.88
DC conductor (pair), independent of installation type	1.0	0.76	0.64	0.43

Chart 8: Reduction values for multicore cable and conductors up to 10mm²

Number of conductors (pairs) under load	AC (conductor > 1 mm²)	DC (Pairs 0,2 to 0,75 mm²)
5	0.75	0.52
7	0.65	0.45
10	0.55	0.39
24	0.40	0.27

Conductors of control circuits generally do not need a reduction.

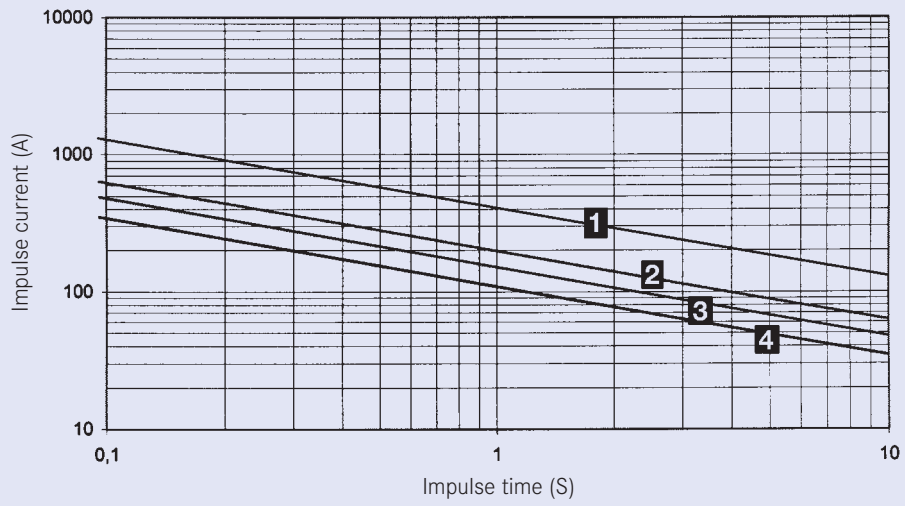
Impulse current carrying capacity

A surge can happen to a connector and its contacts by an impulse current, e.g. through a short circuit in the system or by switching operations. The short-timed high current heat cannot be transferred outside fast enough so the contacts are stressed by the high temperature which in the worst case can lead to a local weld.

The robust design of our connectors prevents most damage by impulse currents.

The diagram 4 below can be used as a guideline.

Chart 4: Impulse current carrying capacity of single contacts



Curve No.	Connector style	Curve No.	Connector style
1	heavy|mate® E or A with screw contact	3	heavy|mate® S with stamped crimp contact
2	heavy|mate® E with stamped crimp contact	4	heavy|mate® D with stamped crimp contact

Voltage grading of connectors

General

Clearances and creepage distances are the base for voltage grading of connectors. Valuation and dimensioning of clearances and creepage distances have changed since the introduction of insulation coordination.

Insulation coordination comprises the selection of the electrical insulation performances of the equipment, taking into account the expected use and its environment.

The following standards apply for this:

IEC 60664-1/10.92
Insulation coordination for equipment within low-voltage systems

DIN VDE 0110-1/4.97
Isolationskoordination für elektrische Betriebsmittel in Niederspannungsanlagen

Clearances

The clearance is the shortest distance in air between two conductive parts. An important point for the dimensioning of clearances is the determination of the overvoltage category. The above standard specifies the possible overvoltages into the four following categories:

Overvoltage category I
Equipment intended for the use in appliances or parts of installations in which no overvoltage can occur.
Examples are low-voltage equipments.

Overvoltage category II
Equipment intended for the use in installations or parts of it in which lightning overvoltages do not need to be considered, but switching overvoltages generated by the equipment do need to be considered.
Examples are household appliances.

Overvoltage category III
Equipment intended for the use in installtions or parts of it in which lightning overvoltages do not need to be considered, however switching overvoltages generated by the euipment, and for cases where the reliability and the availability of the equipment or its dependent circuits are subject to special requirements.
Examples are protecting means, switches and sockets.

Overvoltage category IV
Equipment intended for the use in installations or parts of it in which lightning overvoltage has to be considered.
Examples are electricity meters, overcurrent protection switches.

