

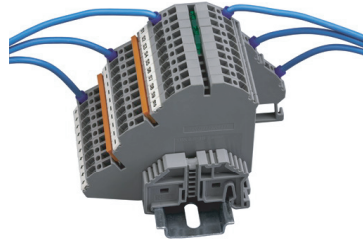
TERMINAL BLOCKS

Terminal blocks are components and systems the main function of which is to ensure safe and secure electrical and mechanical conductor connections. The term covers all conceivable types, designs and forms of connection. From the application point of view, the most important group of terminals is that of rail mounted modular terminal blocks.

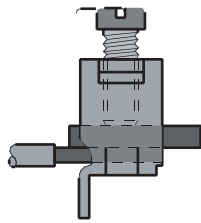
- The current carrying bar must be made of metals which reduce electrical losses to minimum.
- Insulation material must be nonflammable and self extinguishing.

- The screw must not be loosed due to vibration.
- The current carrying bar must have such a form that the conductor has a strong contact area in the connection point.

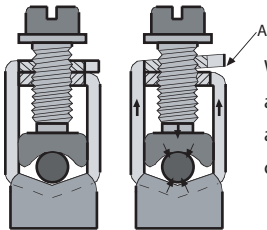
The terminal block series should have a complete range together with all the accessories to provide the best solutions in an ideal area.



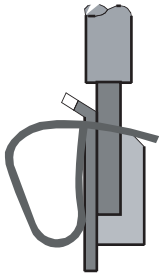
CONNECTION SYSTEMS



SCREW CONNECTION : This is the most popular of all known methods of connection. Screw connection refers to any connection in which the conductor is stripped of its insulation and clamped without any special preparation. IMO screw clamp system is built in protection against loosening.



When the screw is tightened, the resultant pressure pulls apart both halves of the clamping yoke. This generates a particularly high locking action on the screw. These clamping systems provide excellent vibration resistance.



SPRING CLAMP SYSTEM

The stainless steel spring presses the conductor directly against the current bar. Due to the special construction of the clamping body, the contact force is further increased when pulling the conductor.

MATERIALS

IMO terminals are made of selected standard materials. Insulating materials, clamping and conducting metals are subjected to strict quality control as required by stringent international standards. Clamping yokes and screws are zinc plated which considerably increases the resistance to corrosion. Current bars are made out of brass / electrolytic copper. Coating of tin / lead oxide, nickel while ensuring surface protection guarantees very low contact resistance.

Engineering thermoplastic Polyamide 6.6 has excellent electrical, mechanical and chemical characteristics even at temperatures as high as 100 °C and contain no cadmium based color pigments. Polyamide 6.6 moulded housing absorbs humidity from its surroundings. This makes the plastic material elastic and fracture proof even at temperatures as low as -40 °C. Being a self extinguishing material it is difficult to ignite and burns only as long as there is a longlasting supporting flame. It is rated V2 according to UL94. Good aging resistance and insensitivity to ultraviolet light makes it suitable for tropical and open air applications.

MAIN TERMINOLOGY

Modular Terminal Blocks: Modular terminal blocks are used worldwide. Whether they be in distribution boards, control centers or machine control systems, in ships, power stations or railway rolling stock, IMO Din terminals guarantee safe connections in all low voltage installations. In view of this versatile and worldwide application, the materials used and the technical data achieved meet the highest quality standard. Approvals have been obtained from all major industrial countries.

Rated Cross-Section: The rated cross-section of a terminal block is a value of conductor cross-section which is indicated by the manufacturer and covered by the thermal, mechanical and electrical requirements.

Rated Current: The rated current of a terminal block is a current value which is indicated by the manufacturer and covered the thermal, mechanical and electrical requirements on using the rated cross-section.

The Rated Voltage: The rated voltage of a terminal block is a voltage value which is stated by the manufacturer according to creepage and clearance distances and which does not allow any deformation on product.

