Technical Data

Enclosure	Principle:	Modular aluzinc assembly system
	Basic Module:	126 x 126 x 126 mm
	Degree of Protection:	IP20 to IP54
	Internal Division:	Form 1 to 4
	Contact Resistance of Exposed Conductive Parts:	Max. 1,5 mΩ
Doors	Colour:	TABULA blue, BS 4800 blue or grey RAL 7032.
	Corrosion (standard):	300 hours salt spray test acc. to ISO 7253
	Corrosion (special):	1440 hours salt spray test acc. to ISO 7253
Busbar System	Rated Current:	225 A to 7800 A
	Rated Short-Time Withstand Current:	5,4 kA to 115 kA
	Rated Peak Withstand Current:	46 kA to 253 kA
	Rated Operational Voltage:	690 V (1000 V - special design).
	Insulation Rated Voltage, U_i:	1000 V
	Rated Impulse Withstand Voltage, U_{imp}:	12 kV
	Max. test Voltage, V_{eff}:	3500 V for 1 minute
	Insulation Material:	Material class IIIa. Flammability UL94-V0. Glow wire test, 960°C acc. to IEC 60695-2-1
	Creepage Distances	25 mm phase-phase, 19 mm phase-earth
	Clearances	19 mm phase-phase, 16 mm phase-earth
Draw-out System	Rated Current:	125 A to 630 A
	Rated Conditional Short-Circuit Current:	100 kA
	Rated Impulse Withstand Voltage, U_{imp}:	12 kV
	Max. test Voltage, V_{eff}:	3500 V for 1 minute.
	Max. Fault Current for unit with Earth contact, prospective	50 kA
	Contact Resistance from Tray Bottom to Enclosure:	1,5 mΩ
	Insulation Material:	Material class IIIa. Glow wire test, 960°C acc. to IEC 60695-2-1.
Draw-out System Sliding Contacts	Rated Current, I_n:	16 A
	Rated Conditional Short-Circuit Current with Fuse, I_{cf}:	50 kA
	Rated Impulse Withstand Voltage, U_{imp}:	6 kV
	Max. test Voltage, V_{eff}:	3500 V for 1 minute.
	Insulation Material:	Material class IIIa. Glow wire test, 960°C acc. to IEC 60695-2-1.
Norm Reference	IEC/EN 60439-1	
Aluzinc	20 µm aluzinc coated steel plate. Steel plate according to DIN 1623/1541. Aluzinc coating according to EN 10142.	

Technical Data

Polyester Powder Coating for Doors and Covers

Type Powder coating based on epoxy and polyester resins.

Treatment

1. Degreasing and iron phosphating in three steps
2. Rinsing
3. Chrome passivation by phosphate film (thickness 1-2 µm)
4. Rinsing in de-ionizing water
5. Drying
6. Powder painting
7. Stoving at 200°C/14 minutes

Colour TABULA blue.
RAL 7032 grey.

Quality and Inspection

Coating	DS/ISO 2808	Minimum 50 µm
Cross cut	DS/ISO 2409 and DIN 53151	Better than class 1
Gloss	DS/ISO 2813	50-65 angle: 60º
Folding on cylindrical mandrel	DS/ISO 1519	No peeling above R5
Hardness	Eriksen 291D	3H
Chemical resistance	Xylene	10 strokes without significant set-off

Every single batch are inspected concerning tone, colour and structure by a Minolta chromometer and a light box.
The items are subject to daily inspection of coating thickness.
Saltmist test - 300 hours. Test method according to ISO/DS 7253.

Atmospheric-Corrosivity

Standard	ISO 12944
Corrosion Class	C2 Exterior: Atmospheres with low level of pollution and dry climate. Interior: Unheated buildings where condensation may occur, e.g. depots, sports halls.
Standard	DS 412+DS/R 454.
Corrosion Class	2. Interior at varying humidity. In rural districts far away from industry and high density population.

Maintenance Light and alkaline solvents, which are included in ordinary detergents are used for cleaning.
Polishing agents with "scrubbing" effect can cause marginal scratches if the agent is used during a long period.
If organic solvents are used, they should be tested on a less visible spot before use.

Special Treatment for Aggressive Environment Saltmist test - 1440 hours. Test method according to ISO/DS 7253.

Standard	ISO 12944
Corrosion Class	C5M - High. Interior: Chemical plants, swimming pools, coastal ship- and boat yards Exterior: Coastal and offshore areas with high salinity.
Standard	DS 412+DS/R 454
Corrosion Class	4 (1008 hours) - in constant humid atmosphere, in water and ground. - near chemical industry.
Treatment	Doors and covers are painted two times according to instruction above.

Technical Data

Aluzinc	Saltmist test - 1440 hours. Test method according to ISO/DS 7253.	
Enclosure	Standard	ISO 12944
	Corrosion Class	C5M - High.
	Surface Description	Interior: Chemical plants, swimming pools, coastal ship- and boat yards Exterior: Coastal and offshore areas with high salinity.
	Standard	DS 412+DS/R 454
	Corrosion Class	4 (1008 hours) - in constant humid atmosphere, in water and ground. - near chemical industry.
	Treatment	None. White rust surface and beginning red rust after 1440 h.

Service Conditions

Service Conditions

TABULA is produced for inside installation in accordance with the following service conditions.

Ambient Air Temperature

According to IEC/EN 60439-1 the ambient temperature should be between -5°C and +40°C, however, during a period of 24 hours the average value must not exceed +35°C. TABULA can operate with an ambient temperature down to -20°C, still for in-side installation.
The special instructions of the manufacturers must be followed for build in electronic equipment and measuring instruments etc. Due to increased ambient temperature thermal relays might need adjustment of currents in order to give effective protection.

Atmospheric Conditions

The air is clean and its relative humidity does not exceed 50% at a maximum temperature of +40°C. Higher relative humidities may be permitted at lower temperatures, for example 90% at +20°C. Care should be taken of moderate condensation which may occasionally occur due to variations in temperature. Condensation can be avoided by ventilation or mounting of thermostat-controlled electrical heating element with a heat flow rate of approx. 50 W at the bottom of each switchboard section.

Pollution Degree

The pollution degree refers to the environmental conditions for which the assembly is intended.
For switching devices and components inside an enclosure, the pollution degree of the environmental conditions in the enclosure is applicable. For the purpose of evaluating clearances and creepage distances the following three degrees of pollution in the micro-environment are relevant.

Pollution degree 1:	No pollution or only dry, non-conductive pollution occurs.
Pollution degree 2:	Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation may be expected.
Pollution degree 3:	Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation.

Standard pollution degree of industrial applications: Unless otherwise stated, assemblies for industrial applications are generally for use in a pollution degree 3 environment. However, other pollution degrees may be considered to apply, depending upon applications or the micro-environment.
TABULA is produced for installation in environments of pollution degree 1-3.

Altitude

The altitude of the site of installation must not exceed 2000 m (6600 ft.)
Note - for electronic equipment to be used at altitude above 1000 m it may be necessary to take into account the reduction of the dielectric strength and of the cooling effect of the air. Electronic equipment intended to operate in these conditions should be designed or used in accordance with an agreement between manufacturer and user.

Special Service Conditions

Where any of the following special service conditions exist, the applicable particular equipments shall be complied with or special agreements shall be made between user and manufacturer. The user shall inform the manufacturer if such exceptional service conditions exist. Special service conditions are for example:

- Values of temperature, relative humidity, and/or altitude differing from what is stated above
- Applications where variations in temperature and/or air pressure take place at such a speed that exceptional condensation is liable to occur inside the assembly
- Heavy pollution of the air by dust, smoke corrosive or radioactive particles, vapours or salt
- Exposure to strong electric or magnetic fields
- Exposure to extreme temperatures, for example radiation from sun or furnaces
- Attack by fungus or small creatures
- Installation in locations where fire or explosion hazards exist
- Exposure to heavy vibration and shocks
- Installation in such a manner that the current-carrying capacity or breaking capacity is affected, for example equipment built into machines or recessed into walls
- Consideration of appropriate remedies against electrical and radiated interferences

Storage and Installation

The ambient temperature must be between -25°C and +55°C, however, in periods of less than 24 hours the temperature can reach +70°C without damaging **servicable TABULA switchboards**.
Requirements concerning atmospheric conditions are stated above.

Degree of Protection

Degrees of Protection

The degree of protection for a switchboard concerning access to hazardous parts, solid foreign objects and water is stated with an IP code in accordance with IEC/EN 60529.

First characteristic numeral states the degree of protection against penetration of solid foreign objects and the degree of protection against access to hazardous parts.

