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HARTING Han[®] S 450 Plus **Assembly instructions**

Power connections for battery storage technology

General safety instructions

When assembling, maintaining and disassembling Han® S connectors, the following safety instructions must be observed:



Preconditions for the assembly

All work on the assembly, maintenance and disassembly of Han® S connectors may only be carried out by skilled personnel. In the EU, work on electrical connections must be carried out by trained and qualified personnel in compliance with EN 50110-1/-2 and IEC 60364. The respective national accident prevention regulations must be observed.



Do not plug or unplug under voltage/load

When used as intended, the connectors included in this catalogue must not be coupled or decoupled under electrical load unless otherwise stated.



Protection against electric shock

Han® S connectors are designed for overvoltage category III (EN 50124-1). Male and female contacts are completely touch-safe. Depending on the application, further protective measures against electric shock may be required; implementation must be ensured by the user during installation. Observe the five safety rules of the DIN VDE 0105-100 standard.



Do not use damaged parts!

Dispose of fallen or damaged connector components! Do not continue to use them!



Connect metal mounting panel to protective earth!

If a metal mounting panel is used, it must be connected to the protective earth. If a plastic mounting plate is used, the user must take additional measures to protect the application and operator against electric shock in accordance with the applicable safety regulations.

Legends of symbols used in these instructions



Warning, before starting the installation, refer to the accompanying assembly instructions.



Warning, risk of electric shock.

Technical characteristics

Item	Specification
Overvoltage category	III
Number of contacts	1
Rated current (at 25°C)	350A with 95 mm ² /AWG 3/0 or 4/0 cable 400A with 120 mm ² /250 kcmil cable 450A with 150 mm ² /300 kcmil cable
Rated voltage	2,000 V DC
Rated impulse voltage	15 kV
Impulse test voltage	33.7 kV*
Pollution degree	3**
Insulation resistance	> 10 ⁹ Ω (2,500 VDC)
Contact resistance	≤ 0.3 mΩ
Limiting temperatures	-40...+125 °C
Number of mating cycles	500
Degree of protection acc. to IEC/DIN EN 60529 (finger safe contacts with rated voltages ≤ 1500 V DC)	
- mated condition	IP67/IP69K
- bulkhead mounted housing w. protection cap	IP67
Coding system	Mechanical & colour
Locking system	Single lever (status visible), <u>C</u> onnect- <u>P</u> osition <u>A</u> ssurance (CPA), unlock protection as an option
Vibration & shock resistance	IEC 61373-2010 cat. 1, class B
Cable entry	Angled, available rotation through 360° before and after mating
Cable outer diameter	15.4-23.5 mm
Cable gland	Wrench size 34 (A/F 34)
- recommended tightening torque	5 Nm
Contact termination (hood)	Crimp (conductor cross-section 95 mm ² ... 150 mm ²)
Contact termination (housing)	Bolt/busbar/busbar with rivet nut Bolt M10x1.5, torque: 7.5~8.0 Nm Busbar M8x1.25, torque: 5.0~5.5 Nm
- recommended tightening torque	- with rivet nut: 5.0~5.5 Nm - with elongated hole: 7.5~8.0 Nm
Fixing screws (housing)	M4, 6-12 mm long (suggested), DIN EN ISO 4762 screw head
- recommended tightening torque	1.5±0.1 Nm
Colour (hood, housing)	RAL 9005 (black), RAL 3001 (red), RAL 5015 (blue), RAL 2003 (orange)
Material (contacts)	Pure copper
Material flammability class acc. to UL 94	V-0
Railway standard	EN 45545-2:2020 + A1:2023 R22/R23 (HL1/HL2/HL3)
UL	UL 4128 UL 1977
TÜV	TÜV 2PfG 2740

