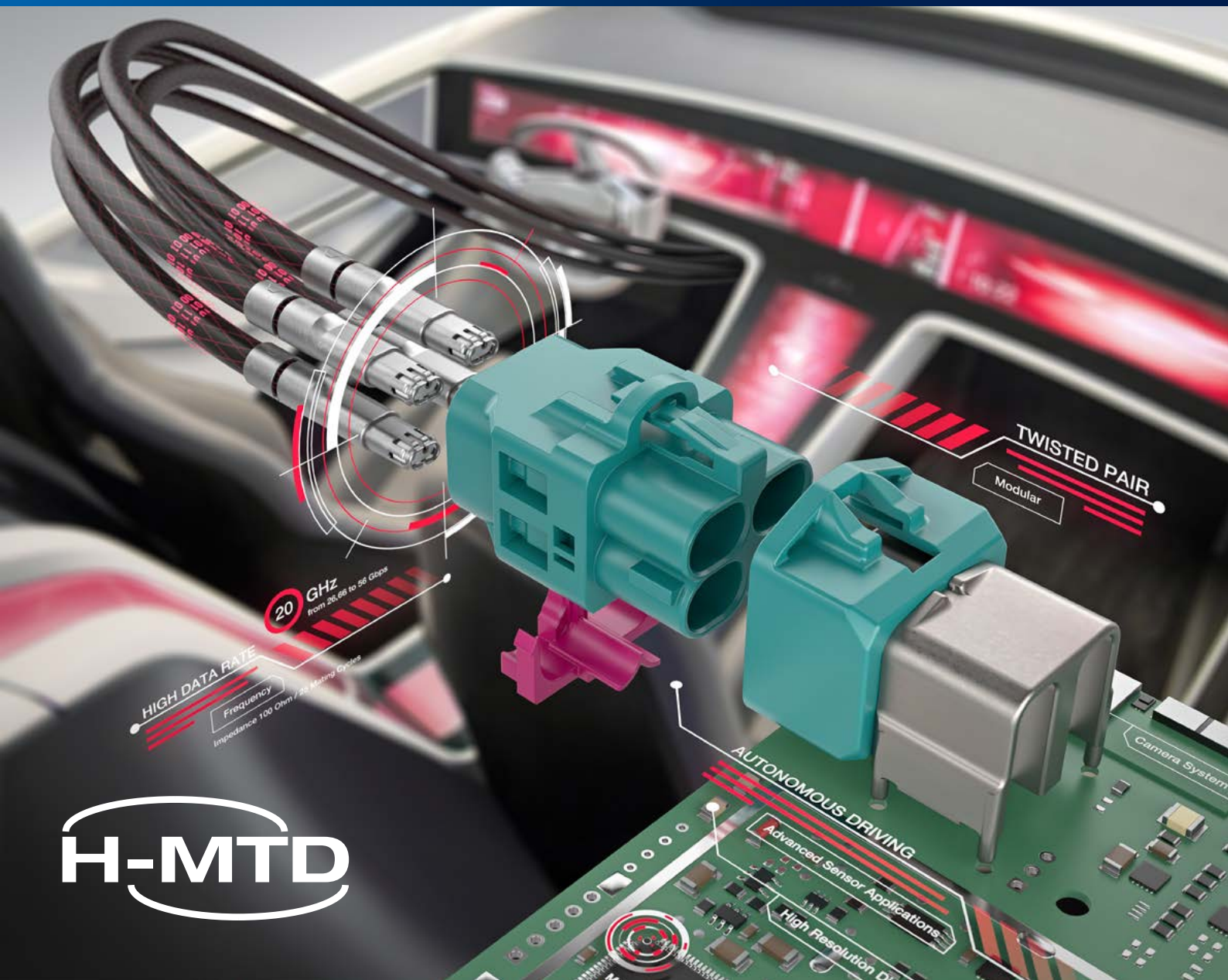
Rosenberger

System for Frequencies up to 20 GHz and Data Transmission up to 56 Gbps

# H-MTD® Connector Systems
# High-Speed Modular Twisted-Pair Data

AUTOMOTIVE



# Rosenberger Automotive – A Synonym for Quality and Innovation

On the following pages we present the high-quality Rosenberger H-MTD® connectors developed in our Automotive Business Area to fulfill the tough requirements of the automotive industry.

# Contents



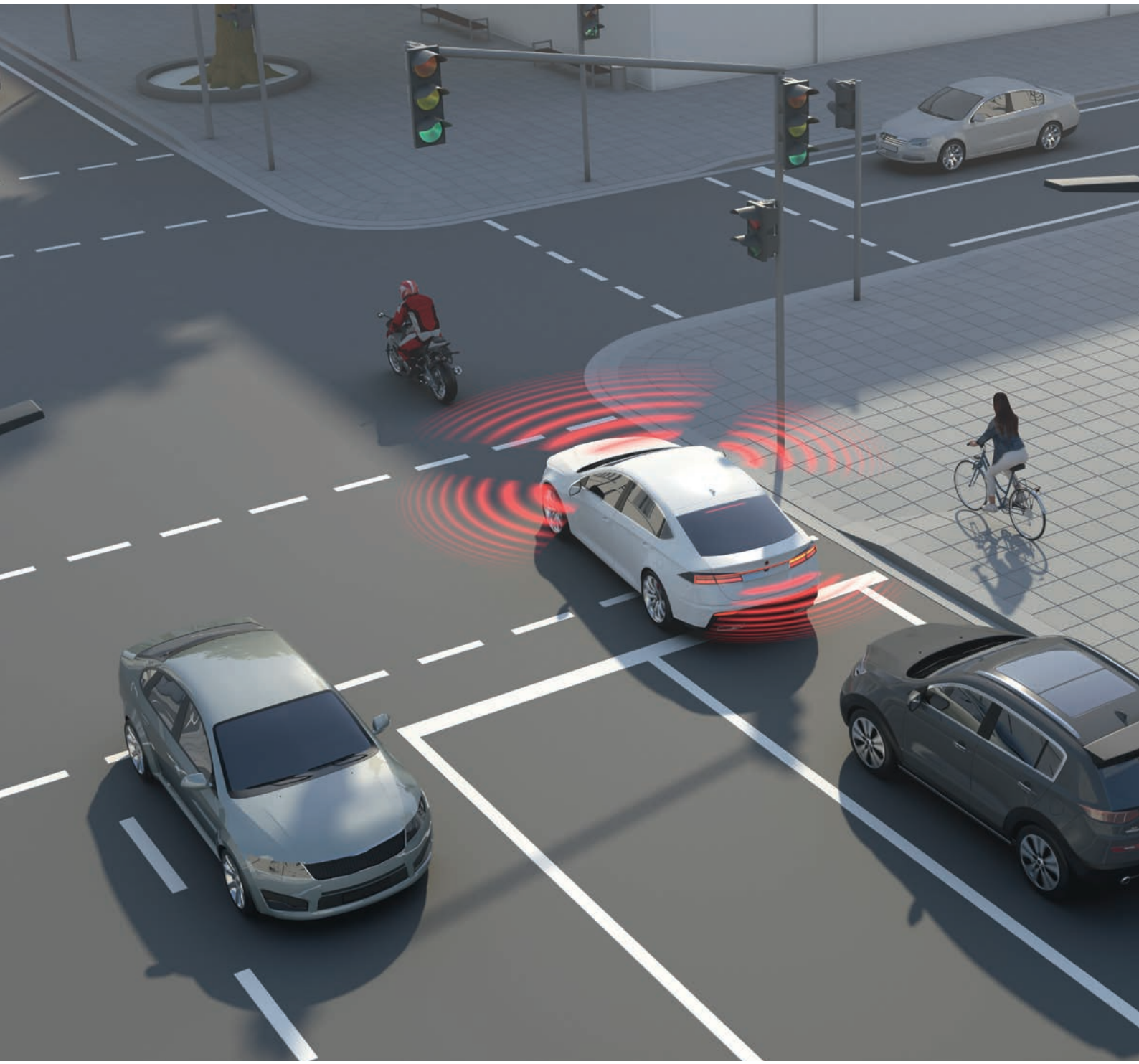
The Rosenberger online catalog contains the current Rosenberger H-MTD® product range with specific details, including data sheets, assembly instructions, and panel piercings.

**www.rosenberger.com/ok/h-mtd**

# Rosenberger Automotive

At Rosenberger, we firmly believe in developing technology for the future. We are currently working on products and solutions that will shape our lives in the future.

We want to get faster and smarter in what we do and how we do it. Advanced driver assistance systems, connected car technology, electric mobility, infotainment systems – Rosenberger is extremely committed to designing innovative connector systems for future automotive electronics.



In 2000, Rosenberger started working in the automotive sector, designing and producing customized and standard products for these specific markets.

Rosenberger Automotive is a specialist development partner when it comes to integrating connector designs and customer-specific solutions with the highest quality and best performance – while continuing to meet customer price targets.

The contact systems have been specially designed to fulfill the tough requirements of the automotive industry. From the beginning, Rosenberger has developed a close and open relationship with its customers.

The priority in the most automotive applications, such as autonomous driving and driver assistance systems, is to ensure safety. It is necessary to determine exact positions, continuously calculate routes, and detect and classify objects. High data volumes from several cameras, various sensors, and navigation sources must be combined and transported for this purpose – in real time.

## Application Areas

- Autonomous driving
- Driver assistance systems
- Navigation
- Infotainment
- Rear-entertainment
- Internet & mobile communication
- “WiGig” (Wireless Gigabit)

# H-MTD® Product Overview

Rosenberger H-MTD® is a differential connector system for high-speed data transmission of up to 20 GHz or 56 Gbps, contained in a compact yet robust automotive grade housing.

Apart from ensuring high-bitrate data transmission and savings on installation space and weight, a further major advantage of this connector system is its modularity, providing the flexibility to support a wide range of Ethernet applications and industry protocols.

The application fields of the Rosenberger H-MTD® are countless as it can be used with a variety of different cables including Shielded Twisted Pair, Unshielded Twisted Pair and new High-Performance cables. With H-MTD® the customer can count on an interface that accommodates future vehicle networks, applications and protocols.

Rosenberger H-MTD® is compliant to all common automotive standards.

