Benefits of WAGO Connection Technology

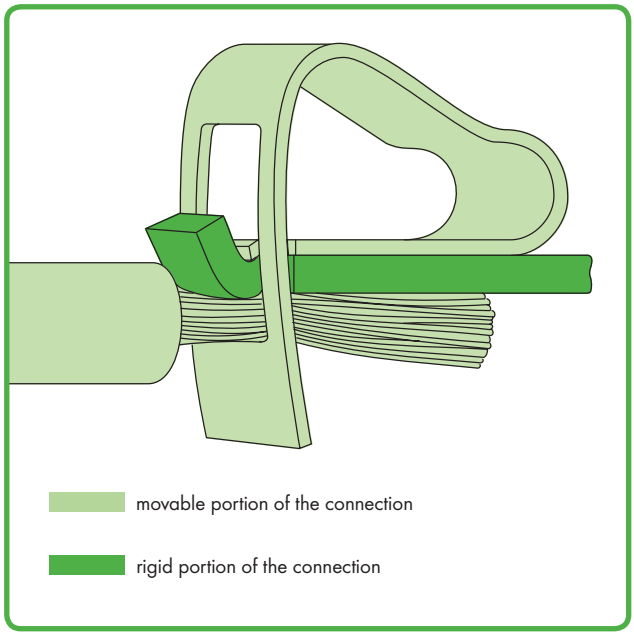
Vibration- and Shock-Proof – Maintenance-Free

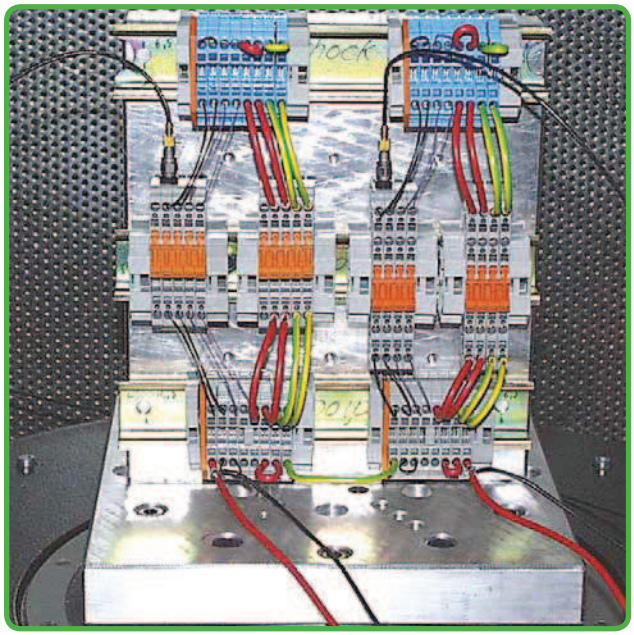
The **vibration-proof properties** of CAGE CLAMP® connections have been tested and verified in a vibration test to IEC/EN 60068-2-6. In this test, a frequency band up to 2000Hz, at different accelerations up to 20g and different amplitudes up to 20m, is passed continuously in three axes. Additionally, international authorities have placed extremely demanding requirements on electrical installations. Railway authorities have applied testing for electrical installations in rolling stock (IEC/EN 61373); multiple marine agencies (e.g., GL, LR and DNV) have also held CAGE CLAMP® to their lofty approval standards. Each rigorous test was successfully passed.

In the **Impact Test** (IEC/EN 60068-2-27) or for railway applications (IEC/EN 61373), test specimens are exposed to instant shock stresses, instead of permanent vibrations. Stresses up to 100g on the x-, y-, and z-axis were easily passed.

Maintenance-free operation results from excellent long-term consistency of the electrical and mechanical properties of the clamping connection – or more precisely, the clamping unit. The Voltage Drop Test evaluates clamping unit quality under stresses such as vibrations, temperature changes and corrosive influences, in order to verify that the contact point is gas-tight. The long-term consistency of CAGE CLAMP® technology has been demonstrated both through laboratory testing by international approval agencies and from world-wide applications.

The resulting maintenance-free operation reduces service costs, leading to greater equipment availability and reliability.



