The
Connection System
Leaf Spring Technology

- Current transmitted through the copper current bar – not the stainless steel spring
- Conductor not surrounded on 4 sides
- Primarily for use with Solid conductors due to concerns over migration of strands off the current bar.
- Direct insertion of solid conductors
CAGE CLAMP® and why it’s better

- Wire retention method
- High contact pressure
- Wire surrounded on all four sides in a metal cage.
- Recommended for solid, stranded or flex wire.
Materials in the CAGE-CLAMP

- Spring is high grade stainless steel
- Current bar is electrolytic copper plated with a corrosion resistant tin coating
- Housings are Nylon Polyamide 6.6 V-0

“S” bend in current bar provides ‘defined contact area’
The CAGE CLAMP Advantage

- **Higher reliability**
  - Contact resistance
    - Vibration
  - Proportional Clamping
    - Corrosion
  - Temperature Cycling

- **Lower total cost**
  Material
  Labor
Proportional Clamping

Proportional clamping gives larger wires higher clamping pressure than that received by smaller wires. This important design feature means that finely stranded small conductors are protected from damage while larger conductors receive sufficient clamping pressure to allow high currents to be transmitted.
Contact Resistance

• Every connection resists the flow of electrons (electricity).
• As the flow is impeded, voltage is lost -- heat is generated.
• We can demonstrate the amount of contact resistance by performing the voltage drop test and a temperature rise test.
• CAGE-CLAMP® has very low contact resistance and maintains that over time even in hostile environments.
• Screw clamp technology- contact resistance can vary as vibration, corrosion and temperature cycling impact the contact point.
Performance under Vibration

- Tested under vibration to 2000 Hz
- Tested for resonant frequencies from 5 Hz to 250 Hz
- Tested to shocks of 109G in the X, Y, & Z axes
- No contact failure -- even momentarily
- NO WIRE DAMAGE
- Screw clamps require periodic maintenance
- CAGE-CLAMP is maintenance-free
Performance under Corrosion

- Materials inherently corrosion resistant (stainless steel spring)
- Soft tin coating ensures gas-tight seating of the conductor.
Performance under Temperature Cycling

- As temperatures rise and fall, metals expand and contract
- Different metals expand and contract at different rates
- Conductors deform
- Screw clamps are static (expansion/contraction has a negative impact on contact pressure)
- CAGE-CLAMP® is dynamic, compensating for changes
- CAGE-CLAMP® is maintenance-free
Theoretical test of a 4 mm² terminal block: Increase of current without limit of time until the conductor glows

In these Test the terminal block is not damaged

The short circuit test acc. IEC 947-7-1, requires 120 A per mm² nominal cross section and a time of 1 sec

CAGE CLAMP®-terminations pass these test without damage or limit of function.
CAGE-CLAMP reduces cost by:

• Reducing installation time.
• Eliminating the need for sophisticated tooling (no torque requirements).
• Allowing the use of less skilled labor.
• Eliminating cost of crimp lugs and labor to install them.
• Reducing warranty costs.
870 Series Compact CAGE CLAMP

280 Series CAGE CLAMP

880 Series CAGE CLAMP
Competitive Designs

- No S-bend in the current bar (defined contact area)
  - Use larger springs
  - Resonant frequency problems
ST SERIES

ZFK SERIES

59.5 mm

48.5 mm

55.5 mm
WKF SERIES

D Series

57 mm

58 mm
CAGE CLAMP Compact

- WAGO’s next step in spring clamp technology
- Same basic design as CAGE CLAMP only in a smaller size
- Defends WAGO position as leader in spring technology
FIT CLAMP

• Fast Insulation displacement Technology
• 28 AWG – 12AWG
• 1x1, 1x2, 2x2 configurations
• FIT to FIT connections
• FIT to CAGE CLAMP hybrids
Series 285 POWER CLAMP

High current applications/Power distribution
600V/ 200A
4 AWG – 4/0 AWG
Grey, Blue & Green-yellow(GND)
CAGE CLAMP Evolution

TOPJOB® S

Rail-mounted terminal block series with CAGE-CLAMP S technology
A high precision product from WAGO – the result of our experience and innovation!
Size Reduction
(up to 30% smaller)

Push-in Termination
No tools required

The new standard for Rail-mounted terminal blocks.
CAGE CLAMP - THE INDUSTRY CHANGING CONCEPT

LEAF SPRING

PUSH WIRE

FIT CLAMP

CAGE CLAMP

POWER CLAMP

CAGE CLAMP COMPACT

TOPJOB® S
**Features**

- High grade stainless steel spring.
- Electrolytic copper current bar plated with tin.
- “CAGE” surrounds the wire on all four sides.
- High contact pressure providing low voltage drop (“S” turn in current bar).
- Worldwide approvals