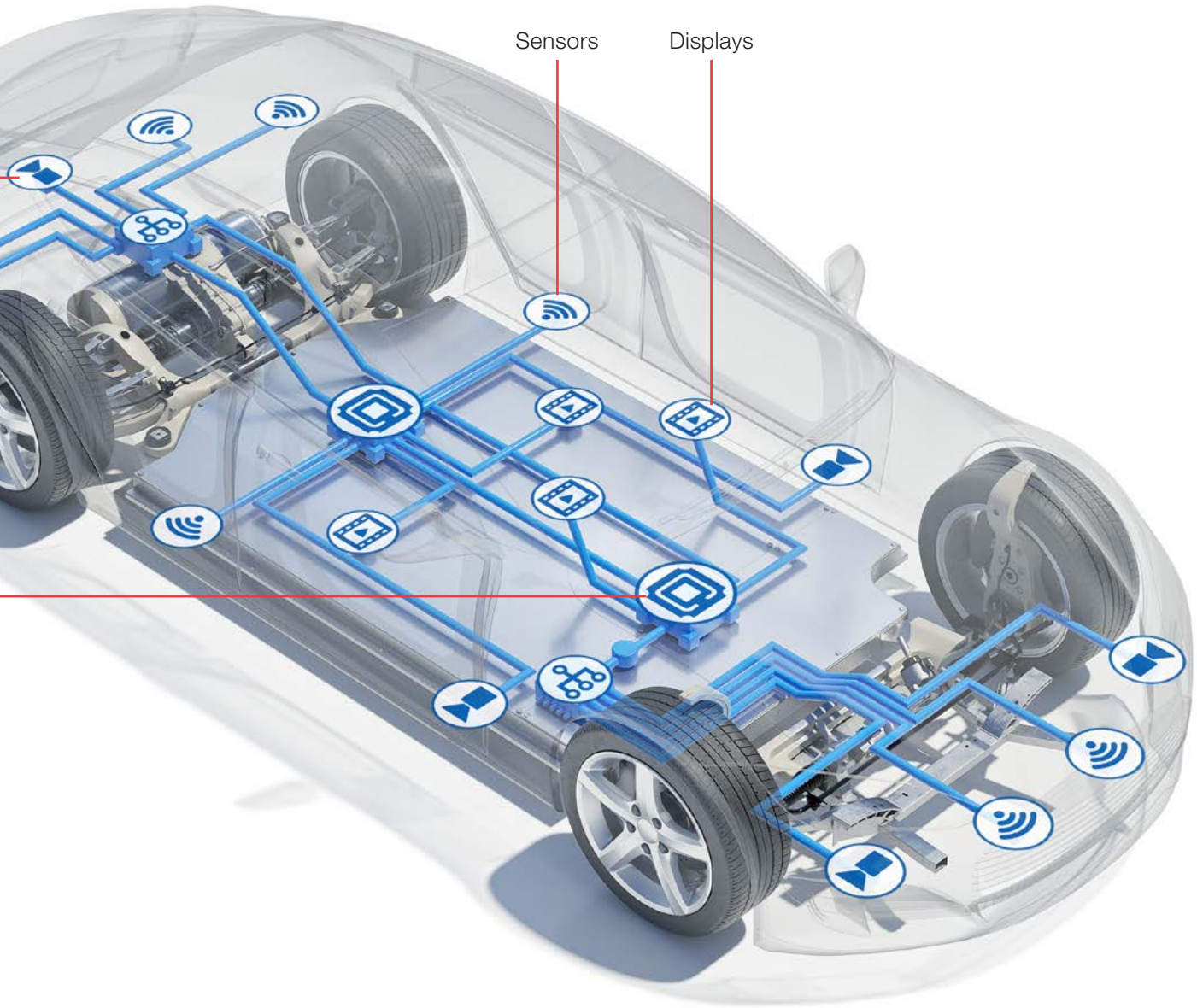

## Product Portfolio

Cable and PCB connectors, modular housings, cable assemblies, waterproof types:

- Rosenberger H-MTD® single
- Rosenberger H-MTD® double
- Rosenberger H-MTD® quad
- Rosenberger H-MTD® six
- Rosenberger H-MTD®+6 Power pins
- Rosenberger H-MTD®e

## Mechanical Properties

- Primary and secondary lock
- Crimp connection
- High cable retention force
- High coding efficiency (different codings on plastic housings to avoid misconnections)
- No contact pin damage possible
- Scoop proof
- Optional Connector Position Assurance (CPA)




## Applications

- Camera systems 4k and higher
- Driver assistance systems
- Autonomous driving
- High resolution displays
- Rear seat entertainment

## Protocols

Automotive Ethernet

- 100BASE-T1
- 1000BASE-T1
- 2.5/5/10GBASE-T1

Further protocols on request

SERDES

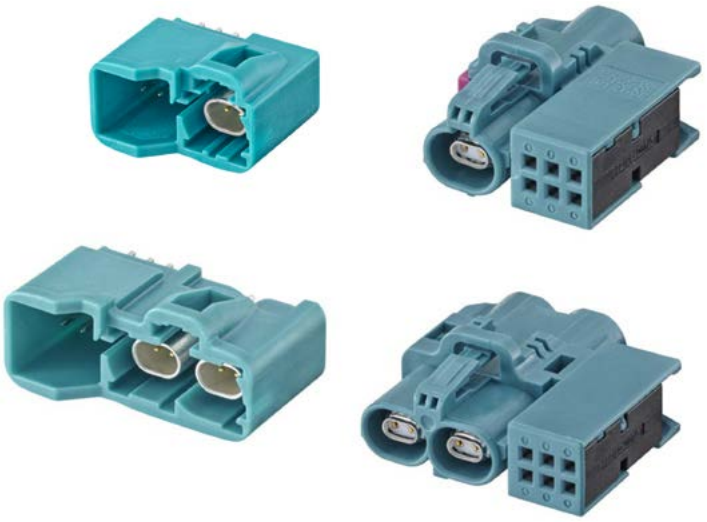
- APIX®
- FPD-Link
- GMSL™
- MIPI® A-PHY℠
- PCIe®
- USB
- GVIF
- HDBase-T™
- ASA Motion Link

## H-MTD® Connectors

The Rosenberger H-MTD® connection system meets all electrical and mechanical automotive requirements. It features mechanical keying, latching, color code options, further locking features and a minimum size combined with pleasing ergonomics.

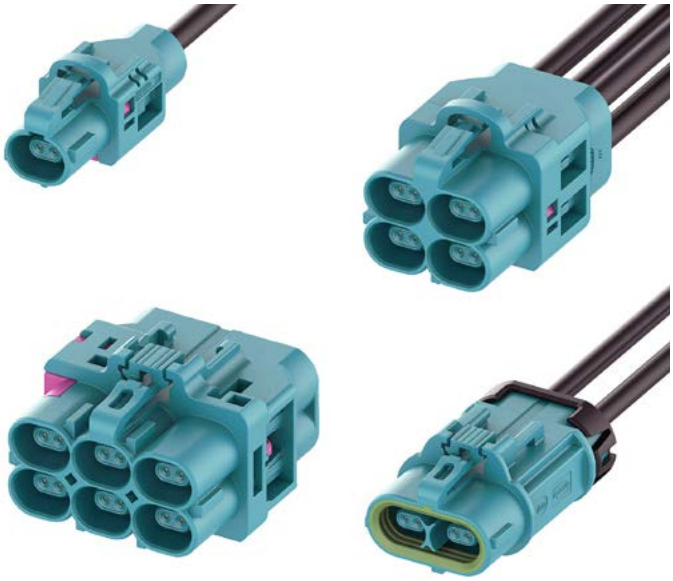
## H-MTD®+6 Connectors

Rosenberger H-MTD®+6 power pin connectors – further variants with additional pins (MQS contacts) for power supply purposes.



## H-MTD®e Unshielded Connectors

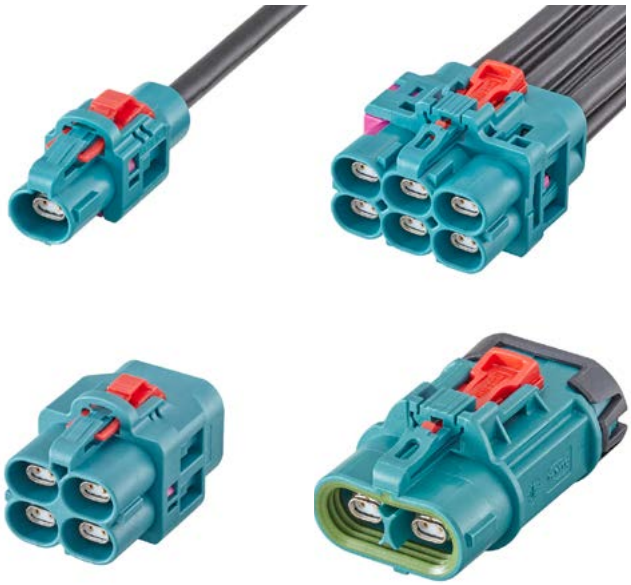
Rosenberger H-MTD®e connectors can be used in a variety of high-speed data connection applications, including unshielded Automotive Ethernet TC2. Highly cost-effective, they fulfill the exacting requirements of the automotive industry.



## Connector Position Assurance (CPA)

High-speed data connectors are increasingly required in safety applications such as autonomous driving and driver assistance systems. In response, Rosenberger has developed an optional CPA solution which prevents unintentional disengagement and therefore improves connection reliability.

The CPA cannot be activated if the connector has not been completely mated. When aligned correctly the CPA can be closed. Additional products are available on request.



# H-MTD® Number Codes

| E6 | K | 1 | 0A – | 1 | xx | Z5 – | y |
|---|---|---|---|---|---|---|---|
| | | | | | | | Coding |
| | | | | | | | A Jet black |
| | | | | | | | B Pure white |
| | | | | | | | C Light blue |
| | | | | | | | D Claret violet |
| | | | | | | | E May green |
| | | | | | | | F Nut brown |
| | | | | | | | Z Water blue (neutral coding for coding A – F) |
| | | | | | | | G Platinum grey |
| | | | | | | | H Light pink |
| | | | | | | | J Beige |
| | | | | | | | K Curry |
| | | | | | | | L Yellow green |
| | | | | | | | M Pastel orange |
| | | | | | | | N Pastel green |
| | | | | | | | O Light green (neutral coding for coding G – R) |
| | | | | | | | P Carmine red |
| | | | | | | | R Signal blue |
| | | | | | | | y Placeholder for required coding |
| | | | | | | | |
| | | | | | | Plating | |
| | | | | | | | |
| | | | | | 01-Z9 Cable group | | |
| | | | | | 00 Blank | | |
| | | | | | 0M Surface mount device | | |
| | | | | | xx Blank cable group | | |
| | | | | | | | |
| | | | | 1 Crimp | | | |
| | | | | 4 PCB mounting | | | |
| | | | | | | | |
| | | | Successive number | | | | |
| | | | | | | | |
| | | 1 Straight connector | | | | | |
| | | 2 Right angle connector | | | | | |
| | | | | | | | |
| | K Female jack | | | | | | |
| | S Male plug | | | | | | |
| | W Tools | | | | | | |
| | Z Plastic housings and accessories | | | | | | |

| |
|---|
| Connector series |
| E6 Rosenberger H-MTD® |
| E9 Rosenberger H-MTD®e |
| 99 Special products power pin (Rosenberger H-MTD®+6) |

## H-MTD® Shielded Cable Groups

| Cable Group | Impedance | Cable Type |
|---|---|---|
| CA | 100 Ω | e.g. GG 2Speed® 251, LEONI Dacar® 686-3 |
| BZ | 100 Ω | e.g. LEONI Dacar® 647-4 |

## H-MTD®e Unshielded Cable Groups

| Cable Group | Impedance | Cable Type |
|---|---|---|
| AQ | 100 Ω | e.g. GG 2Speed® 132, LEONI Dacar® 676 |

## H-MTD® Plating Code

### Outer Contact

| Code | Plating | Symbol | Layer thickness | Magnetic properties |
|---|---|---|---|---|
| S | Stainless steel | | | |
| T | Tin/lead-free | Sn | Min. 1.50 µm | Non magnetic |
| X | Placeholder, no outer contact | | | |
| Z | Special plating | | | |

### Center Contact

| Code | Plating | Symbol | Layer thickness | Magnetic properties |
|---|---|---|---|---|
| 5 | Gold | Au | Min. 0.12 µm | Non magnetic |

The used platings of outer and center contacts as well as the cable group of Rosenberger connectors can be identified by each part number.

