

# fischer elektronik

to cool to protect to connect



**f.news.e 4.1**

Heatsinks Thermally conductive material Cases Connectors



ISO 9001  
ISO 14001  
ISO 27001



Standard extruded heatsinks

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<b>art. no.</b>		
<b>SK 652 ...</b>		

please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 25 37.5 50 75 100 150 1000 mm

<b>art. no.</b>		
<b>SK 653 ...</b>		

please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 25 37.5 50 75 100 150 1000 mm

<b>art. no.</b>		
<b>SK 654 ...</b>		

please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 37.5 50 100 150 1000 mm

<b>art. no.</b>		
<b>SK 657 ...</b>		

please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 37.5 50 75 100 1000 mm



Standard extruded heatsinks

**art. no.**

**SK 655 ...**

please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 37.5 50 75 100 150 1000 mm

**art. no.**

**SK 656 ...**

please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 100 150 200 1000 mm

**art. no.**

**SK 651 ...**

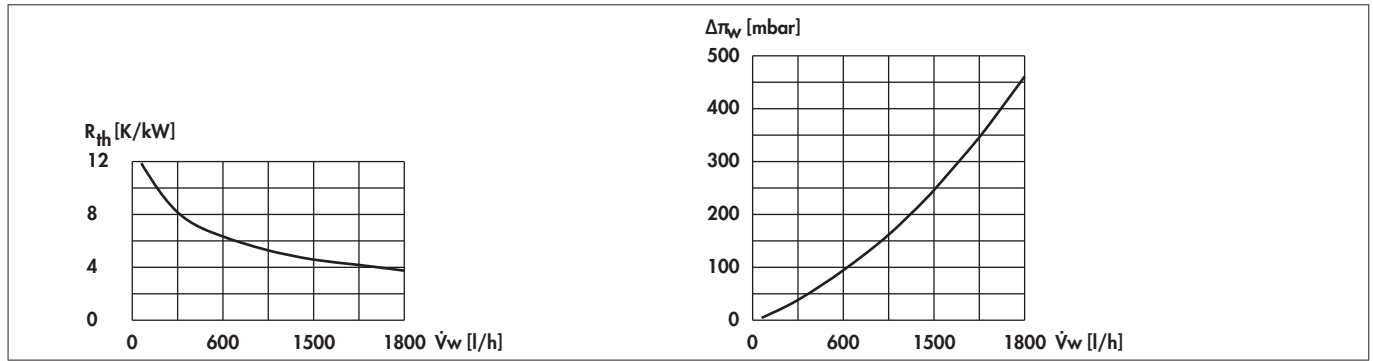
please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 75 100 150 200 1000 mm

**art. no.**

**SK 650 ...**

please indicate: ...  $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$   
 150 200 300 400 1000 mm


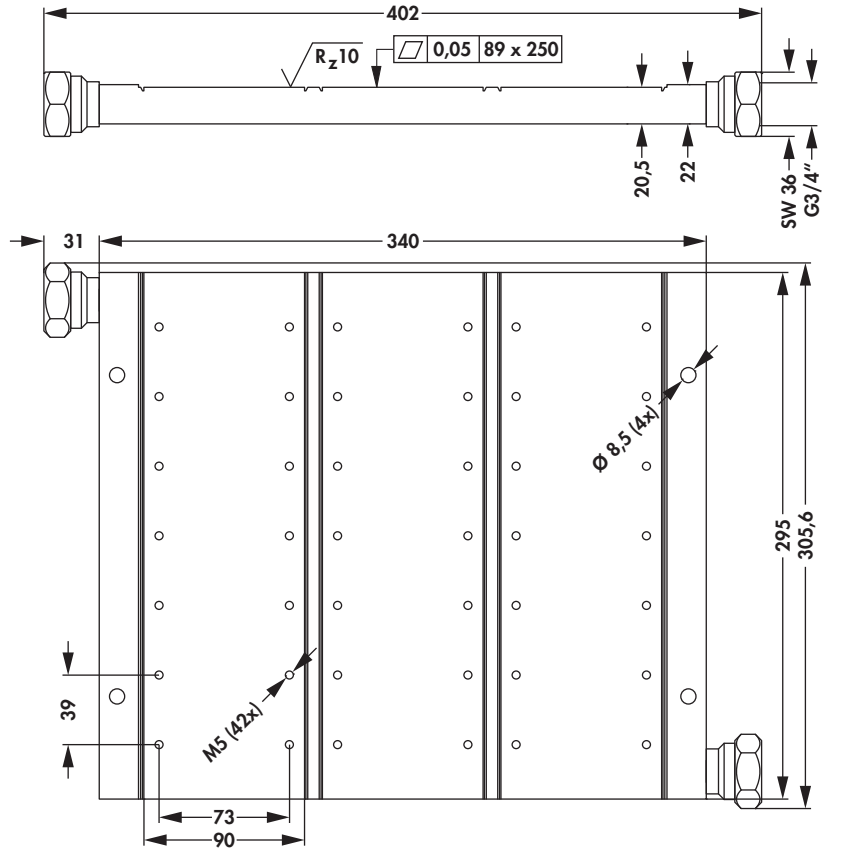
## Fluid coolers for power modules



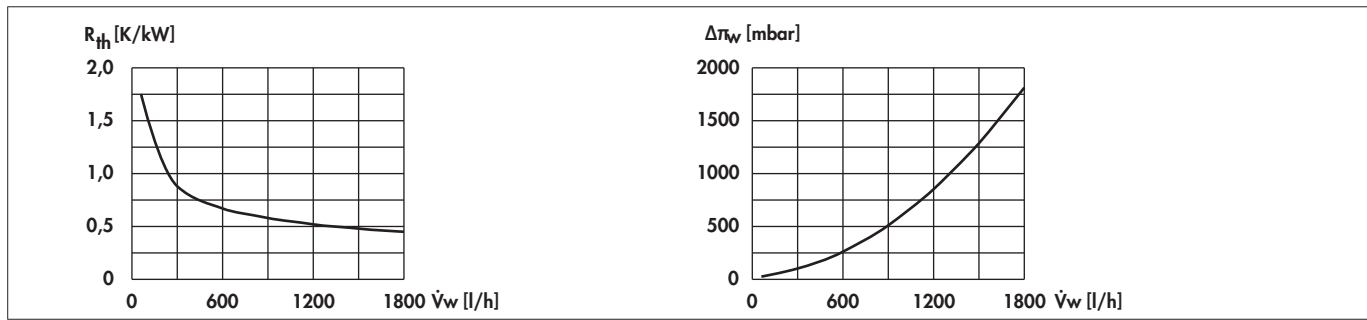
– Water glycol mixture (60/40); inlet temperature approx. 26°C

Fluid coolers of special design for high-power converters PrimePack™3+ module (IGBT 5); **for heat dissipation of maximum 3 modules on one liquid cooler**; suitable for water pH 6,5-8,5 with corrosion protection as well as other fluids (i.e. oils, alcohols, etc.); **particularly good heat transfer to the fluid by means of inner lamellae structure**; operating excess pressure up to 2 bars possible; **thick mounting plate for optimal heat distribution**; mounting of the modules will be done by already installed M5 threads; **three holes for mounting of the fluid coolers**; precisely milled flat semiconductor mounting surface with very good flatness and low roughness depth; **line connection for water inlet and outlet by means of a G 3/4" thread**; special designs and modifications for a specific assembly situation according to customerspecific specifications.

To avoid corrosion in the water cooler the cooling fluid has to flow in a closed circuit and it has to contain 40-60 % (preferred is 50 %) anti-corrosive fluids for aluminium, if necessary with anti-freeze. For the choice and approval of the cooling fluid as well as for the possible consequences in the cooling circuit the user is the only liable person. Therefore we exclude any liability for damages caused by the choice or approval of the cooling fluids.

<p><b>art. no.</b></p> 	 <p>Technical drawing showing dimensions and specifications for the FLKI 295 fluid cooler. Key dimensions include: total length 402, mounting hole offset 31, total width 340, inlet/outlet offset 39, inlet/outlet diameter 20.5, inlet/outlet thread G3/4", mounting hole diameter 8.5 (4x), mounting hole offset 73 and 90, and total height 295 and 305.6. Surface roughness is specified as <math>R_z 10</math> and <math>0,05</math> (89 x 250).</p>
<p><b>FLKI 295</b></p>	<p><b>material:</b> EN AW 6060 (AlMgSi 0.5)</p>

## Fluid coolers for power modules


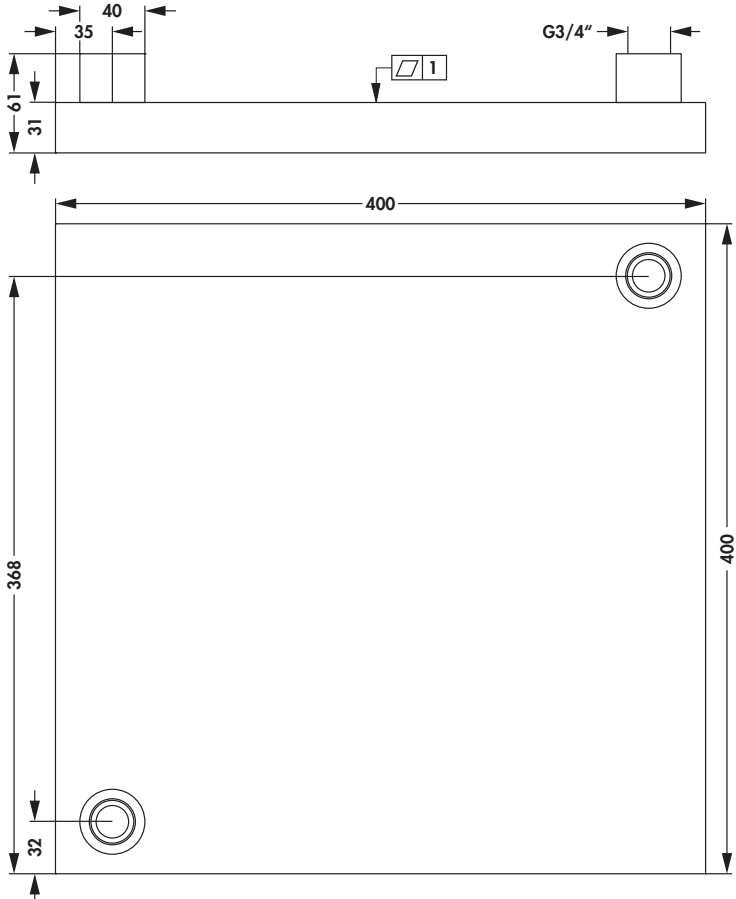


– Water glycol mixture (60/40); inlet temperature approx. 26°C

Fluid cooler for dissipating large quantities of heat with low space requirement; **effective system to cool power modules**; suitable for water pH 6,5-8,5 with anticorrosives, as well as other fluids (eg. oils, alcohols, etc.); **compact design with internal fin structure for particularly good heat transfer to the fluid**; minimised flow pressure losses; **operating excess pressure up to 2 bar possible**; thick base plate for optimum heat distribution and to secure the heat-emitting elements; **mounting flange for the cooler according to customer's instructions**; precisely face milled surface of the component mounting area with very good flatness and low roughness depth; **for power modules such as IGBT-modules, thyristor-modules, SCR diode modules, bridge amplifier and others**; **dimensional modification at specified installation conditions**; connections via thread G3/4" or mounting flange according to customer's specifications; **drilling depth into the base panel maximum 17 mm.**

To avoid corrosion in the water cooler the cooling fluid has to flow in a closed circuit and it has to contain 40-60 % (preferred is 50 %) anti-corrosive fluids for aluminium, if necessary with anti-freeze. For the choice and approval of the cooling fluid as well as for the possible consequences in the cooling circuit the user is the only liable person. Therefore we exclude any liability for damages caused by the choice or approval of the cooling fluids.

– Dimensioning and realisation in connection with customer's specifications

<b>art. no.</b>		
<b>FLKI 400 G 400</b>		
<b>material:</b>		EN AW 6060 (AlMgSi 0.5)

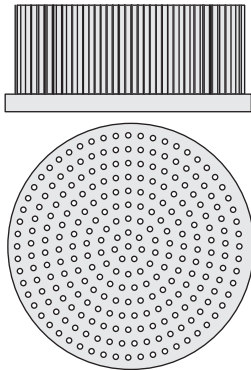
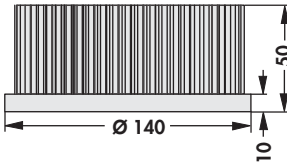
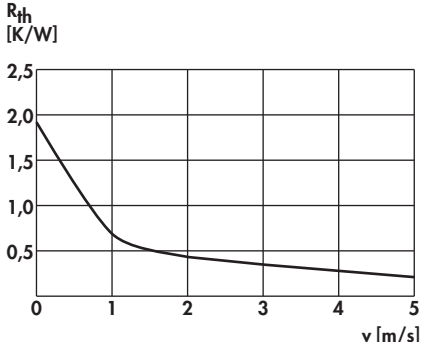
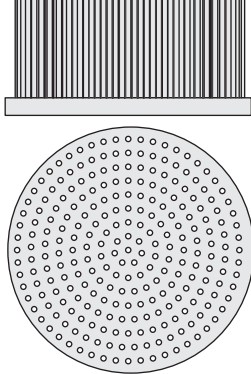

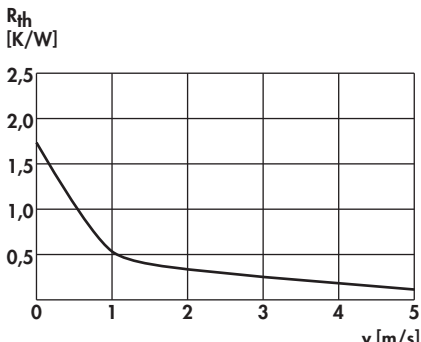
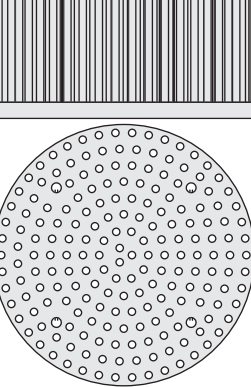

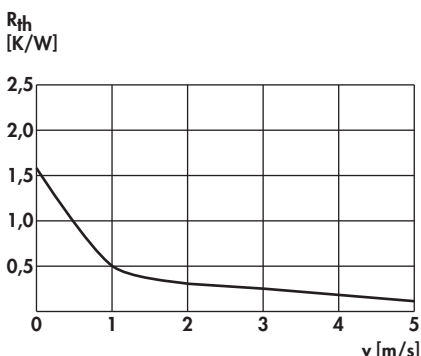
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## Pin heatsinks

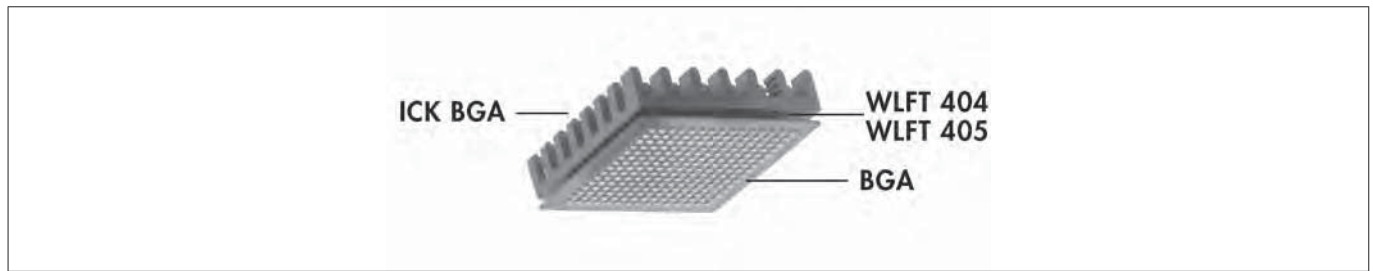
<p><b>art. no.</b></p> <p><b>ICK S 40 x 40 x 7,5</b> WLF ... 40 x 40 weight: 18g</p>		
<p><b>art. no.</b></p> <p><b>ICK S R 100 x 50</b> WLF ... D 100 weight: 320g</p>		
<p><b>art. no.</b></p> <p><b>ICK S R 100 x 70</b> WLF ... D 100 weight: 381.5g</p>		
<p><b>art. no.</b></p> <p><b>ICK S R 120 x 50</b> WLF ... D 120 weight: 455.8g</p>		
<p><b>art. no.</b></p> <p><b>ICK S R 120 x 70</b> WLF ... D 120 weight: 530.9g</p>		



Pin heatsinks

<p><b>art. no.</b></p> <p><b>ICK S R 140 x 50</b> WLF ... D 140 weight: 608.8g</p>			
<p><b>art. no.</b></p> <p><b>ICK S R 140 x 70</b> WLF ... D 140 weight: 705.3g</p>			
<p><b>art. no.</b></p> <p><b>ICK S R 160 x 70</b> WLF ... D 160 weight: 1,055g</p>			

## Heatsinks for BGAs



- particularly suited for **B**all **G**rid **A**rrays
- heatsink dimensions match the respective BGA-type
- can be glued directly on the BGA component
- double-sided adhesive thermal conductive foil **WLF ...**
- **surface:** black anodised

<p><b>art. no.</b></p> <p><b>ICK BGA 21 x 21 x 10</b> WLF ... 21 x 21</p>			
<p><b>art. no.</b></p> <p><b>ICK BGA 21 x 21 x 14</b> WLF ... 21 x 21</p>			

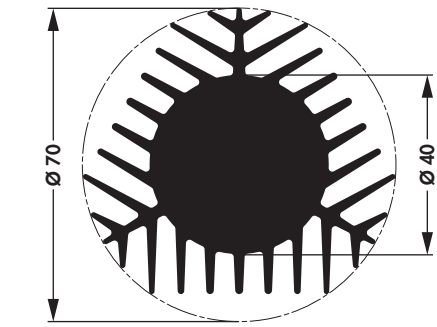
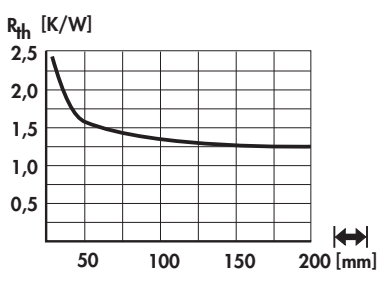
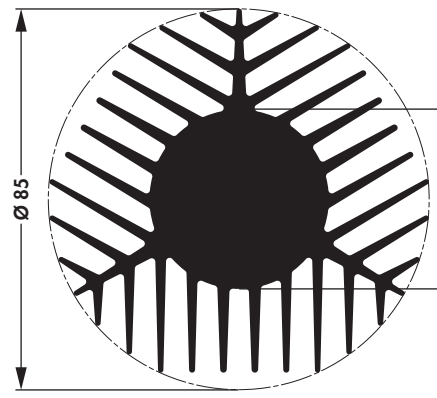
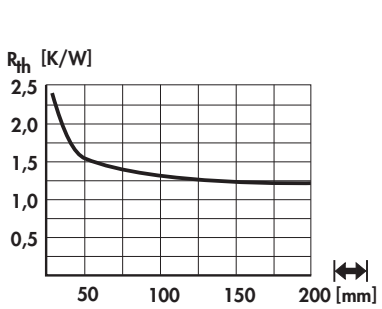
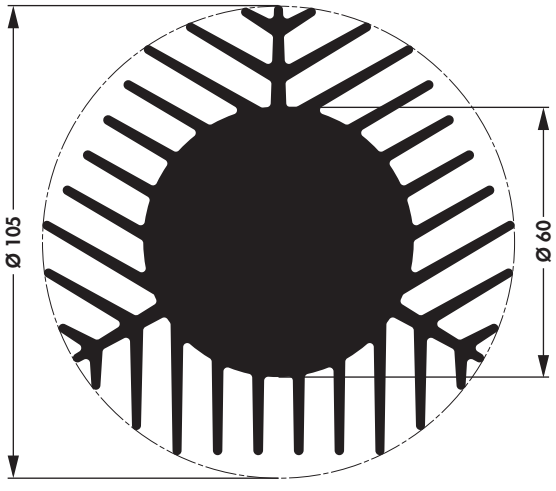
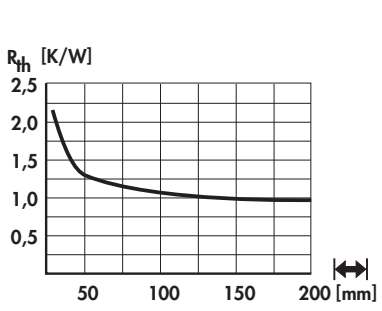
## Heatsinks for LEDs

- adapter plate suitable for LED modules:  
Bridgelux Vero, Citizen CitiLED, Cree XLamp, Edison Edilex, GE Infusion, Luga Shop und Industrial, Lustrous Lustron, Megaman Te-co, Osram PrevaLED und Soleriq, Philips Fortimo und Luxeon, Prolight Opto, Sharp Mega Zenigata, Toshiba E-Core, Tridonic Stark, Vexica Lumaera, Vossloh Schwabe

<p><b>art. no.</b></p> <p><b>AD LED 53</b></p>		
<p><b>surface:</b></p>		<p>black anodised</p>




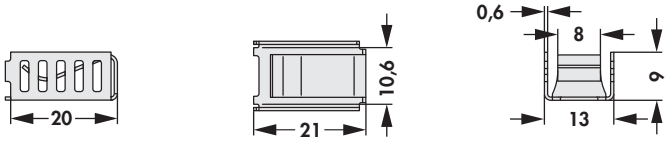

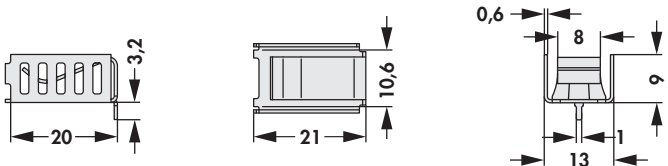

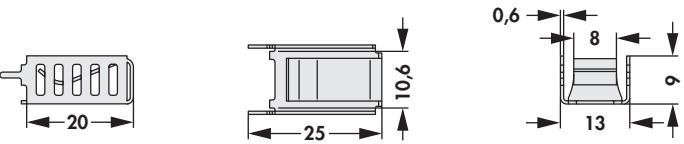

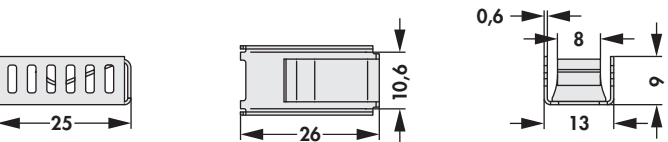

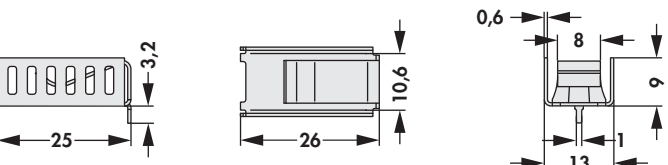

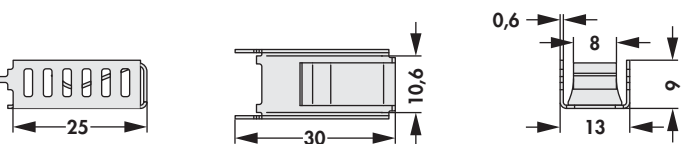
Heatsinks for LEDs

<p>art. no.</p> <p><b>SK 658 ...</b></p>		
<p>art. no.</p> <p><b>SK 659 ...</b></p>		
<p>please indicate: ... <math>\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]</math>                  10 15 20 25 37.5 50 1000 mm</p>		
<p>surface: black anodised</p>		
<p>art. no.</p> <p><b>SK 660 ...</b></p>		
<p>please indicate: ... <math>\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]</math>                  10 15 20 25 37.5 50 75 100 150 1000 mm</p>		
<p>surface: black anodised</p>		


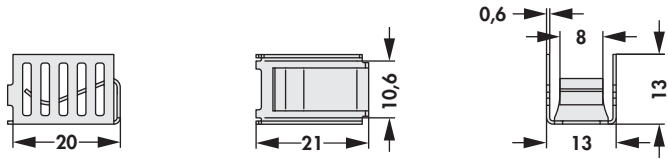

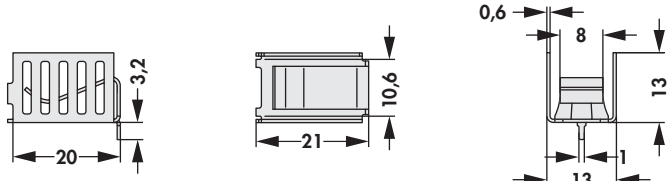

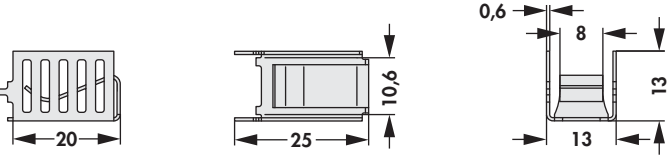

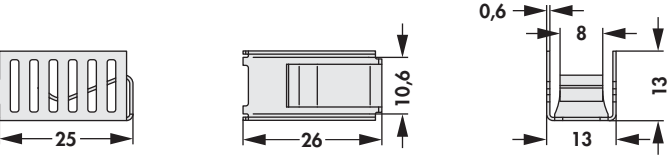

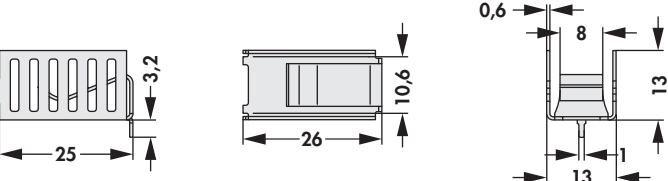

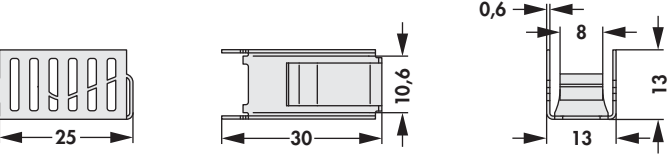
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## Attachable heatsink


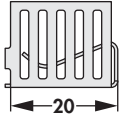
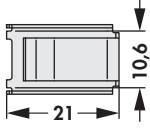
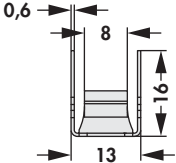

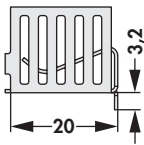
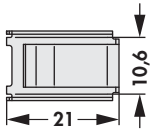
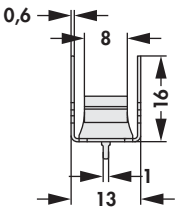

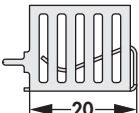
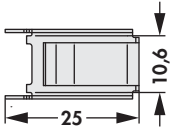
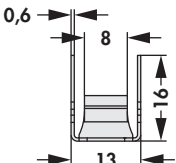

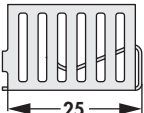
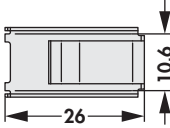
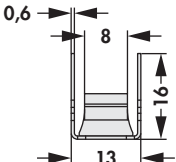

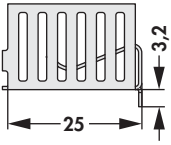
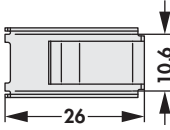
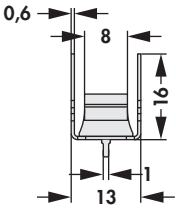

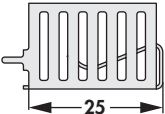
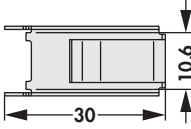
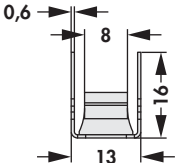
- universal clip-on heatsinks for design TO 220 and similar
- integrated clamp geometry for a secure fixing of the device
- angled designs with enlarged surface
- modifications and special designs according to customer's specifications

<b>art. no.</b>       <b>FK 259 MI 220 O</b>		<b>24,4 K/W</b>  
<b>art. no.</b>       <b>FK 259 MI 220 H</b>		<b>24,7 K/W</b>  
<b>art. no.</b>       <b>FK 259 MI 220 V</b>		<b>23,9 K/W</b>  
<b>art. no.</b>       <b>FK 260 MI 220 O</b>		<b>24,1 K/W</b>  
<b>art. no.</b>       <b>FK 260 MI 220 H</b>		<b>24,4 K/W</b>  
<b>art. no.</b>       <b>FK 260 MI 220 V</b>		<b>23,6 K/W</b>  
<b>material:</b>		copper (Cu)
<b>surface:</b>		solderable surface
<b>material thickness:</b>		0.6 mm


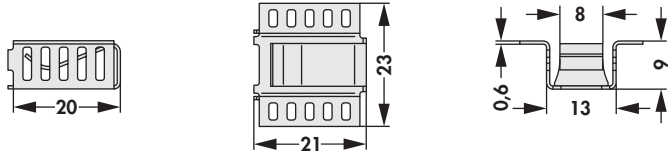

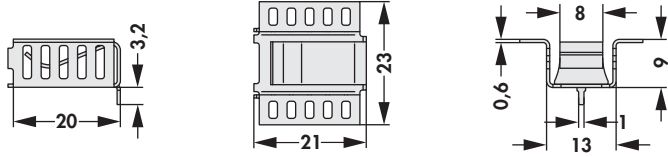

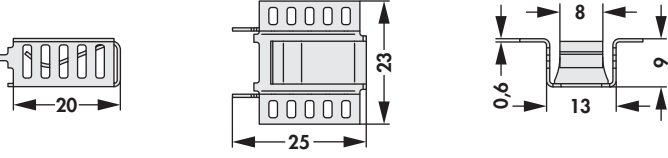

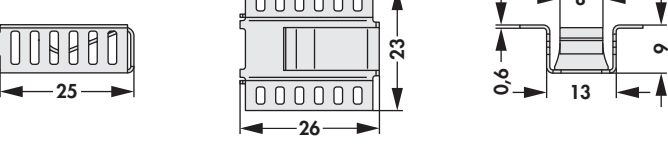

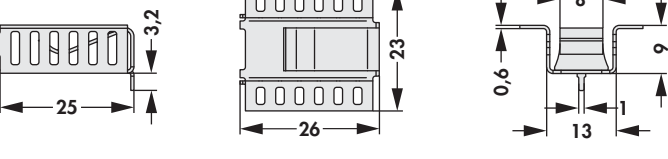

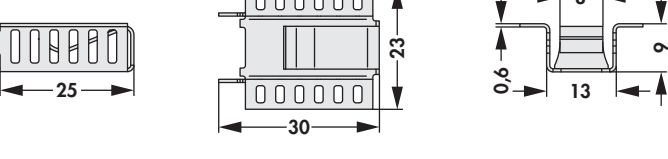
**Attachable heatsink**

<b>art. no.</b>  <b>FK 261 MI 220 O</b>		<b>23,8 K/W</b>  	
<b>art. no.</b>  <b>FK 261 MI 220 H</b>		<b>24,1 K/W</b>  	
<b>art. no.</b>  <b>FK 261 MI 220 V</b>		<b>23,3 K/W</b>  	
<b>art. no.</b>  <b>FK 262 MI 220 O</b>		<b>23,5 K/W</b>  	
<b>art. no.</b>  <b>FK 262 MI 220 H</b>		<b>23,8 K/W</b>  	
<b>art. no.</b>  <b>FK 262 MI 220 V</b>		<b>23 K/W</b>  	
<b>material:</b>		copper (Cu)	
<b>surface:</b>		solderable surface	
<b>material thickness:</b>		0.6 mm	


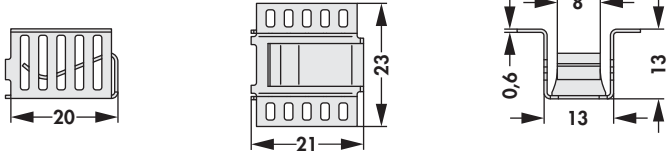

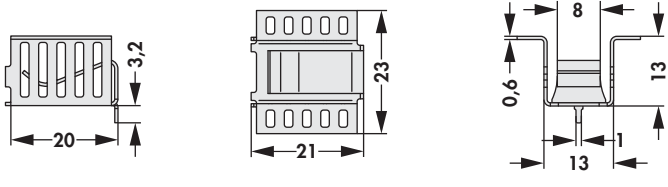

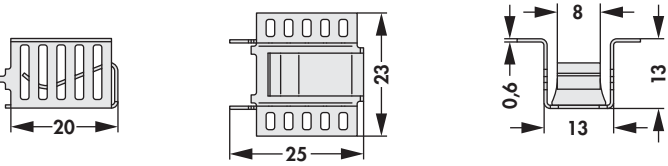

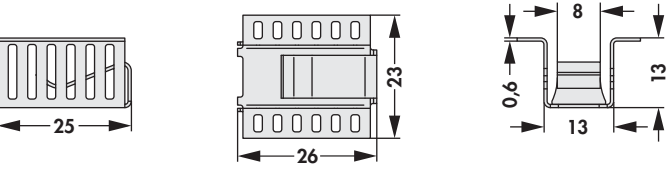

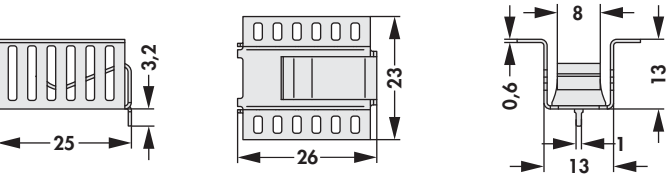

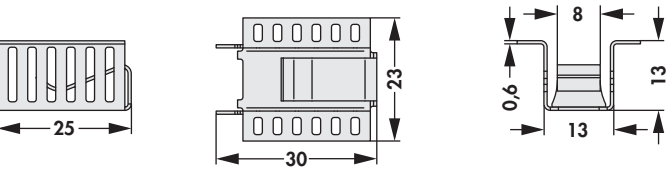
Attachable heatsink

<p>art. no.</p> <p><b>FK 263 MI 220 O</b></p>		<p>23,2 K/W</p>   
<p>art. no.</p> <p><b>FK 263 MI 220 H</b></p>		<p>23,5 K/W</p>   
<p>art. no.</p> <p><b>FK 263 MI 220 V</b></p>		<p>22,7 K/W</p>   
<p>art. no.</p> <p><b>FK 264 MI 220 O</b></p>		<p>22,9 K/W</p>   
<p>art. no.</p> <p><b>FK 264 MI 220 H</b></p>		<p>23,2 K/W</p>   
<p>art. no.</p> <p><b>FK 264 MI 220 V</b></p>		<p>22,4 K/W</p>   
<p><b>material:</b></p>		<p>copper (Cu)</p>
<p><b>surface:</b></p>		<p>solderable surface</p>
<p><b>material thickness:</b></p>		<p>0.6 mm</p>

Attachable heatsink


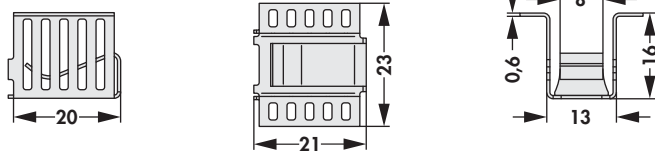

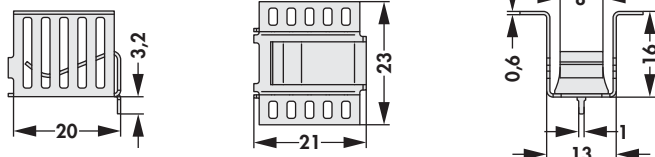

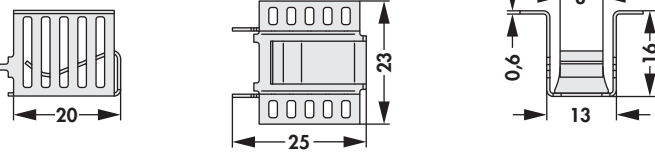

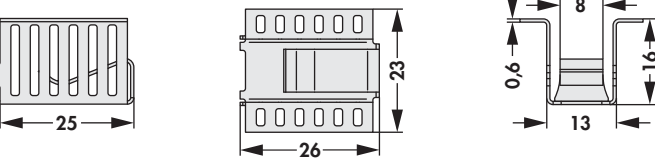

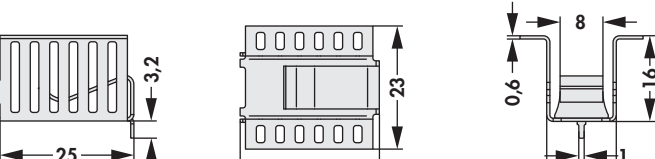

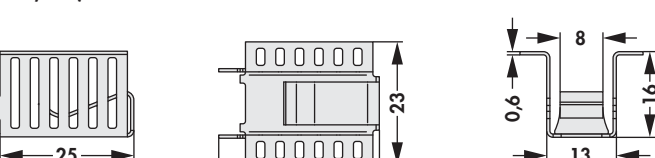
<p>art. no.</p> <p><b>FK 265 MI 220 O</b></p>		<p>22,5 K/W</p> 
<p>art. no.</p> <p><b>FK 265 MI 220 H</b></p>		<p>22,8 K/W</p> 
<p>art. no.</p> <p><b>FK 265 MI 220 V</b></p>		<p>22 K/W</p> 
<p>art. no.</p> <p><b>FK 266 MI 220 O</b></p>		<p>22,2 K/W</p> 
<p>art. no.</p> <p><b>FK 266 MI 220 H</b></p>		<p>22,5 K/W</p> 
<p>art. no.</p> <p><b>FK 266 MI 220 V</b></p>		<p>21,7 K/W</p> 
<p><b>material:</b></p>		<p>copper (Cu)</p>
<p><b>surface:</b></p>		<p>solderable surface</p>
<p><b>material thickness:</b></p>		<p>0.6 mm</p>

Attachable heatsink

<p>art. no.</p> <p><b>FK 267 MI 220 O</b></p>		<p>21,9 K/W</p> 
<p>art. no.</p> <p><b>FK 267 MI 220 H</b></p>		<p>22,2 K/W</p> 
<p>art. no.</p> <p><b>FK 267 MI 220 V</b></p>		<p>21,4 K/W</p> 
<p>art. no.</p> <p><b>FK 268 MI 220 O</b></p>		<p>21,6 K/W</p> 
<p>art. no.</p> <p><b>FK 268 MI 220 H</b></p>		<p>21,9 K/W</p> 
<p>art. no.</p> <p><b>FK 268 MI 220 V</b></p>		<p>21,1 K/W</p> 
<p><b>material:</b></p>		<p>copper (Cu)</p>
<p><b>surface:</b></p>		<p>solderable surface</p>
<p><b>material thickness:</b></p>		<p>0.6 mm</p>