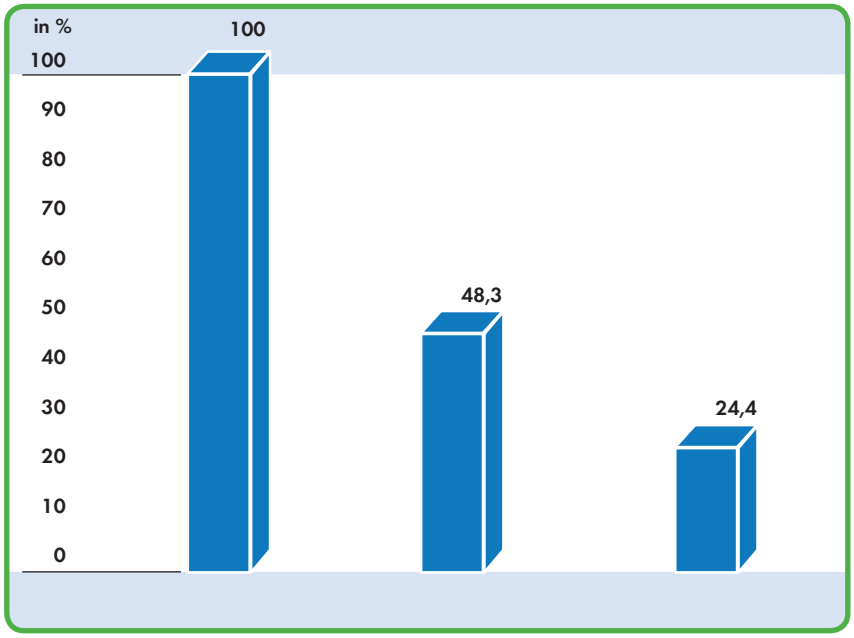


Time-Saving

CAGE CLAMP® technology **significantly reduces wiring times**, which helps minimize labor costs.

Additional savings provided via **faster project commissioning** and **elimination of service costs** due to maintenance-free terminations.

Savings go further **by reducing both material and labor costs** through eliminating the need to prepare ferrules or pin terminals prior to termination. Front-entry terminal blocks are specified for top-tier designs because they minimize both install time and effort.



Average manual wiring times in a percentage comparison (per MTM)

Benefits of WAGO Connection Technology

Gastight Clamping Units – Measurable Contact Quality



Climatic chambers simulate standard atmospheres that could impact long-term constancy of clamping units. All WAGO products meet requirements for the following climatic tests:

- Temperature Cycling Test to IEC/EN 60947-7-1, IEC/EN 60998-2-2
- Industrial Atmospheres to EN ISO 6988, IEC/EN 60068-2-42, IEC/EN 60068-2-60
- Salt Spray Test to IEC/EN 60068-2-11, Marine Applications GL, LR, DNV
- Quick Change of Temperature to IEC/EN 60068-2-14
- Damp Heat, Cyclic (12 + 12 Hours) to IEC/EN 60068-2-30, Marine Applications GL, LR, DNV

Long-term consistency for the low contact resistance of both CAGE CLAMP® and CAGE CLAMP®S results from **gas-tight** clamping units. The spring clamp (acid- and saltwater-proof CrNi spring steel) presses the connected conductor against the current bar (electrolyte copper with lead-free, pure tin coating) within a defined contact zone. The conductor is embedded into the soft tin layer with high contact pressure, securing it against corrosive infiltration.

The contact pressure

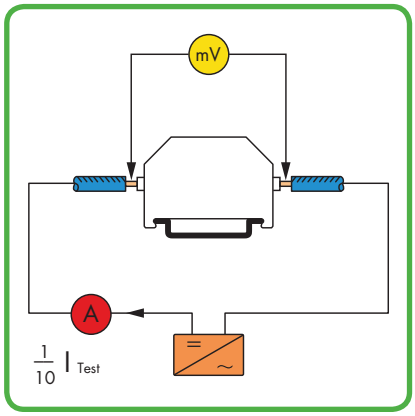
$$P\left[\frac{N}{mm^2}\right] = \frac{\text{Force F [N]}}{\text{Area A [mm}^2\text{]}}$$

exerted by CAGE CLAMP® terminations is similar to screw-style terminals.



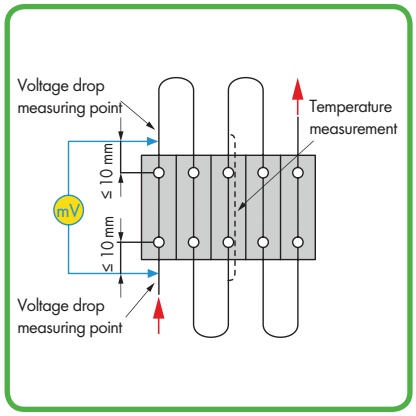
To best evaluate the quality of a clamping point, WAGO uses the following test procedures:

The **Voltage Drop Test** evaluates clamping unit quality under stresses such as vibrations, temperature changes and corrosive influences.



Test arrangement: "Voltage Drop Test"

The **Temperature-Rise Test** examines the clamping unit, including the surrounding insulation, at rated current, overcurrent and short-circuit current levels.