Nominal Dimensions: Nominal dimensions are the overall dimensions of the terminal block with fixings, but without tolerances. To the specified terminal with a tolerance of +0.2 mm. must be allowed during design when mounting in rows.

Insulation Stripping Length: The required stripping length for every IMO product is stated in mm. These lengths must be observed.

End Plate: The last terminal in a rail mounted assembly must be closed with an end plate. The end plate is held in position by the end bracket.

Partition: The partition is required for the visual separation of circuits or for electrical separation in case of adjacent cross connections.

Small Partition: Small partitions can be inserted after assembly into terminal blocks of up to a max. thickness of 10 mm. between cross connections and test sockets.

CE SIGN

The letters CE stand for Comformite Europeene. CE sign confirms that a product meets the demands of all relevant guidelines and regulations of the European Union (EU), and declares a product is appropriate for human security and health.

The products of IMO are subject to below directives:

1- Low Voltage Directive (LVD) - 73/23 EEC

This directive includes electrical devices which function in the range of 50-1000 V (alternative current) and 75-1500 V (direct current).

2- Equipment for use in potentially Explosive Atmospheres (ATEX) - 94/9 EEC. ATEX is the name commonly given to the framework for controlling explosive atmospheres and the standards of equipment and protective systems used in them.

RoHS

The RoHS Directive stands for "Restriction of the use of certain Hazardous Substances in electrical and electronic equipment". This Directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. The permitted ratios are below:

Cd - Cadmium - %0,01 ppm

Hg - Mercury - %0,1 ppm

Cr(VI) - Hexavalent chromium (coating) - %0,1 ppm

PBB - Polybrominated biphenyl (flame retardant) - %0,1 ppm

PBDE - Polybrominated diphenyl ether (flame retardant) - %0,1 ppm

Pb - Lead - %0,1 ppm

ppm: parts per million (in total weight)

IMO has developed some processes and components in accordance with RoHS Directives in 2006, and had its products tested in the approved laboratories, and achieved RoHS Conformity Approvals.

CONDUCTORS

Aluminum and copper conductors are used for the connection of terminals, but copper conductors are used more frequently. These conductors are divided into two main categories.

- 1- Rigid conductors
 - a- Solid strand
 - b- Knitted conductors

- 2- Fine Strand

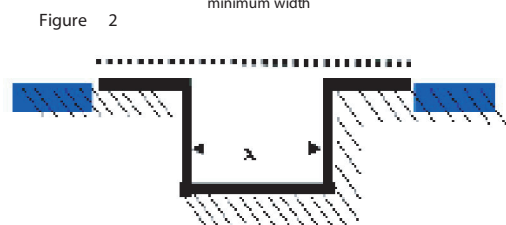
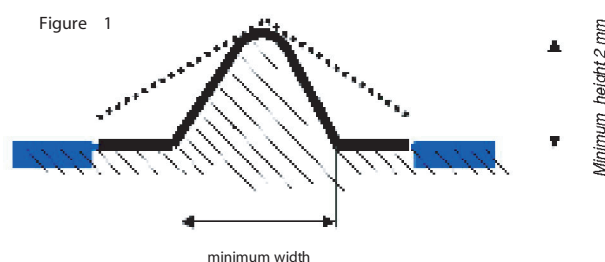
Conductor cross sections are distinguished as metric and American standards.

Metric mm ²	American AWG/kcmil	Equivalent cross-sectional area mm ²
0.2	24	0.205
0.34	22	0.324
0.5	20	0.519
0.75	18	0.82
1	-	-
1.5	16	1.3
2.5	14	2.1
4	12	3.3
6	10	5.3
10	8	8.4
16	6	13.3
25	4	21.2
35	2	33.6
50	0	53.5
70	00	67.4
95	000	85
-	0000	107.2
120	250 kcmil	127
150	300 kcmil	152
185	350 kcmil	177
240	500 kcmil	253
300	600 kcmil	304

AWG : (American Wire Gauge) American standard of measure
 1 kcmil : 1000 cmils
 1 cmil : (1 circular mil) the area of a circle with a diameter of one mil
 1 mil : 1/1000 inch

CLEARANCE AND CREEPAGE DISTANCES

If the corresponding clearance distance is less than 3 mm, the smallest groove width may be reduced to 1/3 of this clearance distance. The measuring methods of clearance and creepage distances are revealed in IEC 60947-1 EK G. Projections decrease the creepages with a high level. Therefore, the clearance which has a projection higher than 2mm can be decreased with 80 percent. (FIGURE 1).

