

EN

# haupa<sup>®</sup>



## Lexicon

CABLE CONNECTING METHODS | CRIMPING AND COMPRESSION TOOLS



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Industrial quality Germany

A close-up photograph of a metal terminal block. A yellow ring terminal is connected to a wire, with a metal ring terminal attached to the wire's end. The terminal block has several terminals with different colored caps: a green cap labeled '0.5', a yellow cap labeled 'A-6', a blue cap labeled '2.5', and a red cap labeled '1.5'. The text 'For a standard connection' is overlaid in white on the right side of the image.

**For a  
standard  
connection**



# HAUPA LEXICON | CABLE CONNECTING METHODS

## Cable connectors and their uses



All HAUPA cable lugs and connectors are annealed. The annealing process ensures a better flow of the material around the conducting medium when compressing. This achieves a better connection and is gentler on the tool. Tension and hardening are removed from the material by the annealing process. This reduces the risk of breakage and the cable lug or connector is thus less sensitive to vibrations such as those found in, for example, rail vehicles. HAUPA standard cable lugs and connectors are Brunel vibration and shock tested in accordance with DIN EN 61373:1999-11, Cat 1, Cl. B.

### Overview of crimping profiles



Spike  
compression



Oval  
compression



Single spike  
compression



Four spike  
compression



Notch  
compression



Wave profile



Hexagonal  
compression



WM  
compression



Hexagonal  
compression  
with spike



Roll  
compression



Trapezoidal  
compression



Square  
compression

## CRIMP-STYLE CABLE LUGS, NOT INSULATED

in accordance with DIN 46234

... are particularly well suited to the processing of multiple, fine and very fine wire cables. The cable lugs are punched from the highest possible quality copper sheeting, and equipped with a special groove profile, as well as being **hard soldered** in the compression area. The highest level protection against oxidation is provided by the tin-plating. Temperature resistance 120 °C. Even after compression is completed, there may be no microscopic cracks at the hard-soldered point. The **groove profile** ensures greater tensile strength. The soldered joint prevents the cable lug from splitting when applying spike compression to the joint. The shape is particularly suitable for wiring in switching cabinets. For cables in accordance with VDE 0295 classes 2, 5 and 6.



## CRIMP-STYLE CABLE LUGS WITH HALOGEN-FREE POLYAMIDE INSULATION

in accordance with DIN 46234

In the event of fire, the halogen-free insulation does not generate vapours which contain hydrochloric acid. The "Easy-Entry" system covers the abutting edge and ensures that the cable can easily be inserted in the cable lug. This enables fine wire cables to be inserted more quickly without bending the individual wires back. RoHS compliant. Temperature resistance 105 °C. For cables in accordance with VDE 0295 classes 2, 5 and 6.



## STANDARD CABLE LUGS & CONNECTORS

"Normal version"

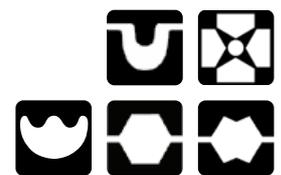
Unlike press connectors, these connectors are not subject to any DIN standard and thus deviate considerably from manufacturer to manufacturer. Other differences compared to standardised connectors lie in the length, wall thickness and labelling. Non-standardised connectors are shorter in the connecting area. They are characterised by a thinner wall thickness and are made from **99.9 % E-Cu/ SE-CU pipe DIN 40500**. For this reason, neither the use of pressing tools for DIN connectors nor the use of third-party tools is recommended since HAUPA is unable to provide a guarantee for the prescribed minimum pulling forces in accordance with VDE 0220 part 2.



**(Cu connector, factor 60 N x cross-section = minimum drawing force in N)**

Standard cable lugs and connectors are fundamentally suitable for use up to **1000 V**.

The pressing form of the connection is not prescribed, thus HAUPA tools with notch, spike or hexagonal compression may be used. The exceptions here are HAUPA **F-type** cable lugs & connectors **for highly flexible, fine wire cables of cable class 5 /6**, for which HAUPA **fundamentally only offers spike-notch tools or hexagonal spike inserts**. The benefits and disadvantages of the pressing formats depend on the intended purpose and can be explained by the HAUPA team if required. For compacted wires, we recommend our specially developed WM dies. These make fitting sleeves and special cable lugs superfluous!



