PRODUCT SPECIFICATION

HPS40-1 2+2
Female Connector MCC

EPS-100043

HIRSCHMANN
AUTOMOTIVE

TABLE

1 General

1.1 Introduction

This product specification is valid for the HPS40-1 2+2 female connector MCC, 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. In the case of improper application or deviation from specification that results in quality issues, the right of complaint is void.

1.2 Other valid documents

A	Hirschmann product drawing	805-972-…00
B	Interface drawing	806-029-…00
C	Process specification	EVS-100097
D	Working committee directive LV214 (cf. TLF 0214)	Working committee test specification for motor vehicle plug-in connector – version March 2010
E	Working committee directive LV215 (cf. TLF 0214)	Electrics/ electronic requirements of HV-plug-in connectors – Feb.2009
F	German norm DIN EN 60352-2	Solderless electric connections Part 2: crimp connections
G	DIN EN 60664-1	Insulation coordination for electronic equipment in low voltage systems. Part 1: principles, requirement, and tests
H	2000/53/EG	Directive of the European Parliament and of the council on end-of life vehicles incl. attachments; European Union
I	ISO 6469-3	Electric road vehicles – safety specifications Part 3: protection of persons against electric hazards
J	ISO 26053	Road vehicles; degrees of protection (IP-Code); protection against foreign objects, water, and access; electrical equipment;

1.3 Product design

1.3.1 BOM, PN, description, weight, MOQ

The HPS40-1 2+2 female connector MCC consists of following parts. (see BOM)

HPS40-1 Female MCC 2x 2.5 mm² without CPA		805-972-…00	Weight without wire:		74,28 g
Article picture	Article description	Article number	Needed parts per system	Packaging unit / MOQ	weight per pcs.
	HPS40-1 locking sleeve without CPA	806-230-515	1	150 pcs.	41,00 g
	HPS40-1 female contact carrier (possible codings in the article number list)	806-229-571 (A) 806-229-572 (B) 806-229-573 (C) 806-229-577 (Z)	1	500 pcs.	2,92 g
	HPS40-1 shield crimp socket	709-115-511	1	2500 pcs.	3,29 g
	HPS40-1 stress relief 2.5 mm² MCC (Coroplast, Leoni, Coficab)	709-107-514	1	1000 pcs.	8,00 g
	HPS40-1 cable seal 2.5 mm² MCC (Coroplast, Leoni, Coficab)	709-113-514	1	5000 pcs.	8,00 g
	HPS40-1 cover cap 2.5 mm² MCC (Coroplast, Leoni, Coficab)	705-749-514	1	1000 pcs.	2,00 g
	HCT4 terminal 2.5 mm²	709-427-502	2	2600 pcs.	1,13 g

HPS40-1 Female MCC 2x 4.0 mm² without CPA		805-972-…00	Weight without wire:		62,23 g
	HPS40-1 locking sleeve without CPA	806-230-515	1	150 pcs.	41,00 g
	HPS40-1 female contact carrier (possible codings in the article number list)	806-229-571 (A) 806-229-572 (B) 806-229-573 (C) 806-229-577 (Z)	1	500 pcs.	2,92 g
	HPS40-1 shield crimp socket	709-115-511	1	2500 pcs.	3,29 g
	HPS40-1 stress relief 4.0 mm² MCC (Coroplast, Leoni, Coficab)	709-107-515	1	1000 pcs.	2,63 g
	HPS40-1 cable seal 4.0 mm² MCC (Coroplast, Leoni, Coficab)	709-113-515	1	5000 pcs.	1,40 g
	HPS40-1 cover cap 4.0 mm² MCC (Coroplast, Leoni, Coficab)	705-749-515	1	1000 pcs.	1,93 g
	HCT4 terminal 4.0 mm²	709-427-504	2	2600 pcs.	1,13 g

