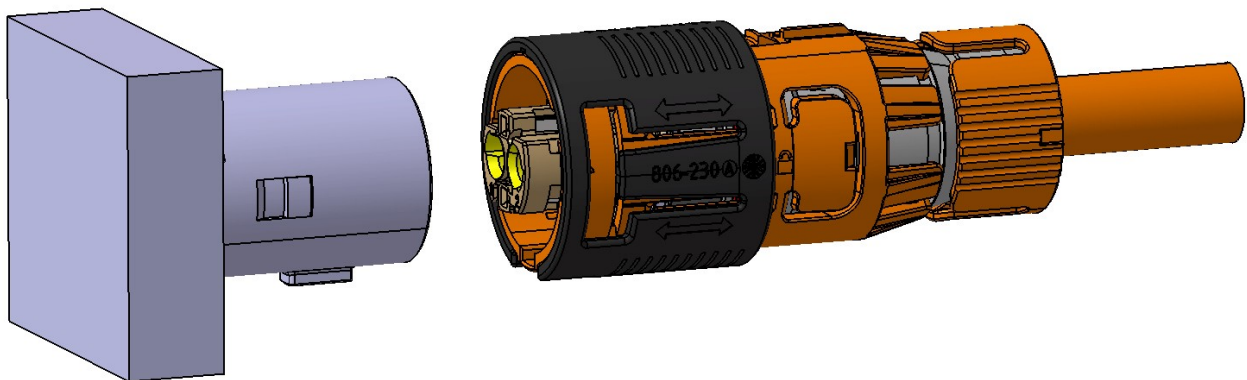
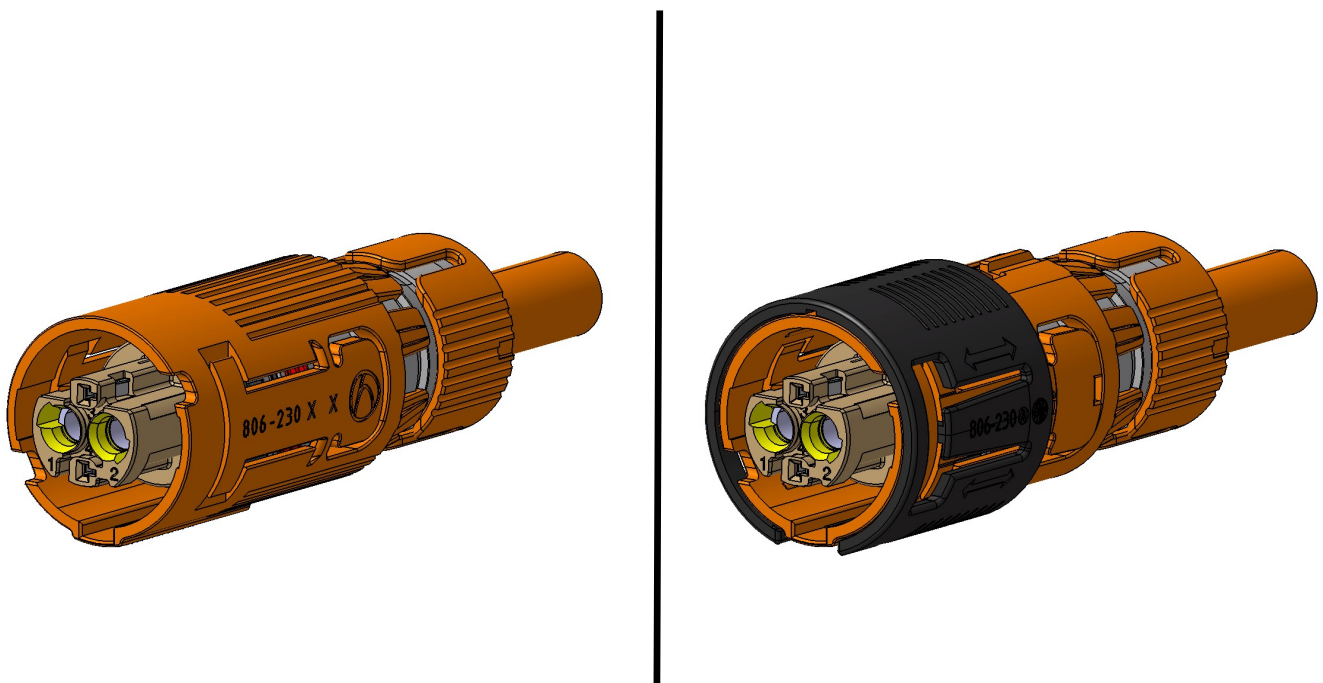




HIRSCHMANN
AUTOMOTIVE

Product specification HIRSCHMANN PowerStar 40-1

HV 2+2 PIN female connector



EPS-100043-00
Version 05



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2. Preface

2.1. Introduction

This product specification is valid for the HV female connector 2+2PIN, assembled according to the process specification listed below, and contains the product design and the condition upon delivery, the technical characteristics as well as the qualification inspections performed.

There is no right of recourse in the event of improper use, deviating from this specification and resulting quality problems.

2.2. Additional applicable documents

| | | |
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| a | Hirschmann product drawing | 805-972-...00 |
| b | Process specification | EVS-100036 / EVS-100037 / EVS-100097 |
| c | Working group guideline LV214 | Working group inspection guideline for motor vehicle connectors, March 2010 edition |
| d | Working group guideline LV215 | Electrical system/electrical requirements of HV connectors – Feb .2009 |
| e | German standard DIN EN 60352-2 | Solderless electrical connections Part 2: Crimp connections |
| f | DIN EN 60664-1 | Insulation coordination for electrical equipment in low-voltage systems-Part 1: Fundamentals, requirements and inspections; |
| g | 2000/53/EG | Directive of the European Parliament and the Council on end-of-life vehicles, incl. appendices; European Union |
| h | ISO 6469-3 | Electric road vehicles - Safety specifications - Part 3: Protection of persons against electric hazards |
| i | ISO 20653 | Road vehicles; protection classes (IP code); protection against foreign objects, Water and contact; electrical equipment; |
| j | Hirschmann Product drawing male connector | 806-029-...00 |



3. Technical characteristics

3.1. Operating temperature

Planned installation area: Engine compartment

Acceptable temperature range for the plastic used:

-40°C to 140°C for a period of 3000h,

Find the exact property changes for the plastic material in the plastic data sheets

3.2. Operating conditions

Rated voltage range $U=750\text{VDC}$

Equipment class: 1

Degree of pollution: 2

Overvoltage category: 1

3.3. Voltage class

Class B as per ISO 6469-3

$60\text{V_DC} < U \leq 1500\text{V_DC}$

$25\text{V_AC} < U_{\text{eff}} \leq 1000\text{V_AC}$ (15 - 150Hz)

3.4. Ampacity

Kat.1 40A (6,0mm²)

~~Kat.2 150A (35mm²)~~

~~Kat.3 250A (50mm²)~~



Attention : The Derating in the housing show exemplary values.
Requirements related to the current capability of the connector has also to be considered with the Derating of the contact supplier



For details, see derating curves

2x2,5mm²/2x4mm²/2x6mm² with ODU E4/K4 circular contact (base material CuZn surface Ag)