### Explanation of embossing HUP 120-12

- HUP → Manufacturer identification "HAUPA"
- 120 → Nominal cross-section of the cable in mm<sup>2</sup>
- 12 → Size of the standardised screw dimensions for the connecting bolts, here M12

**Brunel**  
access to excellence





**F-TYPE PIPE CABLE LUGS AND CONNECTORS**

for extremely flexible, fine wire cables of cable class 5 /6



The interior diameter is larger in order to make it easier to insert the thicker, flexible wires. Depending on manufacturer, these cable lugs and connectors are also called **High-Flex Superflex**, or **KRF type**. Extremely flexible wires are used wherever cables are exposed to movement and vibrations (e.g. forklifts, robot arms etc.). This cable lug type can be recognised by its special labelling. In addition to the cross-section, flange dimension and manufacture label, there is an identifying number on the external end of the pipe. This identifying number also represents the external diameter or the cable lug or connector. HAUPA fundamentally recommends only the use of spike-notch tools for pressing, or hexagonal dies with spikes, in order to ensure secure connections.



**Explanation of embossing HUP 120-12**

- HUP → Manufacturer identification “HAUPA”
- 120 → Nominal cross-section of the cable in mm<sup>2</sup>
- 12 → Size of the standardised screw dimensions for the connecting bolts, here M12
- 22 → Exterior diameter (unique identifying mark for the F series)

**CABLE LUGS AND CONNECTORS MADE FROM NICKEL**

- Temperature resistant **up to 500 °C**.
- Oxidation resistant

Pipe cable lugs and connectors made from nickel are well suited for use in furnaces and combustion systems. They maintain their conductivity and functional faults are excluded. Nickel cable lugs and connectors also ensure secure electrical connections even in aggressive environments.



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## DIN CABLE LUGS ACCORD. TO DIN 46235 AND PRESS CONNECTORS ACCORD. TO DIN 46267

These connectors are subject to the above standards when it comes to their dimensions/tolerances and can thus also be processed using suitable third-party tools, insofar as the pressing dies are manufactured in accordance with DIN 48083 T4.

Material: Also **99,9 % E-Cu/ SE pipe DIN 40500**.

Energy suppliers frequently require the use of standardised materials in project business. In this sector, you will primarily find tenders in which DIN cable lugs and connectors that meet DIN standards are specified. The hexagonal pressing method is usually used for these connectors.

Thanks to the even hexagonal pressing method, DIN cable lugs in accordance with DIN 46235, can be used in the energy supply sector, from 10-30 KV since no extreme distribution occurs in the material (see deep groove pressing). The hexagonal pressing method ensures an even electrical field.

Press cable lugs and connectors are characterised by a long connecting shaft and a greater wall thickness. In addition, each DIN cable lug and connector have marks to aid the correct compression. **Narrow marks for 6 tonne pressing tools** and **wide marks for 12 tonne pressing tools**. The marks also indicate the number of compressions. A identifying number on the upper connecting flange indicates which DIN die is to be used for compression. After compression, this identifying number is imprinted on the press connector as an additional monitoring element.



### Explanation of embossing HUP 120-12 K20

- HUP → Manufacturer identification "HAUPA"
- 120 → Nominal cross-section of the cable in mm<sup>2</sup>
- 12 → Size of the standardised screw dimensions for the connecting bolts, here M12
- K20 → Tool identification (only for press cable lugs DIN 46235)

Further, these cable lugs have aicj marks for the number of compressions. In this example, compression must be carried out either twice with a wide insert or four times with a narrow insert. For processing, the standard recommends dies in accordance with DIN 48083. The compression should always be carried out as a hexagonal compression.

## UNTREATED AL DIN PRESS CABLE LUGS AND CONNECTORS WITHOUT TIN-PLATING

...find special usage in over-voltage or lightning protection systems.

### ALUMINIUM DIN CABLE LUGS AND CONNECTORS

...are being used more and more frequently. The benefits are clear. Low own weight and cheaper than copper. Especially in the **energy distribution sector**, the weight is a key reason for using aluminium conductors. The material properties differ considerably from copper wires. In order to connect an aluminium cable properly, special aluminium cable lugs and connectors are required. These connectors are equipped with contact grease. This grease does not damage the non-conductive oxide film of the aluminium in the pressing area during compression and thus enables perfect electrical connections.

HAUPA also offers a **longitudinally sealed** version with **oil stop**.