# H-MTD® Technical Data

## Technical Data Rosenberger H-MTD® (Code E6)

### Applicable Standards

| | |
|---|---|
| Interface according to | Rosenberger H-MTD® RN_121-00<br>Rosenberger H-MTD® RN_121-01<br>Rosenberger H-MTD® RN_121-02<br>Rosenberger H-MTD® RN_121-04<br>Rosenberger H-MTD® RN_121-06<br>Rosenberger H-MTD® RN_121-16<br>Rosenberger H-MTD® RN_121-26<br>Rosenberger H-MTD® RN_128-01<br>Rosenberger H-MTD® RN_128-02<br>Rosenberger H-MTD® RN_128-04<br>Rosenberger H-MTD® RN_128-16 |

### Electrical Data

| | |
|---|---|
| Impedance | 100 Ω |
| Frequency range depending on cable type | 0.01 GHz to 20 GHz |
| Return loss | ≥ 30 dB, 0.01 GHz to 3 GHz<br>≥ 25 dB, 3 GHz to 6 GHz<br>≥ 20 dB, 6 GHz to 10 GHz<br>≥ 15 dB, 10 GHz to 15 GHz<br>≥ 12 dB, 15 GHz to 20 GHz |
| Near end crosstalk | ≥ 60 dB, 0.01 GHz to 7.5 GHz<br>≥ 45 dB, 7.5 GHz to 20 GHz |
| Far end crosstalk | ≥ 60 dB, 0.01 GHz to 7.5 GHz<br>≥ 45 dB, 7.5 GHz to 20 GHz |
| Insulation resistance | ≥ 1 x $10^2$ MΩ |
| Signal contact resistance | ≤ 10 mΩ |
| Outer contact resistance | ≤ 7.5 mΩ |
| Test voltage (depends on connector) | > 250 V DC |
| Working voltage | < 60 V DC |
| Contact current depending on cable type | ≤ 1.5 A DC at 85 °C ambient temperature |

Electrical requirements are mandatory up to the maximum frequency specified by cable testing (according to data sheet). Data is for informational purposes only when the maximum frequency is surpassed.

### Mechanical Data

| | |
|---|---|
| Mating cycles (standard, non waterproof) | ≥ 25 |
| Mating cycles (waterproof) | ≥ 5 |
| Engagement force | ≤ 45 N* |
| Engagement force waterproof | ≤ 45 N* |
| Retention force latch | ≥ 110 N |
| Retention force primary lock | ≥ 80 N |
| Retention force secondary lock | ≥ 120 N* |
| Polarization feature effectiveness | ≥ 150 N* |

* Depends on connector

## Environmental Data

| | |
|---|---|
| Temperature range | -40 °C to +105 °C |
| Thermal shock | DIN EN 60068-2-14 |
| Humidity | DIN EN 60068-2-30 at +40 °C |
| Dry heat | DIN EN 60068-2-2 at +105 °C |
| Vibration | DIN EN 60068-2-64 |
| Mechanical shock | DIN EN 60068-2-27 |
| RoHS | Compliant |

## Materials

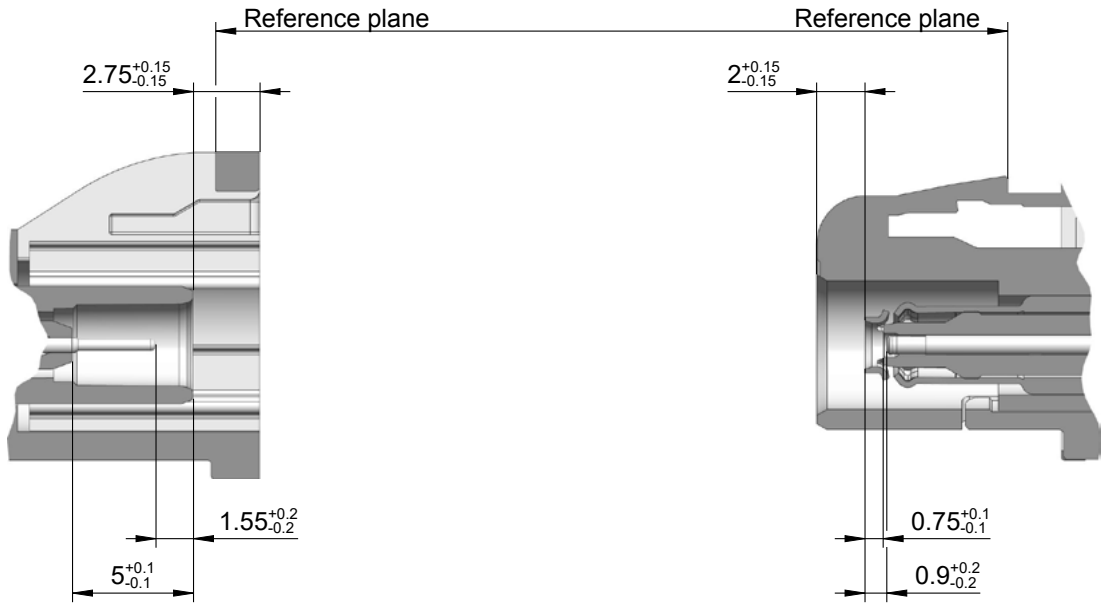
| | |
|---|---|
| Outer contact | CuZn (brass), CuSn (bronze), Zinc Alloy, or equivalent<br>Test adaptors stainless steel |
| Signal contacts | CuZn, CuSn (brass, bronze), or equivalent |
| Dielectric | PA, PBT, LCP, or equivalent |
| Gasket | Silicone, rubber, or equivalent |
| Crimping ferrule | CrNi (steel), or equivalent |
| Plastic housings and secondary lock | PA, PBT, or equivalent |

## Platings

| | |
|---|---|
| Outer contact | Tin, special plating |
| Signal contact | Gold |

Rosenberger connectors fulfill in principle the indicated data of the Technical Data. Individual values of connectors may deviate depending upon application, design, type of cable, assembly method and execution. Specific data sheets for particular products can be provided on request by your Rosenberger sales partner.

# Interface Dimensions



# H-MTD® Connectors

## PCB Connectors – Pin-in-Paste

### Straight Plug, Single

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S10A-40MT5-y | Pin-in-paste<br>2 signal pins | MB 821 | See coding table |  |

### Straight Plug, Double

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S10B-40MT5-y | Pin-in-paste<br>2×2 signal pins | MB 671 | See coding table |  |
| E6S13B-40MT5-y | Pin-in-paste<br>2×2 signal pins<br>Vertical | MB 1035 | See coding table |  |

### Straight Plug, Quad

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S10D-40MT5-y | Pin-in-paste<br>4×2 signal pins | MB 865 | See coding table |  |

### Straight Plug, Six

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S10F-40MT5-y | Pin-in-paste<br>6×2 signal pins | MB 689 / MB 715 | See coding table |  |

y: Please fill-in required coding, availability of the specific coding on request

## Right Angle Plug, Single

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S20A-40MT5-y | Pin-in-paste<br>2 signal pins | MB 633 | See coding table |  |
| E6S22A-40MT5-y | Cable up<br>Pin-in-paste<br>2 signal pins | MB 816 | See coding table |  |
| E6S218-40MT5-y | Cable up<br>Edge mount<br>Pin-in-paste<br>2 signal pins | MB 693 | See coding table |  |

## Right Angle Plug, Double

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S20B-40MT5-y | Pin-in-paste<br>2×2 signal pins | MB 666 | See coding table |  |

## Right Angle Plug, Quad

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S20D-40MT5-y | Pin-in-paste<br>4×2 signal pins | MB 869 | See coding table |  |

## Right Angle Plug, Six

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S20F-40MT5-y | Pin-in-paste<br>6×2 signal pins | MB 940 | See coding table |  |

y: Please fill-in required coding, availability of the specific coding on request

# Cable Connectors

## Straight Plug, Single

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6S10A-1BZZ5-y | 2 signal pins | BZ | MA E6V008<br>MA E6V004 | See coding table |  |
| E6S10A-1CAZ5-y | | CA | | | |
| E6S10C-1BZZ5-y | 2 signal pins<br>With slot for positioning clip | BZ | MA E6V008<br>MA E6V004 | See coding table |  |
| E6S10C-1CAZ5-y | | CA | | | |

## Straight Plug, Double

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6S10B-1BZZ5-y | 2×2 signal pins | BZ | MA E6V008<br>MA E6V004 | See coding table |  |
| E6S10B-1CAZ5-y | | CA | | | |
| E6S10V-1BZZ5-y | 2×2 signal pins<br>With slot for positioning clip | BZ | MA E6V008<br>MA E6V004 | See coding table |  |
| E6S10V-1CAZ5-y | | CA | | | |

## Straight Jack, Single

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K10A-1BZZ5-y | 2 signal pins | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K10A-1CAZ5-y | | CA | | | |
| E6K11A-1BZZ5-y | 2 signal pins<br>With CPA | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K11A-1CAZ5-y | | CA | | | |

y: Please fill-in required coding, availability of the specific coding on request

## Straight Jack, Double

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K10B-1BZZ5-y | 2×2 signal pins | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K10B-1CAZ5-y | | CA | | | |
| E6K11B-1BZZ5-y | 2×2 signal pins<br>With CPA | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K11B-1CAZ5-y | | CA | | | |

## Straight Jack, Quad

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K10D-1BZZ5-y | 4×2 signal pins | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K10D-1CAZ5-y | | CA | | | |
| E6K11D-1BZZ5-y | 4×2 signal pins<br>With CPA | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K11D-1CAZ5-y | | CA | | | |

## Straight Jack, Six

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K10F-1BZZ5-y | 6×2 signal pins | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K10F-1CAZ5-y | | CA | | | |
| E6K11F-1BZZ5-y | 6×2 signal pins<br>With CPA | BZ | MA E6V007<br>MA E6V003 | See coding table |  |
| E6K11F-1CAZ5-y | | CA | | | |

y: Please fill-in required coding, availability of the specific coding on request

# H-MTD® Connectors – Waterproof

## PCB Connectors – Pin-in-Paste

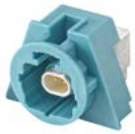
### Straight Plug, Single, Waterproof

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S14A-40MT5-y | Waterproof<br>Pin-in-paste<br>2 signal pins | MB 821 | See coding table |  |

### Straight Plug, Double, Waterproof

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S14B-40MT5-y | Waterproof<br>Pin-in-paste<br>2×2 signal pins | MB 797 | See coding table |  |

### Right Angle Plug, Single, Waterproof

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S24A-40MT5-y | Waterproof<br>Pin-in-paste<br>2 signal pins | MB 780 | See coding table |  |
| E6S24J-40MT5-y | Waterproof<br>Pin-in-paste<br>2 signal pins | MB 1027 | See coding table |  |

### Right Angle Plug, Double, Waterproof

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S24B-40MT5-y | Waterproof<br>Pin-in-paste<br>2×2 signal pins | MB 1026 | See coding table |  |

### Right Angle Plug, Quad, Waterproof

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S24D-40MT5-y | Waterproof<br>Pin-in-paste<br>4×2 signal pins | MB 869 | See coding table |  |

y: Please fill-in required coding, availability of the specific coding on request

# Cable Connectors

## Straight Plug, Single, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6S14E-1BZZ5-y | Waterproof<br>2 signal pins<br>With slot for positioning clip | BZ | On request | See coding table |  |
| E6S14E-1CAZ5-y | | CA | MA E6V006 | | |

## Straight Jack, Single, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K14A-1BZZ5-y | Waterproof<br>2 signal pins | BZ | On request | See coding table |  |
| E6K14A-1CAZ5-y | | CA | MA E6V005 | | |
| E6K14J-1BZZ5-y | Waterproof<br>2 signal pins<br>With CPA | BZ | On request | See coding table |  |
| E6K14J-1CAZ5-y | | CA | MA E6V005 | | |

## Straight Jack, Double, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K14B-1BZZ5-y | Waterproof<br>2×2 signal pins | BZ | On request | See coding table |  |
| E6K14B-1CAZ5-y | | CA | MA E6V005 | | |
| E6K14K-1BZZ5-y | Waterproof<br>2×2 signal pins<br>With CPA | BZ | On request | See coding table |  |
| E6K14K-1CAZ5-y | | CA | MA E6V005 | | |