See figure 1

2x2,5mm²/2x4mm²/2x6mm² with ODU E4/K4 circular contact (base material CuTe surface Ag)

See figure 2

2x2,5mm²/2x4mm²/2x6mm² with HCT4 circular contact (base material Cu alloy surface Ag)

See figure 3

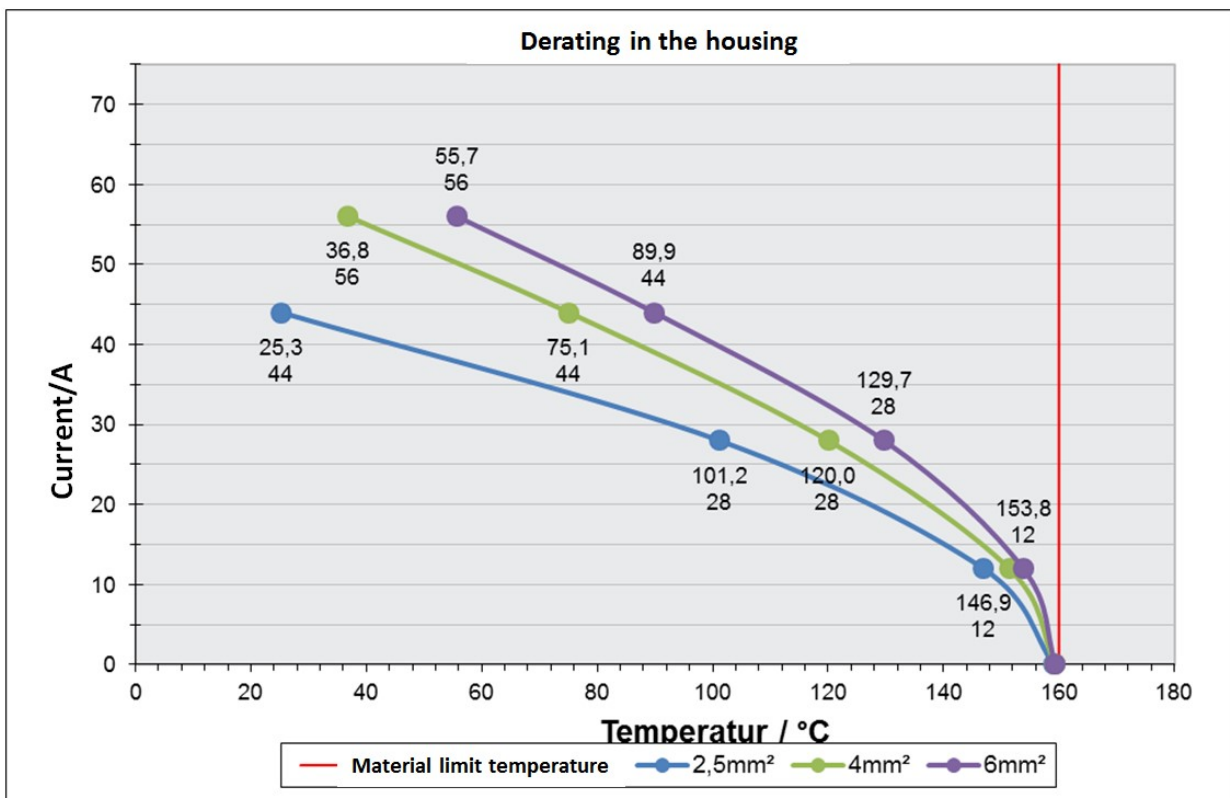
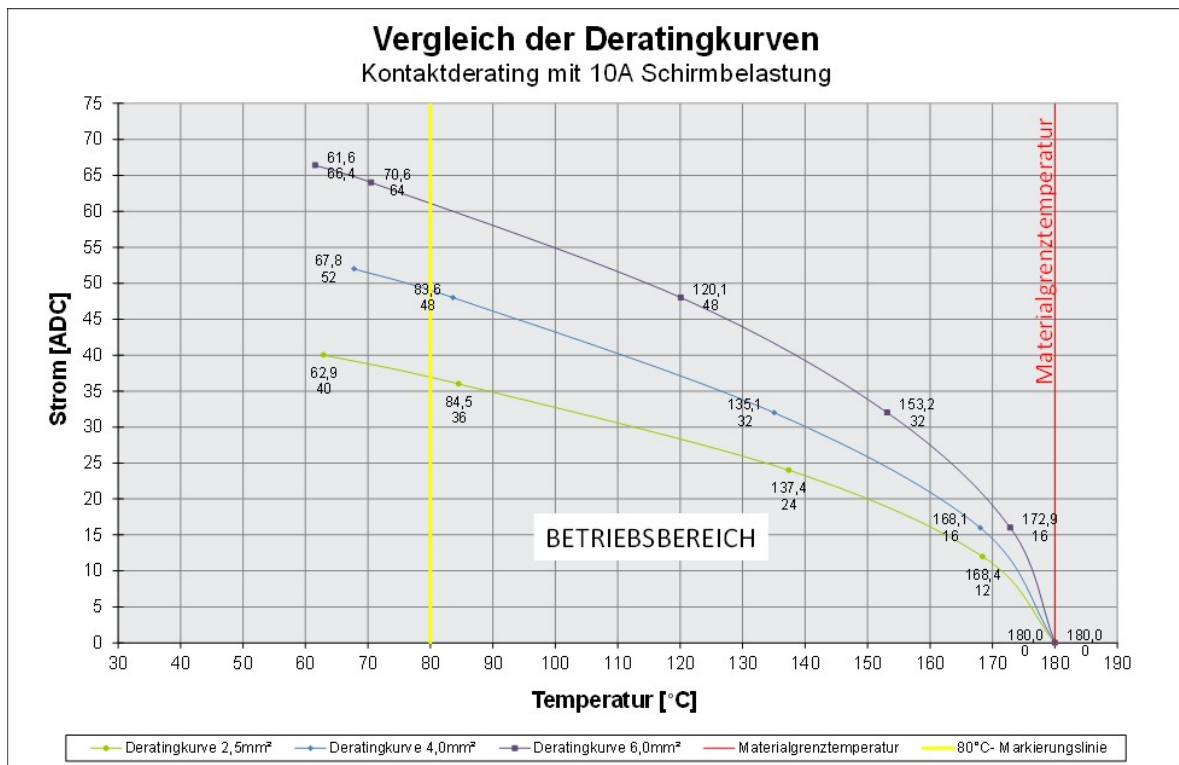
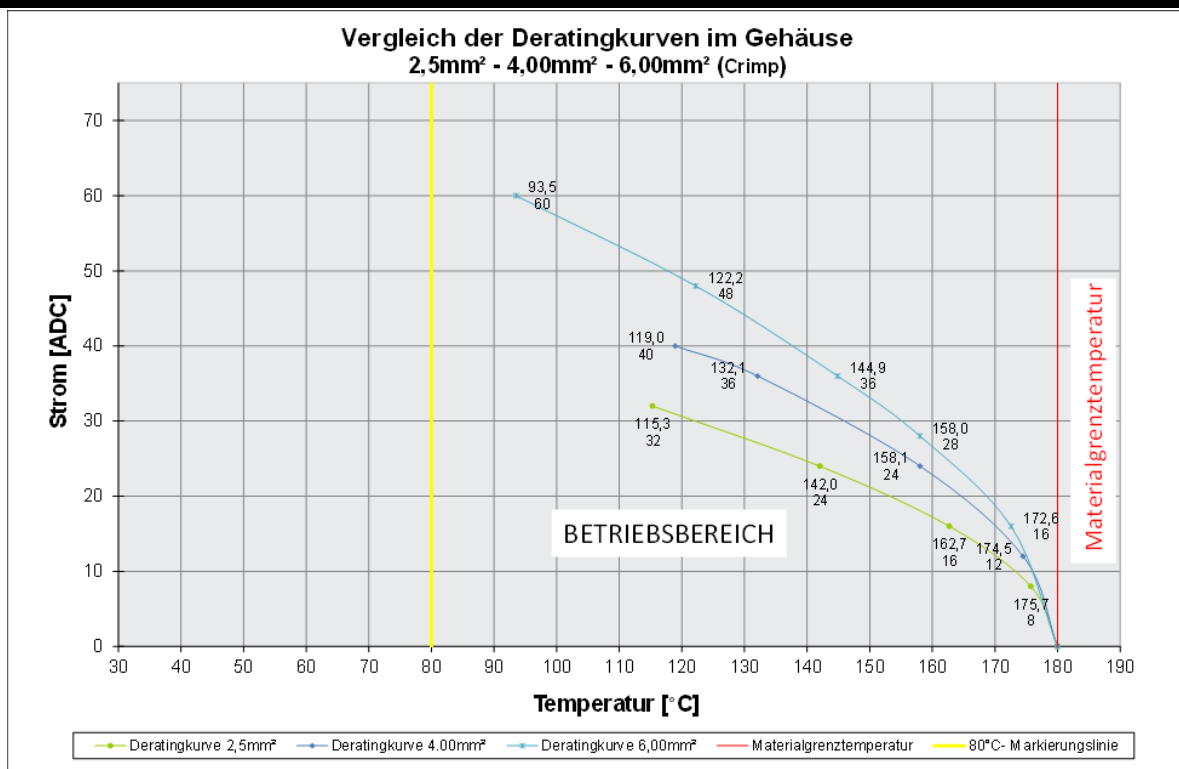