#### Explanation of embossing HUP 120-12 SM/ RM K20

HUP → Manufacturer identification "HAUPA"

120 → Nominal cross-section of the cable in mm<sup>2</sup>

12 → Size of the standardised screw dimensions for the connecting bolts, here M12

K20 → Tool identification code

SM → Sector-shaped, multi-wire

RM → Round, multi-wire

### ALUMINIUM AND COPPER (AL/CU) DIN CABLE LUGS AND CONNECTORS

for aluminium conductors according to DIN 48201 and round-pressed sector cables of up to 400 mm<sup>2</sup>

Copper is the best material to use for cables and electrical connections, however there are good reasons to fall back on aluminium. For this reason, there are requirements that combine these two materials. Copper and aluminium have a tendency to self-passivation due to rapid oxidation since the materials are not easy to combine. Aluminium/copper cable lugs and connectors are used specifically in network renovations, in transformer stations, or in distribution networks. Aluminium/copper reducing connectors equalise the differences in the cable cross-section when transitioning from aluminium to copper.



#### Explanation of embossing HUP 120-12 SM/ RM-150SE M12 HUP K20

HUP → Manufacturer identification "HAUPA"

120 → Nominal cross-section of the cable in mm<sup>2</sup>

12 → Size of the standardised screw dimensions for the connecting bolts, here M12

K20 → Tool identification code

SM → Sector-shaped, multi-wire

RM → Round, multi-wire

SE → Sector-shaped, single wire



## PVC OR NYLON INSULATED TERMINALS

Quality is the highest priority. Small errors may have great and expensive consequences. HAUPA tools are designed to coordinate with HAUPA insulated terminals. For this fundamental reason, we recommend using professional HAUPA tools when working with HAUPA connectors in order to prevent the aforementioned consequences.

### Only suitable for flexible cables.

Colour coding for connectors and cross-sections enables quick allocation of the die to the crimp-style cable lug (RoHS compliant and halogen-free). Insulated terminals are pressed in a so-called oval die. DIN 46245 parts 1, 2 and 3 specify the colour designation of the cable cross-section for the cable lug. In the event of insulated crimp-style cable lugs, attention should be paid to ensure that the abutting edge is located in the centre of the upper profile. In a lateral position, the edge is split open and the cable is not gas-tight and is insufficiently clamped.

<b>Red</b>	0,5 - 1,0 mm <sup>2</sup>
<b>Blue</b>	1,0 - 2,5 mm <sup>2</sup>
<b>Yellow</b>	2,5 - 6,0 mm <sup>2</sup>

### Quality features

A high level of productivity of cable connections and high reliability of the connection are only some of the advantages afforded by the HAUPA connecting systems.

### Material

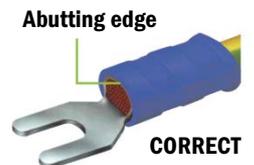
The high level of conductivity and very good mechanical properties are guaranteed by the purity of the copper used for production (up to 99.9%).

### Heat treatment

In order to achieve optimum malleability of the material during the crimping process, the crimp-style connectors are subjected to a heat treatment which is implemented by way of controlled cooling and monitored temperature.

### Surface treatment

The crimp-style connectors have a tin-coating applied by way of an electrolytic process. This method guarantees a maximum compounding of tin with the crimp-style connector surface and reduces the electrical resistance to a minimum. At the same time, the highest possible level of corrosion protection is ensured.



## Insulation

The standard versions are made with an insulation of self-extinguishing PVC or nylon in the standard international colours. The high quality of the insulation material that is used for all crimp-style connectors ensures a high level of resistance during the crimping process without damaging the insulation itself.

In order to guarantee a solid, firm connection in vehicles or vibrating machinery, we offer some insulated cable lugs with vibration-free copper sleeves.

These Easy-Entry copper sleeves ensure even greater strain relief.

- Self-extinguishing PVC in accordance with UL 94 - V0
- Temperature ranges in accordance with UL 486 A
- PVC insulation: 10 - 75 °C
- Nylon insulation: 55 - 105 °C
- 600 V

## SMALL PACKAGES

HAUPA offer cable connectors in resealable, transparent plastic packaging with blister hangers. These are specifically designed to be sold on space-saving counter-top stands and small display units.