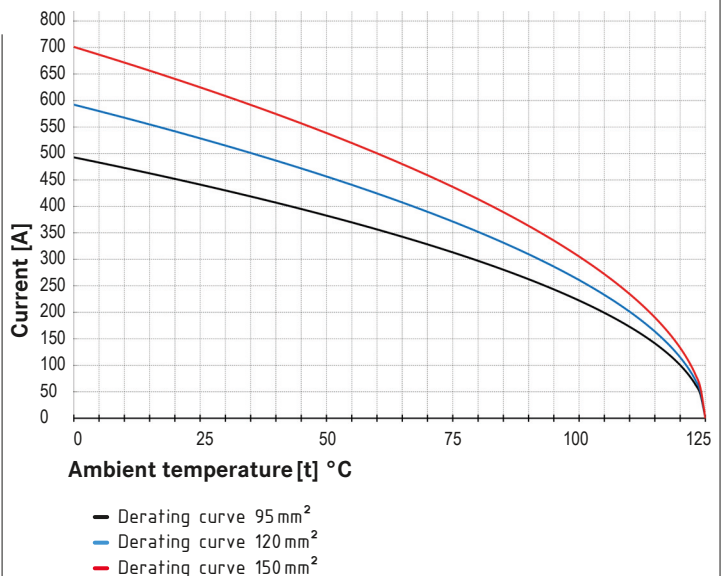
Notes:

* With grounded metal mounting panel

** With pollution degree 3, the product is suitable for use in the macro environment of IP54 applications.

Derating

Current-carrying curves of Han® S 450 Plus



Short-time current-carrying capacity

Connectors can withstand a 18 kA conditional short-circuit current for one second with fuse.

Overview of product range

Product line	Connector style	Bulkhead mounted housing or hood*	Termination technique	Contact specifications	Front coding	Rear coding	Colours	Additional features
Han® S 450 Plus	Circular connector (CC)	Hood, angled (HA)	Crimp terminal (CRT)	95 mm ² 4/0 AWG 120 mm ² 150 mm ²	C1 C2 C3 C4 C5	Rear coding 1 (RC1) Rear coding 2 (RC2)	Black Red Orange Blue	Unlock protection (UP)
		Housing, bulkhead mounted (HBM)	Screw terminal (SCT)	M10 thread (M10)				
			Busbar contact (B1)	- M8 thread (M8) - elongated hole (EH) - rivet nut (RN), M8 thread				
			Transfer pin (T1)					

Angled hoods (90°)

Colours				
	Orange	Red	Black	Blue
Conductor cross-sections	95/120/150 mm ²	95/120/150 mm ²	95/120/150 mm ²	95/120/150 mm ²

Bulkhead mounted housings/termination types

				
Busbar with elongated hole	Busbar with M8 thread	Busbar with rivet nut, M8 thread	Screw terminal, M10 bolt	Transfer pin

Locking levers

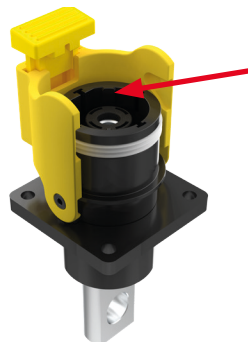
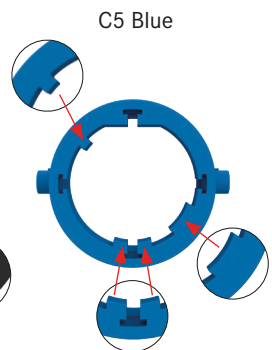
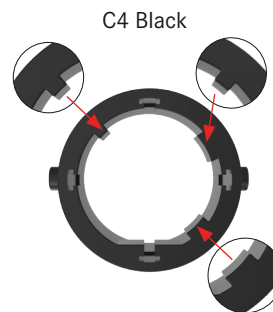
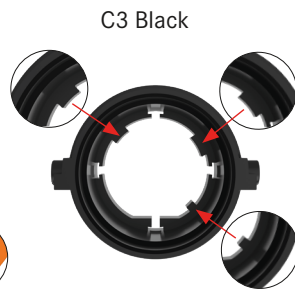
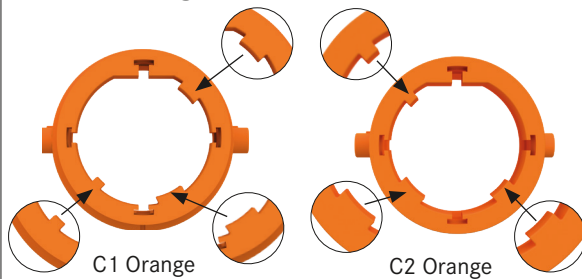
Standard 	Unlock Protection 
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Protection cap