Figure 1





3.5. IP protection class

IPxxD (plugged socket plug)
IPxxB (unplugged socket plug)

3.6. Water tightness

IP6k9k and IPx8, PG23 as per working group inspection guideline LV214 and LV215

3.7. Shielding contact resistance / shielding contact

Shielding contact: Encircling 360°

Shielding contact resistance $R < 10\text{m}\Omega$ (complete from sheathed cable to the assembly housing)

$I_{\text{min}} = 10\text{A}$; leakage current 60s, 25A

3.8. EMC

> 70dB (10kHz bis 5 MHz)
> 65dB (5MHz bis 500MHz)

3.9. Contact holding force in the socket housing

HV contacts: Primary latching mechanism / secondary latching mechanism min. 150N

HVIL contacts (MLK1,2 / MCON 1,2): $F_{\text{Primary}} \geq 60\text{N}$ (contact holding force for 60sec)

3.10. Secondary locking mechanism

Activation force < 40N, accidental opening not possible.

3.11. Polarization/coding/Kujiri security

Failed insertion force min. 300N
Kujiri security present

3.12. Integrated HVIL system

HV load contacts min. 1mm advanced (nominal 2mm)



3.13. Number of mating cycles

max. 50 cycles (Ag)

3.14. Assembly, disassembly forces

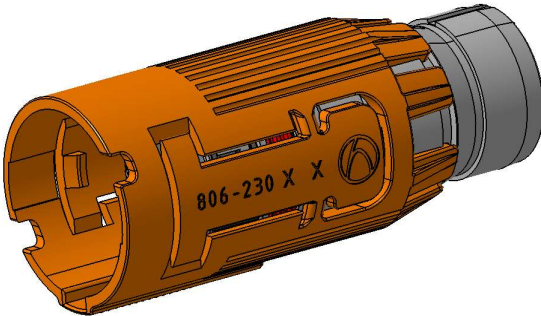
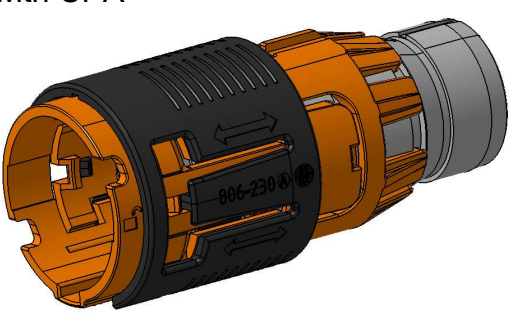
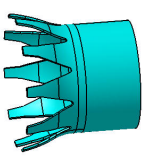
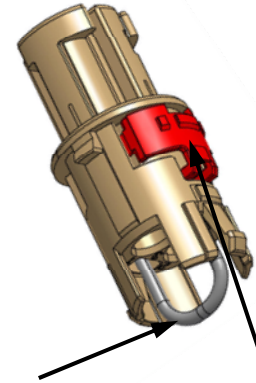
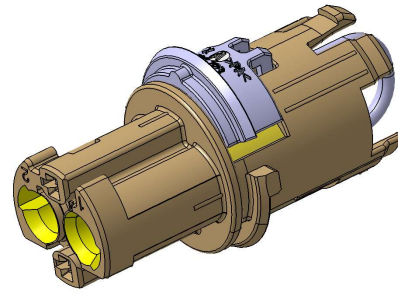
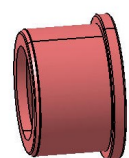
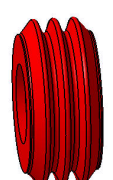
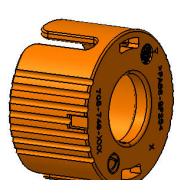
| | |
|---|------|
| Max. assembly force for the socket plug in the plug / plug base: | 85N |
| Max. disassembly force for the socket plug from the plug / plug base: | 85N |
| Min. holding force for the socket plug in the plug / plug base: | 150N |
| Max. contact loading force in the socket housing: | 15N |