## EASY-ENTRY INSULATING SLEEVE



1. Sleeves made from extremely pure copper
2. Electrolytic tin-coating
3. Heat treatment
4. Internal grooves for high extraction forces and best electrical conductivity
5. Insulation "Easy Entry": Funnel-shaped insulating sleeve
6. Cable stop
7. Vibration-free copper sleeves of type Easy Entry: Easy insertion of cables without wire twisting and damages

## SHRINK CONNECTORS WITH POLYOLEFIN INSULATION

These shrink crimp-style connectors have an inner coating of special adhesive. This protects the metal crimp-connector from environmental influences. These connectors are used wherever a reliable connection is required under severe environmental influences.

### First crimp, then shrink to be water-tight!

These connectors are used in lighting technology as well as trucks, cars, farm machinery and commercial vehicles. The shrink ratio is 3:1 at a shrink temperature of > +125 °C. Temperature resistance -55 °C to +125 °C.

The connector is crimped and then shrunk using a hot air gun (with deflector). The connector should be warmed evenly across the entire surface. In order to ensure optimum sealing, you should check whether the meltable internal adhesive has exited at the sides.





## NON-INSULATED, OPEN, BRASS SOCKET SLEEVES

HAUPA's range includes brass socket sleeves in both untreated and tin-plated versions. The additional tin-plating ensures an appropriate corrosion protection. Brass, blade terminals with raster tongues ensure secure hold in environments with considerable vibrations (vehicles/ machinery).

We differentiate between wire crimp and insulation crimp. The wire end should end flush with the wire crimp or protrude by a maximum of 1 mm in order for the plug function not to be affected. The insulation end may not extend into the wire crimp, but it may not only be only halfway under the insulation crimp. This is the only way to achieve a secure standardised pressing. A good compression process must



### CORRECT

Insulation end and stripped wires are pressed precisely. There is a positioning aid for crimping pliers which is designed to make precise crimping easier.



### FALSE

The insulation end is located in the insulation crimp. The stripped wire protrudes into the contact zone.

result in deformation of the wire. In this case, we speak of a "gas-tight" compression. For a precise compression of open plug connectors, positioning aids (locators) may be attached to the pliers.



## INSULATED AND NOT INSULATED END SLEEVES

Compressed end sleeves prevent splitting of the individual wires. A open collar enables the wires to be inserted into the sleeve more easily. The compressed sleeve enables simpler and faster insertion into the connecting terminals. A square compression ensures an excellent electrical connection in the terminal. Core cable ends are made from high-quality electrolytic copper and are tin-plated to prevent oxidation. Insulated core cable ends with "Easy-Entry" enable an even quicker insertion of the wire, as well as colour coded identification and traceability. RoHS compliant and halogen-free.

## TWIN END SLEEVES

... were developed to enable multiple terminal connections when space is critical. Frequently they are the only option for looping in the wire.

## END SLEEVES FOR SHORT-CIRCUIT SAFE CABLES (NSFGAFÖU)

These are used when feeding in or branching off before the main switch of a switching system, distributor, or for rail vehicles, solar systems, ignition cables etc. The particularly widely opened insulation sleeve fits onto the especially thick insulation of the special wires.



**Wave profile**  
Suitable for box terminals



**Trapezoidal compression**



**Square compression**  
Suitable for box terminals and spring terminal technology, good contact surface in terminal connection, easy insertion



**Hexagonal compression**  
Suitable for box terminals and spring terminal technology, as well as slim, round terminal strips, tricky insertion into the terminal connection.

Square, hexagonal and wave profiles are ideally suited for thinned, fine-wired conductors.

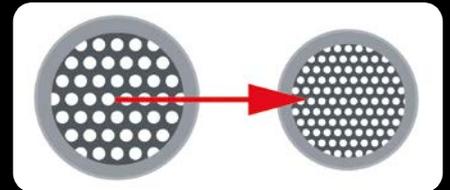
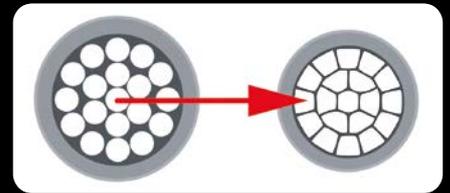
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MADE IN GERMANY

2 0804



# HAUPA LEXICON | CRIMPING AND COMPRESSION TOOLS

for pressing on thinned/compacted conductors



**The cross-section of thinned / compacted conductors is smaller than on not compacted conductors.**

The security risk during the confection is that the cable lugs/connectors as well as the sleeves cannot be installed in accordance with standard.