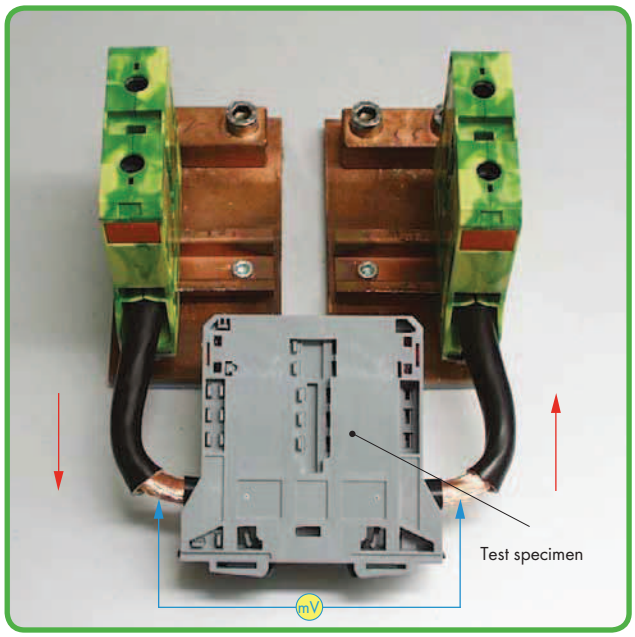
Test arrangement: "Temperature-Rise Test"

High-Current Carrying Capacity

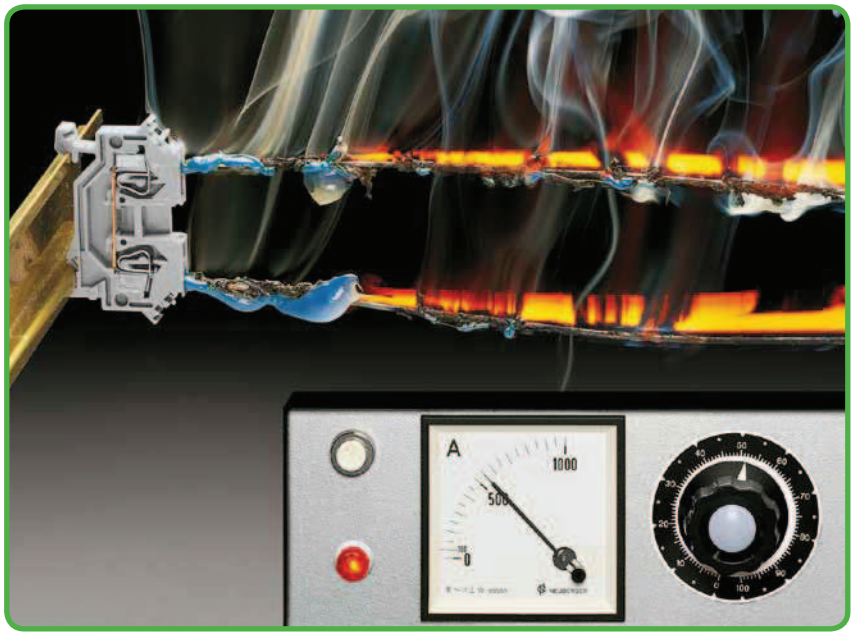
The **short-time withstand capacity** is defined in standards such as IEC/EN 60947-7-1 for through rail-mounted terminal blocks. It is a **current-carrying capacity of 120A per mm² nominal diameter** for the duration of 1 second. **In the case of a 4/0 AWG (95 mm²)** WAGO 285 Series **High-Current Terminal Block, this translates to 11,400A!**

Ground conductor terminal blocks are submitted to the "120A per mm²" test for 3x one second.

The pass criterion for the test is the voltage drop (limit value and constancy). CAGE CLAMP® and CAGE CLAMP®S connections passed this test without damage or reduced functionality.



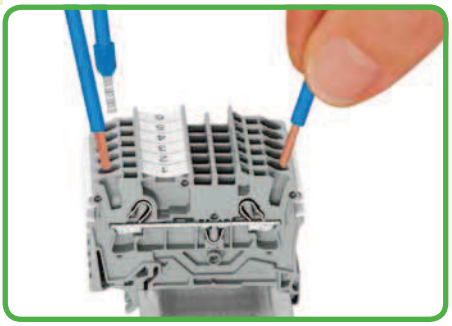
Test arrangement: "Short-Time Current Withstand Test"



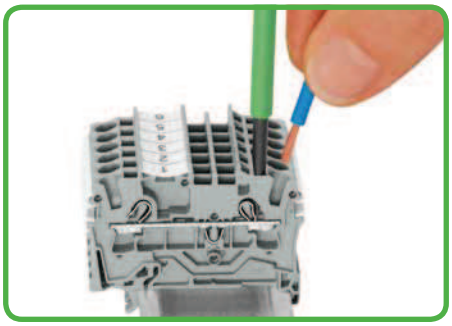
Unrealistic test of a CAGE CLAMP®-equipped,12 AWG (4mm²) rail-mounted terminal block: **Increase of current without time limit.** In such an extreme test – normally, fuse devices would have interrupted the current – **the electrical connection is undamaged.**