Condition upon delivery / product design

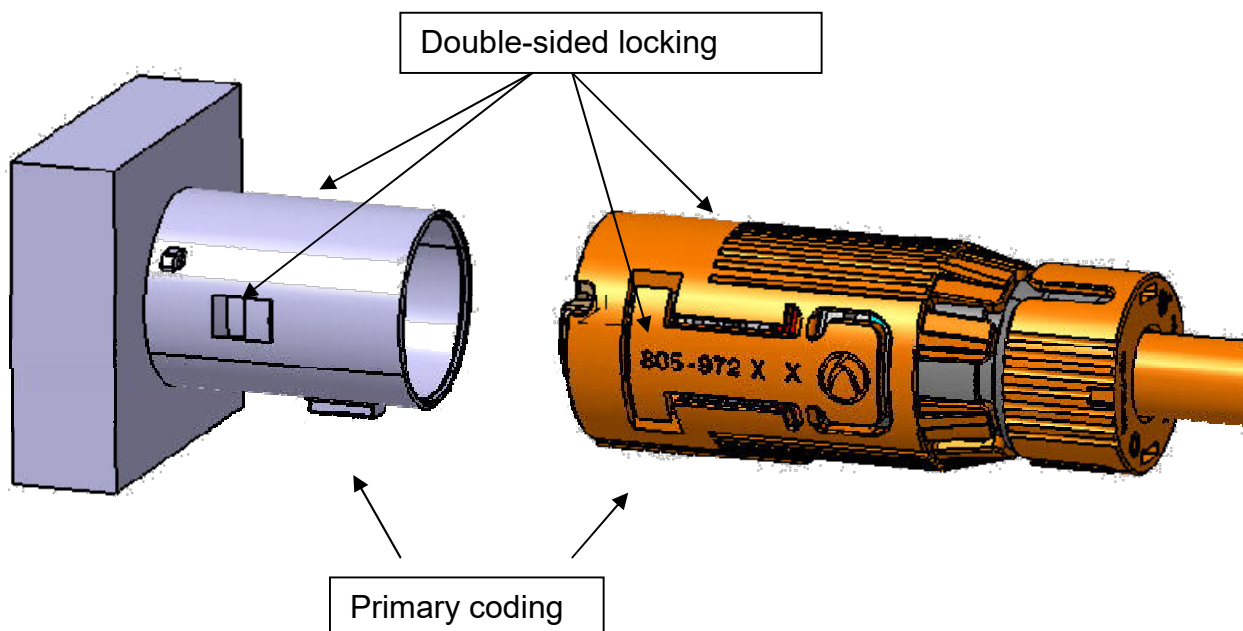
3.15. Female connector

The HV 2+2 PIN female connector consists of >>>

| General components | Coding-dependent components | Conduction-Dependent components |
|---|---|---|
| <p>Assembly locking sleeve HV 2+2 PIN</p>  <p>Assembly locking sleeve HV 2+2 PIN with CPA</p>  <p>shielding crimping sleeve HV 2+2 PIN</p>  | <p>Assembly contact holder HV 2+2 PIN ODU CODING A,B,C,(D,E,F),Z</p>  <p>Optionally with/without interlock bridge</p> <p>Open secondary locking mechanism</p> <p>Assembly contact holder HV 2+2 PIN HCT4 CODING A,B,C,(D,E,F),Z</p>  | <p>tension relief HV 2+2 PIN</p>  <p>line seal HV 2+2 PIN</p>  <p>retaining cap HV 2+2 PIN</p>  |



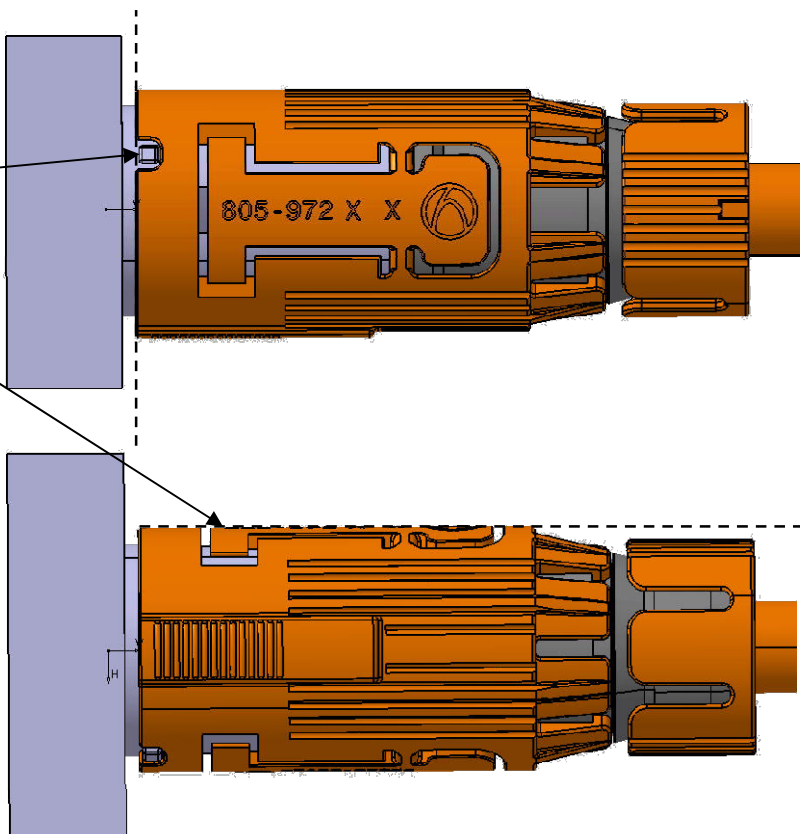
3.16. Product feature

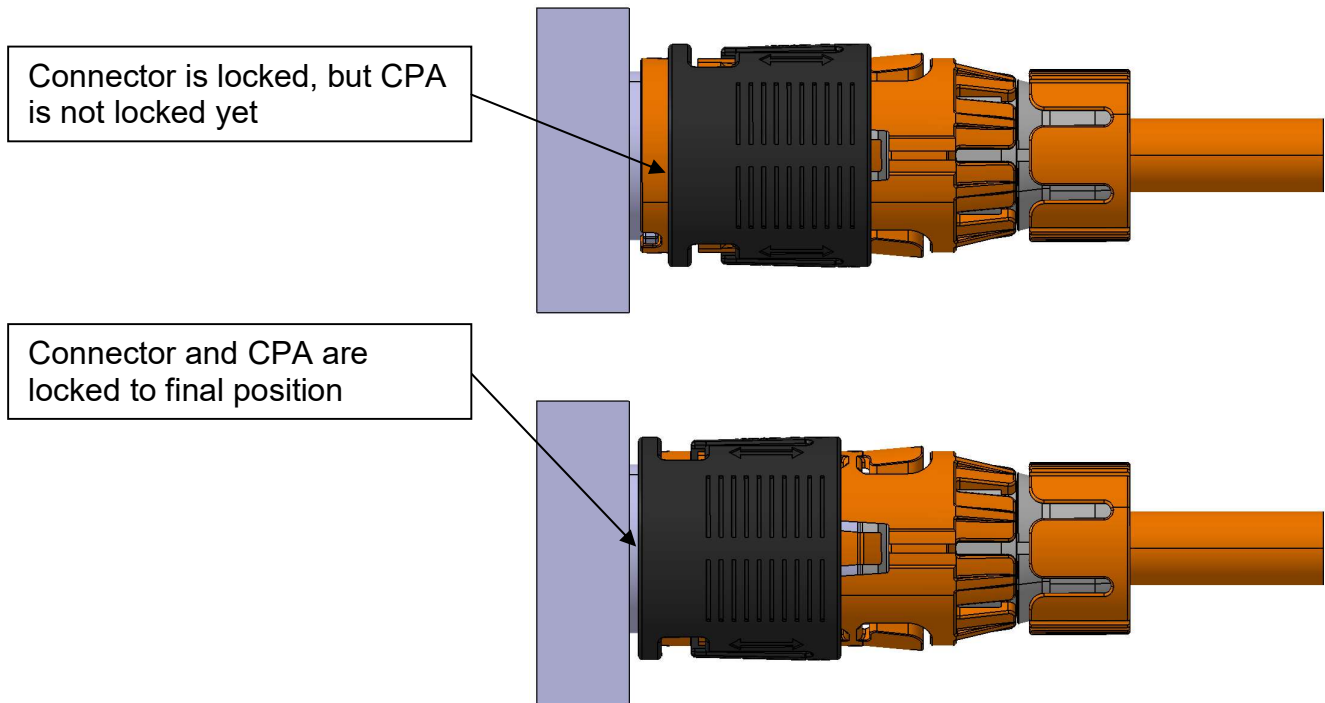


Indicators for locking position

- Plug depth indicators do not protrude over the front surface
- Locking tabs are not deflected

For simplified plugging, the female connector may be twisted up to +/- 180° in relation to the HV cable to reach the required plugging position.