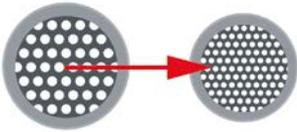
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# CRIMPING PLIERS FOR PRESSING END SLEEVES

on thinned conductors

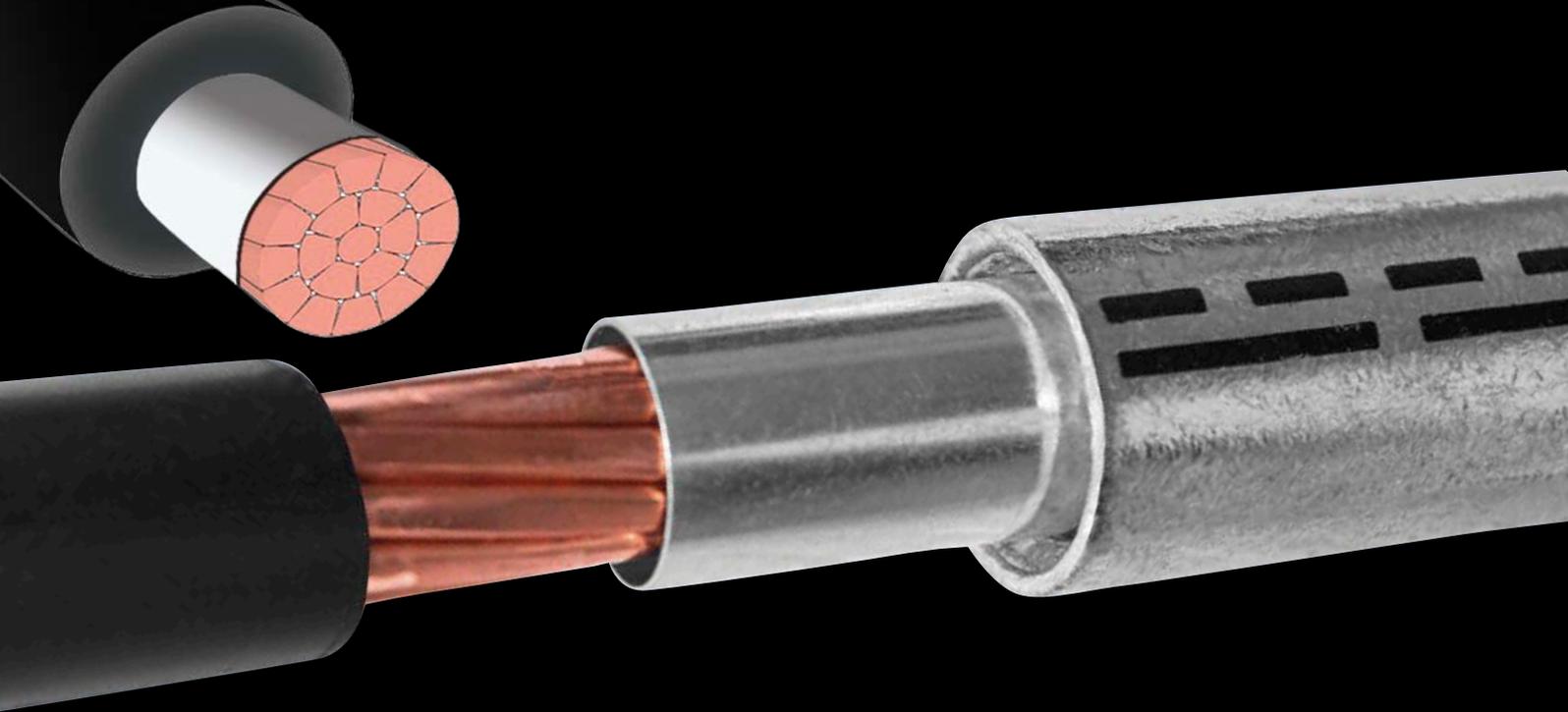
A special precision crimping profiles for thinned conductors