**Benefits**

- Higher reliability
  - Performance under **Vibration**
  - Performance under **Corrosion**
  - Performance under **Temperature Cycling**
- Lower total installed cost
  - Labor (installation and maintenance)
  - Material (special tooling, crimp lugs)
WAGO – Approvals

Worldwide approvals certify the reliability of WAGO spring clamp terminal blocks and connectors

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<td>Underwriters Laboratories</td>
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WAGO Terminal Block Summary

• Insulating Material is Nylon Polyamid 6.6
  ➔ Temp range of -35° to +105° C
  ➔ Self extinguishing to UL 94V-0
  ➔ Non-toxic when burned

• Jumper System
• Grounding System
• Touch-proof, high-density design
• Two Mounting Styles Available
  ➔ Side Entry is more traditional in appearance
  ➔ Front entry eliminates blind wiring and saves panel space
• Front Entry also handles multiple conductors per block.
• Fast, easy marking with the Continuous Marking System
• Flexible touch-proof test options
• Handles up to AWG 4/0 in Side Entry and AWG 2 in Front Entry.
The Insulating Material

• Nylon Polyamid 6.6
• Operating temp. range -35° to +105° C
• Average moisture content of 2.5%
  – Good elasticity
  – High rigidity
• Self extinguishing according to UL 94
  – Light gray to 94-V0
  – All other colors to 94-V2 converting to 94-V0
  – All new products are in 94-V0
More on Nylon Polyamid 6.6

- Does not contain halogens, fluorocarbons, chlorinated hydrocarbons, silicone, asbestos, cadmium or formaldehyde
- Is not toxic when burning
- Resistant to fuels, oils and fats, detergents, mold, fungus and termites
Applications

Industry: Advanced plant genetics (world's leading developer and supplier).

WAGO products: DIN Rail Receptacle, Fuse terminals, Sensor terminals, Feed-thru and ground terminals

Problem solved: eliminated loose connections in a humid corrosive environment.
Applications

Industry: Material Handling
( Hotels / Hospitals / Colleges )
WAGO Products: TJS TB’s

Problem Solved:
• Engineering / Install Time
• Accessibility / space savings
• Integrity of Connection
Applications

Industry: Metal Fabrication

WAGO Products: 769 X-Com
2001 Top Job S
281 Fuse Disconnect
859 relays
264 terminals
Assembled rails by WAGO

Problem Solved:
Reduce size of panel
Reduce labor
Ease of design-Proserve
Reliability
Applications

**Industry:** Dynamic visual communication systems for customers worldwide.

**Video Product Group**
- Sports Products
- Commercial/Advertising
- Financial
- Transportation
- Rental / Staging

**WAGO Products:**
13 Different Custom Rail Assemblies utilizing various 280 series terminal blocks
Applications

Industry: Scissor Lifts & Boom Lifts
WAGO Products: Custom 231, 2002-1401, 280-655/281-410

Problem Solved: Severe application; vibration and corrosion
Applications

**Industry:** Railroad (Headlights, Turn Signals, Interior Lights, Door Operation, Cab Heater.)

**WAGO Products:** 769, 280 & 281 Series

Problem Solved: Fast, reliable, no maintenance installation.
Applications

**Problem Solved:**
Labor, Size, Dependability, Cost

**Industry:** Inspection Systems

**WAGO Products:**
280-284 Terminals Front Entry
Fuse Blocks, Breakout Modules
Applications

Industry: Petro-Chem

WAGO Products: 280-283, Power supplies, Circuit Breakers, 750 and EEx I

Problem Solved: Eliminate loose screws, lower I/O cost, IPC Easy to retrofit any system & more efficient.
Applications

Industry: Construction – Concrete Pumping Trucks

WAGO Products: Series 280 to 282 - plus electronic modules

Problem Solved:
-no more side entry
-Vibration issues gone
-International avail. / approvals
Applications

Industry: TELECOM, (CELLULAR PHONE NETWORK.)


PROBLEM SOLVED: BUILD A NEW CABINET FOR BASE TRANSCEIVER STATION AND BASE STATION CONTROLLER, REDUCING SPACE, LABOR TIME AND CONNECTION FAILS.
Applications

Industry: Aerospace – Test Equipment

WAGO Products: Rail-Mount and Printed Circuit Board Terminals

Problem Solved: Require total reliability of wiring connections
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Ave. Del Marques #38 Bodega 3
Parque Industrial Bernardo Quintana
El Marques, Queretaro 76240

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