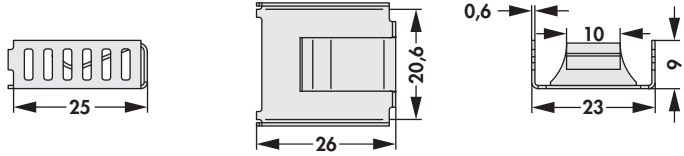

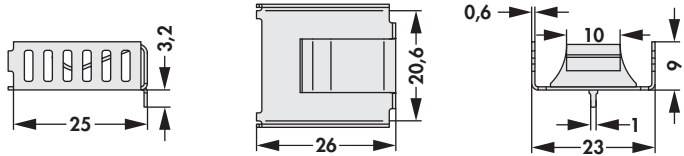

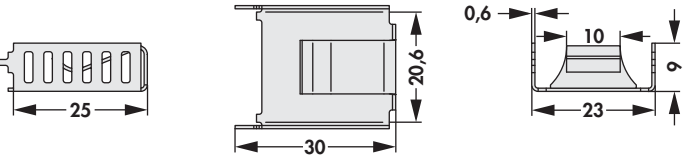

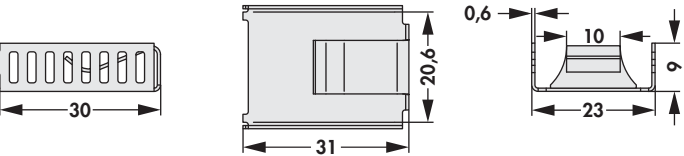

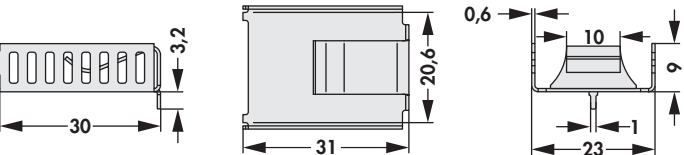

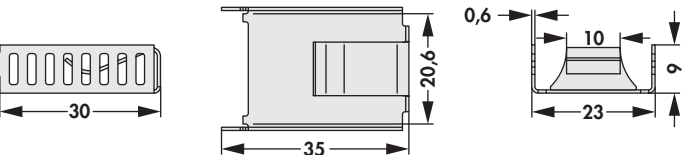


Attachable heatsink


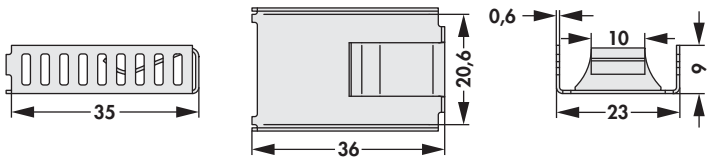

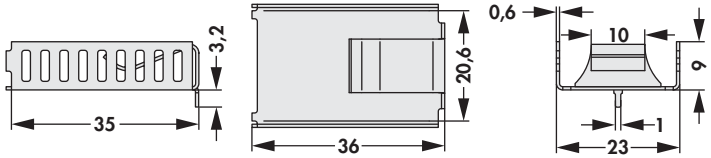

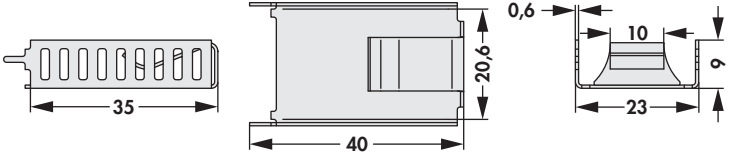

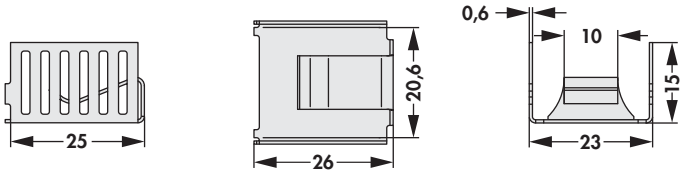

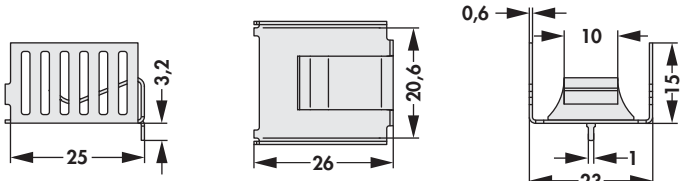

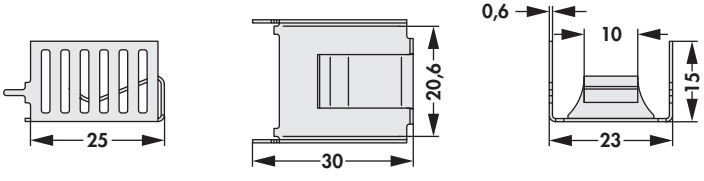
<p>art. no.</p> <p><b>FK 269 MI 220 O</b></p>		<p>21,2 K/W</p> 
<p>art. no.</p> <p><b>FK 269 MI 220 H</b></p>		<p>21,5 K/W</p> 
<p>art. no.</p> <p><b>FK 269 MI 220 V</b></p>		<p>20,7 K/W</p> 
<p>art. no.</p> <p><b>FK 270 MI 220 O</b></p>		<p>20,9 K/W</p> 
<p>art. no.</p> <p><b>FK 270 MI 220 H</b></p>		<p>21,2 K/W</p> 
<p>art. no.</p> <p><b>FK 270 MI 220 V</b></p>		<p>20,4 K/W</p> 
<p><b>material:</b></p>		<p>copper (Cu)</p>
<p><b>surface:</b></p>		<p>solderable surface</p>
<p><b>material thickness:</b></p>		<p>0.6 mm</p>

## Attachable heatsink


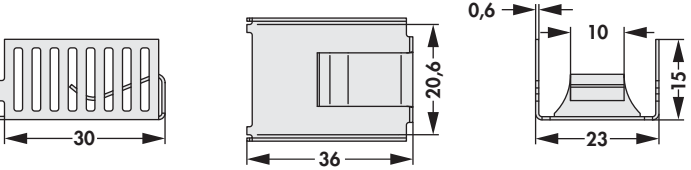

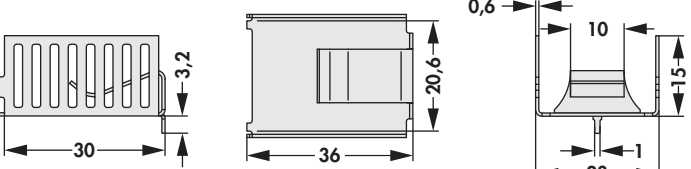

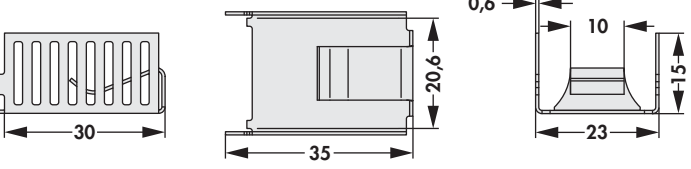

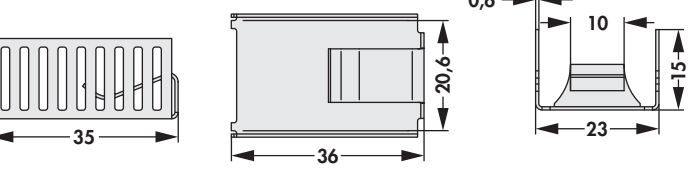

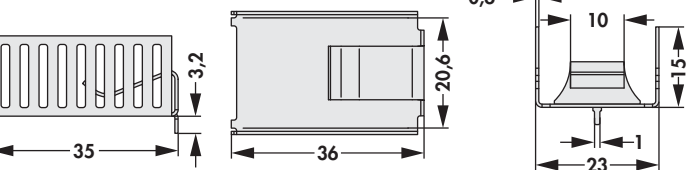

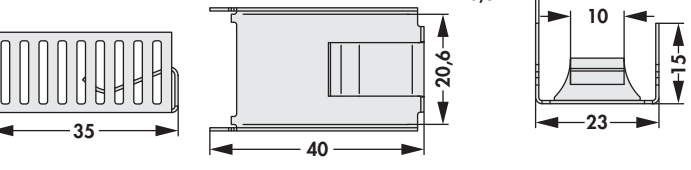
- universal clip-on heatsinks for design TO 218, TO 247, TO 248, SIP-Multiwatt and similar
- integrated clamp geometry for a secure fixing of the device
- angled designs with enlarged surface
- modifications and special designs according to customer's specifications

<b>art. no.</b>      <b>FK 271 MI 247 O</b>		<b>19,9 K/W</b>  
<b>art. no.</b>      <b>FK 271 MI 247 H</b>		<b>20,2 K/W</b>  
<b>art. no.</b>      <b>FK 271 MI 247 V</b>		<b>19,4 K/W</b>  
<b>art. no.</b>      <b>FK 272 MI 247 O</b>		<b>19,6 K/W</b>  
<b>art. no.</b>      <b>FK 272 MI 247 H</b>		<b>19,9 K/W</b>  
<b>art. no.</b>      <b>FK 272 MI 247 V</b>		<b>19,1 K/W</b>  
<b>material:</b>		copper (Cu)
<b>surface:</b>		solderable surface
<b>material thickness:</b>		0.6 mm


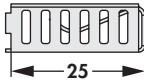
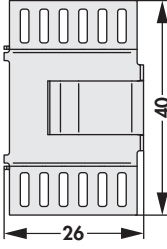
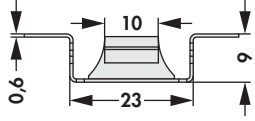

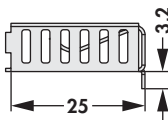
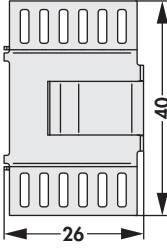
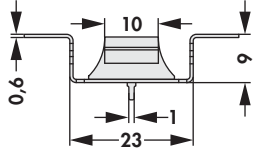

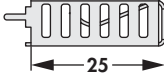
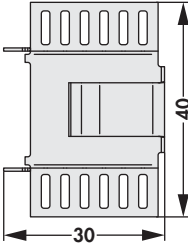
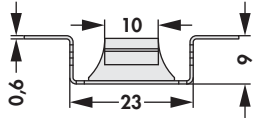

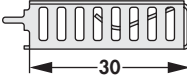
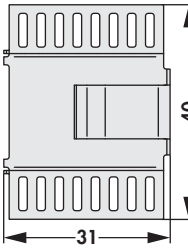
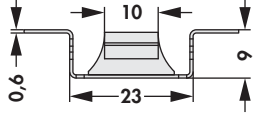

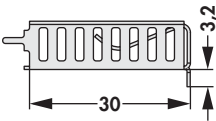
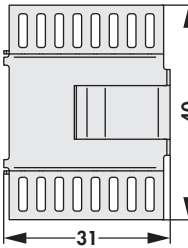
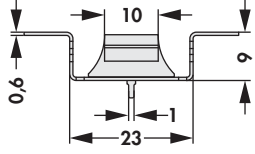

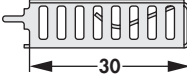
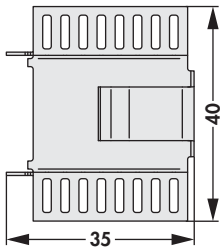
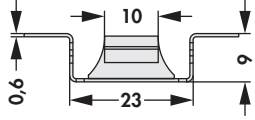
**Attachable heatsink**

<p><b>art. no.</b></p> <p><b>FK 273 MI 247 O</b></p>		<p><b>19,3 K/W</b></p> 
<p><b>art. no.</b></p> <p><b>FK 273 MI 247 H</b></p>		<p><b>19,6 K/W</b></p> 
<p><b>art. no.</b></p> <p><b>FK 273 MI 247 V</b></p>		<p><b>18,8 K/W</b></p> 
<p><b>art. no.</b></p> <p><b>FK 274 MI 247 O</b></p>		<p><b>19,2 K/W</b></p> 
<p><b>art. no.</b></p> <p><b>FK 274 MI 247 H</b></p>		<p><b>19,5 K/W</b></p> 
<p><b>art. no.</b></p> <p><b>FK 274 MI 247 V</b></p>		<p><b>18,7 K/W</b></p> 
<p><b>material:</b></p>		<p>copper (Cu)</p>
<p><b>surface:</b></p>		<p>solderable surface</p>
<p><b>material thickness:</b></p>		<p>0.6 mm</p>


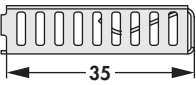
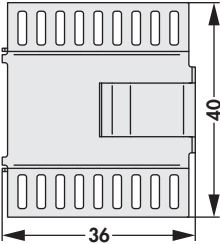
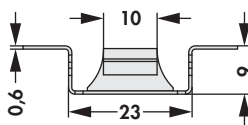

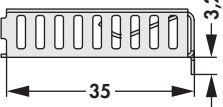
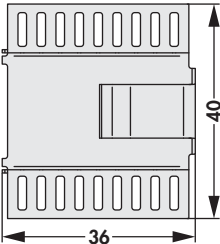
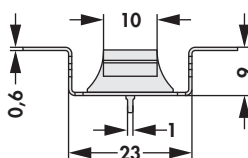

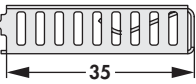
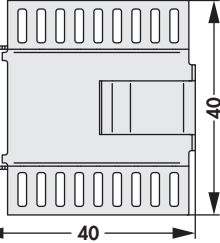
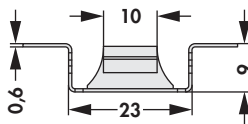

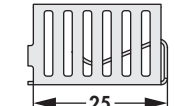
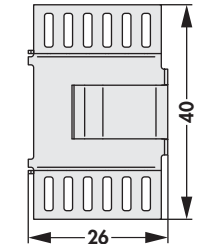
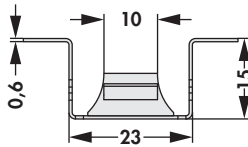

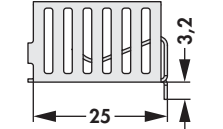
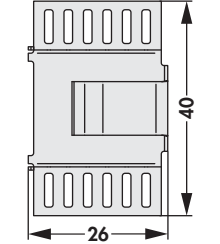
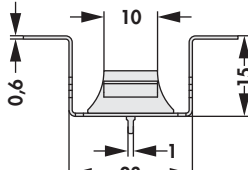

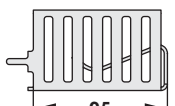
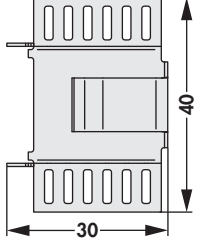
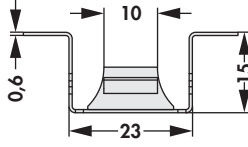
**Attachable heatsink**

<p>art. no.</p> <p><b>FK 275 MI 247 O</b></p>		<p>18,9 K/W</p> 
<p>art. no.</p> <p><b>FK 275 MI 247 H</b></p>		<p>19,2 K/W</p> 
<p>art. no.</p> <p><b>FK 275 MI 247 V</b></p>		<p>18,4 K/W</p> 
<p>art. no.</p> <p><b>FK 276 MI 247 O</b></p>		<p>18,6 K/W</p> 
<p>art. no.</p> <p><b>FK 276 MI 247 H</b></p>		<p>18,9 K/W</p> 
<p>art. no.</p> <p><b>FK 276 MI 247 V</b></p>		<p>18,1 K/W</p> 
<p><b>material:</b></p> <p><b>surface:</b></p> <p><b>material thickness:</b></p>		<p>copper (Cu)</p> <p>solderable surface</p> <p>0.6 mm</p>

Attachable heatsink


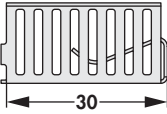
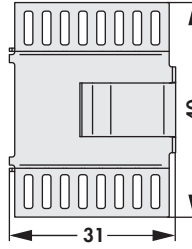
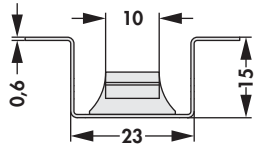

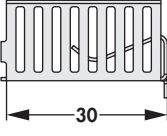
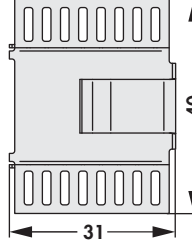
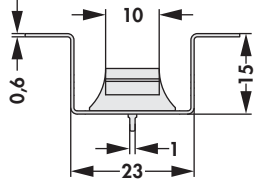

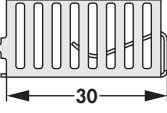
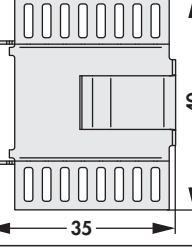
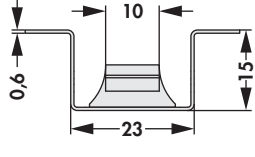

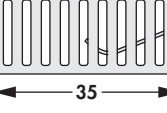
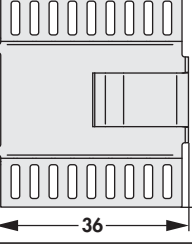
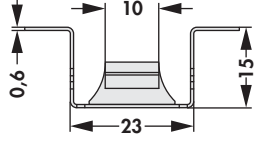

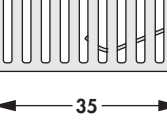
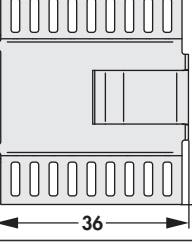
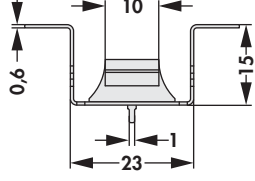

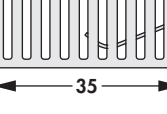
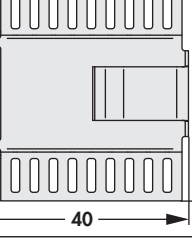
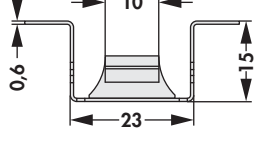
<p>art. no.</p> <p><b>FK 277 MI 247 O</b></p>		<p>18,9 K/W</p> 		
<p>art. no.</p> <p><b>FK 277 MI 247 H</b></p>		<p>19,2 K/W</p> 		
<p>art. no.</p> <p><b>FK 277 MI 247 V</b></p>		<p>18,4 K/W</p> 		
<p>art. no.</p> <p><b>FK 278 MI 247 O</b></p>		<p>18,6 K/W</p> 		
<p>art. no.</p> <p><b>FK 278 MI 247 H</b></p>		<p>18,9 K/W</p> 		
<p>art. no.</p> <p><b>FK 278 MI 247 V</b></p>		<p>18,1 K/W</p> 		
<p><b>material:</b></p>		<p>copper (Cu)</p>		
<p><b>surface:</b></p>		<p>solderable surface</p>		
<p><b>material thickness:</b></p>		<p>0.6 mm</p>		

**Attachable heatsink**

<p>art. no.</p> <p><b>FK 279 MI 247 O</b></p>		<p><b>18,3 K/W</b></p> 		
<p>art. no.</p> <p><b>FK 279 MI 247 H</b></p>		<p><b>18,6 K/W</b></p> 		
<p>art. no.</p> <p><b>FK 279 MI 247 V</b></p>		<p><b>17,8 K/W</b></p> 		
<p>art. no.</p> <p><b>FK 280 MI 247 O</b></p>		<p><b>18,2 K/W</b></p> 		
<p>art. no.</p> <p><b>FK 280 MI 247 H</b></p>		<p><b>18,5 K/W</b></p> 		
<p>art. no.</p> <p><b>FK 280 MI 247 V</b></p>		<p><b>17,7 K/W</b></p> 		
<p><b>material:</b></p>		<p>copper (Cu)</p>		
<p><b>surface:</b></p>		<p>solderable surface</p>		
<p><b>material thickness:</b></p>		<p>0.6 mm</p>		


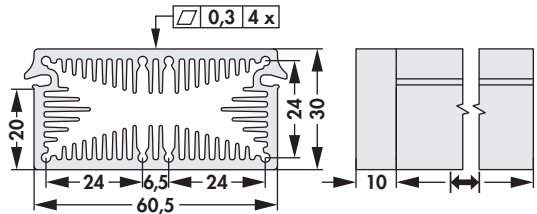
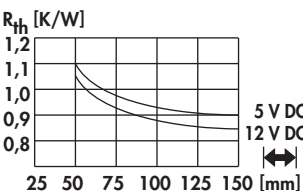


**Attachable heatsink**

<p><b>art. no.</b></p> <p><b>FK 281 MI 247 O</b></p>		<p><b>17,9 K/W</b></p> 		
<p><b>art. no.</b></p> <p><b>FK 281 MI 247 H</b></p>		<p><b>18,2 K/W</b></p> 		
<p><b>art. no.</b></p> <p><b>FK 281 MI 247 V</b></p>		<p><b>17,4 K/W</b></p> 		
<p><b>art. no.</b></p> <p><b>FK 282 MI 247 O</b></p>		<p><b>17,6 K/W</b></p> 		
<p><b>art. no.</b></p> <p><b>FK 282 MI 247 H</b></p>		<p><b>17,9 K/W</b></p> 		
<p><b>art. no.</b></p> <p><b>FK 282 MI 247 V</b></p>		<p><b>17,1 K/W</b></p> 		
<p><b>material:</b></p>		<p>copper (Cu)</p>		
<p><b>surface:</b></p>		<p>solderable surface</p>		
<p><b>material thickness:</b></p>		<p>0.6 mm</p>		

## Miniature cooling aggregates

- compact design
- homogeneous heat distribution
- mounting possible on any side
- powerful axial-fan motor
- other lengths, special designs and machinings according to customer's specifications
- other surfaces, fan types and fan voltages upon request


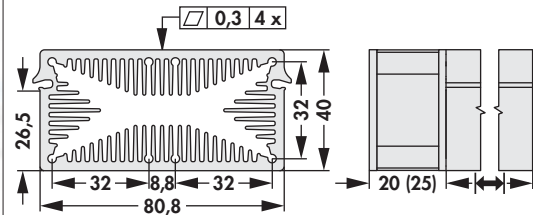
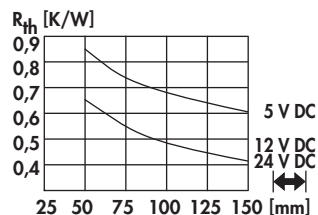
<b>art. no.</b>			
<b>LAM 3 D K ...</b>			
<b>please indicate:</b>	... $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$ <b>50 75 100 125 150 mm</b>		<b>... fan type</b> <b>5 = 5 V DC</b> <b>12 = 12 V DC</b>
<b>surface:</b>	natural colour anodised		

### Technical data of the fans

	<b>... 5</b>	<b>... 12</b>
<b>type</b>	Sepa, ball bearing	Sepa, ball bearing
<b>dimensions</b>	30x30x10 mm	30x30x10 mm
<b>tension</b>	5 V DC	12 V DC
<b>max. air volume</b>	6.8 m <sup>3</sup> /h	7.7 m <sup>3</sup> /h
<b>cur. consumpt.</b>	130 mA	60 mA
<b>temperature range</b>	-10°C... +70°C	-10°C ... +85°C
<b>noise level</b>	21 dB(A)	27 dB(A)
<b>speed</b>	8,500 min <sup>-1</sup>	9,100 min <sup>-1</sup>
<b>weight</b>	8 g	8 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 95,000 h (20°C) MTBF < 280,000 h (20°C)	L <sub>10</sub> > 100,000 h (20°C) MTBF > 400,000 h (20°C)

## Miniature cooling aggregates

- compact design
- homogeneous heat distribution
- mounting possible on any side
- powerful axial-fan motor
- other lengths, special designs and machinings according to customer's specifications
- other surfaces, fan types and fan voltages upon request


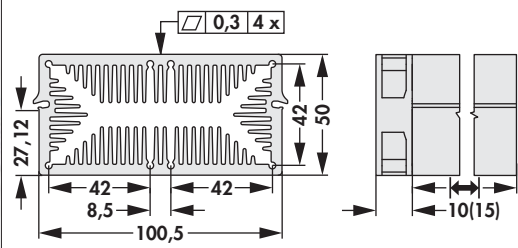
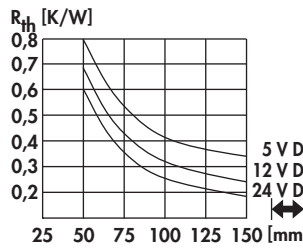
<b>art. no.</b>			
<b>LAM 4 D K ...</b>			
<b>please indicate:</b>	... $\left[ \begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$ <b>50 75 100 125 150 mm</b>		<b>... fan type</b> <b>5 = 5 V DC</b> <b>12 = 12 V DC</b> <b>24 = 24 V DC</b>
<b>surface:</b>	natural colour anodised		

### Technical data of the fans

	<b>... 5</b>	<b>... 12</b>	<b>... 24</b>
<b>type</b>	ebmpapst 405	ebmpapst 412 JHH	ebmpapst 414 JHH
<b>dimensions</b>	40x40x20 mm	40x40x25 mm	40x40x25 mm
<b>tension</b>	5 V DC	12 V DC	24 V DC
<b>power inout</b>	0.9 W	3.3 W	3.6 W
<b>max. air volume</b>	10 m <sup>3</sup> /h	24 m <sup>3</sup> /h	24 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... +60°C	-20°C... +60°C
<b>noise level</b>	18 dB(A)	46 dB(A)	46 dB(A)
<b>speed</b>	6,000 min <sup>-1</sup>	13,000 min <sup>-1</sup>	13,000 min <sup>-1</sup>
<b>weight</b>	27 g	50 g	50 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 50,000 h (40°C) L <sub>10</sub> < 20,000 h (tmax)	L <sub>10</sub> < 57,500 h (40°C) L <sub>10</sub> < 35,000 h (tmax)	L <sub>10</sub> < 57,500 h (40°C) L <sub>10</sub> < 35,000 h (tmax)

## Miniature cooling aggregates

- compact design
- homogeneous heat distribution
- mounting possible on any side
- powerful axial-fan motor
- other lengths, special designs and machinings according to customer's specifications
- other surfaces, fan types and fan voltages upon request


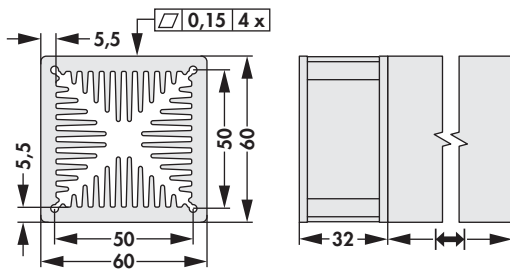
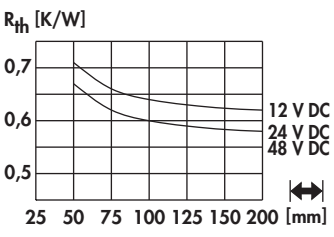

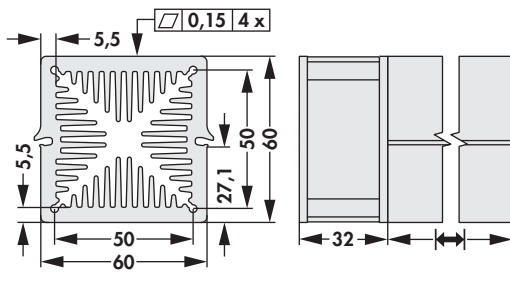
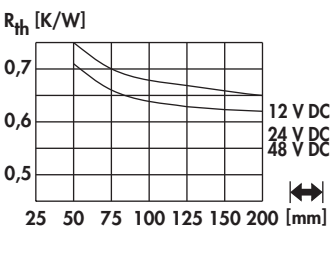
<b>art. no.</b>			
<b>LAM 5 D K ...</b>			
<b>please indicate:</b>	... $\left[ \right]$ 50 75 100 125 150 mm	<b>... fan type</b> 5 = 5 V DC 12 = 12 V DC 24 = 24 V DC	
<b>surface:</b>	natural colour anodised		

### Technical data of the fans

	... 5	... 12	... 24
<b>type</b>	Sepa, ball bearing	Sepa, ball bearing	ebmpapst
<b>dimensions</b>	50x50x10 mm	50x50x10 mm	50x50x15 mm
<b>tension</b>	5 V DC	12 V DC	24 V DC
<b>max. air volume</b>	10 m <sup>3</sup> /h	14.3 m <sup>3</sup> /h	20 m <sup>3</sup> /h
<b>temperature range</b>	-10°C... +70°C	-10°C... +70°C	-20°C... +70°C
<b>speed</b>	3,400 min <sup>-1</sup>	4,800 min <sup>-1</sup>	5,000 min <sup>-1</sup>
<b>noise level</b>	17 dB(A)	22 dB(A)	30 dB(A)
<b>weight</b>	19 g	19 g	27 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 95,000 h (20°C) MTBF < 280,000 h (20°C)	L <sub>10</sub> < 95,000 h (20°C) MTBF < 280,000 h (20°C)	L <sub>10</sub> 50,000 h (20°C)
<b>alarm output</b>	with	with	

## Miniature cooling aggregates

- compact design
- homogeneous heat distribution
- mounting possible on any side
- powerful axial-fan motor
- other lengths, special designs and machinings according to customer's specifications
- other surfaces, fan types and fan voltages upon request

<b>art. no.</b>       <b>LAM 6 ...</b>			
<b>art. no.</b>       <b>LAM 6 K ...</b>			
<b>please indicate:</b> ... $\longleftrightarrow$		<b>... fan type</b> <b>5 = 5 V DC</b> <b>12 = 12 V DC</b> <b>24 = 24 V DC</b>	
<b>surface:</b>		natural colour anodised	


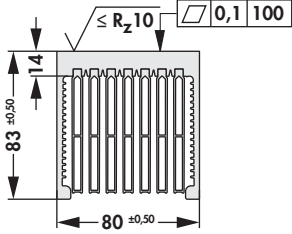
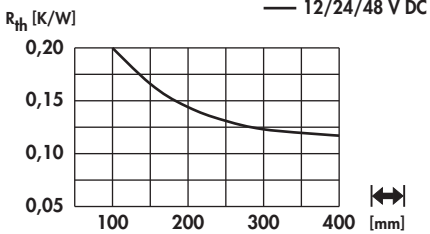

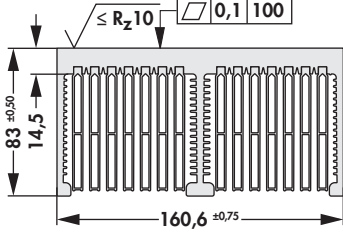
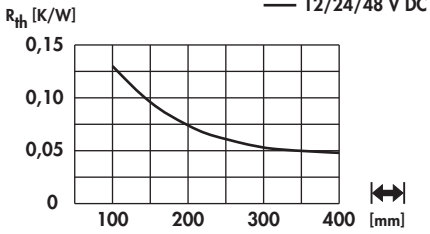
### Technical data of the fans

	... 12	... 24	... 48
<b>type</b>	ebmpapst 612 JH	ebmpapst 614 J/2HHP	ebmpapst 618 J/2HHP
<b>dimensions</b>	60x60x32 mm	60x60x32 mm	60x60x32 mm
<b>tension</b>	12 V DC	24 V DC	48 V DC
<b>power inout</b>	7.7 W	14.6 W	14.6 W
<b>max. air volume</b>	70 m <sup>3</sup> /h	82 m <sup>3</sup> /h	82 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... 75°C	-20°C... 75°C
<b>noise level</b>	53 dB(A)	62 dB(A)	62 dB(A)
<b>speed</b>	11,700 min <sup>-1</sup>	15,000 min <sup>-1</sup>	15,000 min <sup>-1</sup>
<b>weight</b>	100 g	100 g	100 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 57,500 h (40°C)	L <sub>10</sub> > 65,000 h (40°C)	L <sub>10</sub> > 65,000 h (40°C)

## Cooling aggregates with axial fan

### Hollow-fin cooling aggregates

- hollow-fin geometry of new conception
- enlarged surface due to larger fin quantity
- effective heat dissipation with low pressure drop
- available with and without air-flow chamber
- milled flat semiconductor mounting surface
- mechanical treatments according to customer's specifications

<b>art. no.</b>			
<b>LA 34 ...</b>	without air flow chamber		
<b>art. no.</b>			
<b>LA 35 ...</b>	without air flow chamber		
<b>please indicate:</b>	... $\left[ \right]$ 100 150 200 250 300 mm		<b>... fan type</b> 12 = 12 V DC 24 = 24 V DC 48 = 48 V DC

### Technical data of the fans


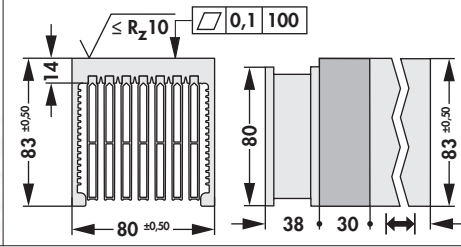
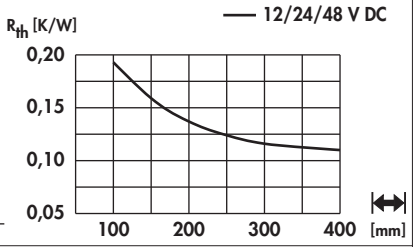

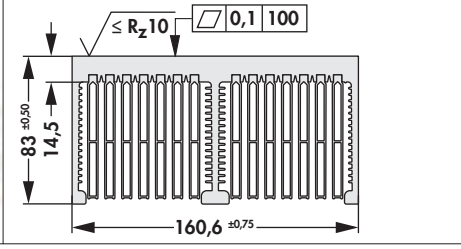
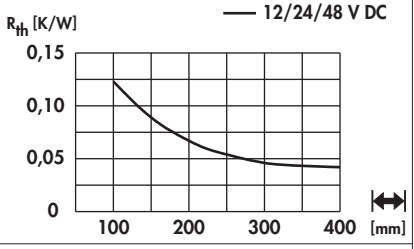
	... 12	... 24	... 48
<b>type</b>	ebmpapst 8212 JH4	ebmpapst 8214 JH4	ebmpapst 8218 JH4
<b>dimensions</b>	80x80x38 mm	80x80x38 mm	80x80x38 mm
<b>tension</b>	12 V DC	24 V DC	48 V DC
<b>power inout</b>	39 W	38 W	36 W
<b>max. air volume</b>	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... +70°C	-20°C... +70°C
<b>noise level</b>	71 dB(A)	71 dB(A)	71 dB(A)
<b>speed</b>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>
<b>weight</b>	200 g	200 g	200 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)



## Cooling aggregates with axial fan

### Hollow-fin cooling aggregates

- hollow-fin geometry of new conception
- enlarged surface due to larger fin quantity
- effective heat dissipation with low pressure drop
- available with and without air-flow chamber
- milled flat semiconductor mounting surface
- mechanical treatments according to customer's specifications

<b>art. no.</b>			
<b>LA V 34 ...</b>	with air flow chamber		
<b>art. no.</b>			
<b>LA V 35 ...</b>	with air flow chamber		
<b>please indicate:</b>	... $\left[ \right]$ 100 150 200 250 300 mm		<b>... fan type</b> 12 = 12 V DC 24 = 24 V DC 48 = 48 V DC

### Technical data of the fans

	... 12	... 24	... 48
<b>type</b>	ebmpapst 8212 JH4	ebmpapst 8214 JH4	ebmpapst 8218 JH4
<b>dimensions</b>	80x80x38 mm	80x80x38 mm	80x80x38 mm
<b>tension</b>	12 V DC	24 V DC	48 V DC
<b>power inout</b>	39 W	38 W	36 W
<b>max. air volume</b>	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... +70°C	-20°C... +70°C
<b>noise level</b>	71 dB(A)	71 dB(A)	71 dB(A)
<b>speed</b>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>
<b>weight</b>	200 g	200 g	200 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)

Cooling aggregates with axial fan



High performance cooling aggregate

- cooling aggregates of special conception with pressed in fins
- enlarged surface by means of fluted fin geometry
- flow-optimised hollow fin structure
- milled flat mounting surface for component assembly
- special designs and other fans upon request

<b>art. no.</b>			
<b>LA HPK 1 ...</b>	without air flow chamber		
<b>please indicate:</b>	... $\leftarrow \rightarrow$ <b>100 150 200 250 300 mm</b>	<b>... fan type</b>	<b>12 = 12 V DC</b> <b>24 = 24 V DC</b> <b>48 = 48 V DC</b>

Technical data of the fans

	... 12	... 24	... 48
<b>type</b>	ebmpapst 612 JH	ebmpapst 614 J/2HHP	ebmpapst 618 J/2HHP
<b>dimensions</b>	60x60x32 mm	60x60x32 mm	60x60x32 mm
<b>tension</b>	12 V DC	24 V DC	48 V DC
<b>power inout</b>	7.7 W	14.6 W	14.6 W
<b>max. air volume</b>	70 m <sup>3</sup> /h	82 m <sup>3</sup> /h	82 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... 75°C	-20°C... 75°C
<b>noise level</b>	53 dB(A)	62 dB(A)	62 dB(A)
<b>speed</b>	11,700 min <sup>-1</sup>	15,000 min <sup>-1</sup>	15,000 min <sup>-1</sup>
<b>weight</b>	100 g	100 g	100 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 57,500 h (40°C)	L <sub>10</sub> > 65,000 h (40°C)	L <sub>10</sub> > 65,000 h (40°C)



**High performance cooling aggregate**

- cooling aggregates of special conception with pressed in fins
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<b>art. no.</b>			
<b>LA V HPK 1 ...</b>	without air flow chamber		
<b>please indicate:</b>	... $\longleftrightarrow$ 100 150 200 250 300 mm	<b>... fan type</b>	12 = 12 V DC 24 = 24 V DC 48 = 48 V DC

**Technical data of the fans**

	... 12	... 24	... 48
<b>type</b>	ebmpapst 612 JH	ebmpapst 614 J/2HHP	ebmpapst 618 J/2HHP
<b>dimensions</b>	60x60x32 mm	60x60x32 mm	60x60x32 mm
<b>tension</b>	12 V DC	24 V DC	48 V DC
<b>power inout</b>	7.7 W	14.6 W	14.6 W
<b>max. air volume</b>	70 m <sup>3</sup> /h	82 m <sup>3</sup> /h	82 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... 75°C	-20°C... 75°C
<b>noise level</b>	53 dB(A)	62 dB(A)	62 dB(A)
<b>speed</b>	11,700 min <sup>-1</sup>	15,000 min <sup>-1</sup>	15,000 min <sup>-1</sup>
<b>weight</b>	100 g	100 g	100 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 57,500 h (40°C)	L <sub>10</sub> > 65,000 h (40°C)	L <sub>10</sub> > 65,000 h (40°C)

Cooling aggregates with axial fan



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- special designs and other fans upon request

<b>art. no.</b>			
<b>LA HPK 2 ...</b>	without air flow chamber		
<b>please indicate:</b>	... $\left[ \begin{array}{c} \leftarrow \rightarrow \\ 100 \ 150 \ 200 \ 250 \ 300 \text{ mm} \end{array} \right.$	<b>... fan type</b>	12 = 12 V DC 24 = 24 V DC 48 = 48 V DC

Technical data of the fans

	... 12	... 24	... 48
<b>type</b>	ebmpapst 8212 JH4	ebmpapst 8214 JH4	ebmpapst 8218 JH4
<b>dimensions</b>	80x80x38 mm	80x80x38 mm	80x80x38 mm
<b>tension</b>	12 V DC	24 V DC	48 V DC
<b>power inout</b>	39 W	38 W	36 W
<b>max. air volume</b>	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... +70°C	-20°C... +70°C
<b>noise level</b>	71 dB(A)	71 dB(A)	71 dB(A)
<b>speed</b>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>
<b>weight</b>	200 g	200 g	200 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)



### High performance cooling aggregate

- cooling aggregates of special conception with pressed in fins
- enlarged surface by means of fluted fin geometry
- flow-optimised hollow fin structure
- milled flat mounting surface for component assembly
- special designs and other fans upon request

<b>art. no.</b>		
<b>LA V HPK 2 ...</b>	without air flow chamber	
<b>please indicate:</b>	... <b>100 150 200 250 300 mm</b>	<b>... fan type</b> <b>12 = 12 V DC</b> <b>24 = 24 V DC</b> <b>48 = 48 V DC</b>

### Technical data of the fans

	... 12	... 24	... 48
<b>type</b>	ebmpapst 8212 JH4	ebmpapst 8214 JH4	ebmpapst 8218 JH4
<b>dimensions</b>	80x80x38 mm	80x80x38 mm	80x80x38 mm
<b>tension</b>	12 V DC	24 V DC	48 V DC
<b>power inout</b>	39 W	38 W	36 W
<b>max. air volume</b>	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h	222 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +70°C	-20°C... +70°C	-20°C... +70°C
<b>noise level</b>	71 dB(A)	71 dB(A)	71 dB(A)
<b>speed</b>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>	14,000 min <sup>-1</sup>
<b>weight</b>	200 g	200 g	200 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)	L <sub>10</sub> > 50,000 h (40°C)

Cooling aggregates with axial fan



High performance cooling aggregate

- high performance cooling aggregates of special design
- optimal pressed in single lamellae
- low pressure losses due to adjusted fin geometry
- smallest fin spacings give a big heat exchange area
- special designs according to drawing