	Protection cap
Notice: Suitable for any Han® S 450 Plus bulkhead mounted housing	

Codings

Front coding options*

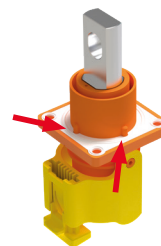


Front codings in the mating faces of bulkhead mounted housing & hood

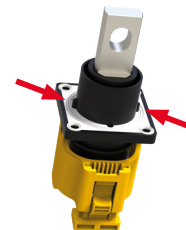
*** Notice:**

For explanation of the Cx abbreviations please refer to the "Available connectors and components" table below. HARTING could supply the front codings in customer-specific colours.

Rear coding options



90°
RC* 1, always
with C1 & C2



180°
RC* 2, always
with C3 & C4



No rear coding

* RC = Rear coding

Available connectors & components

Product codes	Part number
Han S 450+_CC_Cover Plastic	97000002040
Han S 450+_CC_Flange Gasket f.HBM	97000002064
Han S 450+_CC_RS_16.4-17.6mm	97000002065
Han S 450+_CC_RS_17.4-18.6mm	97000002067
Han S 450+_CC_RS_18.4-19.6mm	97000002066
Han S 450+_CC_RS_19.4-20.6mm	97000002070
Han S 450+_CC_RS_20.4-21.6mm	97000002068
Han S 450+_CC_RS_21.4-22.2mm	97000002071
Han S 450+_CC_RS_22.0-22.8mm	97000002115
Han S 450+_CC_RS_22.6-23.0mm	97000002069
Han S 450+_CC_HA_CRT_95mm²_C1_Red	97000002072
Han S 450+_CC_HA_CRT_120mm²_C2_Red	97000002078
Han S 450+_CC_HA_CRT_150mm²_C1_Red	97000002079
Han S 450+_CC_HA_CRT_95mm²_C2_Orange	97000002080
Han S 450+_CC_HA_CRT_120mm²_C1_Orange	97000002081
Han S 450+_CC_HA_CRT_150mm²_C2_Orange	97000002082
Han S 450+_CC_HA_CRT_95mm²_C3_Black	97000002083
Han S 450+_CC_HA_CRT_120mm²_C4_Black	97000002084
Han S 450+_CC_HA_CRT_150mm²_C3_Black	97000002085
Han S 450+_CC_HA_CRT_95mm²_C5_Blue	97000002086
Han S 450+_CC_HBM_B1_EH_C1_RC1_Red	97000002087