## Straight Jack, Quad, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K14D-1BZZ5-y | Waterproof<br>4×2 signal pins | BZ | On request | See coding table |  |
| E6K14D-1CAZ5-y | | CA | MA E6V009 | | |
| E6K14L-1BZZ5-y | Waterproof<br>4×2 signal pins<br>With CPA | BZ | On request | See coding table |  |
| E6K14L-1CAZ5-y | | CA | MA E6V009 | | |

y: Please fill-in required coding, availability of the specific coding on request

# H-MTD®+6 Power Pin Connectors

## PCB Connectors – Pin-in-Paste

### Straight Plug, Single +6

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| 99S1HC-40MT5-y | Pin-in-paste<br>2 signal pins<br>6 power pins | MB 815 | See coding table |  |

### Straight Plug, Single +6, Waterproof

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| E6S14M-40MT5-y | Waterproof<br>Pin-in-paste<br>2 signal pins<br>6 power pins | MB 923 | See coding table |  |

### Straight Plug, Double +6

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| 99S1HG-40MT5-y | Pin-in-paste<br>2×2 signal pins<br>6 power pins | MB 798 | See coding table |  |

### Right Angle Plug, Single +6

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| 99S2HC-40MT5-y | Pin-in-paste<br>2 signal pins<br>6 power pins | MB 756 | See coding table |  |

### Right Angle Plug, Double +6

| Rosenberger No. | Description | Panel Piercing / PCB Layout | Coding H-MTD® | Product |
|---|---|---|---|---|
| 99S2HG-40MT5-y | Pin-in-paste<br>2×2 signal pins<br>6 power pins | MB 757 | See coding table |  |

y: Please fill-in required coding, availability of the specific coding on request

# Cable Connectors

## Straight Jack, Single +6

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| 99K1HC-1BZZ5-y | 2 signal pins<br>6 power pins | BZ | On request | See coding table |  |
| 99K1HC-1CAZ5-y | | CA | MA 99V062 | | |

## Straight Jack, Single +6, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E6K14M-1BZZ5-y | Waterproof<br>2 signal pins<br>6 power pins<br>With CPA | BZ | On request | See coding table |  |
| E6K14M-1CAZ5-y | | CA | MA E6V014 | | |

## Straight Jack, Double +6

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| 99K1HG-1BZZ5-y | 2×2 signal pins<br>6 power pins | BZ | On request | See coding table |  |
| 99K1HG-1CAZ5-y | | CA | MA 99V062 | | |

y: Please fill-in required coding, availability of the specific coding on request

# H-MTD®e Technical Data

## Technical Data H-MTD®e (Code E9)

### Applicable Standards

| | |
|---|---|
| Interface according to | Rosenberger H-MTD®e RN_240-00<br>Rosenberger H-MTD®e RN_240-01<br>Rosenberger H-MTD®e RN_240-02<br>Rosenberger H-MTD®e RN_240-04<br>Rosenberger H-MTD®e RN_240-06<br>Rosenberger H-MTD®e RN_244-01<br>Rosenberger H-MTD®e RN_244-02<br>Rosenberger H-MTD®e RN_244-04 |

### Electrical Data

| | |
|---|---|
| Impedance | 100 Ω |
| Frequency range depending on cable type | DC to 1 GHz |
| Return loss | $\geq \begin{pmatrix} 38 & 1 \leq f < 75 \\ 20 - 20\log\left(f/600\right) & 75 \leq f \leq 600 \end{pmatrix} dB^{*}$ |
| Insertion loss | $\leq \left(0.01\sqrt{f}\right) dB^{*}$ |
| Mode conversion loss | $\geq \begin{pmatrix} 55 & 10 \leq f \leq 80 \\ 77 - 11.51\log(f) & 80 < f \leq 600 \end{pmatrix} dB^{*}$ |
| Skew (between signal contacts) straight connectors<br>Skew (between signal contacts) right angle connectors | ≤ 5 ps<br>≤ 25 ps |
| Near end crosstalk | ≤ -30 dB, DC to 100 MHz |
| Far end crosstalk | ≤ -35 dB, DC to 100 MHz |
| Insulation resistance | ≥ 1 x $10^2$ MΩ |
| Signal contact resistance | ≤ 10 mΩ |
| Test voltage (depends on connector) | > 250 V DC |
| Working voltage | < 60 V DC |
| Contact current depending on cable type | ≤ 1.5 A DC at 85 °C ambient temperature |

* f in MHz

### Mechanical Data

| | |
|---|---|
| Mating cycles (standard, non waterproof) | ≥ 25 |
| Mating cycles (waterproof) | ≥ 5 |
| Engagement force | ≤ 45 N* |
| Engagement force waterproof | ≤ 45 N* |
| Retention force latch | ≥ 110 N |
| Retention force primary lock | ≥ 80 N |
| Retention force secondary lock | ≥ 120 N* |
| Polarization feature effectiveness | ≥ 150 N* |

* Depends on connector

### Compatibility

| | H-MTD®e jack | H-MTD®e plug | H-MTD® jack | H-MTD® plug |
|---|---|---|---|---|
| H-MTD®e jack | – | ✓ | – | ✓ |
| H-MTD®e plug | ✓ | – | × | – |

✓: compatible, ×: not compatible

## Environmental Data

| | |
|---|---|
| Temperature range | -40 °C to +105 °C |
| Thermal shock | DIN EN 60068-2-14 |
| Humidity | DIN EN 60068-2-30 at +40 °C |
| Dry heat | DIN EN 60068-2-2 at +105 °C |
| Vibration | DIN EN 60068-2-64 |
| Mechanical shock | DIN EN 60068-2-27 |
| RoHS | Compliant |

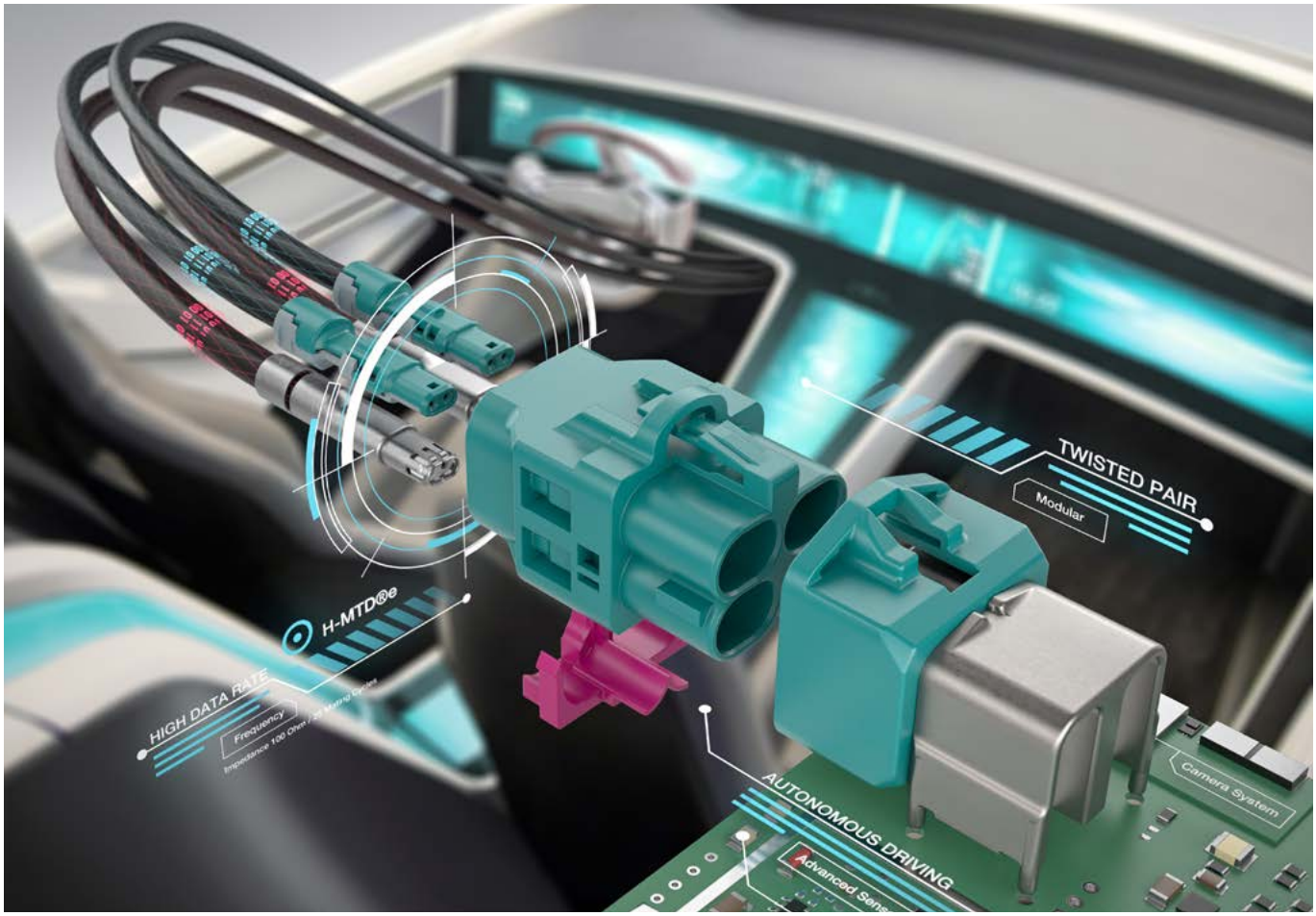
## Materials

| | |
|---|---|
| Signal contacts | CuZn (brass), CuSn (bronze), or equivalent |
| Dielectric | PA, PBT, LCP, or equivalent |
| Gasket | Silicone, rubber, or equivalent |
| Plastic housings and secondary lock | PA, PBT, or equivalent |

## Platings

| | |
|---|---|
| Signal contacts | Gold |

Rosenberger connectors fulfill in principle the indicated data of the Technical Data. Individual values of connectors may deviate depending upon application, design, type of cable, assembly method and execution. Specific data sheets for particular products can be provided on request by your Rosenberger sales partner.



# H-MTD®e Connectors

## H-MTD®e Unshielded Connectors

Rosenberger H-MTD®e connectors can be used in a variety of high-speed data connection applications, including unshielded Automotive Ethernet TC2 and TC9. Highly cost-effective, they fulfill the exacting requirements of the automotive industry and are fully compatible with standard Rosenberger H-MTD® connectors.

