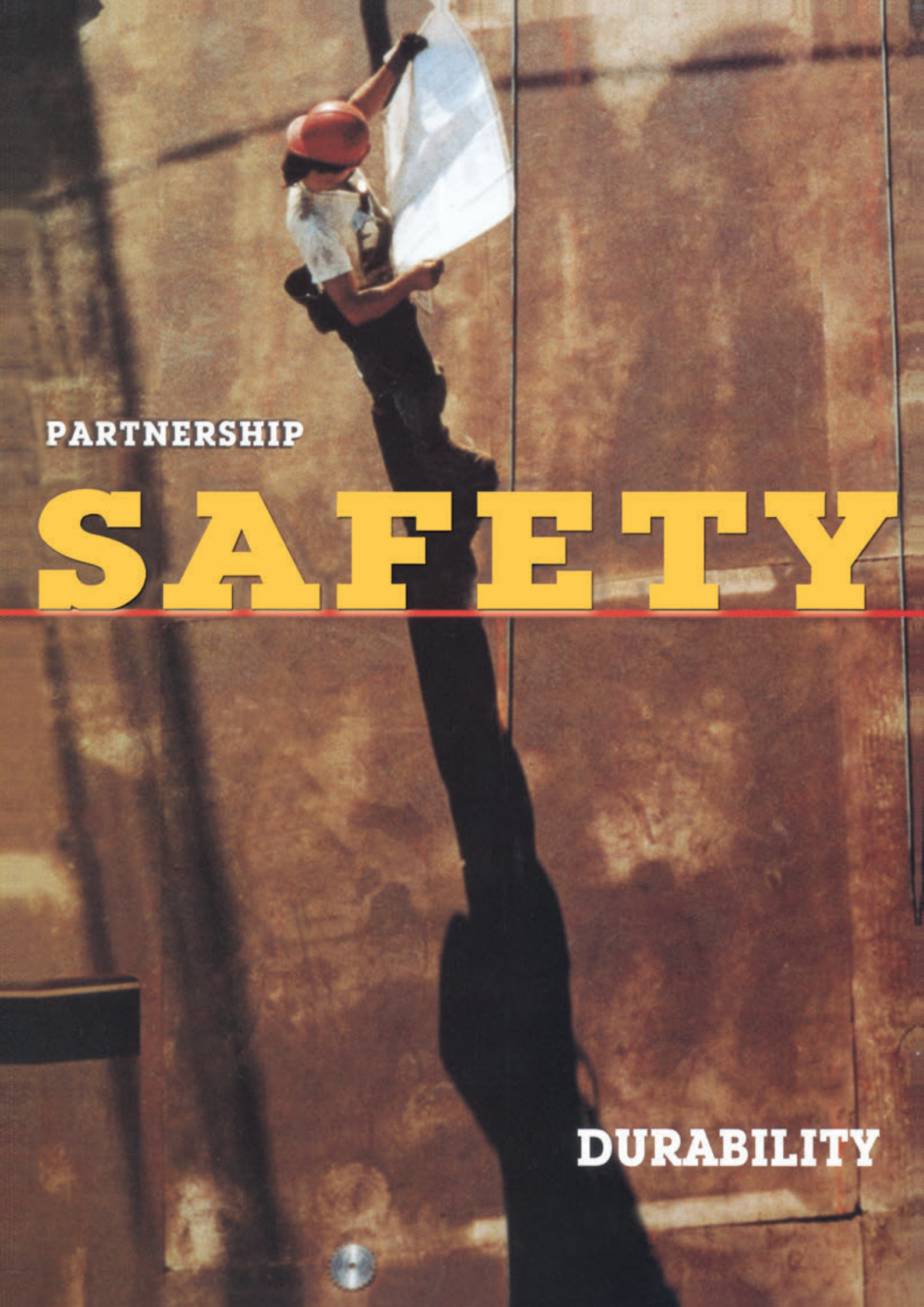
LOW VOLTAGE SOLUTIONS

for Innovative Power Distribution & Control

www.alfanar.com

الفنار alfanar

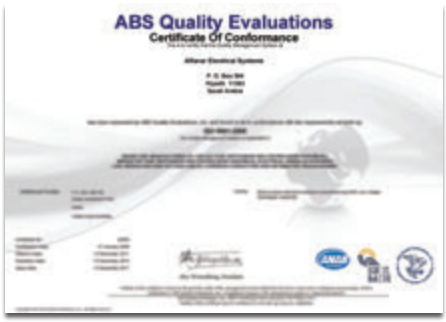

PARTNERSHIP
SAFETY
DURABILITY

Contents

1 – General Features

Safety

alfanar quality systems and solutions are developed according to relevant international standards, offering a high degree of personal and operating safety.