				<b>213088</b>	mm <sup>2</sup> 0,25 - 16
				<b>211652</b>	mm <sup>2</sup> 6 - 16
				<b>211672</b>	mm <sup>2</sup> 10 - 25
				<b>210768</b>	mm <sup>2</sup> 10 - 35
				<b>211674</b>	mm <sup>2</sup> 25 - 50
				<b>210788</b>	mm <sup>2</sup> 10 - 50 2 x 16 TWIN
				<b>210789</b>	mm <sup>2</sup> 50 - 95
				<b>212804</b>	mm <sup>2</sup> 0,08 - 10 2 x 0,25 - 6 TWIN
				<b>210804</b>	mm <sup>2</sup> 0,08 - 10 2 x 0,25 - 4 TWIN
				<b>212806</b>	mm <sup>2</sup> 0,5 - 16 2 x 1 - 4 TWIN
				<b>211818</b>	mm <sup>2</sup> 0,08 - 16 2 x 0,25 - 10 TWIN
				<b>211816</b>	mm <sup>2</sup> 0,08 - 16 2 x 0,25 - 6 TWIN
				<b>210819</b>	mm <sup>2</sup> 0,08 - 10 2 x 0,25 - 4 TWIN
				<b>211810</b>	mm <sup>2</sup> 0,08 - 16 2 x 0,25 - 6 TWIN

# SLEEVES FOR COMPACTED CABLES

for DIN cable lugs and connectors



## Sleeves for compacted round cables DIN

For multi-wire, compacted conductors (e.g. VDE 0295 Class 2). Allows the use of HAUPA DIN cable lugs and connectors for compacted conductors.



Art. no.	mm <sup>2</sup>	d1	d4	l	PE	PU
290561	16	5,0	5,3	16	100	100
290562	25	6,4	6,7	16	100	100
290563	35	7,7	8,2	17	100	100
290564	50	9,0	9,5	23	100	50
290565	70	10,6	11,2	24	100	50
290566	95	12,4	13,0	28	100	50
290567	120	13,9	14,5	30	100	50
290568	150	15,4	16,0	30	100	25
290569	185	17,6	18,2	38	100	25
290570	240	19,9	20,5	38	100	25
290571	300	22,4	23,0	48	100	5
290572	400	25,4	26,2	58	100	5

## Specifications

**Sleeves for compacted copper round cables, for securely pressed and processed DIN cable lugs and connectors.**

The diameters of compacted conductors are smaller than for non-compacted conductors with the same nominal cross-section. The resulting problem with the ready-made cable is that the DIN cable lugs and connectors cannot always be attached according to the standard and thus pose a safety risk.

The DIN cable lugs and connectors therefore do not meet the tensile forces specified in the standard. Therefore, secure and tension-resistant connection according to standard is not ensured.

**Advantages when using sleeves for compacted conductors in connection with DIN cable lugs and connectors:**

- Sleeve serves as diameter compensation for multi-wire, compacted conductors e.g. VDE 0295 Class 2.
- DIN cable lugs and connectors can be pressed according to standard on compacted conductors using HAUPA DIN compression tools.
- Faulty connections are ruled out.
- Existing DIN compression tools can be used.

### Properties

- For conductor cross sections ranging from 16 to 400 mm<sup>2</sup>

### Material

- CU according to EN 13600
- Annealed material for optimum material and compression properties

### Surface

- Tin-plated for protection against corrosion

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# HYDRAULIC COMPRESSION TOOLS

for pressing on thinned/compacted conductors

## Slim pressing



**300-06**



216802      216807  
216801/M    216800

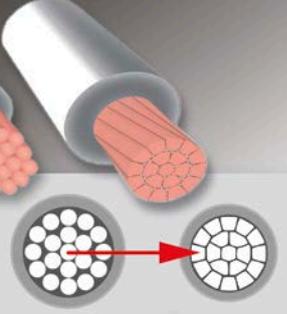
mm <sup>2</sup>	mm <sup>2</sup>
6 - 240	6 - 300

The pressing tools 216801 / M and 216800 additionally monitor the pressing pressure electronically. An LED indicates the end of the compression process Quality of the pressing.

- Light is green: Pressing completed as standard, motor stopped
- Light is orange: Battery voltage not sufficient
- Light is red: Pressing interrupted before completed

## Crimping dies for standard tube cable lugs, serie 300

**300-06**



WM pressing

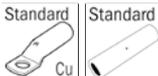


trapezoidal pressing, wave form

• Pressing force kN: 60 • Working pressure in bar: 700 • Opening/ Hub: 17 mm • Pressing width: slim

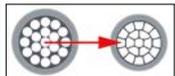
### Dies for standard tube cable lugs and connectors

for standard tube cable lugs, even on thinned/compacted conductors, **WM profile**