Once the overvoltage category has been defined the rated impulse withstand voltage can be selected for the equipment based on the nominal voltage of the supply system and the overvoltage category using chart 9 below:

Chart 9

Nominal voltage of the supply system in V (based on IEC 60038)	Rated impulse voltage in kV for overvoltage category			
Three phase systems	IV	III	II	I
230/400 277/480	6	4	2,5	1,5
400/690	8	6	4	2,5
1000	12	8	6	4

After the rated impulse withstand voltage has been selected the pollution degree must be defined taking the expected pollution around the equipment into account.
The following four degrees of pollution are established:

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

Pollution degree 2
Only non-conductive pollution occurs except occasionally a temporary conductivity caused by condensation is to be expected.

Pollution degree 3
Conductive pollution occurs or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be expected.

Pollution degree 4
The pollution generates persistent conductivity caused by conductive dust or by rain or snow.

It has to be noted that for a connector or plug and socket devise with a degree of protection of min. IP 54 the parts inside the enclosure may be dimensioned for a lower pollution degree. This also applies to mated connectors which enclosure is ensured through the connector housing and which may only be disengaged for test and maintenance purposes.

When impulse withstand voltage and the pollution degree are defined the minimum clearances can be selected from chart 10.

Chart 10

Impulse withstand voltage in kV	Minimum clearances in air in mm up to 2000 m above sea level							
	Case A (non homogeneous field)				Case B (homogeneous field)			
	Pollution degree				Pollution degree			
	1	2	3	4	1	2	3	4
0.33	0.01	0.2	0.8	1.6	0.01	0.2	0.8	1.6
0.40	0.02				0.02			
0.50	0.04				0.04			
0.60	0.06				0.06			
0.80	0.10				0.1			
1.0	0.15				0.15			
1.2	0.25	0.25			0.2			
1.5	0.5	0.5			0.3	0.3		
2.0	1.0	1.0	1.0		0.45	0.45		
2.5	1.5	1.5	1.5		0.6	0.6		
3.0	2	2	2	2	0.8	0.8		
4.0	3	3	3	3	1.2	1,2	1.2	
5.0	4	4	4	4	1.5	1.5	1.5	
6.0	5.5	5.5	5.5	5.5	2	2	2	2
8.0	8	8	8	8	3	3	3	3
10	11	11	11	11	3.5	3.5	3.5	3.5
12	14	14	14	14	4.5	4.5	4.5	4.5
15	18	18	18	18	5.5	5.5	5.5	5.5
20	25	25	25	25	8	8	8	8
25	33	33	33	33	10	10	10	10
30	40	40	40	40	12.5	12.5	12.5	12,5
40	60	60	60	60	17	17	17	17
50	75	75	75	75	22	22	22	22
60	90	90	90	90	27	27	27	27
80	130	130	130	130	35	35	35	35
100	170	170	170	170	45	45	45	45

When defining the minimum clearances for connectors generally the values of the inhomogeneous field can be chosen or the required clearance has to be defined by a voltage test.

Creepage distances

The creepage distance is the shortest distance along the surface of the insulating material between two conductive parts.
For the dimensioning of the creepage distance the following factors are taken into account: the rated voltage, the pollution degree and the tracking formation of the insulating material.

The materials are separated into four groups according to their CTI values (Comparative Tracking Index):

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

The minimum creepage distances can be selected from chart 11 .

