

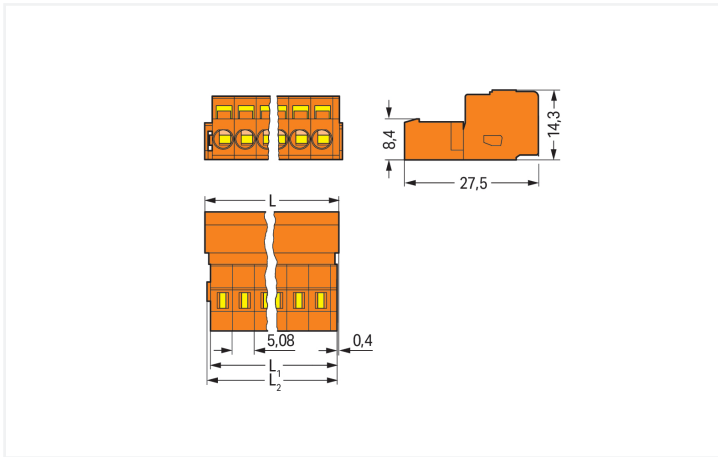
Data Sheet | Item Number: 231-650

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	0.428 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.: 216-101
 Ferrule; Sleeve for 0.5 mm² / AWG 22; un-insulated; electro-tin plated; silver-colored

1.2.3.1 Ferrule



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 / AWG 20; uninsulated; 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; uninsulated; 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; uninsulated; 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 mm² / 0.2 mm² "s"; white

Item No.: 231-671
 Insulation stop; 0.25 - 0.5 mm²; light gray

Item No.: 231-672
 Insulation stop; 0.75 - 1 mm²; 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-/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

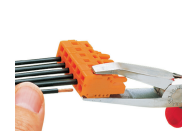
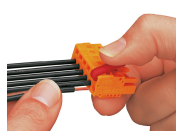
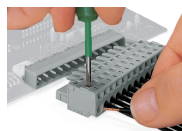
Operating tool; made of insulating material; 7-way; white

Item No.: 280-438

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

Installation Notes

Conductor termination



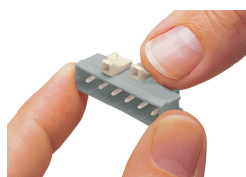
Inserting a conductor via 3.5 mm screwdriver – CAGE CLAMP® actuation parallel to conductor entry.

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).

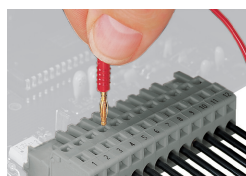
Inserting a conductor via operating tool.

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

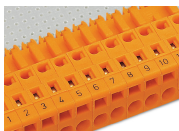
Installation



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.