Standard    Standard

**300-06**



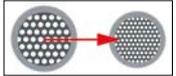

Art. no.	mm <sup>2</sup>	PW	kg	PU
216806/V	6	5	0,136	1
216808/V	10	5	0,136	1
216810/V	16	5	0,136	1
216812/V	25	5	0,135	1
216814/V	35	5	0,135	1
216816/V	50	5	0,134	1
216818/V	70	5	0,132	1
216820/V	95	5	0,132	1
216822/V	120	5	0,130	1
216824/V	150	5	0,128	1
216826/V	185	5	0,125	1
216828/V	240	5	0,121	1
216830/V	300	5	0,118	1

### Dies für end sleeves

for endsleeves on thinned conductors, **wave profile**



**300-06**




Art. no.	mm <sup>2</sup>	PW	kg	PU
216950	6	21	0,120	1
216952	10	21	0,120	1
216954	16	21	0,120	1
216956	25	21	0,120	1
216958	35	21	0,120	1
216960	50	21	0,120	1
216962	70	21	0,120	1
216964	95	21	0,120	1
216966	120	21	0,120	1
216968	150	21	0,120	1
216970	185	21	0,120	1
216972	240	21	0,120	1



## Wide pressing

				standard
		mm <sup>2</sup> 50 - 240	mm <sup>2</sup> 10 - 400	
		mm <sup>2</sup> 50 - 240	mm <sup>2</sup> 10 - 400	
		mm <sup>2</sup> 50 - 240	mm <sup>2</sup> 10 - 400	

The pressing tools 216601, 216622 and 216503 additionally monitor the pressing pressure electronically. An LED indicates the end of the compression process.

- Light is green: Pressing completed as standard, motor stopped
- Light is orange: Battery voltage not sufficient
- Light is red: Pressing interrupted before completed

## Crimping dies for standard tube cable lugs, serie 400



• Pressing force kN: 120 • Working pressure in bar: 700 • Opening/ Hub: 25 mm • Pressing width: wide

### Dies for standard tube cable lugs and connectors

for standard tube cable lugs, even on thinned/compacted conductors, WM-Profil

Art. no.	mm <sup>2</sup>	PW	kg	PU
216008/V	10	10	0,211	1
216010/V	16	10	0,212	1
216012/V	25	10	0,210	1
216014/V	35	13	0,207	1
216016/V	50	13	0,224	1
216018/V	70	14	0,221	1
216020/V	95	14	0,226	1
216022/V	120	14	0,200	1
216024/V	150	11	0,200	1
216026/V	185	11	0,191	1
216028/V	240	11	0,186	1
216030/V	300	11	0,200	1
216032/V	400	11	0,200	1

### Dies für end sleeves

for endsleeves on thinned conductors, wave profile

Art. no.	mm <sup>2</sup>	PW	kg	PU
216112	50	26	0,194	1
216114	70	26	0,200	1
216116	95	26	0,188	1
216118	120	26	0,200	1
216120	150	26	0,200	1
216122	185	26	0,200	1
216123	240	26	0,200	1



# DIELESS HYDRAULIC COMPRESSION TOOLS

## for pressing on thinned/compacted conductors

Indent pressing standard, dieless		
	 standard	
	 216660    216665    216663 216663/M Sensor	$\text{mm}^2$ 16 - 300
	 216661    216666    216667 216667/M Sensor	$\text{mm}^2$ 25 - 400
	 216669 216669/M Sensor	$\text{mm}^2$ 10 - 240

• Pressing force kN: 60 • Working pressure in bar: 700

These hydraulic indent compression tools automatically adjust themselves to the conductor cross-section. When the pressure required by the standard is reached, the pressure sensor switches off and the piston can be retracted.

### SENSOR

The pressing tools of "M"-Serie additionally monitor the pressing pressure electronically. An LED indicates the end of the compression process.

- Light is green: Pressing completed as standard, motor stopped
- Light is orange: Battery voltage not sufficient
- Light is red: Pressing interrupted before completed

**According to the norm DIN compression cable lugs have to be compressed with hexagonal dies!**



# MECHANICAL CRIMPING TOOLS

for pressing on thinned/compacted conductors

## Indent pressing standard, dieless



The HAUPA well known mechanical crimping tool for indent crimps has the same advantages like the WM crimping profile of the dies. Due to the deep indent during the compression process the crosssection

		
	210771	0,75 - 6 mm <sup>2</sup>
		
	210830	0,75 - 16 mm <sup>2</sup>
		
	210836	50 - 120 mm <sup>2</sup>
	210838	120 - 240 mm <sup>2</sup>
	210840	185 - 400 mm <sup>2</sup>



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