Chart 11

U-eff Rated voltage U in V	Min. creepage distance in mm														
	Printed circuits		Other devices												
	Pollution degree		Pollution degree					Pollution degree				Pollution degree			
			1	2				3				4			
	1	2	Material group					Material group				Material group			
	2)	3)	2)	I	II	IIIa	IIIb	I	II	IIIa	IIIb	I	II	IIIa	IIIb
10	0.025	0.04	0.08	0.4	0.4	0.4		1	1	1		1.6	1.6	1.6	
12.5	0.025	0.04	0.09	0.42	0.42	0.42		1.05	1.05	1.05		1.6	1.6	1.6	
16	0.025	0.04	0.1	0.45	0.45	0.45		1.1	1.1	1,1		1.6	1.6	1.6	
20	0,025	0.04	0.11	0.48	0.48	0.48		1.2	1.2	1.2		1.6	1.6	1,6	
25	0,025	0.04	0.125	0.5	0.5	0.5		1.25	1.25	1.25		1.7	1.7	1.7	
32	0.025	0.04	0.14	0.53	0.53	0.53		1.3	1.3	1.3		1.8	1.8	1.8	
40	0.025	0.04	0.16	0.56	0.8	1.1		1.4	1.6	1.8		1.9	2.4	3	
50	0.025	0.04	0.18	0.6	0.85	1.2		1.5	1.7	1.9		2	2.5	3.2	
63	0.04	0.063	0.2	0.63	0.9	1.25		1,6	1.8	2		2.1	2.6	3.4	
80	0.063	0.1	0.22	0.67	0.95	1.3		1.7	1.9	2.1		2.2	2.8	3.6	
100	0.1	0.16	0.25	0.71	1	1.4		1.8	2	2.2		2.4	3.0	3.8	
125	0.16	0.25	0.28	0.75	1.05	1.5		1.9	2.1	2.4		2.5	3.2	4	
160	0.25	0.4	0.32	0.8	1.1	1.6		2	2.2	2.5		3.2	4	5	
200	0.4	0.63	0.42	1	1.4	2		2.5	2.8	3.2		4	5	6.3	
250	0.56	1	0.56	1.25	1.8	2.5		3.2	3.6	4		5	6.3	8	
320	0.75	1.6	0.75	1.6	2.2	3.2		4	4.5	5		6.3	8	10	
400	1	2	1	2	2.8	4		5	5.6	6.3		8	10	12.5	
500	1.3	2.5	1.3	2.5	3.6	5		6.3	7.1	8.0		10	12.5	16	
630	1.8	3.2	1.8	3.2	4.5	6.3		8	9	10		12.5	16	20	
800	2.4	4	2.4	4	5.6	8		10	11	12.5		16	20	25	
1000	3.2	5	3.2	5	7.1	10		12.5	14	16		20	25	32	
1250			4.2	6.3	9	12.5		16	18	20		25	32	40	
1600			5.6	8	11	16		20	22	25		32	40	50	
2000			7.5	10	14	20		25	28	32		40	50	63	
2500			10	12.5	18	25		32	36	40		50	63	80	
3200			12.5	16	22	32		40	45	50		63	80	100	
4000			16	20	28	40		50	56	63		80	100	125	
5000			20	25	36	50		63	71	80		100	125	160	
6300			25	32	45	63		80	90	100		125	160	200	
8000			32	40	56	80		100	110	125		160	200	250	
10000			40	50	71	100		125	140	160		200	250	320	

Connectors in this catalogue are allocated to fixed rated voltages which apply to the machine building industry. In case of other applications the above chart can be used to determine other rated voltages.

Degree of protection

Electrical connector devices have to be protected for safety reasons from outside influences like dust, foreign objects, direct contact, moisture and water. This protection is provided on industrial connectors by the housing latching devices and sealed cable entries. The degree of protection depends on the type of intended use. The standard IEC 60529 and/or DIN EN 60529 has specified the degree of protection and divided them into several classes.

The degree of protection is indicated in the following way: IP 65
Code letters (Internat. Protection)
1st charact. numeral (degree of protection against access to hazardous parts and against solid foreign objects)
2nd charact. numeral (degree of protection against ingress of water)
The following charts 12 an13 give an overview about all protection degrees.

Chart 12

1st charact. numeral	Brief description	Definition
0	Non-protected	–
1	Protected against access to hazardous parts with the back of a hand. Protected against solid foreign objects of ≥50mm Ø.	The probe, sphere of 50mm Ø, shall not fully penetrate and shall have adequate clearance from hazardous parts.
2	Protected against access to hazardous parts with a finger. Protected against solid foreign objects of ≥12,5mm Ø.	The jointed test finger of 12mm Ø, 80mm length, shall have adequate clearance from hazardous parts. The probe, sphere of 12,5mm Ø, shall not fully penetrate.
3	Protected against access to hazardous parts with a tool. Protected against solid foreign objects of ≥2,5mm Ø.	The probe of 2,5mm Ø shall not penetrate at all.
4	Protected against access to hazardous parts with a wire. Protected against solid foreign objects of ≥1mm Ø.	The probe of 1mm Ø shall not penetrate at all.
5	Protected against access to hazardous parts with a wire. Dust-protected.	The probe of 1mm Ø shall not penetrate. Intrusion of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the device or to impair safety.
6	Protected against access to hazardous parts with a wire Dust-tight.	The probe of 1mm Ø shall not penetrate. No intrusion of dust.

