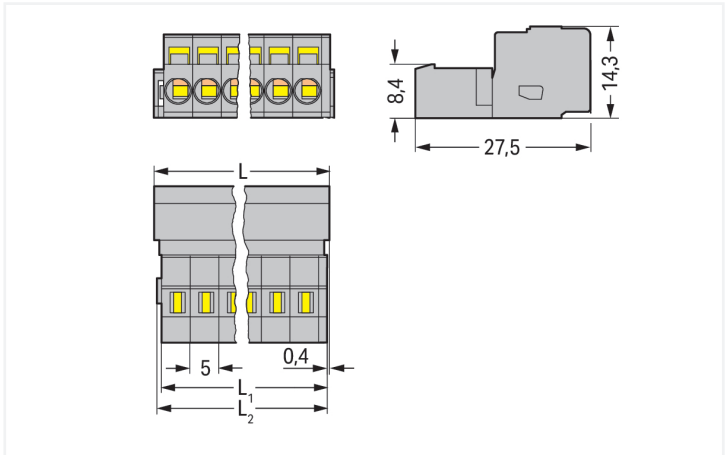
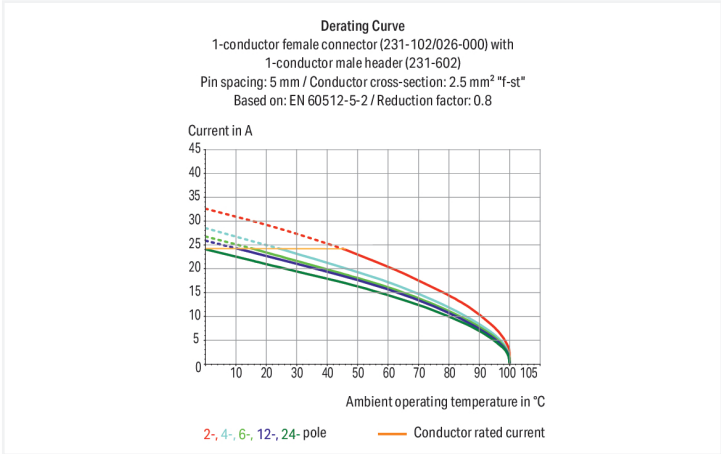




Color: ■ gray



Dimensions in mm
 $L = (\text{pole no.} - 1) \times \text{pin spacing} + 8.2 \text{ mm}$
 $L1 = L - 1.7 \text{ mm}$
 $L2 = L - 1.2 \text{ mm}$



Stiftleiste Serie 231 mit CAGE CLAMP®

Die Stiftleiste mit der Artikelnummer 231-606 bietet eine ordentliche Elektroinstallation. Mit unseren Leiterplatten-Steckverbindern erhalten Sie ein universelles Steckverbinder-system, das vielseitig verwendet werden kann: als Leiterplatten-Steckverbinder, als Durchführungssteckverbinder, als fliegende Steckverbindung für verschiedene Montagearten oder als Steckverbinder auf Reihenklemmen. Diese Stiftleiste benötigt für den Leiteranschluss eine Abisolierlänge zwischen 8 und 9 mm. Dieses Produkt ist mit der CAGE CLAMP®-Technologie ausgerüstet. Der zuverlässige und wartungsfreie CAGE CLAMP® Universalanschluss bietet die Möglichkeit, alle Arten von Leitern mit einer Käfigzugfeder anzuschließen, ohne, dass eine Vorbehandlung der Leiter erforderlich ist. Das Aufcrimpen von Aderendhülsen kann somit entfallen. In Breite x Höhe x Tiefe betragen die Abmessungen (33,2 x 14,3 x 27,5) mm. In Abhängigkeit von der Leiterart ist diese Stiftleiste gemacht für Leiterquerschnitte von 0,08 mm² bis 2,5 mm². Die Oberfläche der Kontakte besteht aus Zinn. Diese Stiftleiste/Stecker wird durch ein Betätigungswerkzeug betätigt. Das MCS – "Multi Connection System" von WAGO ist ein vielfältiges Steckverbinder-system für Ihre durchgängige Systemverdrahtung. Es ermöglicht Ihnen eine vereinfachte Verdrahtung in der Kabelvorkonfektionierung und auf Geräten durch zwei Betätigungsrichtungen für die CAGE CLAMP®-Varianten.