<b>art. no.</b>	
<b>LA HPK 3 ...</b>	without air flow chamber
<b>please indicate:</b>	... $\left[ \begin{array}{c} \leftarrow \rightarrow \\ \text{100 150 200 250 300 mm} \end{array} \right]$
	... <b>fan type</b> 24 = 24 V DC 230 = 230 V AC

Technical data of the fans

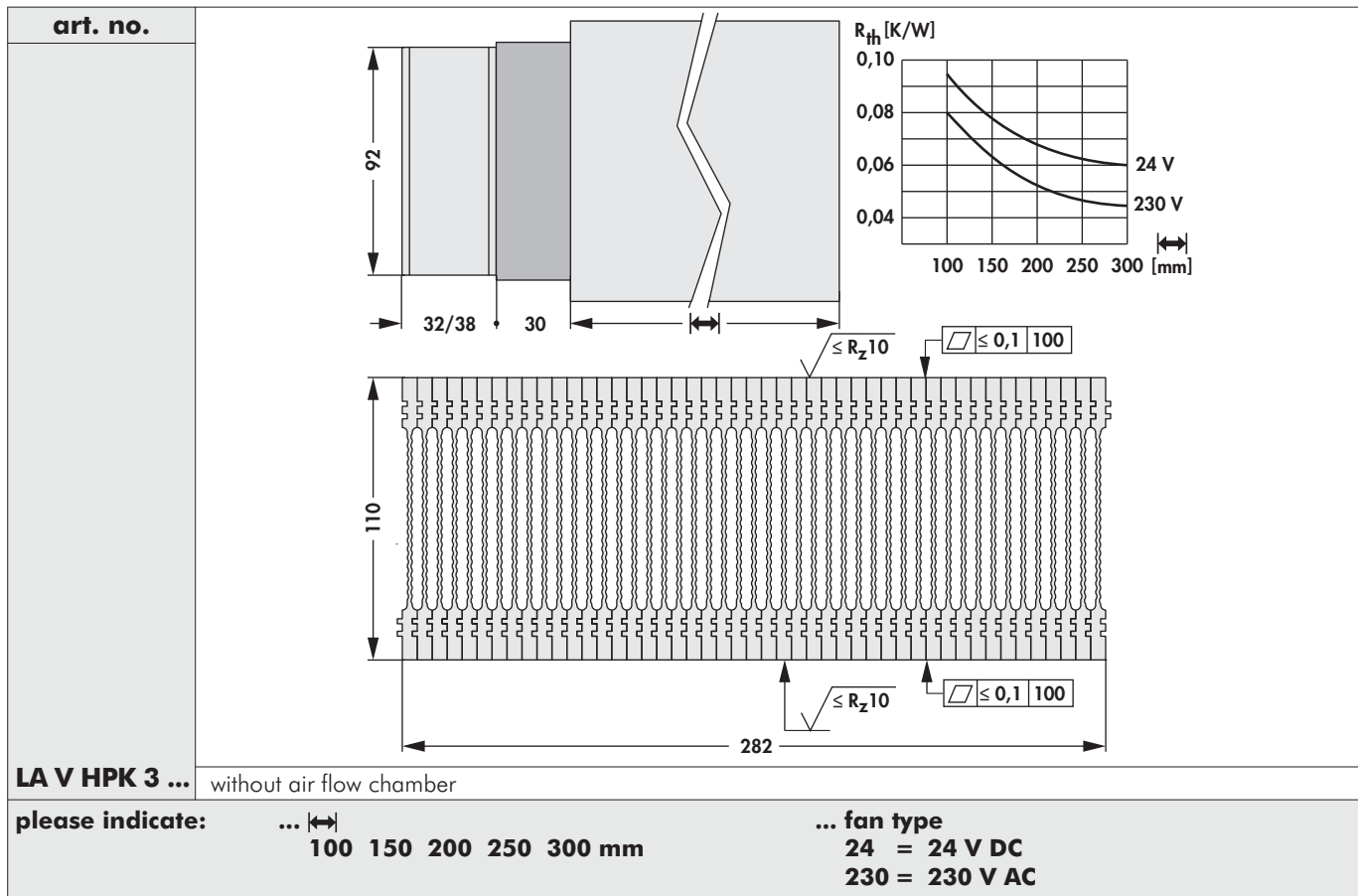
	... 24	... 230
<b>type</b>	ebmpapst 3314 NHH	ebmpapst 3656
<b>dimensions</b>	92x92x32 mm	92x92x38 mm
<b>tension</b>	24 V DC	230 V AC
<b>power inout</b>	3.4 W	12 W
<b>max. air volume</b>	107 m <sup>3</sup> /h	75 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... 75°C	-40°C... +75°C
<b>noise level</b>	42 dB(A)	37 dB(A)
<b>speed</b>	min <sup>-1</sup>	2,700 min <sup>-1</sup>
<b>weight</b>	190 g	420 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 57,500 h (40°C)	L <sub>10</sub> < 52,500 h (40°C)





### High performance cooling aggregate

- high performance cooling aggregates of special design
- optimal pressed in single lamellae
- low pressure losses due to adjusted fin geometry
- smallest fin spacings give a big heat exchange area
- special designs according to drawing



### Technical data of the fans

	... 24	... 230
<b>type</b>	ebmpapst 3314 NHH	ebmpapst 3656
<b>dimensions</b>	92x92x32 mm	92x92x38 mm
<b>tension</b>	24 V DC	230 V AC
<b>power inout</b>	3.4 W	12 W
<b>max. air volume</b>	107 m <sup>3</sup> /h	75 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... 75°C	-40°C... +75°C
<b>noise level</b>	42 dB(A)	37 dB(A)
<b>speed</b>	min <sup>-1</sup>	2,700 min <sup>-1</sup>
<b>weight</b>	190 g	420 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> < 57,500 h (40°C)	L <sub>10</sub> < 52,500 h (40°C)

## Cooling aggregates with axial fan



### High performance cooling aggregate

- high performance cooling aggregates of special design
- optimal pressed in single lamellae
- low pressure losses due to adjusted fin geometry
- smallest fin spacings give a big heat exchange area
- special designs according to drawing

art. no.				
<b>LA HPK 4 ...</b>	without air flow chamber			
<b>please indicate:</b>	... <b>100 150 200 250 300 mm</b>		<b>... fan type</b> <b>12 = 12 V DC</b> <b>24 = 24 V DC</b> <b>230 = 230 V AC</b>	

### Technical data of the fans

	... 12	... 24	... 230
<b>type</b>	ebmpapst 4112NH3	ebmpapst 4114NH3	ebmpapst 4656N
<b>dimensions</b>	119x119x38 mm	119x119x38 mm	119x119x38 mm
<b>tension</b>	12 V DC	24 V DC	230 V AC
<b>power inout</b>	21 W	19.5 W	19 W
<b>max. air volume</b>	310 m <sup>3</sup> /h	310 m <sup>3</sup> /h	160 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +65°C	-20°C... +65°C	-40°C... +85°C
<b>noise level</b>	65 dB(A)	65 dB(A)	47 dB(A)
<b>speed</b>	6,000 min <sup>-1</sup>	6,000 min <sup>-1</sup>	2,650 min <sup>-1</sup>
<b>weight</b>	390 g	390 g	550 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> > 60,000 h (40°C) L <sub>10</sub> > 37,500 h (tmax)	L <sub>10</sub> > 65,000 h (40°C) L <sub>10</sub> > 37,500 h (tmax)	L <sub>10</sub> < 37,500 h (40°C)



### High performance cooling aggregate

- high performance cooling aggregates of special design
- optimal pressed in single lamellae
- low pressure losses due to adjusted fin geometry
- smallest fin spacings give a big heat exchange area
- special designs according to drawing

art. no.		
<b>LA V HPK 4 ...</b>	without air flow chamber	
<b>please indicate:</b>	... <b>100 150 200 250 300 mm</b>	<b>... fan type</b> 12 = 12 V DC 24 = 24 V DC 230 = 230 V AC

### Technical data of the fans

	... 12	... 24	... 230
<b>type</b>	ebmpapst 4112NH3	ebmpapst 4114NH3	ebmpapst 4656N
<b>dimensions</b>	119x119x38 mm	119x119x38 mm	119x119x38 mm
<b>tension</b>	12 V DC	24 V DC	230 V AC
<b>power inout</b>	21 W	19.5 W	19 W
<b>max. air volume</b>	310 m <sup>3</sup> /h	310 m <sup>3</sup> /h	160 m <sup>3</sup> /h
<b>temperature range</b>	-20°C... +65°C	-20°C... +65°C	-40°C... +85°C
<b>noise level</b>	65 dB(A)	65 dB(A)	47 dB(A)
<b>speed</b>	6,000 min <sup>-1</sup>	6,000 min <sup>-1</sup>	2,650 min <sup>-1</sup>
<b>weight</b>	390 g	390 g	550 g
<b>failure rate (L<sub>10</sub>)</b>	L <sub>10</sub> > 60,000 h (40°C) L <sub>10</sub> > 37,500 h (tmax)	L <sub>10</sub> > 65,000 h (40°C) L <sub>10</sub> > 37,500 h (tmax)	L <sub>10</sub> < 37,500 h (40°C)

**Cooling aggregates with axial fan**

**High performance heatsinks**

- flexible designable heatsink solutions
- modular system with different fin heights
- for free and forced convection
- milled flat semiconductor mounting surface
- customer specific designs, machinings and surfaces upon request

art. no.	A [mm]
<b>HPK 60 ...</b>	60
<b>HPK 80 ...</b>	80
<b>HPK 100 ...</b>	100
<b>HPK 120 ...</b>	120
<b>HPK 140 ...</b>	140

**please indicate:**

... number of fins (min. - max.)  
24 - 83

... surface  
SA = black anodised  
ME = natural colour anodised

...  $\leftarrow \rightarrow$   
100 150 200 250 300 mm

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N





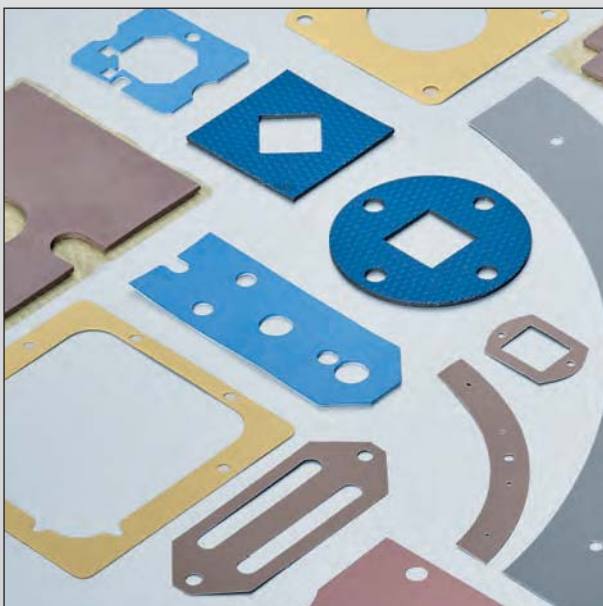
### Thermal contact materials

- aluminium oxide-, Kapton- and mica discs
- high dielectric strength at very good thermal conductivity
- best mechanical properties
- easy and clean handling
- wide operating temperature range
- cuts and special designs acc. to customer's requirement



### Thermal conductive materials

- with high long-term stability and thermal conductivity
- smallest heat transfer resistances
- excellent compensation of unevennesses
- electrical conductive and insulating
- as sheet material or rolled goods
- customised cuts by means of 24 h sample delivery service



### Innovative thermal conductive foils

- very good thermal properties
- silicone containing and silicone-free versions
- optimal contacting between device and heat sink
- easy fitting by means of adhesive coating
- 24 h sample cut service
- individual cuts according to customer specifications



### Efficient thermal conductive materials

- fluid GEL thermal conductive material, thermal conductive paste and glue
- optimum balance of roughnesses and unevennesses
- good performance and processing properties
- automatic dispensable
- containing silicone and silicone-free
- other packaging sizes and container types upon request

## Thermal conductive foils for semiconductors

– other thermal conductive materials and cuts according to to customer's specifications

art. no.	thermal conductivity [W/m·k]	material thickness [mm]	type
<b>WFQ 25 ...</b>	2.5	0.152	aluminium foil
<b>WLFG 9010 ...</b>	5.5	0.150	graphite foil
<b>WLFG 9015 ...</b>	6.0	0.200	
<b>WLFG 9020 ...</b>	4.0	0.250	
<b>WLFG S 900 K</b>	7.5	0.175	
<b>FSF 15 P 011</b>	1.5	0.114	phase-change thermal conductive foil
<b>FSF 15 P 012</b>	1.5	0.127	
<b>FSF 15 P 014</b>	1.5	0.140	
<b>FSF 20 P</b>	2.0	0.200	

### Order example

<b>WLFG 9010</b>   Thermally conductive foil	<b>54 x 94</b>   dimension
--	----------------------------------

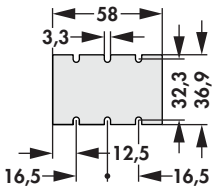
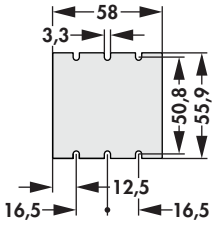
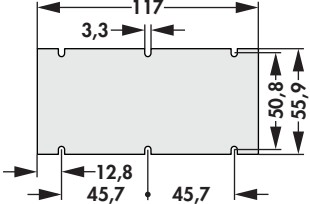
**IGBT**

dimension [mm]	blanks	manufacturer	component
34 x 94		Infineon MCC IXYS Semikron	Int-A-Pak (New) / 34mm modules MF ... F2 / MT ... T2 / MD ... D2 Y4-M6 SEMISTRANS 2 / SEMIPACK 2
45 x 108		Infineon IXYS	Econo 2 / Econo PIM 2 / Econo PACK 2 / Econo BRIDGE / Iso PACK 2 E2-Pack
54 x 94		Infineon MCC IXYS Semikron	MTC / Iso PACK 54 MD ... M3 / MD ... M5 PWS-E Flat / PWS-E SEMIPOINT 4
62 x 107		Infineon MCC IXYS Semikron	Dual Int-A-Pak / 62 mm modules MT ... L2 E3-Pack SEMISTRANS 3 / SEMISTRANS 4
62 x 122		Infineon IXYS Semikron	Econo 3 / Econo DUAL + / Econo PIM 3 / Econo PACK 3 SimBus F SEMIX 3p / SEMIX 3lp
73 x 140		Infineon	IHV
130 x 140		Infineon	IHM / IHV
140 x 190		Infineon	IHM / IHV

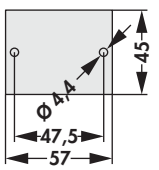
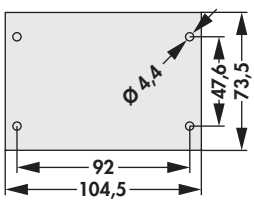
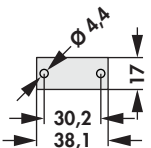
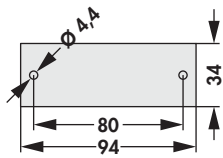


**Thermal conductive foils for semiconductors**

**DC/DC converter**

dimension [mm]	blanks	component
36.9 x 58		Micro DC/DC-converter
55.9 x 58		Mini DC/DC-converter
55.9 x 117		Maxi DC/DC-converter

**Solid State Relais**

dimension [mm]	blanks	component
45 x 57		SSR 1
73.5 x 104.5		SSR 2
17 x 38.1		SSR 3
34 x 94		SSR 4

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

**Thermal conductive foils for LED**

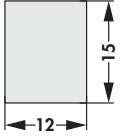
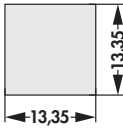
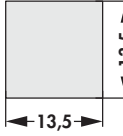
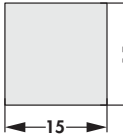
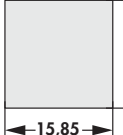



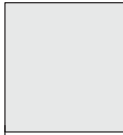

– other thermal conductive materials and cuts according to to customer's specifications

art. no.	thermal conductivity [W/m·k]	material thickness [mm]	type
<b>WFQ 25 ...</b>	2.5	0.152	aluminium foil
<b>WLFQ 9010 ...</b>	5.5	0.150	graphite foil
<b>WLFQ 9015 ...</b>	6.0	0.200	
<b>WLFQ 9020 ...</b>	4.0	0.250	
<b>WLFQ S 900 K</b>	7.5	0.175	
<b>WLFT 404</b>	0.4	0.127	double-sided adhesive thermal conductive foil
<b>WLFT 405</b>	0.5	0.150	
<b>WLFT 8805</b>	0.6	0.130	
<b>WLFT 8810</b>	0.6	0.250	
<b>WLFT 8815</b>	0.6	0.380	
<b>WLFT 8820</b>	0.6	0.500	
<b>WLFT 8926</b>	1.5	0.2 / 0.25 / 0.5	
<b>WLFT 30</b>	3.0	0.15 / 0.23	one-side adhesive thermal conductive foil
<b>FSF 15 P 011</b>	1.5	0.114	phase-change thermal conductive foil
<b>FSF 15 P 012</b>	1.5	0.127	
<b>FSF 15 P 014</b>	1.5	0.140	
<b>FSF 20 P</b>	2.0	0.200	

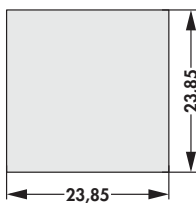
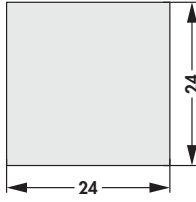
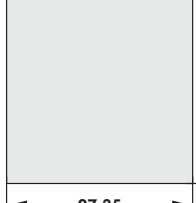

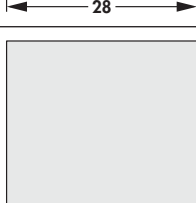
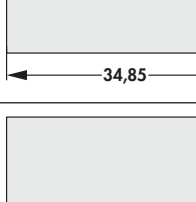
**Order example**

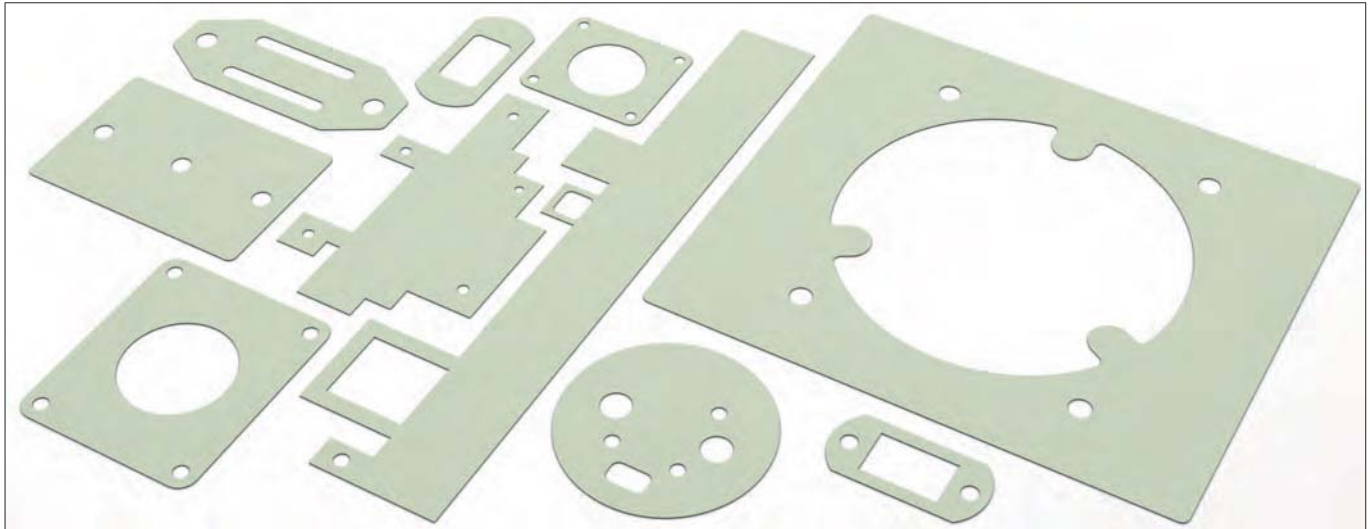
<b>WLFT 8810</b>	<b>20 x 24</b>
Thermally conductive foil	dimension

**Thermal conductive foils for LED**

dimension [mm]	blanks	manufacturer	LED package
12 x 15		Lumileds Luxeon Sharp  Nichia LG Innotec	CoB 1202S Mini ZENIGATA / GW6BMG / GW6BGG / GW6BMW / GW6BGW / GW6NGW NTCWT / NTCWS / NVNWS / NJCWS LEMWM12480 / LEMWM12490
13.35 x 13.35		Cree Seoul Semiconductor	CXA13XX / CXB13XX SAW 806 / SAW810 / SAW906 / SAW910
13.5 x 13.5		Citizen	CLU026 / CLU027 / CLU028 / CLU700 / CLU701
15 x 15		Osram	Soleriq P9
15.85 x 15.85		Cree	CXA15XX / CXB15XX
16 x 19		Lumileds Luxeon Nichia LG Innotec	CoB 1202 / CoB 1203 NFCWL / NVEWL / NVCWL LEMWM19480 / LEMWM19490 / LEMWM19680 / LEMWM19690
17.85 x 17.85		Cree	CXA18XX / CXB18XX
18 x 18		Osram	Soleriq S13
19 x 19		Citizen  Seoul Semiconductor	CLU036 / CLU038 / CLU710 / CLU711 / CLU720 / CLU721 SAW815 / SAW915
20 x 24		Lumileds Luxeon Sharp    LG Innotec	CoB1204 / CoB1205 / CoB1208 Mini ZENIGATA / GW6DMB / GW6DGB / GW6DMC / GW6DGC / GW6DMD / GW6DGD / GW6DME / GW6DGE / GW6TGB / Tiger ZENIGATA / GW6TGC LEMWM24780 / LEMWM24790 / LEMWM24980 / LEMWM24990 / LEMWM24B80 / LEMWM24B90

**Thermal conductive foils for LED**

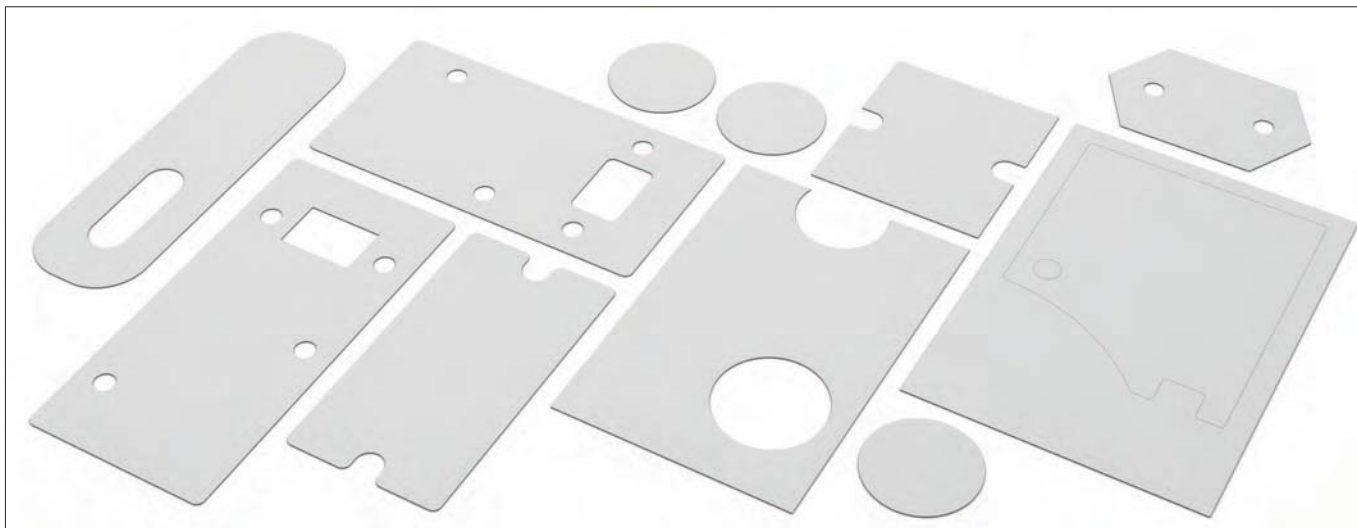
dimension [mm]	blanks	manufacturer	LED package
23.85 x 23.85		Cree	CXA25XX / CXB25XX
24 x 24		Osram	Soleriq S19
27.35 x 27.35		Cree	CXA30XX / CXB30XX
28 x 28		Lumileds Luxeon Citizen Seoul Semiconductor LG Innotec	CoB 1211 CLU046 / CLU048 / CLU731 SAW822 / SAW922 LEMWM28D80 / LEMWM28D90 / LEMWM28E80 / LEMWM28E90
34.85 x 34.85		Cree	CXA35XX / CXB35XX / CXA2Studio
38 x 38		Citizen Seoul Semiconductor Nichia	CLU056 / CLU058 / CLU550 SAW833 / SAW933 NFEWH

**Thermally conductive foil made of siliconelastomer**


- silicone foil with high temperature range
- self-adhesive properties
- high mechanical stability
- with adhesive coating and adhesive film upon request
- cuts and contours according to customer's drawing specifications

art. no.	material thickness [mm]	
<b>WFK 18</b>	0.225	
<b>WFK 18 G 022</b>	0.225	
	<b>WFK 18</b>	<b>WFK 18 G 022</b>
<b>version</b>	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement, one-sided protection foil
<b>colour</b>	lime-green	
<b>hardness</b>	65 - 75 Shore A	
<b>thermal conductivity</b>	1.8 W/m·K	
<b>thermal resistance</b>	0.32 K/W	0.5 K/W
<b>temperature range</b>	-60°C ... +250°C	
<b>density</b>	2,29 g/cm <sup>3</sup>	
<b>elongation</b>	75 %	
<b>volume resistance</b>	2,5·10 <sup>11</sup> Ω·m	
<b>dielectric constant</b>	2,9 [1 kHz]	
<b>tensile strength</b>	2 N/mm <sup>2</sup>	7,5 N/mm <sup>2</sup>
<b>dielectric strength</b>	8 kV	
<b>class of inflammability</b>	UL 94 V-0	
<b>type of delivery</b>	plates, usable area 300x250mm/ other dimensions upon request	

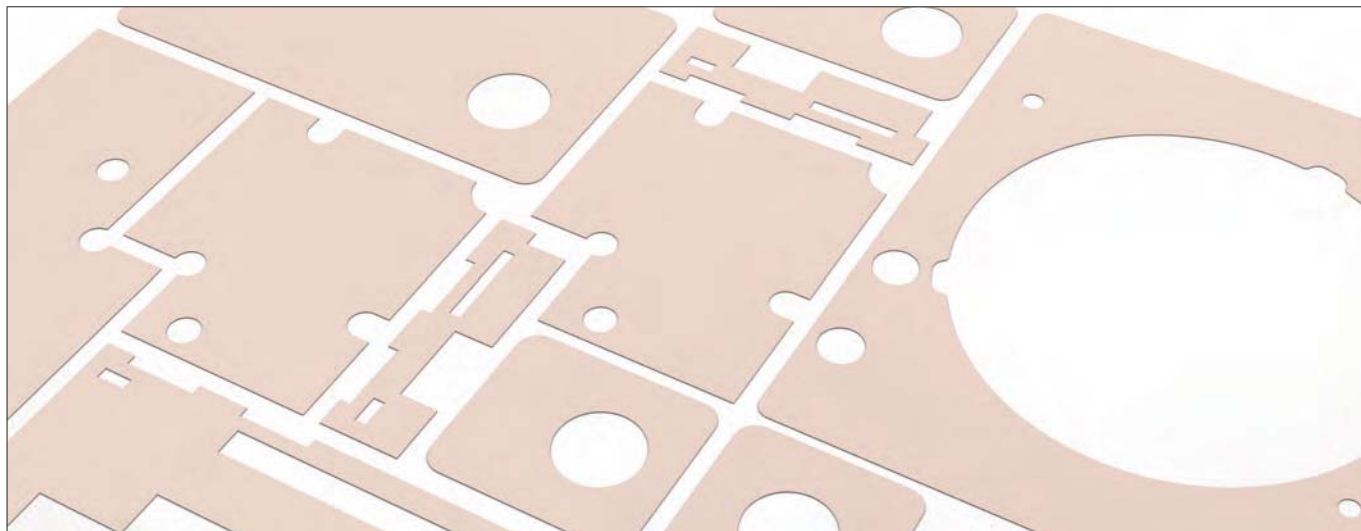
Thermal resistances vs. contact pressure				
pressure [psi]	<b>7.25</b>	<b>29</b>	<b>58</b>	<b>87</b>
<b>thermal resistance WFK 18 [K/W]</b>	0.50	0.42	0.37	0.33
<b>thermal impedance WFK 18 [K-cm<sup>2</sup>/W]</b>	1.75	1.38	1.25	1.18

**Thermally conductive foil made of siliconelastomer**


- silicone foil with very good thermal properties
- good electrical insulation
- optionally with glass fibre reinforcement and adhesive coating
- easy handling and use
- cuts and contours according to customer's drawing specifications

art. no.	material thickness [mm]			
<b>WFK 25</b>	0.225			
<b>WFK 25 G</b>	0.250			
<b>WFK 25 GK</b>	0.250			
<b>WFK 25 K</b>	0.250			
	<b>WFK 25</b>	<b>WFK 25 G</b>	<b>WFK 25 GK</b>	<b>WFK 25 K</b>
<b>version</b>	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil	silicone foil without glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil
<b>colour</b>	white			
<b>hardness</b>	70 - 80 Shore A			
<b>thermal conductivity</b>	2.5 W/m·K			
<b>thermal resistance</b>	0,22 K/W	0,25 K/W	0,3 K/W	0,265 K/W
<b>temperature range</b>	-60°C ... +250°C			
<b>density</b>	2,33 g/cm <sup>3</sup>			
<b>elongation</b>	31 %			
<b>volume resistance</b>	2,5 · 10 <sup>11</sup> Ω·m			
<b>dielectric constant</b>	3 [1 kHz]			
<b>tensile strength</b>	1,5 N/mm <sup>2</sup>	7,5 N/mm <sup>2</sup>	1,5 N/mm <sup>2</sup>	1,5 N/mm <sup>2</sup>
<b>dielectric strength</b>	1,5 kV			
<b>class of inflammability</b>	UL 94 V-0			
<b>type of delivery</b>	plates, usable area 300x250mm/ other dimensions upon request		plates, usable area 300x235mm/ other dimensions upon request	

Thermal resistances vs. contact pressure				
pressure [psi]	<b>7.25</b>	<b>29</b>	<b>58</b>	<b>87</b>
thermal resistance WFK 25 [K/W]	0.38	0.33	0.30	0.27
thermal impedance WFK 25 [K-cm <sup>2</sup> /W]	1.13	1.00	0.92	0.83

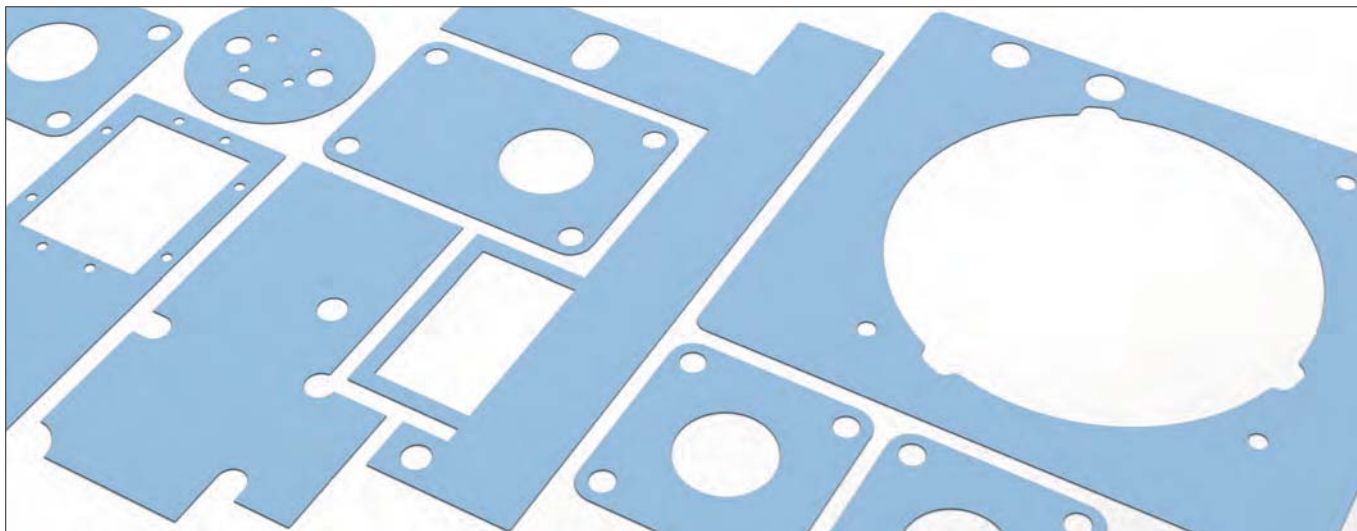
**Thermally conductive foil made of siliconelastomer**


- silicone foil with very good thermal properties
- good electrical insulation
- optionally with glass fibre reinforcement and adhesive coating
- easy handling and use
- cuts and contours according to customer's drawing specifications

art. no.	material thickness [mm]			
<b>WFK 35 012</b>	0.125			
<b>WFK 35 022</b>	0.225			
<b>WFK 35 G</b>	0.250			
<b>WFK 35 GK</b>	0.250			
<b>WFK 35 K</b>	0.250			
	<b>WFK 35</b>	<b>WFK 35 G</b>	<b>WFK 35 GK</b>	<b>WFK 35 K</b>
<b>version</b>	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil	silicone foil without glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil
<b>colour</b>	pink			
<b>hardness</b>	70 - 80 Shore A			
<b>thermal conductivity</b>	3.5 W/m·K			
<b>thermal resistance</b>	0.16 K/W	0.22 K/W	0.27 K/W	0.26 K/W
<b>temperature range</b>	-60°C ... +250°C			
<b>density</b>	1,97 g/cm <sup>3</sup>			
<b>elongation</b>	25 %			
<b>volume resistance</b>	1,3·10 <sup>14</sup> Ω·m			
<b>dielectric constant</b>	2,3 [1 kHz]			
<b>tensile strength</b>	1,3 N/mm <sup>2</sup>	10 N/mm <sup>2</sup>		1,3 N/mm <sup>2</sup>
<b>dielectric strength</b>	1,5 kV			
<b>class of inflammability</b>	UL 94 V-0			
<b>type of delivery</b>	plates, usable area 300x250mm/ other dimensions upon request		plates, usable area 300x235mm/ other dimensions upon request	

Thermal resistances vs. contact pressure				
pressure [psi]	<b>7.25</b>	<b>29</b>	<b>58</b>	<b>87</b>
<b>thermal resistance WFK 35 [K/W]</b>	0.25	0.21	0.17	0.15
<b>thermal impedance WFK 35 [K-cm<sup>2</sup>/W]</b>	0.94	0.81	0.75	0.56

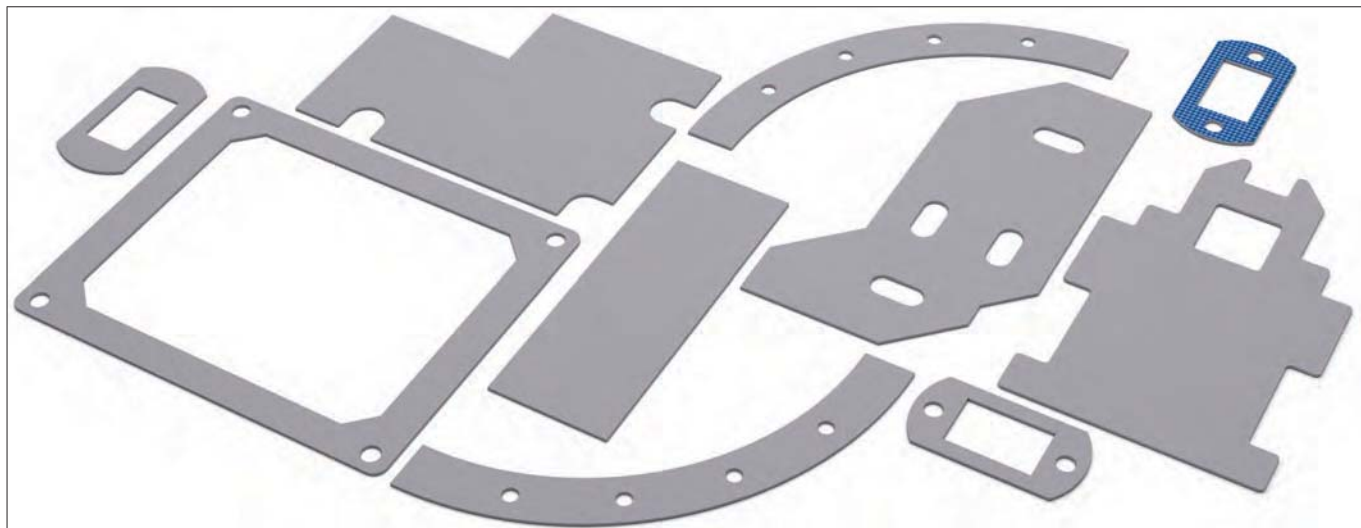


**Thermally conductive foil made of siliconelastomer**


- silicone foil ceramic filled
- very good mechanical properties
- high thermal conductivity for smallest heat transfer resistances
- adhesive coating for easy handling
- cuts and contours according to customer's drawing specifications

art. no.	material thickness [mm]	
<b>WFK 60 01</b>	0.100	
<b>WFK 60 02</b>	0.200	
<b>WFK 60 03</b>	0.300	
<b>WFK 60 K</b>	0.225	
	<b>WFK 60</b>	<b>WFK 60 K</b>
<b>version</b>	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with adhesive layer, one-sided protection foil
<b>colour</b>	light blue	
<b>hardness</b>	70 - 85 Shore A	
<b>thermal conductivity</b>	6 W/m·K	
<b>thermal resistance</b>	0,082 K/W	
<b>temperature range</b>	-40°C... +125°C	
<b>density</b>	1,46 g/cm <sup>3</sup>	
<b>elongation</b>	150 %	
<b>volume resistance</b>	2·10 <sup>11</sup> Ω·m	
<b>dielectric constant</b>	3,1 [1 kHz]	
<b>tensile strength</b>	2 N/mm <sup>2</sup>	
<b>dielectric strength</b>	4 kV	
<b>class of inflammability</b>	UL 94 V-0	
<b>type of delivery</b>	plates, usable area 300x235mm/ other dimensions upon request	plates, usable area 300x230mm/ other dimensions upon request

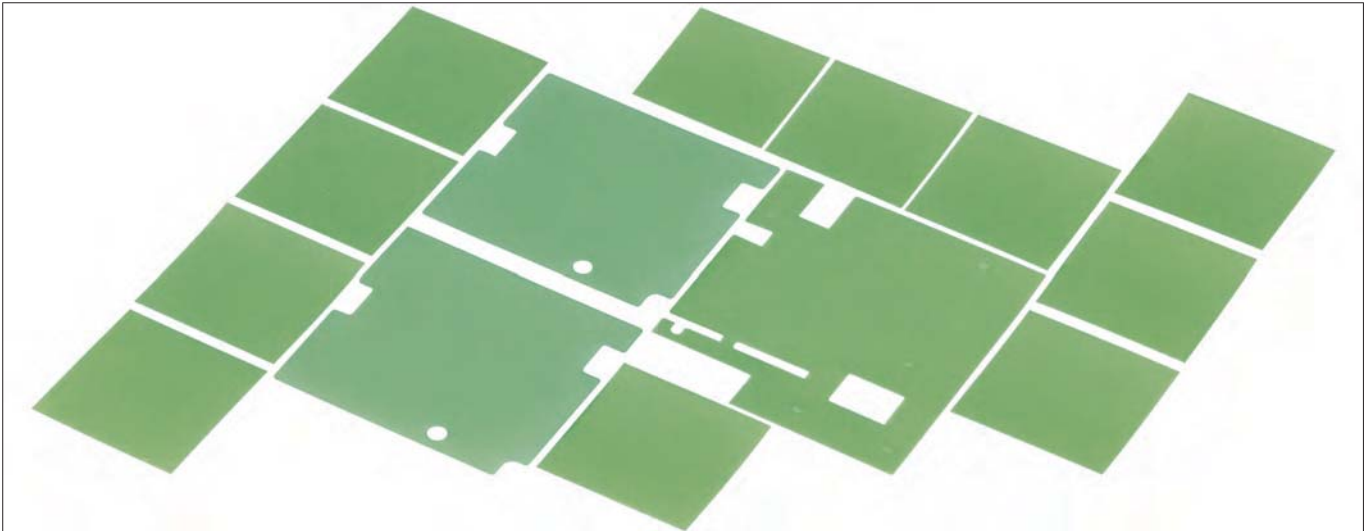
Thermal resistances vs. contact pressure				
pressure [psi]	<b>7.25</b>	<b>29</b>	<b>58</b>	<b>87</b>
thermal resistance WFK 60 [K/W]	0.24	0.16	0.12	0.09
thermal impedance WFK 60 [K·cm <sup>2</sup> /W]	0.88	0.56	0.38	0.31