Reliability and Service Continuity

alfanar products fully satisfy different performance and harsh environmental conditions to offer an extremely high level of reliability.

Superior temperature performance up to 50°C without derating with **alfanar** ACBs and MCCBs.

Reinforced framework to guarantee increased resistance to earthquakes as per (IEC 60068-3-3:2013).

Our products offer a variety of protection levels (IP40, IP42 up to IP66) for use in a variety of applications and harsh environments such as cement works, wet areas, iron and steel industry, etc….

Flexible and User Friendly

alfanar products provide years of safe, reliable operations. The mechanical structure (frame) and the main busbar systems are designed to be maintenance-free and accessible from the front.

By eliminating the need to access the equipment from the rear, our equipment can be installed virtually anywhere in a facility.

The modular design allows for easy installation, operation and maintenance and will accommodate most project specifications and requirements.

2 – Applications

alfanar Low voltage products are used for electrical power distribution and control and are generally installed downstream of transformers or generators that contain the main and distribution circuit breakers. Loads are motors, heating equipment, lighting and air-conditioning units.

Buildings, Infrastructure and Industrial:

Airports, hospitals, factories, shopping malls, hotels, commercial and residential towers.

Utility:

Power generation, transmission, distribution substations, water and waste water treatment plants.

Oil and Gas:

Oil and gas plants, petrochemical plants and refineries.

Renewable Energy:

PV Solar solutions.

3 – Product Portfolio

EletraGear
Main Distribution Board
ATS, Synch, 2 out of 3

EletraGear Plus
Motor Control Center

EletraSub
Sub Distribution Board

Eletra-LD
Final Distribution Board

PFC
Power Factor Correction

800V LVSwitchgear

4 – Main Distribution Board (EletraGear)

A switchboard is a large single panel, frame, or assembly of panels which are accessed from front, rear or both sides. They are generally installed immediately after the power source (transformers or generators).

EletraGear is designed and tested as per the new IEC standard 61439-1,2. This panel is available up to 6300A, 100kA/ 1 sec, fully compartmentalized design up to Form 4b.

EletraGear Overview

- Tested for Internal Arc Fault as per (IEC-61641:2014) up to 100KA (Classified as PSC).
- Tested to withstand vibration caused by an earthquake in accordance with (IEC 60068-3-3:2013). Enclosure design seismically tested up to 0.75g = 8.0 Richter scale (Zone-4).
- RAL7035 color is standard, other colors can be provided upon request.
- Neutral and earth busbars can be rated up to 100% of the main busbar.
- Optimized solution within a small footprint enclosure.
- Designed for ambient temperature up to 50°C.
- Enclosures available for indoor and outdoor applications.

Standards

- IEC 61439 -1 & 2
- IEC60068-3-3
- SASO
- IEC 60529
- IEC60068-2-57
- IEC62262
- IBC2006/SBC301
- IEC 61641
- SBC401

Test Certificate

- (ASTA / KEMA)

Technical Data

Enclosure Name			EletraGear
Electrical Data	Rated voltage	Rated operating voltage Ue	Up to 690 V
		Rated insulation voltage Ui	Up to 1000 V
		Rated impulse withstand voltage Uimp	Up to 12 kV
		Overvoltage category	Up to IV
		Material group	IIIa
		Degree of pollution	3
		Rated frequency	50/60 Hz
	Rated current	Busbar type	Pure copper bars, with 99.9%conductivity
		Rated current for main distribution busbar In	Up to 6300 A
		Conditional short circuit current Icc	Up to 100 kA @ 0.2PF
		Rated short-time withstand current Icw	Up to 100 kA @ 1 Sec
		Rated short-time withstand current Icw	Up to 65 kA @ 3 Sec
		Rated peak withstand current Ipk	Up to 220 kA
	Incoming and outgoing	Incoming feeders	Up to 6300 A
		Distribution feeders	Up to 6300 A
	Arc fault	Prospective short-circuit current	Up to 100 kA
	Direct contact protection	Form of separation	Up to 4b
		Protection against electric shock	Yes
	Seismic withstand capability test and induced vibrations		Yes
	Ventilation		Forced / Normal
Mechanical Characteristics	Skid base height		Up to 300 mm
	Number of useful modules (1 module = 50mm)		Up to 43 M
	Degree of protection	External mechanical impacts strength IK	Up to IK11
		External degree of protection IP	Up to IP55
	Steel components	Frame thickness	Up to 3 mm
		Sheet metal material	AluZinc steel Electrogalvanized /Stainless Steel
	Surface protection		Electrostatic powder coating/ Epoxy
	Standard colors		RAL7035*
	Panel mounting		Free standing only
General	Installation environment	Ambient temperature (°C)	Up to 50°C*
		Relative humidity	Max 50% at 50°C
		Maximum altitude	Up to 2000m*
	Busbar	Busbar system	3 PH, Neutral and PE
		Busbar insulating material	PVC sleeving
		Busbar plating material	Bare / tin / silver