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			
Overvoltage category	III	III	II	Use group	B	C	D
Pollution degree	3	2	2	Rated voltage	300 V	-	300 V
Nominal voltage	320 V	320 V	630 V	Rated current	15 A	-	10 A
Rated surge voltage	4 kV	4 kV	4 kV				
Rated current	12 A	12 A	12 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	6	Connection 1	
Total number of potentials	6	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 mm² / 28 ... 12 AWG
		Fine-stranded conductor	0.08 ... 2.5 mm² / 28 ... 12 AWG
		Fine-stranded conductor; with insulated ferrule	0.25 ... 1.5 mm²
		Fine-stranded conductor; with uninsulated ferrule	0.25 ... 2.5 mm²
		Strip length	8 ... 9 mm / 0.31 ... 0.35 inches
		Pole number	6
		Conductor entry direction to mating direction	0°

Physical data

Pin spacing	5 mm / 0.197 inches
Width	33.2 mm / 1.307 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	gray	
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	0.165 MJ	
Weight	9.2 g	

Environmental requirements		
Limit temperature range	-60 ... +100 °C	Environmental Testing
Processing temperature	-35 ... +60 °C	
		Test specification: DIN EN 50155 (VDE 0115-200):2022-06 Railway applications – Rolling stock – Electronic equipment
		Test procedure: DIN EN 61373 (VDE 0115-0106):2011-04 Railway applications – Rolling stock equipment – Vibration and shock tests
		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)
		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)	50 pcs	
Packaging type	Box	
Country of origin	DE	
GTIN	4044918257374	
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 8.0	EC002638	
ECCN	NO US CLASSIFICATION	

Environmental Product Compliance		
RoHS Compliance Status	Compliant, No Exemption	

Approvals / Certificates

General approvals			Declarations of conformity and manufacturer's declarations		
					
Approval	Standard	Certificate Name	Approval	Standard	Certificate Name
CB DEKRA Certification B.V.	IEC 61984	NL-113351	Railway WAGO GmbH & Co. KG	-	Railway Ready
CSA DEKRA Certification B.V.	C22.2	LR 18677-25			
KEMA/KEUR DEKRA Certification B.V.	EN 61984	71-130478 REV.1			
UL Underwriters Laboratories Inc.	UL 1059	UL-US- L45172-6187117-81111991-1			
UR Underwriters Laboratories Inc.	UL 1977	E45171			

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)