**Thermally conductive foil made of siliconelastomer**


- silicone foil with excellent thermal conductivity
- very good electrical properties
- adhesive coating for easy assembly handling
- particularly suitable for high-performance applications
- cuts and contours according to customer's drawing specifications

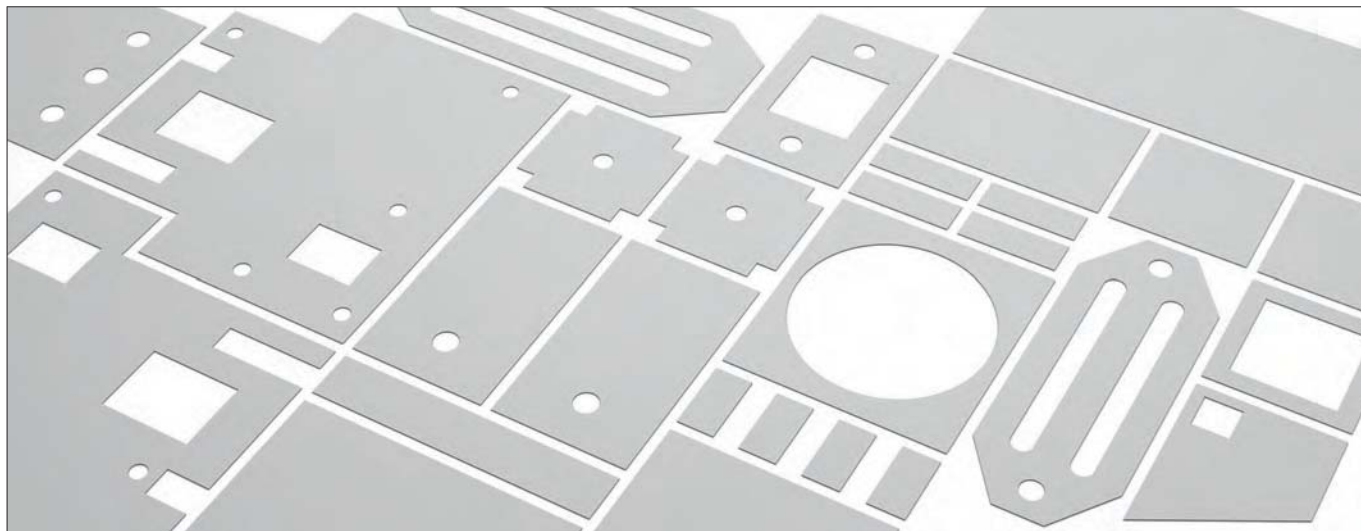
art. no.	material thickness [mm]	
<b>WFK 65</b>	0.250	
<b>WFK 65 K</b>	0.275	
	<b>WFK 65</b>	<b>WFK 65 K</b>
<b>version</b>	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with adhesive layer, one-sided protection foil
<b>colour</b>	red	
<b>hardness</b>	60 - 70 Shore A	
<b>thermal conductivity</b>	6,5 W/m·K	
<b>thermal resistance</b>	0,09 K/W	
<b>temperature range</b>	-40°C... +200°C	
<b>density</b>	1,23 g/cm <sup>3</sup>	
<b>elongation</b>	2 %	
<b>volume resistance</b>	2·10 <sup>14</sup> Ω·m	
<b>dielectric constant</b>	2,4 [1 kHz]	
<b>tensile strength</b>	13 N/mm <sup>2</sup>	
<b>dielectric strength</b>	1 kV	
<b>class of inflammability</b>	UL 94 V-0	
<b>type of delivery</b>	plates, usable area 300x250mm/ other dimensions upon request	plates, usable area 300x235mm/ other dimensions upon request

Thermal resistances vs. contact pressure				
pressure [psi]	<b>7.25</b>	<b>29</b>	<b>58</b>	<b>87</b>
thermal resistance WFK 65 [K/W]	0.18	0.12	0.10	0.08
thermal impedance WFK 65 [K·cm <sup>2</sup> /W]	0.68	0.50	0.39	0.31

**Thermal conductive foil one-sided adhesive**


- one-side adhesive thermal conductive foil
- glass fibre reinforced design
- very good thermal conductivity
- simple handling and mounting
- cuts and contours according to customer's drawing specifications

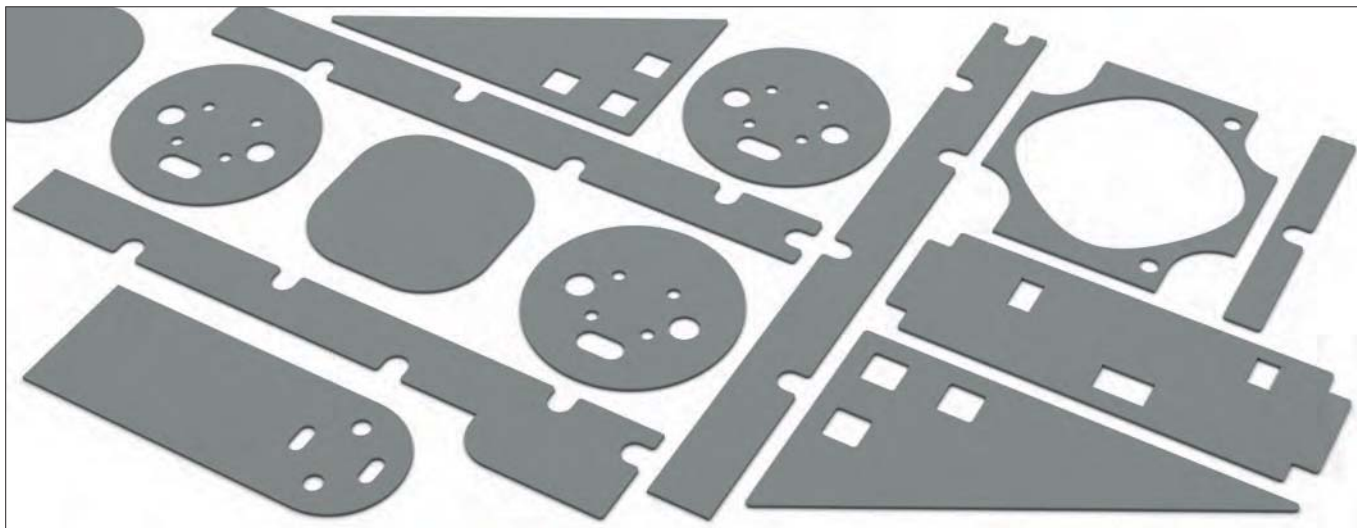
art. no.	material thickness [mm]	
<b>WLFT 30 015</b>	0.15	
<b>WLFT 30 023</b>	0.23	
	<b>WLFT 30 015</b>	<b>WLFT 30 023</b>
<b>version</b>	silicone foil with glass fibre reinforcement	
<b>colour</b>	green	
<b>hardness</b>	80 Shore A	
<b>thermal conductivity</b>	3 W/m·K	
<b>temperature range</b>	-60°C ... +200°C	
<b>elongation</b>	5 %	
<b>volume resistance</b>	> 10 <sup>11</sup> Ω·cm	
<b>dielectric constant</b>		
<b>tear strength</b>	1 N/mm <sup>2</sup>	
<b>dielectric strength</b>	4 kV	6 kV
<b>class of inflammability</b>	UL 94 V-0	
<b>type of delivery</b>	plates, usable area 300x200mm/ other dimensions upon request	

**Thermally conductive foil both sides adhesive**


- double-sided adhesive thermal conductive foil
- excellent adhesive properties on different materials
- filling material with ceramic particles
- very good thermal conductivity and technical performance
- cuts and contours according to customer's drawing specifications

art. no.	type of delivery		
<b>WLFT 8926 02</b>	plates, usable area 300x200mm/ other dimensions upon request		
<b>WLFT 8926 025</b>			
<b>WLFT 8926 05</b>			
	<b>WLFT 8926 02</b>	<b>WLFT 8926 025</b>	<b>WLFT 8926 05</b>
<b>version</b>	double sided adhesive, filled acrylic polymer		
<b>material thickness</b>	0.2 mm	0.25 mm	0.5 mm
<b>filling material</b>	ceramic		
<b>protection cover</b>	silicone treated polyester		
<b>colour</b>	yellowish white		
<b>thermal conductivity</b>	1.5 W/m·K		
<b>specific thermal resistance</b>	8.49 °C cm <sup>2</sup> /W	8.74°C cm <sup>2</sup> /W	9.7°C cm <sup>2</sup> /W
<b>temperature range</b>	permanent up to 80°C		
<b>peel strength at RT 70°C and 72 h</b>	15 N/cm		
<b>dielectric strength</b>	15 kV/mm		
<b>class of inflammability</b>	UL 94 V-0		

## Gel thermal conducting foils



- silicone-free thermal conductive foil
- particularly suitable for silicone-free applications
- very good thermal and mechanical properties
- high electrical insulation
- cuts and contours made of sheet or roller material according to your specifications

art. no.	material thickness [mm]
<b>WFKF 20 05</b>	0.5
<b>WFKF 20 10</b>	1.0
<b>WFKF 20</b>	
<b>version</b>	silicone-free foil without glass fibre reinforcement
<b>colour</b>	grey
<b>density</b>	1,5 g/cm <sup>3</sup>
<b>hardness</b>	55 - 65 Shore 00
<b>thermal conductivity</b>	2 W/m·K
<b>thermal resistance</b>	0.6 K/W
<b>temperature range</b>	-40°C ... +130°C
<b>volume resistance</b>	5,3·10 <sup>9</sup> Ω·m
<b>dielectric constant</b>	5.6 [1 KHz]
<b>elastic modulus</b>	244 g/cm <sup>2</sup>
<b>tensile strength</b>	18 kN/m
<b>dielectric strength</b>	7 kV
<b>class of inflammability</b>	UL 94 V-0
<b>type of delivery</b>	plates, usable area 450x250mm/ other dimensions upon request

Thermal resistances vs. contact pressure				
pressure [psi]	0	14.50	29	43.51
thermal resistance WFKF 20 05 [K/W]	0.60	0.56	0.53	0.50
thermal impedance WFKF 20 10 [K/W]	1.31	1.20	0.98	0.89

## Gel thermal conductive foils for extreme compression

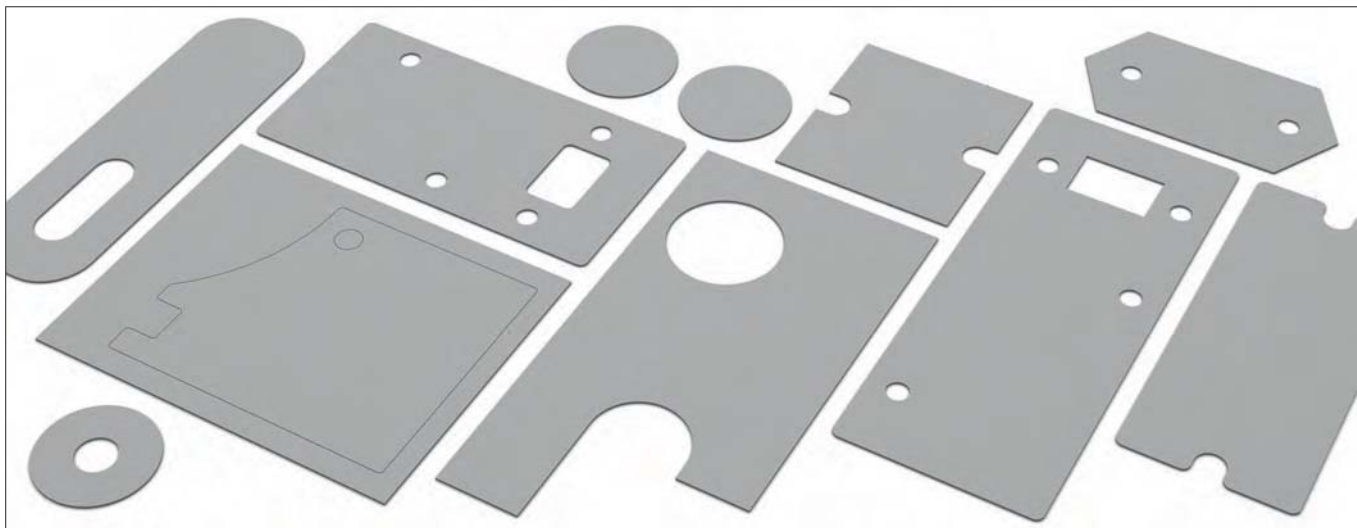


- specially soft design
- levels smallest air gaps and unevennesses
- cuts and contours with cutouts according to customer's specifications

art. no.	material thickness [mm]	$R_{th}$ (100 kPa) [°C in <sup>2</sup> /W]	$R_{th}$ (100 kPa) [°C cm <sup>2</sup> /W]
<b>GEL 28 S 10</b>	1.0 ±0.15	0.42	2.7
<b>GEL 28 S 15</b>	1.5 ±0.20	0.60	3.9
<b>GEL 28 S 20</b>	2.0 ±0.30	0.76	4.9
<b>GEL 28 S 25</b>	2.5 ±0.30	0.90	5.8
<b>GEL 28 S 30</b>	3.0 ±0.30	1.02	6.6
<b>GEL 28 S 35</b>	3.5 ±0.35	1.15	7.4
<b>GEL 28 S 40</b>	4.0 ±0.40	1.27	8.2
<b>GEL 28 S 45</b>	4.5 ±0.45	1.45	9.4
<b>GEL 28 S 50</b>	5.0 ±0.50	1.64	10.6

<b>GEL 28 S</b>	
<b>version</b>	standard
<b>colour</b>	grey
<b>density</b>	2.6 g/cm <sup>3</sup>
<b>hardness</b>	9 ASKER C
<b>thermal conductivity</b>	2.5 W/m·K
<b>temperature range</b>	-40°C... +150°C
<b>volume resistance</b>	1·10 <sup>11</sup> Ω·m
<b>dielectric constant</b>	7.21 [50 Hz] / 6.73 [1 kHz] / 6.25 [1 MHz]
<b>dielectric loss factor</b>	0.059 [50 Hz] / 0.031 [1 kHz] / 0.007 [1 MHz]
<b>dielectric strength</b>	18 kV/mm
<b>class of inflammability</b>	UL 94 V-0
<b>type of delivery</b>	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request



**Gel thermal conducting foils**


- silicone-free thermal conductive foil
- very good balance of unevennesses
- excellent thermal performance
- natural adhesive coating
- cuts and contours according to customer's drawing specifications

art. no.	material thickness [mm]
<b>WFGF 30 025</b>	0.254
<b>WFGF 30 04</b>	0.406
<b>WFGF 30 058</b>	0.584
<b>WFGF 30 076</b>	0.762
<b>WFGF 30 10</b>	1.016
<b>WFGF 30 15</b>	1.524
<b>WFGF 30 20</b>	2.032
<b>WFGF 30 25</b>	2.540
<b>WFGF 30 31</b>	3.175
<b>WFGF 30</b>	
<b>version</b>	silicone-free foil, one-sided protection foil
<b>colour</b>	light gray
<b>density</b>	3.2 g/cm <sup>3</sup>
<b>hardness</b>	70 Shore 00
<b>thermal conductivity</b>	3 W/m·K
<b>temperature range</b>	-40°C... +125°C
<b>volume resistance</b>	1·10 <sup>11</sup> Ω·m
<b>dielectric constant</b>	8 [1 kHz]
<b>dielectric strength</b>	6 kV
<b>class of inflammability</b>	UL 94 V-0
<b>type of delivery</b>	plates, usable area 457x228mm/ other dimensions upon request



**Phase Change thermal conductive material**


- phase change material on a polyimide basis
- very good thermal properties
- easy handling and high dielectric strength
- particularly suitable for the application of spring clips
- cuts and contours upon customised drawing specifications

art. no.	material thickness [mm]
<b>FSF 16 P 010</b>	0.102
<b>FSF 16 P 011</b>	0.114
<b>FSF 16 P 012</b>	0.127

<b>FSF 16 P</b>	
<b>version</b>	electrically insulating phase change material with polyimide reinforcement
<b>colour</b>	green
<b>phase change temperature</b>	55 °C
<b>thermal conductivity</b>	1.6 W/m·K
<b>temperature range</b>	-40°C... +150°C
<b>elongation</b>	40 %
<b>volume resistance</b>	10 <sup>12</sup> Ω·m
<b>dielectric constant</b>	4,5 [1 kHz]
<b>tear strength</b>	7,000 psi
<b>dielectric strength</b>	5 kV
<b>class of inflammability</b>	UL 94 V-0
<b>type of delivery</b>	plates, usable area 300x275mm/ other dimensions upon request

Thermal resistances vs. contact pressure					
pressure [psi]	10	25	50	100	200
thermal resistance FSF 16 P 010 [K/W]	0.95	0.94	0.92	0.91	0.90
thermal resistance FSF 16 P 011 [K/W]	1.19	1.17	1.16	1.14	1.12
thermal resistance FSF 16 P 012 [K/W]	1.38	1.37	1.35	1.33	1.32
thermal impedance FSF 16 P 010 [K-cm <sup>2</sup> /W]	0.81	0.81	0.75	0.75	0.75
thermal impedance FSF 16 P 011 [K-cm <sup>2</sup> /W]	1.06	1.00	1.00	1.00	0.93
thermal impedance FSF 16 P 012 [K-cm <sup>2</sup> /W]	1.18	1.18	1.18	1.12	1.12

## Thermally conductive adhesive

- space networking thermal conductive glue made on silicone basis
- very good thermal conductivity
- mixing in ration 1:1 with static mixing tube
- hardening will be proceeded at room temperature
- wide range of temperatures
- store cool, dark and dry



art. no.	basin	contents of delivery
<b>WLK SK 50</b>	cartridge	1x 50 ml cartridge / 3x mixer WLK SK M
<b>WLK SK 50</b>		
<b>version</b>	2-component silicone thermal adhesive	
<b>colour</b>	violet	
<b>density</b>	2.8 g/cm <sup>3</sup>	
<b>hardness</b>	65 Shore A	
<b>thermal conductivity</b>	2 W/m·K	
<b>temperature range</b>	-60°C... +180°C	
<b>working life at room temperature</b>	approx. 30 min	
<b>hardening time</b>	25°C approx. 8 h / 50°C approx. 4 h / 85°C approx. 1 h	
<b>volume resistance</b>	10 <sup>11</sup> Ω·m	
<b>dielectric constant</b>	6.9 [1 KHz]	
<b>heat capacity</b>	1 J/g·K	
<b>dielectric strength</b>	10.8 kV/mm	
<b>Scherfestigkeit bei RT</b>	1.4 MPa	
<b>class of inflammability</b>	UL 94 V-0	

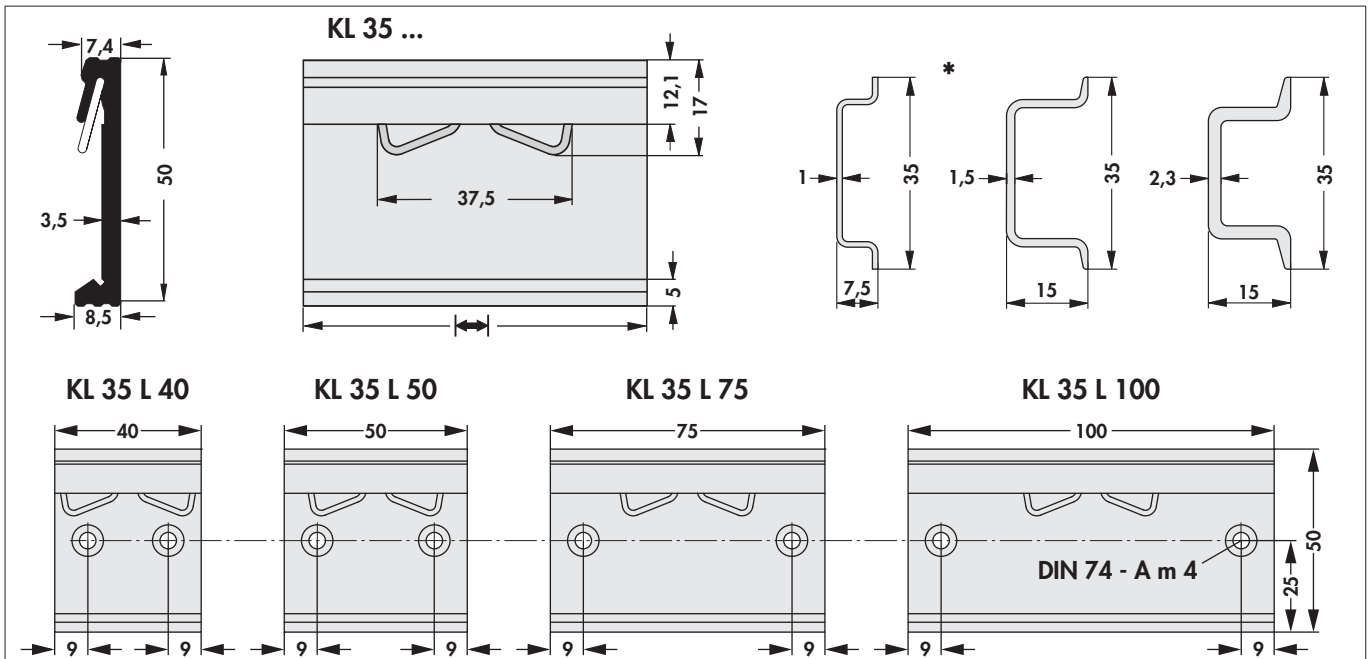
### Accessories

art. no.	contents of delivery
<b>WLK SK M</b>	10x mixer für 50 ml cartridge (packing unit 10 pieces)
<b>WLK P</b>	1x applicator gun for 50 ml cartridge

## Fastening for mounting rail



- universal, massive aluminium clamp mounting for all 35mm mounting rails
- suitable for rail material thicknesses from 1 to 2.3 mm according to DIN EN 60 715 (formerly DIN EN 50 022)
- fast and easy mounting of heatsinks, casings etc. by direct snap up on the mounting rail
- safe hold due to a stable extruded profile with integrated wire form spring made of stainless steel
- special lengths ( $\geq 40\text{mm}$ ), machinings and surfaces upon request
- \* = examples of mounting rail versions suitable for KL 35



art. no.	dim. [mm]	art. no.	dim. [mm]
<b>KL 35 40</b>	40	<b>KL 35 L 40</b>	40
<b>KL 35 50</b>	50	<b>KL 35 L 50</b>	50
<b>KL 35 75</b>	75	<b>KL 35 L 75</b>	75
<b>KL 35 100</b>	100	<b>KL 35 L 100</b>	100
<b>material:</b>	aluminium		
<b>surface:</b>	natural colour anodised		

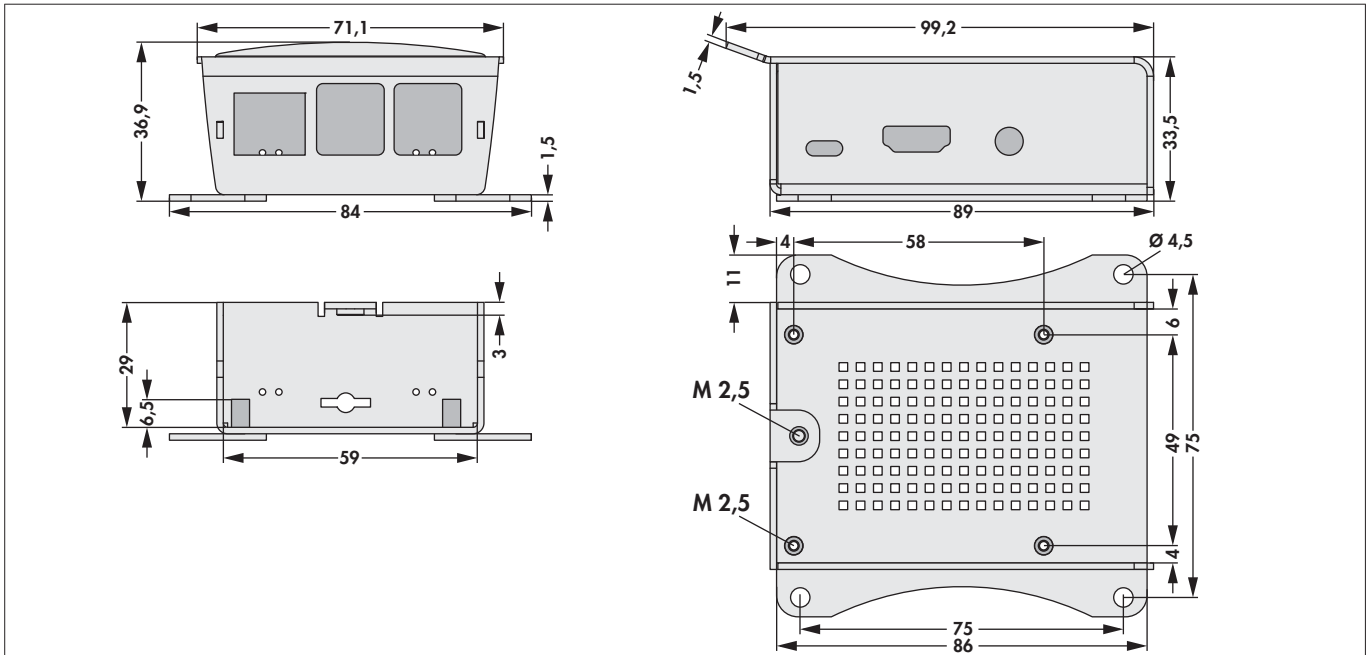
## Shell cases for Raspberry Pi



### contents of delivery:

**1** = 1 x upper part; **2** = lower part; **3** = 2 x fixing clamp (optional); **4** = 1 x mounting material

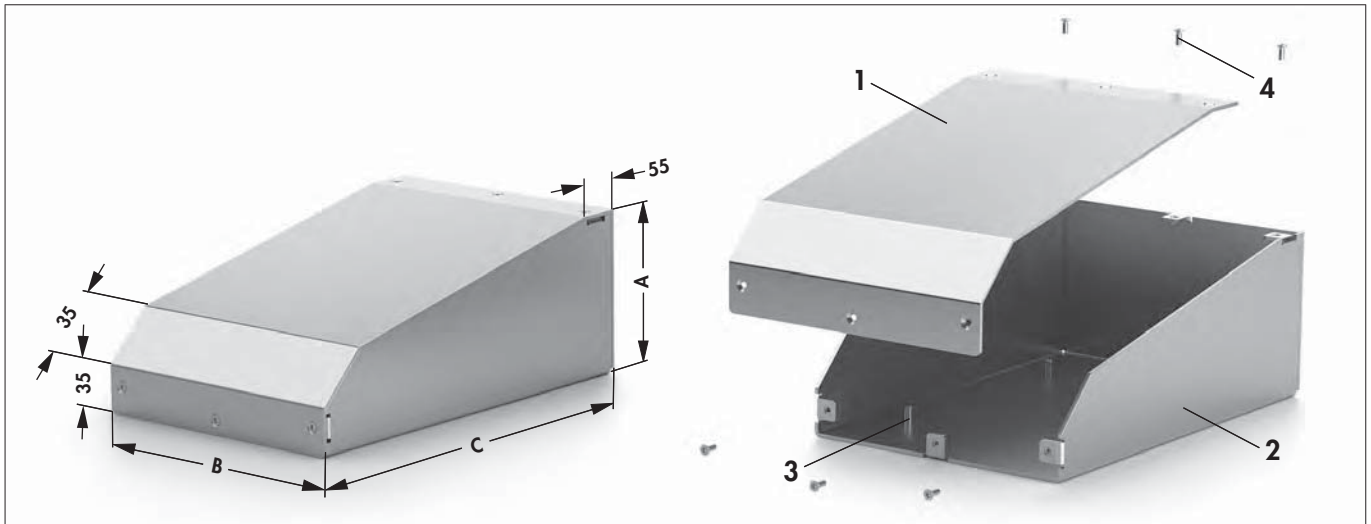
- solid case made of 1,5 mm thick aluminium half shells designed for the single board computer Raspberry Pi
- easy to install thanks to an easy screwing
- ventilation slots in the upper and lower part for an improved heat transport
- optional fixing clamps, also fitting to VESA MIS-D 75 x 75
- optional heatsink set consisting of heatsink **ICK BGA 14 x 14**, **ICK BGA 10 x 10** and appropriate double sided adhesive thermal conductive foil **WLFT 404**
- special machinings, further surfaces and colours upon request



art. no.	details	
<b>RSP 1 ...</b>	Raspberry Pi 2 Model B & Raspberry Pi 3 Model B, B+	
<b>please indicate:</b>	<b>... surface</b> <b>SA</b> = black anodised <b>ME</b> = natural colour anodised <b>MS</b> = case profile SA, cover panels ME <b>B</b> = case profile SA, cover panels blue (similar to RAL 5015) <b>R</b> = case profile SA, cover panels red (similar to RAL 3001) <b>OG</b> = case profile SA, cover panels orange-gold (similar to RAL 1028)	<b>... fixing strap (optional)</b> <b>L</b> = with fixing straps
	<b>... fixing of mounting rail (optional)</b> <b>KL</b> = fixing of mounting rail	<b>... heatsink set (optional)</b> <b>KS</b> = heatsink set

In addition to standard colours the colours green (similar **RAL 6032**) and violet (similar **RAL 4008**) are available for the upper shell.

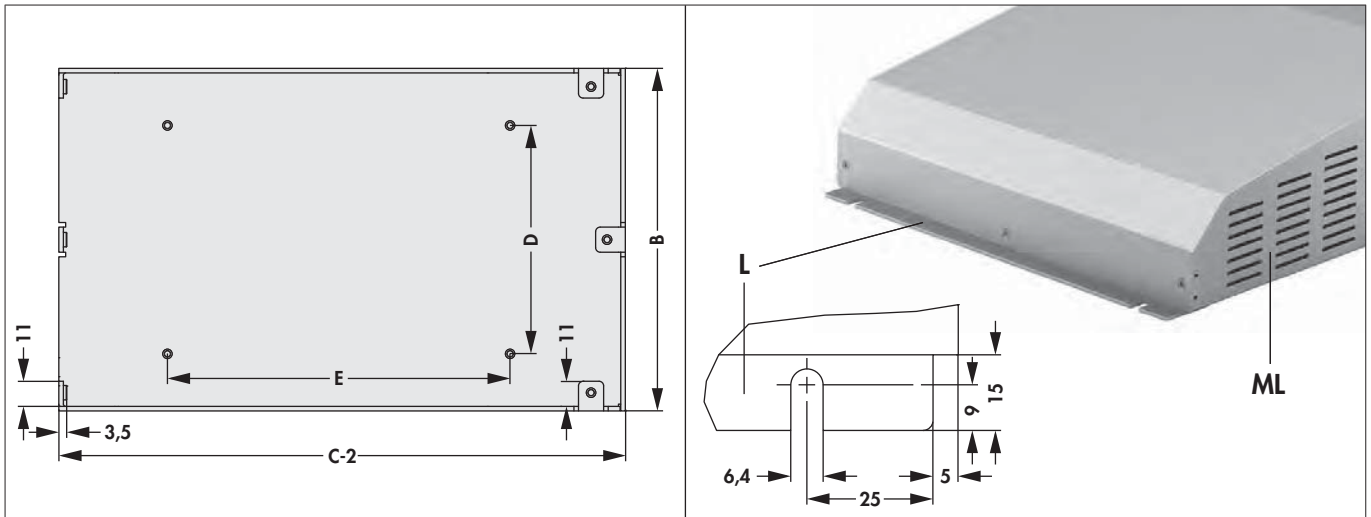
Shell cases variable



contents of delivery:

1 = upper shell; 2 = lower shell; 3 = 4 x M3 – threaded bush for PCB mounting; 4 = mounting material

- universal shell case with variable dimensions
- easy and fast mounting
- insertion of non-standardised PCBs and devices
- material thickness of the half shells 2 mm, other material thicknesses on request
- special treatments, surfaces and labelings acc. to customer specifications



possible dimensions:						
art. no.	dim. [mm]					
	A	B	C	D	E	thread sleeve height
SGV P ...	max. 200	max. 500	max. 400	max. 376	max. 476	6/8/10/12/14/20
please indicate with your order:						
art. no.	dim. [mm]					
	A	B	C	D	E	thread sleeve height
SGV P ...						
please indicate:		... surface		... fixing tab (optional)		
	SA = black anodised		L = fixing tab			
	ME = natural colour anodised					
	TP = transparent passivated					
	... ventilation slots (optional)					
	ML = ventilation slots					

## Case with slide-in cover panel



- versatile usable case with integrated guide slot for inserting non standardized components or PCBs
- slide-in cover panel in various metal sheet thicknesses: 1.5/2 mm (**GB 81 - 83, GB 307/308**); 2/2.5 mm (**GB 84**)
- integration possibility for front foils or foil keypads
- special dimensions, treatments and surfaces possible according to your demand

<p><b>art. no.</b></p> <p><b>GD 55 28 ...</b></p>	
<p><b>art. no.</b></p> <p><b>GD 125 41 ...</b></p>	
<p><b>please indicate:</b> ... <math>\left[ \right]</math> <b>100 120 160 200 220 234 mm</b> ... <b>surface</b>  <b>SA = black anodised</b>  <b>ME = natural colour anodised</b></p>	



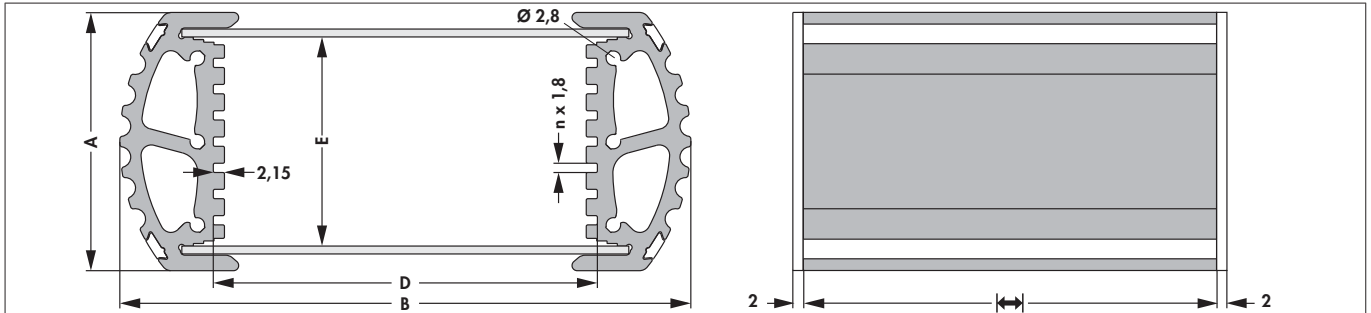
## Extruded assembled cases



### contents of delivery:

**1** = 2 x side panel profile; **2** = 4 x design strip; **3** = 2 x cover plate (1.5 mm); **4** = 2 x cover plate (2 mm); mounting material

- variable case by utilization of aluminium sheets and extruded profiles in four different heights
- integrated guide grooves in the side panel profile for receiving PCBs
- the cover plates can be varied by 1.5 - 3 mm
- design strips are available in the colours **turquoise blue (similar to RAL 5018)**, **heather violet (similar to RAL 4003)**, **ultramarine blue (similar to RAL 5002)**, **fire red (similar to RAL 3000)** and **daffodil yellow (similar to RAL 1007)**
- other plate thicknesses, special productions, treatments and modifications according to your demands



art. no.	dim. [mm]					art. no.	dim. [mm]				
	A	B	D	E	n		A	B	D	E	n
<b>GV 35 51 ...</b>	35	84.2	51.0	25.5	4	<b>GV 60 85 ...</b>	60	123.2	85.0	50.5	9
<b>GV 35 67 ...</b>		100.5	67.3			<b>GV 60 100 ...</b>		138.5	100.3		
<b>GV 35 85 ...</b>		118.2	85.0			<b>GV 60 116 ...</b>		154.2	116.0		
<b>GV 35 100 ...</b>		133.5	100.3			<b>GV 60 130 ...</b>		168.2	130.0		
<b>GV 35 116 ...</b>		149.2	116.0			<b>GV 60 160 ...</b>		198.5	160.3		
<b>GV 35 130 ...</b>		163.2	130.0			<b>GV 60 200 ...</b>		238.2	200.0		
<b>GV 35 160 ...</b>		193.5	160.3			<b>GV 60 233 ...</b>		271.6	233.4		
<b>GV 50 85 ...</b>	50	121.2	85.0	40.5	7	<b>GV 70 85 ...</b>	70	125.2	85.0	60.5	11
<b>GV 50 100 ...</b>		136.5	100.3			<b>GV 70 100 ...</b>		140.5	100.3		
<b>GV 50 116 ...</b>		152.2	116.0			<b>GV 70 116 ...</b>		156.2	116.0		
<b>GV 50 130 ...</b>		166.2	130.0			<b>GV 70 130 ...</b>		170.2	130.0		
<b>GV 50 160 ...</b>		196.5	160.3			<b>GV 70 160 ...</b>		200.5	160.3		
<b>GV 50 200 ...</b>		236.2	200.0			<b>GV 70 200 ...</b>		240.2	200.0		
<b>GV 50 233 ...</b>		269.6	233.4			<b>GV 70 233 ...</b>		273.6	233.4		

please indicate:

...  $\left[ \right]$   
85 100 120 160 200 220 mm

... surface

**SA** = black anodised  
**ME** = natural colour anodised


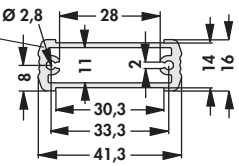
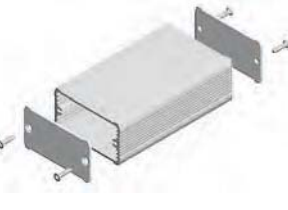
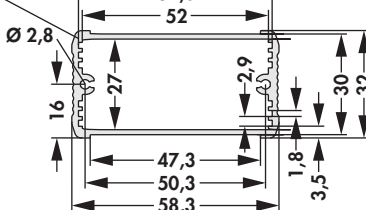

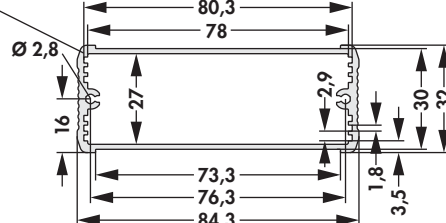
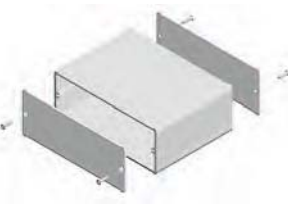
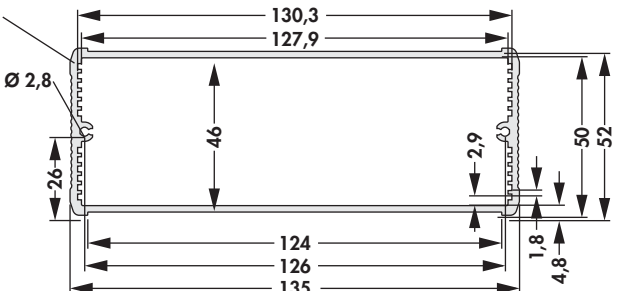

