

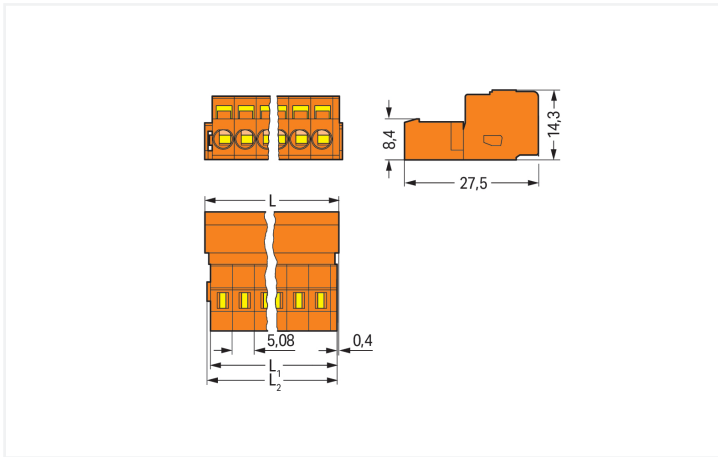
Data Sheet | Item Number: 231-650

1-conductor male connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; orange

<https://www.wago.com/231-650>



Color: ■ orange



Dimensions in mm

$L = (\text{pole no.} - 1) \times \text{pin spacing} + 8.2 \text{ mm}$
 $L_1 = L - 1.7 \text{ mm}$
 $L_2 = L - 1.2 \text{ mm}$

Male connector, 231 Series, CAGE CLAMP®

Our male connector (item number 231-650) is designed for seamless electrical installations. Strip lengths must be between 8 and 9 mm when connecting conductors to this male connector. This product incorporates one conductor terminal and utilizes CAGE CLAMP®. Our proven universal connection known as CAGE CLAMP® is the industry standard for connection technology and electrical interconnections. The dimensions are (104.8 x 14.3 x 27.5) mm (width x height x depth). This male connector is suitable for conductor cross sections ranging from 0.08 mm² to 2.5 mm².

The contact surface is coated with tin.

Notes

Safety Information

The MCS – MULTI CONNECTION SYSTEM includes connectors without breaking capacity in accordance with DIN EN 61984. When used as intended, these connectors must not be connected/disconnected when live or under load. When used as intended, these connectors must not be connected/disconnected when live or under load. The circuit design should ensure header pins, which can be touched, are not live when unmated.

Variants:

Other pole numbers
Gold-plated or partially gold-plated contact surfaces
Other versions (or variants) can be requested from WAGO Sales or configured at <https://configurator.wago.com/>.

Electrical data

| Ratings per IEC/EN 60664-1 | | | | Approvals per UL 1059 | | | |
|---------------------------------|-------|-------|-------|-----------------------|-------|---|-------|
| | III | III | II | Use group | B | C | D |
| Overvoltage category | III | III | II | Rated voltage | 300 V | - | 300 V |
| Pollution degree | 3 | 2 | 2 | Rated current | 15 A | - | 10 A |
| Nominal voltage | 320 V | 320 V | 630 V | | | | |
| Rated impulse withstand voltage | 4 kV | 4 kV | 4 kV | | | | |
| Rated current | 12 A | 12 A | 12 A | | | | |

| Approvals per UL 1977 | | Approvals per CSA | | | |
|-----------------------|-------|-------------------|-------|---|-------|
| | 600 V | Use group | B | C | D |
| Rated voltage | 600 V | Rated voltage | 300 V | - | 300 V |
| Rated current | 15 A | Rated current | 15 A | - | 10 A |

Connection Data

| | | | |
|----------------------------|----|---|--|
| Clamping units | 20 | Connection 1 | |
| Total number of potentials | 20 | Connection technology | CAGE CLAMP® |
| Number of connection types | 1 | Actuation type | Operating tool |
| Number of levels | 1 | Actuation direction 1 | Operation parallel to conductor entry |
| | | Actuation direction 2 | Operation perpendicular to conductor entry |
| | | Solid conductor | 0.08 ... 2.5 mm ² / 28 ... 12 AWG |
| | | Fine-stranded conductor | 0.08 ... 2.5 mm ² / 28 ... 12 AWG |
| | | Fine-stranded conductor; with insulated ferrule | 0.25 ... 1.5 mm ² |
| | | Fine-stranded conductor; with uninsulated ferrule | 0.25 ... 2.5 mm ² |
| | | Strip length | 8 ... 9 mm / 0.31 ... 0.35 inches |
| | | Pole number | 20 |
| | | Conductor entry direction to mating direction | 0° |

