

## Data Sheet | Item Number: 231-646/109-000

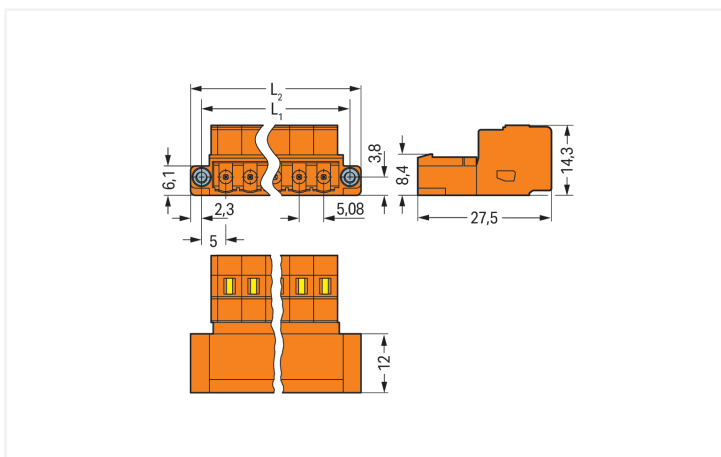
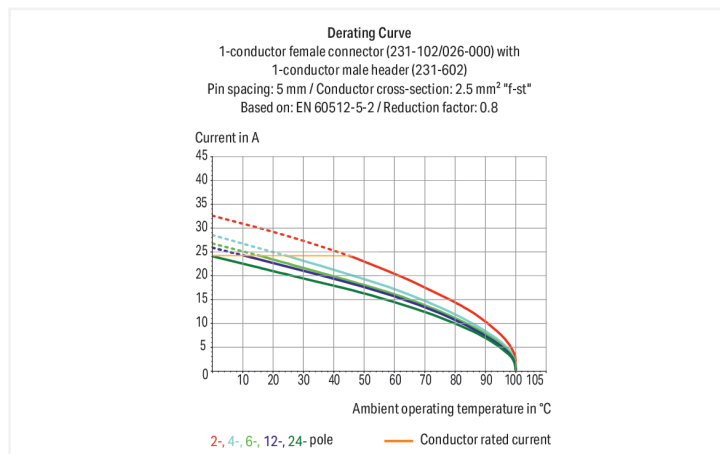
1-conductor male connector; CAGE CLAMP®; 2.5 mm<sup>2</sup>; Pin spacing 5.08 mm; 16-pole;  
Threaded flange; orange

<https://www.wago.com/231-646/109-000>



Color: ■ orange

Similar to illustration



Dimensions in mm

L1 = (pole no. x pin spacing) + 5.4 mm  
L2 = (pole no. x pin spacing) + 10 mm

Male connector, 231 Series, 0° conductor exit to connection direction

Easy electrical installations are guaranteed with this male connector (item number 231-646/109-000). Ensure that the strip lengths are between 8 and 9 mm when connecting conductors to this male connector. Featuring one conductor terminal along with CAGE CLAMP®, this product delivers reliable performance. Our trusted universal connection known as CAGE CLAMP® is the industry standard when it comes to connection technology and electrical interconnections. The dimensions are (91.18 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 mm<sup>2</sup> to 2.5 mm<sup>2</sup>. 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		
Overvoltage category	III	III	II
Pollution degree	3	2	2
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 1059		
Use group	B	C	D
Rated voltage	300 V	-	300 V
Rated current	15 A	-	10 A

Approvals per	UL 1977
Rated voltage	600 V
Rated current	15 A

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

**Connection Data**

Clamping units	16
Total number of potentials	16
Number of connection types	1
Number of levels	1

Connection 1	
Connection technology	CAGE CLAMP®
Actuation type	Operating tool
Actuation direction 1	Operation parallel to conductor entry
Actuation direction 2	Operation perpendicular to conductor entry
Solid conductor	0.08 ... 2.5 mm <sup>2</sup> / 28 ... 12 AWG
Fine-stranded conductor	0.08 ... 2.5 mm <sup>2</sup> / 28 ... 12 AWG
Fine-stranded conductor; with insulated ferrule	0.25 ... 1.5 mm <sup>2</sup>
Fine-stranded conductor; with uninsulated ferrule	0.25 ... 2.5 mm <sup>2</sup>
Strip length	8 ... 9 mm / 0.31 ... 0.35 inches
Pole number	16
Conductor entry direction to mating direction	0 °

**Physical data**

Pin spacing	5.08 mm / 0.2 inches
Width	91.18 mm / 3.59 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
Locking of plug-in connection	Threaded flange