... colour design strip

**EV** = heather violet  
**FR** = fire red  
**NG** = daffodil yellow  
**TB** = turquoise blue  
**UL** = ultramarine blue

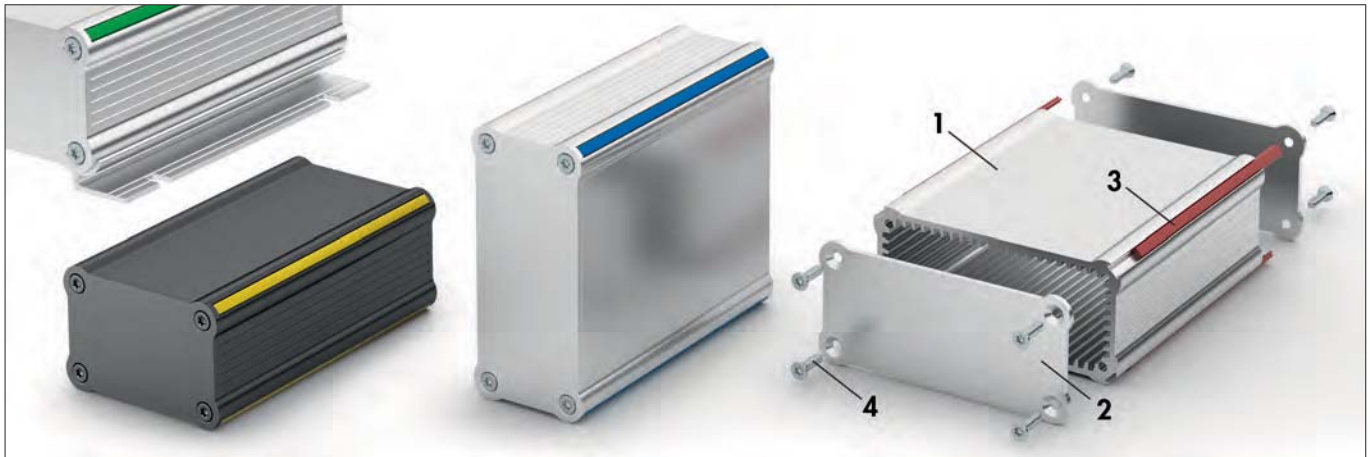


## Tube cases

- universal tube case with integrated guide slots for insertion of non standardised circuit boards
- EMC compatible version due to electrical conductive surfaces (**TP**) and additional conductive seals **EDKO**
- integration possibilities for front foils or foil keypads
- the 2 mm covers panels can be perforated or imprinted acc. to your specifications
- supplied as demounted kit incl. cover plates and mounting material

<b>art. no.</b>  <b>TUF 41 16 ...</b>		<b>GP 221</b> 	
<b>art. no.</b>  <b>TUF 58 32 ...</b>		<b>GP 224</b> 	
<b>art. no.</b>  <b>TUF 84 32 ...</b>		<b>GP 225</b> 	
<b>art. no.</b>  <b>TUF 135 52 ...</b>		<b>GP 226</b> 	
<b>please indicate:</b> ...  <b>50 80 100 120 160 200 220 mm</b>		<b>... surface</b> <b>SA = black anodised</b> <b>ME = natural colour anodised</b> <b>MS = case profile SA, cover panels ME</b>	

## Tube cases



### contents of delivery:

**1** = 1 x basic profile (**GB 87** for **TUS 58 39 ...**, **GB 88** for **TUS 84 39 ...**)

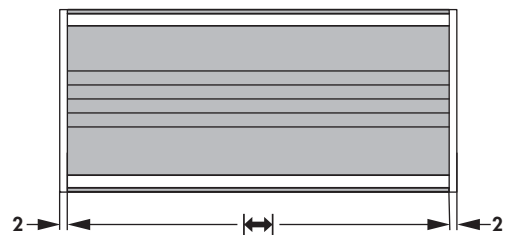
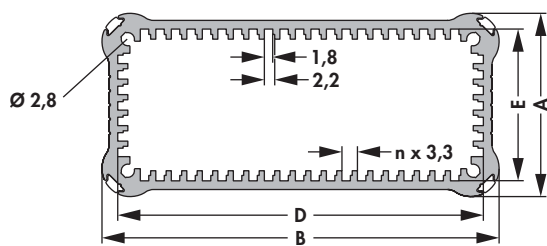
**2** = 2 x cover plate (2 mm)

**3** = 4 x plastic design strip

**4** = mounting material

- universal aluminium tube case with integrated guide slots for insertion of non-standardised components or circuit boards
- horizontal or vertical insertion possibility of PCB's in 1.6 or 2 mm material thickness
- ergonomical shape due to special outer contour
- EMC compatible version due to electrically conductive surfaces (**TP**) and additionally conductive sealings **EDKO "TUS"**
- design strips in sky blue (similar to **RAL 5015**), brick red (similar to **RAL 3002**), bright green (similar to **RAL 6038**), pure orange (similar to **RAL 2004**) or sulphur yellow (similar to **RAL 1016**)
- special designs, treatments, modifications and versions according to customer specifications
- further colours of the design bar and surface treatments upon request

art. no.	dim. [mm]			
	A	B	D	E
<b>TUS 58 39 ...</b>	39	58.9	52.2	32.3
<b>TUS 84 39 ...</b>		84.5	77.8	
<p><b>please indicate:</b></p> <p>... <math>\left[ \right]</math> <b>50 80 100 120 160 200 220 mm</b></p> <p>... <b>surface</b>  <b>SA = black anodised</b>  <b>ME = natural colour anodised</b>  <b>MS = case profile SA, cover panels ME</b></p> <p>... <b>fixing strap (optional)</b>  <b>L = with fixing straps</b></p> <p>... <b>colour design strip</b>  <b>HB = sky blue</b>  <b>KR = carmine red</b>  <b>GL = bright green</b>  <b>RO = pure orange</b>  <b>SG = sulphur yellow</b></p>				



## Case with cooling fins: Embedded case



**contents of delivery:** 1 = 1 x case profile; 2 = 2 x cover panel; 3 = 1 x bottom panel; 4 = mounting material

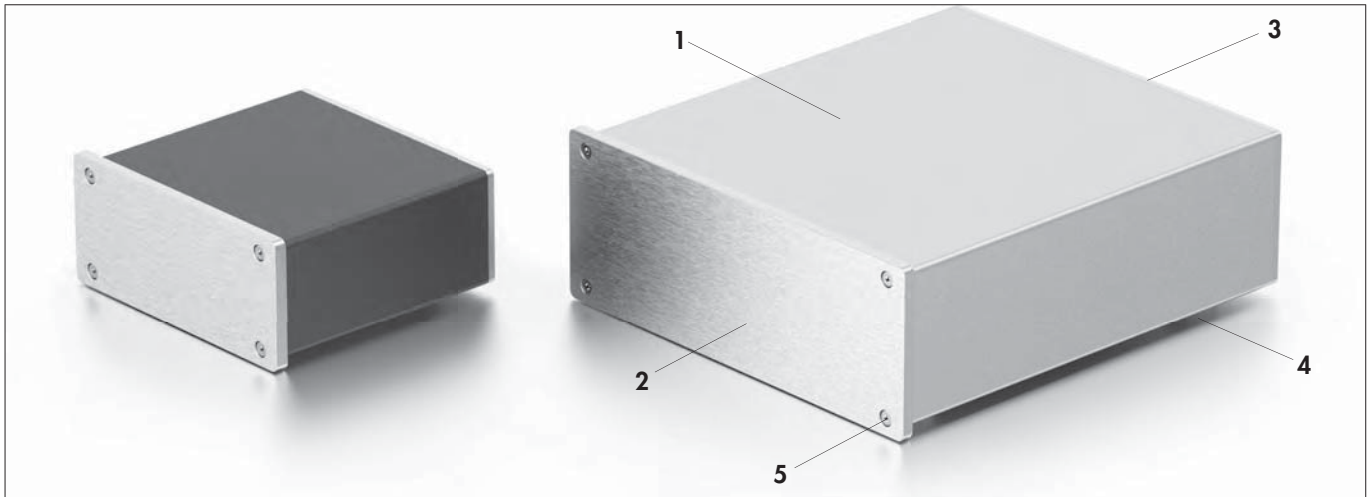
- universal cooling fin case made of aluminium extruded profile, cover panels in 2 mm thickness and removable bottom panel
- optimized heat dissipation by means of external cooling fins
- the integrated T-grooves in the case profile for mounting of i.e. mainboards in the Mini-ITX or NUC form factor by means of distance, bolts and mounting plate also EBX, Nano ITX, EPIC, ETX/XTX and PC/104 form factors by means
- internal guide grooves for inserting PCBs or mounting plates
- wall-, ceiling- or top-hat rail mounting by means of fixing straps or top-hat rail mounting from the bottom
- special designs, embedded cover panels, machinings, surfaces and printings upon request

<p><b>art. no.</b></p> <p><b>EMB 135 ...</b></p>		
<p><b>art. no.</b></p> <p><b>EMB 175 ...</b></p>		
<p><b>please indicate:</b></p> <p>...  105 150 200 250 mm</p> <p>... <b>surface</b>  <b>SA = black anodised</b>  <b>ME = natural colour anodised</b>  <b>MS = case profile SA, cover panels ME</b></p> <p>... <b>way of fixation (optional)</b>  <b>KL = fixing of mounting rail</b>  <b>LS = mounting strap set</b></p> <p>... <b>accessories (optional)</b>  <b>BL = bottom panel with ventilation slots</b></p>		

\* accessories mounting set BFS

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

**Aluminium decorative case**

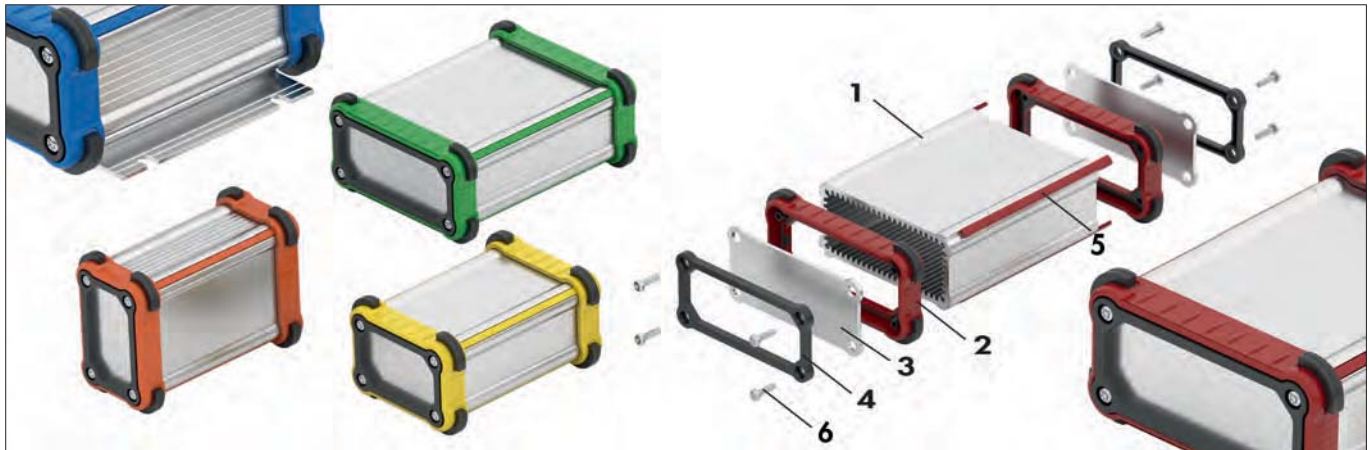


**contents of delivery:** **1** = 2 x case profile; **2** = 1 x front panel; **3** = 1 x back panel; **4** = device base (PVC); **5** = mount. material

- high class decorative and robust case made of aluminium
- on the basis of combination case profiles → **KOH ...** and → **KO HL ...**
- front panel decoratively polished with 180 grit, case profile glass bead blasted
- suitable as an amplifier case or for similar applications with highly decorative standards
- other device bases upon request
- individual customer specific machinings and surface coating upon request

<p><b>art. no.</b></p> <p><b>ADG 111 50 ...</b></p>	
<p><b>art. no.</b></p> <p><b>ADG 171 65 ...</b></p>	
<p><b>please indicate:</b> ... <math>\left[ \begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \end{array} \right]</math></p> <p>100 120 160 200 220 234 mm</p> <p><b>... front panels</b></p> <p>6 = 6 mm</p> <p>8 = 8 mm</p> <p>10 = 10 mm</p> <p><b>... surface</b></p> <p>SA = black anodised</p> <p>ME = natural colour anodised</p> <p>MS = case profile SA, front panels ME</p>	

Design case SECCO

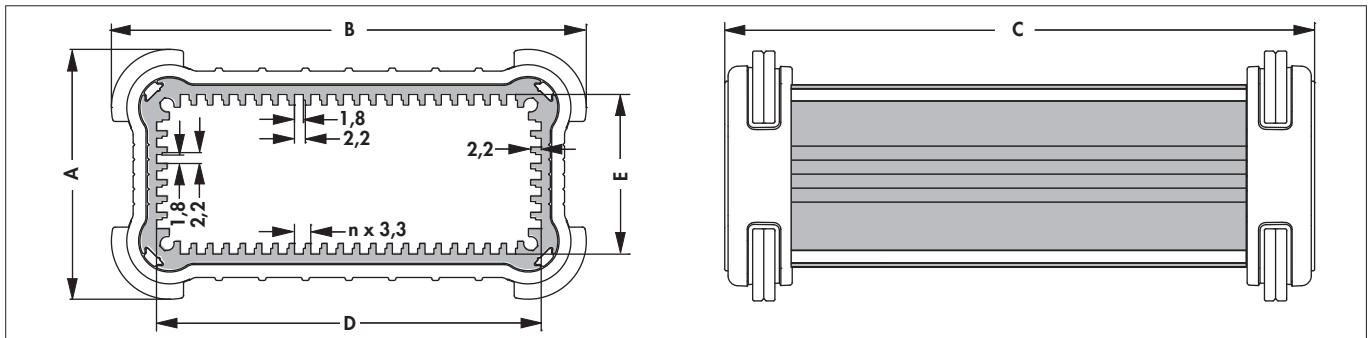


contents of delivery:

- 1 = 1 x basic profile
- 2 = 2 x plastic exterior frame
- 3 = 2 x cover panel (2 mm)
- 4 = 2 x plastic pressed on frame (similar RAL 7012)
- 5 = 4 x plastic design strip
- 6 = mounting material

- multi-purpose tube case made of aluminium with integrated guide slots for mounting non-standard PCBs or devices
- unique, elegant design with shock-proof plastic covers and integrated sealing
- horizontal or vertical mounting possibility of the PCB with 1.6 or 2 mm thickness
- protection class IP 67 achievable without using additional sealings
- integration possibility of front foils or front keypads
- special designs and treatments, modifications and versions possible according to your demand
- outer frames and design strips in sky blue (similar to RAL 5015), brick red (similar to RAL 3002), bright green (similar to RAL 6038), pure orange (similar to RAL 2004) or sulphur yellow (similar to RAL 1016)
- other colours and surfaces upon request

C = deliverable inside length +19 mm



art. no.	dim. [mm]				
	A	B	D	E	n
SEC 58 39 ...	50.5	70.4	52.2	32.3	13
SEC 84 39 ...		96.0	77.8		21
please indicate:	... $\left[ \right]$ 50 80 100 120 160 200 220 mm		... fixing strap (optional) L = with fixing straps		
	... surface SA = black anodised ME = natural colour anodised MS = case profile SA, cover panels ME		... colour design strip HB = sky blue KR = carmine red GL = bright green RO = pure orange SG = sulphur yellow		

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

19" insert with low depth



contents of delivery:

1 = front panel (made of profiles GB 28, GB 40, GB 54); 2 = hood; 3 = handles (optional); mounting material

- 19" insert with low depth for insertion of non-standardised devices or PCBs
- front panels made of extruded aluminium profiles 1 U up to 3 U, hoods made of 1.5mm aluminium sheets
- insertion depth 50 mm and 70 mm
- case optionally with handles as well as hoods with ventilation slots
- surface of the single components is natural colour anodised
- other depths, surfaces and customer specific machinings upon request

art. no.	dim. [mm]			art. no.	dim. [mm]		
	A		T		A		T
VESA GT 1 50 ...	43.8	39.6	50	VESA GT 1 70 ...	43.8	39.6	70
VESA GT 2 50 ...	88.1	81.8		VESA GT 2 70 ...	88.1	81.8	
VESA GT 3 50 ...	132.5	126.2		VESA GT 3 70 ...	132.5	126.2	

please indicate: ... accessories (optional)  
**G** = handles  
**ML** = ventilation slots

surface: natural colour anodised


## Insert modules for 19" subracks, 3 U

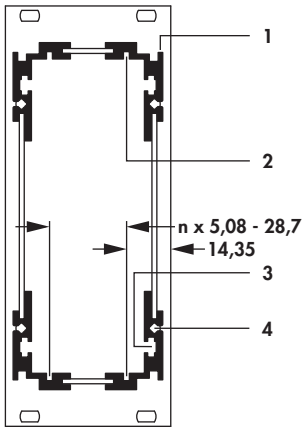
### Design G

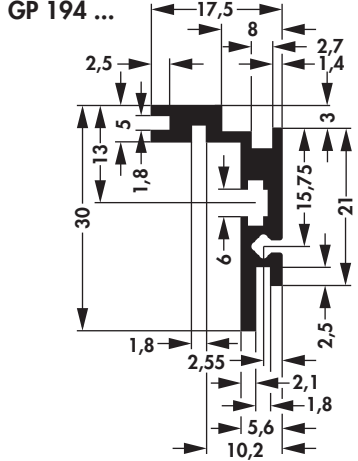
- insert modules made of four corner extrusions with T-grooves for threaded rails, slide nuts M 3 or screw heads
- with the corner extrusions the insert modules can be produced in any standard size and in any customer specific size
- external screw channels prevent short circuits by screw swarfs
- dimensioned drawing of the corner extrusion **GP 194**
- photo view from rear with removed back panel

**1** = guide ridge for 19" case; **2** = slot for PCB guides;

**3** = slot for threaded rails, hexagon screws respectively screw nuts M 3; **4** = external screw channel M 3







art. no.		HP	art. no.		HP	art. no.		HP
<b>GME 10 ...</b>	ME	10	<b>GSA 10 ...</b>	SA	10	<b>GTP 10 ...</b>	TP	10
<b>GME 12 ...</b>		12	<b>GSA 12 ...</b>		12	<b>GTP 12 ...</b>		12
<b>GME 14 ...</b>		14	<b>GSA 14 ...</b>		14	<b>GTP 14 ...</b>		14
<b>GME 16 ...</b>		16	<b>GSA 16 ...</b>		16	<b>GTP 16 ...</b>		16
<b>GME 20 ...</b>		20	<b>GSA 20 ...</b>		20	<b>GTP 20 ...</b>		20

**please indicate:**

... insert depth  
**160 220 mm**

... perforated cover panel (optional)  
**L**

... cut-out of rear panel  
**R 1, R 2, R 3**

... handle (optional)  
**KG = plastic-handle**  
**AG = aluminium-handle**

**ME** = front panel, profiles and rear panel natural colour anodised

**SA** = front panel natural colour anodised, profiles and rear panel black anodised

**TP** = front panel, profiles and rear panel transparent passivated

**cut-out of rear panel R 1 - R 3** explanation page → **Available rear panels**

### Profile section

art. no.	surface	dim. [mm]
		↔
<b>GP 194 1000 AL</b>	AL	1000
<b>GP 194 166 ME</b>	ME	166
<b>GP 194 226 ME</b>		226
<b>GP 194 1000 ME</b>		1000

**AL** = nature degreased

**ME** = natural colour anodised

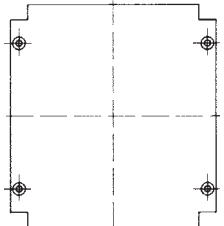
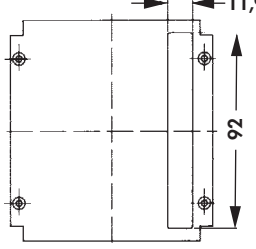
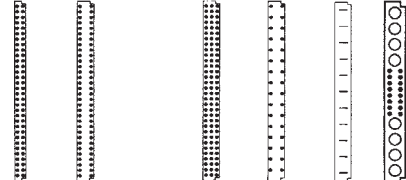
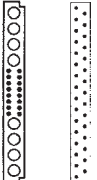
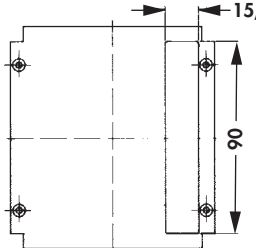
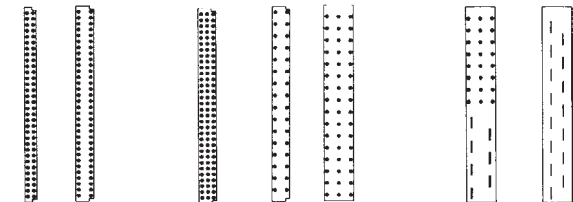


## Accessories for insert modules

### Available rear panels

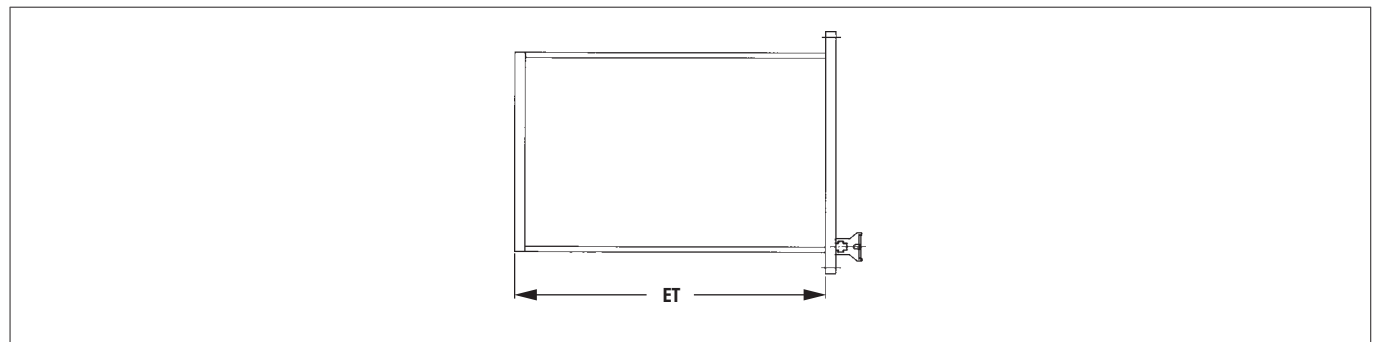
– when viewed from the rear, the male and female connector cut-outs are located on the right hand side

**1** = no. for order example; **2** = dimensioned drawing; **3** = fitting to connectors

1	2	3
R 1		
R 2		<p>DIN 41612</p>  <p>B 64 C 64 (32) C 96 D 32 H 11 M</p> <p>DIN 41617</p>  <p>31-polig</p>
R 3		<p>DIN 41612</p>  <p>B 64 C 64 (32) C 96 D 32 F 48 (32) F 24/H 7 H 15</p>

### Insert depth (ET)

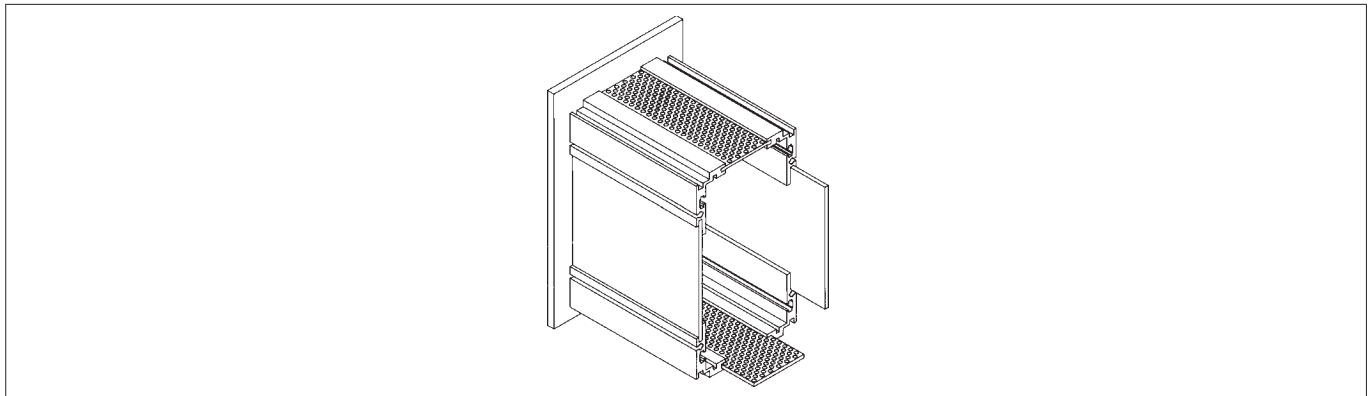
- **160** = insert depth  $168^{+0,5}$ mm, suitable for Eurocards  $100 \times 160$  mm /  $233.4 \times 160$  mm
- **220** = insert depth  $228^{+0,5}$  mm, suitable for Eurocards  $100 \times 220$  mm /  $233.4 \times 220$  mm



## Accessories for insert modules

### Perforated cover panel

– hole diameter 3.2 mm only for designs **A, B, C, D, E, G, S** and **T**



### Handles

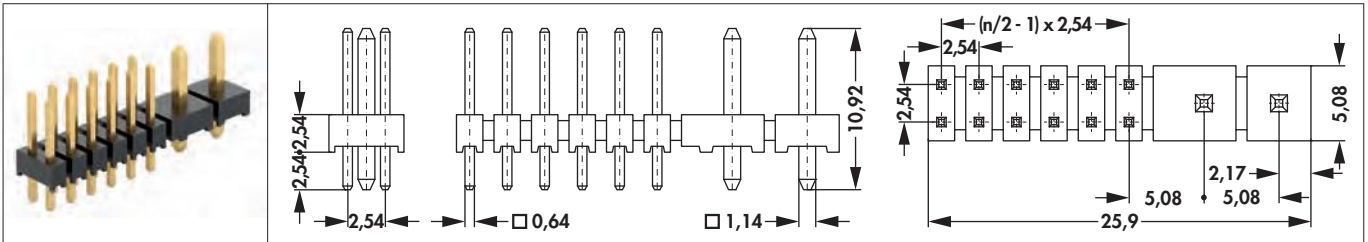
- **AG** = front panel with anodised aluminium-handle and fixing material
- **KG** = front panel with plastic-handle, anodised aluminium-insert strip and fixing material



Male headers

Turned precision male contacts

- Suitable for **BL 22 SHK 14 02 G** and **BL 23 SHK 14 02 SMD G**
- Signal and high-power contacts
- Contacts gold-plated
- Other number of contacts / contact surface upon request

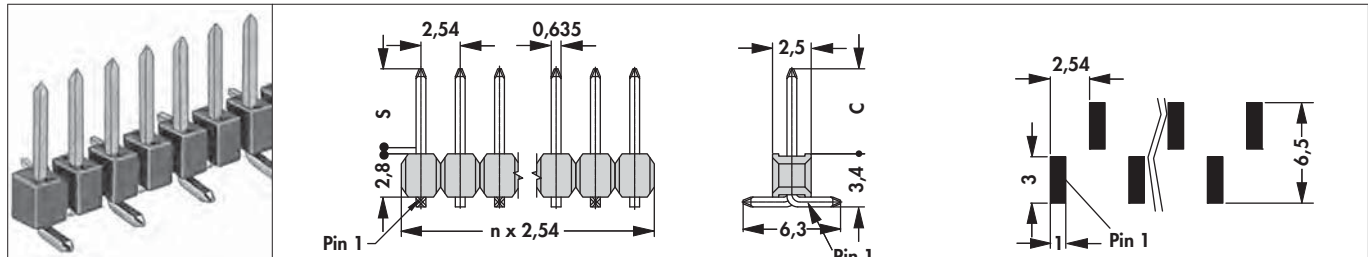


<b>art. no.</b>	
<b>SL 26 SHK 14 02 G</b>	
<b>surface of contact:</b>	gold-plated

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

### Male headers

□ 0.635 mm



art. no.	dim. [mm]		art. no.	dim. [mm]		art. no.	dim. [mm]	
	C	S		C	S		C	S
SL 10 SMD 040 ...	4.0	4	SL 10 SMD 062 ...	6.7	5	SL 10 SMD 104 ...	10.8	5
SL 10 SMD 052 ...	5.5		SL 10 SMD 078 ...	8.2		SL 10 SMD 130 ...	13.4	

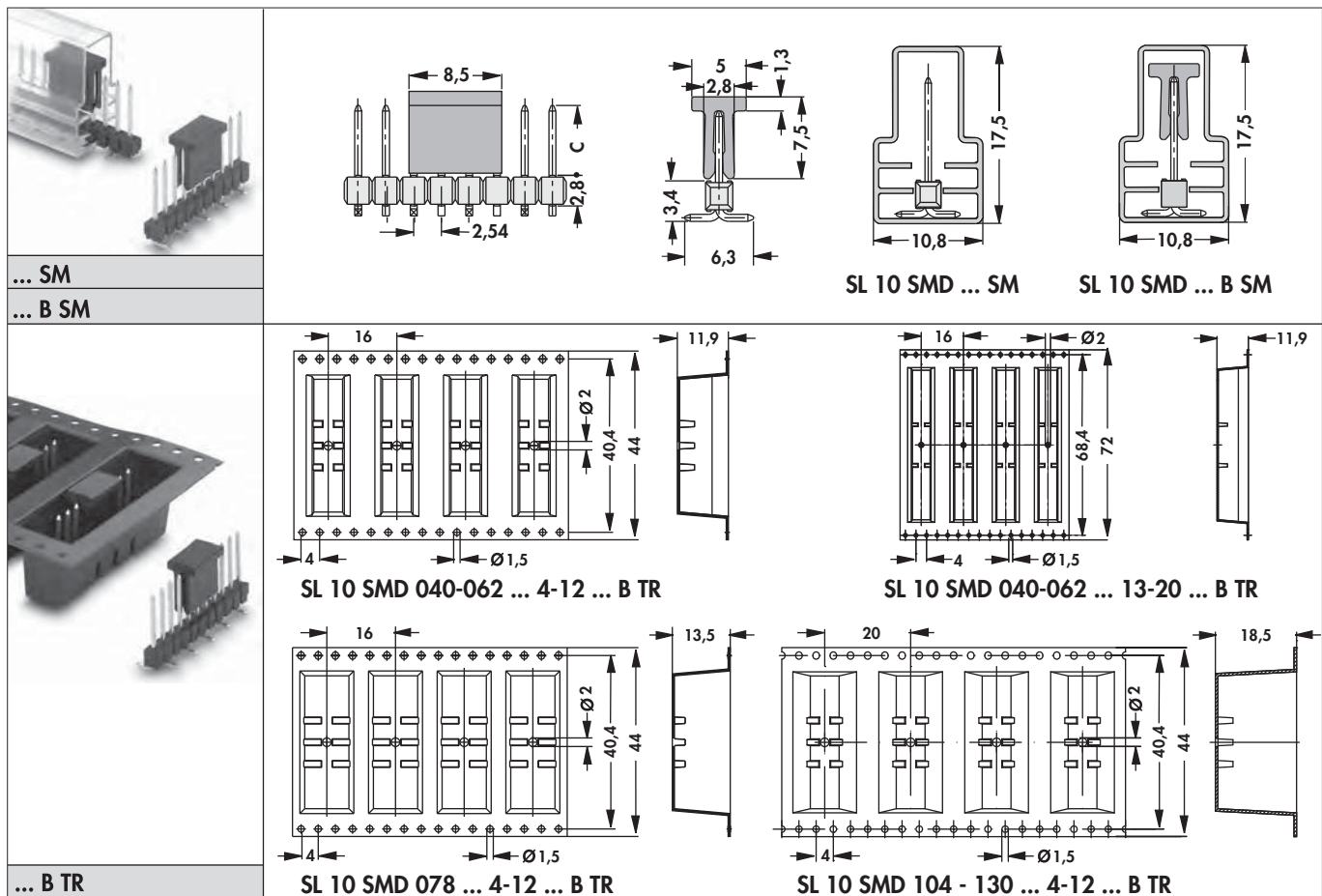
**please indicate:**

- ... no. of contacts one row 4 - 20
- ... surface of contact
  - S = selective gold-plated
  - G = gold-plated
  - Z = tin-plated
- ... packing
  - SM = bar magazine
  - B SM = pick and place pad and bar magazine
  - B TR = pick and place pad and tape and reel (250pcs/reel)

... packing (option) - additions:  
 SL 10 SMD 040-104 ... SM; ... B SM: 4-20 contacts  
 SL 10 SMD 040-062 ... B TR: 4-20 contacts  
 SL 10 SMD 078 / 104 - 130 ... B TR: 4-12 contacts

### Option, for automatic assembly

- reel diameter Ø 330 mm



... SM  
 ... B SM

SL 10 SMD ... SM      SL 10 SMD ... B SM

SL 10 SMD 040-062 ... 4-12 ... B TR

SL 10 SMD 040-062 ... 13-20 ... B TR

SL 10 SMD 078 ... 4-12 ... B TR

SL 10 SMD 104 - 130 ... 4-12 ... B TR

A  
B  
C  
D  
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F  
G  
H  
I  
K  
L  
M  
N

Male headers

□ 0.635 mm

<b>art. no.</b>	dim. [mm] C S	<b>art. no.</b>	dim. [mm] C S	<b>art. no.</b>	dim. [mm] C S
<b>SL 11 SMD 040 ...</b>	4.0	<b>SL 11 SMD 062 ...</b>	6.7	<b>SL 11 SMD 104 ...</b>	10.8
<b>SL 11 SMD 052 ...</b>	5.5				
<b>please indicate:</b>	<b>... no. of contacts</b> two rows 4 - 40	<b>... surface of contact</b> S = selective gold-plated G = gold-plated Z = tin-plated	<b>... packing (optional)</b> SM = bar magazine B SM = pick and place pad and bar magazine B TR = pick and place pad and tape and reel		

... packing (option) - additions:

SL 11 SMD 040-104 ... SM; ... B SM: 6-40 contacts

SL 11 SMD 040-078 ... B TR: 6-24 contacts, 250 pcs/reel

SL 11 SMD 104-130 ... B TR: 6-24 contacts, 150 pcs/reel

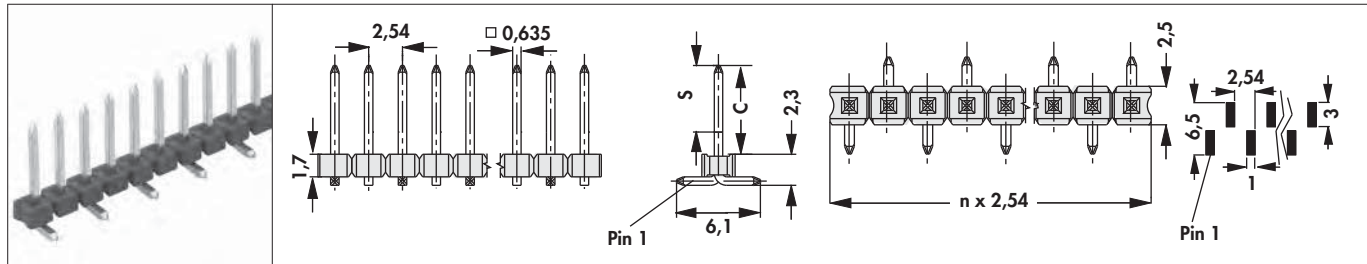
Option, for automatic assembly

- reel diameter Ø 330 mm

<b>... SM</b>			<b>SL 11 SMD ... SM</b>	<b>SL 11 SMD ... B SM</b>
<b>... B SM</b>				
	<b>SL 11 SMD 040-062 ... B TR</b>	<b>SL 11 SMD 078 ... B TR</b>		
<b>... B TR</b>	<b>SL 11 SMD 104-130 ... 6-24 ... B TR</b>			

Male headers

Low profile in SMD □ 0.635 mm



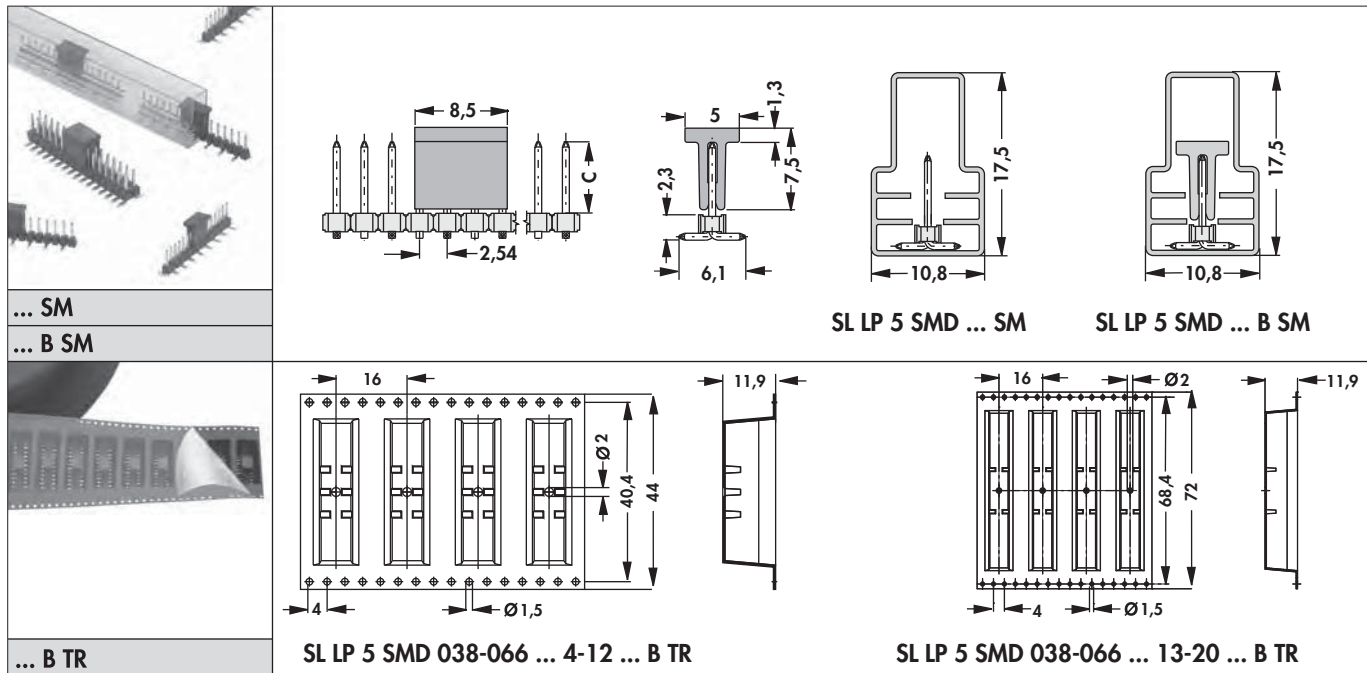
art. no.	dim. [mm]		art. no.	dim. [mm]		art. no.	dim. [mm]	
	C	S		C	S		C	S
SL LP 5 SMD 038 ...	3.8	3	SL LP 5 SMD 051 ...	5.1	4	SL LP 5 SMD 066 ...	6.6	4

please indicate:	... no. of contacts one row 4 - 20	... surface of contact S = selective gold-plated G = gold-plated Z = tin-plated	... packing (optional) SM = bar magazine B SM = pick and place pad and bar magazine B TR = pick and place pad and tape and reel (250pcs/reel)
------------------	---------------------------------------	--	---

... packing (option) - additions:  
 SL LP 5 SMD ... SM; ... B SM: 4-20 contacts  
 SL LP 5 SMD ... B TR: 4-20 contacts