Physical data

| | |
|-------------|-------------------------|
| Pin spacing | 5.08 mm / 0.2 inches |
| Width | 104.8 mm / 4.126 inches |
| Height | 14.3 mm / 0.563 inches |
| Depth | 27.5 mm / 1.083 inches |

Mechanical data

| | |
|--------------------------|-----|
| Variable coding | Yes |
| Anti-rotation protection | Yes |

Plug-in connection

| | |
|------------------------------------|---------------------|
| Contact type (pluggable connector) | Male connector/plug |
| Connector (connection type) | for conductor |
| Mismating protection | No |

Material data

| | |
|------------------------------------|--|
| Note (material data) | Information on material specifications can be found here |
| Color | orange |
| Material group | I |
| Insulation material (main housing) | Polyamide (PA66) |
| Flammability class per UL94 | V0 |
| Clamping spring material | Chrome-nickel spring steel (CrNi) |
| Contact material | Electrolytic copper (E _{Cu}) |
| Contact Plating | Tin |
| Fire load | 0.481 MJ |
| Weight | 30.4 g |

Environmental requirements

| | |
|-------------------------|-----------------|
| Limit temperature range | -60 ... +100 °C |
| Processing temperature | -35 ... +60 °C |

Environmental Testing

| | |
|---|---|
| Test specification: Railway applications – Rolling stock – Electronic equipment | DIN EN 50155 (VDE 0115-200):2022-06 |
| Test procedure: Railway applications – Rolling stock equipment – Vibration and shock tests | DIN EN 61373 (VDE 0115-0106):2011-04 |
| Spectrum/Mounting location | Service life test, Category 1, Class A/B |
| Functional test with noise-like oscillations | Test passed according to Section 8 of the standard |
| Frequency | f ₁ = 5 Hz to f ₂ = 150 Hz |
| Acceleration | 0.101g (highest test level used for all axes) |
| Test duration per axis | 10 min. |
| Test directions | X, Y and Z axes |
| Monitoring of contact faults and interruptions | Passed |
| Voltage drop measurement before and after each axis | Passed |
| Simulated service life test through increased levels of noise-like oscillations | Test passed according to Section 9 of the standard |
| Frequency | f ₁ = 5 Hz to f ₂ = 150 Hz |
| Acceleration | 0.572g (highest test level used for all axes) |
| Test duration per axis | 5 h |
| Test directions | X, Y and Z axes |
| Extended testing: Monitoring of contact faults and interruptions | Passed |
| Extended testing: Voltage drop measurement before and after each axis | Passed |
| Shock test | Test passed according to Section 10 of the standard |
| Shock pulse form | Half sine |
| Acceleration | 5g (highest test level used for all axes) |

| Environmental Testing | |
|---|-------------------|
| Shock duration | 30 ms |
| Number of shocks (per axis) | 3 pos. und 3 neg. |
| Test directions | X, Y and Z axes |
| Extended testing: Monitoring of contact faults and interruptions | Passed |
| Extended testing: Voltage drop measurement before and after each axis | Passed |
| Vibration and shock stress for rolling stock equipment | Passed |

| Commercial data | |
|-----------------------|------------------------|
| Product Group | 3 (Multi Conn. System) |
| PU (SPU) | 10 pcs |
| Packaging type | Box |
| Country of origin | DE |
| GTIN | 4044918261180 |
| Customs tariff number | 85366930000 |

| Product Classification | |
|------------------------|----------------------|
| UNSPSC | 39121409 |
| eCl@ss 10.0 | 27-44-03-09 |
| eCl@ss 9.0 | 27-44-03-09 |
| ETIM 9.0 | EC002638 |
| ETIM 10.0 | EC002638 |
| ECCN | NO US CLASSIFICATION |

| Environmental Product Compliance | |
|----------------------------------|-------------------------|
| RoHS Compliance Status | Compliant, No Exemption |