### Straight Jack, Single

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9K10A-1AQX5-y | 2 signal pins | AQ | MA_E9V001 | See coding table |  |

### Straight Jack, Double

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9K10B-1AQX5-y | 2×2 signal pins | AQ | MA_E9V001 | See coding table |  |

### Straight Jack, Quad

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9K10D-1AQX5-y | 4×2 signal pins | AQ | MA_E9V001 | See coding table |  |

### Straight Jack, Six

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9K10F-1AQX5-y | 6×2 signal pins | AQ | MA_E9V001 | See coding table |  |

### Straight Plug, Single

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9S10A-1AQX5-y | 2 signal pins | AQ | MA_E9V002 | See coding table |  |
| E9S1CA-1AQX5-y | 2 signal pins<br>With slot for positioning clip | AQ | MA_E9V002 | See coding table |  |

y: Please fill-in required coding, availability of the specific coding on request

### Straight Plug, Double

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9S10B-1AQX5-y | 2×2 signal pins | AQ | MA_E9V002 | See coding table |  |
| E9S1CB-1AQX5-y | 2×2 signal pins<br>With slot for positioning clip | AQ | MA_E9V002 | See coding table |  |

y: Please fill-in requiredcoding, availability of the specific coding on request

## H-MTD®e Unshielded Connectors – Waterproof

### Straight Jack, Single, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9K14A-1AQX5-y | Waterproof<br>2 signal pins | AQ | MA_E9V003 | See coding table |  |

### Straight Jack, Double, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9K14B-1AQX5-y | Waterproof<br>2×2 signal pins | AQ | MA_E9V0003 | See coding table |  |

### Straight Plug, Single, Waterproof

| Rosenberger No. | Description | Cable Group | Assembly Instruction | Coding H-MTD® | Product |
|---|---|---|---|---|---|
| E9S14A-1AQX5-y | Waterproof<br>2 signal pins | AQ | MA_E9V006 | See coding table |  |
| E9S14E-1AQX5-y | Waterproof<br>2 signal pins<br>With slot for positioning clip | AQ | MA_E9V006 | See coding table |  |

y: Please fill-in required coding, availability of the specific coding on request

# H-MTD® Test PC-Boards

## Testboard H-MTD®

| Rosenberger No. | Description | Connectors | Product |
|---|---|---|---|
| PCB-T2003-SB-01 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S10A-40MT5-Z<br>4 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T3503-SB-01 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S10F-40MT5-Z<br>4 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-S3401-SB-01 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S20A-40MT5-Z<br>4 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T0601-SB-01 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S20B-40MT5-Z<br>6 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T0602-SB-01 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S20D-40MT5-Z<br>10 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T0704-SB-02 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S20F-40MT5-Z<br>12 × RPC-2.92 female 02K721-40MS3 |  |

## Testboard H-MTD®, Waterproof

| Rosenberger No. | Description | Connectors | Product |
|---|---|---|---|
| PCB-T2003-SB-02 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S14A-40MT5-Z waterproof<br>4 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-S3401-SB-02 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S24A-40MT5-Z waterproof<br>4 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T0601-SB-02 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S24B-40MT5-Z waterproof<br>6 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T0602-SB-02 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD® male E6S24D-40MT5-Z waterproof<br>10 × RPC-2.92 female 02K721-40MS3 |  |

## Testboard H-MTD® +6 Power Pin

| Rosenberger No. | Description | Connectors | Product |
|---|---|---|---|
| PCB-T2003-SB-03 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD®+6 male 99S1HC-40MT5-Z<br>6 × SMA female 32K101-400L5<br>4 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T2003-SB-04 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD®+6 male 99S1HG-40MT5-Z<br>6 × SMA female 32K101-400L5<br>6 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T1401-SB-01 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD®+6 male 99S2HC-40MT5-Z<br>6 × SMA female 32K101-400L5<br>4 × RPC-2.92 female 02K721-40MS3 |  |
| PCB-T1401-SB-02 | Impedance 100 Ω<br>Frequency range DC to 10 GHz | 1 × H-MTD®+6 male 99S2HG-40MT5-Z<br>6 × SMA female 32K101-400L5<br>6 × RPC-2.92 female 02K721-40MS3 |  |

# H-MTD® Test Adaptors

## Precision Adaptors with H-MTD® Housing

| Rosenberger No. | Description | Connector Interfaces | Product |
|---|---|---|---|
| 02K3E6-K00S5 | Y-Adaptor<br>With H-MTD® housing single | RPC-2.92 female<br>H-MTD® female |  |
| 02S3E6-K00S5 | Y-Adaptor<br>With H-MTD® housing single | RPC-2.92 male<br>H-MTD® female |  |
| 02K3E6-S00S5 | Y-Adaptor<br>With H-MTD® housing single | RPC-2.92 female<br>H-MTD® male |  |
| 02S3E6-S00S5 | Y-Adaptor<br>With H-MTD® housing single | RPC-2.92 male<br>H-MTD® male |  |

## Precision Adaptors without H-MTD® Housing for Universal Use

| Rosenberger No. | Description | Connector Interfaces | Product |
|---|---|---|---|
| 02K3E6-K01S5 | Y-Adaptor<br>Without H-MTD® housing | RPC-2.92 female<br>H-MTD® female |  |
| 02S3E6-K01S5 | Y-Adaptor<br>Without H-MTD® housing | RPC-2.92 male<br>H-MTD® female |  |
| 02K3E6-S01S5 | Y-Adaptor<br>Without H-MTD® housing | RPC-2.92 female<br>H-MTD® male |  |
| 02S3E6-S01S5 | Y-Adaptor<br>Without H-MTD® housing | RPC-2.92 male<br>H-MTD® male |  |

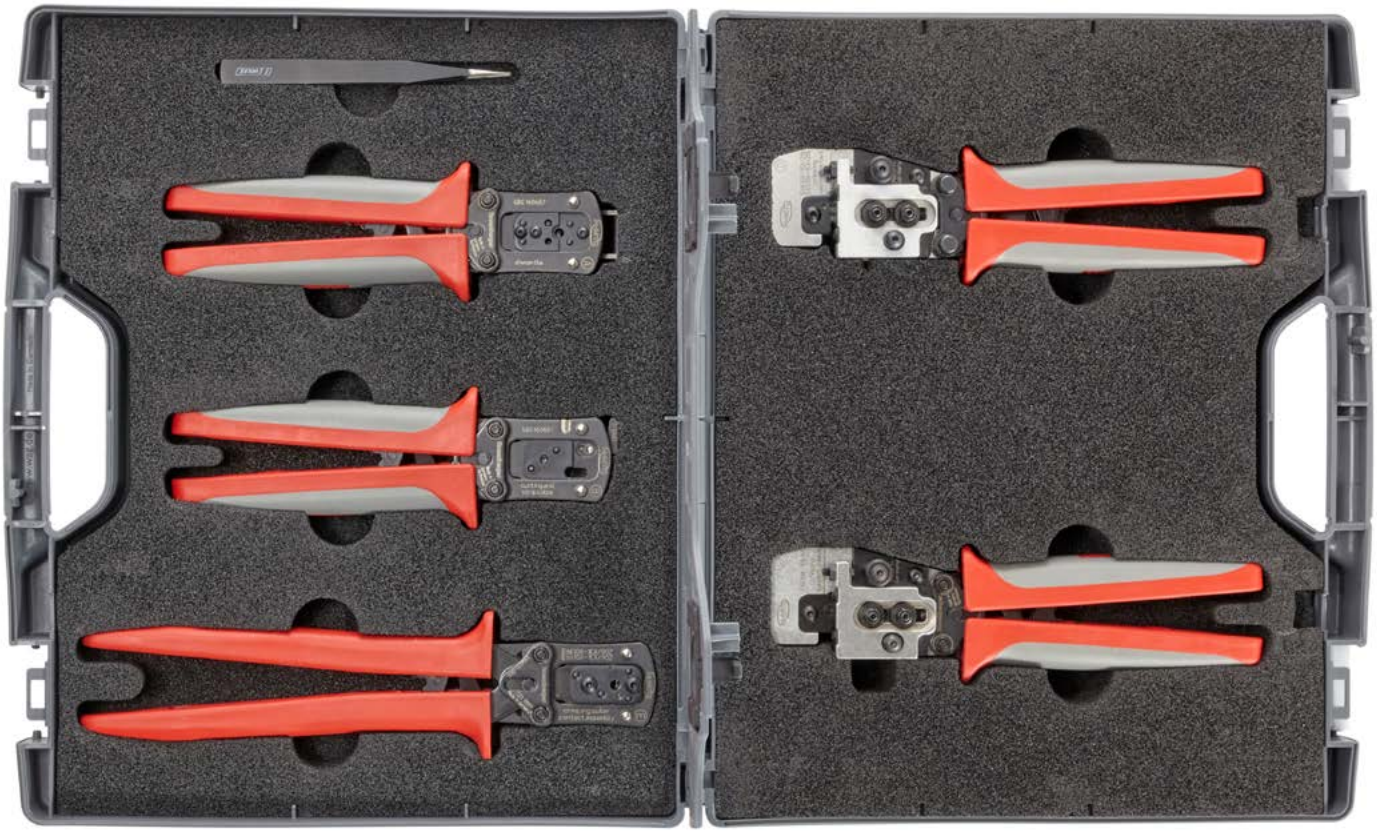
## Directional Coupler

| Rosenberger No. | Description | Coupler | Product |
|---|---|---|---|
| DCDP-H-MTD-1G | Coupler Kit including:<br>1 × coupler H-MTD®<br>2 × cable assemblies LCA-109-1000-Z<br>2 × cable assemblies LCA-101-1000-Z-Z | 2 × H-MTD® male E6S215-40ML5-Z<br>4 × SMA female 32K264-40ML5 |  |

## Hand Crimping Tool Kit

| Rosenberger No. | Description | Cable Group | Product |
|---|---|---|---|
| E6W003-SET | Complete tool kit in case<br>Incl. 6 pliers for cutting, stripping, crimping<br>For male and female connectors | CA |  |

Further tools and tool kits are availabe on request



Learn more about the compact hand crimping tool kit from Rosenberger for the quick replacement of damaged Rosenberger H-MTD® connectors on the cable harness.

**www.rosenberger.com/v/h-mtd-toolkit**

# H-MTD® Connectors for Multiheader

Rosenberger multiheaders combine multipin configurations with coaxial and differential high-speed connectors for future-proof automotive wiring systems. They enable all connector combinations for data transmission and power supply in the smallest space, with the lowest weight at the best price/performance ratio. Depending on the design, they combine a variety of electrical contacts, e. g. MQS with coaxial and differential data connectors such as FAKRA, HFM®, H-MTD® or RosenbergerHSD®.

All customized assembly combinations are explicitly designed for the respective application. Rosenberger develops the interfaces according to the requirements of automotive manufacturers and Tier 1 suppliers.

## Product Portfolio

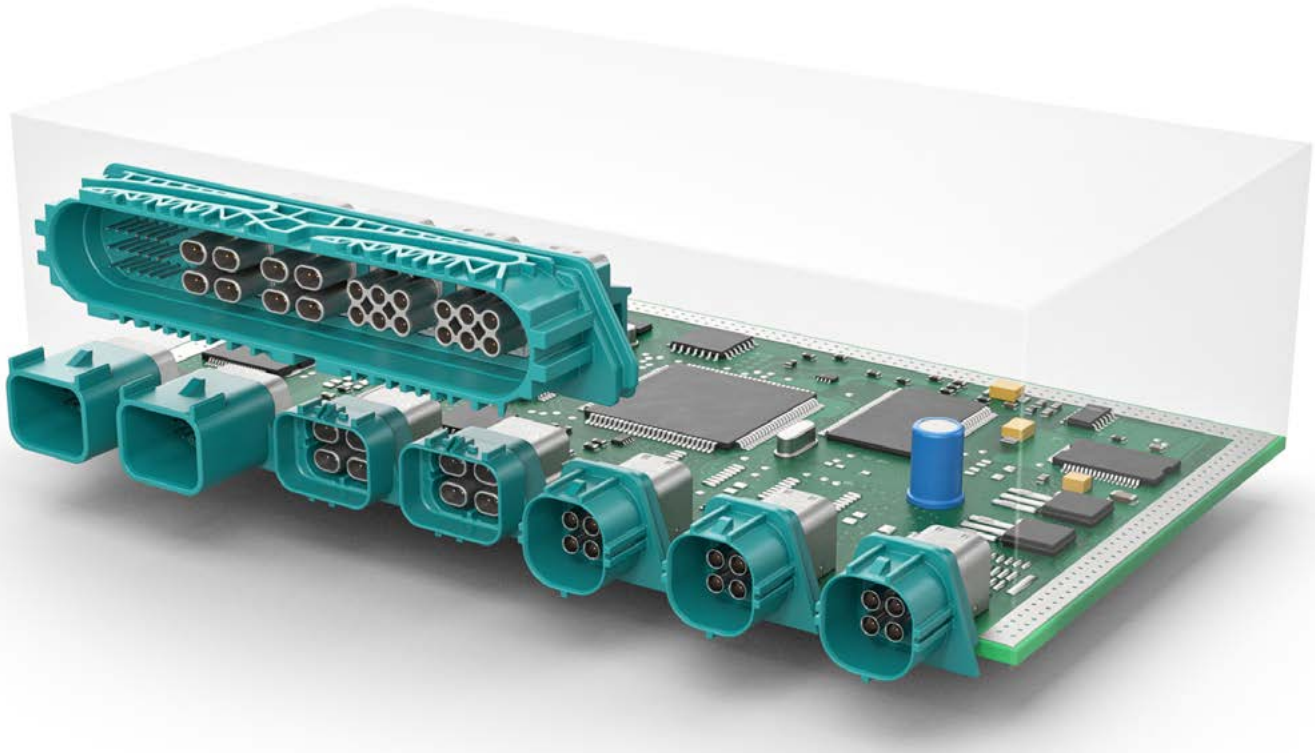
- Scalable multiheader
- Customized multiheader
- Modular housings, single, double, quad, six, right angle and straight
- Combinations of all common series e. g. HFM®, H-MTD®, RosenbergerHSD®, FAKRA