Option, for automatic assembly

- reel diameter Ø 330 mm

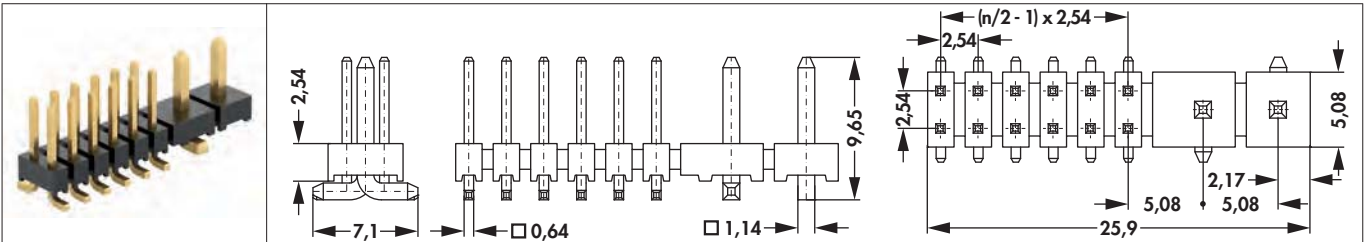


A  
B  
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G  
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L  
M  
N

**Male headers**

**Turned precision male contacts**

- Suitable for **BL 22 SHK 14 02 G** and **BL 23 SHK 14 02 SMD G**
- Signal and high-power contacts
- Contacts gold-plated
- Other number of contacts / contact surface upon request



<b>art. no.</b>	
<b>SL 27 SHK 14 02 SMD G</b>	
<b>surface of contact:</b>	gold-plated

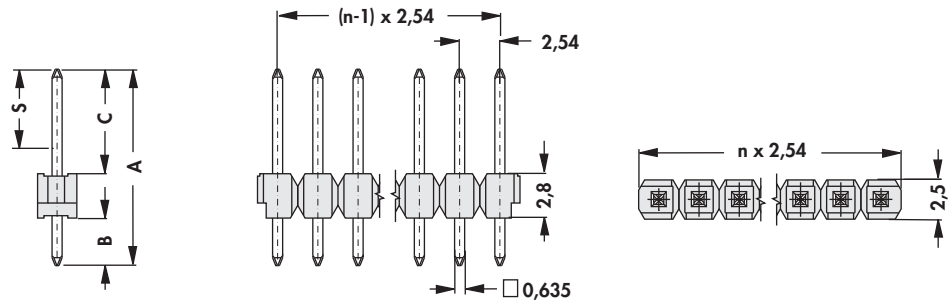
A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N



## Male headers

### Male connectors for LED applications

- every pin length is available upon request
- insulating body made of white plastic (nature)
- one row,  $\square$  0.635 mm



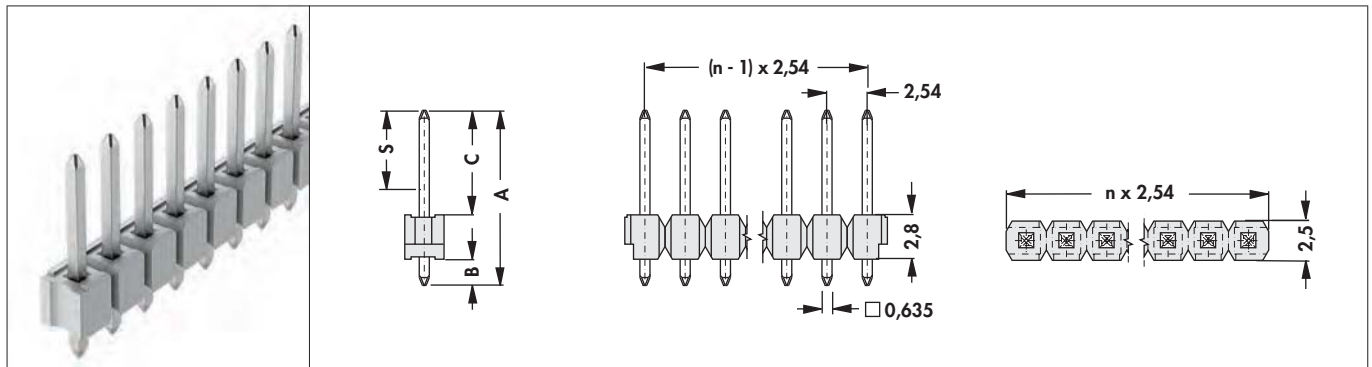
art. no.	dim. [mm]			
	A	B	C	S
SL 24 LED 097 ...	9.7	3	3.9	4
SL 24 LED 112 ...	11.2		5.4	
SL 24 LED 124 ...	12.4		6.6	5
<b>please indicate:</b>	<b>... no. of contacts</b> one row 1 - 36		<b>... surface of contact</b> S = selective gold-plated G = gold-plated Z = tin-plated	

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

Male headers

Male connectors for LED applications

- every pin length is available upon request
- insulating body made of white plastic (nature)
- one row, □ 0.635 mm




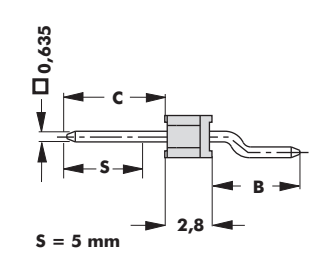
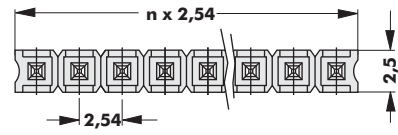
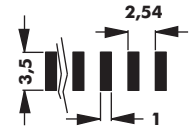
art. no.	dim. [mm]			
	A	B	C	S
SL 25 LED THR 097 ...	9.7	2	4.9	4
SL 25 LED THR 112 ...	11.2		6.4	5
SL 25 LED THR 124 ...	12.4		7.6	5

please indicate: ... no. of contacts one row 1 - 36      ... surface of contact  
**S** = selective gold-plated  
**G** = gold-plated  
**Z** = tin-plated

# Male headers

## Male connectors for LED applications

- insulating body made of white plastic (nature)
- one row, □ 0.635 mm


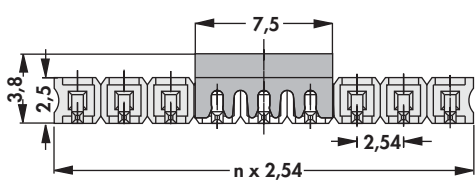
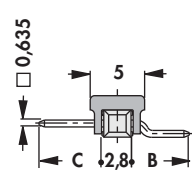
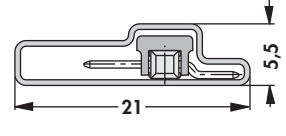
art. no.	dim. [mm]		
	B	C	S
SL 23 LED SMD 031 ...	5.2	3.1	4
SL 23 LED SMD 058 ...		5.8	5

**please indicate:**

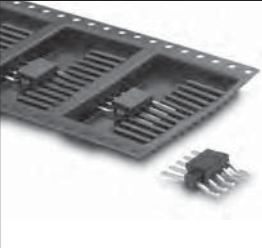
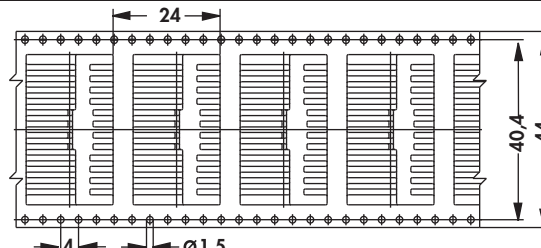
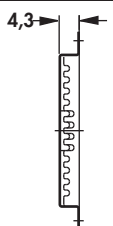
- ... no. of contacts one row 2 - 20
- ... surface of contact
  - S = selective gold-plated
  - G = gold-plated
  - Z = tin-plated
- ... packing (optional)
  - B SM = pick and place pad and bar magazine
  - B TR = pick and place pad and tape and reel (500pcs/reel)

... packing (option) - additions:  
 SL 23 LED ... B TR: 2-13 contacts

## Option, for automatic assembly

SL 23 LED SMD ... B SM

SL 23 LED SMD ... B TR

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

Male headers

Turned precision male contacts

- suitable for → BLY 10 SHK 14 02 G
- signal and high-power contacts
- contacts gold-plated
- other number of contacts / contact surface upon request

<b>art. no.</b>		
<b>SLY 13 SHK 14 02 G</b>		

<b>art. no.</b>		
<b>SLY 14 SHK 14 02 G</b>		
<b>surface of contact:</b>	gold-plated	

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Male headers

### Design, matching for BLY ...

- are used to connect overlying PCBs
- within the total length of the pin the insulating body is variable upon request
- **separable!** every requested number of contact can be delivered

- one row, □ 0,5 mm

art. no.	dim. [mm] A	art. no.	dim. [mm] A	art. no.	dim. [mm] A
<b>SLY 11 SMD 051 ...</b>	5.1	<b>SLY 11 SMD 092 ...</b>	9.2	<b>SLY 11 SMD 133 ...</b>	13.3

**please indicate:**

... no. of contacts one row 4 - 20	... surface of contact S = selective gold-plated G = gold-plated Z = tin-plated
---------------------------------------	--

- two rows, □ 0.5 mm

art. no.	dim. [mm] A	art. no.	dim. [mm] A	art. no.	dim. [mm] A
<b>SLY 12 SMD 051 ...</b>	5.1	<b>SLY 12 SMD 092 ...</b>	9.2	<b>SLY 12 SMD 133 ...</b>	13.3

**please indicate:**


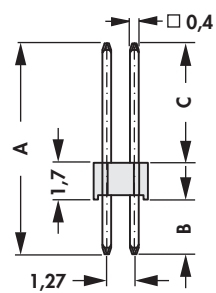
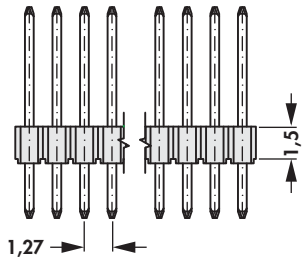
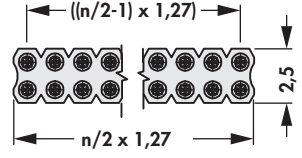
... no. of contacts two rows 4 - 40	... surface of contact S = selective gold-plated G = gold-plated Z = tin-plated
--	--

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Male headers

### Contact cross section □ 0.4 mm


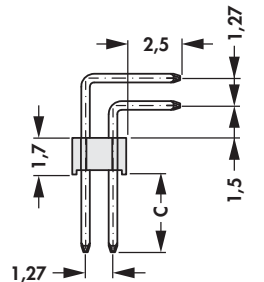
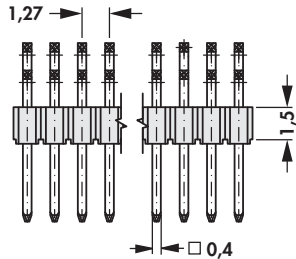
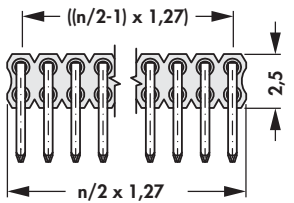
- two rows 4-72 contacts
- grid spacing 1.27 x 1.27

art. no.	dim. [mm]			art. no.	dim. [mm]		
	A	B	C		A	B	C
SLV W 4 055 ...	9.7	2.5	5.5	SLV W 4 105 ...	14.7	2.5	10.5
SLV W 4 080 ...	12.2		8.0	SLV W 4 130 ...	17.2		13.0

**please indicate:** ... no. of contacts two rows 4 - 72      ... surface of contact  
**G = gold-plated**  
**Z = tin-plated**

- two rows 4-72 contacts
- grid spacing 1.27 x 1.27 mm
- preferred number of contacts, others upon request


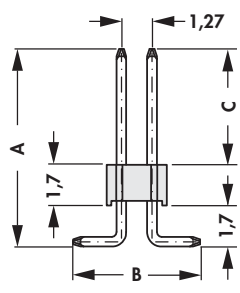
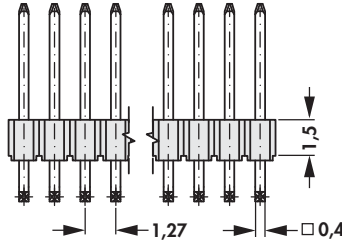
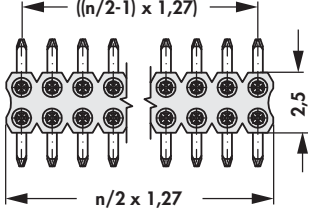
art. no.	no. of contacts	dim. [mm] C	art. no.	no. of contacts	dim. [mm] C
SLV W 4 KA 036 10 ...	10	3.6	SLV W 4 KA 060 10 ...	10	6.0
SLV W 4 KA 036 14 ...	14		SLV W 4 KA 060 14 ...	14	
SLV W 4 KA 036 16 ...	16		SLV W 4 KA 060 16 ...	16	
SLV W 4 KA 036 20 ...	20		SLV W 4 KA 060 20 ...	20	
SLV W 4 KA 036 26 ...	26		SLV W 4 KA 060 26 ...	26	
SLV W 4 KA 036 30 ...	30		SLV W 4 KA 060 30 ...	30	
SLV W 4 KA 036 34 ...	34		SLV W 4 KA 060 34 ...	34	
SLV W 4 KA 036 40 ...	40		SLV W 4 KA 060 40 ...	40	
SLV W 4 KA 036 50 ...	50		SLV W 4 KA 060 50 ...	50	
SLV W 4 KA 036 72 ...	72		SLV W 4 KA 060 72 ...	72	

**please indicate:** ... surface of contact  
**G = gold-plated**  
**Z = tin-plated**



# Male headers

- two rows 4-40 contacts
- grid spacing 1.27 x 1.27

art. no.	dim. [mm]			art. no.	dim. [mm]		
	A	B	C		A	B	C
SLV W 4 SMD 048 ...	8.2	5.3	4.8	SLV W 4 SMD 073 ...	10.7	5.3	7.3

**please indicate:**

... no. of contacts	... surface of contact
two rows 4 - 40	G = gold-plated
	Z = tin-plated

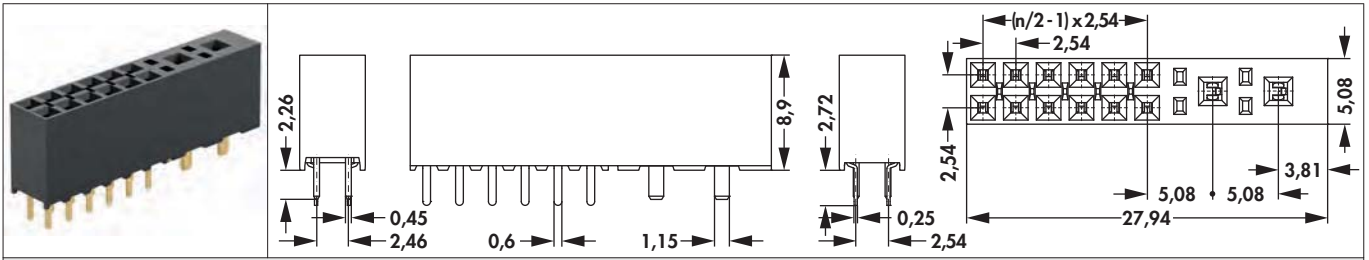
A  
B  
C  
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G  
H  
I  
K  
L  
M  
N



Female headers

Turned precision female contacts

- suitable for **SL 26 SHK 14 02 G** and **SL 27 SHK 14 02 SMD G**
- signal and high-power contacts
- contacts gold-plated
- other number of contacts / contact surface upon request



<b>art. no.</b>	
<b>BL 22 SHK 14 02 G</b>	
<b>surface of contact:</b>	gold-plated

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Female headers

### Low profile, fork contact spring

- for  $\square$  0.635 mm plug pins
- other number of contacts on request

<b>art. no.</b>				
<b>BL LP 5 SMD ...</b>				
<b>please indicate:</b>	<b>... no. of contacts</b> one row 4 - 20	<b>... surface of contact</b> S = selective gold-plated Z = tin-plated	<b>... packing (optional)</b> SM = bar magazine B SM = pick and place pad and bar magazine	

### Option, for automatic assembly

<b>... SM</b> <b>... B SM</b>	<b>BL LP 5 SMD ... B</b>		<b>BL LP 5 SMD ... SM</b>	<b>BL LP 5 SMD ... B SM</b>

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

Female headers

<b>art. no.</b>				
<b>BL LP 6 SMD ...</b>				
<b>please indicate:</b>	<b>... no. of contacts</b> two rows 4 - 40	<b>... surface of contact</b> S = selective gold-plated Z = tin-plated	<b>... packing (optional)</b> SM = bar magazine B SM = pick and place pad and bar magazine	

... packing (option) - additions:  
 BL LP 6 SMD ... SM 6-40 contacts  
 BL LP 6 SMD ... B SM 4-40 contacts

Option, for automatic assembly

<b>... SM</b> <b>... B SM</b>	<b>BL LP 6 SMD ... B</b>	<b>BL LP 6 SMD ... SM</b>	<b>BL LP 6 SMD ... B SM</b>	

<b>art. no.</b>				
<b>BL LP 7 SMD ...</b>				
<b>please indicate:</b>	<b>... no. of contacts</b> one row 1 - 20	<b>... surface of contact</b> S = selective gold-plated Z = tin-plated	<b>... packing (optional)</b> SM = bar magazine	

... packing (option) - additions:  
 BL LP 7 SMD ... SM 4-20 contacts

Option, for automatic assembly

<b>... SM</b>	<b>BL LP 7 SMD ... SM</b>

## Female headers

- no capillary action when soldering due to protected inner contact
- **separable!** any requested number of contact can be delivered

<b>art. no.</b>					
<b>BL 20 SMD ...</b>					
<b>please indicate:</b>	<b>... no. of contacts</b> two rows 4 - 40	<b>... packing (optional)</b> SM = bar magazine TR = tape and reel (600pcs/reel)			

**... packing (option) - additions:**

**BL 20 SMD ... TR: 4-26 contacts**

<b>contact sleeve:</b>	tin-plated
<b>contact spring:</b>	gold-plated
<b>insertion / drawing force:</b>	1.3N/0.3N

### Option, for automatic assembly

<b>... SM</b>	<b>BL 20 SMD ... SM</b>
<b>... TR</b>	<b>BL 20 SMD ... 4-26 TR</b>

### Turned precision female contacts

- suitable for **SL 26 SHK 14 02 G** and **SL 27 SHK 14 02 SMD G**
- signal and high-power contacts
- contacts gold-plated
- other number of contacts / contact surface upon request

	<b>art. no.</b>
<b>BL 23 SHK 14 02 SMD G</b>	
<b>surface of contact:</b>	gold-plated

## Female headers

### Precision contacts for $\square$ 0.635 mm and $\varnothing$ up to 0.85 mm, pin cross section

- no capillary action when soldering due to protected inner contact
- **separable!** any requested number of contact can be delivered

<b>art. no.</b>			
<b>MK 22 SMD ...</b>			
<b>please indicate:</b>	<b>... no. of contacts</b> one row 4 - 20	<b>... packing (optional)</b> B SM = pick and place pad and bar magazine B TR = pick and place pad and tape and reel (600pcs/reel)	

**... packing (option) - additions:**  
**MK 22 SMD ... B TR: 3-22 contacts**

<b>contact sleeve:</b>	tin-plated
<b>contact spring:</b>	gold-plated
<b>insertion / drawing force:</b>	1.3N/0.3N

### Option, for automatic assembly

<p><b>... B SM</b></p>	<p style="text-align: right;"><b>MK 22 SMD ... B SM</b></p>	
<p><b>... B TR</b></p>	<p style="text-align: center;"><b>MK 22 SMD ... 3-13 B TR</b></p>	<p style="text-align: center;"><b>MK 22 SMD ... 14-22 B TR</b></p>

A  
B  
C  
D  
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G  
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I  
K  
L  
M  
N

## Female headers

### Precision contacts for pin cross section $\varnothing 0,5$ mm

- one row
- no capillary action when soldering due to protected inner contact
- **separable!** any requested number of contact can be delivered

<b>art. no.</b>		
<b>MK 23 SMD ...</b>		
<b>please indicate:</b>	<b>... no. of contacts</b> one row 4 - 20	<b>... packing (optional)</b> B SM = pick and place pad and bar magazine B TR = pick and place pad and tape and reel (600pcs/reel)

**... packing (option) - additions:**  
MK 23 SMD ... B TR: 3-22 contacts

<b>contact sleeve:</b>	tin-plated
<b>contact spring:</b>	gold-plated
<b>insertion / drawing force:</b>	1.8 N/1.4 N

### Option, for automatic assembly

<b>... B SM</b>	<b>MK 23 SMD ... B SM</b>	
<b>... B TR</b>	<b>MK 23 SMD ... 3-13 B TR</b>	<b>MK 23 SMD ... 14-22 B TR</b>

A  
B  
C  
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G  
H  
I  
K  
L  
M  
N

Female headers

Female connectors for LED applications, low profile, fork contact spring

- **separable!** any requested number of contact can be delivered
- insulating body made of white plastic (nature)
- for  $\square$  0.635 mm pin cross section, straight

<p>art. no.</p> <p>BL LP 9 LED ...</p>				
<p>please indicate:</p>		<p>... no. of contacts one row 1 - 36</p>	<p>... surface of contact S = selective gold-plated Z = tin-plated</p>	

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N



## Female headers

### Female connectors for LED applications

- **separable!** any requested number of contact can be delivered
- insulating body made of white plastic (nature)
- for  $\square$  0.635 mm pin cross section, straight

<b>art. no.</b>				
<b>BL LP 8 LED SMD ...</b>				
<b>please indicate:</b>	<b>... no. of contacts</b> one row 1 - 20	<b>... surface of contact</b> S = selective gold-plated Z = tin-plated	<b>... packing (optional)</b> SM = bar magazine	

... packing (option) - additions:

BL LP 8 LED SMD ... SM 4-20 contacts

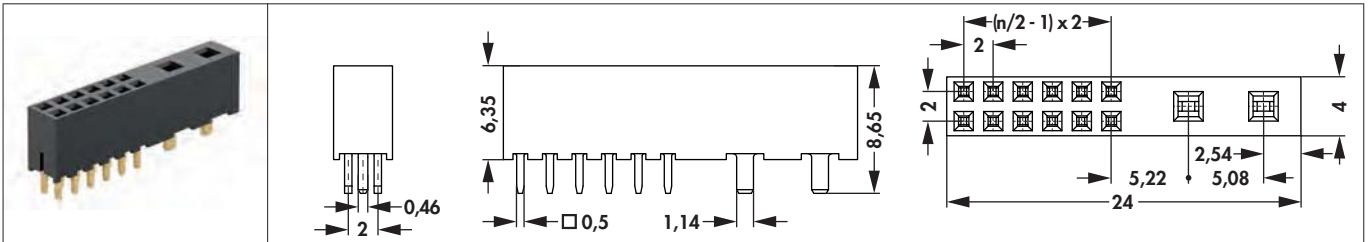
### Option, for automatic assembly

<b>... SM</b>	<b>BL LP 8 LED SMD ... SM</b>

**Female headers**

**Turned precision female contacts**

- suitable for → **SLY 13 SHK 14 02 G** and **SLY 14 SHK 14 02 G**
- signal and high-power contacts
- contacts gold-plated
- other number of contacts / contact surface upon request

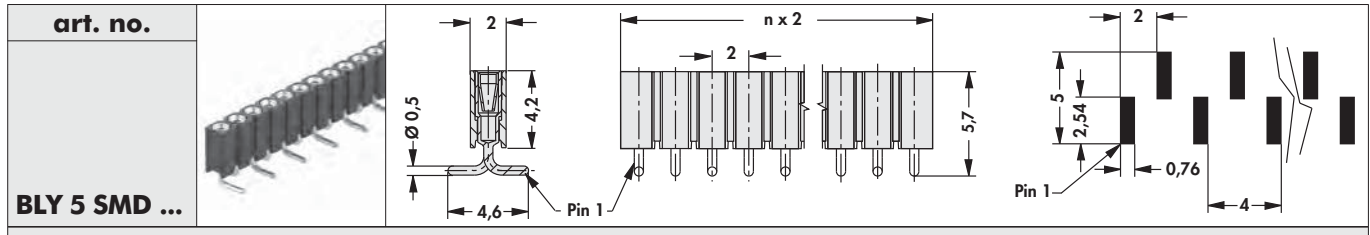


<b>art. no.</b>	
<b>BLY 10 SHK 14 02 G</b>	
<b>surface of contact:</b>	gold-plated

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

# Female headers

Precision contacts for  $\square$  0.5 mm and  $\varnothing$  up to 0.56 mm, pin cross section



<b>art. no.</b>		
<b>BLY 5 SMD ...</b>		
<b>please indicate:</b>	<b>... no. of contacts</b> one row 4 - 20	<b>... packing (optional)</b> B SM = pick and place pad and bar magazine B TR = pick and place pad and tape and reel (700pcs/reel)

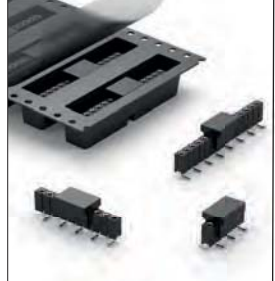
... packing (option) - additions:  
BLY 5 SMD ... B TR: 4-15 contacts

<b>contact sleeve:</b>	tin-plated
<b>contact spring:</b>	gold-plated
<b>insertion / drawing force:</b>	1.3N/0.3N

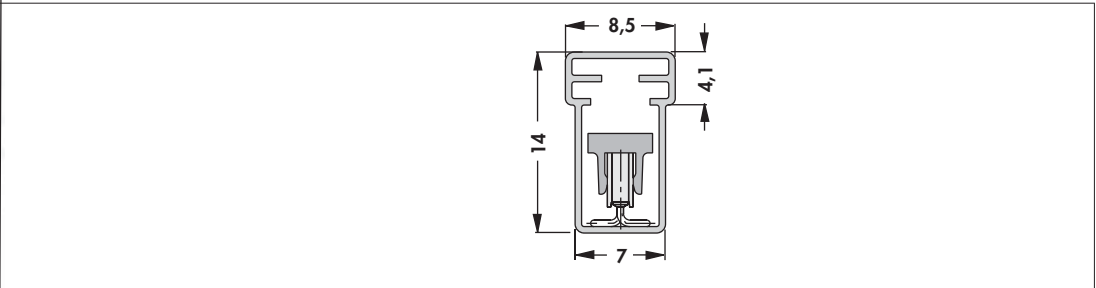
## Option, for automatic assembly



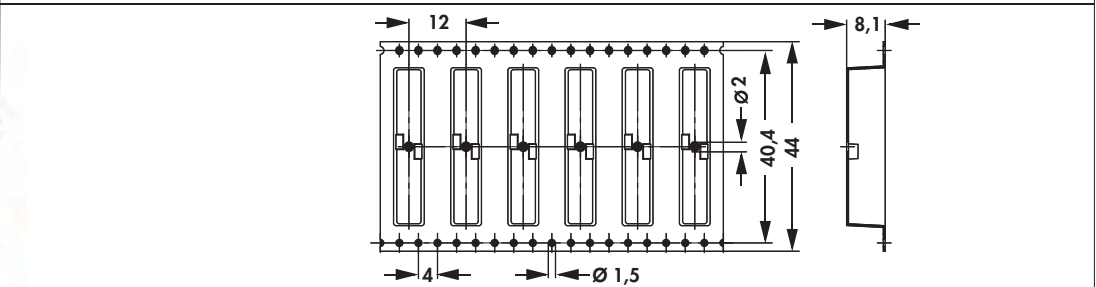
... B SM



... B TR



BLY 5 SMD ... B SM



BLY 5 SMD ... 4-15 B TR

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Female headers

- no capillary action when soldering due to protected inner contact
- **separable!** any requested number of contact can be delivered

<b>art. no.</b>				
<b>BLY 6 SMD ...</b>				
<b>please indicate:</b>	<b>... no. of contacts</b> one row 2 - 20	<b>... packing (optional)</b> TR = tape and reel		

**... packing (option) - additions:**  
**BLY 6 SMD ... TR: 2-10 contacts**  
**BLY 6 SMD ... TR: 11-20 contacts**

<b>contact sleeve:</b>	tin-plated
<b>contact spring:</b>	gold-plated
<b>insertion / drawing force:</b>	1.3N/0.3N

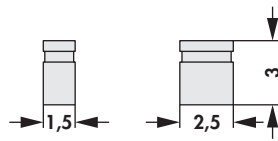
### Option, for automatic assembly

- reel diameter  $\varnothing$  330 mm

<b>... TR</b>	<b>BLY 6 SMD ... TR (2-10 contacts) (2.400 pcs/reel)</b>
<b>... TR</b>	<b>BLY 6 SMD ... TR (11-20 contacts) (2.200 pcs/reel)</b>

**Jumpers**

For □ 0.3...0.4 mm and Ø 0.4...0.5 mm



art. no.	grid [mm]	surface of contact	no. of contacts	version
<b>CAB 16 G ...</b>	1.27	<0.1 μm Au	2	closed
<b>please indicate:</b>	<b>... colour</b> <b>S = black</b> <b>R = red</b> <b>B = blue</b>			

A

B

C

D

E

F

**G**

H

I

K

L

M

N

**Technical data: PCB connectors**

	<b>SL ... SHK ...</b>	<b>SL ..., SL LP ...</b>	<b>SL ... LED ...</b>	<b>SLY ... SHK ...</b>
<b>contact material</b>	CuZn-alloy	CuSn alloy		CuZn-alloy
<b>surface contact / contact sleeve</b>	Ni+≥0.2μm Au	Ni+≥0.2μm Au/ Ni+4...6μm Sn		Ni+≥0.2μm Au
<b>volume resistance</b>	≤10 mΩ	≤5 mΩ		≤10 mΩ
<b>nominal current</b>	8.2 A/ 3 A	3 A		8.2 A/ 2.5 A
<b>nominal voltage</b>	250 V AC			
<b>test voltage</b>	1000 V	2000 V		1000 V
<b>insulating body material</b>	PCT, GF	PA 4.6. GF	LCP	PCT, GF
<b>temperature range</b>	-40°C ... +105°C (260°C / 10s)	-40°C... +163°C/ (260°C/10 s)	-40°C...+230°C/ (260°C/10 s)	-40°C ... +105°C (260°C / 10s)
<b>class of inflammability</b>	UL 94 V-0			
<b>specific insulation resistance</b>		>10 <sup>7</sup> Ω·m	>10 <sup>15</sup> Ω·cm	
	<b>SLY ...</b>	<b>SLV W ...</b>	<b>BL LP ...</b>	<b>BL 20 SMD ...</b>
<b>contact material</b>	CuSn alloy	CuZn-alloy	CuSn alloy	CuZn-alloy
<b>surface contact / contact sleeve</b>	Ni+≥0.2μm Au/ Ni+4...6μm Sn		Ni+0.2μm Au (selective)/ Ni+2...4μm Sn (matt finished tin)	Ni+4...6μm Sn
<b>inner contact spring material</b>				CuBe-alloy
<b>inner contact spring surface</b>				Ni+0,75μm Au
<b>type internal spring</b>			fork contact	6-fingers
<b>plugability for circuit points</b>			□0,5...0,7mm	□0,55...0,65mm/ Ø0,65...0,85mm
<b>insert depth</b>			2...4mm	2.5...6mm
<b>insertion / drawing force</b>			2N/1.5N	1.3N/0.3N
<b>shock resistance</b>				50 g
<b>volume resistance</b>	≤5 mΩ		≤10 mΩ	
<b>vibration resistance max.</b>				15 g
<b>capacity between two adjacent contacts</b>			≤ 0,9 pF	≤ 0,3 pF
<b>nominal current</b>	3 A	1.5 A	3 A	
<b>nominal voltage</b>	100 V DC	125 V AC		150 V DC
<b>test voltage</b>	500 V	300 V	1500 V	
<b>insulating body material</b>	PA 4.6. GF		PPS	PA 4.6. GF
<b>temperature range</b>	-40°C... +163°C/ (260°C/10 s)		-40°C... +200°C/ (260°C/10 s)	-40°C... +163°C/ (260°C/10 s)
<b>class of inflammability</b>	UL 94 V-0			
<b>specific insulation resistance</b>	>10 <sup>7</sup> Ω·m		>10 <sup>12</sup> Ω	>10 <sup>7</sup> Ω·m

**Technical data: PCB connectors**

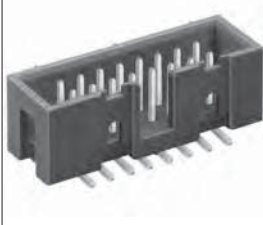
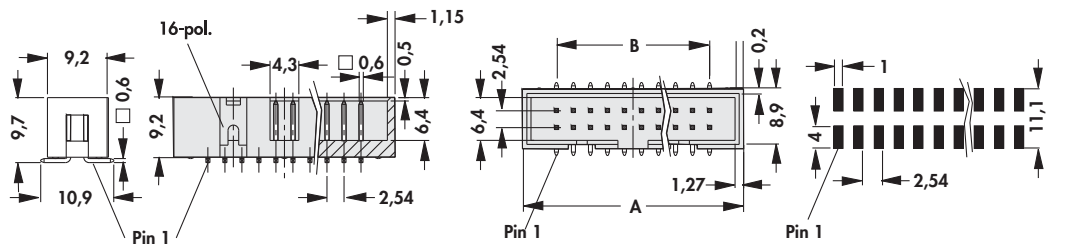
	<b>BL ... SHK ...</b>	<b>MK 22/222 ...</b>	<b>MK 23/223 ...</b>	<b>BL LP ... LED ...</b>
<b>contact material</b>	CuZn-alloy			CuSn alloy
<b>surface contact / contact sleeve</b>	Ni+ $\geq 0.2\mu\text{m Au}$	Ni+4... $6\mu\text{m Sn}$		Ni+ $0.2\mu\text{m Au}$ (selective)/ Ni+2... $4\mu\text{m Sn}$ (matt finished tin)
<b>inner contact spring material</b>		CuBe-alloy		
<b>inner contact spring surface</b>		Ni+ $0,75\mu\text{m Au}$	Ni+ $0,25\mu\text{m Au}$	
<b>type internal spring</b>	fork contact	6-fingers	4-fingers	fork contact
<b>plugability for circuit points</b>	$\square 0,64\text{mm}/ \square 1,14\text{mm}$	$\square 0,55...0,65\text{mm}/ \varnothing 0,65...0,85\text{mm}$	$\square 0,22 \times 0,25\text{mm}... \square 0,4 \times 0,55\text{mm}/ \varnothing 0,4...0,56\text{mm}$	$\square 0,5...0,7\text{mm}$
<b>insert depth</b>		2.5...3.6mm		2...4mm
<b>insertion / drawing force</b>		1.3N/0.3N	1.8 N/1.4 N	2N/1.5N
<b>shock resistance</b>		50 g		
<b>volume resistance</b>		$\leq 10 \text{ m}\Omega$		
<b>vibration resistance max.</b>		15 g		
<b>capacity between two adjacent contacts</b>		$\leq 0,3 \text{ pF}$	$\leq 0,4 \text{ pF}$	$\leq 0,9 \text{ pF}$
<b>nominal current</b>	8.2 A/ 3 A	3 A	1.5 A	3 A
<b>nominal voltage</b>	250 V AC	150 V DC	60 V DC	125 V AC
<b>test voltage</b>	1000 V	1500 V	1000 V	1500 V
<b>insulating body material</b>	PCT, GF	PA 4.6. GF		LCP
<b>temperature range</b>	-40°C ... +105°C (260°C / 10s)	-40°C... +163°C/ (260°C/10 s)		-40°C...+230°C/ (260°C/10 s)
<b>class of inflammability</b>		UL 94 V-0		
<b>specific insulation resistance</b>		$> 10^7 \Omega \cdot \text{m}$		$> 10^{15} \Omega \cdot \text{cm}$
	<b>BLY ... SHK ...</b>	<b>BLY ...</b>	<b>CAB 16 G ...</b>	
<b>contact material</b>	CuZn-alloy			
<b>surface contact / contact sleeve</b>	Ni+ $\geq 0.2\mu\text{m Au}$	Ni+4... $6\mu\text{m Sn}$	$< 0.1\mu\text{m Au}$	
<b>inner contact spring material</b>		CuBe-alloy		
<b>inner contact spring surface</b>		Ni+ $0,25\mu\text{m Au}$		
<b>type internal spring</b>	fork contact	6-fingers		
<b>plugability for circuit points</b>	$\square 0,45...0,5\text{mm}/ \square 1,14\text{mm}$	$\square 0,45...0,5\text{mm}/ \varnothing 0,4...0,56\text{mm}$		
<b>insert depth</b>		2.5...3.8mm		2.2...2.4mm
<b>insertion / drawing force</b>		1.3N/0.3N		
<b>shock resistance</b>		50 g		
<b>volume resistance</b>		$\leq 10 \text{ m}\Omega$		
<b>vibration resistance max.</b>		15 g		
<b>capacity between two adjacent contacts</b>		$\leq 0,7 \text{ pF}$		
<b>nominal current</b>	8.2 A/ 2.5 A	2.5 A		1 A
<b>nominal voltage</b>	250 V AC	100 V DC		100 V AC
<b>test voltage</b>	500 V			
<b>insulating body material</b>	PCT, GF	PA 4.6. GF		PBT
<b>temperature range</b>	-40°C ... +105°C (260°C / 10s)	-40°C... +163°C/ (260°C/10 s)		-40°C... +105°C
<b>class of inflammability</b>		UL 94 V-0		
<b>specific insulation resistance</b>		$> 10^7 \Omega \cdot \text{m}$		



## Shroud-male header

### SMD, two rows, shrouded

- suitable for female multipoint connector **VFL, FLMP, PV**
- **VPE** = packing unit (pieces/tube)
- plug-in area available in gold-plated or completely tin-plated
- in addition they can be combined with many other ribbon cable connectors in 2.54 mm pitch

art. no.	no. of contacts	packing unit	dim. [mm]		art. no.	no. of contacts	packing unit	dim. [mm]	
			A	B				A	B
ASL 06 SMD ...	6	32	15.3	5.08	ASL 20 SMD ...	20	15	33.1	22.86
ASL 08 SMD ...	8	27	17.8	7.62	ASL 26 SMD ...	26	12	40.7	30.48
ASL 10 SMD ...	10	24	20.4	10.16	ASL 34 SMD ...	34	9	50.9	40.64
ASL 12 SMD ...	12	21	22.9	12.70	ASL 40 SMD ...	40	8	58.5	48.26
ASL 14 SMD ...	14	19	25.4	15.24	ASL 50 SMD ...	50	7	71.2	60.96
ASL 16 SMD ...	16	17	28.0	17.78					

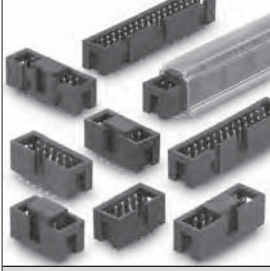
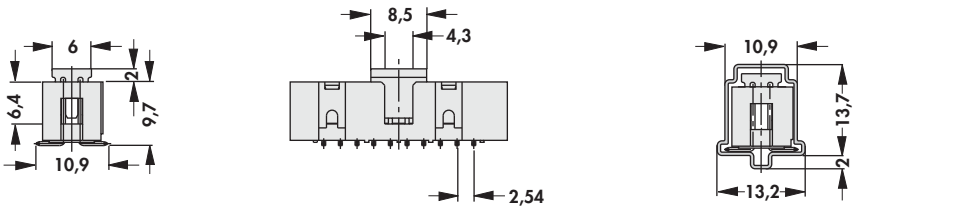
**please indicate:**

... surface of contact  
**G** = gold-plated  
**Z** = tin-plated

... packing  
**SM** = bar magazine  
**B SM** = pick and place pad and bar magazine  
**B TR** = pick and place pad and tape and reel (300pcs/reel)


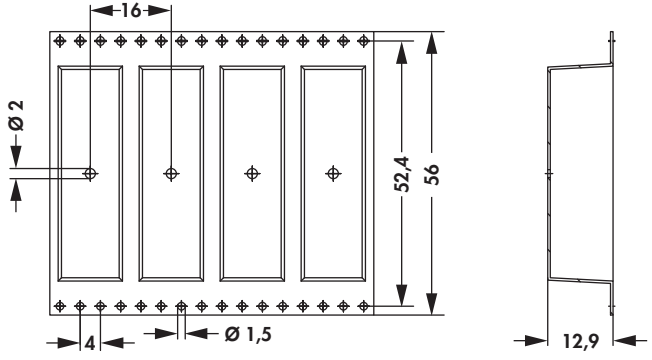
... packing (option) - additions:  
**ASL 26 SMD ... B TR: 26 contacts**

### Option, for automatic assembly

ASL ... SMD ...