Chart 13

2nd charact. numeral	Brief description	Definition
0	Non-protected	–
1	Protected against vertically falling water drops	Vertically falling drops shall have no harmful effects.
2	Protected against vertically falling water drops when enclosure tilted up to 15°	Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angel up to 15° .
3	Protected against spraying water	Water sprayed at any angle up to 60° shall have no harmful effects.
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects.
5	Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects.
6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects.
7	Protected against the effects of temporary immersion in water	Intrusion of water in quantities causing harmful effects shall not be possible when the enclosure is temporalily immersed in water for 30 min. in 1m depth.
8	Protected against the effects of continous immersion in water	Intrusion of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for numeral 7.
9K[1)]	Protected against water during high pressure/steam jet cleaning	Water projected in powerful jets with high pressure and heat against the enclosure from any direction shall have no harmful effects.

[1)] Remark: Numeral acc. to DIN 40050 part 9, vehicles IP code

Cable

For the termination of all Amphenol-industrial connectors we recommend the use of commercially available high flexible cable acc. to VDE or other local specifications. Our connectors are designed to fit these cables especially as far as number of conductors and cable diameters are concerned.

When selecting cables care must be taken that the cables do not affect (solvent) the connector or preserve an existing fire resistance.

Sealing

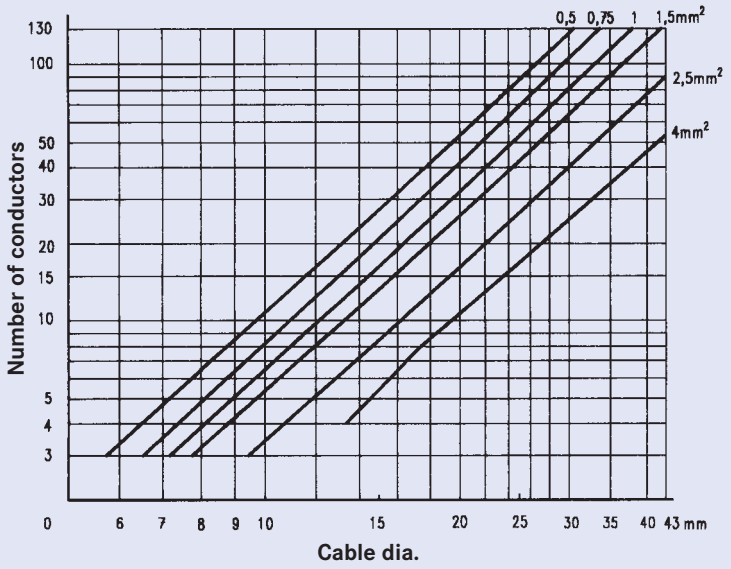
The sealing of the cable entries of all Amphenol-industrial connectors is with gland bushings. All sealings are made from Neoprene which has a good resistance against grease, oil and gasoline.

Selection of gland bushings

Beside glands with a fixed inside diameter which equals the number, there are also glands with variable inside diameters available (so-called onion glands). The inside diameter of these glands can be adjusted to the outside cable diameter by cutting out the smaller rings.

The selection of the appropiate gland bushing depends on the cable diameter (cable composition) can be made using the following diagram 5 (see page XXX).