## Features

- Design and process perfectly aligned for automotive market requirements and applications
- Wide operating temperature range
- Frequency range data connectors up to 20 GHz
- Reliable signal integrity
- Cost efficient
- Open to various protocols

Scalable multiheader

Customized multiheader



## Benefits

- Scalable multiheaders reduce weight and size – space savings of up to 40 %
- Production according to customer specification
- Every conceivable modular design is possible
- Combination of data and power connectors as specified
- Simplified, fast connection and disconnection of complex signal lines
- The modular concept enables a fully automated assembly process
- Application-specific implementations due to modular and scalable design in the smallest installation space

## Applications

- For all applications and complex controls in the automotive wiring system
- Video and audio technology
- Wiring harnesses
- Advanced Driver Assistance Systems (ADAS)
- 4K cameras and displays
- Infotainment

# H-MTD® Cable Assemblies

Rosenberger offers a comprehensive range of standard cable assemblies as well as customized solutions for high speed data transmissions.

Cable variants with 0.14 mm² center contact sections are available. There are fully shielded cable variants for Rosenberger H-MTD®. Additional unshielded cables for the cost-optimized Rosenberger H-MTD®e are available.

Customized versions on request, please feel free to contact us.

## Rosenberger Number Code – Cable Assemblies Rosenberger H-MTD®/H-MTD®e

| L | xx- | 101- | xxxx- | -y-y | (_flex) |
|---|---|---|---|---|---|
| | | | | | Add. if flexible cable |
| | | | | | |
| | | | | Coding Side A and B | |
| | | | | A Jet black | |
| | | | | B Pure white | |
| | | | | C Light blue | |
| | | | | D Claret violet | |
| | | | | E May green | |
| | | | | F Nut brown | |
| | | | | Z Water blue (neutral coding for coding A – F) | |
| | | | | G Platinum grey | |
| | | | | H Light pink | |
| | | | | J Beige | |
| | | | | K Curry | |
| | | | | L Yellow green | |
| | | | | M Pastel orange | |
| | | | | N Pastel green | |
| | | | | O Light green (neutral coding for coding G – R) | |
| | | | | P Carmine red | |
| | | | | R Signal blue | |
| | | | | y Placeholder for required coding | |
| | | | | | |
| | | | Length in mm | | |
| | | | | | |
| | | Successive number | | | |
| | | Include assembled connectors | | | |
| | | For details please see data sheet | | | |
| | | | | | |
| | Cable group | | | | |
| | AQ | | | | |
| | BZ | | | | |
| | CA | | | | |
| | | | | | |
| Cable assembly | | | | | |

## Cable Assemblies H-MTD®

| Rosenberger No. | Description | Cable Group | Side A | Side B | Product |
|---|---|---|---|---|---|
| LCA-101-xxxx-y-y | xxxx: length in mm<br>y-y: coding side A/B<br>(see table) | CA | E6K10A-1CA<br>Jack, straight | E6K10A-1CA<br>Jack, straight |  |
| LCA-102-xxxx-y-y | xxxx: length in mm<br>y-y: coding side A/B<br>(see table) | CA | E6K10A-1CA<br>Jack, straight | E6S10A-1CA<br>Plug, straight |  |
| LCA-103-xxxx-y-y | xxxx: length in mm<br>y-y: coding side A/B<br>(see table) | CA | E6S10A-1CA<br>Plug, straight | E6K10A-1CA<br>Jack, straight |  |
| LCA-104-xxxx-y-y | xxxx: length in mm<br>y-y: coding side A/B<br>(see table) | CA | E6S10A-1CA<br>Plug, straight | E6S10A-1CA<br>Plug, straight |  |

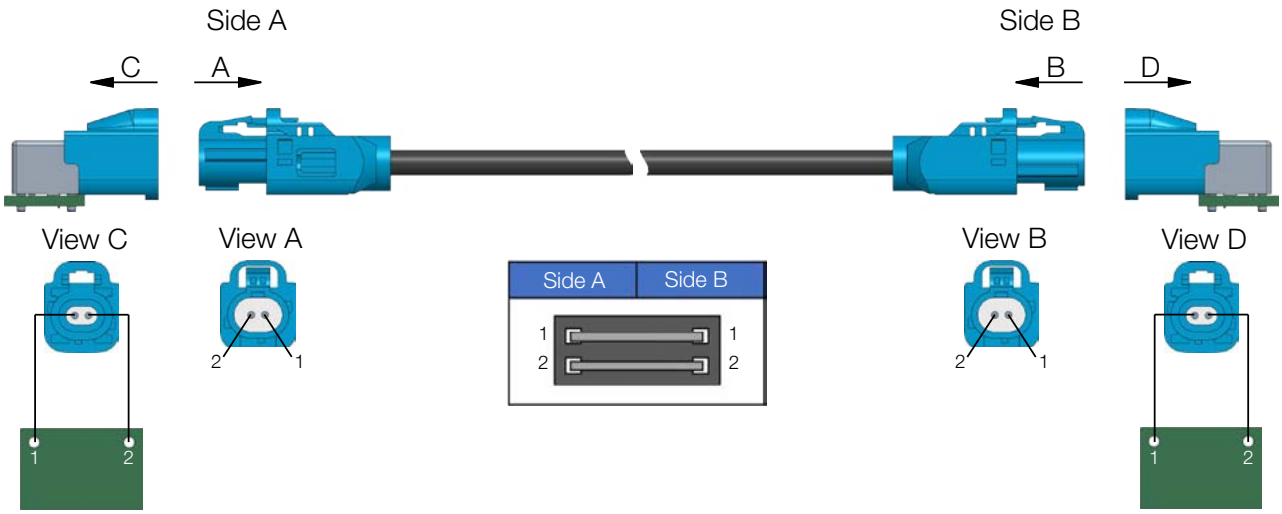
## Cable Assemblies H-MTD®e

| Rosenberger No. | Description | Cable Group | Side A | Side B | Product |
|---|---|---|---|---|---|
| LAQ-344-xxxx-y-y | xxxx: length in mm<br>y-y: coding side A/B<br>(see table) | AQ | E9K10A-1AQ<br>Jack, straight | E9K10A-1AQ<br>Jack, straight |  |
| LAQ-338-xxxx-y-y | xxxx: length in mm<br>y-y: coding side A/B<br>(see table) | AQ | E9S10A-1AQ<br>Plug, straight | E9S10A-1AQ<br>Plug, straight |  |
| LAQ-339-xxxx-y-y | xxxx: length in mm<br>y-y: coding side A/B<br>(see table) | AQ | E9S10A-1AQ<br>Plug, straight | E6K10A-1AQ<br>Jack, straight |  |

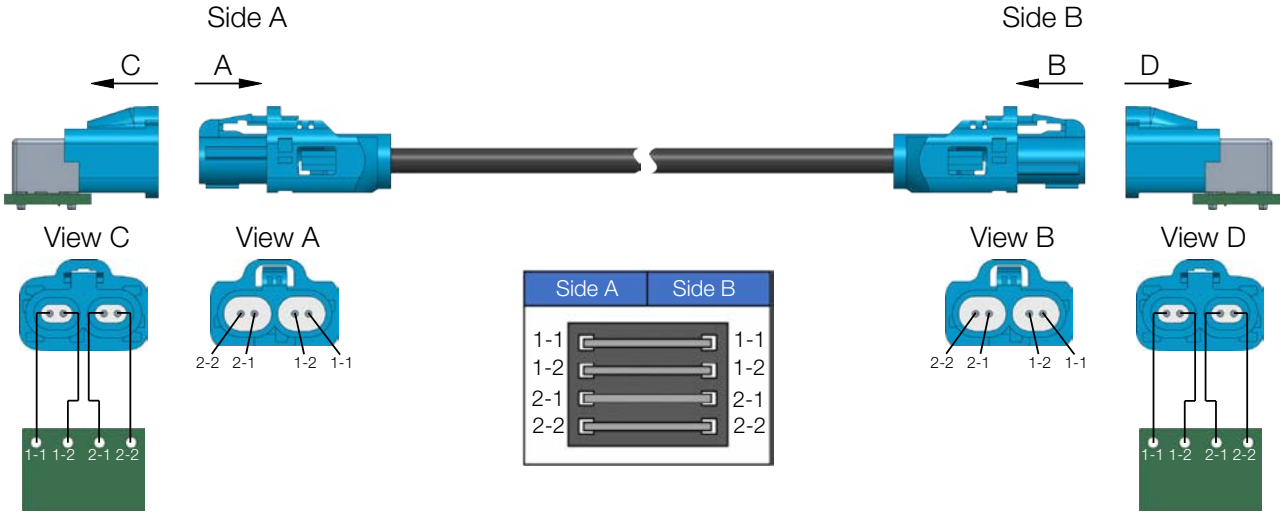
xxxx: length in mm, -y: coding side A/B see table

# H-MTD® Pinnings

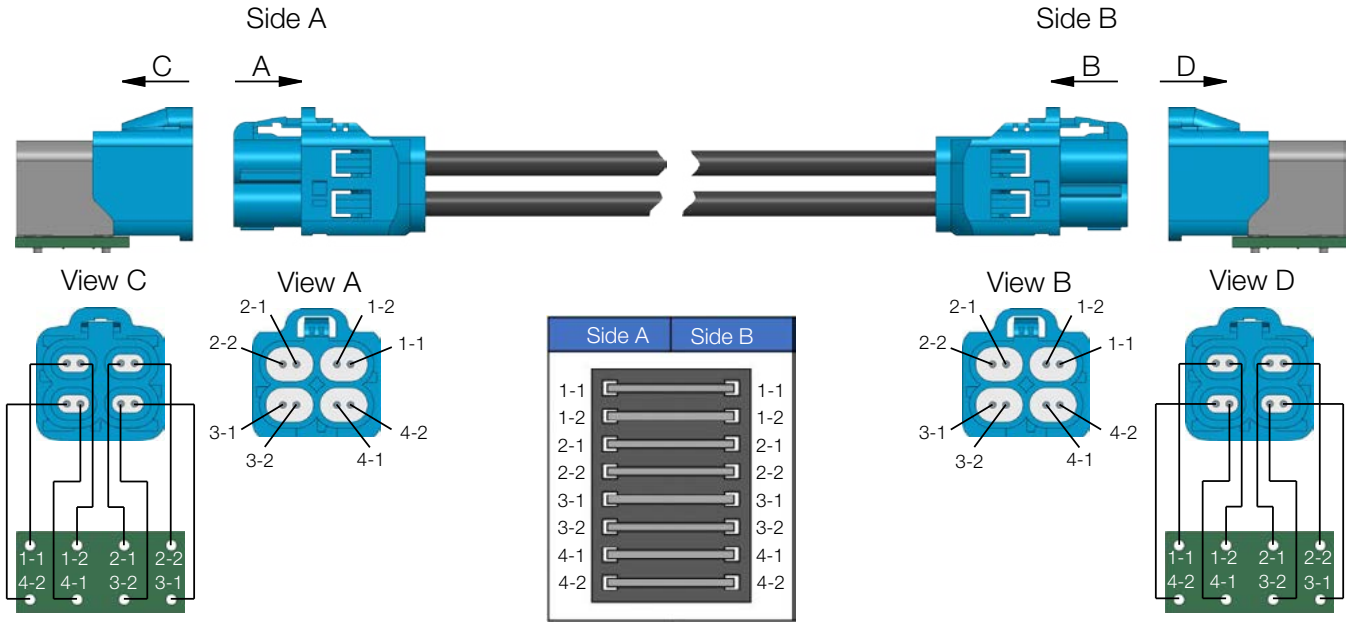
The standard pinning of the Rosenberger H-MTD® is defined in the Rosenberger standards RN_143-XX (XX defining the port quantity).