ASL ... SMD ... B SM

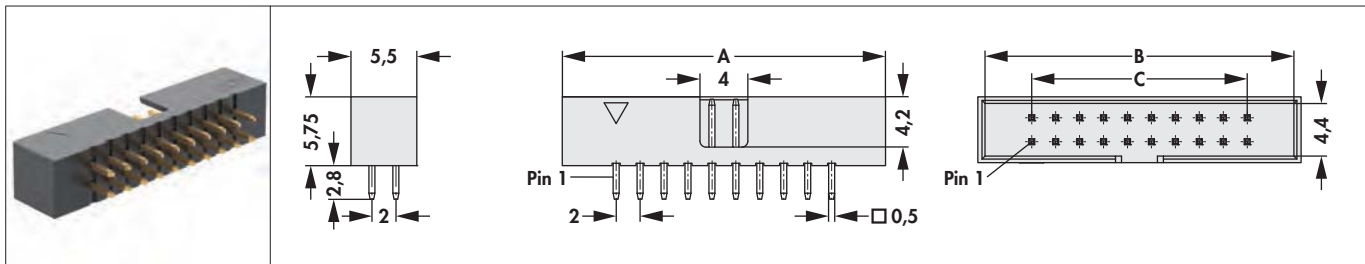



ASL 26 SMD ... B TR

## Shroud-male header

### Straight, two rows, shrouded

- suitable for female multipoint connector → **PVY ...**
- they are also combinable with many other ribbon cable female multipoint connectors in grid 2,00 mm
- contacts are available in gold-plated, tin-plating upon request!



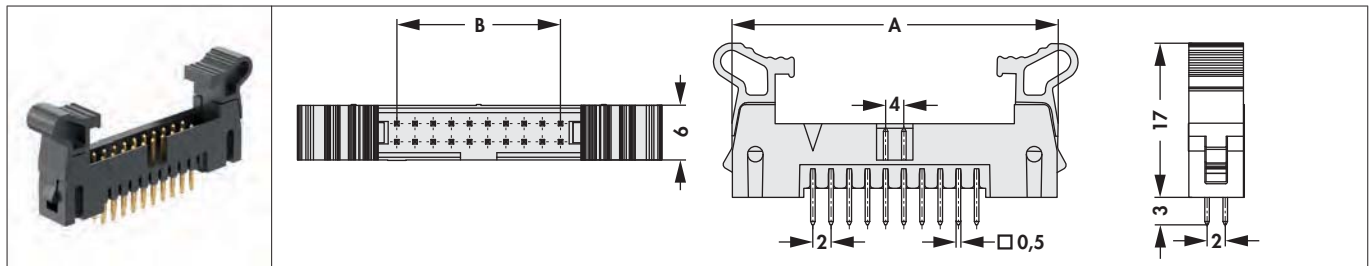
art. no.	no. of contacts	dim. [mm]		
		A	B	C
<b>ASLGY 10 G</b>	10	17	15.8	8
<b>ASLGY 20 G</b>	20	27	25.8	18
<b>ASLGY 26 G</b>	26	33	31.8	24
<b>ASLGY 40 G</b>	40	47	45.8	38
<b>ASLGY 44 G</b>	44	51	49.8	42
<b>ASLGY 50 G</b>	50	57	55.8	48

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Shroud-male header

### Straight, two rows, shrouded and with lock

- suitable for female multipoint connector → **PVY ...**
- they are also combinable with many other ribbon cable female multipoint connectors in grid 2,00 mm
- contacts are available in gold-plated, tin-plating upon request!



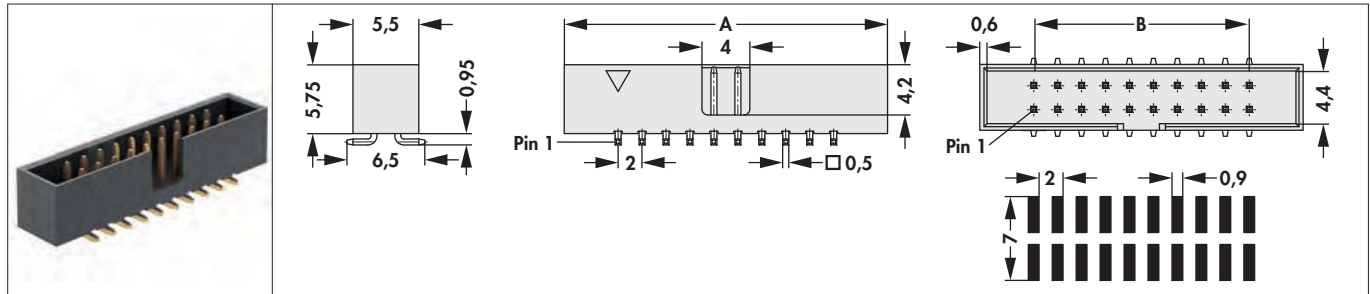
art. no.	no. of contacts	dim. [mm]	
		A	B
<b>VSLGY 10 G</b>	10	25.7	8
<b>VSLGY 20 G</b>	20	35.7	18
<b>VSLGY 26 G</b>	26	41.7	24
<b>VSLGY 40 G</b>	40	55.7	38
<b>VSLGY 44 G</b>	44	59.7	42
<b>VSLGY 50 G</b>	50	65.7	48

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Shroud-male header

### SMD, two rows, shrouded

- suitable for female multipoint connector → PVY ...
- they are also combinable with many other ribbon cable female multipoint connectors in grid 2,00 mm
- contacts are available in gold-plated, tin-plating upon request!



art. no.	no. of contacts	dim. [mm]	
		A	B
<b>ASLY 10 SMD G</b>	10	17	8
<b>ASLY 20 SMD G</b>	20	27	18
<b>ASLY 26 SMD G</b>	26	33	24
<b>ASLY 40 SMD G</b>	40	47	38
<b>ASLY 44 SMD G</b>	44	51	42
<b>ASLY 50 SMD G</b>	50	57	48

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Shroud-male header

### Straight, two rows, shrouded

- suitable for female multipoint connector → **PVV ...**
- they are also combinable with many other ribbon cable female multipoint connectors in grid 1,27 mm
- contacts are available in gold-plated, tin-plating upon request!

	<table border="1"> <thead> <tr> <th rowspan="2">art. no.</th> <th rowspan="2">no. of contacts</th> <th colspan="3">dim. [mm]</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><b>ASLGV 10 G</b></td> <td>10</td> <td>12.65</td> <td>11.10</td> <td>5.08</td> </tr> <tr> <td><b>ASLGV 20 G</b></td> <td>20</td> <td>19.00</td> <td>17.45</td> <td>11.43</td> </tr> <tr> <td><b>ASLGV 26 G</b></td> <td>26</td> <td>22.80</td> <td>21.25</td> <td>15.24</td> </tr> <tr> <td><b>ASLGV 40 G</b></td> <td>40</td> <td>31.70</td> <td>30.15</td> <td>24.13</td> </tr> </tbody> </table>	art. no.	no. of contacts	dim. [mm]			A	B	C	<b>ASLGV 10 G</b>	10	12.65	11.10	5.08	<b>ASLGV 20 G</b>	20	19.00	17.45	11.43	<b>ASLGV 26 G</b>	26	22.80	21.25	15.24	<b>ASLGV 40 G</b>	40	31.70	30.15	24.13		
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<b>ASLGV 40 G</b>	40	31.70	30.15	24.13																											

### Angled, two rows, shrouded

- suitable for female multipoint connector → **PVV ...**
- they are also combinable with many other ribbon cable female multipoint connectors in grid 1,27 mm
- contacts are available in gold-plated, tin-plating upon request!

	<table border="1"> <thead> <tr> <th rowspan="2">art. no.</th> <th rowspan="2">no. of contacts</th> <th colspan="3">dim. [mm]</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><b>ASLAV 10 G</b></td> <td>10</td> <td>12.65</td> <td>11.10</td> <td>5.08</td> </tr> <tr> <td><b>ASLAV 20 G</b></td> <td>20</td> <td>19.00</td> <td>17.45</td> <td>11.43</td> </tr> <tr> <td><b>ASLAV 26 G</b></td> <td>26</td> <td>22.80</td> <td>21.25</td> <td>15.24</td> </tr> <tr> <td><b>ASLAV 40 G</b></td> <td>40</td> <td>31.70</td> <td>30.15</td> <td>24.13</td> </tr> </tbody> </table>	art. no.	no. of contacts	dim. [mm]			A	B	C	<b>ASLAV 10 G</b>	10	12.65	11.10	5.08	<b>ASLAV 20 G</b>	20	19.00	17.45	11.43	<b>ASLAV 26 G</b>	26	22.80	21.25	15.24	<b>ASLAV 40 G</b>	40	31.70	30.15	24.13		
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<b>ASLAV 26 G</b>	26	22.80	21.25	15.24																											
<b>ASLAV 40 G</b>	40	31.70	30.15	24.13																											

### Straight, two rows, shrouded and with lock

- suitable for female multipoint connector → **PVV ...**
- they are also combinable with many other ribbon cable female multipoint connectors in grid 1,27 mm
- contacts are available in gold-plated, tin-plating upon request!

	<table border="1"> <thead> <tr> <th rowspan="2">art. no.</th> <th rowspan="2">no. of contacts</th> <th colspan="2">dim. [mm]</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td><b>VSLGV 10 G</b></td> <td>10</td> <td>20.83</td> <td>5.08</td> </tr> <tr> <td><b>VSLGV 20 G</b></td> <td>20</td> <td>27.18</td> <td>11.43</td> </tr> <tr> <td><b>VSLGV 26 G</b></td> <td>26</td> <td>30.89</td> <td>15.24</td> </tr> <tr> <td><b>VSLGV 40 G</b></td> <td>40</td> <td>39.88</td> <td>24.13</td> </tr> </tbody> </table>	art. no.	no. of contacts	dim. [mm]		A	B	<b>VSLGV 10 G</b>	10	20.83	5.08	<b>VSLGV 20 G</b>	20	27.18	11.43	<b>VSLGV 26 G</b>	26	30.89	15.24	<b>VSLGV 40 G</b>	40	39.88	24.13	
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<b>VSLGV 20 G</b>	20	27.18	11.43																					
<b>VSLGV 26 G</b>	26	30.89	15.24																					
<b>VSLGV 40 G</b>	40	39.88	24.13																					

## Shroud-male header

### SMD, two rows, shrouded

- suitable for female multipoint connector → PVV ...
- they are also combinable with many other ribbon cable female multipoint connectors in grid 1,27 mm
- contacts are available in gold-plated, tin-plating upon request!

	art. no.	no. of contacts	dim. [mm]		A	B
<b>ASLV 10 SMD G</b>	10		6.35		5.08	
<b>ASLV 20 SMD G</b>	20		12.70		11.43	
<b>ASLV 26 SMD G</b>	26		16.51		15.24	
<b>ASLV 40 SMD G</b>	40		25.40		24.13	

### SMD, two rows, shrouded and with lock

- suitable for female multipoint connector → PVV ...
- they are also combinable with many other ribbon cable female multipoint connectors in grid 1,27 mm
- contacts are available in gold-plated, tin-plating upon request!

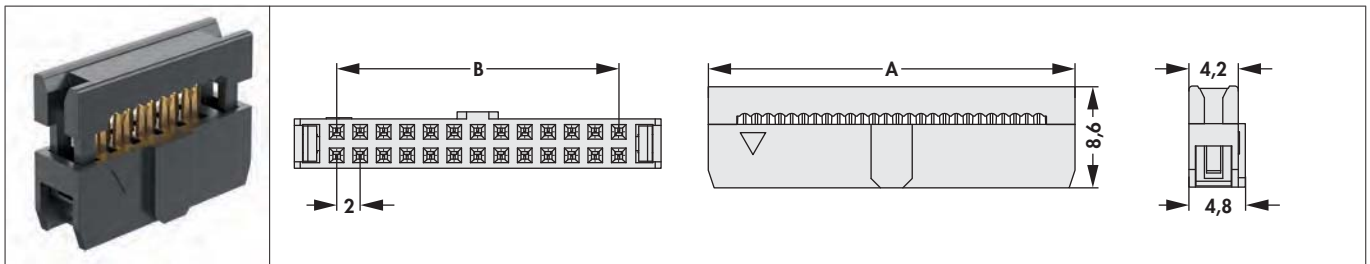
art. no.	no. of contacts	dim. [mm]		A	B	
<b>VSLV 10 SMD G</b>	10		20.83		5.08	
<b>VSLV 20 SMD G</b>	20		27.18		11.43	
<b>VSLV 26 SMD G</b>	26		30.89		15.24	
<b>VSLV 40 SMD G</b>	40		39.88		24.13	

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**Female connector**

**Two rows**

- Suitable for **ASLGY ...**, **ASLY ... SMD** and **VSLGY ...**
- Protrusion length of the ribbon cable to the case  $\geq 1$  mm!




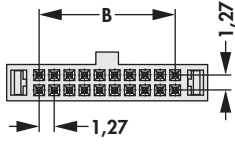
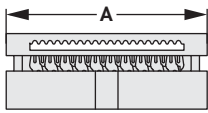
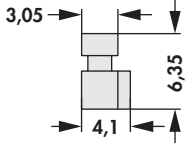
art. no.	no. of contacts	dim. [mm]	
		A	B
<b>PVY 10 S</b>	10	15.2	8
<b>PVY 20 S</b>	20	25.1	18
<b>PVY 26 S</b>	26	31.2	24
<b>PVY 40 S</b>	40	45.3	38
<b>PVY 44 S</b>	44	49.3	42
<b>PVY 50 S</b>	50	55.1	48
<b>surface of contact:</b>		selective gold-plated	
<b>annotation:</b>		IDC-pattern, 1 mm	
<b>recommended connector pins:</b>		□ 0,5 mm	



Female connector

Two rows

- Suitable for **ASLGV ...**, **ASLAV ...**, **VSLGV ...**, **ASLV ... SMD** und **VSLV ... SMD**
- Protrusion length of the ribbon cable to the case  $\geq 1$  mm!

							
art. no.	no. of contacts	dim. [mm]					
		A		B			
<b>PVV 10 G</b>	10	10.54		5.08			
<b>PVV 20 G</b>	20	16.89		11.43			
<b>PVV 26 G</b>	26	20.70		15.24			
<b>PVV 40 G</b>	40	29.59		24.13			
<b>surface of contact:</b>		gold-plated					
<b>annotation:</b>		IDC-pattern 0.635mm					
<b>recommended connector pins:</b>		□ 0,4 mm					

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**Technical data: IDC-connectors**

	<b>ASL ...</b>	<b>ASLGY ..., ASLY ... SMD G, VSLGY ...</b>	<b>ASLAV ..., ASLGV ..., VSLGV ..., VSLV ... SMD G</b>	<b>PVY ... S</b>
<b>surface contact / contact sleeve</b>	Ni+ $\geq 0.2\mu\text{m Au}$ / Ni +4...8 $\mu\text{m Sn}$	Ni+ $\geq 0.2\mu\text{m Au}$		contact area: Ni +<0.1 $\mu\text{m Au}$ / con- nection area: Ni +0.5...2.5 $\mu\text{m Sn}$
<b>contact material</b>	CuSn alloy	Cu-alloy		
<b>creepage</b>	$\geq 1,1\text{ mm VDE0110}$			
<b>air gap</b>	$\geq 0,8\text{ mm VDE0110}$			
<b>nominal current</b>	1 A	1.5 A	1 A	1.5 A
<b>nominal voltage</b>	250V AC insulation group A, according to VDE0110	150 V DC	100 V DC	150 V DC
<b>test voltage</b>	500 V AC		300 V AC	500 V AC
<b>insertion / drawing force</b>				$\geq 0.5 \dots \leq 1.8\text{ N}$ per contact
<b>insulating body material</b>	PPS	PBT		PBT, schwarz
<b>temperature range</b>	-40°C ... +200°C (260°C / 10s)	-40°C ... +105°C (260°C / 10s)		-40°C... +105°C
<b>class of inflammability</b>	UL 94 V-0			
<b>specific insulation resistance</b>	$> 10^7 \Omega\cdot\text{m}$			$> 10^{10} \Omega\cdot\text{m}$

**Technical data: IDC-connectors**

	<b>PVW ... G</b>
<b>surface contact / contact sleeve</b>	contact area: Ni+ <0.1µm Au
<b>contact material</b>	Cu-alloy
<b>nominal current</b>	1.5 A
<b>nominal voltage</b>	100 V DC
<b>test voltage</b>	500 V AC
<b>insertion / drawing force</b>	≥0.5 ... ≤1.8N per contact
<b>insulating body material</b>	PBT, schwarz
<b>temperature range</b>	-40°C... +105°C
<b>class of inflammability</b>	UL 94 V-0
<b>specific insulation resistance</b>	> 10 <sup>10</sup> Ω·m

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**USB & RJ 45 connectors**

- USB 2.0 type A and typ B
- USB 2.0 mini type B
- USB 2.0 micro type B
- USB 3.0 type A
- USB 3.1 type C
- RJ 45



**D-Sub connectors**

- with Wire Wrap, solder cup and dip soldering connection
- with plastic angle and rivet, earthing plate, snap-in clip
- with metal angle and rivet



**D-Sub hoods**

- design with large cable space
- hoods with self-cutting threaded bolts
- hoods with quick fastener
- compact hoods with cable outlet on the side



**D-Sub accessories**

- cable reels
- cut-out covers
- HF-dense seal caps
- HF seals
- Dust covers
- Threaded couplings



USB connectors

USB 2.0 type A sockets

- for PCB mounting
- in THT design
- industrial standard
- \* PCB edge (PCB)

<b>art. no.</b> <b>USB 2 A 90</b>	no. of contacts 4	type USB Typ A	connection type THT (soldering)	packing Tray
<b>surface of contact:</b>		selective gold-plated		
<b>art. no.</b> <b>USB 2 A 90 V</b>	no. of contacts 4	type USB Typ A	connection type THT (soldering)	packing Tray
<b>surface of contact:</b>		selective gold-plated		
<b>art. no.</b> <b>USB 2 A 180</b>	no. of contacts 4	type USB Typ A	connection type THT (soldering)	packing Tray
<b>surface of contact:</b>		selective gold-plated		

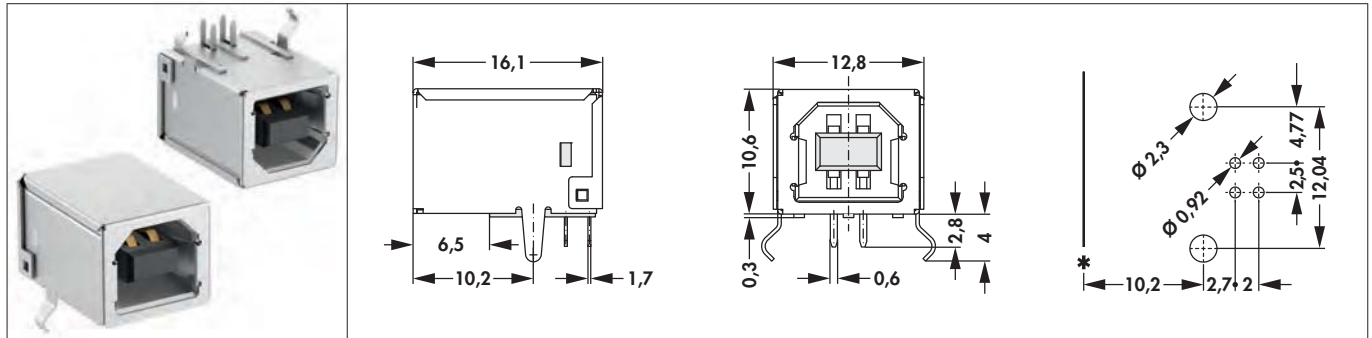
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## USB connectors

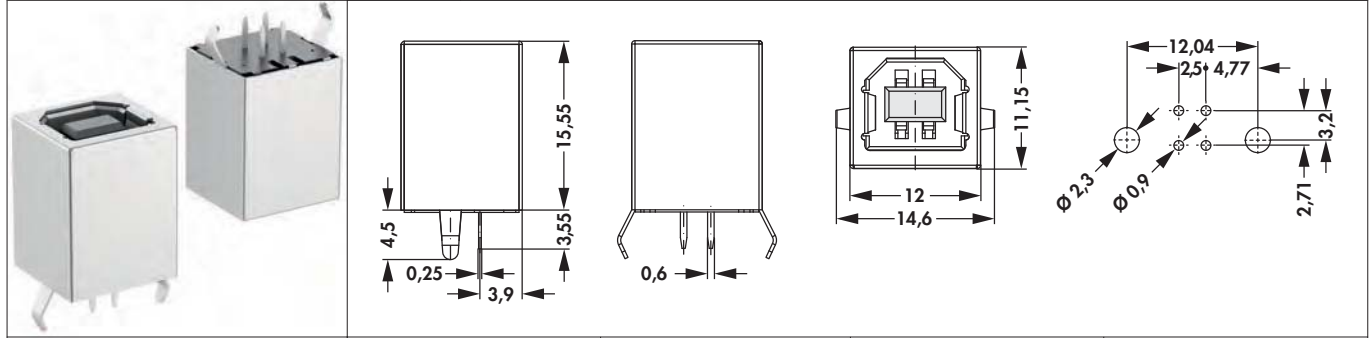
### USB 2.0 type B sockets

- for PCB mounting
- in THT design
- industrial standard
- \* PCB edge (PCB)



art. no.	no. of contacts	type	connection type	packing
<b>USB 2 B 90</b>	4	USB Typ B	THT (soldering)	Tray

surface of contact: selective gold-plated

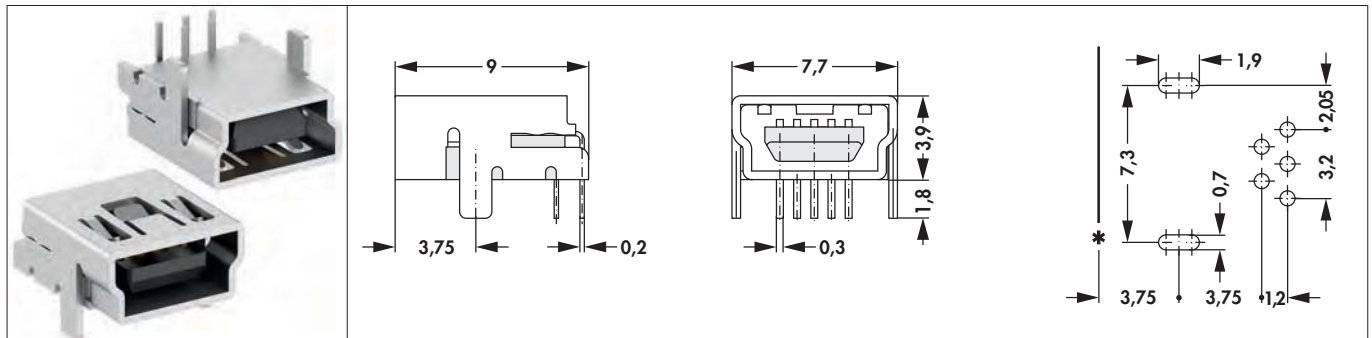


art. no.	no. of contacts	type	connection type	packing
<b>USB 2 B 180</b>	4	USB Typ B	THT (soldering)	Tray

surface of contact: selective gold-plated

### USB 2.0 type B mini sockets

- for PCB mounting
- in THT design
- industrial standard
- \* PCB edge (PCB)



art. no.	no. of contacts	type	connection type	packing
<b>USB MN 2 B</b>	5	USB Typ B	THT (soldering)	Tray

surface of contact: selective gold-plated



USB connectors

USB 2.0 type A sockets

- for PCB mounting
- in SMD design
- industrial standard
- \* PCB edge (PCB)

<b>art. no.</b>	no. of contacts	type	connection type	packing
<b>USB 2 A SMD</b>	4	USB Typ A	SMD	Tray
<b>surface of contact:</b>		selective gold-plated		

USB 2.0 type B sockets

- for PCB mounting
- in SMD design
- industrial standard
- \* PCB edge (PCB)

<b>art. no.</b>	no. of contacts	type	connection type	packing
<b>USB 2 B SMD</b>	4	USB Typ B	SMD	Tray
<b>surface of contact:</b>		selective gold-plated		

USB 2.0 type B mini sockets

- for PCB mounting
- in SMD design
- industrial standard
- \* PCB edge (PCB)

<b>art. no.</b>	no. of contacts	type	connection type	packing
<b>USB MN 2 B SMD</b>	5	USB Typ B	SMD	Tray
<b>surface of contact:</b>		selective gold-plated		





**USB connectors**

**USB 2.0 type B micro sockets**

- for PCB mounting
- in SMD design
- industrial standard
- \* PCB edge (PCB)

<p><b>art. no.</b></p>	<p>no. of contacts</p>	<p>type</p>	<p>connection type</p>	<p>packing</p>
<p><b>USB MC 2 B SMD</b></p>	<p>5</p>	<p>USB Typ B</p>	<p>SMD</p>	<p>tape and reel</p>
<p><b>surface of contact:</b></p>		<p>selective gold-plated</p>		

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USB connectors

USB 3.0 type A sockets

- for PCB mounting
- in THT design
- industrial standard

<b>art. no.</b> <b>USB 3 A 90</b>	no. of contacts 9	type USB Typ A	connection type THT (soldering)	packing Tray
<b>surface of contact:</b>		selective gold-plated		
<b>art. no.</b> <b>USB 3 A 90 V</b>	no. of contacts 9	type USB Typ A	connection type THT (soldering)	packing Tray
<b>surface of contact:</b>		selective gold-plated		

USB 3.1 type C sockets

- for PCB mounting
- in THT design
- industrial standard

<b>art. no.</b> <b>USB 31 C</b>	no. of contacts 24	type USB Typ C	connection type THT (soldering)	packing tape and reel
<b>surface of contact:</b>		selective gold-plated		

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## RJ 45 connectors

### RJ 45 sockets

- for PCB mounting
- in THT design
- industrial standard

<p><b>art. no.</b></p>	<p>no. of contacts</p>	<p>type</p>	<p>connection type</p>	<p>packing</p>
<p><b>RJ 45 U</b></p>	<p>10</p>	<p>RJ 45</p>	<p>THT (soldering)</p>	<p>Tray</p>
<p><b>surface of contact:</b></p>		<p>selective gold-plated</p>		
<p><b>art. no.</b></p>	<p>no. of contacts</p>	<p>type</p>	<p>connection type</p>	<p>packing</p>
<p><b>RJ 45 G</b></p>	<p>10</p>	<p>RJ 45</p>	<p>THT (soldering)</p>	<p>Tray</p>
<p><b>surface of contact:</b></p>		<p>selective gold-plated</p>		
<p><b>art. no.</b></p>	<p>no. of contacts</p>	<p>type</p>	<p>connection type</p>	<p>packing</p>
<p><b>RJ 45 LED</b></p>	<p>8</p>	<p>RJ 45</p>	<p>THT (soldering)</p>	<p>Tray</p>

**LED 1:** yellow


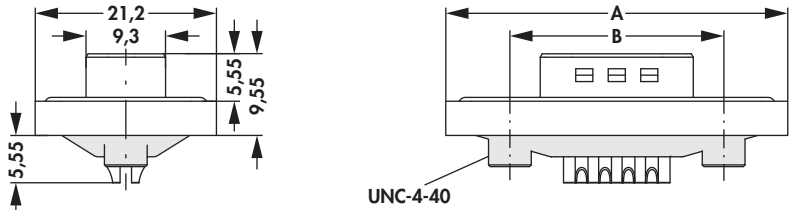
**LED 2:** green

<p><b>surface of contact:</b></p>	<p>selective gold-plated</p>
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## D-Sub standard connectors


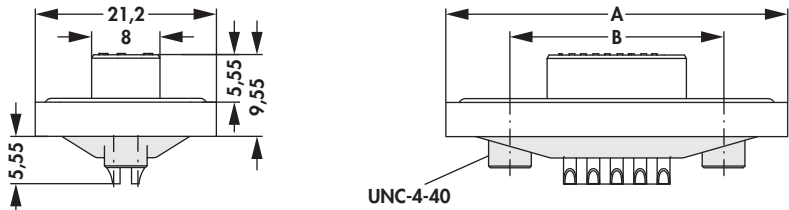
### Male headers with IP protection

- IP 67 protected
- solder bucket connection

			
art. no.	design	dim. [mm]	
		A	B
<b>DS 09 L IP 67</b>	male	40.0	25.0
<b>DS 15 L IP 67</b>		48.4	33.3
<b>DS 25 L IP 67</b>		62.0	47.0

### Female headers with IP protection

- IP 67 protected
- solder bucket connection

			
art. no.	design	dim. [mm]	
		A	B
<b>DB 09 L IP 67</b>	female	40.0	25.0
<b>DB 15 L IP 67</b>		48.4	33.3
<b>DB 25 L IP 67</b>		62.0	47.0

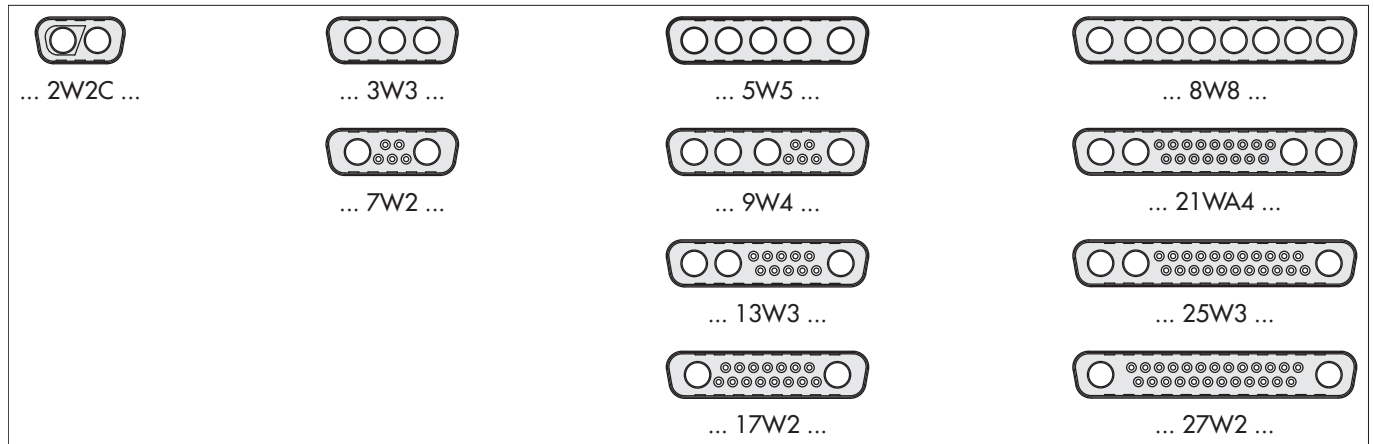
## D-Sub mixed layout connectors

### Order example (case and assembly type)

<b>DSM / DBM</b> connector (DSM = D-Sub male header mixed layout DBM = D-Sub female header mixed layout)	<b>7W2</b> Contact pattern (see overview) case	<b>L</b> connection type signal contact (L = solder bucket connection)	<b>GN</b> assembly type (see overview)	<b>UN</b> internal thread (UNC 4-40) assembly type (optional)
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### Overview contact pattern

- the contact pattern is valid for male headers
- for using socket connectors the hole pattern has to be mirrored



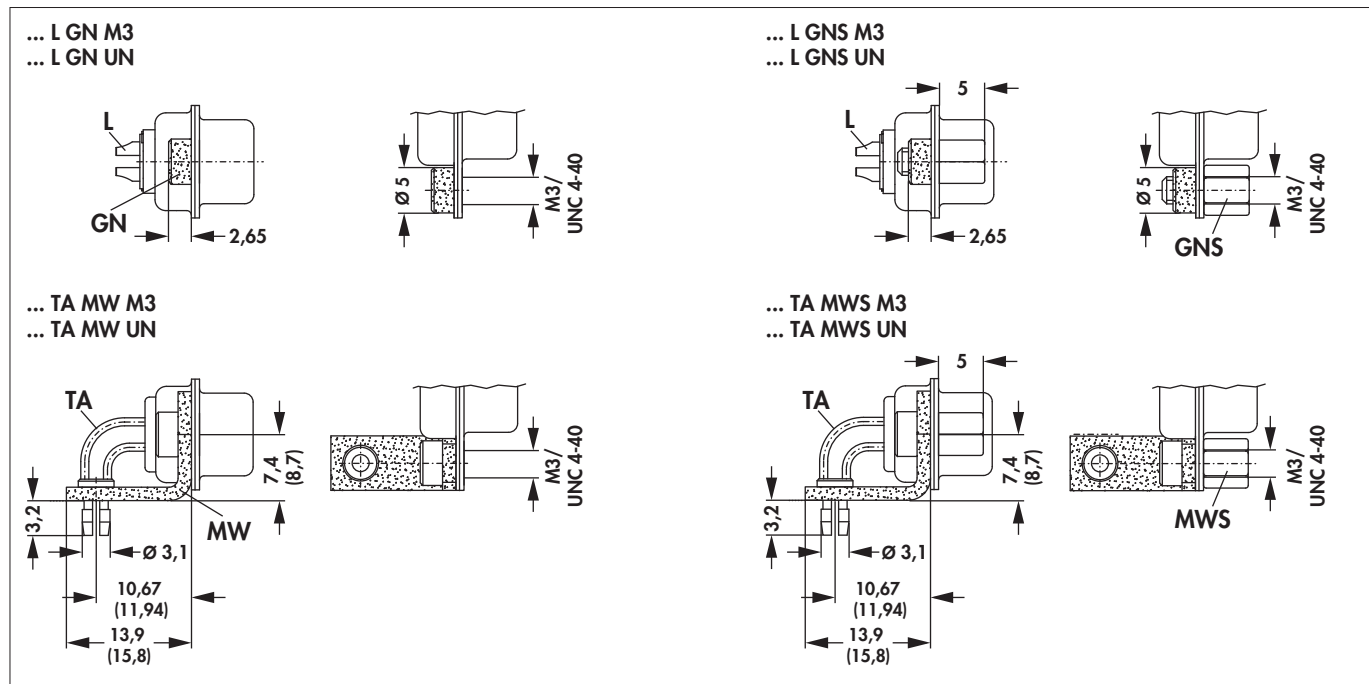
### Order example (mixed layout contacts)

<b>HAS</b> high-power contacts (HAS = high-power contacts male)	<b>10</b> current (10 A)	<b>TA</b> connection type mixed layout contacts (see overview)
mixed layout contacts		

### Overview mixed layout contacts, connection type




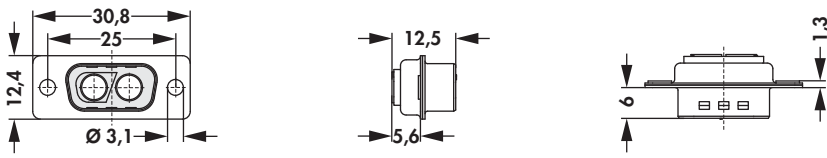

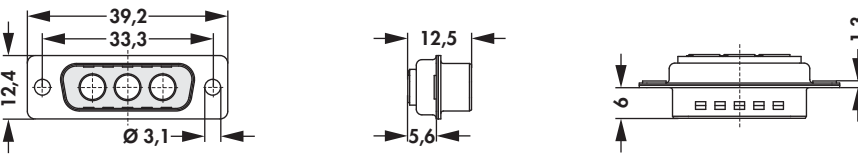

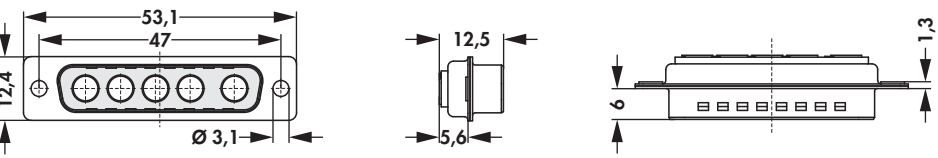

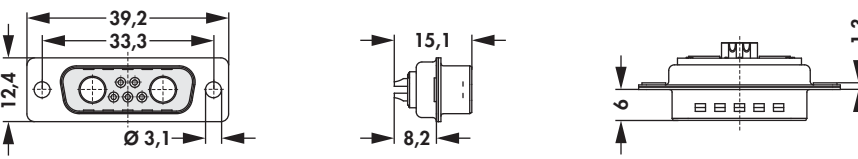

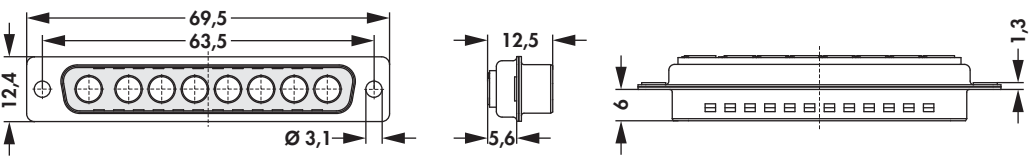
Overview assembly type (optional)



## D-Sub mixed layout connectors


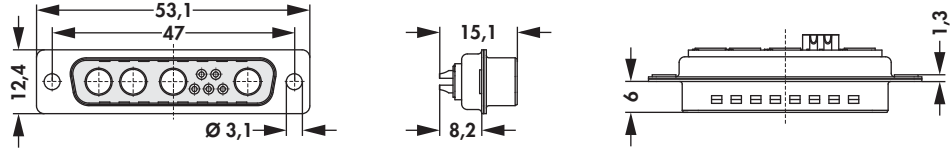

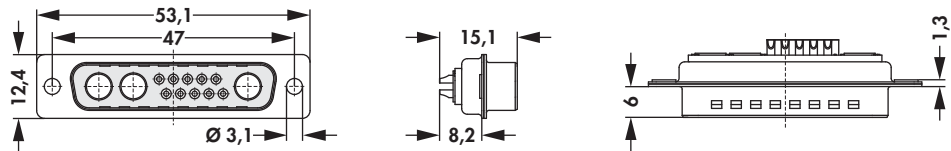

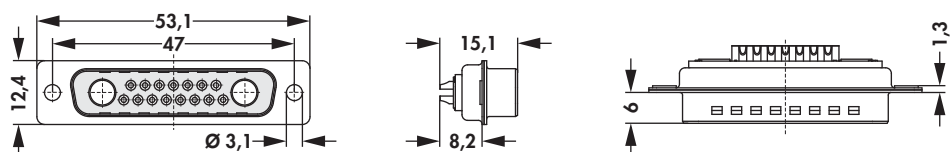

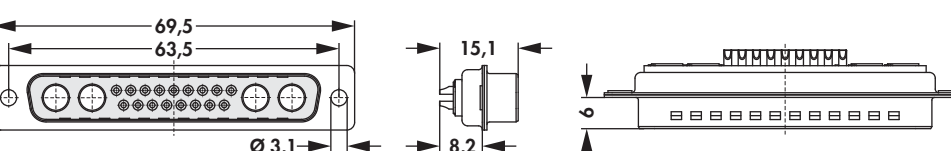

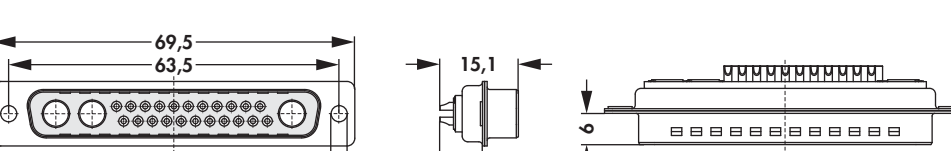
### Male headers

- gold-plated contacts, straight
- equipped with turned precision contacts
- for power cables up to AWG 16
- combinable with high-power contacts **HAS ...**