For higher altitude ,ambient temperature and special colors please contact* **alfanar.

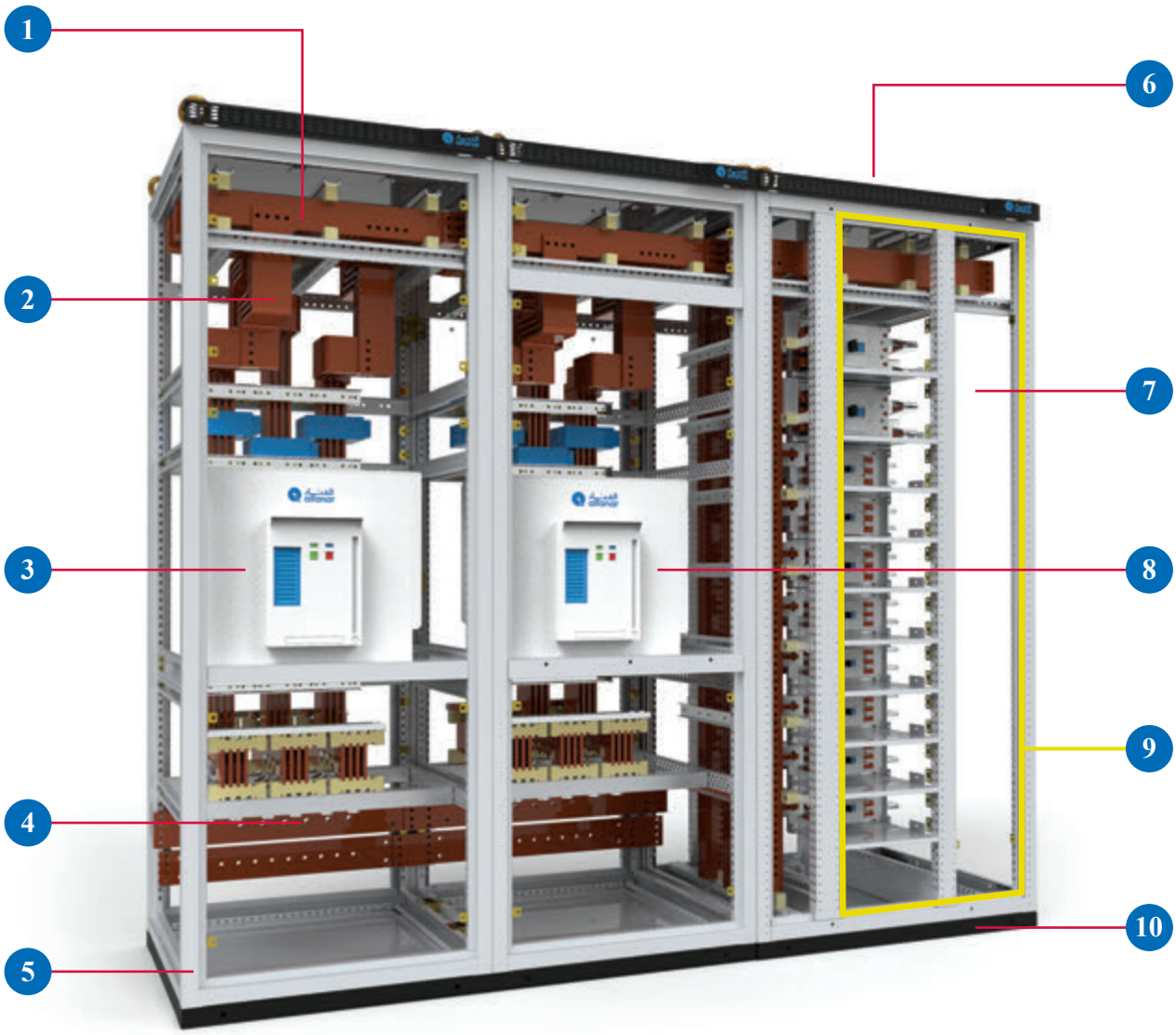
Appearance

With its new design, **alfanar EletraGear** has changed the concept of the bulky LV main distribution board and moved the competition to the next level, it is manufactured and tested to fulfil the ultimate needs in all segments.

alfanar's ability to change the color of the switchgear according to customer requirements and applicable standards (RAL and ANSI series) fortifies the unique appearance and flexibility.