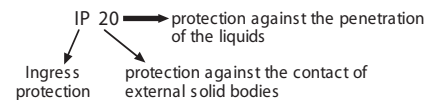


..... CLEARANCE DISTANCES

———— CREEPAGE DISTANCES

DEGREE of SOILING	MINIMUM WIDTH "X" in mm
1	0,25 mm
2	1,0 mm
3	1,5 mm
4	2,5 mm

DEGREES OF IP PROTECTION (IP CODE)



IP FIRST DIGIT - PROTECTION AGAINST SOLID OBJECTS

0	No protection
1	Protection against solid objects up to 50mm, e.g. accidental touches by hands.
2	Protection against solid objects up to 12mm, e.g. fingers.
3	Protection against solid objects over 2.5mm (tools and wires).
4	Protection against solid objects over 1 mm (tools, wires, and small wires).
5	Protection against dust limited ingress (no harmful deposit).
6	Totally protected against dust.

IP SECOND DIGIT - PROTECTION AGAINST LIQUIDS

0	No protection
1	Protection against vertically falling drops of water e.g. condensation.
2	Protection against direct sprays of water up to 15° from the vertical.
3	Protection against direct sprays of water up to 60° from the vertical.
4	Protection against water sprayed from all directions - limited ingress permitted.
5	Protection against low pressure jets of water from all directions - limited ingress permitted.
6	Protection against low pressure jets of water, e.g. for use on ship decks - limited ingress permitted.
7	Protection against the effect of immersion between 15 cm an 1 m.
8	Protection against long periods of immersion under pressure.

REF: IEC 60529 IMO terminals furnish its customers with IP 20 protection.

TORQUE VALUES OF FASTENING

In screw type terminals torque values are important. If the connector is tightened less than the required value, resistance and heating would appear. On the contrary, when extreme force is applied during fastening, the molecular structure of the metal would distort and heating could appear in conclusion. Therefore, if the nominal torque values obtained by IEC are applied, the probable risks would be eliminated.

Torque values based on IEC 60947-1 Table 4;	TORQUE (Nm)		
SCREW DIAMETER VALUES (mm)	I	II	III
Screws with diameters smaller than 1.6 mm	0.05	0.1	0.1
1.6-2	0.1	0.2	0.2
2-2.8	0.2	0.4	0.4
2.8-3	0.25	0.5	0.5
3-3.2	0.3	0.6	0.6
3.2-3.6	0.4	0.8	0.8
3.6-4.1	0.7	1.2	1.2
4.1-4.7	0.8	1.8	1.8
4.7-5.3	1.2	2	2
5.3-6	2.5	2.5	3
6-8	É	3.5	6
8-10	É	4	10
10-12	É	É	14
12-15	É	É	19
15-20	É	É	25
20-24	É	É	36
Screws with diameters bigger than 24 mm	É	É	50

COLUMN I Applied to the headless screws fixing in the cavity and other screws which cannot be fastened by screw-drivers.
 COLUMN II Applied to all screws fastened by screw-drivers.
 COLUMN III Applied to screws and nuts fastened by other devices.

Ref: IEC 60947-1/ IEC 60999-1
 IMO apply security tests to its screw-type terminals with doubled values of IEC torque standards.

Terminal block Technical data

Working voltages on the LED fuse holders as follows:

24v = 12 - 30v

48v = 30 - 60v

110v = 60 - 150v

220v = 110 - 250v

The ERF4 does not need an end plate they are supplied with one fitted.

ERTD2 comes complete with the fuse link