Second characteristic numeral states the degree of protection against water.

Additional character states the degree of protection against access to hazardous parts.

Example: IP2XC. In this case 2 indicates that a 12.5 mm access probe shall penetrate, an access probe of 12 mm and a length of 80 mm can penetrate with adequate clearance from hazardous parts. X indicates that there is no demands regarding protection against water, and C allows an access probe of 2.5 mm with a length of 100 mm to penetrate with adequate clearance from hazardous parts. This means that penetration of solid foreign objects is not valid according to the first characteristic numeral when the letter C makes greater demands.

TABULA makes it possible to build enclosures with a degree of protection up to IP54 according to IEC/EN 60529.

First Characteristic Numeral

IP2X TABULA standard design. It is recommended to use gasket in the closing sides of the doors and at the top/bottom of rear covers

IP3X TABULA standard design with gasket at doors and rear covers

IP4X As IP3X

IP5X TABULA standard design with gasket at doors and rear covers. Sealing of corners, joints between enclosure profiles and between possible transport sections by means of silicone rubber - see figure 1 and 4.
Wide gasket or sealing at claw couplings - see figure 2.
Rear cover with height ≤ 8M, 1 bracket in each side, and 2 brackets at each end.
Rear cover with 8M < height, 2 brackets in each side, and 2 brackets at each end.
Flange for cable entry 220A6401 is tightened with silicone-rubber - see figure 3.

Second Characteristic Numeral

IPX1 TABULA standard design with gasket at doors and rear covers. Flange for cable entry 220A6401 is tightened with silicone-rubber - see figure 3.

IPX2 As IPX1.

IPX3 As IPX1, corners additionally tightened with silicone, see figure 1. Transport sections are tightened around busbar compartments with enclosure gasket, see part 9.10 Technical Information.

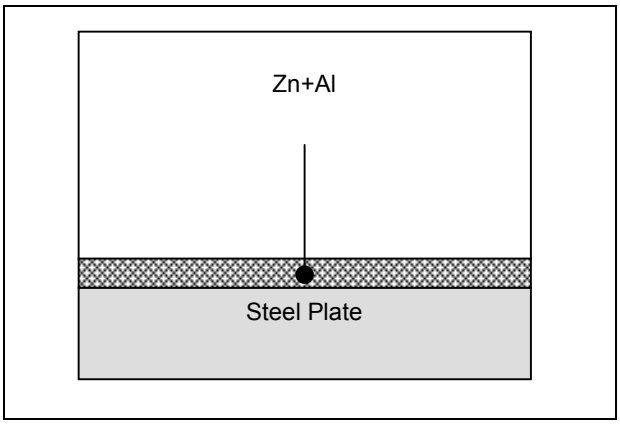
IPX4 TABULA standard design with gasket at doors and rear covers. Flange for cable entry 220A6401 is tightened with silicone-rubber - see figure 3.
Sealings with silicon-rubber at corners and joints between enclosure profiles - see figure 1.
Wide gasket on intermediate profiles or seals over claw couplings - see figure 2.
Transport sections are tightened with silicone - see figure 4.
Rear cover with height ≤ 8M, 1 bracket in each side and 2 brackets at each end.
Rear cover with 8M < height, 2 brackets in each side and 2 brackets at each end.

Additional Letter

Additional Letters A,B,C and D are used to intensify the demand for protection against access to hazardous parts, normally indicated by first characteristic numeral. As the example above additional letter C in IP2XC is a higher demand than IP2X.

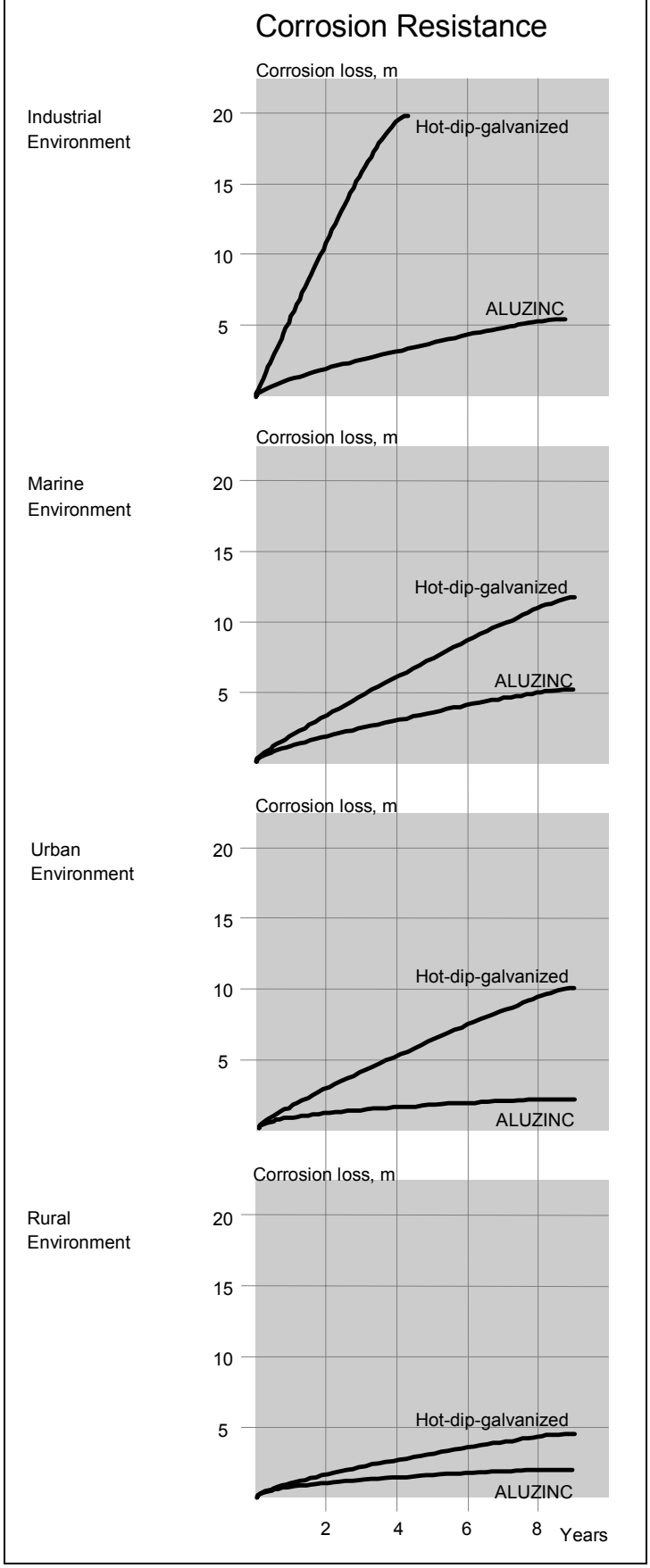
Aluzinc

Aluzinc Steel Plate



Aluzinc

All enclosure parts are produced in aluzinc, which is extremely corrosion resistant.
Aluzinc is a metal-coated steel sheet that combines the best properties of steel, aluminium and zinc. Steel provides strength, aluminium gives protection from corrosion, and zinc safeguards the steel at edges and scratches by virtue of its cathodic action.
The coating consist of 55% aluminium, 43,4% zinc and 1,6% silicon.



TABULA Modules

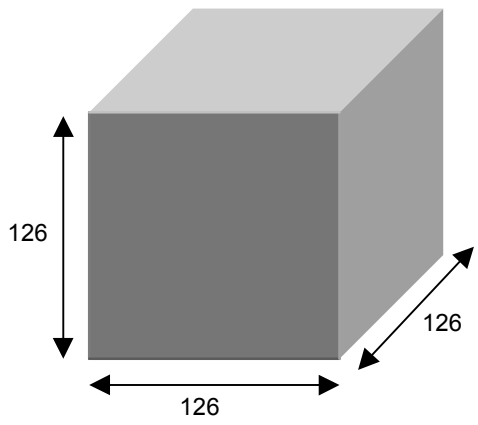


Figure 1. Basic module

Basic Module

TABULA is built by a standardised basic module which measures 126 mm in all three dimensions. This small basic module makes it possible to optimise the dimensions of any switchboard construction.

Assembly Dimensions

Each switchboard section can be assembled in steps of 126 mm in width, height and depth.
The maximum height and width of enclosure profiles is 18 modules (2268 mm). If larger switchboards are required, is has to be built in sections. For installation on the floor, a plinth of 105 mm is added to the height.

Corner Sections

The module system makes it possible to assemble corner sections for L-shaped or U-shaped switchboards.