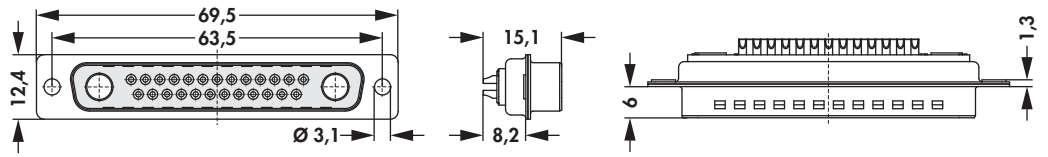
			
<b>art. no.</b> <b>DSM 2W2C L ...</b>	design male	signal contacts 0	high-power contacts max. 2
			
<b>art. no.</b> <b>DSM 3W3 L ...</b>	design male	signal contacts 0	high-power contacts max. 3
			
<b>art. no.</b> <b>DSM 5W5 L ...</b>	design male	signal contacts 0	high-power contacts max. 5
			
<b>art. no.</b> <b>DSM 7W2 L ...</b>	design male	signal contacts 5	high-power contacts max. 2
			
<b>art. no.</b> <b>DSM 8W8 L ...</b>	design male	signal contacts 0	high-power contacts max. 8
<b>please indicate:</b>	<b>... type of mounting (optional)</b> <b>GN M3</b> = threaded rivet with M3 <b>GN UN</b> = threaded rivet with UNC 4-40 <b>GNS M3</b> = threaded rivet and screwing bolt with M3 <b>GNS UN</b> = threaded rivet and screwing bolt with UNC 4-40		
<b>casing frame:</b>	steel, tin plated		



## D-Sub mixed layout connectors

			
<b>art. no.</b> DSM 9W4 L ...	design male	signal contacts 5	high-power contacts max. 4
			
<b>art. no.</b> DSM 13W3 L ...	design male	signal contacts 10	high-power contacts max. 3
			
<b>art. no.</b> DSM 17W2 L ...	design male	signal contacts 15	high-power contacts max. 2
			
<b>art. no.</b> DSM 21WA4 L ...	design male	signal contacts 17	high-power contacts max. 4
			
<b>art. no.</b> DSM 25W3 L ...	design male	signal contacts 22	high-power contacts max. 3
<b>please indicate:</b>	<b>... type of mounting (optional)</b> <b>GN M3 = threaded rivet with M3</b> <b>GN UN = threaded rivet with UNC 4-40</b> <b>GNS M3 = threaded rivet and screwing bolt with M3</b> <b>GNS UN = threaded rivet and screwing bolt with UNC 4-40</b>		
<b>casings frame:</b>	steel, tin plated		

D-Sub mixed layout connectors




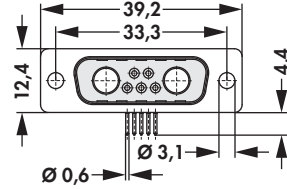
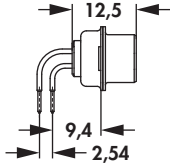
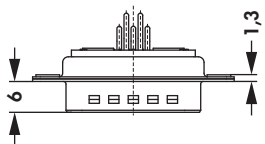

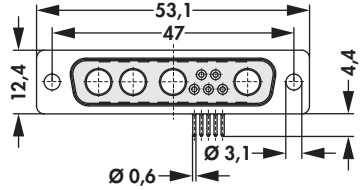
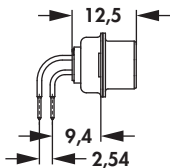
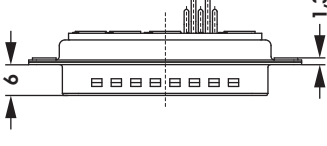

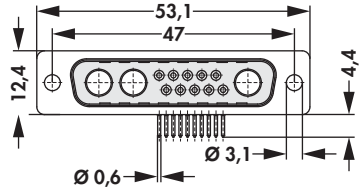
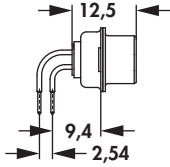
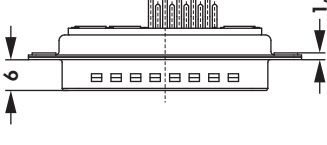

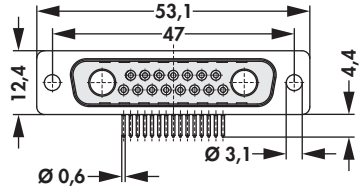
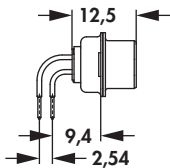
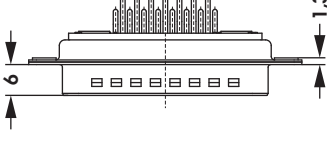
<b>art. no.</b>	design	signal contacts	high-power contacts
<b>DSM 27W2 L ...</b>	male	25	max. 2
<b>please indicate:</b>	<b>... type of mounting (optional)</b>		
	GN M3 = threaded rivet with M3		
	GN UN = threaded rivet with UNC 4-40		
	GNS M3 = threaded rivet and screwing bolt with M3		
	GNS UN = threaded rivet and screwing bolt with UNC 4-40		
<b>casing frame:</b>	steel, tin plated		

A  
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M  
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## D-Sub mixed layout connectors

### Male headers


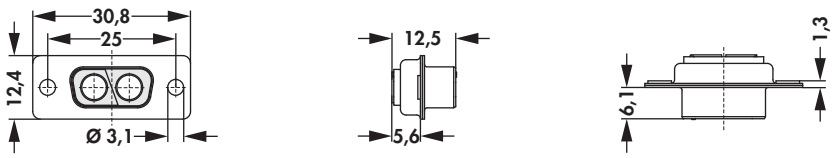

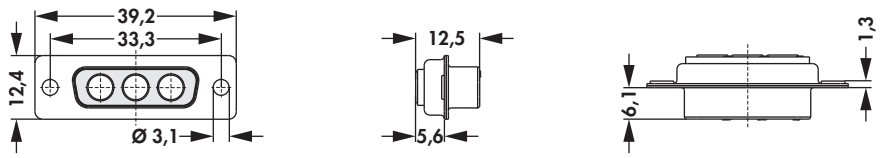

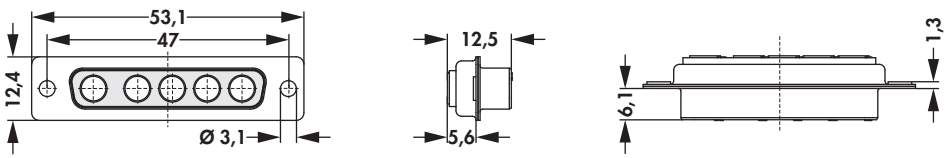

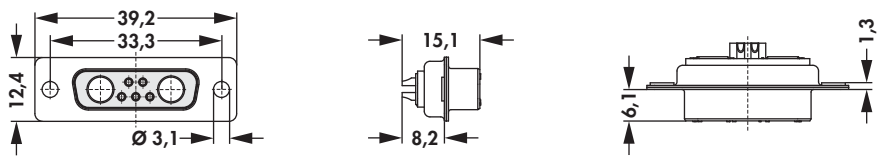

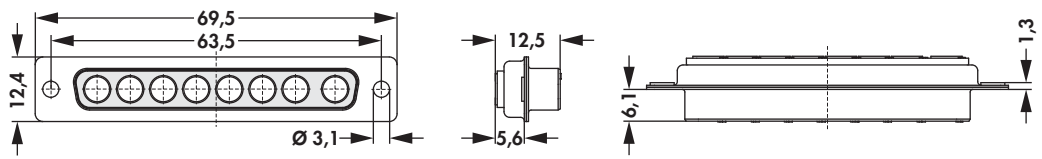
- gold-plated contacts, angled
- equipped with turned precision contacts
- with PCB connection, angled
- combinable with high-power contacts **HAS ...**

			
<b>art. no.</b> <b>DSM 7W2 TA ...</b>	design male	signal contacts 5	high-power contacts max. 2
			
<b>art. no.</b> <b>DSM 9W4 TA ...</b>	design male	signal contacts 5	high-power contacts max. 4
			
<b>art. no.</b> <b>DSM 13W3 TA ...</b>	design male	signal contacts 10	high-power contacts max. 3
			
<b>art. no.</b> <b>DSM 17W2 TA ...</b>	design male	signal contacts 15	high-power contacts max. 2
<b>please indicate:</b>	<b>... type of mounting (optional)</b> <b>MW M3</b> = metal angle with M3 <b>MW UN</b> = metal angle with UNC 4-40 <b>MWS M3</b> = metal angle screwing bolt with M3 <b>MWS UN</b> = metal angle and screwing bolt with UNC 4-40		
<b>casing frame:</b>	steel, tin plated		


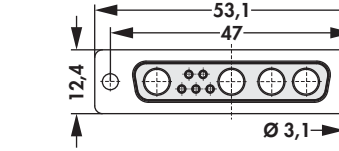
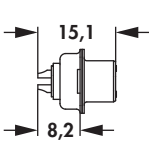
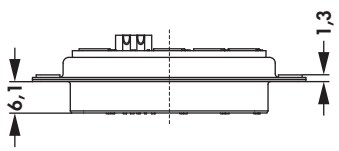

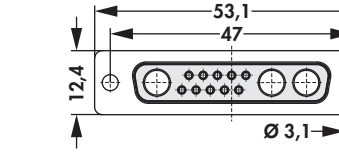
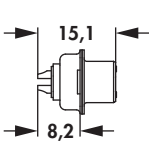
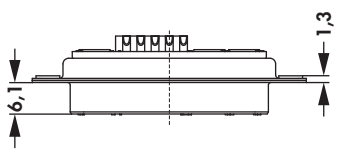

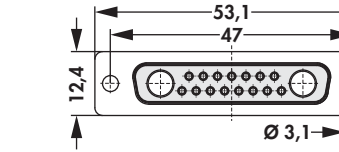
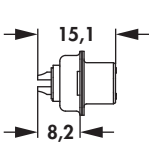
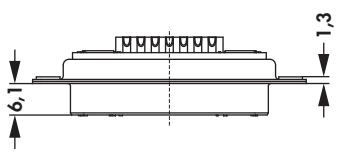

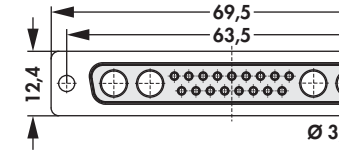
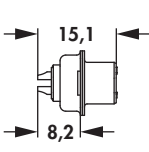
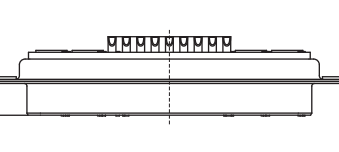

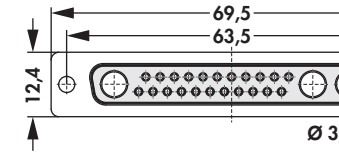
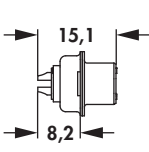
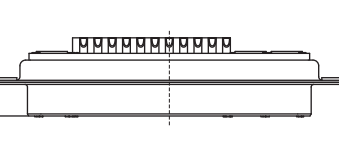
## D-Sub mixed layout connectors

### Female headers

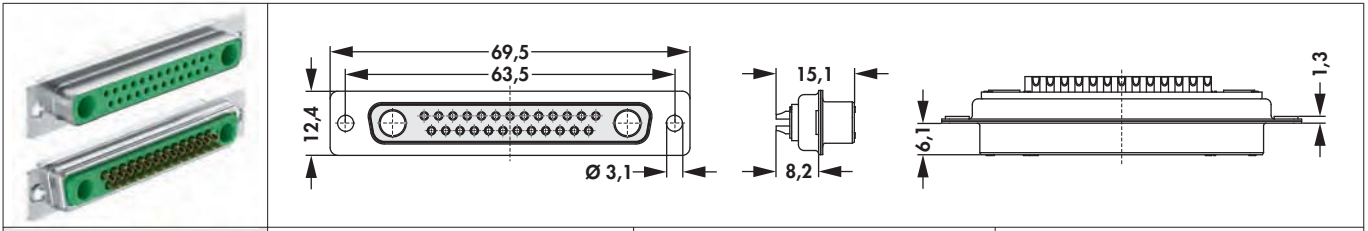
- gold-plated contacts
- equipped with turned precision contacts
- for power cables up to AWG 16
- combinable with high-power contacts **HAB ...**

			
<b>art. no.</b> <b>DBM 2W2C L ...</b>	design female	signal contacts 0	high-power contacts max. 2
			
<b>art. no.</b> <b>DBM 3W3 L ...</b>	design female	signal contacts 0	high-power contacts max. 3
			
<b>art. no.</b> <b>DBM 5W5 L ...</b>	design female	signal contacts 0	high-power contacts max. 5
			
<b>art. no.</b> <b>DBM 7W2 L ...</b>	design female	signal contacts 5	high-power contacts max. 2
			
<b>art. no.</b> <b>DBM 8W8 L ...</b>	design female	signal contacts 0	high-power contacts max. 8
<b>please indicate:</b>	<b>... type of mounting (optional)</b> <b>GN M3</b> = threaded rivet with M3 <b>GN UN</b> = threaded rivet with UNC 4-40 <b>GNS M3</b> = threaded rivet and screwing bolt with M3 <b>GNS UN</b> = threaded rivet and screwing bolt with UNC 4-40		
<b>casing frame:</b>	steel, tin plated		

## D-Sub mixed layout connectors

			
<b>art. no.</b> DBM 9W4 L ...	design female	signal contacts 5	high-power contacts max. 4
			
<b>art. no.</b> DBM 13W3 L ...	design female	signal contacts 10	high-power contacts max. 3
			
<b>art. no.</b> DBM 17W2 L ...	design female	signal contacts 15	high-power contacts max. 2
			
<b>art. no.</b> DBM 21WA4 L ...	design female	signal contacts 17	high-power contacts max. 4
			
<b>art. no.</b> DBM 25W3 L ...	design female	signal contacts 22	high-power contacts max. 3
<b>please indicate:</b>	<b>... type of mounting (optional)</b> GN M3 = threaded rivet with M3 GN UN = threaded rivet with UNC 4-40 GNS M3 = threaded rivet and screwing bolt with M3 GNS UN = threaded rivet and screwing bolt with UNC 4-40		
<b>casings frame:</b>	steel, tin plated		

D-Sub mixed layout connectors



art. no.	design	signal contacts	high-power contacts
DBM 27W2 L ...	female	25	max. 2

please indicate: ... type of mounting (optional)

- GN M3 = threaded rivet with M3
- GN UN = threaded rivet with UNC 4-40
- GNS M3 = threaded rivet and screwing bolt with M3
- GNS UN = threaded rivet and screwing bolt with UNC 4-40


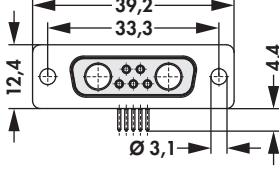
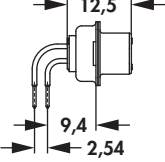
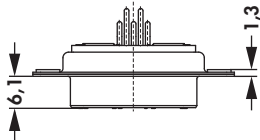

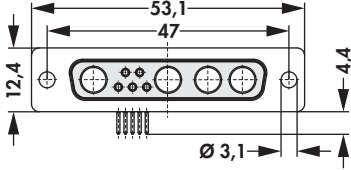
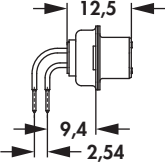
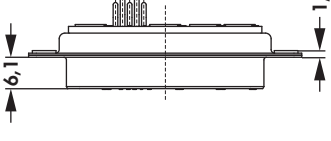

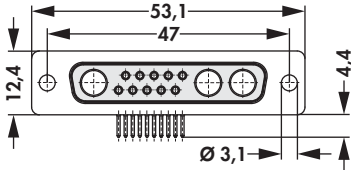
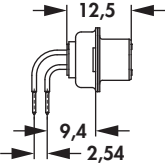
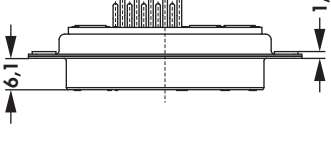

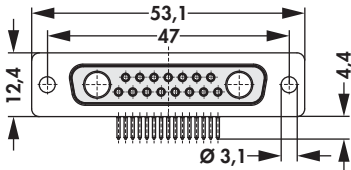
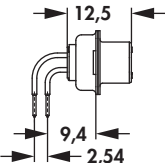
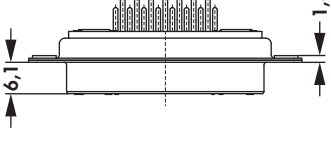
casing frame:	steel, tin plated
---------------	-------------------

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## D-Sub mixed layout connectors

### Female headers

- gold-plated contacts, angled
- equipped with turned precision contacts
- with PCB connection, angled
- combinable with high-power contacts **HAB ...**


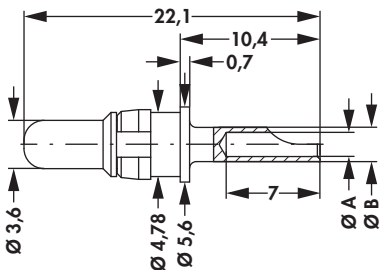
			
<b>art. no.</b> DBM 7W2 TA ...	design female	signal contacts 5	high-power contacts max. 2
			
<b>art. no.</b> DBM 9W4 TA ...	design female	signal contacts 5	high-power contacts max. 4
			
<b>art. no.</b> DBM 13W3 TA ...	design female	signal contacts 10	high-power contacts max. 3
			
<b>art. no.</b> DBM 17W2 TA ...	design female	signal contacts 15	high-power contacts max. 2
<b>please indicate:</b> <ul style="list-style-type: none"> <li>... type of mounting (optional)</li> <li><b>MW M3</b> = metal angle with M3</li> <li><b>MW UN</b> = metal angle with UNC 4-40</li> <li><b>MWS M3</b> = metal angle screwing bolt with M3</li> <li><b>MWS UN</b> = metal angle and screwing bolt with UNC 4-40</li> </ul>			
<b>caseing frame:</b>	steel, tin plated		

## High-power contacts, loose


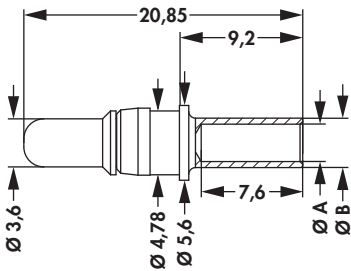
### Pin contacts

- 10 A / 20 A / 40 A
- combinable with cases **DSM ...**


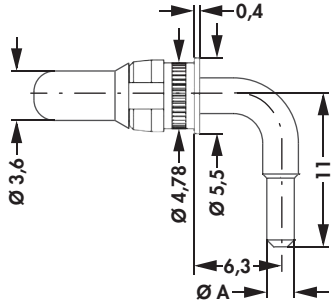
- straight, with solder bucket connection

				
	art. no.	current [A]	dim. [mm]	
<b>HAS 10 L</b>	10	A	B	
<b>HAS 20 L</b>	20	1.8	2.55	
<b>HAS 40 L</b>	40	2.8	3.70	
		4.8	5.60	

- straight, with connection crimp

				
	art. no.	current [A]	dim. [mm]	
<b>HAS 10 C</b>	10	A	B	
<b>HAS 20 C</b>	20	1.8	2.55	
<b>HAS 40 C</b>	40	2.8	3.70	
		4.8	5.60	

- angled, with PCB connection (tin-plated)

				
	art. no.	current [A]	dim. [mm]	
<b>HAS 10 TA</b>	10	A	B	
<b>HAS 20 TA</b>	20	1.8	2.55	
<b>HAS 40 TA</b>	40	2.8	3.70	
		4.8	5.60	


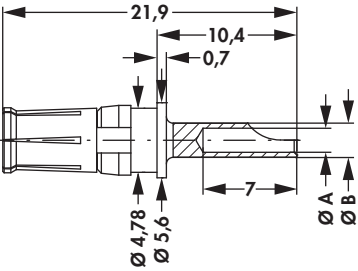


## High-power contacts, loose


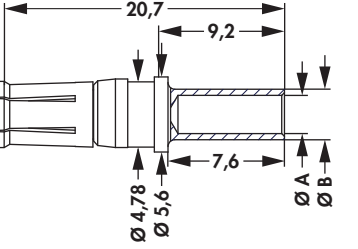
### Socket contact

- 10 A / 20 A / 40 A
- combinable with cases **DBM ...**

- straight, with solder bucket connection


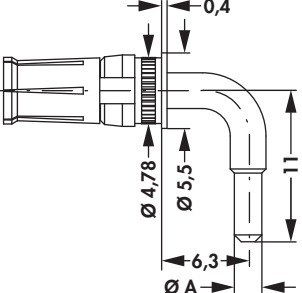
			
	art. no.	current [A]	dim. [mm]
			A                      B
<b>HAB 10 L</b>	10	1.8	2.55
<b>HAB 20 L</b>	20	2.8	3.70
<b>HAB 40 L</b>	40	4.8	5.60

- straight, with connection crimp

			
	art. no.	current [A]	dim. [mm]
			A                      B
<b>HAB 10 C</b>	10	1.8	2.55
<b>HAB 20 C</b>	20	2.8	3.70
<b>HAB 40 C</b>	40	4.8	5.60

### Socket contact


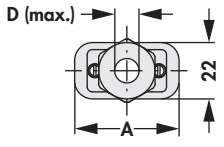
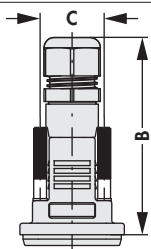
- angled, with PCB connection (tin-plated)

			
	art. no.	current [A]	dim. [mm]
			A                      B
<b>HAB 10 TA</b>	10	1.8	2.55
<b>HAB 20 TA</b>	20	2.8	3.70
<b>HAB 40 TA</b>	40	4.8	5.60

## D-Sub hoods


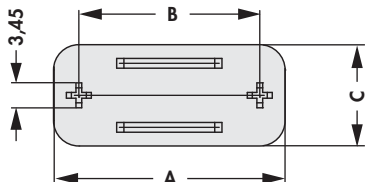
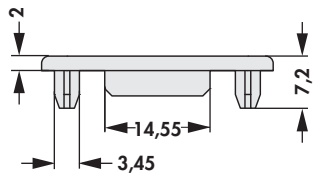
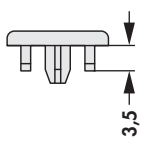
### IP 67 protected

– straight cable outlet with pre-assembled strain relief

				
	art. no.		dim. [mm]	
<b>DH 09 L IP 67</b>	A	B	C	D
<b>DH 15 L IP 67</b>	40.8	77	25.00	10
<b>DH 25 L IP 67</b>	49.5	79	33.30	12
	63.0	87	47.04	

## D-Sub accessories

- plastic cover, blank, for blind D-Sub and other connector cutouts in front and rear panels
- simple mounting by clamping

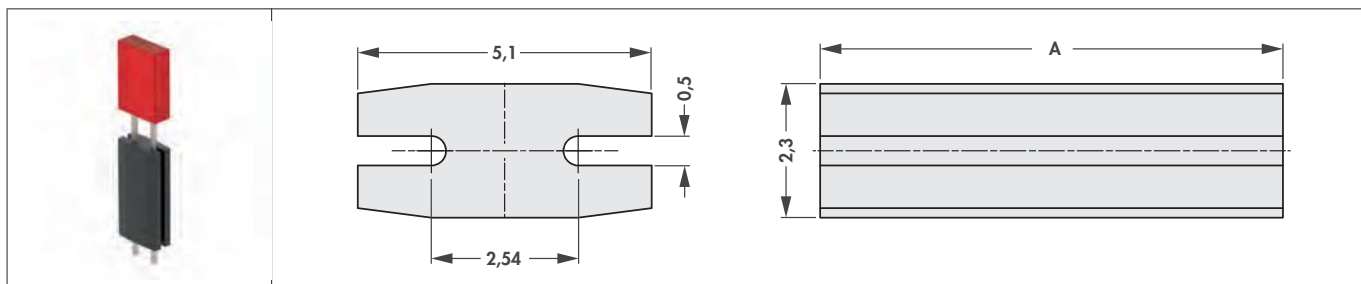
					
	art. no.		dim. [mm]		
<b>BADK 09</b>	A	B	C		
<b>BADK 15</b>	32.0	25.0	14.0		
<b>BADK 25</b>	40.3	33.3			
<b>BADK 37</b>	54.0	47.0			
<b>BADK 50</b>	70.5	63.5			
	68.1	61.1			

**Technical data: USB / RJ / D-Sub connectors**

	<b>USB 2 A 180, USB 2 A 90, USB 2 A 90 V, USB 2 A SMD, USB 2 B 90, USB 2 B SMD</b>	<b>USB 2 B 180</b>	<b>USB MN 2 B, USB MN 2 B SMD</b>	<b>USB MC 2 B SMD</b>
<b>contact material</b>	CuSn alloy			
<b>surface contact / contact sleeve</b>	Ni+ $\geq 0.2\mu\text{m}$ Au (selective)			
<b>cycles of operation</b>				
<b>nominal current</b>	0.5 A			1 A for Pin 1-5 / 1.8 A for Pin 1, 5 / 0.5 A for Pin 2-4
<b>nominal voltage</b>	40 V <sub>RMS</sub> /V <sub>DC</sub>			
<b>insulating body material</b>	PA, white			
<b>temperature range</b>	-25°C ... +85°C (230°C / 5s)		-40°C ... +105°C (260°C / 10s)	-30°C ... +80°C (260°C / 10s)
<b>class of inflammability</b>	UL 94 V-0			
	<b>USB 3 A 90, USB 3 A 90 V</b>	<b>USB 31 C</b>	<b>RJ 45 G, RJ 45 U</b>	<b>RJ 45 LED</b>
<b>contact material</b>	CuSn alloy			
<b>surface contact / contact sleeve</b>	Ni+ $\geq 0.2\mu\text{m}$ Au (selective)			
<b>cycles of operation</b>				
<b>nominal current</b>	0.5 A	5 A for VBUS Pin / 1.25 A for VCONN Pin	1 A	
<b>nominal voltage</b>	40 V <sub>RMS</sub> /V <sub>DC</sub>		125 V <sub>RMS</sub> /V <sub>DC</sub>	
<b>insulating body material</b>				
<b>temperature range</b>	-25°C ... +85°C (230°C / 5s)		-55°C ... +105°C (230°C / 5s)	0°C ... +70°C (230°C/5s)
<b>class of inflammability</b>	UL 94 V-0			
	<b>DB ... L IP 67, DS ... L IP 67</b>	<b>DBM ..., DBM ... TA, DSM ..., DSM ... TA</b>	<b>HAB ... C, HAB ... L, HAS ... C, HAS ... L</b>	<b>HAB ... TA, HAS ... TA</b>
<b>contact material</b>	Cu-alloy			
<b>surface contact / contact sleeve</b>	hard gold plated over nickel	nickel-phosphorus- gold-surface/ ( $\geq 0.1\mu\text{m}$ Au over 2...4 $\mu\text{m}$ chem. NiP)	Ni+ $\geq 0.2\mu\text{m}$ Au	Ni+ $\geq 0.2\mu\text{m}$ Au (se- lective)
<b>quality class / cyces of operation</b>	quality class 2 = 200 cycles of operation			
<b>nominal current</b>	5A (20°C)	signal contact: $\leq 5$ A/ power contact: $\leq 20$ A	power contact: $\leq 20$ A	
<b>nominal voltage</b>	125 V AC			
<b>test voltage</b>	1000 V			
<b>insulating body material</b>	PBT, GF	Polyester, GF		
<b>temperature range</b>	-55°C... +125°C		-55°C... +150°C	
<b>class of inflammability</b>	UL 94 V-0			
<b>insulation resistance</b>	$\geq 5$ G $\Omega$			
	<b>DH ... L IP 67</b>	<b>BADK ...</b>		
<b>insulating body material</b>	ABS			
<b>class of inflammability</b>	UL 94 V-0			
<b>surface of case</b>	plastic, black		plastic, grey	

**Spacers for LED**

– for rectangular LED



art. no.	dim. [mm]	art. no.	dim. [mm]	art. no.	dim. [mm]
	A		A		A
<b>RAH 503</b>	3	<b>RAH 506</b>	6	<b>RAH 509</b>	9
<b>RAH 504</b>	4	<b>RAH 507</b>	7	<b>RAH 510</b>	10
<b>RAH 505</b>	5	<b>RAH 508</b>	8		
<b>insulating body material:</b>		PVC Blend, black			
<b>temperature range:</b>		-40°C... +85°C			
<b>class of inflammability:</b>		UL 94 V-0			

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Light pipes for SMDs

– panel light pipe 3 mm, ESD protection from panel to PCB

art. no.	diameter of lense	dim. [mm]	art. no.	diameter of lense	dim. [mm]
<b>LL 30 PRE 032</b>	Ø3mm	A	<b>LL 30 PRE 095</b>	Ø3mm	A
<b>LL 30 PRE 064</b>		3.2	<b>LL 30 PRE 127</b>		9.5
		6.4			12.7
<b>insulating body material:</b>		Polycarbonate, clear			
<b>temperature range:</b>		-30°C... +100°C			
<b>class of inflammability:</b>		UL 94 V-0			

– panel light pipe 5 mm, ESD protection from panel to PCB

art. no.	diameter of lense	dim. [mm]	art. no.	diameter of lense	dim. [mm]
<b>LL 50 PRK 032</b>	Ø5mm	A	<b>LL 50 PRK 095</b>	Ø5mm	A
<b>LL 50 PRK 064</b>		3.2	<b>LL 50 PRK 127</b>		9.5
		6.4			12.7
<b>insulating body material:</b>		Polycarbonate, clear			
<b>temperature range:</b>		-30°C... +100°C			
<b>class of inflammability:</b>		UL 94 V-0			

– panel light pipe Rechteck 3,3 mm, ESD protection from panel to PCB

art. no.	diameter of lense	dim. [mm]	art. no.	diameter of lense	dim. [mm]
<b>LL 30 QRL 032</b>	□ 3,3mm	A	<b>LL 30 QRL 095</b>	□ 3,3mm	A
<b>LL 30 QRL 064</b>		3.2	<b>LL 30 QRL 127</b>		9.5
		6.4			12.7
<b>insulating body material:</b>		Polycarbonate, clear			
<b>temperature range:</b>		-30°C... +100°C			
<b>class of inflammability:</b>		UL 94 V-0			

A  
B  
C  
D  
E  
F  
G  
H  
I  
K  
L  
M  
N

## Terms and conditions of business

### 1. General provisions

1.1. The present General Terms and Conditions (GTC) apply to all of our business relationships with our customers ("Purchaser"). The GTC only apply if the Purchaser is an entrepreneur (§ 14 of the German Civil Code), a legal entity of public law or a special fund under public law.

The GTC particularly apply for contracts about the sale and/or the delivery of transportable objects ("Goods"), regardless of whether we manufacture the Goods ourselves or buy them in from suppliers (§§ 433, 651 of the German Civil Code). Unless otherwise agreed, the GTC apply, in the version valid at the time of the Purchaser's order or in the version last transmitted to them, as a framework agreement for similar future contracts, without us having to refer to them each time.

1.2. Our GTC apply exclusively. Deviating, contradicting or additional General Terms and Conditions of the Purchaser are only part of the contract if we have expressly authorised their validity. This approval requirement applies in any case, also if we make deliveries to the Purchaser without reserve, in full knowledge of their Terms and Conditions. Individual, isolated agreements with the Purchaser (including ancillary agreements, additions and changes) always take priority over these GTC. The content of this type of agreement, subject to counterevidence, is to be determined according to a written contract or our written confirmation.

1.3. Legally relevant declarations and announcements of the Purchaser with regards to the contract (for example deadline agreements, defect notifications, withdrawal or reduction) are to be submitted in writing, i.e. in written or text form (for example letter, e-mail, fax). Legal form provisions and other certificates, especially in case of doubts about the legitimacy of the declaring party, remain unaffected.

1.4. References to the validity of legal provisions are only for clarification purposes. The legal provisions therefore apply even if there is no reference, unless they have been modified directly in these GTC or expressly excluded.

### 2. Quotations and orders

Our quotations shall be subject to change without notice and are non-binding. This applies also to information contained in price lists, leaflets etc. Delivery dates stated in our quotations or given to the purchaser by any other means are approximate, and we shall endeavour to keep to them. Delays in delivery shall give no right to claims, unless we have explicitly confirmed such delivery dates and an adequate period of grace granted to us has expired. Orders shall only be binding on us when they have been explicitly confirmed in writing, regardless of the form in which they have been placed with us. Statements made in catalogues are simply descriptions of goods and under no circumstances do they constitute warranted qualities. Furthermore, the characteristics of our samples cannot be regarded as warranted characteristics.

### 3. Prices

Prices shall be valid only when confirmed by us in writing. They are exclusive of VAT at the current rate and incidentals such as postage and packing, freight, insurance etc., as of storage. If delivery is made more than 4 months after the date of order, we shall be entitled to invoice the price valid at the date of despatch, even though different prices were initially confirmed. The price valid at the date of despatch shall also apply if the order was confirmed without prices being stated. When an order on call is placed, partial deliveries shall be invoiced at the price valid at the date of despatch. Any request by the purchaser for subsequent modifications shall entitle us to amend prices.

### 4. Conditions of payment

The invoiced sum is to be paid net within 30 days of date of invoice and delivery. If the purchaser is in default with any payment, we are entitled to claim interest for such default at the normal rate of interest charged for current accounts. If we are able to prove that we have incurred greater losses as a result of the delay, we shall be entitled to claim compensation for such damages. We are however entitled at any time, in the context of an ongoing business relationship, to execute a delivery in full or in part only against an advance deposit. We shall declare a corresponding reserve at the latest at the confirmation of the contract.

### 5. Set-off, right to retention

Only claims which have been recognised by us or have become legally binding may be offset against our invoices. Any right to a retention to be exercised

by the purchaser in connection with our claims is explicitly excluded. In case of defects in the delivery, the rights of the Purchaser remain unaffected, particularly with regards to point 10.3 of these GTC.

### 6. Delivery

The delivery is performed from the storage, wherever the place of fulfilment for the delivery and any subsequent fulfilment may be. Upon request by the Purchaser, the Goods will be sent to a different place of their choice (shipped purchase). Delivery of our goods is explicitly made on behalf of and at the risk of the purchaser. The risk shall pass over to the purchaser when the ordered goods leave our premises. The same applies if goods are collected in our premises from the point in time at which we notify the purchaser that they are ready for collection. Unless we have received instructions to the contrary from the purchaser, we shall decide at our discretion on the most economical delivery method without assuming any liability for the chosen means of delivery.

### 7. Specially manufactured goods

Components made according to a sample or a drawing or by special request must be taken over and paid for, unless they have a defect we are answerable for and which makes the components completely unfit for the purchaser's purposes. If their fitness for the purchaser's purposes is only reduced, the purchaser may request a reduction of payment but the contract shall not be cancelled.

### 8. Quantities

We are entitled to supply quantities which are above or below the ordered quantities by up to 10%. Such deviations are usual in this trade and the deliveries are deemed as being in compliance with the contract. If delivery quantities fall below the ordered quantities there shall be no right to subsequent delivery of the missing quantity.

### 9. Reservation of proprietary rights

9.1. All goods supplied shall remain our property until all current and future claims resulting from the Purchase contract and the business relationship with the purchaser (secured claims) have been paid in full. The purchaser is entitled to dispose of the purchased goods in the ordinary course of business transactions. Reservation of proprietary rights also applies to products resulting from processing, mixing up or combining our goods, in which case we are considered as manufacturers. In the case where our goods are processed, mixed up or combined with goods of third parties, and the proprietary rights of such third parties remain in force, we are entitled to co-ownership according to the proportion of the amount invoiced for such processed goods. In such cases such rights to co-ownership shall be safeguarded by the purchaser.

9.2. The purchaser shall transfer to us, as a security, his claims against third parties resulting from the resale of our goods in full or in the proportion of our coownership (see subparagraph 9.1). He is entitled to collect the amount of such claims on our behalf until revoked or until cessation of his payments made to us. The purchaser is not entitled to assign these claims to third parties.

9.3. The purchaser is not entitled to mortgage or transfer the goods which are subject to reservation by way of security.

9.4. The purchaser shall advise us immediately at any seizure of our goods or of any infringement of our rights by third parties.

9.5. In case of a default in payment or a deterioration in the financial situation, we are entitled to request immediate handing over of the goods which are subject to reservation. Any time limited claims shall immediately become due.

9.6. If the value of the securities exceeds our claims by more than 20%, securities to a corresponding amount will be released by us on request at our discretion.

### 10. Warranty

10.1. We expressly point out that all information and data is given to the best of our knowledge and belief. The user is solely responsible for the proper use of our products and he should check their suitability for the intended application.

Fischer Elektronik do not assume any warranty, whether expressed or implied, for the suitability, function or merchantability of their products in specific or general applications, and they cannot be held liable for accidental or consequential damage due to non-observance of the above.

10.2. Claims for defects can only be considered if the purchaser has complied with their obligation to check goods and submit a complaint as per Sections

377, 381 of the German Commercial Code [HGB]. If goods have a defect attributable to us, we are obliged to effect a cure, excluding the purchaser's right to withdraw from the contract or to reduce the purchase price (reduction), unless we are entitled to refuse to effect a cure by virtue of legal regulations. The purchaser shall grant us an adequate period of grace for effecting a cure. A cure may at our discretion be an elimination of the defect (rectification) or the supply of new products. We are entitled to determine the cure owed according to the payment of the purchase price due by the Purchaser. The Purchaser, however, is entitled to retain a part of the purchase price that is proportionate to the defect. The expenses incurred for the verification and cure, particularly transport, road, work and materials costs (not: expansion and installation costs) are borne by us, if there is indeed a defect. Otherwise, we can require that the Purchaser bear the costs arising from the unjustified defect rectification request (particularly examination and transport costs), unless the Purchaser could not have been aware that the defect rectification was unnecessary.

10.3. If goods have a defect attributable to us, we are obliged to provide subsequent fulfilment, excluding the purchaser's right to withdraw from the contract or to reduce the purchase price (abatement), unless we are entitled to refuse subsequent fulfilment by virtue of legal provisions. The purchaser shall grant us an adequate period of grace for subsequent fulfilment. Subsequent fulfilment may at our discretion be an elimination of the defect (rectification) or the supply of new products.

10.4. If rectification of the defect has failed, the purchaser shall be entitled to request a reduction in the purchase price (abatement) or to withdraw from the contract. Rectification shall be deemed to have failed after the second vain attempt, unless further attempts are reasonable in view of the object of the contract and can be reasonably imposed on the purchaser.

10.5. The purchaser's right to put forward further claims for damages shall remain unaffected by this.

10.6. If it becomes apparent (by the opening of an application for an insolvency procedure for example) after the conclusion of the contract that our claims to the purchase price are endangered due to lacking payment capacities of the Purchaser, we will then be entitled to refuse the delivery and – after a possible period of notice – to withdraw from the contract in accordance with the legal provisions (§ 321 of the German Civil Code). For contracts about the manufacturing of specific items (making to specification), we can declare the withdrawal immediately; the legal regulations about the dispensability of giving a period of notice remain unaffected.

### 11. Withdrawal

When delivery in accordance with the contract is not possible for reasons beyond our control, we are entitled to withdraw from the contract. Such withdrawal shall not entitle the purchaser to assert any right against us.

### 12. Export clause

We are not obliged to reimburse damages arising from delays in delivery or it being completely impossible to deliver as a result of statutory or official export restrictions, unless we act with intent or gross negligence suffered by the Customer or other persons. The Customer's duty to pay the agreed remuneration shall not be affected by disruptions in our performance as a result of export restrictions. We shall be entitled to withdraw from the contract if, after the contract is signed, our performance is disrupted as a result of export restrictions.

### 13. Place of performance and jurisdiction, applicable law

13.1. The place of performance and the place of venue for deliveries and payments and for any litigation arising between us and the purchaser shall be the headquarters of our company.

13.2. The relationship between the contractual parties shall be regulated solely in accordance with the law in force in the Federal Republic of Germany. The regulations of international uniform law, particularly the UN CISG, shall not apply.

Status as at: 29.07.2019

The latest T&Cs shall apply at all times. They may be downloaded at [www.fischerelektronik.de](http://www.fischerelektronik.de)