Product codes	Part number
Han S 450+_CC_HBM_B1_EH_C2_RC1_Red	97000002088
Han S 450+_CC_HBM_B1_M8_C1_RC1_Red	97000002089
Han S 450+_CC_HBM_B1_M8_C2_RC1_Red	97000002090
Han S 450+_CC_HBM_SCT_M10_C1_RC1_Red	97000002091
Han S 450+_CC_HBM_B1_EH_C1_RC1_Orange	97000002098
Han S 450+_CC_HBM_B1_EH_C2_RC1_Orange	97000002100
Han S 450+_CC_HBM_B1_M8_C1_RC1_Orange	97000002101
Han S 450+_CC_HBM_B1_M8_C2_RC1_Orange	97000002102
Han S 450+_CC_HBM_SCT_M10_C2_RC1_Orange	97000002103
Han S 450+_CC_HBM_B1_RN_C2_RC1_Orange	97000002104
Han S 450+_CC_HBM_B1_EH_C3_RC2_Black	97000002105
Han S 450+_CC_HBM_B1_EH_C4_RC2_Black	97000002106
Han S 450+_CC_HBM_B1_M8_C3_RC2_Black	97000002107
Han S 450+_CC_HBM_B1_M8_C4_RC2_Black	97000002108
Han S 450+_CC_HBM_SCT_M10_C4_RC2_Black	97000002109
Han S 450+_CC_HBM_B1_RN_C3_RC2_Black	97000002110
Han S 450+_CC_HBM_B1_M8_C5_Blue	97000002111
Han S 450+_CC_HBM_B1_EH_C1_RC1_Red_UP	97000002112
Han S 450+_CC_HBM_B1_EH_C2_RC1_Orange_UP	97000002113
Han S 450+_CC_HBM_B1_EH_C3_RC2_Black_UP	97000002114

Handling of standard locking lever

Opening process



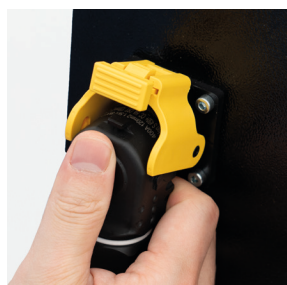
①



②



③



④



⑤



⑥

Handling of UP locking lever

Opening process (using a flat head screwdriver)



①



②



③



④



⑤



⑥

Cable side, hood assembly

Ⓐ

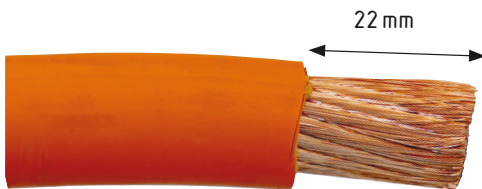


Notice:

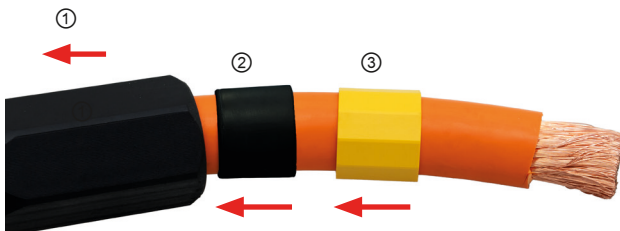
Notice Clean copper strands from dirt and oxide film.

- Copper strands must not be drilled.

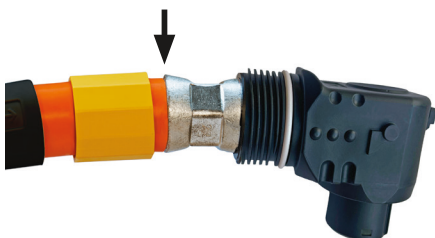
Ⓑ



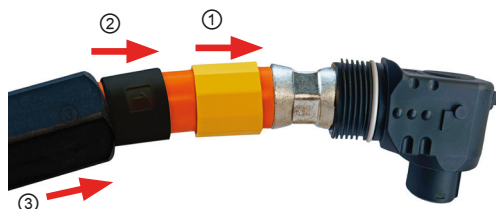
Ⓒ



Ⓓ



Ⓔ



- Ⓐ Clean the cable, making sure that the outer jacket is free from oil and dust.

- Ⓑ Remove cable sheath and strip it by 22 mm.

- Ⓒ Before starting to crimp, slide...
 ① back shell
 ② rubber sleeve
 ③ cable holder
 over the cable in the direction of the arrows.