Standard Dimensions

Module	Width	Height (wall model)	Height (floor model)	Depth
	[mm]	[mm]	[mm]	[mm]
1				176
2	252	252		302
3	378	378		428
4	504	504		554
5	630	630		680
6	756	756		806
7	882	882		932
8	1008	1008		1058*
9	1134			
10	1260	1260	1365	
11	1386	1386	1491	
12	1512	1512	1617	
13	1638	1638	1743	
14	1764	1764	1869	
15	1890	1890	1995	
16	2016	2016	2121	
17	2142	2142	2247	
18	2268	2268	2373	

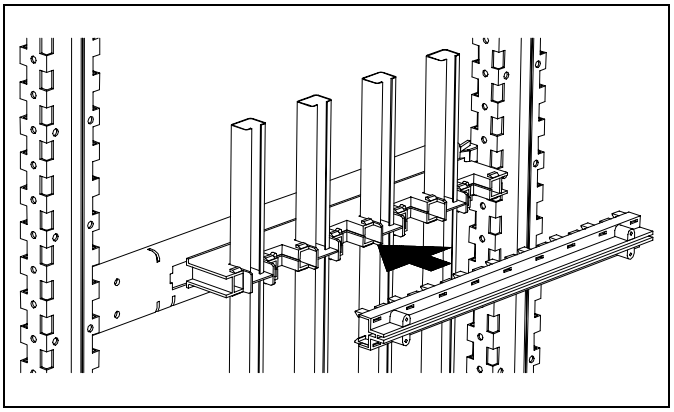
Remarks

If side covers are mounted, 50 mm has to be added in the width.

The depth are including front door and back cover.

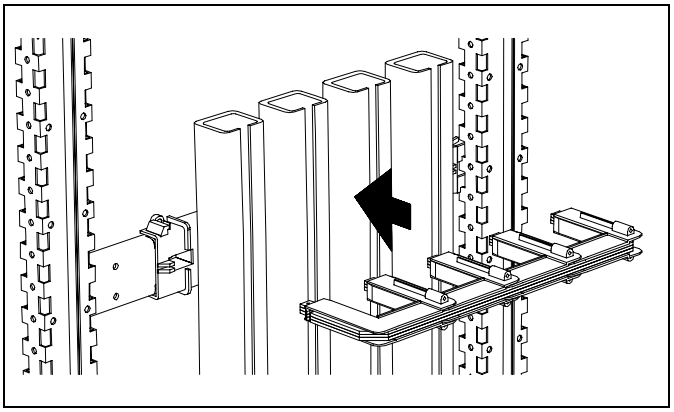
*No limit - can be extended further.

Vertical Distribution Busbars



C225

Busbar type C225 with the outer dimensions of 17x13 mm is used for currents until 250 A. The same busbar is produced with flat-quick connectors for maximum 32 A.
The flat-quick connection is fully type-tested including thermal, dielectrical, mechanical and vibration test.

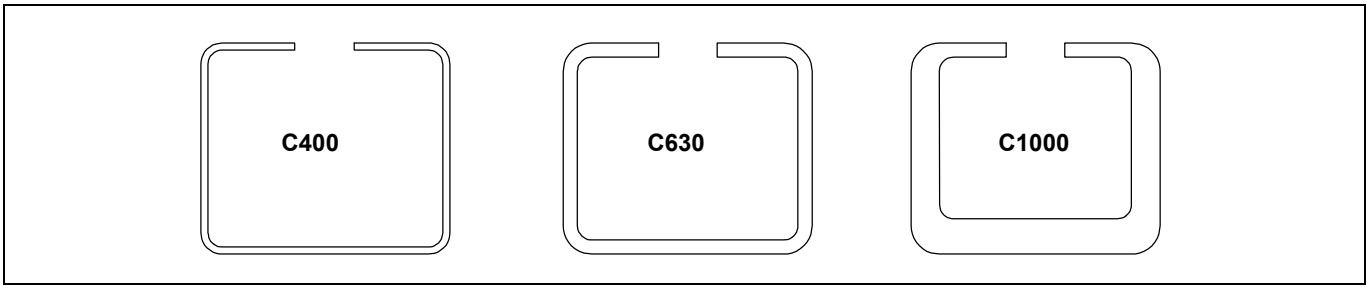


C400, C630 and C1000

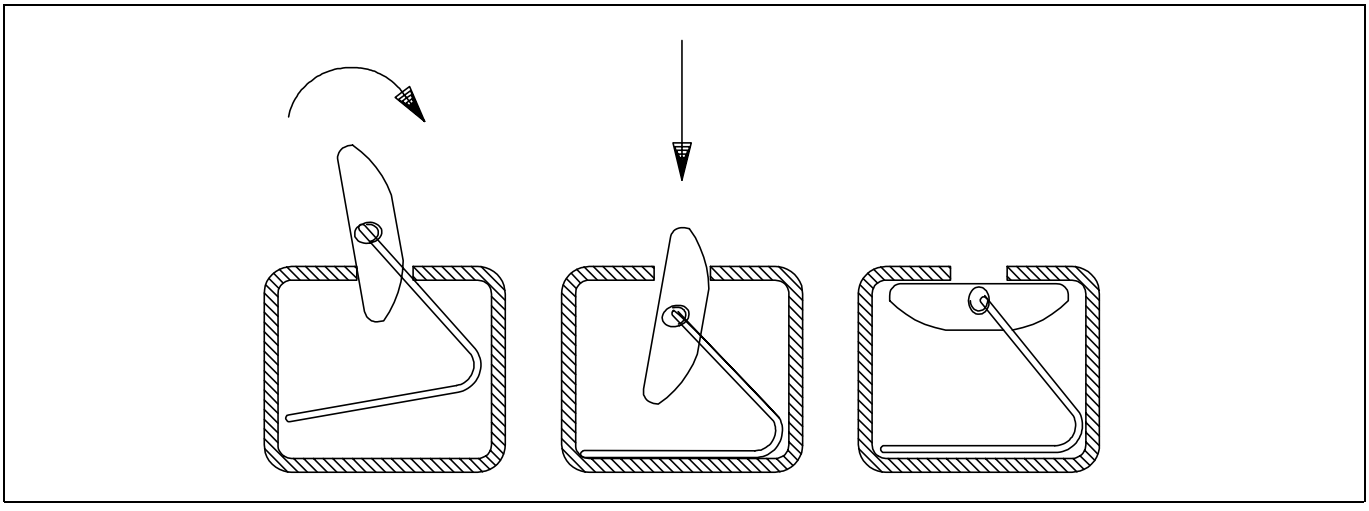
Busbars types C400, C630 and C1000 all with the outer dimension of 30x35 mm are used for currents from 400 - 1700 A.

Optimised Current Density

The C-shaped vertical busbars minimises the skin-effect, resulting in a high current density, i.e A/mm².

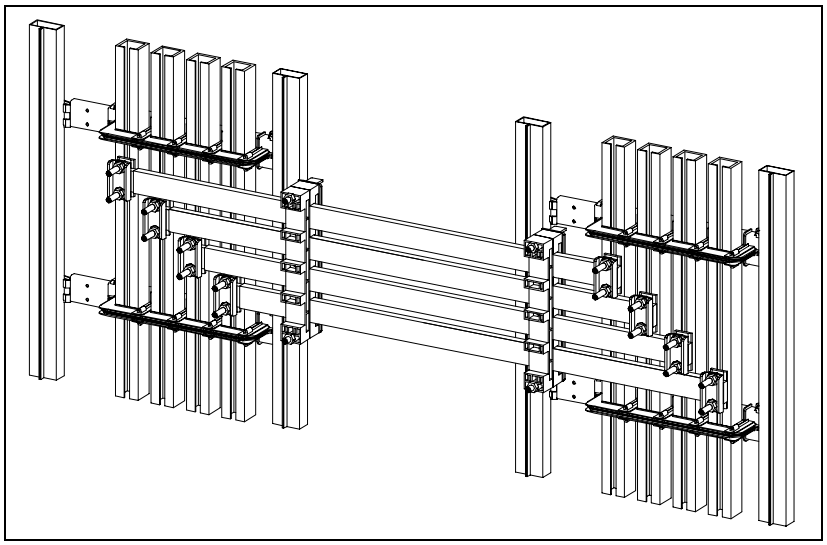


The spring nut in the TABULA system offers high mounting flexibility on the same time.