Approvals / Certificates

General approvals



| Approval | Standard | Certificate Name |
|---------------------------------------|-----------|------------------|
| CB DEKRA Certification B.V. | IEC 61984 | NL-113351 |
| CSA DEKRA Certification B.V. | C22.2 | 1466354 |
| KEMA/KEUR DEKRA Certification B.V. | EN 61984 | 71-130478 REV.1 |
| UL UL International Germany GmbH | UL 1977 | E45171 |
| UR Underwriters Laboratories Inc. | UL 1059 | E45172 |

Declarations of conformity and manufacturer's declarations



| Approval | Standard | Certificate Name |
|-------------------------------|----------|------------------|
| Railway WAGO GmbH & Co. KG | - | Railway Ready |

Approvals for marine applications



| Approval | Standard | Certificate Name |
|---|-----------|-------------------|
| ABS American Bureau of Ship- ping | - | 24-0095975-PDA |
| DNV DNV GL SE | - | TAE000016Z |
| LR Lloyds Register | IEC 61984 | 96/20035 (E5) |
| PRS Polski Rejestr Statków | - | TE/1095/880590/23 |

Downloads

Environmental Product Compliance

| Compliance Search |
|--|
| Environmental Product Compliance 231-650 ↓ |

Documentation

| Additional Information |
|---|
| Technical Section 03.04.2019 pdf 2027.26 KB ↓ |

CAD/CAE-Data

| CAD data |
|--|
| 2D/3D Models 231-650 ↓ |

| CAE data |
|---|
| EPLAN Data Portal 231-650 ↓ |
| ZUKEN Portal 231-650 ↓ |

1 Compatible Products

1.1 System counterpart

1.1.1 Female connector/socket



[Item No.: 232-320/026-000](#)
1-conductor female connector, angled; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; 2,50 mm²; orange



[Item No.: 232-420/026-000](#)
1-conductor female connector, angled; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; 2,50 mm²; orange



[Item No.: 231-320/027-000](#)
1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; clamping collar; orange



[Item No.: 231-320/031-000](#)
1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; clamping collar; orange



[Item No.: 231-320/037-000](#)
1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; Lateral locking levers; orange



[Item No.: 231-320/026-000](#)
1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; orange



[Item No.: 231-320/008-000](#)
1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; Snap-in mounting feet; orange



[Item No.: 231-320/102-000](#)
1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; with integrated end plate; orange

1.1.1 Female connector/socket



Item No.: 2231-320/026-000

1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; 2,50 mm²; orange



Item No.: 2231-320/031-000

1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; clamping collar; 2,50 mm²; orange



Item No.: 2231-320/037-000

1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; Lateral locking levers; 2,50 mm²; orange



Item No.: 2231-320/008-000

1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; Snap-in mounting feet; 2,50 mm²; orange



Item No.: 2231-320/102-000

1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 20-pole; with integrated end plate; 2,50 mm²; orange



Item No.: 232-280

THT female header; angled; Pin spacing 5.08 mm; 20-pole; 0.6 x 1.0 mm solder pin; orange

Item No.: 232-280/031-000

THT female header; angled; Pin spacing 5.08 mm; 20-pole; clamping collar; 0.6 x 1.0 mm solder pin; orange

Item No.: 232-280/039-000

THT female header; angled; Pin spacing 5.08 mm; 20-pole; Locking lever; 0.6 x 1.0 mm solder pin; orange



Item No.: 232-280/047-000

THT female header; angled; Pin spacing 5.08 mm; 20-pole; Spacer flange; 0.6 x 1.0 mm solder pin; orange



Item No.: 232-180

THT female header; straight; Pin spacing 5.08 mm; 20-pole; 0.6 x 1.0 mm solder pin; orange

Item No.: 232-180/031-000

THT female header; straight; Pin spacing 5.08 mm; 20-pole; clamping collar; 0.6 x 1.0 mm solder pin; orange

Item No.: 232-180/039-000

THT female header; straight; Pin spacing 5.08 mm; 20-pole; Locking lever; 0.6 x 1.0 mm solder pin; orange



Item No.: 232-180/047-000

THT female header; straight; Pin spacing 5.08 mm; 20-pole; Spacer flange; 0.6 x 1.0 mm solder pin; orange