4. Inspection performed

| |
|---|
| Inspections according to LV214/ LV 215 / MBN_10305-1_2008-06 |
| >>>> For details, see DVP_overview_HV 2+2PIN_release validation |

| | | |
|------|--|--|
| 1.1 | PG 0 – Eingangsprüfung (4mm Kontakt + Schirmung) <i>Receiving inspection (4mm contact + shielding)</i> | Insulation strength R>200MΩ at 1000V _{DC} ; dielectric strength 2500V AC for 1 min. (according to DIN EN 1987-3 and LV 215) |
| 1.2 | PG 1 - Maße <i>Dimensions</i> | |
| 1.3 | PG 2 - Material- und Oberflächenanalyse, Schirm <i>Material and surface analysis, shielding</i> | |
| 1.4 | PG 3 - Material- und Oberflächenanalyse, Gehäuse <i>Material and surface analysis, housing</i> | |
| 1.5 | PG 4 - Kontaktüberdeckung <i>Terminal overlapping</i> | |
| 1.6 | PG 6 - Wechselwirkung zw. Kontakt- und Gehäuse <i>Interconnection between terminal and housing</i> | |
| 1.7 | PG 7 - Haltekraft Gehäuseverriegelung + Kosi <i>Unmating force housing + terminal insurance</i> | |
| 1.8 | PG 8 - Einsteck- und Haltekraft f. Kontaktteile <i>Insertion and holding force for terminals</i> | |
| 1.9 | PG 9 - Schrägsteckwinkel / Koshirisicherheit <i>Mishandling / Koshiri security</i> | |
| 1.10 | PG 13 - Derating mit Gehäuse <i>Derating with housing</i> | Tlimit 160°C/ 180°C |
| 1.11 | PG 17 - Dyn. Beanspruchung Sinus <i>Vibration load</i> | class 3 acc. to LV214 class 2 for shielding contact > 10mΩ |
| 1.12 | PG 18 - Küstenklimabeanspruchung Salznebeltest gem. KLH 9.1.1.4.10 <i>Costal environmental load (salt spray test) Salt spray test as per KLH 91.1.4.10</i> | 720h, 35°C, salt conc. 5% weight |
| 1.13 | PG 19 – Umweltsimulation <i>Environmental simulation</i> | |
| | B19.1 - Temp.schock <i>Temperature shock</i> | |
| | B19.2 - Temp.wechsel <i>Change of temperature</i> | |

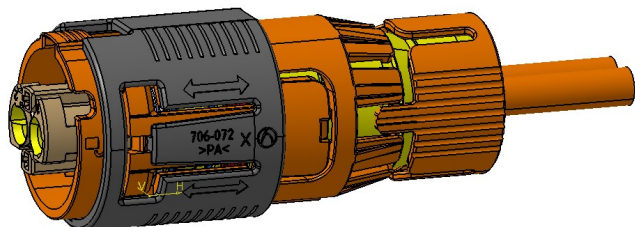
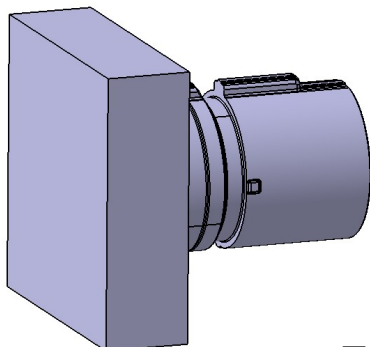
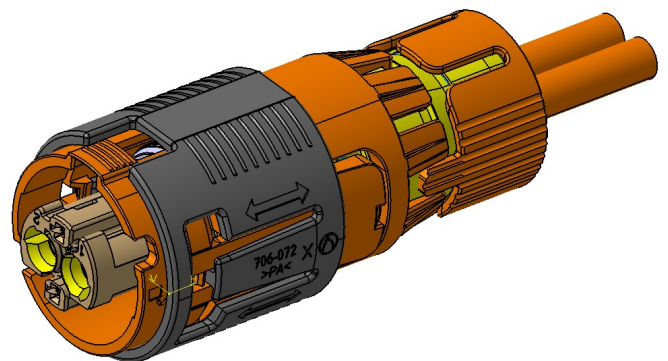
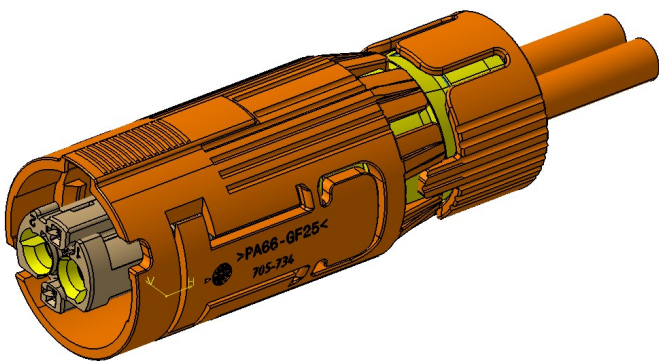


| | | |
|-------------|--|---|
| | B19.3 Lagerung bei trockener Wärme <i>Storage under dry heat conditions</i> | |
| | B19.4 Industrieklima <i>Industrial environment</i> | Duration 14d |
| | B19.5 Temperaturwechsel, Feuchte konstant gem. 6.1.7 <i>Temperature change, constant humidity as per 6.1.7</i> | -10°C/65°C, 93%rel.humidity., 240h |
| 1.14 | PG 20 - Klimatische Beanspruchung <i>Climatic load</i> | |
| 1.15 | Lebensdauertest Feuchte Wärme (HTHE)gem. 6.1.8 <i>Durability humidity, heat</i> | 85°C/85% r.H., 1485h |
| 1.16 | Tieftemperaturdauerlauf gem 6.1.2 <i>Low temperature endurance test 6.1.2</i> | -50/-40°C, 120h |
| 1.17 | PG 21 - Langzeittemp.lagerung <i>Long term storage</i> | 1000h/ 130°C |
| 1.18 | PG 22 B - Chem. Beständigkeit <i>Chem. resistance</i> | |
| 1.19 | PG 23 - Wasserdichtheit <i>Water tightness</i> | All cable cross-sections (2,5mm ² , 4,0mm ² , 6,0mm ²) |
| 1.20 | PG 28 - Verriegelungsgeräusch <i>Locking noise</i> | acc. LV214-1 |
| 1.21 | Falltest unverpackt, mit HV-Leitungssatz gem. 6.2.5 <i>Fall test unpacked, with HV wiring harness as per 6.2.5</i> | One fall from 1m on all 6 sides |
| 1.22 | Schutz gegen direktes Berühren <i>Protection against direct contact</i> | IPxxB open IPxxD closed (plugged in) |
| 1.23 | Nachweis der Luft und Kriechstrecken <i>Proof of air and leakage distance</i> | 4mm air and ceepage distance |