TOPJOB®S Rail-Mounted Terminal Blocks 2000, 2001, 2002, 2004, 2006, 2010 and 2016 Series

Conductor termination/removal



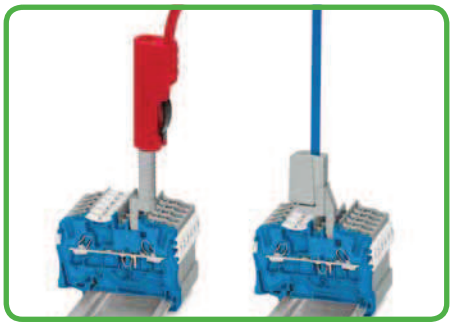
Push-in termination: Solid conductors with cross sections from either one size above, or up to two sizes below, the rated cross section can be pushed in directly – without tools.



With screwdriver: The operation of the clamp remains the same for unprepared fine-stranded conductors or small cross sections that don't allow push-in termination.

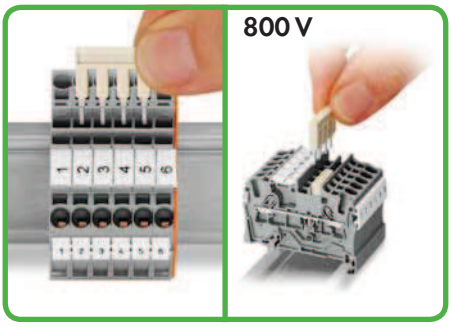
Like the original CAGE CLAMP®, a screwdriver is used for conductor removal with CAGE CLAMP®S.

Testing



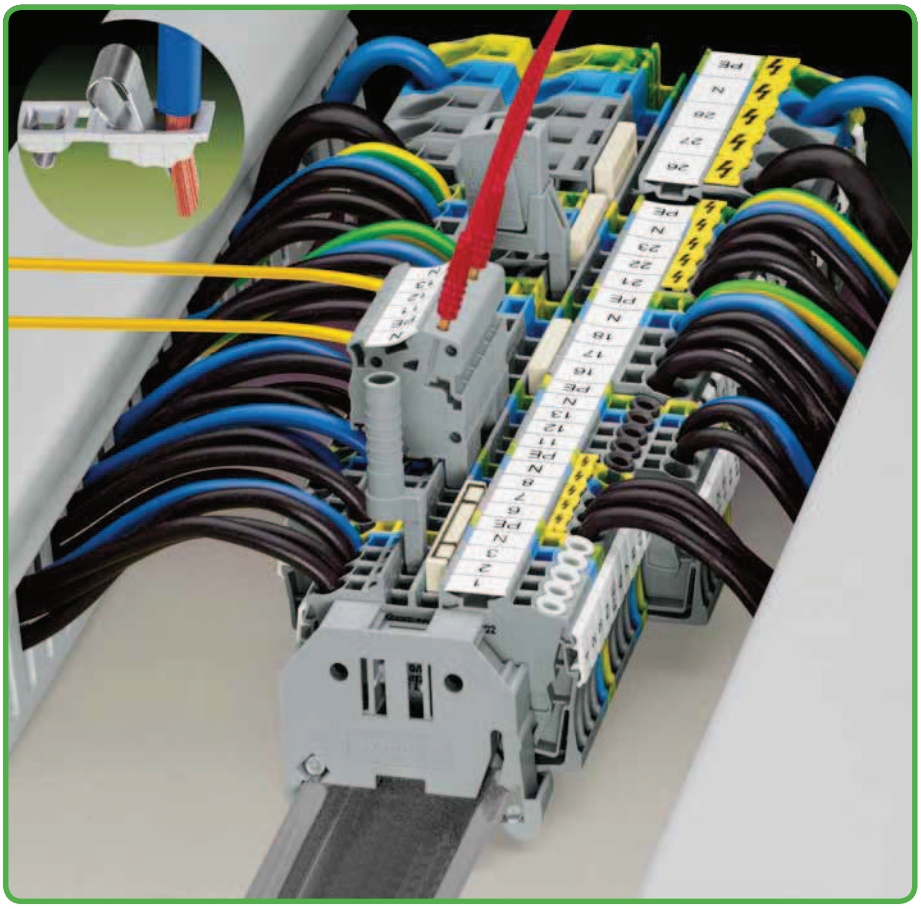
Testing of TOPJOB®S rail-mounted terminal blocks using test plug adapter or testing tap

Commoning

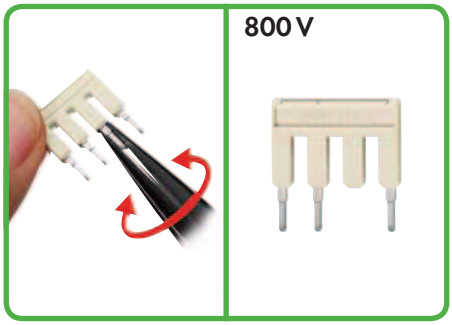


Twin integrated, spring-loaded jumper system allows use of comb-style jumper bars, test plugs and connectors.