1.2 Optional Accessories

1.2.1 Coding

1.2.1.1 Coding



Item No.: 231-129

Coding key; snap-on type; light gray

1.2.2 Cover

1.2.2.1 Cover



Item No.: 231-669

Lockout caps; for covering unused clamping units; orange

1.2.3 Ferrule

1.2.3.1 Ferrule



Item No.: 216-301

Ferrule; Sleeve for 0.25 mm² / AWG 24; insulated; electro-tin plated; yellow



Item No.: 216-302

Ferrule; Sleeve for 0.34 mm² / 22 AWG; insulated; electro-tin plated; light turquoise



Item No.: 216-201

Ferrule; Sleeve for 0.5 mm² / 20 AWG; insulated; electro-tin plated; electrolytic copper; acc. to DIN 46228, Part 4/09.90; white



Item No.: 216-241




Ferrule; Sleeve for 0.5 mm² / 20 AWG; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; white

1.2.3.1 Ferrule

| | | | |
|---|---|---|---|
|  Item No.: 216-141 Ferrule; Sleeve for 0.5 mm ² / 20 AWG; un-insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 1/08.92 |  Item No.: 216-101 Ferrule; Sleeve for 0.5 mm ² / AWG 22; un-insulated; electro-tin plated; silver-colored |  Item No.: 216-242 Ferrule; Sleeve for 0.75 mm ² / 18 AWG; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; gray |  Item No.: 216-262 Ferrule; Sleeve for 0.75 mm ² / 18 AWG; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; gray |
|  Item No.: 216-202 Ferrule; Sleeve for 0.75 mm ² / 18 AWG; insulated; electro-tin plated; gray |  Item No.: 216-142 Ferrule; Sleeve for 0.75 mm ² / 18 AWG; un-insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 1/08.92 |  Item No.: 216-102 Ferrule; Sleeve for 0.75 mm ² / AWG 20; un-insulated; electro-tin plated; silver-colored |  Item No.: 216-243 Ferrule; Sleeve for 1 mm ² / AWG 18; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; red |
|  Item No.: 216-263 Ferrule; Sleeve for 1 mm ² / AWG 18; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; red |  Item No.: 216-203 Ferrule; Sleeve for 1 mm ² / AWG 18; insulated; electro-tin plated; red |  Item No.: 216-103 Ferrule; Sleeve for 1 mm ² / AWG 18; un-insulated; electro-tin plated |  Item No.: 216-143 Ferrule; Sleeve for 1 mm ² / AWG 18; un-insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 1/08.92 |
|  Item No.: 216-204 Ferrule; Sleeve for 1.5 mm ² / AWG 16; insulated; electro-tin plated; black |  Item No.: 216-244 Ferrule; Sleeve for 1.5 mm ² / AWG 16; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; black |  Item No.: 216-264 Ferrule; Sleeve for 1.5 mm ² / AWG 16; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; black |  Item No.: 216-284 Ferrule; Sleeve for 1.5 mm ² / AWG 16; insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 4/09.90; black |
|  Item No.: 216-144 Ferrule; Sleeve for 1.5 mm ² / AWG 16; un-insulated; electro-tin plated; electrolytic copper; gastight crimped; acc. to DIN 46228, Part 1/08.92; silver-colored |  Item No.: 216-104 Ferrule; Sleeve for 1.5 mm ² / AWG 16; un-insulated; electro-tin plated; silver-colored |  Item No.: 216-106 Ferrule; Sleeve for 2.5 mm ² / AWG 14; un-insulated; electro-tin plated; silver-colored | |






1.2.4 Insulation stop

1.2.4.1 Insulation stop

| | | |
|---|---|--|
|  Item No.: 231-670 Insulation stop; 0.08-0.2 mm ² / 0.2 mm ² "s"; white |  Item No.: 231-671 Insulation stop; 0.25 - 0.5 mm ² ; light gray |  Item No.: 231-672 Insulation stop; 0.75 - 1 mm ² ; dark gray |
|---|---|--|

1.2.5 Jumper

1.2.5.1 Jumper

| | | | |
|---|--|---|--|
|  Item No.: 231-910 Jumper; for conductor entry; 10-way; insulated; gray |  Item No.: 231-902 Jumper; for conductor entry; 2-way; insulated; gray |  Item No.: 231-903 Jumper; for conductor entry; 3-way; insulated; gray |  Item No.: 231-905 Jumper; for conductor entry; 5-way; insulated; gray |
|  Item No.: 231-907 Jumper; for conductor entry; 7-way; insulated; gray | | | |