Diagram 5



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American Wire Gauge (AWG)	Contact
System of numerical designations for wire sizes, based on specified ranges of cross-sectional areas. Starts with 4/0 (000) at the largest size, going to 3/0, 2/0, 1/0, 1, 2, and up to 40 and beyond for the smallest size. A step of one AWG number corresponds to a reduction of cross-sectional area of appr. 20 %.	The conductive element in a connector which mates with a corresponding element to provide an electrical path.
Attenuation	**Contact resistance**
A reduction of power. Occurs naturally when waves travel through lines, wave guides, or media such as air or water. Is produced additionally by imperfections in electrical or optical connections (attenuation in fibre optics), e. g. contact resistance, mismatch, etc.	The electrical resistance of a mated set of contacts under specified conditions. Tested according to tests 2a, 2b, 2c, of IEC 60 512 -2/ DIN EN 60 512-2.
Bulkhead connector	**Contact size**
Connector designed to be inserted into a panel cutout from the rear of the panel, thus forming part of the barrier between two spaces. Back-mounted.	The designation used to differentiate one contact from another. It may be denoted by one of the following numbering systems: • numbering system: assigned numbers used to denote the size of the contact and its related conductor accomodation (e. g. in AWG units), • current rating system: the related current-carrying capacity is used to denote the size of the contact, • cross-sectional area system: reference is made to the cross-sectional area of the maximum conductor accommodation to denote the size of the contact, e. g. in mm^2.
Clearance	**Creepage distance**
The shortest distance in air between two conductive parts, see IEC 60664.	The shortest distance along the surface of the insulating material between two conductive parts. The longer the distance, the less the risk of arc damage or tracking. Minimum creepage distances are specified according to the rated voltage and the applicable pollution degree and Comperative Tracking Index.
Climatic stability	**Crimped connection**
General term describing the behavior of components under various climatic conditions, e. g. high and low temperatures, tropical climate, high humidity, moist heat, fungus, atmospheric conditions (industial atmosphere), reduced air pressure, etc. Climatic conditions for test purposes are explained in IEC 60068, DIN 46 040.	A solderless connection made by crimping. IEC 60352-2 / DIN IEC 60352 Part 2.
Connector	**Derating curve**
A component which terminates conductors for the purpose of providing connection and disconnection to a suitable mating component which shall not be engaged or disengaged when live. Depending on the fastening to a cabinet, panel, rack etc. or a cable, they are classified as fixed or free connectors. A connector comprises one or more contacts and a housing which may have a separate connector insert and a separate outer housing or shell.	The method for determining derating is specified in IEC 60 512-3. Here the combination of ambient temperature (Tu) and the current (J) leading to the same maximum allowable temperature (Tb) at the hottest point of the connector are plotted.
Connector housing	**DIN**
The part of a connector into which the insert and the contacts are assembled. It may function as part of the locking mechanism.	**D**eutsches **I**nstitut für **N**ormung. A German standards organization.
Connector insert	**Electromagnetic interference (EMI)**
An insulating element designed to support and position contacts in a connector housing.	General term describing the undesirable effects of the immission or emission of radio frequency fields. In connectors electromagnetic interference is prevented by shielding. Shielded connectors normally provide means to connect the screens of attached cables.
Connector life	**Funnel entry (restricted entry C146 D series)**
The number of mating cycles prior to abrasion of the conductive contact surface and which does not result in a significant rise of the contact resistance. Tests according to test 9a of ICE 60512-5 / DIN EN 60512 Part 5.	Flared or widened entrance to a conductor barrel permitting easier insertion of the conductor.