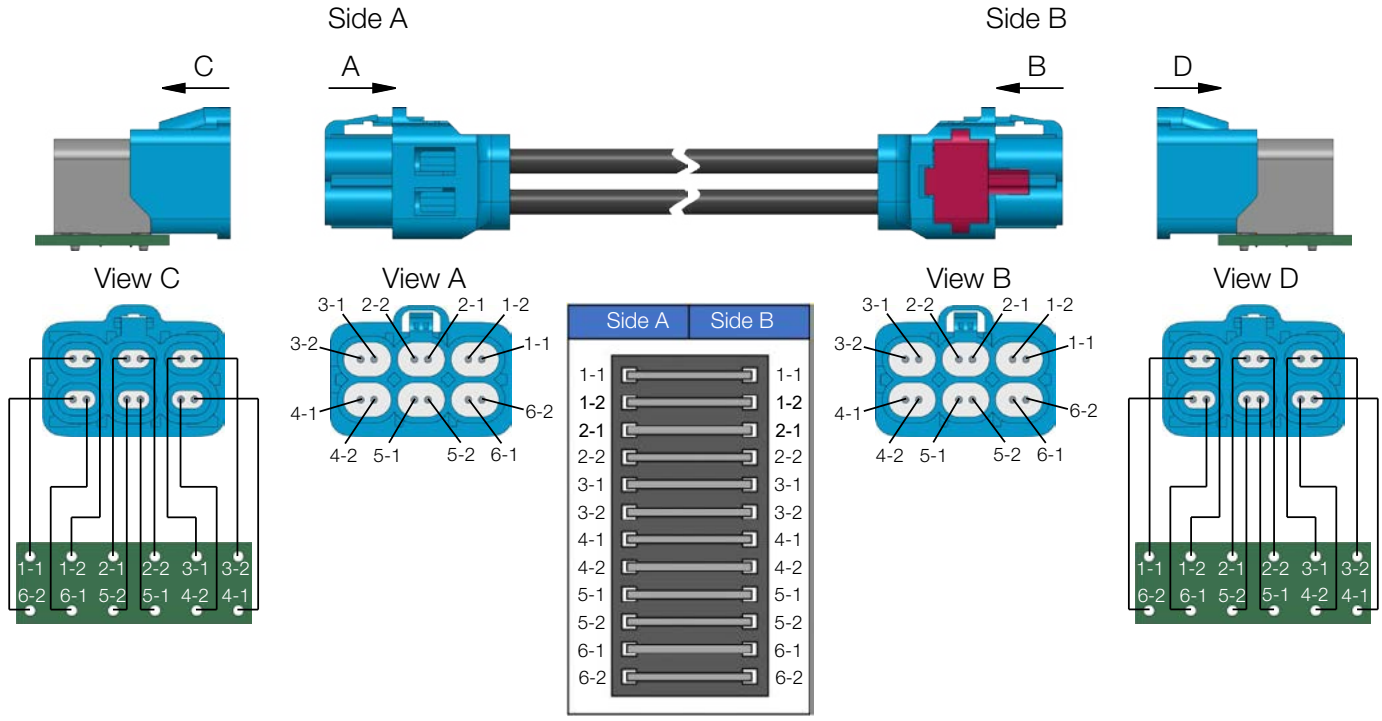

Pinning according Rosenberger norm RN_143-01




Pinning according Rosenberger norm RN_143-02




Pinning according Rosenberger norm RN_143-04




Pinning according Rosenberger norm RN_143-06

# H-MTD® Codings

## Coding H-MTD® Single, H-MTD®+6 Single

| Coding | Jack | Plug | Color / RAL-No. (similar) |
|---|---|---|---|
| A |  |  | Jet black / 9005 |
| B |  |  | Pure white / 9010 |
| C |  |  | Light blue / 5012 |
| D |  |  | Claret violet / 4004 |
| E |  |  | May green / 6017 |
| F |  |  | Nut brown / 8011 |
| G |  |  | Platinum grey / 7036 |
| H |  |  | Light pink / 3015 |
| J |  |  | Beige / 1001 |
| K |  |  | Curry / 1027 |
| L |  |  | Yellow green / 6018 |
| M |  |  | Pastel orange / 2003 |
| O<br>(neutral coding for coding G – M) |  |  | Light green / 6027 |
| Z<br>(neutral coding for coding A – F) |  |  | Water blue / 5021 |

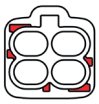
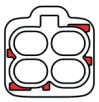
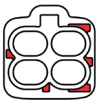
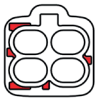
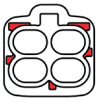
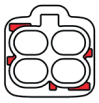
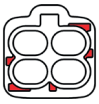
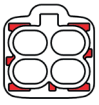
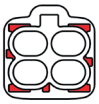
Availability of specific codings upon request. Color of the plastic housing defined in accordance to the listed RAL colors. Minor color differences due to manufacturing possible.

## Coding H-MTD® Double, H-MTD®+6 Double

| Coding | Jack | Plug | Color / RAL-No. (similar) |
|---|---|---|---|
| A |  |  | Jet black / 9005 |
| B |  |  | Pure white / 9010 |
| C |  |  | Light blue / 5012 |
| D |  |  | Claret violet / 4004 |
| E |  |  | May green / 6017 |
| F |  |  | Nut brown / 8011 |
| G |  |  | Platinum grey / 7036 |
| H |  |  | Light pink / 3015 |
| J |  |  | Beige / 1001 |
| K |  |  | Curry / 1027 |
| L |  |  | Yellow green / 6018 |
| M |  |  | Pastel orange / 2003 |
| O<br>(neutral coding for coding G – M) |  |  | Light green / 6027 |
| Z<br>(neutral coding for coding A – F) |  |  | Water blue / 5021 |

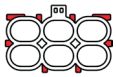
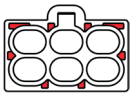
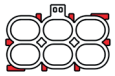
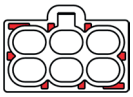
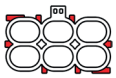
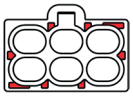
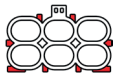
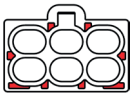
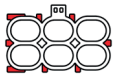
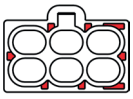
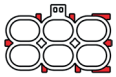
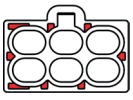
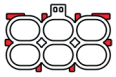
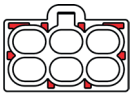
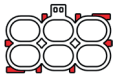
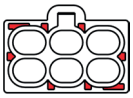
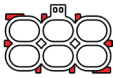
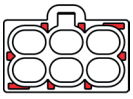
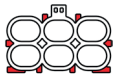
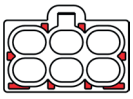
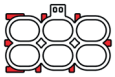
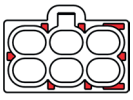
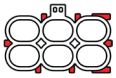
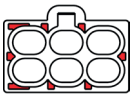
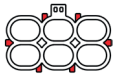
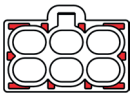
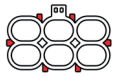
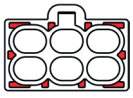
Availability of specific codings upon request. Color of the plastic housing defined in accordance to the listed RAL colors. Minor color differences due to manufacturing possible.

# Coding H-MTD® Quad

| Coding | Jack | Plug | Color / RAL-No. (similar) |
|---|---|---|---|
| A |  |  | Jet black / 9005 |
| B |  |  | Pure white / 9010 |
| C |  |  | Light blue / 5012 |
| D |  |  | Claret violet / 4004 |
| E |  |  | May green / 6017 |
| F |  |  | Nut brown / 8011 |
| G |  |  | Platinum grey / 7036 |
| H |  |  | Light pink / 3015 |
| J |  |  | Beige / 1001 |
| K |  |  | Curry / 1027 |
| L |  |  | Yellow green / 6018 |
| M |  |  | Pastel orange / 2003 |
| O<br>(neutral coding for coding G – M) |  |  | Light green / 6027 |
| Z<br>(neutral coding for coding A – F) |  |  | Water blue / 5021 |

Availability of specific codings upon request. Color of the plastic housing defined in accordance to the listed RAL colors. Minor color differences due to manufacturing possible.

## Coding H-MTD® Six

| Coding | Jack | Plug | Color / RAL-No. (similar) |
|---|---|---|---|
| A |  |  | Jet black / 9005 |
| B |  |  | Pure white / 9010 |
| C |  |  | Light blue / 5012 |
| D |  |  | Claret violet / 4004 |
| E |  |  | May green / 6017 |
| F |  |  | Nut brown / 8011 |
| G |  |  | Platinum grey / 7036 |
| H |  |  | Light pink / 3015 |
| J |  |  | Beige / 1001 |
| K |  |  | Curry / 1027 |
| L |  |  | Yellow green / 6018 |
| M |  |  | Pastel orange / 2003 |
| O<br>(neutral coding for coding G – M) |  |  | Light green / 6027 |
| Z<br>(neutral coding for coding A – F) |  |  | Water blue / 5021 |

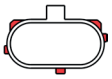
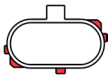
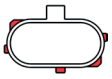
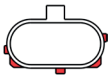
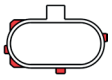
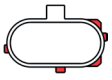
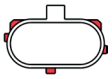
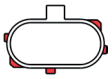
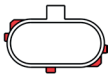
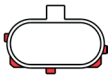
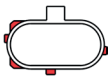
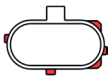
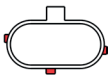
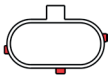
Availability of specific codings upon request. Color of the plastic housing defined in accordance to the listed RAL colors. Minor color differences due to manufacturing possible.