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HPS40-1 Female MCC 2x 6.0 mm² without CPA		805-972-…00	Weight without wire:		61,67 g
	HPS40-1 locking sleeve without CPA	806-230-515	1	150 pcs.	41,00 g
	HPS40-1 female contact carrier (possible codings in the article number list)	806-229-571 (A) 806-229-572 (B) 806-229-573 (C) 806-229-577 (Z)	1	500 pcs.	2,92 g
	HPS40-1 shield crimp socket	709-115-511	1	2500 pcs.	3,29 g
	HPS40-1 stress relief 6.0 mm² MCC (Coroplast, Leoni, Coficab)	709-107-516	1	1000 pcs.	2,50 g
	HPS40-1 cable seal 6.0 mm² MCC (Coroplast, Leoni, Coficab)	709-113-516	1	5000 pcs.	1,07 g
	HPS40-1 cover cap 6.0 mm² MCC (Coroplast, Leoni, Coficab)	705-749-516	1	1000 pcs.	1,83 g
	HCT4 terminal 6.0 mm²	709-427-504	2	2600 pcs.	1,13 g

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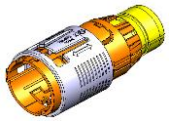
HPS40-1 Female MCC 2x 2.5 mm² with CPA		805-972-…00	Weight without wire:		68,91 g
	HPS40-1 locking sleeve with CPA	806-230-516	1	150 pcs.	41,00 g
	HPS40-1 female contact carrier (possible codings in the article number list)	806-229-571 (A) 806-229-572 (B) 806-229-573 (C) 806-229-577 (Z)	1	500 pcs.	2,92 g
	HPS40-1 shield crimp socket	709-115-511	1	2500 pcs.	3,29 g
	HPS40-1 stress relief 2.5 mm² MCC (Coroplast, Leoni, Coficab)	709-107-514	1	1000 pcs.	2,63 g
	HPS40-1 cable seal 2.5 mm² MCC (Coroplast, Leoni, Coficab)	709-113-514	1	5000 pcs.	8,00 g
	HPS40-1 cover cap 2.5 mm² MCC (Coroplast, Leoni, Coficab)	705-749-514	1	1000 pcs.	2,00 g
	HCT4 terminal 2.5 mm²	709-427-502	2	2600 pcs.	1,13 g

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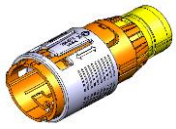
HPS40-1 Female MCC 2x 4.0 mm² with CPA		805-972-…00	Weight without wire:		62,23 g
	HPS40-1 locking sleeve with CPA	806-230-516	1	150 pcs.	41,00 g
	HPS40-1 female contact carrier (possible codings in the article number list)	806-229-571 (A) 806-229-572 (B) 806-229-573 (C) 806-229-577 (Z)	1	500 pcs.	2,92 g
	HPS40-1 shield crimp socket	709-115-511	1	2500 pcs.	3,29 g
	HPS40-1 stress relief 4.0 mm² MCC (Coroplast, Leoni, Coficab)	709-107-515	1	1000 pcs.	2,63 g
	HPS40-1 cable seal 4.0 mm² MCC (Coroplast, Leoni, Coficab)	709-113-515	1	5000 pcs.	1,40 g
	HPS40-1 cover cap 4.0 mm² MCC (Coroplast, Leoni, Coficab)	705-749-515	1	1000 pcs.	1,93 g
	HCT4 terminal 4.0 mm²	709-427-504	2	2600 pcs.	1,13 g

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HPS40-1 Female MCC 2x 6.0 mm² with CPA		805-972-…00	Weight without wire:		61,67 g
	HPS40-1 locking sleeve with CPA	806-230-516	1	150 pcs.	41,00 g
	HPS40-1 female contact carrier (possible codings in the article number list)	806-229-571 (A) 806-229-572 (B) 806-229-573 (C) 806-229-577 (Z)	1	500 pcs.	2,92 g
	HPS40-1 shield crimp socket	709-115-511	1	2500 pcs.	3,29 g
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	HPS40-1 cover cap 6.0 mm² MCC (Coroplast, Leoni, Coficab)	705-749-516	1	1000 pcs.	1,83 g
	HCT4 terminal 6.0mm²	709-427-504	2	2600 pcs.	1,13 g