Product specification

HIRSCHMANN PowerStar 40-1

HV 2+2 PIN female connector SCC



EPS-100109-00
Version 05

2/67



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2. Preface

2.1. Introduction

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3. Technical characteristics

3.1. Operating temperature

Planned installation area: Engine compartment

Acceptable temperature range for the plastic used:

-40°C to 140°C for a period of 3000h,

Find the exact property changes for the plastic material in the plastic data sheets

3.2. Operating conditions

Rated voltage range $U=750\text{VDC}$

Equipment class: 1

Degree of pollution: 2

Overvoltage category: 1

3.3. Voltage class

Class B as per ISO 6469-3

$60\text{V_DC} < U \leq 1500\text{V_DC}$

$25\text{V_AC} < U_{\text{eff}} \leq 1000\text{V_AC}$ (15 - 150Hz)

3.4. Ampacity

Kat.1 40A (6,0mm²)

~~Kat.2 150A (35mm²)~~

~~Kat.3 250A (50mm²)~~



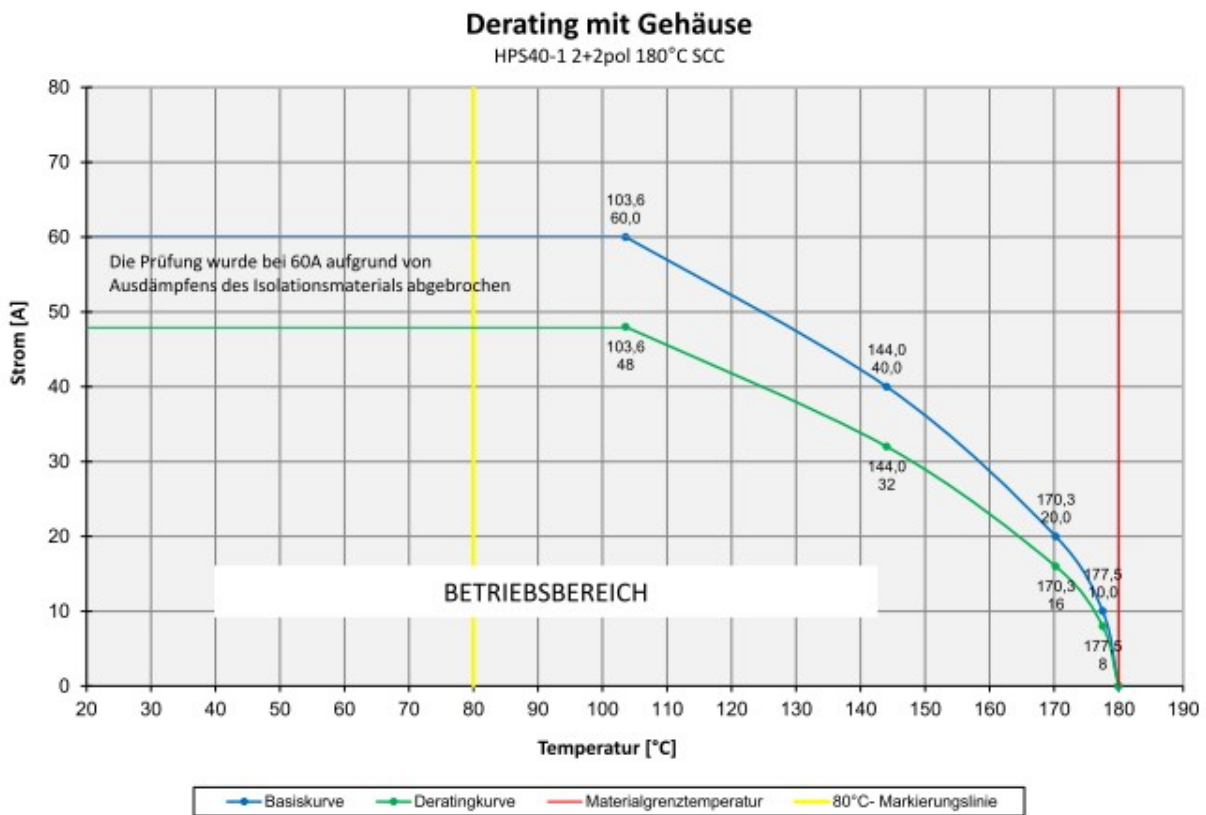
Attention : The Derating in the housing show exemplary values.
Requirements related to the current capability of the connector has also to be considered with the Derating of the contact supplier



For details, see derating curve

2x5,0mm² with HCT4 circular contact (base material Cu alloy surface Ag)

See figure 1





3.5. IP protection class

IPxxD (plugged socket plug)
IPxxB (unplugged socket plug)

3.6. Water tightness

IP6k9k and IPx8, PG23 as per working group inspection guideline LV214 and LV215

3.7. Shielding contact resistance / shielding contact

Shielding contact: Encircling 360°

Shielding contact resistance $R < 10\text{m}\Omega$ (complete from sheathed cable to the assembly housing)
 $I_{\text{min}} = 10\text{A}$; leakage current 60s, 25A

3.8. EMC

> 70dB (10kHz bis 5 MHz)
> 65dB (5MHz bis 500MHz)

3.9. Contact holding force in the socket housing

HV contacts: Primary latching mechanism / secondary latching mechanism min. 150N
HVIL contacts (MLK1,2 / MCON 1,2): $F_{\text{Primary}} \geq 60\text{N}$ (contact holding force for 60sec)

3.10. Secondary locking mechanism

Activation force < 40N, accidental opening not possible.