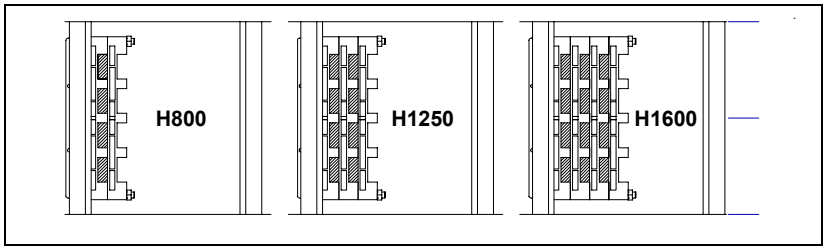
Horizontal Main Busbars

800 - 2500 A



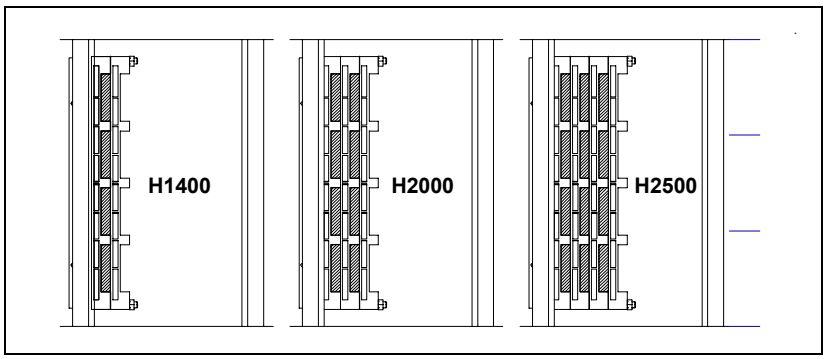
H800-H2500

This busbar system cover the range from 800 to 2500 A. The mounting time is minimised in this system, there is no need for drilling holes in the busbars, which among other things means a large reduction in mounting time. There are two busbar dimensions, 30x10 mm and 60x10 mm.



H800 - H1600

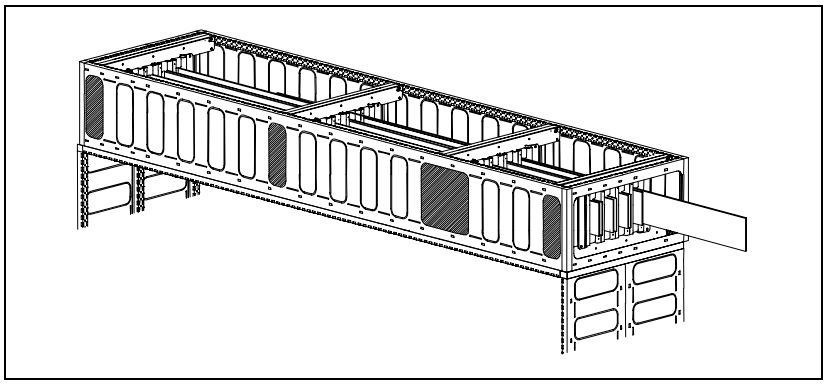
These main busbars with the dimensions 30x10 mm are built up in one, two and three parallel busbars for 800, 1250 and 1600 A.



H1400 - H2500

These main busbars with the dimensions 60x10 mm are built up in one, two and three parallel busbars for 1400, 2000 and 2500 A.

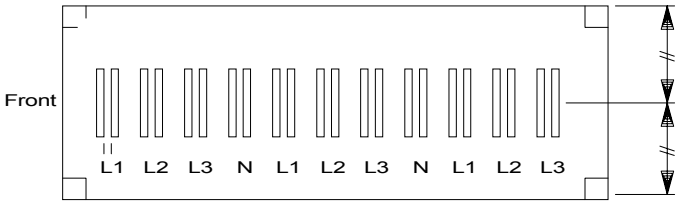
3000 - 7800 A



B3000-B7800

The system is mounted in a separate 2M high compartment in the switchboard, either in the top (standard) in the middle or in the bottom.

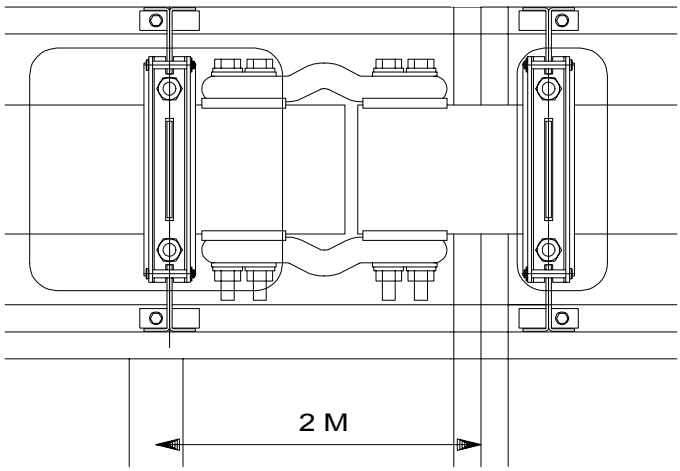
Horizontal Main Busbars



Type B3000	4 - 2 // 10 x 100	D 3 M
Type B5500	7 - 2 // 10 x 100	D 4 M
Type B7800	11 - 2 // 10 x 100	D 6 M

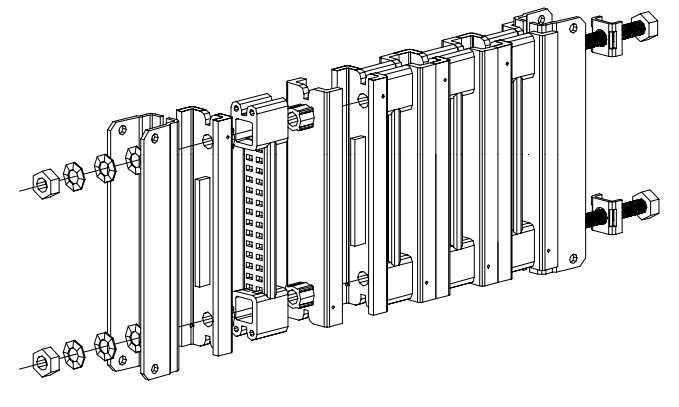
Configuration

The system is increased in the depth from 3000 A to 5500 A and again for 7800 A. The busbar support and the connections to the vertical distribution busbars is the same for the whole range.



Transport Sections

The maximum width for sections is 18 modules, after which the switchboard is assembled in sections. The connection between sections is flexible to ensure a proper connection on the site.



Busbar Support

The busbars support is typetested to withstand short-circuit current up to 253 kA. The limit for the strength of the support is unknown as the bending of the copper bars is the limiting factor during the short-circuit test of this busbar system.

Short-circuit Data

Horizontal Main Busbars

Type	Configu-ration	Rated Current In [A]	Area As [mm²]	Dimension [mm]	Peak Current Ipk [kA]	Withstand Current Icw [kA]	Time t [s]	Let-Through Energy I²t [A²s·10⁶]
B250		260	51	17x3	49	24	0,05	29
B400		420	102	2//17x3	54	28	0,07	54
B550		550	153	3//17x3	54	28	0,07	54
H800		860	300	30x10	97	36	1,00	1296
H1250		1400	600	2//30x10	121	50	1,00	2500
H1600		1800	900	3//30x10	143	65	1,00	4225
H1400		1450	600	60x10	105	50	1,00	2500
H2000		2000	1200	2//60x10	132	60	1,00	3600
H2500		2500	1800	3//60x10	165	75	1,00	5625
B3000	3	3500*	2000	2//100x10	203	91	1,00	8281
	4				138			
B5500	3	6500*	4000	2x2//100x10	253	115	1,00	13225
	4				227			
B7800	3	7800	6000	3x2//100x10	253	115	1,00	13225
	4				253			

