

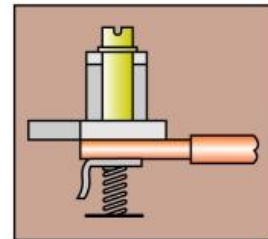
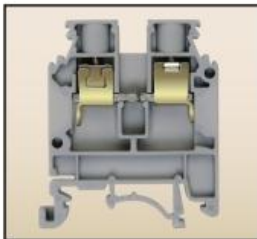


# cross currents

AUGUST, 2007

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## elmex CONDUCTOR CLAMPING TECHNOLOGY



### Screw Clamp (Steel)

Screw Clamp consists of a U-Shaped steel part, called Yoke or Contact Clamp and a screw for clamping the conductor. Loosening of screws during service is prevented by elastic deformation of yoke while tightening of screws, which in turn grips screw threads firmly.

Outstanding feature of **elmex** screw-clamp technology is the provision of double interlock. The vertical arms of the Contact Clamp are folded at the top end into lips, overlapping each other. The lip from each arm locks into recess provided on the other arm, thus providing double interlocking. In the event of inadvertent overtightening, this design prevents damage to the threads and deformation of Contact Clamp.

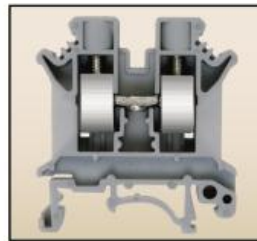
**elmex** contact clamps are subjected to a special heat treatment process, so that the rolled inner threads of the clamp achieve a uniform and strong wear resistance. The rolled threads provide higher mechanical strength.

**elmex** uses cold forged rolled threaded washer base, or cheese head, screws. **elmex** contact-clamps and the screws are protected by zinc plating and passivation, under controlled plating process, for achieving better corrosion resistance.

### Screw Clamp - Spring Loaded

Spring-loaded terminals are a special offering from **elmex** for high vibration applications, although **elmex** standard screw-clamp design is already resistant to vibrations.

Compression springs are assembled under the contact clamps in pre-stressed condition. When the screws are fully tightened upto specified torque, the springs under the contact clamps provide additional pressure between current bar and conductor, making the terminals especially suitable for high vibration applications.

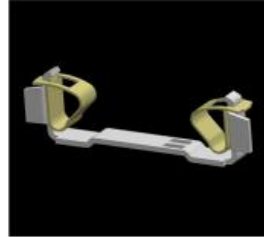


### Screw Clamp (Copper - Alloy)

In copper alloy screw clamp design, also popularly called "All Brass Terminals", the clamping part is made of brass, and brass screws are used for clamping the conductor. The brass screw clamps are also designed to prevent loosening of screws during service.

By appropriate selection of materials and processes in the **elmex** copper-alloy screw clamp design, the phenomena of stress corrosion cracking is taken care of. Protection against atmospheric corrosion in **elmex** design is achieved by tin plating in a controlled plating process, with an undercoat of nickel plating to prevent zinc migration.

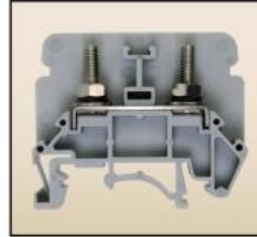




### Spring Clamps

Spring clamp (also named "tension-clamp" or "cage clamp") provides screwless clamping and consists of stainless steel clamp, which functions as a spring for developing necessary contact pressure between current bar and conductor. Current bar is the current carrying part in the terminal block.

The spring clamp is brought under tension by inserting a screwdriver in the space provided. This creates necessary opening in the clamp for inserting conductor. After stripping the insulation at the conductor end, the conductor is fully inserted and the screwdriver is withdrawn. The clamp arm thereby presses the conductor firmly against current bar, by spring action of the clamp. **elmex** current bars have serrated face for better grip on conductor, giving lower contact resistance.



### Stud and Nut clamping for Cable Lugs:

This conductor-clamping design is especially developed for receiving Ring-type or Fork-type cable lugs. The terminal block consists of Housing, Studs and Nuts and the Current Bar.

In **elmex** design the lugged cables are clamped to the current bar by tightening the nuts, in case of "Nut-Driver" type of Stud Terminals. For Screwdriver operated stud terminals, the stud is provided with a special long-nut with a slot at the top for applying screwdriver. These are used where assembly space is a constraint.

The metal parts in these types of **elmex** terminals are made of Copper alloy and tin plated, with nickel undercoat, for protection against atmospheric corrosion.

## TESTS FOR CONDUCTOR CLAMPING AS PER IEC-60947-1 & IEC-60947-7-1

IEC 60947-1 specifies General Rules for low voltage switchgear and control gear including rules for their terminals. IEC-60947-7-1 is the specification for terminal blocks for Copper conductors.

A section in IEC-60947-7-1 on mechanical properties of clamping units specifies tests to verify these properties. These tests are briefly explained below:

#### ▶ Test for Mechanical strength of clamping units :

This test consists of connection and disconnection of conductor a number of times, under specified test conditions. After the test contact voltage-drop must not change beyond specified limit and no damage should occur to the clamping system.

#### ▶ Test for damage to and accidental loosening of conductors :

This test consists of rotating the conductor with its fulcrum at the point of connection to the terminal block, in a specified manner, using specified device for testing and under specified test conditions. During the test the conductor must not slip out nor break near clamping area.