## Coding H-MTD® Single Waterproof

| Coding | Jack | Plug | Color / RAL-No. (similar) |
|---|---|---|---|
| A |  |  | Jet black / 9005 |
| B |  |  | Pure white / 9010 |
| C |  |  | Light blue / 5012 |
| D |  |  | Claret violet / 4004 |
| E |  |  | May green / 6017 |
| F |  |  | Nut brown / 8011 |
| G |  |  | Platinum grey / 7036 |
| H |  |  | Light pink / 3015 |
| J |  |  | Beige / 1001 |
| K |  |  | Curry / 1027 |
| L |  |  | Yellow green / 6018 |
| M |  |  | Pastel orange / 2003 |
| O<br>(neutral coding for coding G – M) |  |  | Light green / 6027 |
| Z<br>(neutral coding for coding A – F) |  |  | Water blue / 5021 |

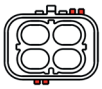
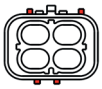
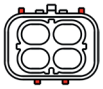
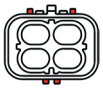
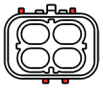
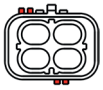
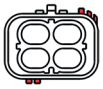
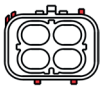
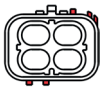
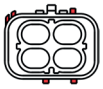
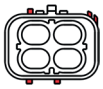
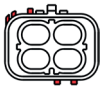
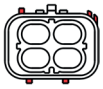
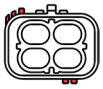
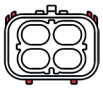
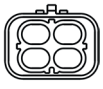
Availability of specific codings upon request. Color of the plastic housing defined in accordance to the listed RAL colors. Minor color differences due to manufacturing possible.

## Coding H-MTD® Double Waterproof

| Coding | Jack | Plug | Color / RAL-No. (similar) |
|---|---|---|---|
| A |  |  | Jet black / 9005 |
| B |  |  | Pure white / 9010 |
| C |  |  | Light blue / 5012 |
| D |  |  | Claret violet / 4004 |
| E |  |  | May green / 6017 |
| F |  |  | Nut brown / 8011 |
| G |  |  | Platinum grey / 7036 |
| H |  |  | Light pink / 3015 |
| J |  |  | Beige / 1001 |
| K |  |  | Curry / 1027 |
| L |  |  | Yellow green / 6018 |
| M |  |  | Pastel orange / 2003 |
| O<br>(neutral coding for coding G – M) |  |  | Light green / 6027 |
| Z<br>(neutral coding for coding A – F) |  |  | Water blue / 5021 |

Availability of specific codings upon request. Color of the plastic housing defined in accordance to the listed RAL colors. Minor color differences due to manufacturing possible.

# Coding H-MTD® Quad Waterproof

| Coding | Jack | Plug | Color / RAL-No. (similar) |
|---|---|---|---|
| A |  |  | Jet black / 9005 |
| B |  |  | Pure white / 9010 |
| C |  |  | Light blue / 5012 |
| D |  |  | Claret violet / 4004 |
| E |  |  | May green / 6017 |
| F |  |  | Nut brown / 8011 |
| G |  |  | Platinum grey / 7036 |
| H |  |  | Light pink / 3015 |
| J |  |  | Beige / 1001 |
| K |  |  | Curry / 1027 |
| L |  |  | Yellow green / 6018 |
| M |  |  | Pastel orange / 2003 |
| N |  |  | Pastel green / 6019 |
| P |  |  | Carmine red / 3002 |
| R |  |  | Signal blue / 5005 |
| Z<br>(neutral coding for coding A – R) |  |  | Water blue / 5021 |

Availability of specific codings upon request. Color of the plastic housing defined in accordance to the listed RAL colors. Minor color differences due to manufacturing possible.

# Competencies & Technologies

Rosenberger's mission is to be a leader when it comes to innovation and technology within its business segments.

An ongoing focus on cost management and process optimization complements our commitment to the increasingly stringent market requirements for delivering products of the highest quality. Effective research & development, the very latest manufacturing technologies, the highest possible levels of efficiency in production processes, and continuous improvement of process automation make up Rosenberger's core competencies.

Using state-of-the-art production, Rosenberger can continue to develop and optimize key manufacturing technologies – turned parts production, stamped & formed technology, injection molding technology.

Manufacturing everything in house ensures a high degree of flexibility which combined with continuous quality controls ensures newly designed products can be produced in the required quantities. With acceptable tolerances now in the range of one hundredth of a millimeter, the production of electronic connectors requires the highest precision.

## Automated Connector Mounting and Cable Assembling

At Rosenberger various machine types are used for enabling precise and extreme deformation of raw materials and fast throughput of large quantities. In addition to extensive stamping, forming and embossing operations, Rosenberger machines are used to join, laser-weld and, if required, laser-mark large quantities of pieces. This takes place directly in the processing area with minimum set-up and assembly times.

The necessary tool construction for the specially equipped stamping and forming assembly machines are designed and produced as far as possible in the company's own tool shop.

With the help of its strip stamping technology Rosenberger produces high quantities with maximum repeatability and short reaction and running times. The implementation of the production process from strip material to high-quality end product is carried out with maximum production speed, cost-efficiency and precision.

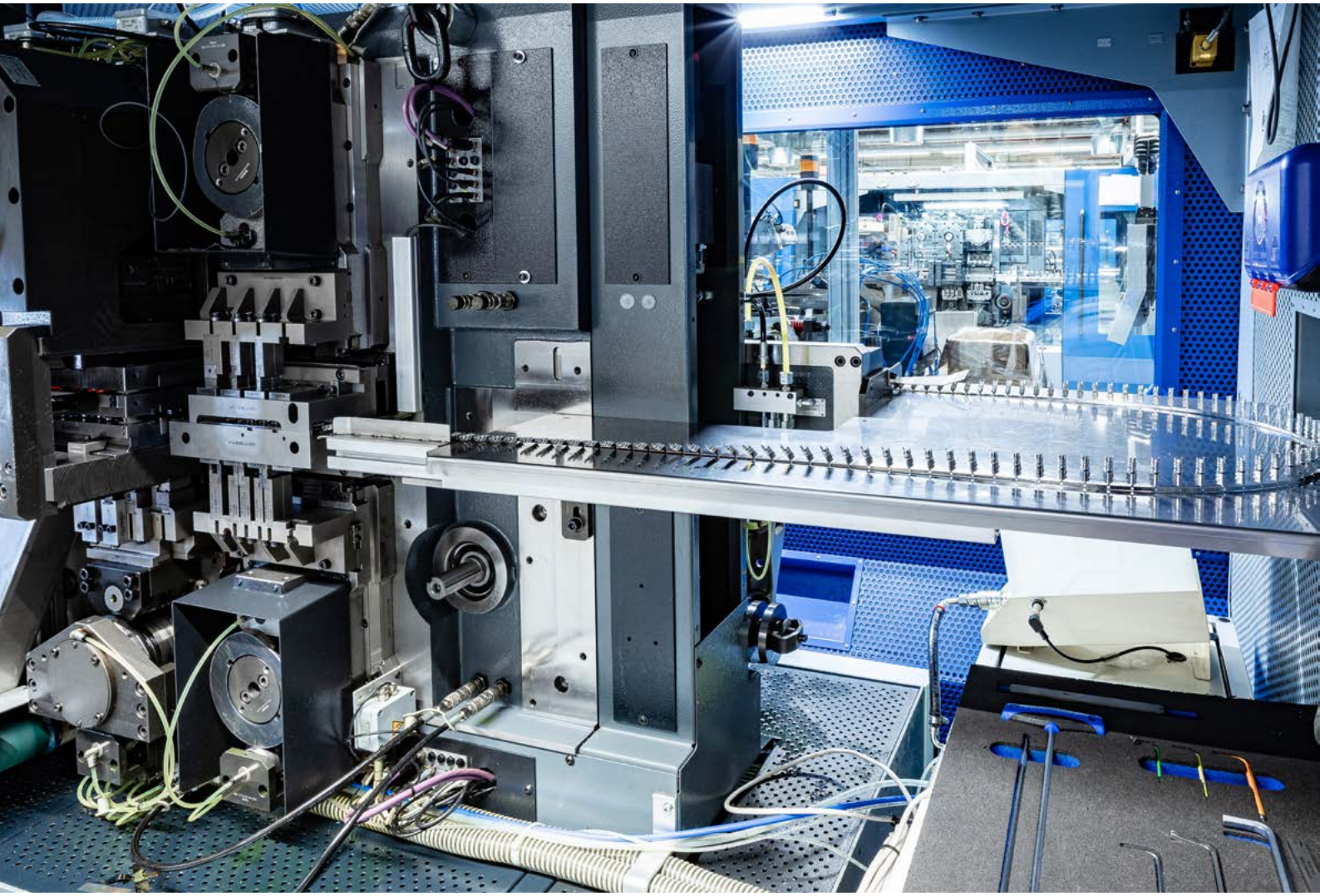
Rosenberger uses various raw materials including pure and partially tinned copper, copper-tin and stainless steel strips.

## Stamping Technologies

The Rosenberger Group meets the increasing requirements with its high-quality stamping technology. Competence and experience guarantees reliable pluggability as well as highly resilient, stamped and formed (SF) connectors; especially under demanding conditions such as those found in the automotive industry. Rosenberger quality is assured by the adoption of fully automated processes with 100 % repeatability. Maximum efficiency is achieved by the involvement of the potential harness makers as early as the design phase of the respective SF connectors.

### Benefits of Stamping & Forming

- Cost optimization
- Reduced use of materials
- Fast production of large quantities
- Guaranteed plug compatibility
- Process-safe manufacturing
- Precision



## Belting & Packing – Tape & Reel

For high volume production, stamped and formed connector parts such as outer contacts/connector bodies, center/inner contacts or support sleeves can be delivered on reels only.

Information about high-volume production and assembly, special tools for cable assembly and ordering procedure of packing units is available on request: automotive@rosenberger.com

Learn more about the stamping technologies at Rosenberger.

**www.rosenberger.com/stamping-technologies**

# Quality & Environment

The quality of Rosenberger products, solutions and services is an essential part of our corporate strategy.

Ensuring the optimum quality of products and services and taking responsibility for our environment are fundamental elements of Rosenberger's corporate philosophy. Our quality philosophy does not only cover the optimization of parts and products, but also the continuous improvement of all company processes: from product development, planning, procurement, production, sales, logistics right through to environmental policy. To summarize, we want to offer maximum benefits for our customers all over the world.

We aim to act in an environmentally conscious manner, use materials economically, protect natural resources, recycle, and ensure energy efficiency.

In recognition of continuously improving processes and applying quality management systems, Rosenberger has won a number of prestigious quality and environmental excellence awards.

## Complete Control with Innovative Technology

Industrial image processing guarantees fully automatic machine inspection. A combination of hardware and software ensures error-free execution of complex production. Digital sensors inside industrial cameras with special optics for image acquisition analyze and monitor all process steps. If products are in need of adjustment they are immediately scanned prior to checking for errors against the respective design data.

## IMDS System

Rosenberger has been registered in the IMDS database (International Material Data System) since 2001.

IMDS reports for automotive customers are provided as a part of the PPAP documentation.

www.mdsystem.com

## Certificates

- IATF 16949
- DIN EN 9100
- ISO 9001
- ISO 14001
- ISO 45001
- ISO 50001
- DaKKs accreditation according to DIN EN ISO 17025

Learn more about Rosenberger certifications:

**www.rosenberger.com/certifications**

## Information Security – TISAX®

Information security is an integral part of our corporate culture. Rosenberger was audited at TISAX® (Trusted Information Security Assessment Exchange).

Learn more about Rosenberger information security:

**www.rosenberger.com/company/information-security**

# Rosenberger Global Network

Rosenberger is one of the world`s leading manufacturers of impedance controlled and optical connectivity solutions. It provides connectivity solutions in high-frequency, high-voltage, and fiber-optic technologies for mobile communication networks, data centers, test & measurement applications, automotive electronics, as well as high-voltage contact systems, medical electronics or aerospace applications.

A global network of R&D, manufacturing and assembly locations provides innovation, optimized cost structure and excellent customer services world-wide.

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# Rosenberger No.



## Website

For more information refer to our website:
www.rosenberger.com/h-mtd

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