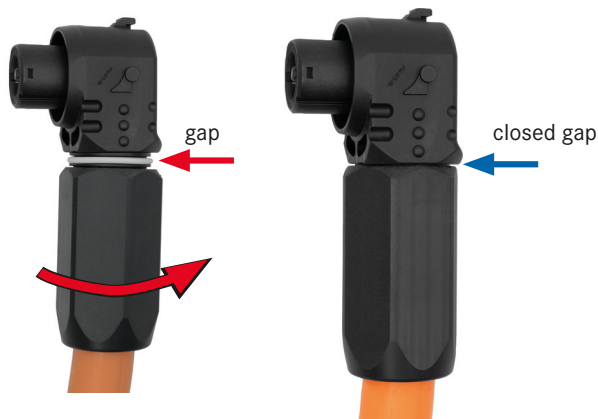
- Ⓓ Insert the wire strands completely into the crimp ferrule and start to crimp using the appropriate tools.

- After the crimping, minimize the gap between the contact and the outer rim of the cable sheath!
 (⇒ black arrow)

- Ⓔ For assembling the cable side, the following steps are required:

- ① Slide the cable holder over the crimped zone of the contact up to the upper part of the hood.
- ② Slide the rubber sleeve up to the cable holder.
- ③ Slide the back shell over the rubber sleeve and the cable holder until the threads engage. Screw together both parts of the hood (⇒ Ⓕ, next page).

Ⓕ

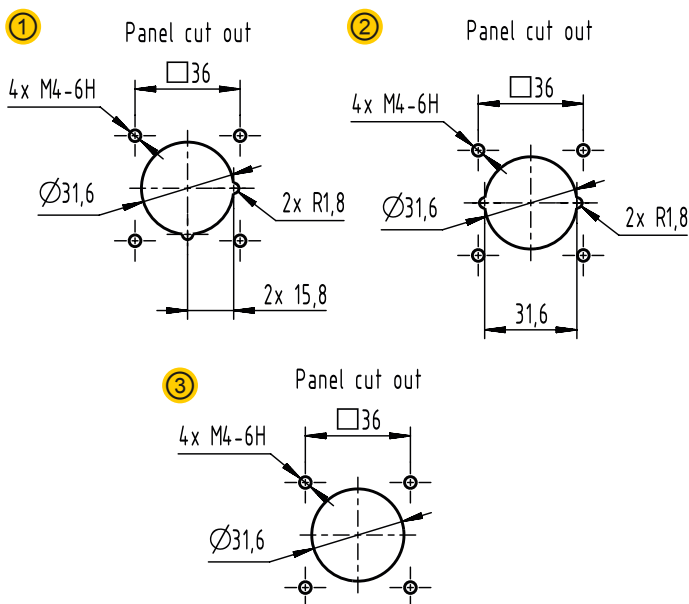


Ⓕ Hand-tighten the back shell!

- ▶ A narrow gap will remain between both parts of the hood ($\Rightarrow$ small red arrow). To close this gap, turn the back shell clockwise using a wrench (size 34), to bring it into the final position ($\Rightarrow$ blue arrow).

Notice: The recommended tightening torque is 5 Nm.

Device side, panel mounting



- Ⓐ To install the Han® S 450 Plus bulkhead mounted housing in a panel cut out, first, tighten the two screws opposite the lever with an appropriate tool applying a tightening torque of 1.5 $\pm$ 0.1 Nm. Then, rotate the housing by 180° and tighten the remaining two screws. Compare panel cut outs on the left showing solutions with 2 Ⓐ (RC1) + Ⓑ (RC2) or 0 Ⓒ coding elements.

Notice: It is recommended to use M4 screws, 6-12 mm length, equipped with screwheads according to DIN EN ISO 4762.