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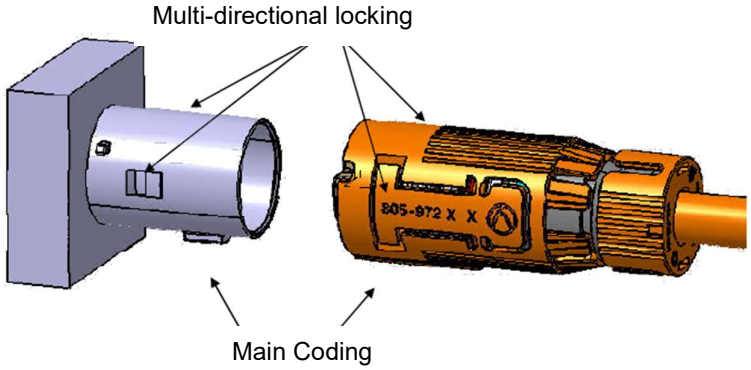
1.3.2 Product features



- Multi-directional locking
- Main coding/ polarisation
- HPS40-1 locking sleeve is with or without CPA
- HPS40-1 female contact carrier is with or without an integrated HVIL bridge
- HPS40-1 female contact carrier has 4 coding options (A, B, C, Z)

2 Technical product information

The connector can be placed in the entire vehicle if the specified characteristics will not be exceeded. The characteristics are determined by tests (see verification plan) and material datasheets.

2.1 Current class

The connector system fulfills the class 1 and 2.

2.2 Operating condition

Nominal voltage	750 VDC
Maximum altitude	4,000 m
Insulating material group:	1
Degree of contamination:	2
Overvoltage category:	1
Rated impulse voltage:	4,000 VDC
Test voltage for electric strength:	4,242 VDC (3,000 VAC)

2.3 Voltage class

Class B according to ISO 6469-3
60 VDC < U ≤ 1,000 VDC
25 VAC < Ueff ≤ 707 VAC (15-150 Hz)

2.4 Ambient condition

Permissible temperature range for the plastic used:
-40° C to +140° C according to “temperature collective 4” for 8,000 h
The details of the changes in the properties of the plastics can be found in the plastics data sheets.

“Temperature collective 4” of MBN 10306, 2020-06 or GS 95024-3-1, 2013-07

Temperature in ° C	Distribution in %
-40	6
23	20
85	65
135	8
140	1

2.5 EMC performance

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

2.6 Shield area

Shield transfer: 360° circumferential
Shielding contact resistance R < 10 mΩ (Total from sheathed cable until the device.)

2.7 IP-Degree of protection

IPxxD (plugged female connector)
IPxxB (unplugged female connector)

2.8 HVIL system

Min. 1.00 mm leading HV Interlock contacts to HV load contact at unmating (nominal 2.00 mm)

3 Performed tests MCC

Tests acc. to LV214 / LV215 (cf. TLF 0214)
Details see DVP-Plan HPS40-1 2+2 female connector MCC released validation

1.1	PG 0 – Receiving inspection and testing (contacts + shield)	Insulation resistance R > 200 mΩ at 1,000 VDC; Withstand voltage 2,500 VAC for 1 min. (acc. to DIN EN 1987-3 and LV215)
1.2	PG 1 - Dimension	
1.3	PG 2 – Material and surface test (contacts)	
1.4	PG 3 – Material and surface test (housing)	
1.5	PG 4 – Contact overlap	
1.6	PG 6 – Interaction between terminal and housing	
1.7	PG 7 – Unmating force housing + terminal insurance	
1.8	PG 8 – Insertion and holding force for terminals	
1.9	PG 9 – Koshiri angle safety	
1.10	PG 13 – Derating with housing	Tlimit. 180° C
1.11	PG 17 – Vibration load	Class 3 acc. to LV214 Class 2 for shielding contact > 10 mΩ
1.12	Costal environmental load (salt spray test) / salt spray test as per KLH 91.1.4.10	720 h, 35° C, salt conc. 5% weight
1.13	PG 19 – Environmental simulation PG 19.1 – Temperature shock PG 19.2 – Change of temperature PG 19.3 – Storage under dry head conditions PG 19.4 – Industrial environment PG 19.5 – Temperature change, constant humidity as per 6.1.7	Duration 14 d -10° C/ 65° C, 93% rel. humidity, 240 h
1.14	PG 20 – Climatic load	
1.15	Durability humidity, heat	85° C/ 85% r.H., 1,485 h
1.16	Low temperature endurance test 6.1.2	-50/-40° C, 120 h
1.17	PG 21 - Long term storage	1,000 h/ 130° C
1.18	PG 22 - Chem. resistance	
1.19	PG 23 – Water leak tightness	MCC: All cross sections (2.5 mm²/ 4.0 mm²/ 6.0 mm²) SCC: 5.0 mm²
1.20	PG 28 – Locking noise	acc. LV214-1
1.21	Fall test unpacked, with HV wiring harness as per 6.2.5	One fall from 1 m on all 6 sides
1.22	Protection against direct contact	IPxxB open / IPxxD closed (plugged in)
1.23	Proof of air and leakage distance	4.0 mm air and ceepage distance