#### ▶ Pull out test :

The test is to be carried out immediately after the above test for damage and accidental loosening of conductors and it consists of pulling the conductor with a specified force for one minute, under specified test conditions. During the test the conductor must not slip out nor break near clamping area.

**One of the important test conditions in the above tests (as well as in temperature rise test) is that the conductor has to be tightened with specified torque. The performance of terminal block in service, as much as in tests, depends on "proper" tightening of screws, defined by tightening torque and use of "proper" conductors, defined by rated connection capacity. Both these values are specified by manufacturers in their catalogues.**

## HARMFUL PRACTICES FOR CONDUCTOR CLAMPING

**Each of the harmful practices described in the tabulation below, results into increase in contact resistance, overheating of conductor-connection and burn-out of terminal block. The safe practices, which are according to standard specifications, on the other hand, give long trouble free service:**

HARMFUL PRACTICES	TECHNICALITY	SAFE PRACTICES
1. Inserting wires without stripping the insulation to required length.	Along with conductor, the insulation also gets clamped, reducing contact area and causing overheating.	Always strip the conductor to required length so that only the conductor and its full contact area is clamped.
2. Using Aluminium wires instead of Copper wires.	For some cross-section Aluminium wires have lower current rating. Bare Aluminium builds up non conducting film in normal atmosphere. Both these factors cause overheating.	a) Use only Copper wires as per rated connection capacity of terminal block. b) If Aluminium wires are to be used consult manufacturer. The terminal for copper wire has to be de-rated and Aluminium wires need to be prepared first to prevent oxide film.
3. Cutting off strands from stranded / flexible wires for making connections.	At the clamping face of conductor, number of strands are reduced, hence joint cannot carry rated current, causing overheating.  The strands are cut off usually by ignorance, neglect or by using aluminium stranded conductor of same current rating, which cannot be accommodated in terminal block without cutting off strands!	Connect up all the strands of stranded & flexible wires, to the terminal block.
4. 'Connector' type small screw drivers are used for all sizes of terminals.	Screws of terminals have to be tightened upto specified torque level as per all standard specifications. Connector type screw drivers cannot provide required torque as terminal size increases, causing overheating.	It is best to use torque measuring screw drivers. Alternatively select proper size of screwdriver to match slot size of terminal screw.
5. Use of over size screw drivers for tightening screws.	Oversize screw drivers can damage threads. By slipping of screw driver from screw-slots, required tightening torque cannot be applied, causing overheating.	As above, use torque measuring screw driver, or alternatively only the proper size of screw drivers.
6. Connecting very small size wires in large size terminals.	Smaller wire sizes cannot be clamped properly in larger size terminal blocks, causing overheating.	Refer to catalogue before connecting very small wire-sizes, since, for each terminal size, minimum and maximum conductor sizes are specified, which are permitted for connection to the terminal.



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# VISIT US AT ELECHEMA-2008

elmex and econix will participate in the 8th International Exhibition of Electrical and Industrial Electronics Industry which will be held at Bombay Exhibition Centre, Goregaon, Mumbai from January 18 to 22, 2008.

This time we have a lot of surprises to offer with a whole new range of termination and interface solutions! Do visit us at Stall # H1 E56K86, Hall # 1.

## elmex POLYAMIDE (NYLON) 66 POWER TERMINALS

<p><b>DPBB 50</b> DPBC 50 &amp; DPCC 50 also available</p>  <p>1000 V/150 A/50 sq mm/ 3 Nm Screw Driver</p>	<p><b>DPBB 70</b> DPBC 70 &amp; DPCC 70 also available</p>  <p>1000 V/192 A/70 sq mm/ 3 Nm Screw Driver</p>	<p><b>DPBB 120</b></p>  <p>1000 V/269 A/120 sq mm/ 6 Nm Screw Driver</p>	<p><b>NEW</b> <b>SPT 35</b></p>  <p>Fully Shrouded 1000 V/140 A/35 sq mm/3 Nm</p>
<p><b>KBT M6C</b></p>  <p>Fully Shrouded 800 V/101 A/25 sq mm/2.5 Nm</p>	<p><b>KUT 35</b></p>  <p>1000 V/125 A/35 sq mm/3 Nm</p>	<p><b>DPBC 120</b></p>  <p>1000 V/269 A/120 sq mm/ 6.0/4.0 (10) Nm Screw Driver (Wrench)</p>	<p><b>NEW</b> <b>SPT 70</b></p>  <p>Fully Shrouded 1000 V/192 A/70 sq mm/6 Nm</p>
<p><b>KUT 50</b></p>  <p>1000 V/150 A/50 sq mm/8 Nm</p>	<p><b>KUT 95</b></p>  <p>1000 V/232 A/95 sq mm/20 Nm</p>	<p><b>DPCC 120</b></p>  <p>1000 V/269 A/120 sq mm/ 10 Nm Wrench</p>	<p><b>SPT 35 &amp; SPT 70</b></p>  <p>TOP VIEW WITH LIFTED SHROUD AND CABLE LUG IN POSITION</p>

We welcome your suggestions and queries regarding our products and feedback about CROSS CURRENTS. Write to us at [ask@elmex.net](mailto:ask@elmex.net)

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TECHNICAL SPECIFICATIONS MAY CHANGE IN LINE WITH TECHNICAL ADVANCES AND INDUSTRY STANDARDS.