*For closed version till IP54 3000 A and 5000 A

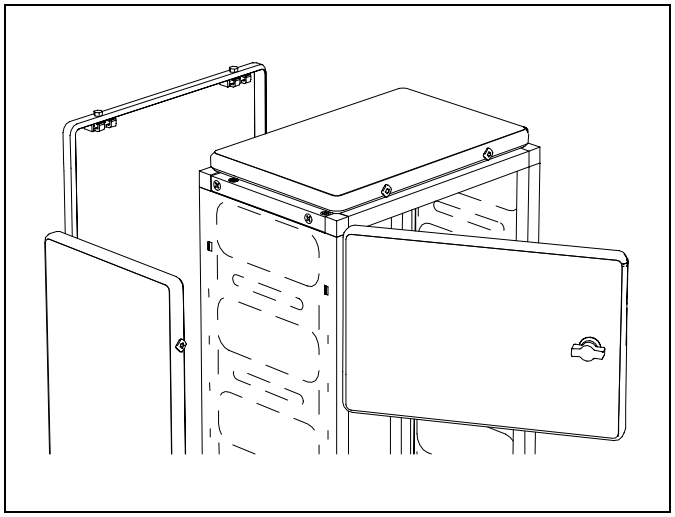
Vertical Distribution Busbars

Type	Configu-ration	Rated Current In [A]	Area As [mm²]	Dimension [mm]	Peak Current Ipk [kA]	Withstand Current Icw [kA]	Time t [s]	Let-Through Energy I²t [A²s·10⁶]
C225	1	225	35	C17x13x0,8	49	24	0,05	29
C225	2				33			
C225	3				26			
C400	2f	570	113	C35x30x1	86	20	1,00	416
C400	3f				60			
C400	2				54			
C630	2f	800	217	C35x30x2	111	33	1,00	1089
C630	2				84			
C630	3				79			
C1000	1f	1100	402	C35x30x4/5	200	50	1,00	2500
C1000	2f				161			
C1000	3				135			
C1600	2	1700	804	2//C35x30x4/5	200	91	1,00	8281
C1600	3				176			

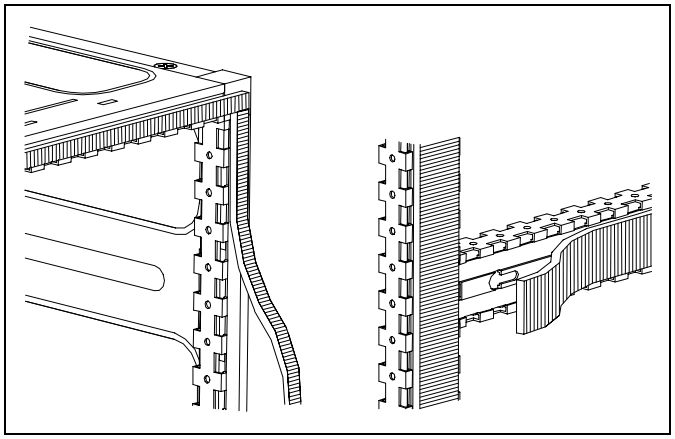
1: Busbar Support Distance 1M
2: Busbar Support Distance 2M
2f: Busbar Support Distance 2M, Enforced
3: Busbar Support Distance 3M
3f: Busbar Support Distance 3M, Enforced

For design and dimensioning, further details are found in part 4.30 and 4.50 of Technical Information.

Doors and Covers

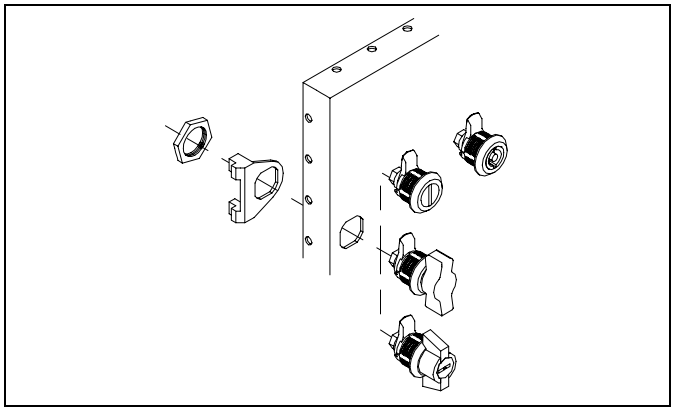


Within the TABULA system the same basic elements can be used for both doors and covers. 1.5 mm cold-rolled steel plates with all-welded corners ensures high stiffness and stability against torsion. Large doors for high component density switchboards are available with extra stiffness.
Both rear side, top, right and left side of the switchboard can be assembled with cover.
For module size of doors and covers, please see the TABULA catalogue.



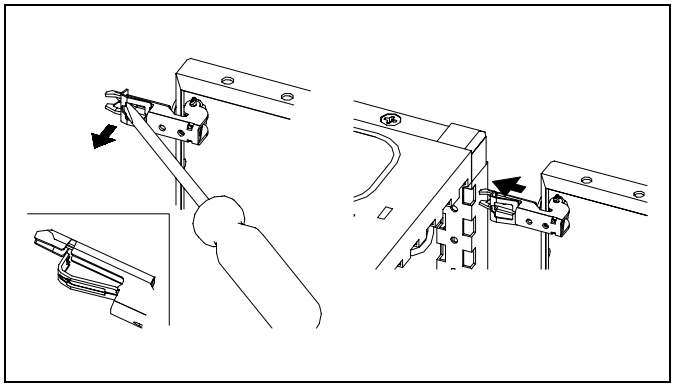
Door Gasket

For IP codes higher than IP20, the door gasket is fitted. It is possible to tighten the system to IP54 category 2 with gasket and other means. Further information Technical Information part 3.20.



Door Catch

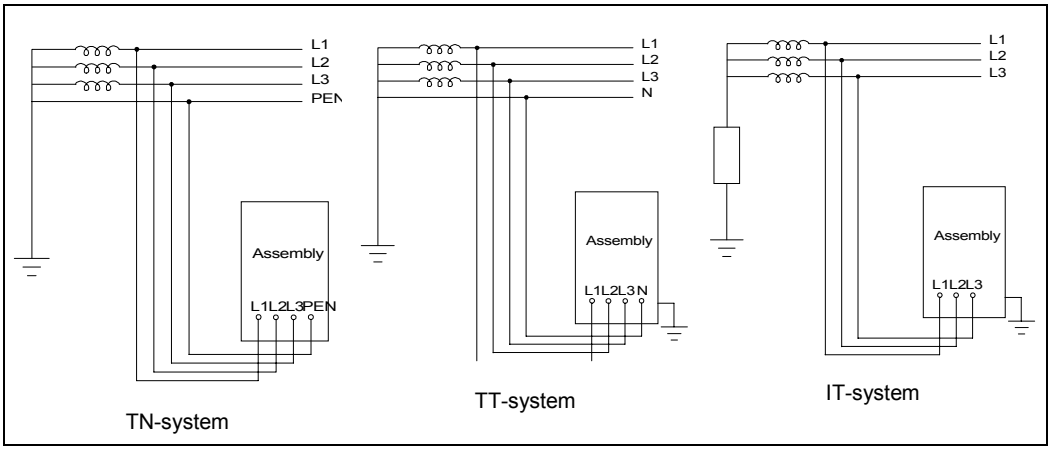
There are different types of front mounted door catches for key DIN 3, with triangle, slot or handle.
Please, see the TABULA catalogue for further information.



Door Hinge

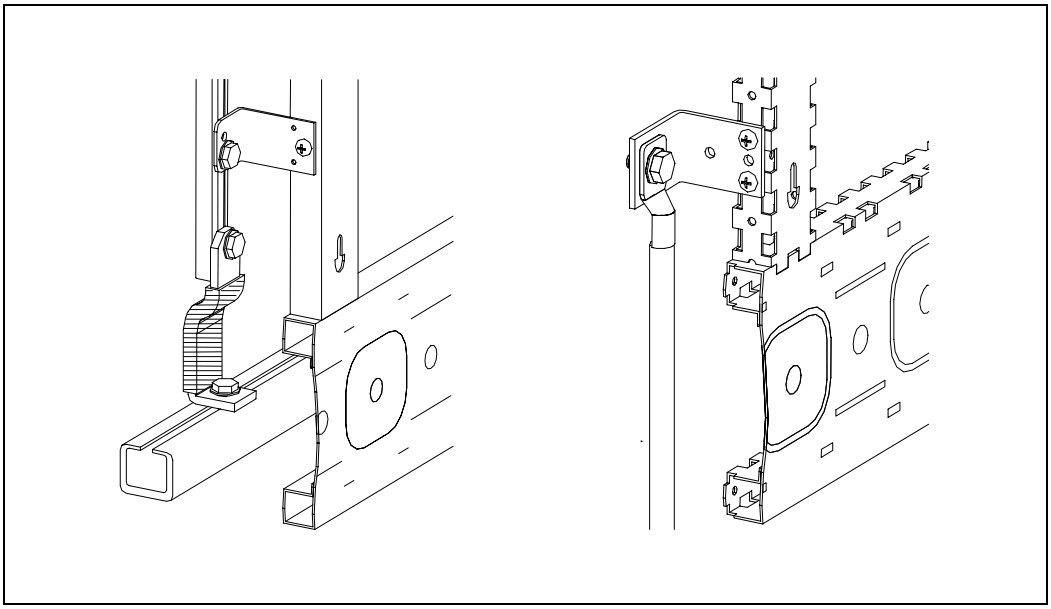
The hinges are fast to mount and remove with a screwdriver. Maximum opening angle is 95°.
The hinge are short-circuit tested to carry earth fault currents, please see Technical Information part 5.30.