4 Result of performed tests

4.1 Ampacity MCC (I/t) measurement results

2x 2.5 mm²/ 2x 4.0 mm²/2x 6.0 mm² with ODU E4/K4 circular contact (CuZn surface Ag)

Ambient temperature		55.70	89.90	129.70	153.80
Current (A)	6.0 mm²	56	44	28	12
Ambient temperature		36.80	75.10	120.0	153.80
Current (A)	4.0 mm²	56	44	28	12
Ambient temperature		25.30	-	101.20	146.90
Current (A)	2.5 mm²	44	-	28	12

2x 2.5 mm²/ 2x 4.0 mm²/2x 6.0 mm² with ODU E4/K4 circular contact (CuTe surface Ag)

Ambient temperature		122.20	144.90	158.00	172.60
Current (A)	6.0 mm²	48	36	28	16
Ambient temperature		119.00	132.10	158.10	174.50
Current (A)	4.0 mm²	40	36	24	12
Ambient temperature		115.30	142.00	162.70	175.70
Current (A)	2.5 mm²	32	24	16	8

2x 2.5 mm²/ 2x 4.0 mm²/2x 6.0 mm² with HCT4 circular contact (Cu alloy surface Ag)

Ambient temperature		70.60	120.10	153.20	172.90
Current (A)	6.0 mm²	64	48	32	16
Ambient temperature		67.80	83.60	135.10	168.10
Current (A)	4.0 mm²	52	48	32	16
Ambient temperature		62.90	84.50	137.40	168.40
Current (A)	2.5 mm²	40	36	24	12

4.2 Watertightness

IP6k9k and IPx8

PG23 as per working group inspection guideline LV214 and LV215 (cf. TLF 0214)

4.3 Vibration load

Vibration stability: PG17 acc. To working group inspection guideline LV214 and LV215 (cf. TLF 0214)
Fixing length: Free cable length between connector and first cable fixing point, where the cable is fixed with the same oscillation as the connector. The cable fixing must be designed for every operation mode.

Vibration class severity level 2	without fixation point
Vibration class severity level 3	first fixation point at < 100 mm

4.4 Amount of mating cycles

Max. 50 cycles (Ag)

4.5 Polarization/ Koshiri-safety

Failed insertion force min. 300 N
Koshiri-safety is given

4.6 Retention force of the contact in the housing

HV contacts:	Primary latching mechanism / secondary latching mechanism min. 150 N
HVIL contacts (MLK 1.2/ MCON 1.2):	$F_{Primary} \geq 60$ N (contact holding force for 60 sec)

4.7 Secondary locking

Activation force < 40 N
No unintentional opening is possible.

4.8 Mating/ Unmating force

Assembly force for the female plug in the plug socket with CPA:	< 75 N
Assembly force for the female plug in the plug socket without CPA:	< 100 N
Disassembly force from the female plug out of the plug socket with CPA:	< 75 N
Disassembly force from the female plug out of the plug socket with CPA:	< 100 N
Holding force for the female plug in the plug/ plug socket:	> 150 N
Contact loading force in the socket housing:	< 15 N

5 Table of change

Change description	Change date	Editor
First edition	-	Weiss M.
Document reworked; ODU CuTe contacts added	11/ 2014	Weiss M.
HCT4 contact and CPA added	05/ 2016	Kleiner T.
SCC version added	07/ 2017	Hoor R.
Added reference for male connector	06/ 2018	Hoor R.
Added comment to permit twisting of connector	08/ 2018	Hoor R.
Update design specification	06/ 2023	Jussel E-M.
Update derating 2x 2.5 mm²/ 2x 4.0 mm²/2x 6.0 mm² with HCT4 circular contact (Cu alloy surface Ag)	06/ 2023	Jussel E-M.
Adjusting data of the bottom line	07/ 2023	Jussel E-M.
Adjusting data “Ambient Condition”	10/ 2023	Jussel E-M.