3.11. Polarization/coding/Kujiri security

Failed insertion force min. 300N
Kujiri security present

3.12. Integrated HVIL system

HV load contacts min. 1mm advanced (nominal 2mm)



3.13. Number of mating cycles

max. 50 cycles (Ag)

3.14. Assembly, disassembly forces

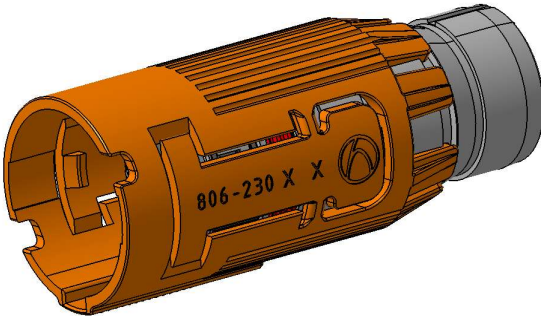
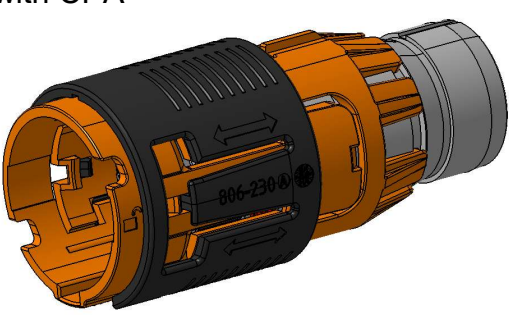
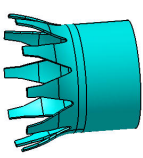
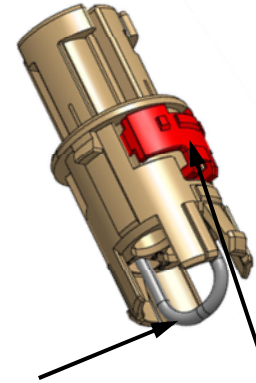
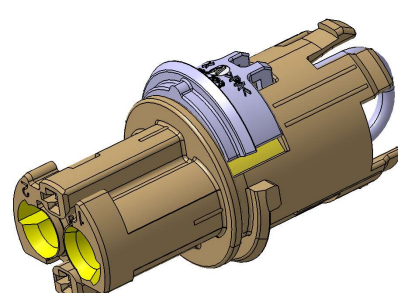
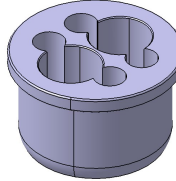
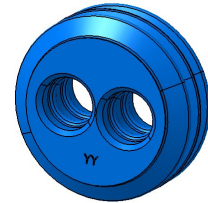
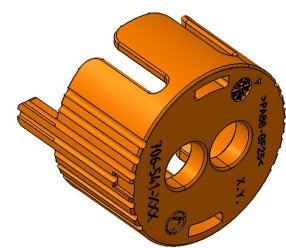
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| Max. disassembly force for the socket plug from the plug / plug base: | 85N |
| Min. holding force for the socket plug in the plug / plug base: | 150N |
| Max. contact loading force in the socket housing: | 15N |



Condition upon delivery / product design

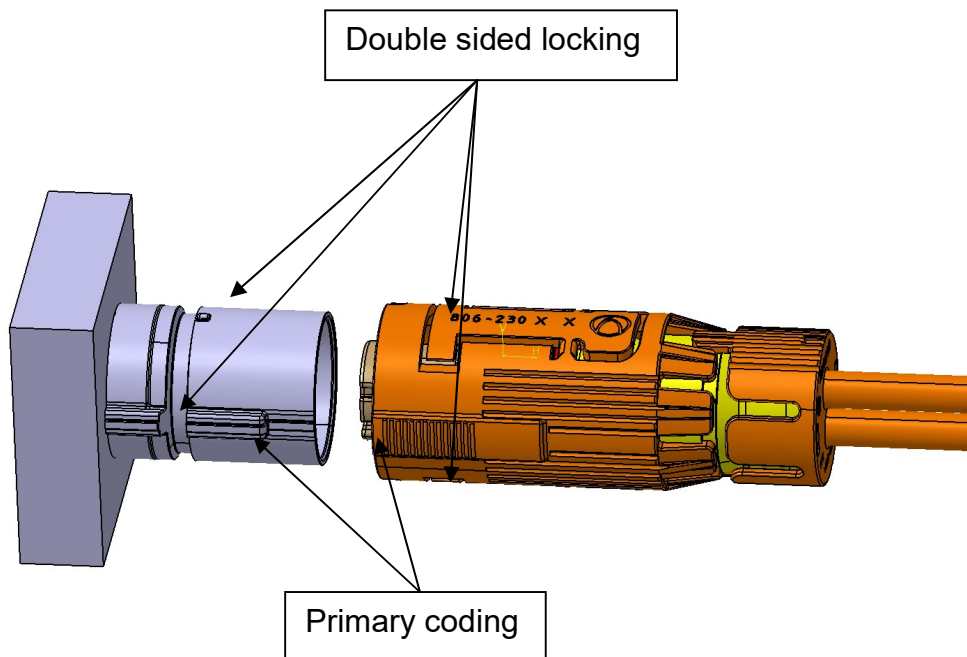
3.15. Female connector

The HV 2+2 PIN female connector consists of >>>

| General components | Coding-dependent components | Conduction-Dependent components |
|---|---|---|
| <p>Assembly locking sleeve HV 2+2 PIN</p>  <p>Assembly locking sleeve HV 2+2 PIN with CPA</p>  <p>shielding crimping sleeve HV 2+2 PIN</p>  | <p>Assembly contact holder HV 2+2 PIN ODU CODING A,B,C,(D,E,F),Z</p>  <p>Optionally with/without interlock bridge</p> <p>Open secondary locking mechanism</p> <p>Assembly contact holder HV 2+2 PIN HCT4 CODING A,B,C,(D,E,F),Z</p>  | <p>tension relief HV 2+2 PIN</p>  <p>line seal HV 2+2 PIN</p>  <p>retaining cap HV 2+2 PIN</p>  |