Protection against Electric Shock



Supply Systems

The high conductivity of the aluzink enclosure ensures the best protection against indirect contact in all supply systems.
The TABULA enclosure resistance is verified through short-circuit tests not to exceed 0,5 mΩ.



Earth Busbars

All vertical busbars can be mounted as earth conductors in the switchboard. The short-circuit strength is verified to withstand extremely high fault currents.

Enclosure Earth

If the switchboard is protected with a maximum fuse of 250 A or an MCCB with similar or smaller breaking data, no earth busbars is needed for prospective short-circuit currents up to 50 kA. The enclosure frame can withstand the full earth fault current.

PE/PEN-busbar	Cross section [mm²]	I_{cw} [kA]	I_{pk} [kA]	I^2t [$A^2s \cdot 10^6$]
C225	35	24,2 - 0,05 s	49	29
C400	113	27 - 0,57 s	57	416
C630	217	40 - 0,39 s	84	625
C1000	402	44 - 0,32 s	92	625

For design and dimensioning, please se part 5.30 of Technical Information

MCCB

The MCCB connection plinth for outgoing units are rated to 400 A as standard. They are prepared for thermographic maintenance, as the primary connections are accessible from the front. The horizontal mounting makes it an optimised solution for minimum use of space.

Dimensioning

It is important to consider the technical data of the MCCB during the dimensioning of main- and distribution busbars concerning current rating and short-circuit level. A higher prospective short-circuit current can be the criteria for the choice of busbars, and thereby cause that the busbars are chosen with a higher current rating than necessary.
It is in those cases of great importance to consider the use of a current limiting MCCB.
According to IEC/EN 60439-1, a section, including distribution busbars, must be designed to withstand the reduced short-circuit stresses on the load side.
Thus, the use of a current limiting MCCB will reduce the demands for distribution busbars and connecting plinth to the MCCB.

Horizontal Mounted Outgoing Units

The MCCB is placed on mounting plates and z-consoles with a connecting plinth which establishes connection to the vertical distribution busbars C400-1000. There are two mounting principles:

1: One breaker per connection plinth - cable compartment to the left side.

2: Two breakers per connection plinth - cable compartment to the left side and right side. The total rated current for the two breakers must not exceed 250 A. (Be aware of the short-circuit clearances prescribed by the MCCB manufacturer in this configuration)

The mounting with z-consoles and mounting plates meets as standard the following form separations:

Principle 1: form 2-4a.

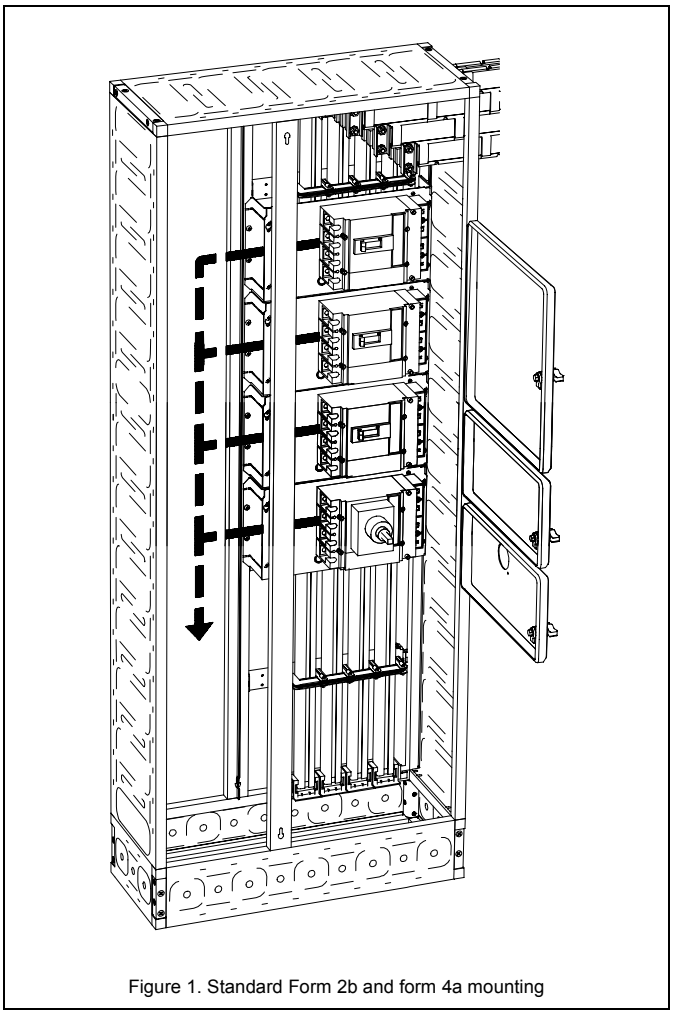


Figure 1. Standard Form 2b and form 4a mounting

Principle 2: form 2b.

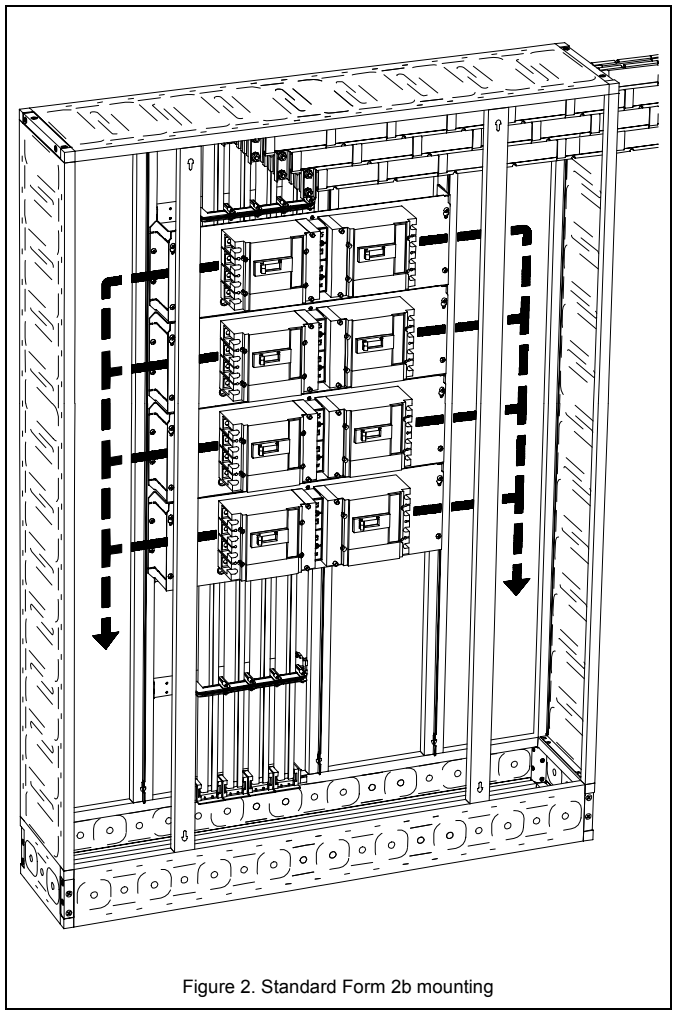


Figure 2. Standard Form 2b mounting

The connection part consists of an insulation part with copper connections to the vertical busbars. There are two types with the following maximum current ratings:

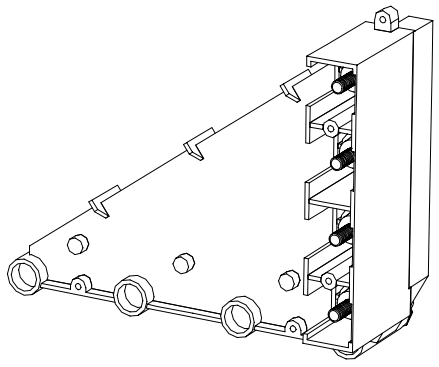


Figure 3. MCCB connection part

1: Up to and including 250A

2: Above 250A up to and including 400A

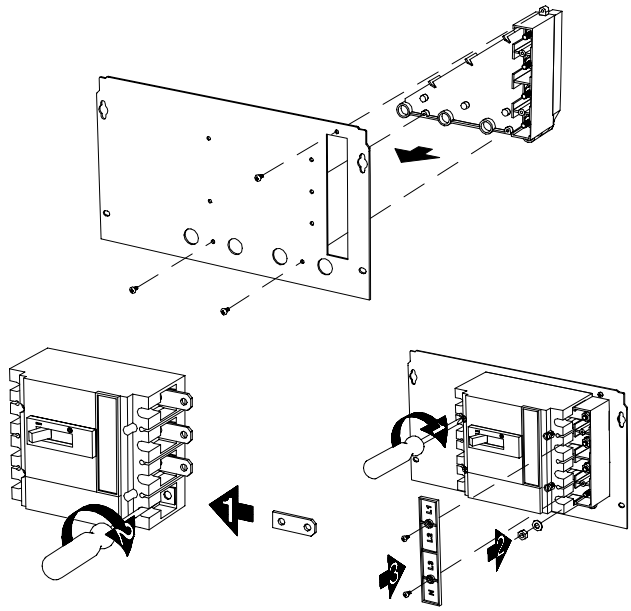


Figure 4. Mounting of breaker on connection part

The connection part is mounted on the mounting plate, where the breaker is mounted horizontally (pay attention to the screw lengths for mounting the breaker, as they must not interfere with the insulation part).
The connection between breaker and connection part is done with terminals or a short piece of cable and a cable lug.