1.2.6 Marking

1.2.6.1 Marking strip



Item No.: 210-331/508-103

Marking strips; as a DIN A4 sheet; MARKED; 1-12 (200x); Height of marker strip: 2.3 mm/0.091 in; Strip length 182 mm; Horizontal marking; Self-adhesive; white



Item No.: 210-332/508-202

Marking strips; as a DIN A4 sheet; MARKED; 1-16 (160x); Height of marker strip: 3 mm; Strip length 182 mm; Horizontal marking; Self-adhesive; white



Item No.: 210-332/508-205

Marking strips; as a DIN A4 sheet; MARKED; 1-32 (80x); Height of marker strip: 3 mm; Strip length 182 mm; Horizontal marking; Self-adhesive; white



Item No.: 210-331/508-104

Marking strips; as a DIN A4 sheet; MARKED; 13-24 (200x); Height of marker strip: 2.3 mm/0.091 in; Strip length 182 mm; Horizontal marking; Self-adhesive; white



Item No.: 210-332/508-204

Marking strips; as a DIN A4 sheet; MARKED; 17-32 (160x); Height of marker strip: 3 mm; Strip length 182 mm; Horizontal marking; Self-adhesive; white



Item No.: 210-332/508-206

Marking strips; as a DIN A4 sheet; MARKED; 33-48 (160x); Height of marker strip: 3 mm; Strip length 182 mm; Horizontal marking; Self-adhesive; white

1.2.7 Tool

1.2.7.1 Operating tool



Item No.: 210-720

Operating tool; Blade: 3.5 x 0.5 mm; with a partially insulated shaft; multicoloured



Item No.: 210-657

Operating tool; Blade: 3.5 x 0.5 mm; with a partially insulated shaft; short; multicoloured



Item No.: 209-132

Operating tool; for connecting comb-style jumper bar; made of insulating material; 2-way; natural



Item No.: 280-440

Operating tool; made of insulating material; 10-way; white



Item No.: 209-130

Operating tool; made of insulating material; 1-way; for 264 Series (1-1/2-way), 280, 281 Series (up to 3-way); natural



Item No.: 231-291

Operating tool; made of insulating material; 1-way; loose; red



Item No.: 231-131

Operating tool; made of insulating material; 1-way; loose; white



Item No.: 280-432

Operating tool; made of insulating material; 2-way; white



Item No.: 280-433

Operating tool; made of insulating material; 3-way; white



Item No.: 280-434

Operating tool; made of insulating material; 4-way; white



Item No.: 280-435

Operating tool; made of insulating material; 5-way; gray



Item No.: 280-436

Operating tool; made of insulating material; 6-way; white



Item No.: 280-437

Operating tool; made of insulating material; 7-way; white

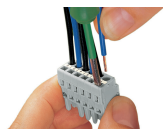


Item No.: 280-438

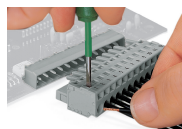
Operating tool; made of insulating material; 8-way; white

Installation Notes

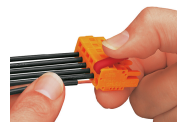
Conductor termination



Inserting a conductor via 3.5 mm screwdriver – CAGE CLAMP® actuation parallel to conductor entry.



Inserting a conductor via 3.5 mm screwdriver – CAGE CLAMP® actuation perpendicular to conductor entry.

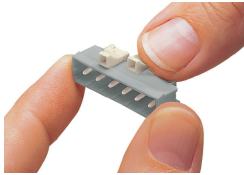


Inserting a conductor into CAGE CLAMP® unit via operating tool (231-291).



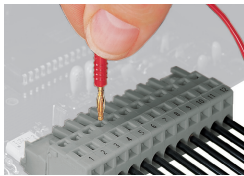
Inserting a conductor via operating tool.

Coding



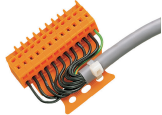
Coding a male header – fitting coding key (s).

Testing



Testing – female connector with CAGE CLAMP®
Integrated test ports for testing perpendicular to conductor entry via 2 or 2.3 mm Ø test plug

Installation



Male connector with strain relief plate



Strain relief housing shown with a male connector equipped with CAGE CLAMP®

Marking



Labeling via direct marking or self-adhesive strips.