### Material data

Note (material data)	<a href="#">Information on material specifications can be found here</a>
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 <sub>Cu</sub> )
Contact Plating	Tin
Fire load	0.37 MJ
Weight	25.1 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 <sub>1</sub> = 5 Hz to f <sub>2</sub> = 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 <sub>1</sub> = 5 Hz to f <sub>2</sub> = 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	4045454029265
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,With Exemption
RoHS Exemption	6(c)
SCIP notification number (Austria)	a794598d-a899-406e-a673-d57486892928
SCIP notification number (Belgium)	8e0f4a75-4927-4357-bd33-6d52ee743d26
SCIP notification number (Bulgaria)	f6857137-9f01-4c29-ab75-b688a4ee6ba3
SCIP notification number (Czech Republic)	8edbe503-b52d-45a0-9fe5-2a092913bae1
SCIP notification number (Denmark)	cc144310-43fc-4169-8bac-08701b1db1a4
SCIP notification number (Finland)	985198fd-3e29-41c3-801c-0b02a58c6819
SCIP notification number (France)	494c2514-820e-4576-a6c4-ddb0be887440
SCIP notification number (Germany)	1981a069-1ac0-4ee1-92a7-8e2ecb854eb7
SCIP notification number (Hungary)	2571ad26-ba4d-42f5-8dd6-2e518f1708d9
SCIP notification number (Italy)	274e0ce6-2cf5-4cc0-b09f-672000fff685
SCIP notification number (Netherlands)	af9ba163-515e-4f95-862c-1ab448484321
SCIP notification number (Poland)	fd9e0efb-9771-431f-9e96-cbb4604bcaa2
SCIP notification number (Romania)	db0f1d80-c670-4344-a9ae-20ca514703a7
SCIP notification number (Sweden)	5965e1cf-fd1a-43bc-85fd-fa169d426ea8

**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
BV Bureau Veritas S.A.	IEC 60998	11915/E0 BV

**Downloads**

**Environmental Product Compliance**

**Compliance Search**

Environmental Product Compliance 231-646/109-000	<a href="#">↓</a>
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**Documentation**

**Additional Information**

Technical Section	03.04.2019	pdf 2027.26 KB	<a href="#">↓</a>
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**CAD/CAE-Data**

**CAD data**

2D/3D Models 231-646/109-000	<a href="#">↓</a>
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**CAE data**

EPLAN Data Portal 231-646/109-000	<a href="#">↓</a>
ZUKEN Portal 231-646/109-000	<a href="#">↓</a>

## 1 Compatible Products

### 1.1 System counterpart

#### 1.1.1 Female connector/socket



**Item No.: 231-316/107-000**

1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 16-pole; Screw flange; orange

**Item No.: 2231-316/107-000**

1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 16-pole; Screw flange; 2,50 mm²; orange

**Item No.: 231-2316/107-000**

2-conductor female connector; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5.08 mm; 16-pole; Screw flange; 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.: 216-101**

Ferrule; Sleeve for 0.5 mm² / AWG 22; un-insulated; electro-tin plated; silver-colored



**Item No.: 216-202**

Ferrule; Sleeve for 0.75 mm² / 18 AWG; insulated; electro-tin plated; gray



**Item No.: 216-102**

Ferrule; Sleeve for 0.75 mm² / 18 AWG; un-insulated; electro-tin plated; silver-colored



**Item No.: 216-203**

Ferrule; Sleeve for 1 mm² / AWG 18; insulated; electro-tin plated; red



**Item No.: 216-103**

Ferrule; Sleeve for 1 mm² / AWG 18; un-insulated; electro-tin plated



**Item No.: 216-204**

Ferrule; Sleeve for 1.5 mm² / AWG 16; insulated; electro-tin plated; black



**Item No.: 216-104**

Ferrule; Sleeve for 1.5 mm² / AWG 16; 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<sup>2</sup> / 0.2 mm<sup>2</sup> "s"; white



**Item No.: 231-671**

Insulation stop; 0.25 - 0.5 mm<sup>2</sup>; light gray



**Item No.: 231-672**

Insulation stop; 0.75 - 1 mm<sup>2</sup>; 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 Strain relief

### 1.2.7.1 Strain relief housing



**Item No.: 232-646**

Strain relief housing; for female and male connectors; 2 parts; Pin spacing 5.08 mm; 16-pole; orange

**1.2.8 Tool**

**1.2.8.1 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; multi-coloured

**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-/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**

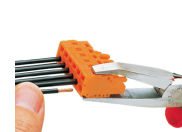
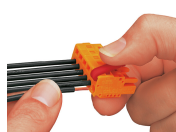
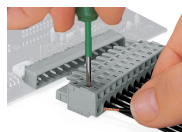
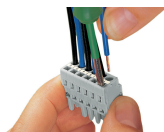
Operating tool; made of insulating material; 7-way; white

**Item No.: 280-438**

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

**Installation Notes**

**Conductor termination**



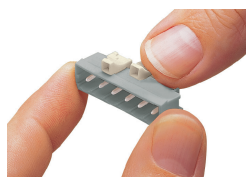
Inserting a conductor via 3.5 mm screwdriver – CAGE CLAMP® actuation parallel to conductor entry.

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).

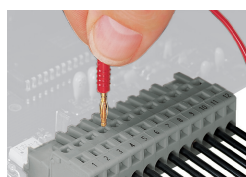
Inserting a conductor via operating tool.

**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

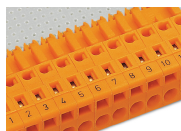
## Installation



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.