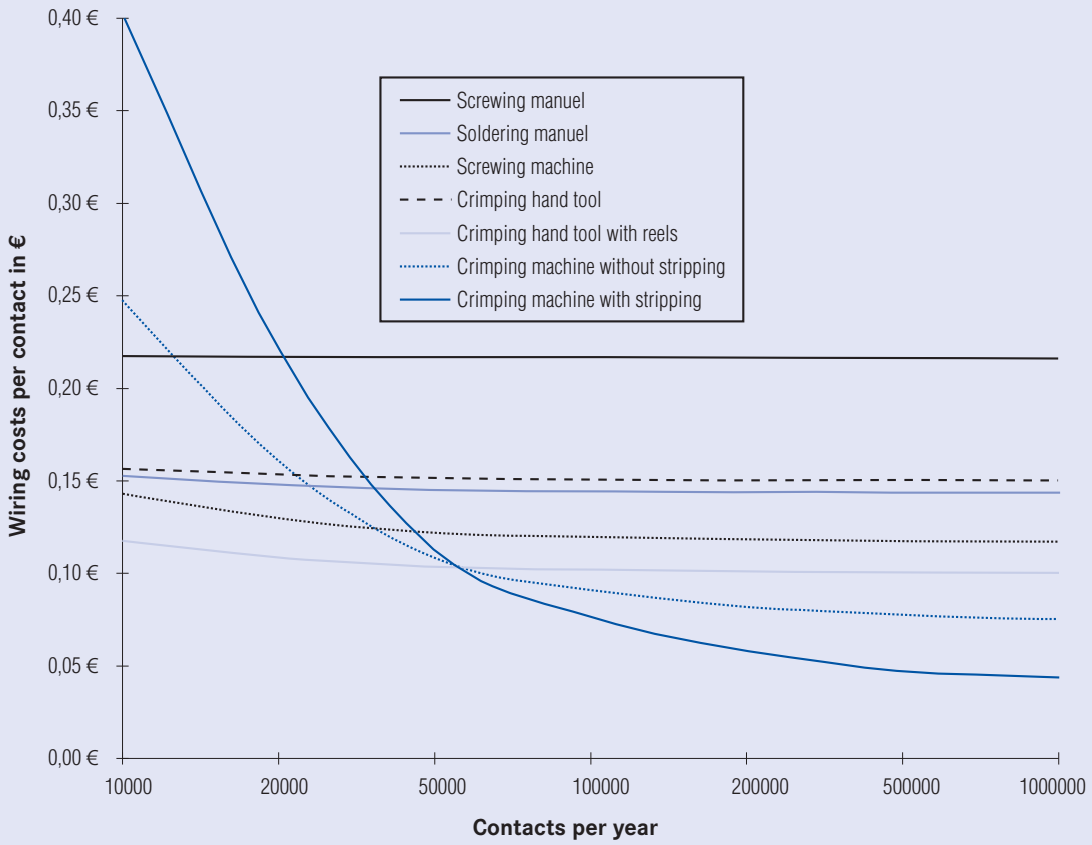
Insertion or withdrawal force	Material group
The force required to fully insert or withdraw a set of mated connectors without the effect of coupling, locking or similar devices. The insertion force is usually greater than the withdrawal force.	Classification of insulation materials according to their CTI values (CTI = Comperative Tracking Index)
Insulation grip	**Overvoltage category**
The area of a crimp contact that has been reshaped around the insulation of the conductor by compression during the crimping operation.	A numeral defining a transient overvoltage condition. Overvoltage categories I, II, III and IV are used.
Insulation resistance	**Connector with braking capacity (CBC)**
The resistance of the insulation between two conductive elements, in particular, the resistance between two contacts or between a contact and a metallic housing or shield. Tested according to test 3a of IEC 60512-2 / DIN IEC 60512 Part 2.	A component which may be engaged or disengaged in normal use, when live or under load. Note: In the sense of this document the term - live- is used if contacts are under voltage not necessarily with a current flowing across the contacts. The term - load - is used if a current is flowing across the contacts.
Intermateable	**Rated current**
Two connectors are intermateable when they are capable of being connected electrically and mechanically but without regard to their performance and intermountability.	A current value assigned by the manufacturer which the connector or PSD can carry continuously (without interruption) and simultaneously through all its contacts wired with the largest conductor preferrably at an ambient temperature of 40 °C without the upper temperature being exceeded.
Locator	**Shield, shielding**
In a crimping tool the device used for positioning a crimp contact or terminal end.	Shielding of internal or external electric fields by means of a plane with a uniform electric potential, formed by metal shells or metallic layers on the inside or outside of plastic shells. The shield is normally connected to the shielding braid of the cable and/or chassis ground.
Locking lever	**Terminal block**
A mechanical locking device operated by actuating a lever, designed to hold two mated connectors together. Typically the lever can only be fully locked if the two connectors are correctly mated.	An assembly of terminals in a housing or body of insulating material to facilitate interconnection between multiple conductors. Also called terminal strip or barrier blocks if the terminals are separated by an insulation barrier.
Mating cycle	**Wire range**
One mating cycle comprises one insertion and one withdrawal operation. Term used in the definition of connector life.	The range of wire cross sections which is compatible with the dimensions the terminals of the contact (wire barrel). The wire range is expressed in mm2 or in AWG numbers.