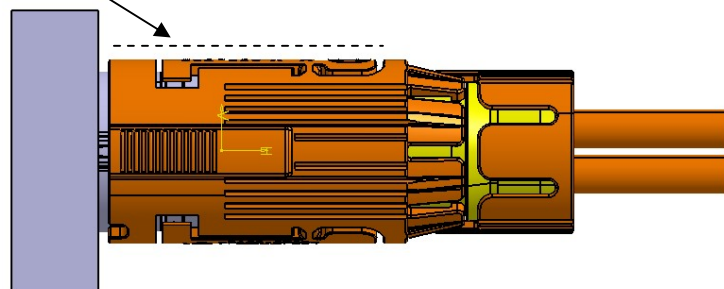


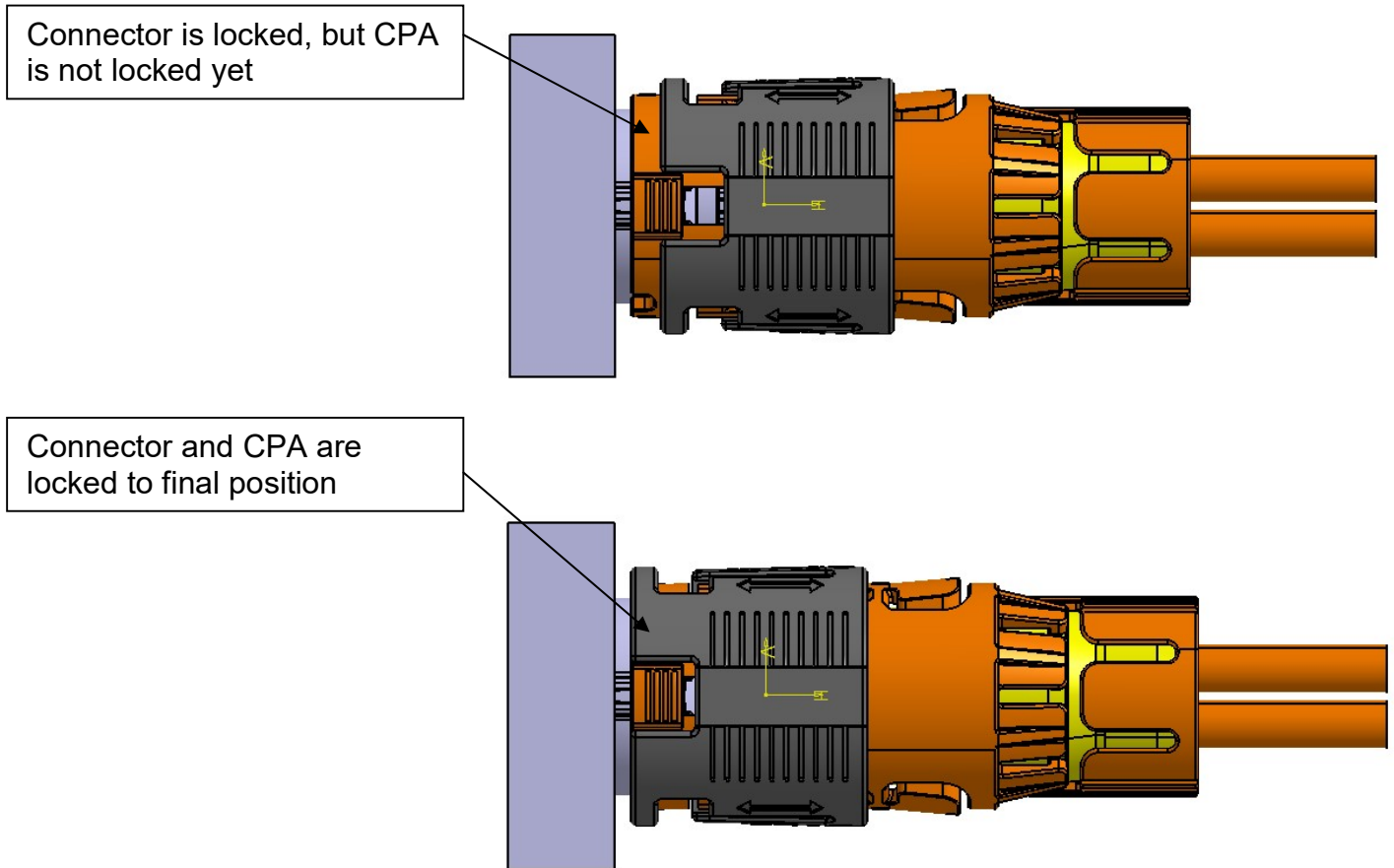
3.16. Product feature



Indicator for locking position:

- Locking tabs are not deflected







4. Inspection performed

Inspections according to LV214/ LV 215 / MBN_10305-1_2008-06

>>>> For details, see DVP_overview_HV 2+2PIN_release validation

| | | |
|------|--|--|
| 1.1 | PG 0 – Eingangsprüfung (4mm Kontakt + Schirmung) <i>Receiving inspection (4mm contact + shielding)</i> | Insulation strength R>200MΩ at 1000V _{DC} ; dielectric strength 2500V AC for 1 min. (according to DIN EN 1987-3 and LV 215) |
| 1.2 | PG 1 - Maße <i>Dimensions</i> | |
| 1.3 | PG 2 - Material- und Oberflächenanalyse, Schirm <i>Material and surface analysis, shielding</i> | |
| 1.4 | PG 3 - Material- und Oberflächenanalyse, Gehäuse <i>Material and surface analysis, housing</i> | |
| 1.5 | PG 4 - Kontaktüberdeckung <i>Terminal overlapping</i> | |
| 1.6 | PG 6 - Wechselwirkung zw. Kontakt- und Gehäuse <i>Interconnection between terminal and housing</i> | |
| 1.7 | PG 7 - Haltekraft Gehäuseverriegelung + Kosi <i>Unmating force housing + terminal insurance</i> | |
| 1.8 | PG 8 - Einsteck- und Haltekraft f. Kontaktteile <i>Insertion and holding force for terminals</i> | |
| 1.9 | PG 9 - Schrägsteckwinkel / Koshirisicherheit <i>Mishandling / Koshiri security</i> | |
| 1.10 | PG 13 - Derating mit Gehäuse <i>Derating with housing</i> | Tlimit 180°C |
| 1.11 | PG 17 - Dyn. Beanspruchung Sinus <i>Vibration load</i> | class 3 acc. to LV214 class 2 for shielding contact > 10mΩ |
| 1.12 | PG 18 - Küstenklimabeanspruchung Salznebeltest gem. KLH 9.1.1.4.10 <i>Costal environmental load (salt spray test) Salt spray test as per KLH 91.1.4.10</i> | 720h, 35°C, salt conc. 5% weight |
| 1.13 | PG 19 – Umweltsimulation <i>Environmental simulation</i> | |
| | B19.1 - Temp.schock <i>Temperature shock</i> | |
| | B19.2 - Temp.wechsel <i>Change of temperature</i> | |



| | | |
|------|--|---|
| | B19.3 Lagerung bei trockener Wärme <i>Storage under dry heat conditions</i> | |
| | B19.4 Industrieklima <i>Industrial environment</i> | Duration 14d |
| | B19.5 Temperaturwechsel, Feuchte konstant gem. 6.1.7 <i>Temperature change, constant humidity as per 6.1.7</i> | -10°C/65°C, 93%rel.humidity., 240h |
| 1.14 | PG 20 - Klimatische Beanspruchung <i>Climatic load</i> | |
| 1.15 | Lebensdauertest Feuchte Wärme (HTHE)gem. 6.1.8 <i>Durability humidity, heat</i> | 85°C/85% r.H., 1485h |
| 1.16 | Tieftemperaturdauerlauf gem 6.1.2 <i>Low temperature endurance test 6.1.2</i> | -50/-40°C, 120h |
| 1.17 | PG 21 - Langzeittemp.lagerung <i>Long term storage</i> | 1000h/ 130°C |
| 1.18 | PG 22 B - Chem. Beständigkeit <i>Chem. resistance</i> | |
| 1.19 | PG 23 - Wasserdichtheit <i>Water tightness</i> | 5,0mm ² |
| 1.20 | PG 28 - Verriegelungsgeräusch <i>Locking noise</i> | acc. LV214-1 |
| 1.21 | Falltest unverpackt, mit HV-Leitungssatz gem. 6.2.5 <i>Fall test unpacked, with HV wiring harness as per 6.2.5</i> | One fall from 1m on all 6 sides |
| 1.22 | Schutz gegen direktes Berühren <i>Protection against direct contact</i> | IPxxB open IPxxD closed (plugged in) |
| 1.23 | Nachweis der Luft und Kriechstrecken <i>Proof of air and leakage distance</i> | 4mm air and ceepage distance |



5. Table of change

| Version | Change | Date/Agent |
|----------------|---|-------------------|
| 00 | First edition | Weiss |
| 01 | Document reworked, ODU CuTe Contacts added | 11/2014 Weiss |
| 02 | HCT4 contact and CPA added | 05/2016 Kleiner |
| 03 | SCC version added | 07/2017 Hoor |
| 04 | Added reference for male connector | 06/2018 Hoor |
| 05 | Added comment to permit twisting of connector | 08/2018 Hoor |