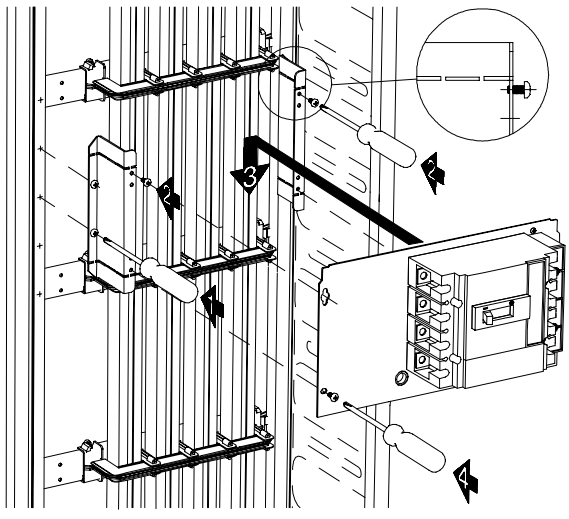


Figure 5. Mounting of mounting plate with connecting part

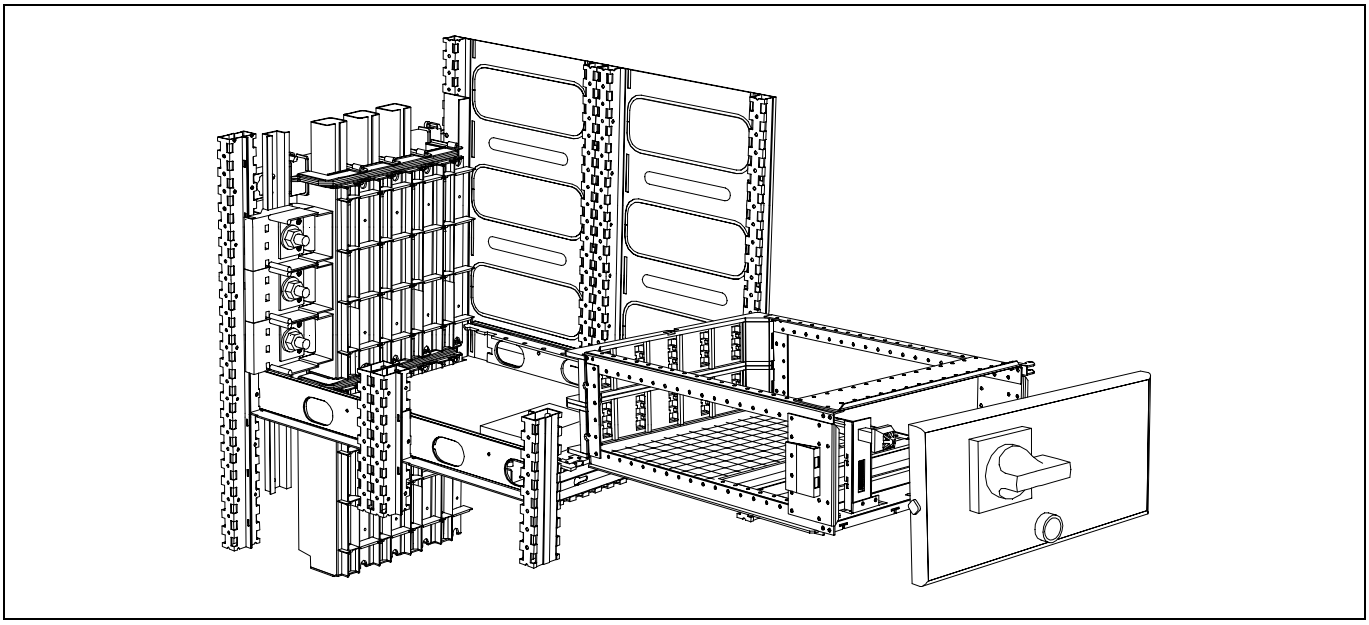
The mounting plates are designed with a keyhole for direct mounting on the z-consoles.

There are two types of mounting plates:

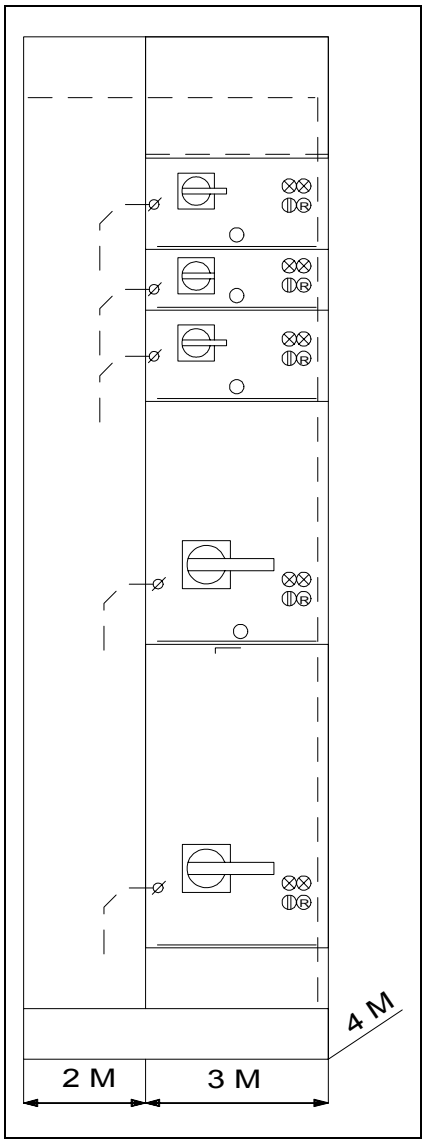
1: Mounting plates with holes for certain MCCB labels.

2: Mounting plates without holes for individual mounting of breakers (in those cases the guidelines from the MCCB manufacturer must be considered carefully) Relevant dimensions can be found in section 7 of the TABULA Assembly Drawings.

Draw-out



Draw-out System Characteristics



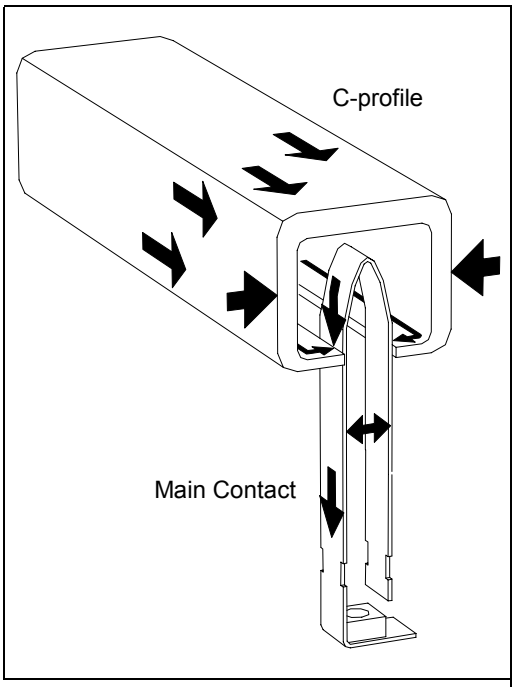
Compartment Sizes
The draw-out units have a standard width of 3 modules and can be built in the heights of 1, 1.5, 2, 3, 4, 5 or 6 modules.

Main Currents
Main current range from 32 A - 630 A.
The section is supplied from the vertical distribution busbars with currents up to 1600 A.

Standard Positions
All standard positions *connected, test, disconnected* and *removed position* are built in the system. Additionally, each draw-out unit can be mechanically coded to ensure correct placement after it has been removed. It can be locked in both test and disconnected with a padlock.