Stamped crimp contacts series C146, stripping length						
Termination crimp [mm2]	Wire gauge		Insulation diameter of the wire [mm]	Min. stripping length [mm]	Contact Part Number	Series
	mm²	AWG				
0.09 - 0.25	0.09 - 0.25	28 - 24	0.7 - 1.6	2.3 + 0.4	N01 010 0130 (2) N02 010 0130 (2)	heavy | mate® M heavy | mate® M
0.14 - 0.5	0.14 0.25 0.5	26 24-22 20	1.0 - 2.0	3.0 + 0.5	N01 016 0003 N02 016 0003	heavy | mate® D/M heavy | mate® D/M
0.25 - 0.5	0.25 0.5	24-22 20	1.6 - 2.0	2.3 + 0.4	N01 010 0131 (2) N02 010 0131 (2)	heavy | mate® M heavy | mate® M
0.5 - 1.5	0.5 0.75 1.0 1.5	20 20 - 18 18 - 16 16 - 15	1.8 - 2.8	3.5 + 1.0	N01 016 0002 N02 016 0002 N01 016 0015 N02 016 0015 N01 025 0001 N02 025 0001 N01 025 0007	heavy | mate® D/M heavy | mate® D/M heavy | mate® D heavy | mate® D heavy | mate® E/M heavy | mate® E/M/S heavy | mate® S
1.5 - 2.5	1.5 2.5	16 - 15 14	2.5 - 3.5	3.5 + 1.0	N01 016 0005 N02 016 0005 N01 016 0016 N02 016 0016 N01 025 0010 N02 025 0010 N01 025 0008	heavy | mate® D/M heavy | mate® D/M heavy | mate® D heavy | mate® D heavy | mate® E/M heavy | mate® E/M/S heavy | mate® S
2.5 - 4.0	2.5 4.0	14 12	3.3 - 4.2	3.5 + 1.0	N01 025 0043 N02 025 0043	heavy | mate® M heavy | mate® M

Turned crimp contacts series heavy|mate®, stripping length						
Termination crimp [mm2]	Min. stripping length + Tolerance[mm]	Contact Part Number	Series	Min. stripping length + Tolerance[mm]	Contact Part Number	Series
	1,6 (Contact without clip)			2,5 (Contact with clip)		
0.14 - 0.37	8 + 1	N01 016 0024 N02 016 0024	heavy|mate® D/DD/M			heavy|mate® M
0.5	8 + 1	N01 016 0025 N02 016 0025	heavy|mate® D/DD/M	7 + 1	N01 025 0029 N02 025 0029	heavy|mate® M
0.75 - 1.0	8 + 1	N01 016 0026 N02 016 0026	heavy|mate® D/DD/M	7 + 1	N01 025 0030 N02 025 0030	heavy|mate® M
1.5	8 + 1	N01 016 0027 N02 016 0027	heavy|mate® D/DD/M	7 + 1	N01 025 0031 N02 025 0031	heavy|mate® M
2.5	6 + 1	N01 016 0028 N02 016 0028	heavy|mate® D/DD/M	7 + 1	N01 025 0032 N02 025 0032	heavy|mate® M
4.0				7 + 1	N01 025 0033 N02 025 0033	heavy|mate® M
	2,5 (Contact without clip)			3,6 (Contact with clip)		
0.5	7 + 1	N01 025 0035 N02 025 0035	heavy|mate® E/EE			
0.75 - 1.0	7 + 1	N01 025 0036 N02 025 0036	heavy|mate® E/EE			
1.5	7 + 1	N01 025 0037 N02 025 0037	heavy|mate® E/EE	10 + 1	N01 036 0004 N02 036 0004	heavy|mate® M
2.5	7 + 1	N01 025 0038 N02 025 0038	heavy|mate® E/EE	10 + 1	N01 036 0005 N02 036 0005	heavy|mate® M
4.0	7 + 1	N01 025 0039 N02 025 0039	heavy|mate® E/EE	10 + 1	N01 036 0001 N02 036 0001	heavy|mate® M
6.0				10 + 1	N01 036 0002 N02 036 0002	heavy|mate® M
10.0				10 + 1	N01 036 0003 N02 036 0003	heavy|mate® M

Time saving through the introduction of stamped contacts

Wiring costs of different contacts



Break Even at about 60.000 contacts per year

General conditions	
Maturity (Depreciation)	5 years
Interest	8 %
Maintenance	5 %
Hourly wages	20 €

Non binding declarations are based on experienced values.

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