Downloads

Environmental Product Compliance

Compliance Search

Environmental Product Compliance 231-606

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Documentation

Additional Information

Technical Section

03.04.2019

pdf

2027.26 KB

↓

CAD/CAE-Data

CAD data

2D/3D Models 231-606

↓

CAE data

EPLAN Data Portal 231-606

↓

ZUKEN Portal 231-606

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1 Compatible Products

1.1 System counterpart

1.1.1 Female connector/socket

 Item No.: 232-106/026-000 1-conductor female connector, angled; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; 2,50 mm²; gray	 Item No.: 232-206/026-000 1-conductor female connector, angled; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; 2,50 mm²; gray	 Item No.: 731-506/031-000 1-conductor female connector, angled; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; clamping collar; DIN-35 rail/ panel mounting; 2,50 mm²; gray	 Item No.: 731-506/008-000 1-conductor female connector, angled; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Snap-in mounting feet; 2,50 mm²; gray
 Item No.: 231-106/027-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; clamping collar; gray	 Item No.: 231-106/031-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; clamping collar; gray	 Item No.: 231-106/026-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; gray	 Item No.: 231-106/037-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Lateral locking levers; gray
 Item No.: 231-106/125-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Snap-in flange; gray	 Item No.: 231-106/008-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Snap-in mounting feet; gray	 Item No.: 231-106/026-000/034-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Strain relief plate; gray	 Item No.: 231-106/102-000 1-conductor female connector; CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; with integrated end plate; gray
 Item No.: 2231-1106/327-000/334-000 1-conductor female connector; gray	 Item No.: 2231-1106/327-000 1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; 2,50 mm²; gray	 Item No.: 2231-1106/328-000 1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Centered locking levers; 2,50 mm²; gray	 Item No.: 2231-1106/328-000/334-000 1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Centered locking levers; Strain relief plate; gray
 Item No.: 2231-1106/327-047 1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; direct marking; 2,50 mm²; gray	 Item No.: 2231-1106/327-9037 1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; direct marking; 2,50 mm²; gray	 Item No.: 2231-1106/038-000 1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Lateral locking levers; 2,50 mm²; gray	 Item No.: 2231-1106/038-000/334-000 1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Lateral locking levers; Strain relief plate; gray



1.1.1 Female connector/socket



Item No.: 2231-1107/038-000
1-conductor female connector; lever; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 7-pole; Lateral locking levers; 2,50 mm²; gray



Item No.: 2231-106/026-000
1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; 2,50 mm²; gray



Item No.: 2231-106/031-000
1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; clamping collar; 2,50 mm²; gray



Item No.: 2231-106/037-000
1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Lateral locking levers; 2,50 mm²; gray



Item No.: 2231-106/008-000
1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Snap-in mounting feet; 2,50 mm²; gray



Item No.: 2231-106/102-000
1-conductor female connector; push-button; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; with integrated end plate; 2,50 mm²; gray



Item No.: 231-2106/037-000
2-conductor female connector; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; Lateral locking levers; gray



Item No.: 231-2106/026-000
2-conductor female connector; Push-in CAGE CLAMP®; 2.5 mm²; Pin spacing 5 mm; 6-pole; with integrated end plate; gray



Item No.: 232-236/005-000/039-000
Female connector for rail-mount terminal blocks; 0.6 x 1 mm pins; angled; Locking lever; Pin spacing 5 mm; 6-pole; gray



Item No.: 232-236/005-000
Female connector for rail-mount terminal blocks; 0.6 x 1 mm pins; angled; Pin spacing 5 mm; 6-pole; gray



Item No.: 232-136/005-000/039-000
Female connector for rail-mount terminal blocks; 0.6 x 1 mm pins; straight; Locking lever; Pin spacing 5 mm; 6-pole; gray



Item No.: 232-136/005-000
Female connector for rail-mount terminal blocks; 0.6 x 1 mm pins; straight; Pin spacing 5 mm; 6-pole; gray



Item No.: 232-236
THT female header; angled; Pin spacing 5 mm; 6-pole; 0.6 x 1.0 mm solder pin; gray



Item No.: 232-236/031-000
THT female header; angled; Pin spacing 5 mm; 6-pole; clamping collar; 0.6 x 1.0 mm solder pin; gray



Item No.: 232-236/039-000
THT female header; angled; Pin spacing 5 mm; 6-pole; Locking lever; 0.6 x 1.0 mm solder pin; gray



Item No.: 232-236/047-000
THT female header; angled; Pin spacing 5 mm; 6-pole; Spacer flange; 0.6 x 1.0 mm solder pin; gray



Item No.: 232-136
THT female header; straight; Pin spacing 5 mm; 6-pole; 0.6 x 1.0 mm solder pin; gray



Item No.: 232-136/031-000
THT female header; straight; Pin spacing 5 mm; 6-pole; clamping collar; 0.6 x 1.0 mm solder pin; gray



Item No.: 232-136/039-000
THT female header; straight; Pin spacing 5 mm; 6-pole; Locking lever; 0.6 x 1.0 mm solder pin; gray