Interlocking System
The interlocking system ensures that a draw-out unit cannot be brought out of *connected position* without switching the main breaker off.

Degree of Protection
Removing a draw-out unit leves the distribution busbar with an IP20 screening. A closed draw-out switchboard can be prepared for IP54.



Main Contact
The rear side of the draw-out units are equipped with a spring loaded contact system, which ensures a high contact pressure. The main contact is designed to increase the contact pressure due to the electromagnetic forces during a short-circuit fault.
Main contacts current are the following.
1 Contact = 125 A
2 Contacts = 250 A
3 Contacts = 400 A
6 Contacts = 630 A

List of References

Country/Project:

Argentina
- Philip Morris
- Shell C.A.P.S.A

Australia
- Alice Springs Fire Station
- Convention Centre
- H.M.A.S. Harman
- State Bank

Austria
- Bleckmann
- Eisenw. Sulzau
- Milchhof Salzburg

Bahrain
- Bahrain Islamic Bank Headquarters
- BATELCO Headquarter Building
- Salmannya Medical Centre
- SEEF Mall Shopping Centre

Belgium
- Credit Communal de Belgium Bank
- EEC Building
- Pfizer Pharmaceuticals
- Stib Metro Bruxelles

Brazil
- Petrobrass

China
- Cement Works, (FLS Industries)
- Du Pont Factory
- Jing Guang Centre
- Ricoh Factory Phase II and III

Denmark
- Carlsberg Breweries
- Cheminova
- Copenhagen Airport, Station Terminal
- DSC Communications
- KARA Waste Incinerator Plant
- Kontek Interconnection
- Lucent Technology
- Maersk Container Industry
- Ministry of Foreign Affairs
- Novo Nordisk
- Panum Institut
- Power Plants, Asnæsværket, Studstrupværket, Skærbæk-værket and Amagerværket
- Railway Station Centre, Odense
- Skejby Hospital
- Telia
- The National Museum of Art
- The National Serum Institute
- Tulip International
- Unibank, Main Division

England
- ASDA Superstores
- British Oxygen Company
- British Telecommunication

Country/Project:

England
- Catterick Army Garrison
- CIBA, Pharmaceutical Company
- INSPEC, International Speciality Chemicals
- North-Western Electricity Board
- Selfridges, Department Stores
- Unipart, Parts for Automobile Industry
- Wilkinson DIY Warehouses

Faroe Islands
- New Buildings No. 32 & 32, P/F Thorshavn

Finland
- Slaughterhouse, Huittnen
- Wood Processing Industry
- Wooden Floor Industry

France
- BFCM Bank, Strasbourg
- CEA, Nuclear Plant
- Euro Information (94 Fontenay)
- Eurostyle, Chemical Industry
- Paris Airport
- Rohm & Haas
- Sante Public, Hospital

Germany
- 'Alexander von Humbolt'
- 'MS Antares'
- 'Ubena Von Bremen' (Hansa Kogge Nachbau)
- Deck Cargo Barge, Baltic Shipping Co., Lenningrad
- Dr. Oetker Company
- Gas & Electic Power Station, Cologne
- Hotel St. Raphael, Hamburg
- Neubau 600, Oelkers Werft Hamburg
- Segelschulschiff 'SSS Gorch Fock'
- Television Tower, Berlin
- Wasserwerk Stellinger Moor, Hamburg
- WDR, Radiostation

Greenland
- Fishing Industry, Aasiat

Holland
- 3 Hopperdredgers, Thailand
- Atlas Copco
- Beatrix Hospital
- Coca Cola
- Dredgers, China
- Hopperdredgers, HAM 311, "Pearl River"
- Max. Planck Institut
- Philips, Apeldoorn and Einhoven
- Princess Beatrix
- Schiphol Airport
- Survey Vessel 'Tridens'
- Texaco/Chrevon Laboratory

Hong Kong
- Drainage Service Dept., Flood Water Pumping Station
- French International School
- Hong Kong Aircaft Engineering Company Ltd.
- Hong Kong Special Adm., Central Goverment Office Building

List of References

Country/Project:

Hong Kong
- Hong Kong Special Adm., Centralized Goverment Godown
- Hong Kong Special Adm., District Police Station
- Hong Kong Special Adm., Kwai Chung Provissional School
- Hong Kong Special Adm., Sai Ying Pun Market
- Hong Kong Telecom
- Japanese International School
- Kimberley Road Hotel
- Kowloon Motor Bus
- Matilda & War Memorial Hospital
- Pearl Island Residential Building
- Singleton Hostel
- Wellcome Supermarket, Fresh Food Processing Facility

Iceland
- Cement Works
- Coca Cola Nordic Breverages A/S
- Dairy, Flóamanna
- Fishmeal Plants, Seyöisfjödur, Helguvik, Raufarhöfn and Siglufjördur
- Hydro Power Plants, Búrfell and Sog
- Nesjavellir, Geothermal Power Plant
- Reykjavik Municipal Hospital

Iran
- Alvan Sabet Project
- National Iranian Steel Company

Iraq
- Ministery of Electricity and Water

Ireland
- Aer Lingus Dublin
- Dublin Airport
- Dublin Castle
- Masonite, Timber Processing
- Merfin, Medical Manufacturing
- Quarryvale, Shopping Centre
- Tallaght Hospital
- Trinity College, Dublin

Italy
- ACEA, Electricity Distribution of Roma City
- Ceramics Production
- Italian Railways
- Italian Telecom
- NATO Base
- New University, Firenze
- Refining Plant, Snamprogetti
- Rimini Airport
- Texas Instrument

New Zealand
- Alpine Dairy
- APV NZ Ltd.
- Ashburton Sub Station
- Benmore Power
- Broadcast Communications Ltd.
- Hornby Cold Store
- Linton Military Camp
- Milburn NZ Ltd.
- Nelson Hospital

Country/Project:

New Zealand
- P&O Cold Stores
- PPCS Canterbury
- Solid Energy
- Tiwai Point Aluminium Smelter

North Ireland
- Department of the Environment, Water Treatment

Norway
- Coca Cola Nordic Breverages A/S
- Maersk Giant, Oil Rig
- Norcem
- Norsk Hydro, Aluminium Plant
- Norsk Hydro, Magnesium Plant
- Oslo Airport, Parking House
- Power Plant, Uvdal
- West Avion, Oil Rig

Poland
- Cementownia Ozarów
- Centrum Uslug Satelitarnych w Psarach
- Elektrocieplownia Bydgoszcz
- Elektrocieplownia Gdansk
- Elektrocieplownia Gdynia
- Elektrocieplownia Tychy
- Hevelius Brewing Co. Gdansk
- Oczyszczalnia Scieków - Slawno
- Oczyszczalnia Scieków - Slupsk
- Rybnik Power Station
- Zaklady Azotowe Pulawy
- Zaklady Cementowo - Wapiennicze Górazdze
- Zaklady Chemiczne Police

Portugal
- Airport in Ponta Delgada
- Airport in Porto Santo
- Caixa Geral de Depósitos New Headquarters Building
- Historical Archive of Torre do Tombo Informatics' Center of TAP
- Imprensa Nacional Casa da Moeda
- Lisabon Airport
- Navy Base in Lisbon
- Propane Station Air - Gas of Portugal
- Shopping Center Continente Alfragide
- Technical Institute

Russia
- Bridge over Moscow River
- Central Bank, Moscow
- Coca Cola
- Hotel Olympia, Moscow

Scotland
- North of Scotland Water Authority
- Tait Paper, Paper Mill

Singapore
- Apollo Centre
- Fraser & Neave Electrical
- Jurong Town Corporation
- Phoenix Tower

List of References

Country/Project:

Slovak Republic
Vojany Power Station

South Africa
Mercedes-Benz
SAPREF

Spain
Petronas

Sultanate of Oman
Oman Min. of Def.

Sweden
Akademiska Hus
Boliden / Trelleborg
Electrolux
Ericsson
Karolinska Hospital
McDonalds
Perstorp
Pharmacia
Pripps Breweries
Statoil
SAAB, Trollhättan
Vattenfall
Öresund Bridge

U.A.E.
Amir Flight Building, Abu Dhabi
Chicago Beach Resort Development, Dubai
Dubai Aluminium
El Rashid Hospital
Hamarain Center
Marriot Hotel, Dubai
National Bank of Fujairah, Dubai
New Hilton Beach Club
Star Energy Resources, Dubai
Swimming Pool Facilities at Ruler's Palace

Ukraine
Coca Cola

Country/Project: