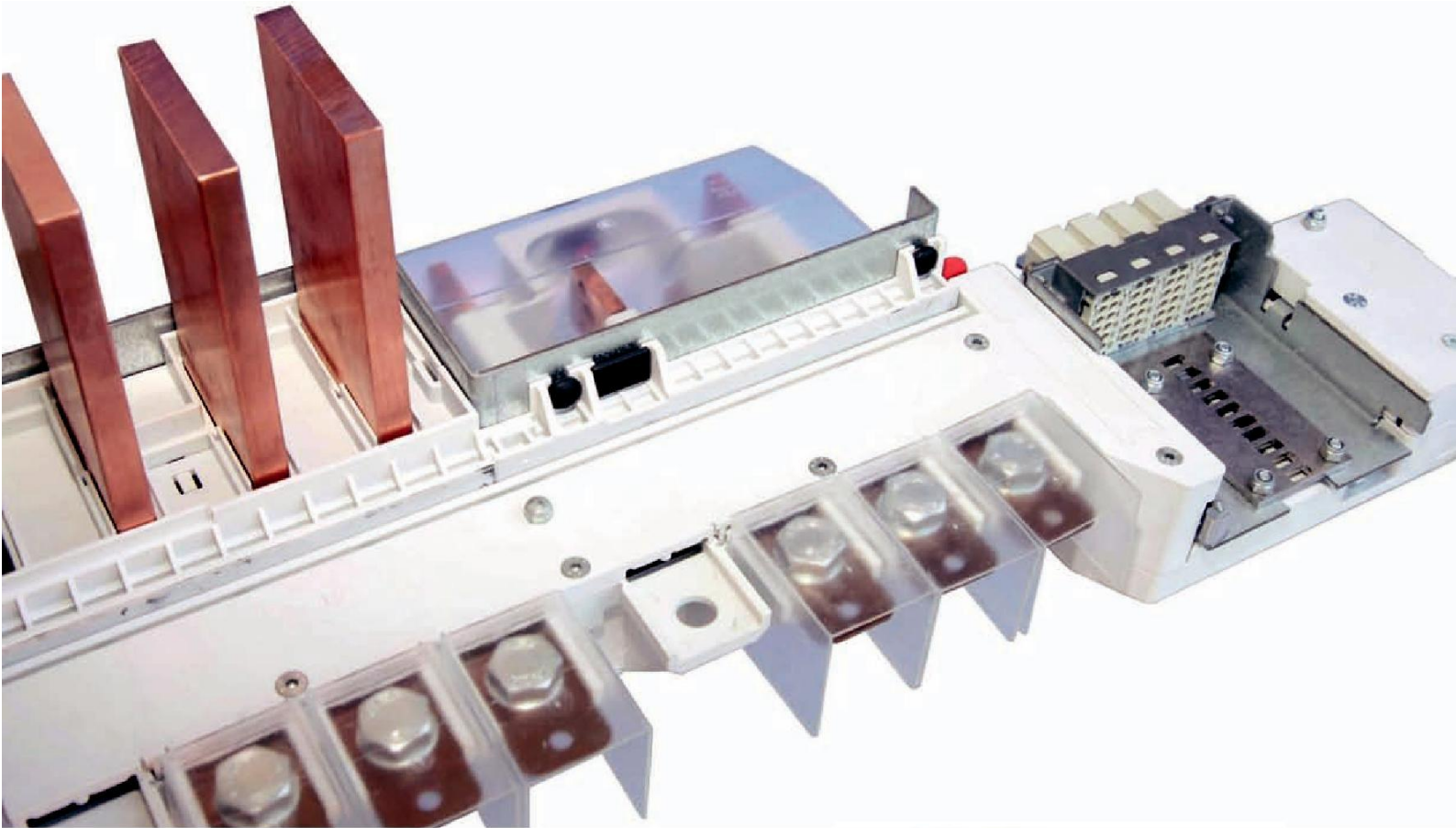
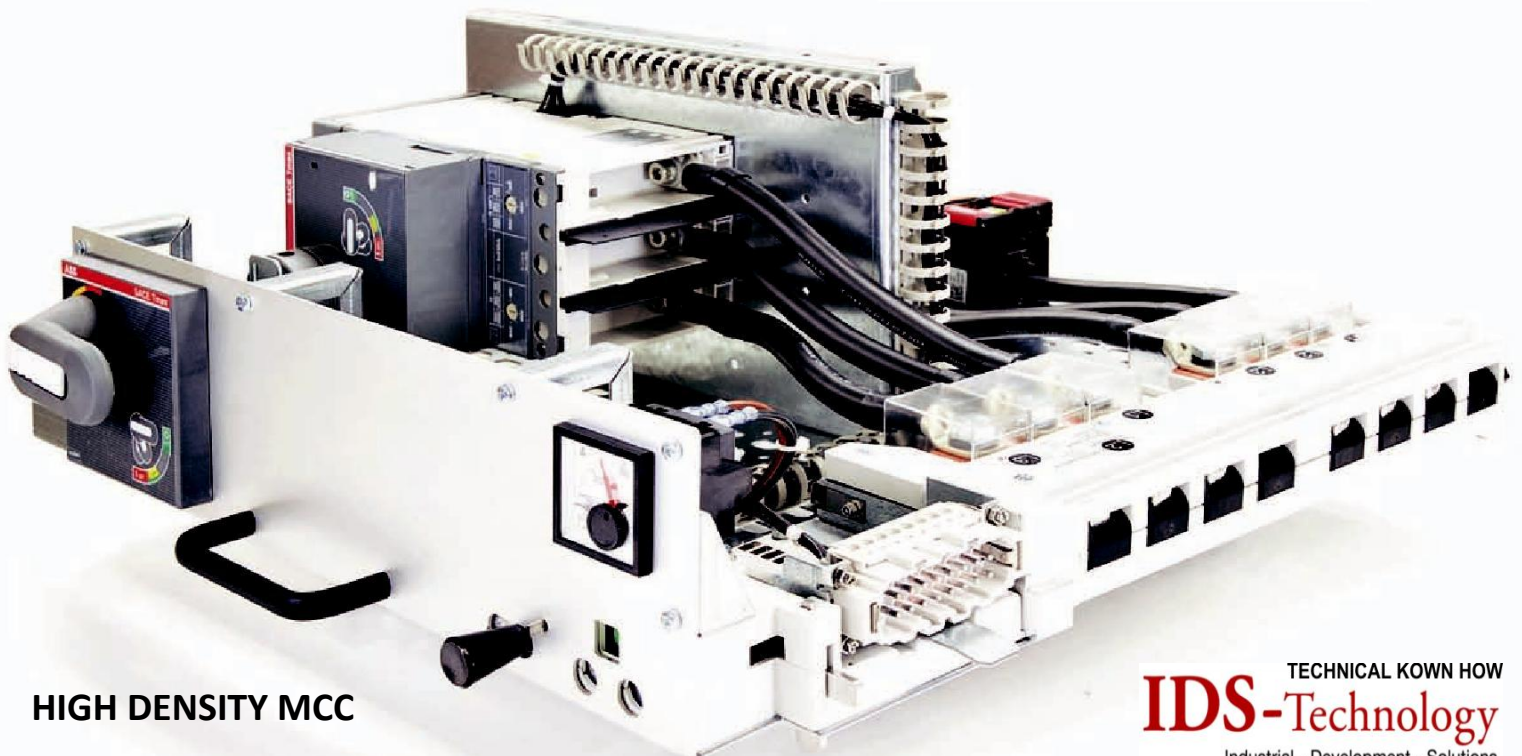


-highest availability is our philosophy | safety is a must

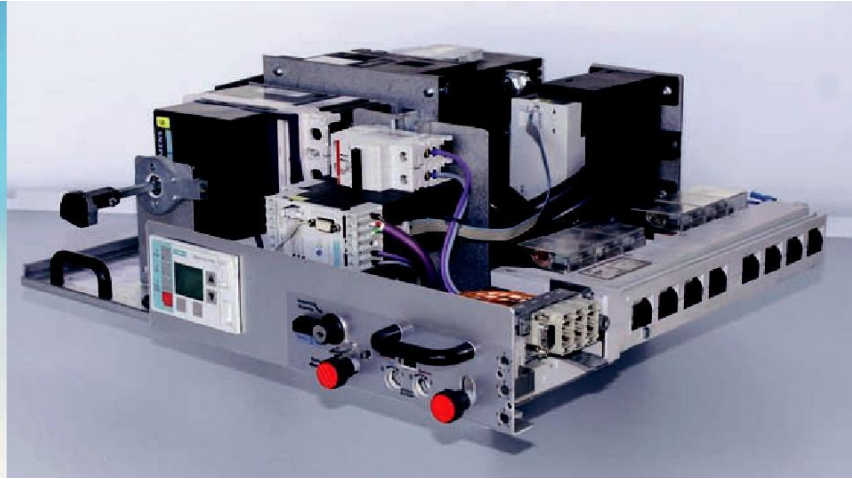
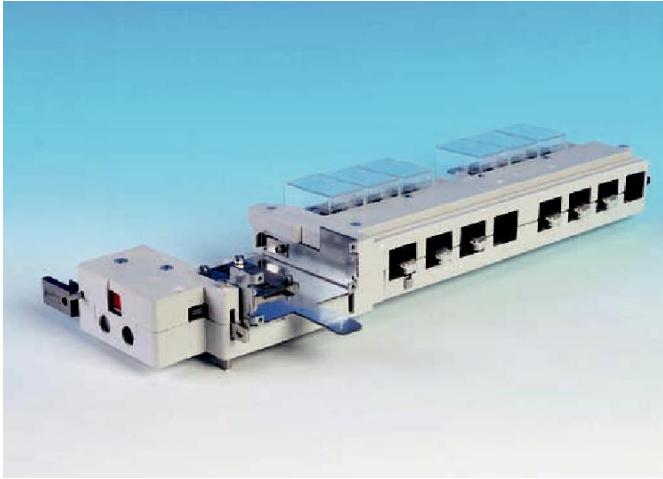


LV-Contacting-module up to 690V; 630A
Fully withdrawable and plug-in type

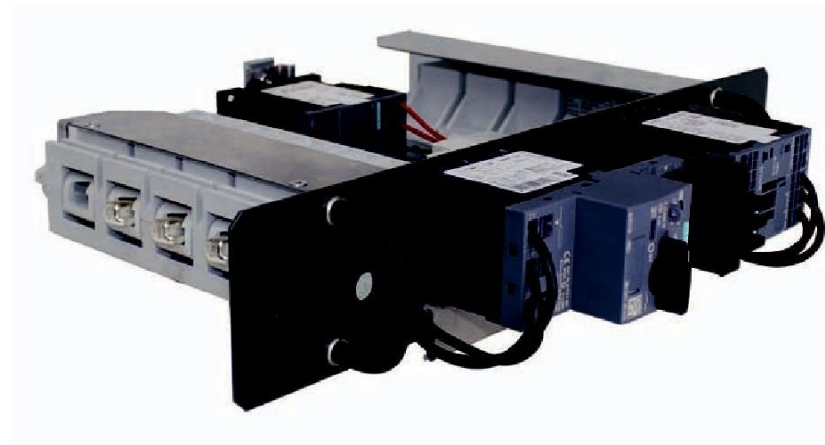


HIGH DENSITY MCC

–highest availability is our philosophy | safety is a must



Fully withdrawable type



Plug-in-type; Semi-withdrawable-type

HIGH DENSITY MCC

–highest availability is our philosophy | safety is a must –



arc-fault free zone

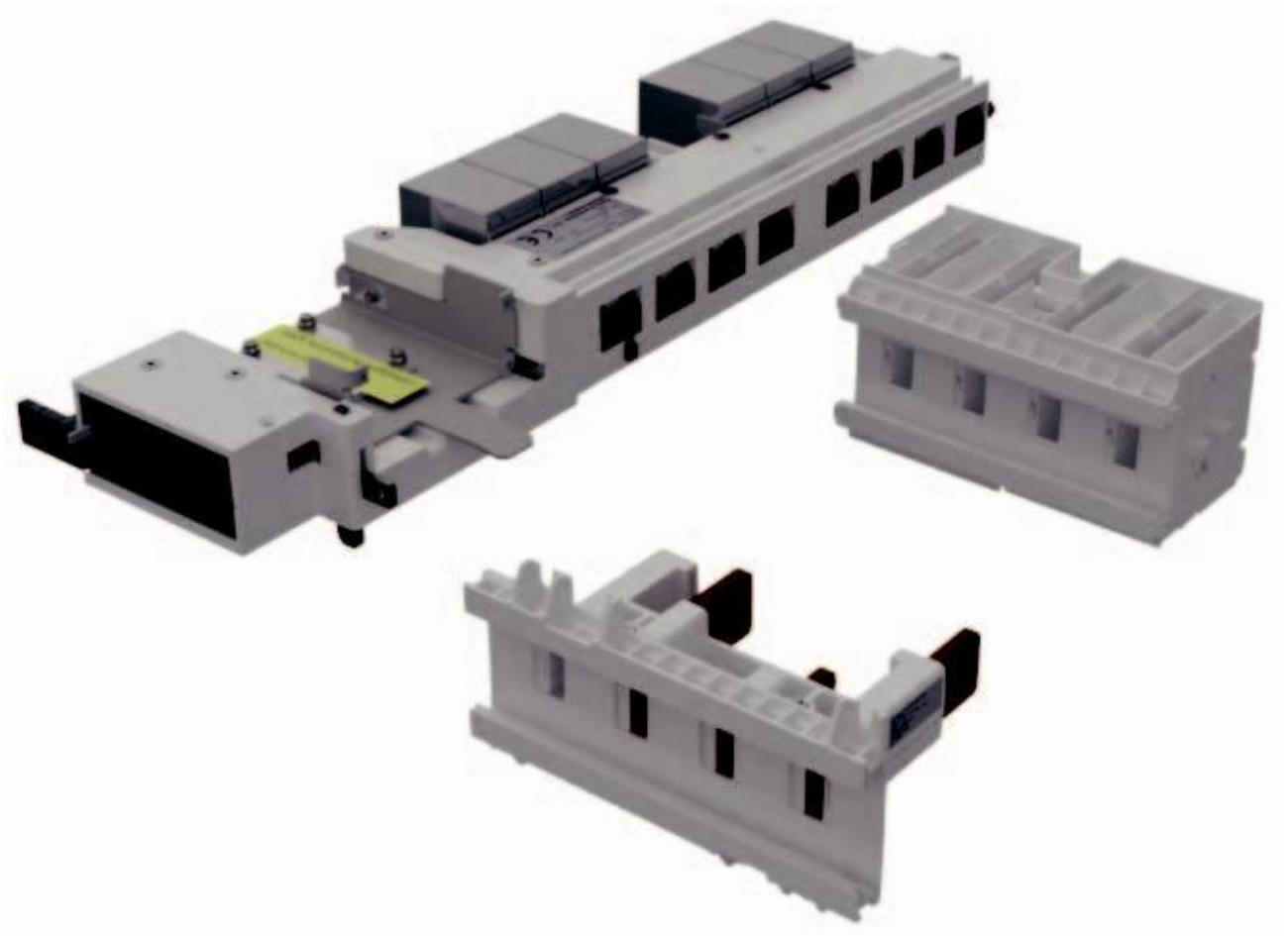
Interested to:

- **have your own draw-out-technology?**
- **improve your existing switchgear-system?**

e-con S.I. grants your own individual solution.



There are only three elements to be installed to create your own fully withdrawable technology at highest safety level.



HIGH DENSITY MCC

Introduction

Pyrotech is a first exclusively manufacturer & authorized distributor of Closed Door High Density MCC system in India with withdraw able modules based on Pyrotech Modular System and IDS's e-con s.i. Futuristic system for draw out Motor Control Centre Technology.

Modules with fully withdrawable technology proved to be the best solution for MCC, compared to the usual solution with a fixed installation of the equipment or with plug in type.

Closed Door Withdrawable Modules are mainly used in critical power system in which withdrawable modules, in case of failure, can be quickly, easily & safely replaced.

The High- Density Modules are mainly used in following areas:

- In Industries
- Process plants like chemical, oil refineries etc
- Municipal System like Waterworks etc.
- Banks / Data Centers
- Hospitals and Hotels



The **Pyrotech High -Density Motor Control Centre in Closed Door Design** is a comprehensive modular system allowing the user to create a wide range of Switchboards. Key benefits include:

- Modular & Compact Design
- Minimal downtime
- Easy re-configuration of units while live
- Interchangeability of different unit types
- Easy upgrade or repair
- Possibility to fit switchgears from all standard manufacturers
- Up to 40 units per section

Introduction

Electrical Energy should be distributed safe and controlled

For human safety, most of the industrial companies defined, for the operation of their electrical switchgears three lines of defense to avoid accidents by the hazardous potential of electrical energy what are:

Third line: regulation: using special cloth and following the electrical safety rules

Second Line: limitation: additional mechanical measures

First Line: prevention: measures of encapsulation of parts which are alive.

The heart of switchboards in **Closed Door Draw out Technology is its contacting device**, what is responsible to take the energy from the bus bar system.

Prevention means, that the contacting device, the vertical bus-section and the outgoing-plug form up a hermetic encapsulation what means an arc-fault- free-zone.

Prevention also means the technical advantages of the pressure-contacts.

The difference between finger contacts and the pressure contact is how to eliminate and reduce the undesired effects of the magnetic forces but to reinforce the contacting pressure.

Requirements

Contacting device with its patented, innovative and arc-safe pressure contact:

- The drawer units are constructed in such a way, that the contacting device, the vertical bus section and the power plug form up together a hermetic encapsulation, what means an arc fault- free zone.
- The vertical bus section is completely insulated, from phase to phase as well as from phase to earth to reduce the risk of an internal arc fault.
- The insulation of the vertical bus section is that strong, that there is nearly no movement of the vertical bus-bars which could influence the contacting pressure of the plug system.
- The contacting device is constructed in such a way that under no circumstances the contacting pressure will be reduced or even lost during a short circuit.
- Moving the drawer to operating position or test position does not influence the protection degree of the switch- board (**Closed Door Design**).
- Moving to operate position is possible while the whole power cabling stays fixed (Power cabling should not be moved to avoid breaking wires).
- The contacting device is of self-cleaning type when pushing or turning it to operating position, so that it will be maintenance free.
- The contacting device is constructed and dimensioned in such a way, that the contacting pressure will be reinforced during a short circuit. This reinforcement will not be reduced or lost by the interaction of magnetic fields which could reach drastically ratings during a short circuit.
- Each power contact is completely insulated to its neighbour contact and to earth, that in case of a contact arc flash, ionized gases cannot short circuit two phases or a phase to earth. The fault will be kept within the individual contacting chamber.
- The contacting device is not influenced from mechanical tolerances which could influence the contacting-pressure.
- The contacting device should be tested for 725V, 65 kA for highest limited short circuit; what could arise in combination with a fuse or MCCB.
- All power contacts as well as control plugs disappear behind the drawer frame to provide damages during transportation.



-brings low voltage switchgears to a new level of safety and state of the art

Solution

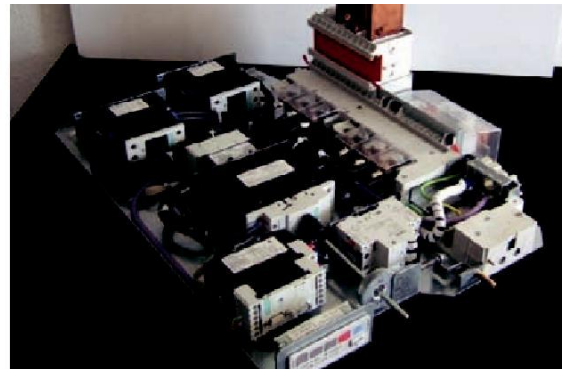
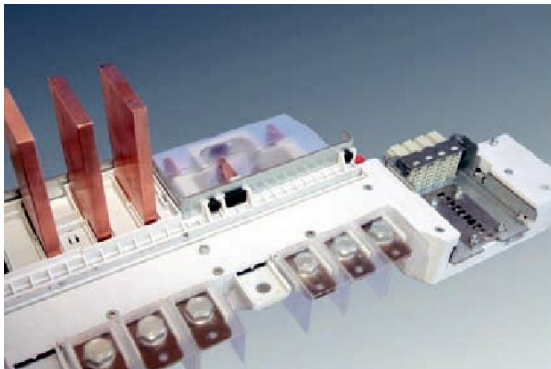
ARC SAFE Vertical Bus section

- The vertical bus section is completely insulated also from phase to phase.
- Any change of drawer modules can be rearranged during voltage is alive.
- The “Automatic Shutter” is mechanically interlocked, and can additionally be padlocked.
- Accredited testing laboratories have certified the bus duct as “arc safe”.



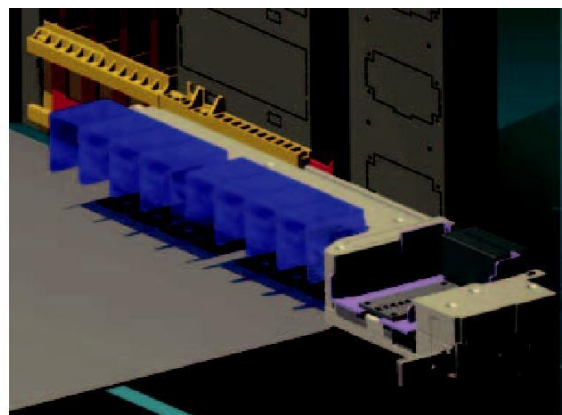
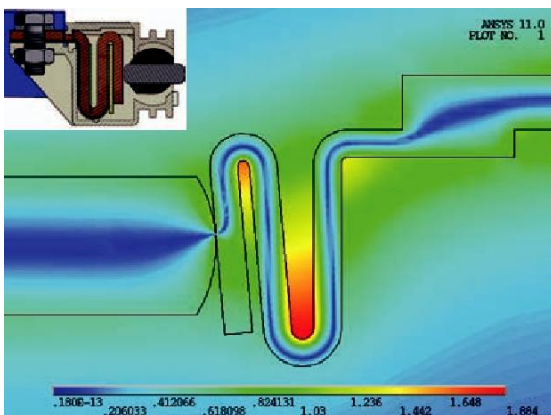
ARC FAULT FREE contacting device

- The movable and switchable contacting module forms together with the insulators of the vertical bus section (bus-bar module) and the outgoing plug (outgoing module) an arc fault free zone.



INNOVATIVE PRESSURE CONTACT

- The pressure contact within the contacting module is developed together with the Fraunhofer- Institute and grants a reinforcement of the contacting pressure in case of a short circuit.



The special outline of the internal copper layer increases the contacting pressure.

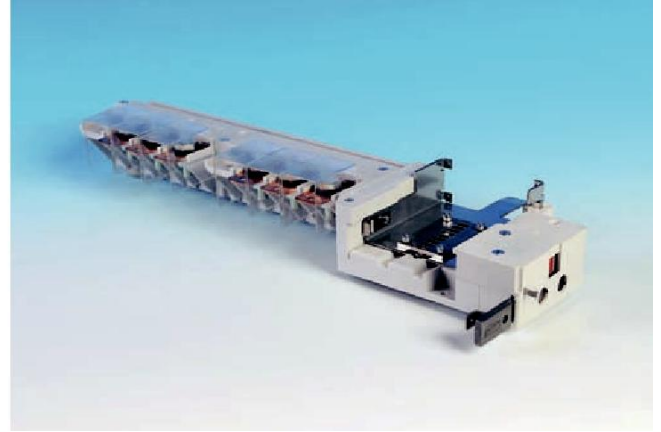
-brings low voltage switchgears to a new level of safety and state of the art

Contacting-Module available in 3 ratings only: 125A, 320A and 630A

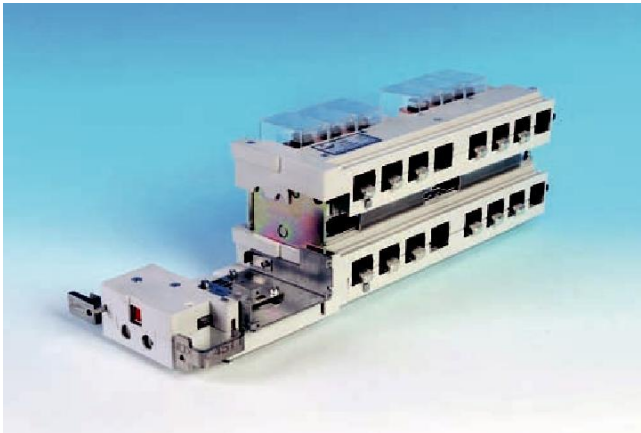
Full size-Type withdrawable unit



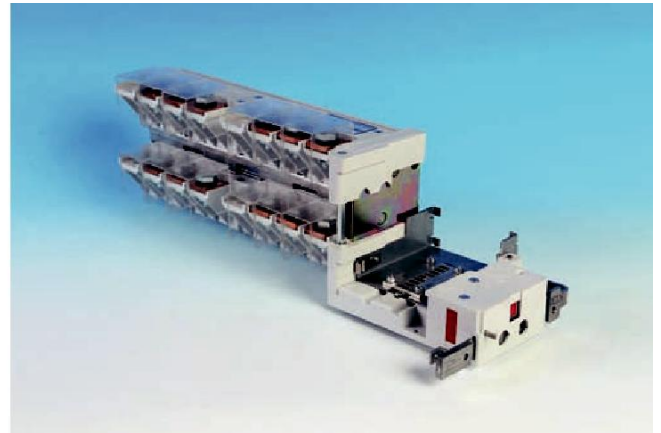
Contacting module front side
One size up to 315A



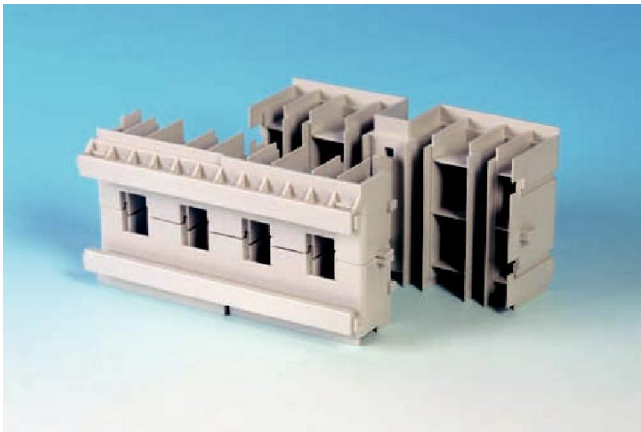
Contacting module rear side



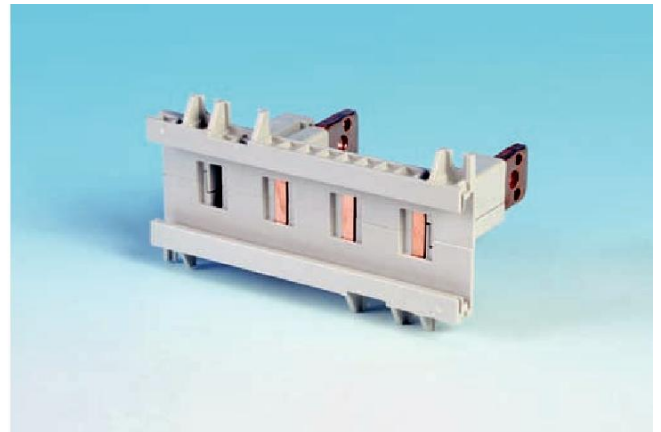
Contacting module front side
Up to 630A



Contacting module rear side




Bus-bar Module for copper 4 x 60x10mm



Cable Module up to 315A

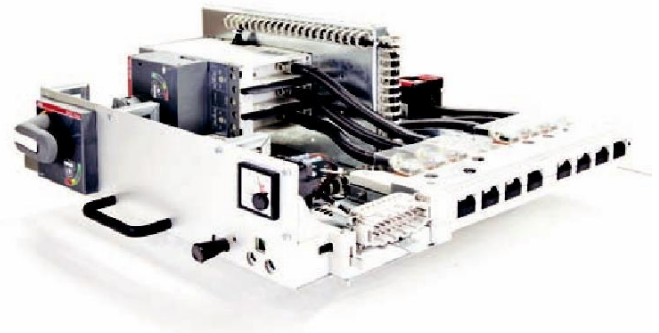
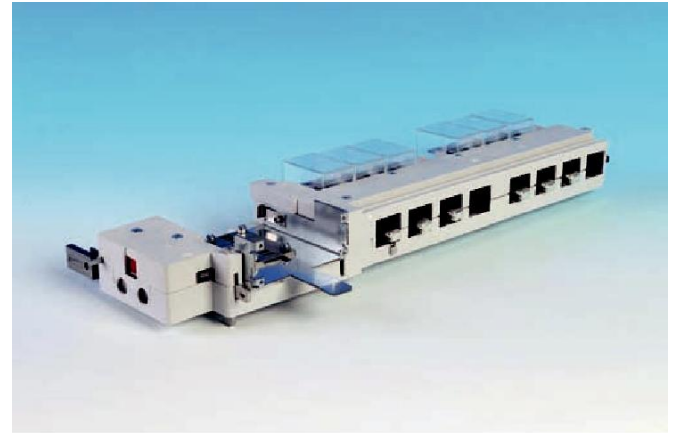
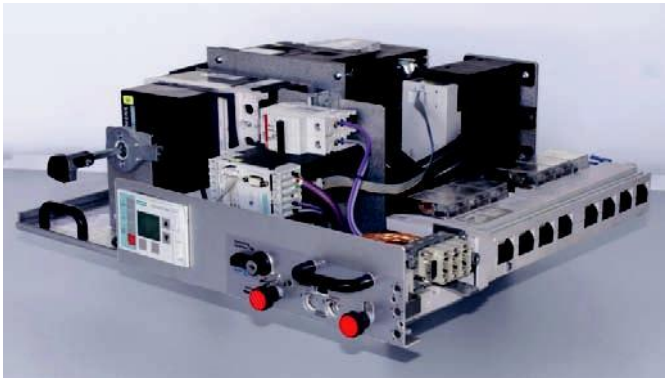
HIGH DENSITY MCC

Full size-Type withdrawable unit

Patented contact mechanism 
 arc- fault- free power- connection and
 has all functions included like:

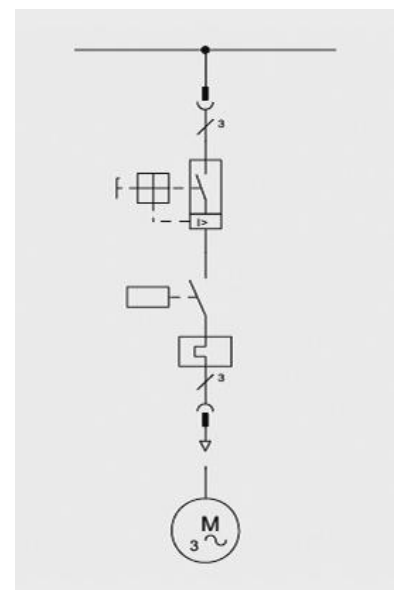
- Disconnected- Operating- and Test position
- Main switch can only be operated when the door is closed
- Unit can only be withdrawn in disconnected position
- Power circuits are disconnected at incoming and outgoing and prevent necessary insulation
- Both withdrawable units and subsections can be exchanged or converted while the board is live
- Mechanical encoding available (option)

- Colored display showing the different positions of the drawer unit
- Control plugs as modular type can have up to 40 pins, and or additional bus contacting for intelligent control devices.



Dimensioning Sample for motor starters, fuse less, 400 V; 50 kA

TYPICAL	RATED DATA (AC-2/AC-3)		RATING OF CONTACTING-DEVICE A	SIZE OF WITHDRAWABLE UNIT
	P _n (KW)	I _e (A)		
D_M11	11	21,73	125	M1 (S3)
D_M22	15	35	125	M1 75mm
D_M45	45	81,21	125	M2 150mm
D_M75	75	133,91	315	M3 225mm
D_M110	110	196,4	315	M4 300mm
D_M132	160	230,52	315	M5 375mm
D_M250	250	436,59	630	M6
D_M315	315	436,59	630	M8

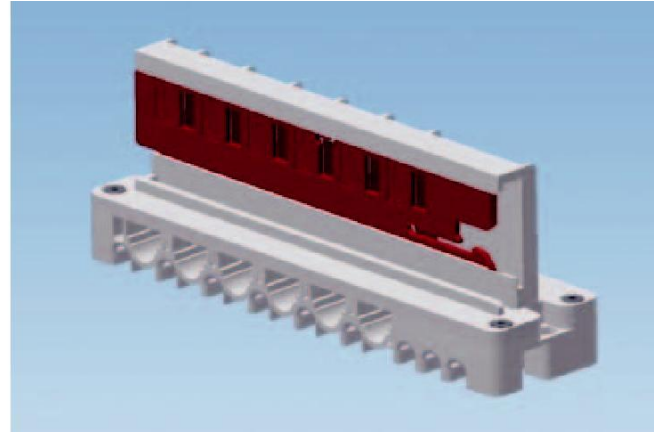


-brings low voltage switchgears to a new level of safety and state of the art

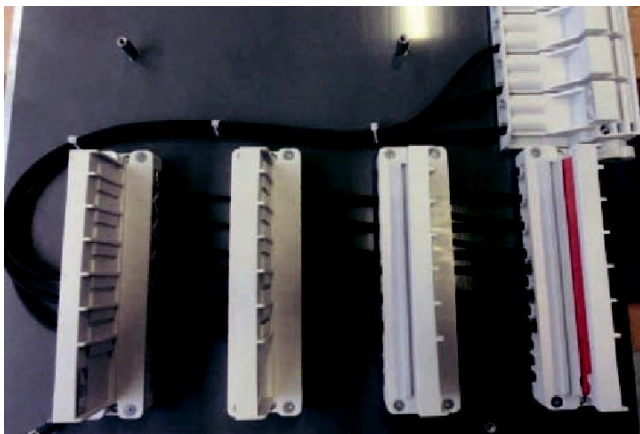
**S type Contacting-Module for
Small size- withdrawable unit**



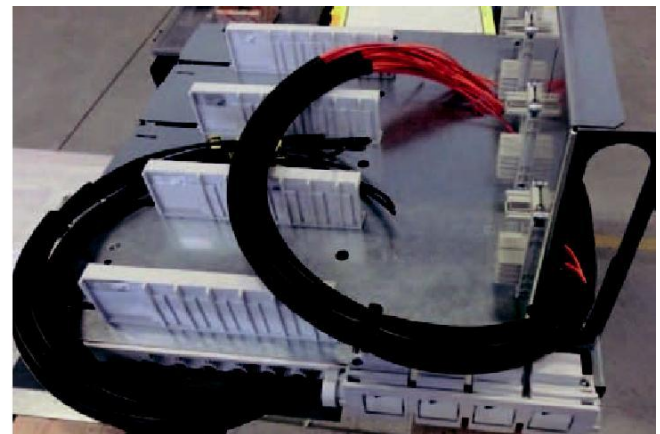
KAS 125A 3P
Energy module transfer unit 125A, up to 4-pole
Multi-use to get the energy from the VBS



ES 50A 2x3pol.
Energy socket small drawer 50A, 2 x 3-pole



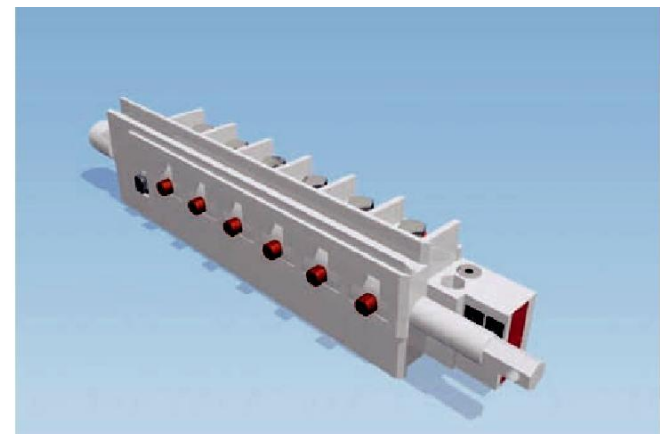
Adapting plate, prewired bottom for power circuit



Adapting plate wired for power and control




IB 1 S
Interlocking unit for small- size- drawer



EMS 50A 3P
Contacting module 50A 2x3-pole

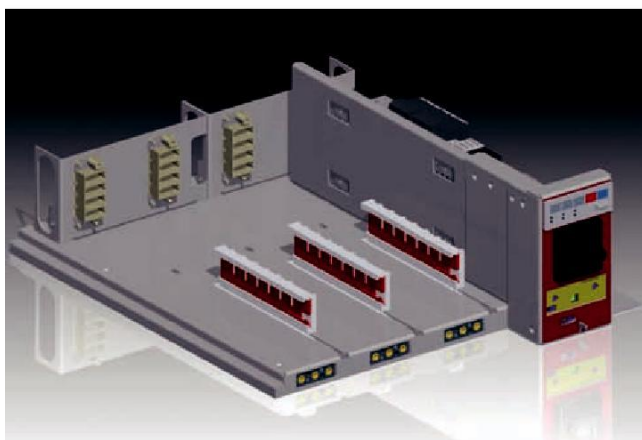
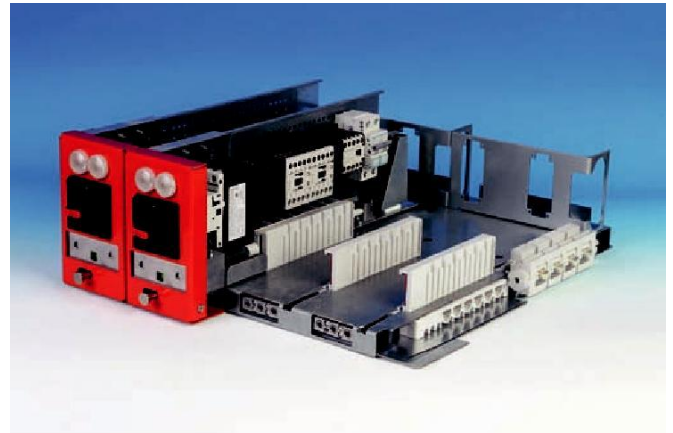
HIGH DENSITY MCC

**Contacting-Module for
Small size- withdrawable unit**

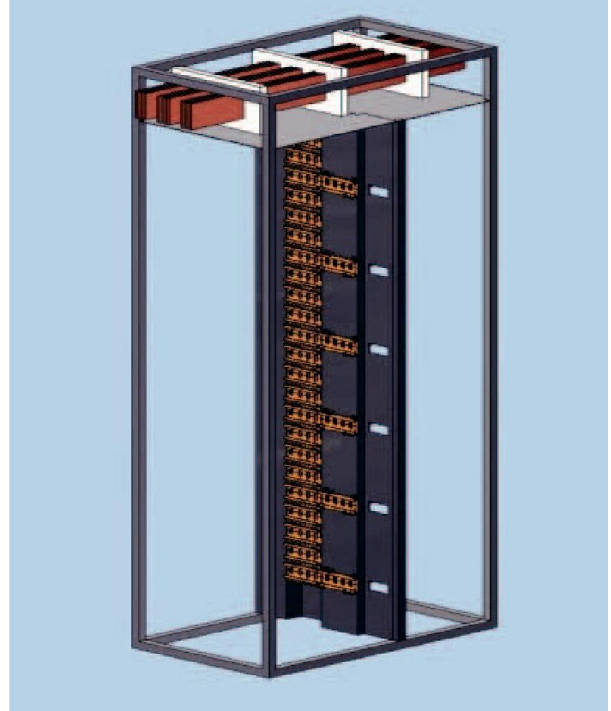
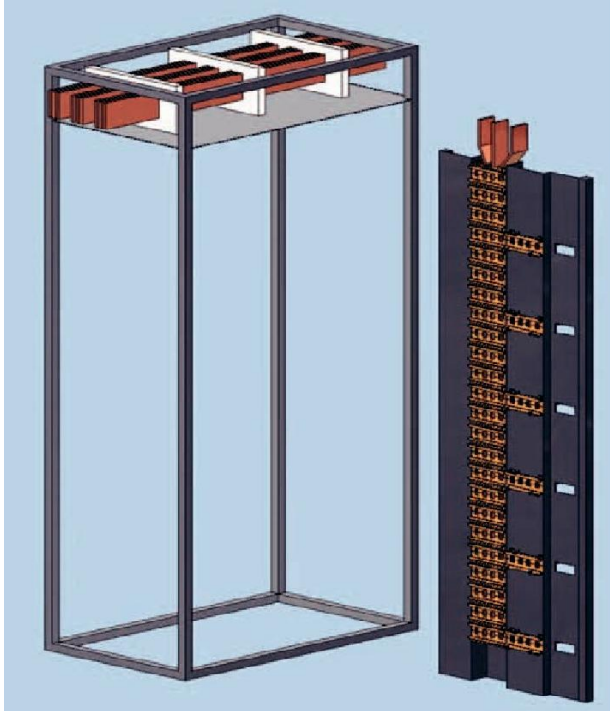
Patented contact mechanism 
arc fault free power- connection and
has all functions included like:

- Disconnected- Operating- and Test position
- Main switch can only be operated when the door is closed
- Unit can only be withdrawn in disconnected position
- Power circuits are disconnected at incoming and outgoing and prevent necessary insulation
- Both withdrawable units and subsections can be exchanged or converted while the board is live
- Free mechanical dimensioning in height, width and depth
- Mechanical encoding available (option)

- Colored display showing the different positions of the drawer unit
- Control plugs as modular type can have up to 40 pins, and or additional bus contacting for intelligent control devices.



The drawers are inserted on a double sheeted bottom. Within this bottom all power- and control connections to terminals will be done. Power- and control wiring can be wired to terminals at the back as well as to the side.



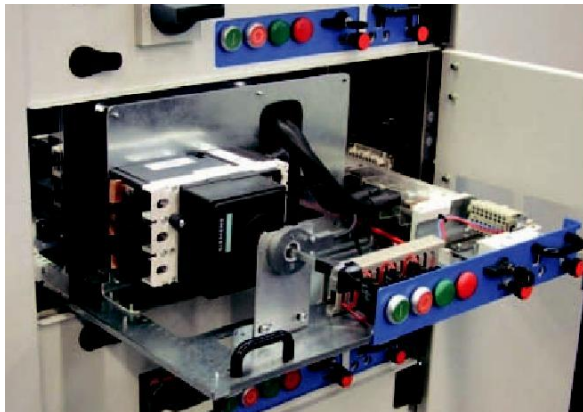
It is easy to implement the EST- Wall “energy and signal- transfer- wall” to existing panel frames.



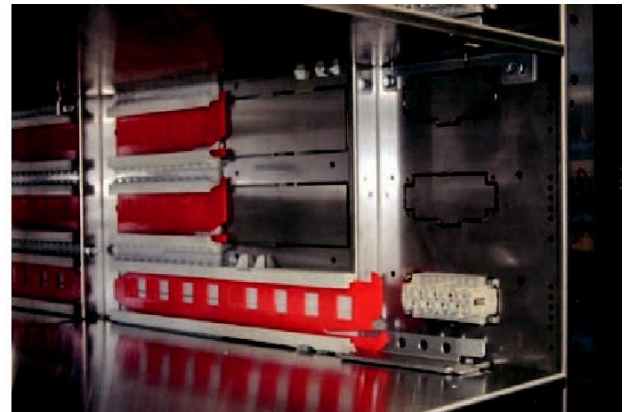
The vertical bus section which is completely encapsulated from phase to phase, the individual power- plugs located where necessary are ready to take individual drawers in steps of 75mm.

HIGH DENSITY MCC

-brings low voltage switchgears to a new level of safety and state of the art



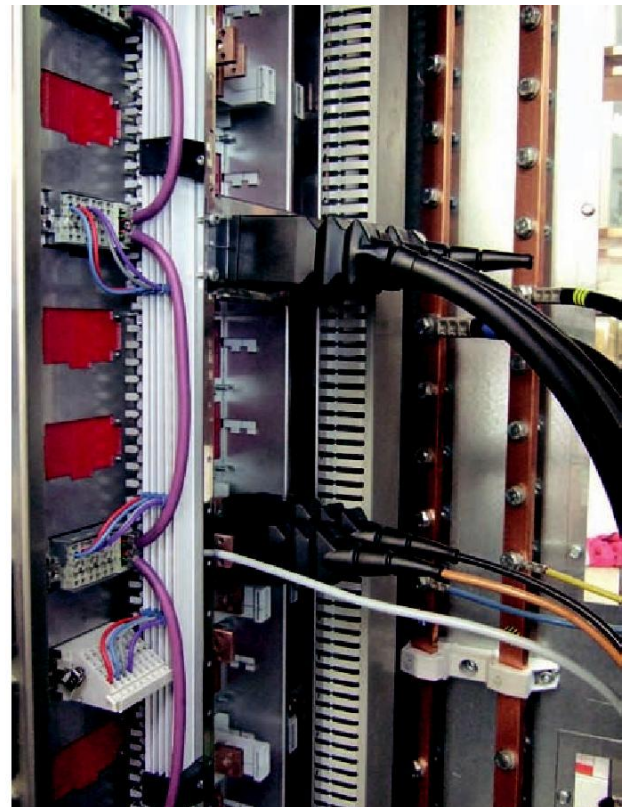
Motor Starter 160 kW; in draw out position



Drawer compartment with shutter system;
Completely arc safe; even when the drawer is in
Operating position



Sample for modularity of control wiring




Samples for power cabling and control wiring
within the cable compartment



HIGH DENSITY MCC

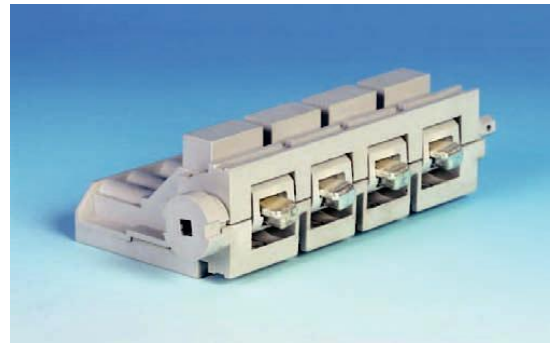
-brings low voltage switchgears to a new level of safety and state of the art and provides all kinds of flexibility

Contacting-Module for Plug-in type; Semi withdrawable

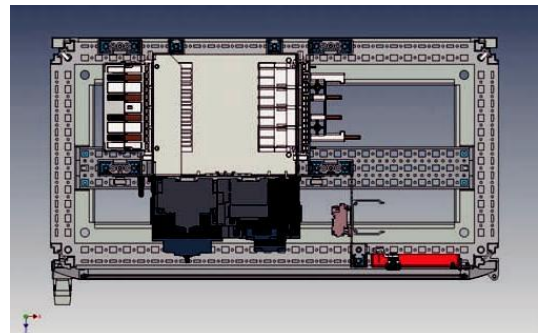
Patented contact mechanism 
arc- fault- free power- connection,

- Disconnect able without any tools
- One size up to 315A (double unit up to 630A)
- Unit can only be withdrawn in disconnected position
- Power circuits are disconnected at incoming and if needed also at the outgoing and prevent necessary insulation.
- VBS can be located left- or right-hand side.
- Cable outgoing to all directions: Left; right, rear

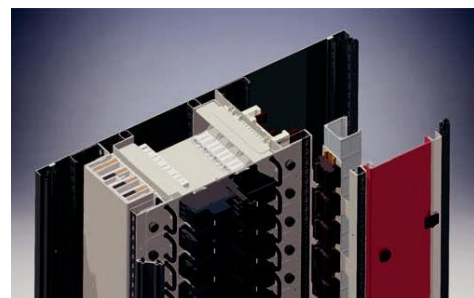
Picture shows:
 Plug-in unit with contacting module for incoming and outgoing



Picture shows:
 VBS at left side; cable outlet right side;
 incoming and outgoing disconnect able.

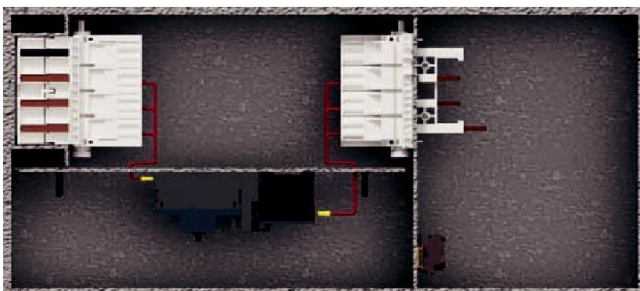
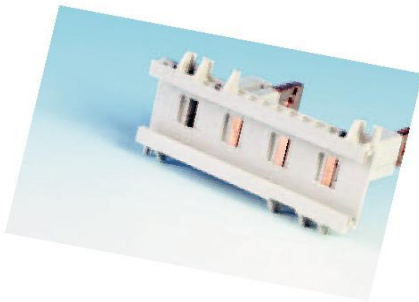
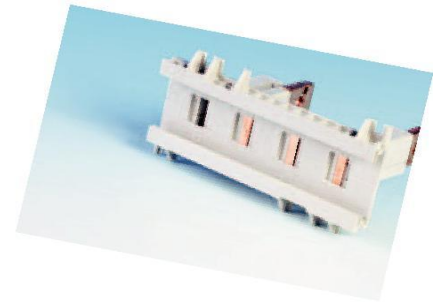
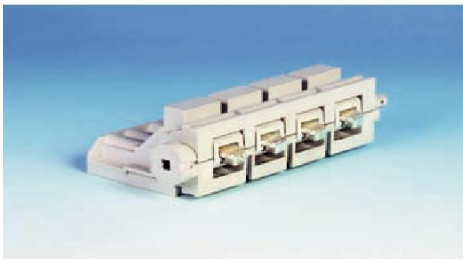
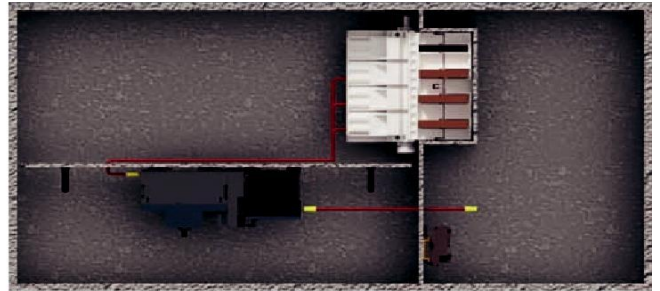
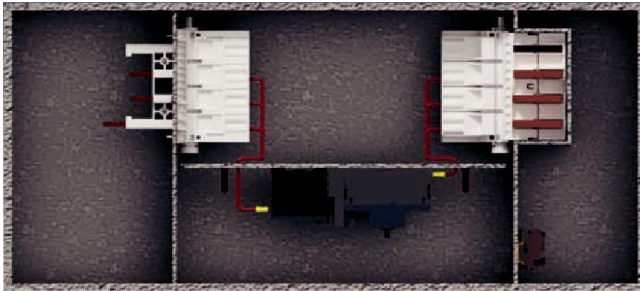


Picture shows:
 Plug -in units in a typical switch-board with a depth of 400 mm only.



Pictures below show only some of the possibilities where to place the VBS and having the free choice where and how to connect the outgoing cables. Furthermore, it is free to decide to connect the outgoing cables fix or to screw them to an outgoing plug.

- Cable compartment left, right, or rear
- Vertical bus-bar left or right at each position
- Any size of cubicle and type of cubicle



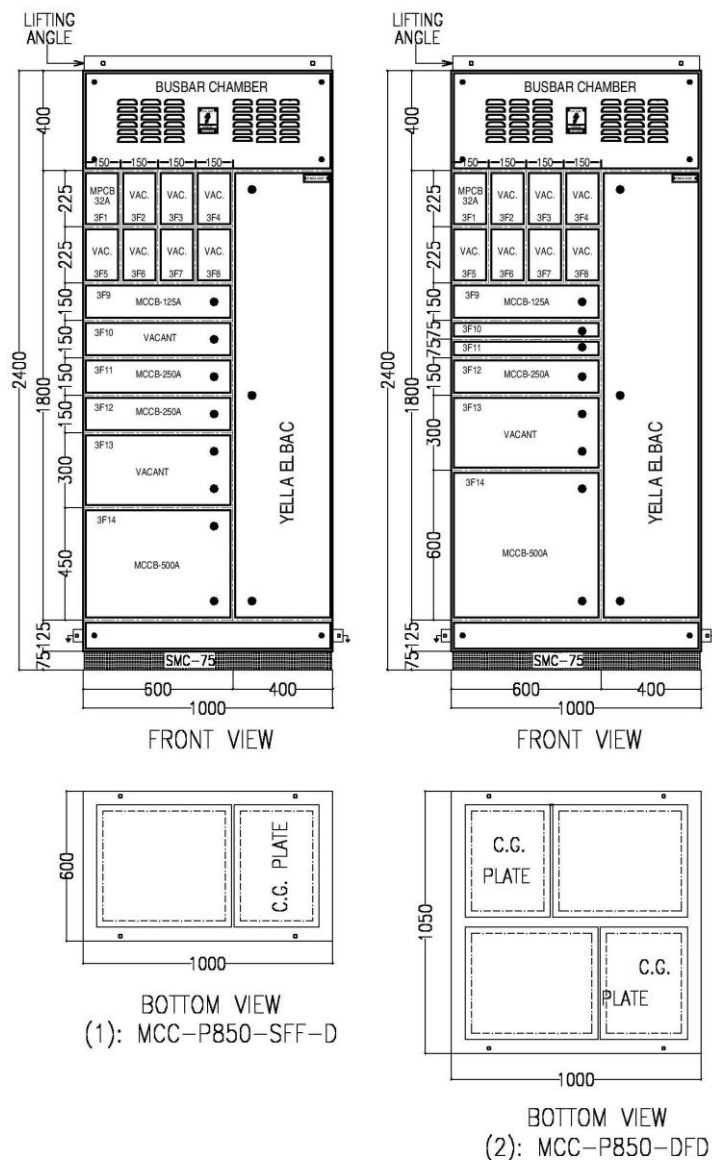
HIGH DENSITY MCC

Pyrotech Type and Dimension for High Density MCC :(Only Two Type of Panel cover all the range of HD modules)

S.No.	Panel no.	Panel Type	Height (mm)	Width (mm)	Depth (mm)	Main Bus Bar Chamber Height	Cable Chamber Height
Construction : Single Front (Fixed / Withdraw able Type)							
1	1	HDMCC-P1000-SFD	2400	1000	600	400 mm	1800 mm
Construction : Double Front (Withdraw able Type)							
2	2	HDMCC-P1000-DFD	2400	1000	1050	400 mm	1800 mm

Remarks –

- Heights available for same variants are 2300 / 2000.
- Special Construction Possible i.e. BB at bottom

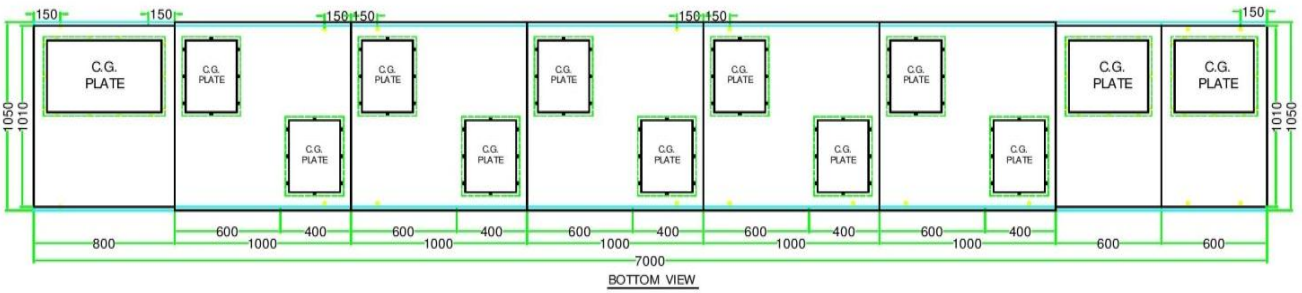


HIGH DENSITY MCC

Example: GA Drawings



P-4
N-2

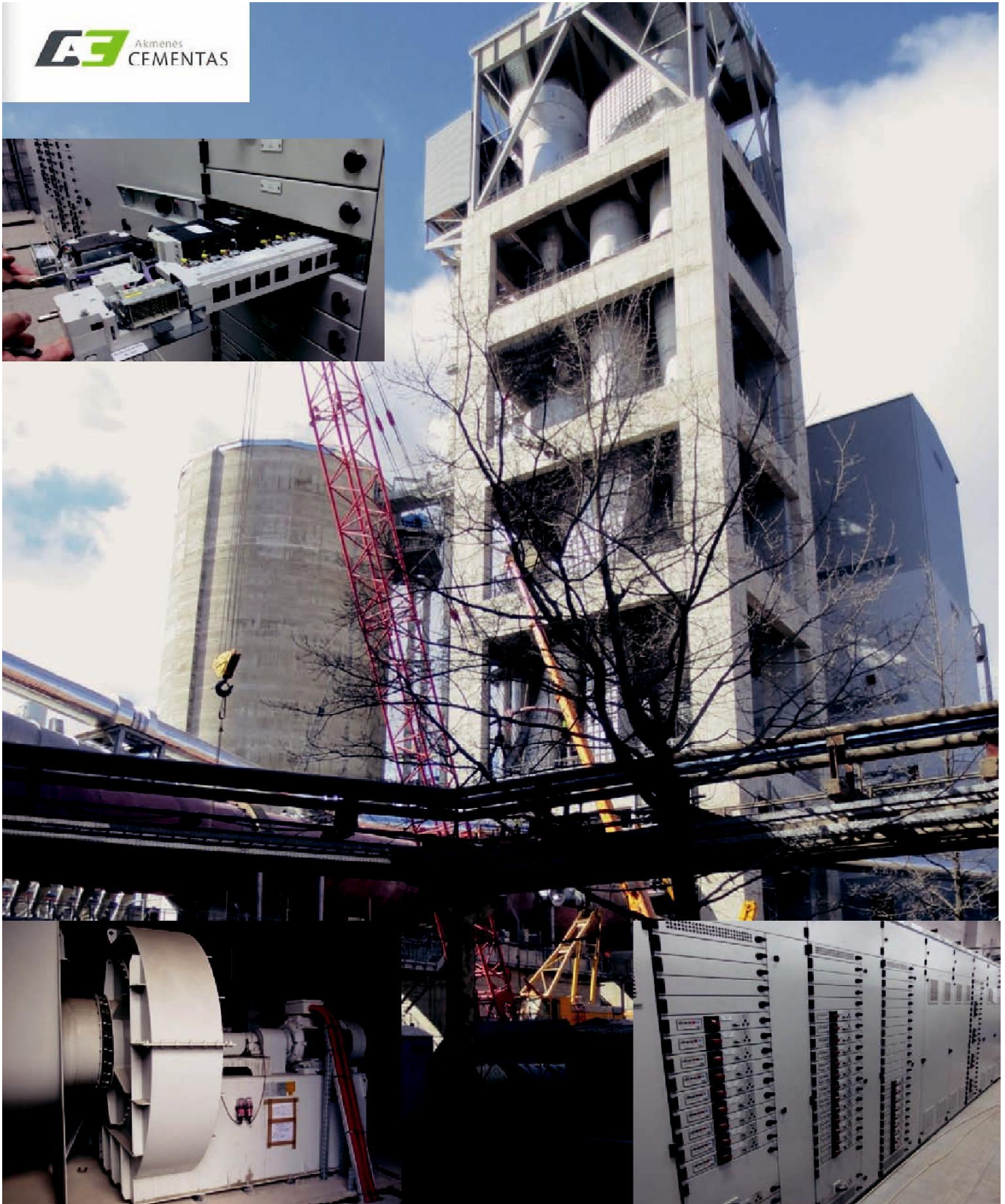


Part of References of projects with IDS-Technology with our partners (since 2011):

Kind of industry	Country	Customer	Cubicles
ship-motor-production-line	Germany	Caterpillar	20
cement-plant	Litonia	Siemens	120
steel-plant	Germany	Dillinger Hütte	30
Mining	Russia	Arosa	25
chemical industry	Russia	Linde Angarsk	10
Steel-plant	Sweden	SSAB	10
water treatment	Germany	City close to Leipzig	20
Object for demonstration	Italy	ABB 5	
Water treatment	Germany	City of Berlin	30
Mining	North-Africa	ABB	50
Oil and Gas	Germany	Siemens / Wintershall	20
Water treatment plant	Jarjah / Dubai		23
Oil and Gas (mega-project)	Kuwait	Sipem	250
Water-treatment plant	Indonesia	outocumpo	20
High Voltage 50 Hz Power supply	Austria	ABB	10
Cement plant	Brazil	Haver & Boeker	20
Power Station 200 MW	Czek Republik.	ABB	85
Steel Plant	Brazil		90
Oil and Gas	Brazil	Petrobras	75
Oil and Gas	Romania	Luk Oil	120
Oil and Gas	Bulgaria	Luk Oil	110
Steel Plant	Russia	SMS	70
Infrastructure	Germany	Air-Port Munich	30
Steel Plant	Saudi Arabia	aluminium-smelter	20
Oil and Gas	Brazil	British Petrol	40
Different ore-mills	Africa	Siemens	80
Chemical industry	Russia	Linde Vorsino	18
paper-industry	Germany	Stora Enso	10
Metro-line	Brazil	Alstom	120
Cement-plant	Belgium	Lösche	20
Cement plant	Thailand	Siemens	240
Power Plant	Czek Republic	ABB	86
Chemical plant	Poland	Pulawy	25

e-con brings low voltage switchgears to a new level of safety and state of the art
IDS-Technology

A3 Akmenės
CEMENTAS



HIGH DENSITY MCC

Kind of industry	Country	Customer	Cubicles
Minerals and mining	Brazil	Vale Rio Dore	32
Chemical Industry	Ukraine	Linde	15
Power plant	Brazil	Andritz Hydro	197
Ore mill	Vietnam		15
Waste water treatment	Turkey	ISKI (Istanbul water)	23
Fertilizer plant (Gubretas)	Turkey	Gubretas	27
Nuclear power plant	Russia	Balakovo	11
Mining (copper)	Poland	KGHM	10
Oil and Gas	France	Total	12
Mining	Chile	KHD	8
Oil and Gas	Irak		70
Power Plant (Biogas)	Italy		120
Oil and Gas	Russia	Gazprom	8
Oil and Gas	Turkey	Botas	40
Power Plant	Poland	Pulawy	20
Cement Plant	Malaysia	Claudius & Peters	45
Oil and gas	Germany	Egemin	47
Cement Plant	Columbia	Cemex Maceo	80
Tunnel project	Israel		22
Aluminium Plant	Bahrain		18
Nuclear Power Plant	Russia	Chernobyl (sarkopharg)	30
Cement Plant	Columbia	Cemex Maceo II	150
Mining (copper)	Poland	KGHM	12
Raffinery	Russia	Ryazan (RNPK)	18
Steel Plant	Russia	Voest Alpine	90

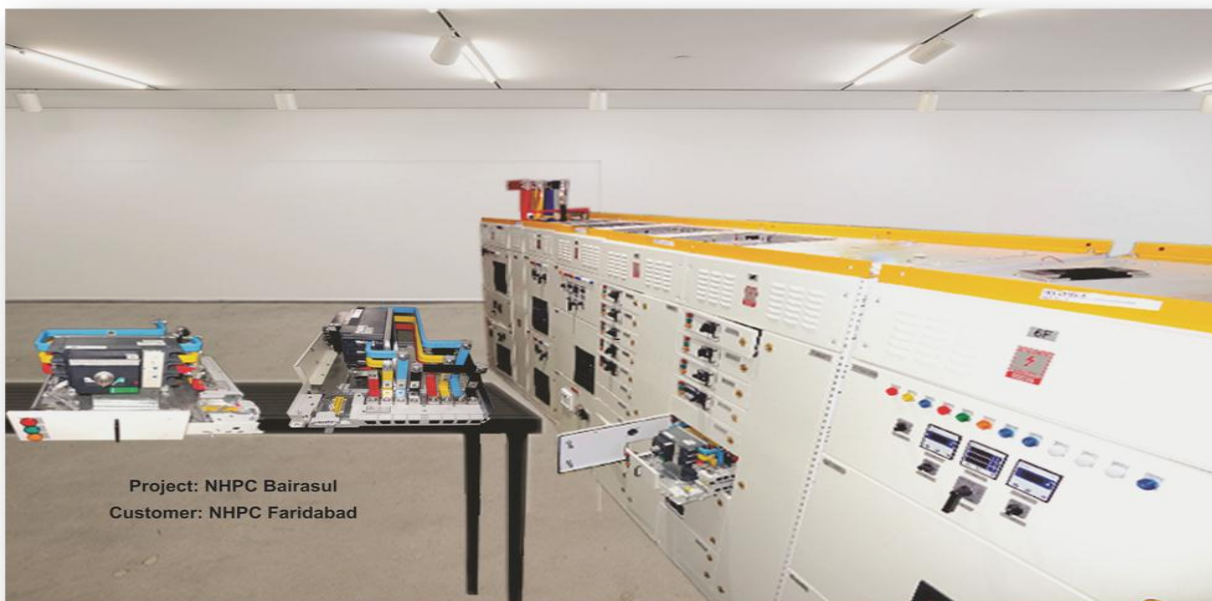
brings low voltage switchgears to a new level of safety and state of the art



HIGH DENSITY MCC

Projects Executed by PYROTECH in INDIA:

Kind of industry	Country	Customer	Cubicles
Hotel	India	Maharana Of Mewar Charitable Foundation Udaipur	21
Hotel	India	The Lake Shore Palace Hotel Pvt Ltd UDAIPUR	18
Hotel	India	The Lake Shore Palace Hotel Pvt Ltd UDAIPUR	11
Hotel	India	The Lake Palace Hotels & Motels Pvt Ltd UDAIPUR	11
Hotel	India	The Lake Palace Hotels & Motels Pvt Ltd UDAIPUR	8
Chemical Plant	India	PI Industries Ltd	28
Mining	India	Grossmacht Engineers Pvt Ltd, HYDERABAD	18
Power Plant	India	NHPC Limited CHAMBA	80
Minerals Industry	India	Chaitanya International Minerals LLP, Rajsamand	32
Electrical equipment Manufacturing	India	Bharat Heavy Electricals Limited	3600
Manufacturing	India	Nitya Electronics Pvt. Ltd.	21
Edible Oil Manufacturing industry	India	Adani Wilmar Limited	307



Project: NHPC Bairsul
Customer: NHPC Faridabad

HIGH DENSITY MCC

S.No.	Feeder Type	Feeder Rating	Maximum feeder height	Contact Module Ratings
1A	DOL /POWER FEEDER with MPCB	Up to 5.5 KW (16A)	M3(S TYPE –Q4)	50A
1B	DOL /RDOL/POWER FEEDER WITH MPCB/MCCB	Above 5.5 -11 KW (32A)	M3(S TYPE –Q2)	50A
1C	DOL/RDOL starter- with MPCB	UP TO 11 KW (32A)	M2(S TYPE –Q2)	50A
2	DOL starter- with MPCB	Below 15 KW	M1(75mm)	125A
3	DOL starter	15- 45 KW	M2(150mm)	125A
4	DOL starter	55 KW	M3(225mm)	315A
5	DOL starter	75 KW	M4(300mm)	315A
6	DOL starter	110 KW	M5(375mm)	315A
7	DOL starter	132KW	M6(450mm)	315A
8	DOL starter	250KW	M8(600mm)	630A
9	RDOL starter – with MPCB	Up to 11 KW	M1(75mm)	125A
10	RDOL starter	22 KW	M2(150mm)	125A
11	RDOL starter	30 KW	M2(150mm)	125A
12	RDOL starter	45 KW	M3(225mm)	125A
13	RDOL starter	55 KW	M4(300mm)	315A
14	RDOL starter	75 KW	M6(450mm)	315A
15	RDOL starter	110 KW	M6(450mm)	315A
16	RDOL starter	132KW	M6(450mm)	315A
17	RDOL starter	250KW	M8(600mm)	630A
18	STAR-DELTA	Up to 11 KW	M2(150mm)	125A
19	STAR-DELTA	22 KW	M2(150mm)	125A
20	STAR-DELTA	30 KW	M3(225mm)	125A
21	STAR-DELTA	45 KW	M4(300mm)	125A
22	STAR-DELTA	55 KW	M6(450mm)	315A
23	STAR-DELTA	75 KW	M6(450mm)	315A
24	STAR-DELTA	110 KW	M8(600mm)	315A
25	STAR-DELTA	132KW	M8(600mm)	315A
26	POWER feeder	UP TO 16A	M3(S TYPE –Q4)	50A
27	POWER feeder	Up to 100A (MCCB)	M2(150mm)	125A
28	POWER feeder	160A (MCCB)	M2(150mm)	315A
29	POWER feeder	250A	M3(225mm)	315A
30	POWER feeder	400A	M4(300mm)	630A
31	POWER feeder	630A	M6(450mm)	630A

NOTE: For fuse type feeder minimum module size will start from 225 mm (M3).



Picture shows sample of test certificate

Certified according ISO 9001

All of this kind of product relevant tests has been performed by audited test laboratories according the relevant standards as **IEC 60439** as well as **IEC 61439**

- Short circuit withstand strength test, vertical bus section 4-pole: I_{cw} 80 kA, I_{peak} 176 kA, 1 sec.
- Short circuit withstand strength test, vertical bus section 3-pole: I_{cw} 80 kA, I_{peak} 176 kA, 1 sec.
- Conditional short circuit test: 735 V; 65 kA, limiting fuse 250A
- Conditional short circuit test: 735 V; 65 kA, limiting fuse 400A
- Conditional short circuit test: 415 V; 50 kA, with MCCB 320A
- Temperature rise test during motor start: 45 / 132 kW; 400V heavy starting conditions 20 sec.
- Glow wire test EN60695
- Mechanical operation test EN61439-1/2
- Impulse withstand test 12kV (8kV)

Picture shows part of Quality control
– Contact pressure control check –



HIGH DENSITY MCC



HIGH DENSITY MCC

Details from the System-Documentation what is available on request

■ Test position (Fig. 42)

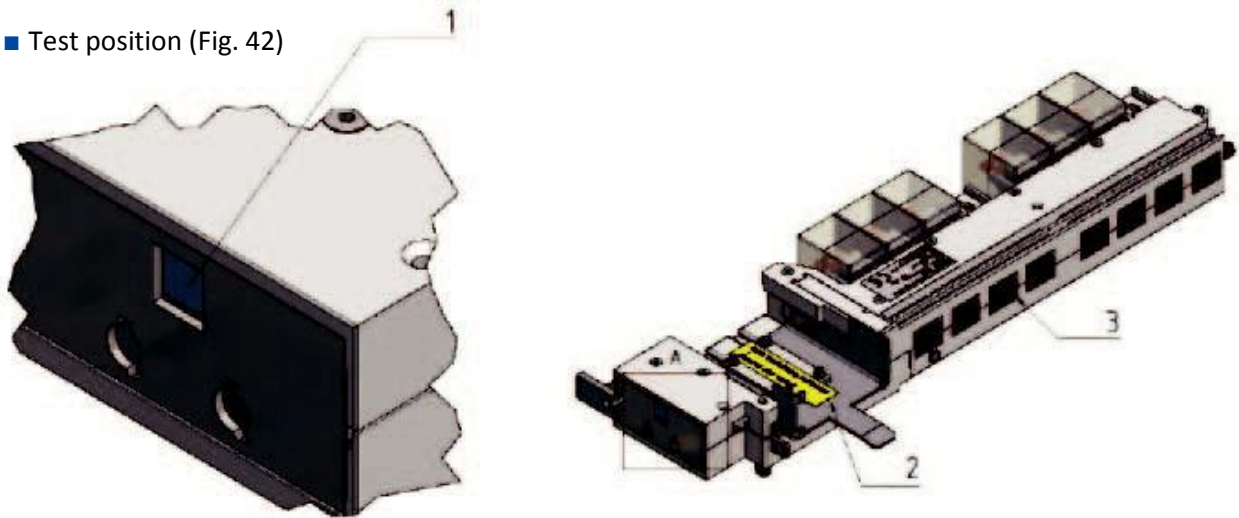


Fig 24: Contact module in "Test position"

1. Inspection window (blue)
2. Control plug holder outside
3. Contact pieces inside

■ Operating position (Fig. 43)

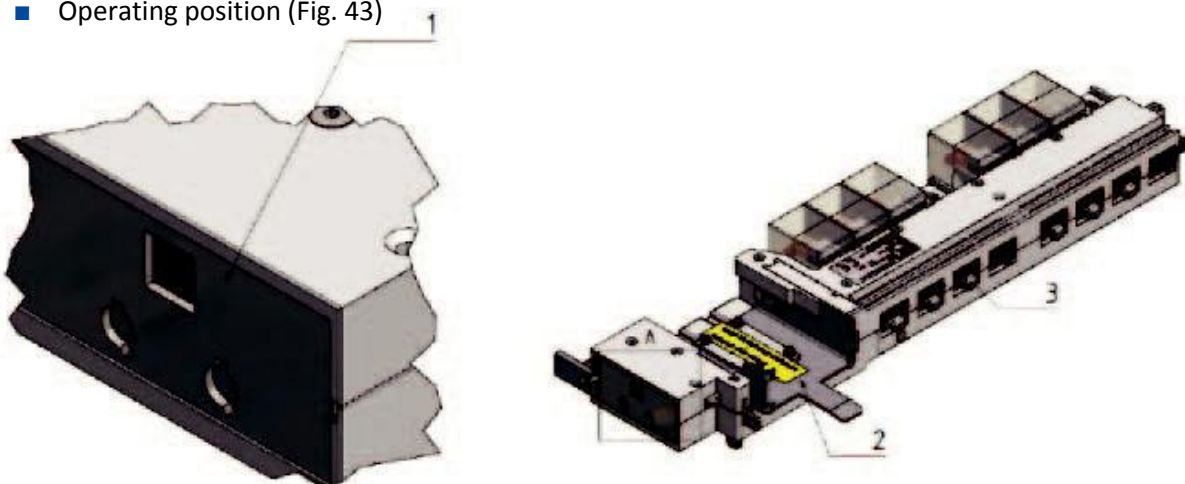


Fig 43: Contact module in "Operating position"

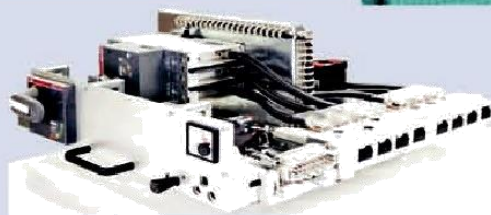
1. Inspection window (red)
2. Control plug holder outside
3. Contact pieces outside

Designation	Unit	Order no. 0001..x	Order no. 0002..x	Order no. 0003..x
Module Height	HE	1	1	2
Mechanical service life <i>tests were made without control-plug. Different kinds of control-plugs which may be used could influence the values</i>	Switching operations	500	500	250
Permissible operating and ambient temperature minimum/maximum	°C	-25/+55	-25/+55	-25/+55
Permissible storage and ambient temperature minimum/maximum	°C	-25/+75	-25/+75	-25/+75
Pollution degree in compliance with IEC 61984		3	3	3
Permissible position for use		horizontal	horizontal	horizontal
Degree of Protection		IP 00	IP 00	IP 00
Weight	kg	3.5kg max.	4kg max.	7kg max.
Rated operational voltage U_e 50/60Hz	V	690	690	690
Rated insulation voltage U_i	V	1000	1000	1000
Rated impulse withstand voltage U_{imp}	kV	8	8	8
Rated operating current I_e max. at AC 690V(AC-3)	A	125	315	630
Max. rated conditional short- circuit current I_{cc} <i>limited through a protection device / (circuit breaker / fuse)</i>	kA	25	35	50
Max. Joule integral I^2t Based on 15kA 60ms	kA ² s	9000	14500	21000

Diagram shows details from the system documentation and product manual

e-con s.i.
Powertransfer...

...by completely
insulated contacting.



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