Item No.: 232-136/047-000
THT female header; straight; Pin spacing 5 mm; 6-pole; Spacer flange; 0.6 x 1.0 mm solder pin; gray

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.: 231-668
Lockout caps; for covering unused clamping units; gray



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
 Item No.: 216-141 Ferrule; Sleeve for 0.5 mm² / 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 mm² / AWG 22; un-insulated; electro-tin plated; silver-colored	 Item No.: 216-242 Ferrule; Sleeve for 0.75 mm² / 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 mm² / 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 mm² / 18 AWG; insulated; electro-tin plated; gray	 Item No.: 216-142 Ferrule; Sleeve for 0.75 mm² / 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 mm² / AWG 20; un-insulated; electro-tin plated; silver-colored	 Item No.: 216-243 Ferrule; Sleeve for 1 mm² / 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 mm² / 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 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.: 216-143 Ferrule; Sleeve for 1 mm² / 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 mm² / AWG 16; insulated; electro-tin plated; black	 Item No.: 216-244 Ferrule; Sleeve for 1.5 mm² / 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 mm² / 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 mm² / 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 mm² / 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 mm² / AWG 16; un-insulated; electro-tin plated; silver-colored	 Item No.: 216-106 Ferrule; Sleeve for 2.5 mm² / 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 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
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1.2.5 Jumper

1.2.5.1 Jumper



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

1.2.6 Marking

1.2.6.1 Marking strip



Item No.: 210-331/500-103
Marking strips; as a DIN A4 sheet; MARKED; 1-12 (300x); Height of marker strip: 2.3 mm/0.091 in; Strip length 182 mm; Horizontal marking; Self-adhesive; white



Item No.: 210-332/500-202
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.: 210-332/500-205
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.: 210-331/500-104
Marking strips; as a DIN A4 sheet; MARKED; 13-24 (300x); Height of marker strip: 2.3 mm/0.091 in; Strip length 182 mm; Horizontal marking; Self-adhesive; white



Item No.: 210-332/500-204
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.: 210-332/500-206
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.: 232-606
Strain relief housing; for female and male connectors; 2 parts; Pin spacing 5 mm; 6-pole; gray

1.2.8 Tool

1.2.8.1 Operating tool



Item No.: 231-231
Combination operating tool; red



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.: 210-250
Operating tool; for MCS MINI and MIDI with CAGE CLAMP® connection; red



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

1.2.8.1 Operating tool



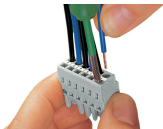
Item No.: 280-436
Operating tool; made of insulating material; 6-way; white



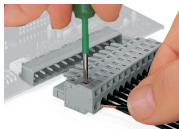
Item No.: 231-159
Operating tool; natural

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.

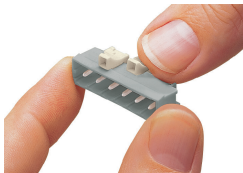


Inserting a conductor into CAGE CLAMP® unit via operating tool (231-291).



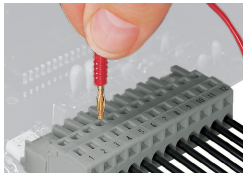
Inserting a conductor via operating tool.

Coding



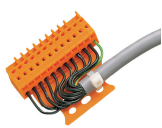
Coding a male header – fitting coding key(s).

Testing

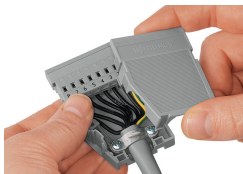


Testing – female connector with CAGE CLAMP®
Integrated test ports for testing perpendicular to conductor entry via 2 or 2.3 mm Ø test plug

Installation

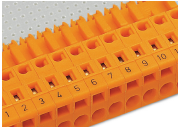


Male connector with strain relief plate



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

Marking



Labeling via direct marking or self-adhesive strips.