Crimp die sets & crimping tools

Suitable crimp die sets*

95 mm² Crimp die for
120 kN tool (D16)
09 99 000 0868

120 mm² Crimp die
for 120 kN tool (D16)
09 99 000 0869

150 mm² Crimp die
for 120 kN tool (D18)
09 99 000 0870



Recommended tools

Battery hydraulic crimping
tool with rechargeable
battery, 120 kN
09 99 000 0860

For processing TC 70-
TC 650 ($\leq$ 240 mm²)
acc. to DIN 46235,
with pressing width
10... 14 mm



Manually operated
hydraulic crimping tool,
120 kN

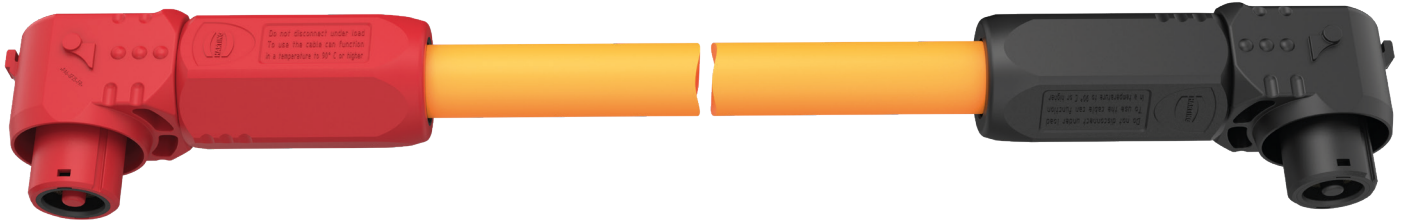
09 99 000 0861

For processing TC 70-
TC 650 ($\leq$ 240 mm²)
acc. to DIN 46235



* Fitting to tools 09 99 000 0860 and 09 99 000 0861

Cable harnesses



Features / Benefits



High power transmission, rated current up to 450A/1500 V.



Safe installation due to vision control of locking status and touch safe design.



Fast installation and setup times even for big batch sizes.



Cable resistant against heat, cold, oil, ozone, acid and alkali.



Lower total cost of ownership as no tools or stock are required and labour costs are reduced.

Technical specifications

Cable: HV 125°C 1500V XLPE orange cable
Loading plan: 1:1
Protection level: IP67
Temperature range: -40°C ~ +125°C

Conductor cross-section	Rubber sleeve packed with plug
95 mm ² or 3/0 AWG	Han® S 450 Plus RS 17.4 - 18.6 mm
4/0 AWG	Han® S 450 Plus RS 18.4 - 19.6 mm
120 mm ² or 250 kcmil	Han® S 450 Plus RS 20.4 - 21.6 mm
150 mm ² or 300 kcmil	Han® S 450 Plus RS 22.6 - 23.5 mm
Notice: If the customer uses a cable with different outer diameter, the suitable rubber sleeve must be ordered separately.	

Contact data for cable assemblies

If you require cable harnesses equipped with Han® S 450 Plus connectors, please contact our specialists at HARTING Customised Solutions.

Address: HARTING Customised Solutions Stiftung & Co. KG
In der Tütenbeke 22, 32339 Espelkamp, Germany
Phone: +49 5772 47 0 | Fax: +49 5772 47 400
e-mail: hcs@harting.com

Product codes & part numbers

Product codes	Part number
Han S 450+_CC_HBM_B1_M8_C1_Black	97000004980
Han S 450+_CC_HBM_B1_M8_C2_Black	97000004981
Han S 450+_CC_HBM_B1_M8_C3_Black	97000004982
Han S 450+_CC_HBM_B1_M8_C4_Black	97000004988
Han S 450+_CC_HBM_B1_M8_C5_Black	97000004989
Han S 450+_CC_HBM_SCT_M10_C3_RC2_Black	97000002733
Han S 450+_CC_HBM_B1_M8_C5_RC1_Red	97000005627
Han S 450+_CC_HA_CRT_120mm2_C1_Black	97000004976
Han S 450+_CC_HA_CRT_120mm2_C2_Black	97000004977
Han S 450+_CC_HA_CRT_120mm2_C3_Black	97000004978
Han S 450+_CC_HA_CRT_120mm2_C5_Black	97000004979
Han S 450+_CC_HA_CRT_120mm2_C1_Red	97000005624
Han S 450+_CC_HA_CRT_120mm2_C5_Red	97000005626

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