Jumper bars rated at 800V (ex works).



Commoning

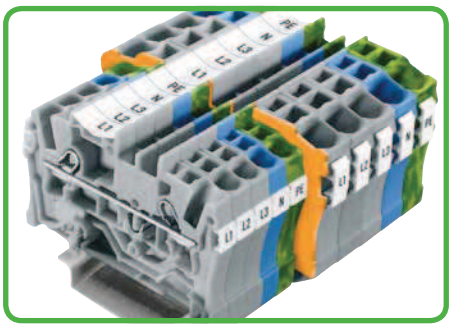


Jumper contacts that are not required can be broken off and removed, the upper-side of the jumper can then be marked accordingly. Applies to 2001, 2002 and 2004 Series.

Marking

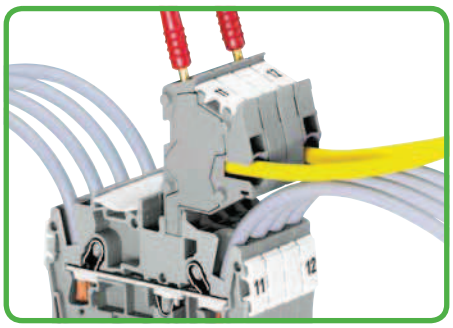


A thermal transfer printer and WAGO "smartDESIGNER" software generate the marking.



TOPJOB®S offers three marking positions for WMB markers, miniature WSB markers or a full-length marking strip.

Pre-assembled connectors



Pre-assembled connectors with CAGE CLAMP®S connection provide an additional connection option.

CAGE CLAMP®S clamps the following copper conductors:



solid | stranded | fine-stranded | tip bonded | with ferrule | with pin terminal

Strip length, see packaging or instructions.

TOPJOB®S
Rail-Mounted Terminal Blocks 1.0 (1.5) mm²
2000 Series

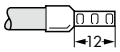
CAGE CLAMP®S

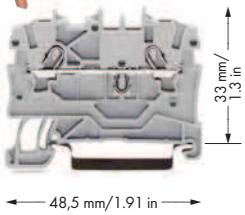
0.14 - 1.0 (1.5) mm² ❶	AWG 24 - 16
800 V/6 kV/3	600 V, 10 A
I_N 13.5 A (18 A)	600 V, 10 A

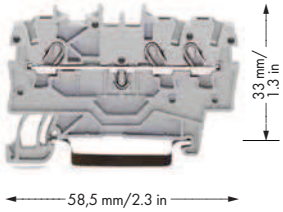
Terminal block width 3.5 mm / 0.138 in
9 - 11 mm / 0.39 in
❷ Approvals

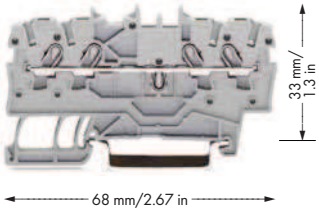
❶ Conductor sizes: 0.14 – 1.5 mm² "s + f-st";
Push-in conductor sizes: 0.5 – 1.5 mm² "s" and 0.5 – 1 mm² "insulated ferrule, 12 mm"











Color	Item No.	Pack. Unit
2-conductor through terminal block		
gray	**2000-1201**	100
blue	**2000-1204**	100
orange	**2000-1202**	100
red	**2000-1203**	100
black	**2000-1205**	100
yellow	**2000-1206**	100
2-conductor ground terminal block		
green-yellow	**2000-1207**	100

Color	Item No.	Pack. Unit
3-conductor through terminal block		
gray	**2000-1301**	100
blue	**2000-1304**	100
orange	**2000-1302**	100
red	**2000-1303**	100
black	**2000-1305**	100
yellow	**2000-1306**	100
3-conductor ground terminal block		
green-yellow	**2000-1307**	100

Color	Item No.	Pack. Unit
4-conductor through terminal block		
gray	**2000-1401**	100
blue	**2000-1404**	100
orange	**2000-1402**	100
red	**2000-1403**	100
black	**2000-1405**	100
yellow	**2000-1406**	100
4-conductor ground terminal block		
green-yellow	**2000-1407**	100

Item-Specific Accessories

End and intermediate plate, 0.7 mm thick



orange **2000-1292** 100 (4x25)
gray **2000-1291** 100 (4x25)

End and intermediate plate, 0.7 mm thick



orange **2000-1392** 100 (4x25)
gray **2000-1391** 100 (4x25)

End and intermediate plate, 0.7 mm thick



orange **2000-1492** 100 (4x25)
gray **2000-1491** 100 (4x25)

2000 Series Accessories

Appropriate marking systems: **WMB/Marking Strips**

Push-in type jumper bar, insulated, I_N 14 A, light gray



2-way **2000-402** 200 (8x25)
3-way **2000-403** 200 (8x25)
4-way **2000-404** 200 (8x25)
5-way **2000-405** 100 (4x25)
: :
10-way **2000-410** 100 (4x25)

Push-in type jumper bar, insulated, I_N 14 A, light gray



1 - 3 **2000-433** 200 (8x25)
1 - 4 **2000-434** 200 (8x25)
1 - 5 **2000-435** 100 (4x25)
: :
1 - 10 **2000-440** 100 (4x25)

Star point jumper, insulated,



I_N = I_N terminal block, light gray
1–3–5 **2000-405/011-000**
100 (4x25)

Protective warning marker, with high-voltage symbol,
for 5 terminal blocks



yellow **2000-115** 100 (4x25)

WMB Multi marking system,

10 strips with 10 markers per card
for 3.5 mm terminal block width,
plain **793-3501** 50 (10x5)

Marking strips, plain



11 mm wide,
50m roll
white **2009-110** 1

Operating tool with partially insulated shaft,



type 1, (2.5 x 0.4) mm blade
210-719 1

Suitable for Ex i applications

Test plug adapter, for test plug 4 mm Ø



gray **2009-174** 100 (4x25)

Insulated ferrules, extra long,
for TOPJOB®S terminal blocks
see page 195



Testing tap, for max. 2.5 mm²/AWG 14



gray **2009-182** 100 (4x25)

❷ Approvals are available online at: www.wago.com.

For technical explanations and abbreviations, see technical section.

WAGO®

TOPJOB®S
Through/Ground Conductor and Ex Terminal Blocks 1.5 (2.5) mm²
2001 Series

0.25 - 1.5 (2.5) mm² ❶ | **AWG 22 - 14**
800 V/8 kV/3 | **600 V, 10 A**
I_N 18 A (24 A) | **600 V, 10 A**
Terminal block width 4.2 mm / 0.165 in
9 – 11 mm / 0.39 in
❷ Approvals

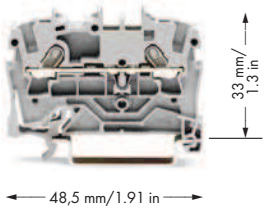
0.25 - 1.5 (2.5) mm² ❶ | **AWG 22 - 14**
800 V/8 kV/3 | **600 V, 10 A**
I_N 18 A (24 A) | **600 V, 10 A**
Terminal block width 4.2 mm / 0.165 in
9 – 11 mm / 0.39 in
❷ Approvals

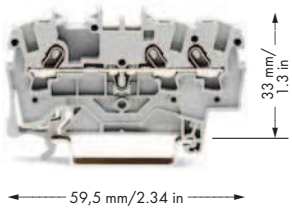
0.25 - 1.5 (2.5) mm² ❶ | **AWG 22 - 14**
800 V/8 kV/3 | **600 V, 10 A**
I_N 18 A (24 A) | **600 V, 10 A**
Terminal block width 4.2 mm / 0.165 in
9 – 11 mm / 0.39 in
❷ Approvals

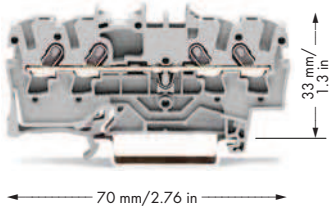


❶ Conductor sizes: 0.25 – 2.5 mm² "s + f-st";
Push-in conductor sizes: 0.5 – 2.5 mm² "s" and
0.75 – 1.5 mm² "insulated ferrule, 12 mm"









Color	Item No.	Pack. Unit
2-conductor through terminal block		
gray Ex	**2001-1201**	100
blue Ex	**2001-1204**	100
orange Ex	**2001-1202**	100
red Ex	**2001-1203**	100
black Ex	**2001-1205**	100
yellow Ex	**2001-1206**	100
2-conductor ground terminal block		
green-yellow Ex	**2001-1207**	100
Other terminal blocks with the same profile:		
Diode	**2001-1211/1000-411**	Volume 1

Color	Item No.	Pack. Unit
3-conductor through terminal block		
gray Ex	**2001-1301**	100
blue Ex	**2001-1304**	100
orange Ex	**2001-1302**	100
red Ex	**2001-1303**	100
black Ex	**2001-1305**	100
yellow Ex	**2001-1306**	100
3-conductor ground terminal block		
green-yellow Ex	**2001-1307**	100
Other terminal blocks with the same profile:		
Diode	**2001-1311/1000-411**	Volume 1
LED	**2001-1321/1000-434**	Volume 1

Color	Item No.	Pack. Unit
4-conductor through terminal block		
gray Ex	**2001-1401**	100
blue Ex	**2001-1404**	100
orange Ex	**2001-1402**	100
red Ex	**2001-1403**	100
black Ex	**2001-1405**	100
yellow Ex	**2001-1406**	100
4-conductor ground terminal block		
green-yellow Ex	**2001-1407**	100
Other terminal blocks with the same profile:		
Diode	**2001-1411/1000-411**	Volume 1
Diode	**2001-1411/1000-434**	Volume 1
Double-potential	**2001-1441**	Volume 1

Item-Specific Accessories

Separator for Ex e/Ex i applications, see page 30

End and intermediate plate, 0.8 mm thick



orange **2002-1292** 100 (4x25)
gray **2002-1291** 100 (4x25)

End and intermediate plate, 0.8 mm thick



orange **2002-1392** 100 (4x25)
gray **2002-1391** 100 (4x25)

End and intermediate plate, 0.8 mm thick



orange **2002-1492** 100 (4x25)
gray **2002-1491** 100 (4x25)

Separator, oversized, 0.8 mm thick



orange **2002-1294** 100 (4x25)
gray **2002-1293** 100 (4x25)

Separator, oversized, 0.8 mm thick



orange **2002-1394** 100 (4x25)
gray **2002-1393** 100 (4x25)

Separator, oversized, 0.8 mm thick



orange **2002-1494** 100 (4x25)
gray **2002-1493** 100 (4x25)

2001 Series Accessories

Appropriate marking systems: **WMB/Marking Strips**

Push-in type jumper bar, insulated, I_N 18 A, light gray



2-way **2001-402** 200 (8x25)
3-way **2001-403** 200 (8x25)
4-way **2001-404** 200 (8x25)
: :
10-way **2001-410** 100 (4x25)

Push-in type jumper bar, insulated, I_N 18 A, light gray



1 - 3 **2001-433** 200 (8x25)
1 - 4 **2001-434** 200 (8x25)
1 - 5 **2001-435** 100 (4x25)
: :
1 - 10 **2001-440** 100 (4x25)

Push-in type wire jumper, insulated, I_N 16 A,
wire size 1.5 mm²/AWG 16



60 mm **2009-412** 100 (10x10)
110 mm **2009-414** 100 (10x10)
250 mm **2009-416** 100 (10x10)

Insulation stop,



5 pcs/strip,
0.25 – 0.5 mm²
light gray **2001-171** 200 (8x25)

Protective warning marker, with high-voltage symbol,
for 5 terminal blocks



yellow **2001-115** 100 (4x25)

TOPJOB®S connector, modular,
for jumper contact slot



gray **2001-511** 100 (4x25)

Spacer module
gray **2001-549** 100 (4x25)

WMB Multi marking system,

10 strips with 10 markers per card,
stretchable 4 – 4.2 mm
plain **793-4501** 5

Suitable for Ex i applications
Suitable for Ex e II applications
550 V, 17 A

Operating tool with partially insulated shaft,



type 1, (2.5 x 0.4) mm blade
210-719 1

Marking strip, plain,



11 mm wide,
50m roll
white **2009-110** 1

Insulated ferrules, extra long,



for TOPJOB®S terminal blocks
see page 195

❷ Approvals are available online at: www.wago.com.

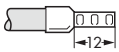
For technical explanations and abbreviations, see technical section.

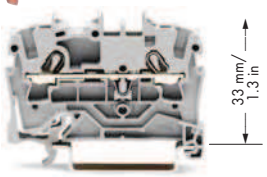
TOPJOB®S
Through/Ground Conductor and Ex Terminal Blocks 2.5 (4) mm²
2002 Series

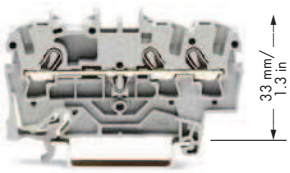
CAGE CLAMP®S

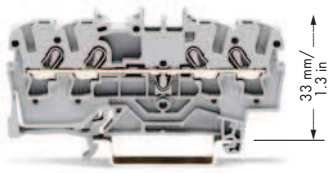
0.25 - 2.5 (4) mm² ❶ 800 V/8 kV/3 I_N 24 A (32 A) AWG 22 - 12 600 V, 20 A 600 V, 20 A Terminal block width 5.2 mm / 0.205 in 10 - 12 mm / 0.43 in. ❷ Approvals	0.25 - 2.5 (4) mm² ❶ 800 V/8 kV/3 I_N 24 A (32 A) AWG 22 - 12 600 V, 20 A 600 V, 20 A Terminal block width 5.2 mm / 0.205 in 10 - 12 mm / 0.43 in. ❷ Approvals	0.25 - 2.5 (4) mm² ❶ 800 V/8 kV/3 I_N 24 A (32 A) AWG 22 - 12 600 V, 20 A 600 V, 20 A Terminal block width 5.2 mm / 0.205 in 10 - 12 mm / 0.43 in. ❷ Approvals

❶ Conductor sizes: 0.25 – 4 mm² "s + f-st";
Push-in conductor sizes: 0.75 – 4 mm² "s" and
0.75 – 2.5 mm² "insulated ferrule, 12 mm"









Color	Item No.	Pack. Unit
2-conductor through terminal block		
gray (Ex)	**2002-1201**	100
blue (Ex)	**2002-1204**	100
orange (Ex)	**2002-1202**	100
red (Ex)	**2002-1203**	100
black (Ex)	**2002-1205**	100
yellow (Ex)	**2002-1206**	100
2-conductor ground terminal block		
green-yellow (Ex)	**2002-1207**	100
Other terminal blocks with the same profile:		
Diode	**2002-1211/1000-411**	Page 42

Color	Item No.	Pack. Unit
3-conductor through terminal block		
gray (Ex)	**2002-1301**	100
blue (Ex)	**2002-1304**	100
orange (Ex)	**2002-1302**	100
red (Ex)	**2002-1303**	100
black (Ex)	**2002-1305**	100
yellow (Ex)	**2002-1306**	100
3-conductor ground terminal block		
green-yellow (Ex)	**2002-1307**	100
Other terminal blocks with the same profile:		
Diode	**2002-1311/1000-411**	Page 42
LED	**2002-1321/1000-434**	Page 42

Color	Item No.	Pack. Unit
4-conductor through terminal block		
gray (Ex)	**2002-1401**	100
blue (Ex)	**2002-1404**	100
orange (Ex)	**2002-1402**	100
red (Ex)	**2002-1403**	100
black (Ex)	**2002-1405**	100
yellow (Ex)	**2002-1406**	100
4-conductor ground terminal block		
green-yellow (Ex)	**2002-1407**	100
Other terminal blocks with the same profile:		
Diode	**2002-1411/1000-411**	Page 42
Diode	**2002-1411/1000-434**	Page 42
Double-potential	**2002-1441**	Volume 1

Item-Specific Accessories

Separator for Ex e/Ex i applications, see page 30

End and intermediate plate, 0.8 mm thick



orange	**2002-1292**	100 (4x25)
gray	**2002-1291**	100 (4x25)

End and intermediate plate, 0.8 mm thick



orange	**2002-1392**	100 (4x25)
gray	**2002-1391**	100 (4x25)

End and intermediate plate, 0.8 mm thick



orange	**2002-1492**	100 (4x25)
gray	**2002-1491**	100 (4x25)

Separator, oversized, 0.8 mm thick



orange	**2002-1294**	100 (4x25)
gray	**2002-1293**	100 (4x25)

Separator, oversized, 0.8 mm thick



orange	**2002-1394**	100 (4x25)
gray	**2002-1393**	100 (4x25)

Separator, oversized, 0.8 mm thick



orange	**2002-1494**	100 (4x25)
gray	**2002-1493**	100 (4x25)

2002 Series Accessories

Appropriate marking systems: **WMB/Marking Strips/WMB Inline/Mini-WSB**

Push-in type jumper bar, insulated, I_N 25 A, light gray



2-way	**2002-402**	200 (8x25)
3-way	**2002-403**	200 (8x25)
4-way	**2002-404**	200 (8x25)
:	:	
10-way	**2002-410**	100 (4x25)

Push-in type jumper bar, insulated, I_N 25 A, light gray



1 - 3	**2002-433**	200 (8x25)
1 - 4	**2002-434**	200 (8x25)
1 - 5	**2002-435**	100 (4x25)
:	:	
1 - 10	**2002-440**	100 (4x25)

Staggered jumper, insulated, I_N 25 A, light gray



2-way	**2002-472**	100 (4x25)
3-way	**2002-473**	100 (4x25)
4-way	**2002-474**	100 (4x25)
:	:	
12-way	**2002-482**	50 (2x25)

Insulation stop, 5 pcs/strip 200 strips



light gray	**2002-171**	0.25–0.5 mm²
dark gray	**2002-172**	0.75–1 mm²

Protective warning marker, with high-voltage symbol, for 5 terminal blocks



yellow	**2002-115**	100 (4x25)

TOPJOB®S connector, modular,



for jumper contact slot

gray	**2002-511**	100 (4x25)

Spacer module

gray	**2002-549**	100 (4x25)

WMB Multi marking system,

10 strips with 10 markers per card, stretchable 5 – 5.2 mm

plain	**793-5501**	5

Marking strip, plain,



11 mm wide, 50m roll

white	**2009-110**	1

- Suitable for Ex i applications
- (Ex) Suitable for Ex e II applications 550 V, 22 A

Operating tool with partially insulated shaft,



type 2, (3.5 x 0.5) mm blade

	210-720	1

Insulated ferrules, extra long,



for TOPJOB®S terminal blocks

see page 195