Product Breakdown

alfanar switchgear is precisely sized to meet your requirements and budget. Each main distribution board provides a ready to use optimized solution, designed to the exact size and requirements for your specified functional application.



1	Horizontal busbar	6	Roof
2	Busbar connection to main horizontal busbar	7	Cable compartment
3	Incomer ACB breaker 6300 Amp	8	Outgoing ACB breaker 4000 Amp
4	Cable connection	9	Horizontal MCCB solution
5	Frame member	10	Skid base

Admissible Current in Copper Bars

The current available inside the horizontal copper bars, based on the number, cross-section and the outside ambient temperature is shown in the following table.

Admissible current for tin plated busbar for ambient temperature up to 50 °C based on normal ventilation (<= IP43) and forced ventilation (<= IP55).

Busbar Size (mm)			Amp
Quantity	Width	Thickness	
1b	20	10	250
1b	30	10	400
1b	30	10	600
1b	50	10	630
1b	55	10	800
1b	60	10	1000*
1b	70	10	1000
1b	85	10	1250
2b	55	10	1600
2b	70	10	2000
2b	85	10	2500
3b	85	10	3000
3b	100	10	3200
4b	100	10	4000
4b	150	10	5000
5b	150	10	6300

**for MCC only*

- In case of higher ingress protection over IP 43, forced ventilation is recommended
- In case of ratings of 5000A and higher, forced ventilation is recommended
- Maximum allowed size for the VBB feeding multi branch breakers = 3 x 85 x 10

Main Busbar Supports

For increased safety and to guarantee a higher level of short circuit without any side effects, **EletraGear** provides its design features and possible short circuit.

Short circuit level	30 kA	50 kA	65 kA	85 kA	100 kA
Busbar type	Max. distance between supports				
VBB	600 mm	400 mm	300 mm	250 mm	250 mm*
HBB	700 mm	650 mm	550 mm	380 mm	400 mm

Please contact* **alfanar

Dimensions and Possible Layouts

EletraGear cubicles have the following representative dimensions, constructed to provide the best solution using minimum space without affecting power efficiency.

Height (mm)	2150				
Width (mm)	400	600	800	1000	1200
Depth (mm)	800				

For more information please contact **alfanar**

For special dimensions upon request

Height (mm)	1600	1800	2300	
Width (mm)	400	600	800	1000	1200
Depth (mm)	600	800	1000	1200	

For more information please contact **alfanar**

Possible Layouts

• Air Circuit Breakers Configurations (1 Tier / 2 Tier / 3 Tier)

Width	600 mm	800 to 2000 Amp
Depth	800 mm	

Width	800 mm	2500 to 4000 Amp
Depth	800 mm	

Width	1200 mm	5000 to 6300 Amp
Depth	800 mm	

Width	800 mm	800 to 2000 Amp
Depth	1200 mm	

Width	1200 mm	800 to 3200 Amp
Depth	800 mm	

• Molded Case Circuit Breaker

EletraGear type tested MCCB panel boards are designed for easy handling and quick, simple installation.

The compact MCCB design provides a maximum cabling area within the enclosure with removable top and bottom gland plates for easier installation and cable entry.

	Form 3 / 4	Form 1 / 2
Width	1000 mm	800 mm
Depth	800 mm	800 mm

Based on the modular configuration of each solution, various arrangements are available according to the size and polarity:

- Up to Form 4b in width 1000
- Up to 11 × 125 or 250 AF **alfanar** MCCBs 3P can be placed in one cubical for Form 3 / 4
- Up to 24 × 125 or 250 AF **alfanar** MCCBs 3P can be placed in one cubical for Form 1 / 2

5 – Sub Distribution Board (EletraSub)

The **EletraSub** Distribution Board is is a component of an electricity supply system which divides an electrical power feed into subsidiary circuits while providing a protective fuse or CB for each circuit.

alfanar Sub Main Distribution Board (**EletraSub**) serves as a complete solution for the distribution of power and is available up to 630A. The design provides complete flexibility at the time of installation, complying with IEC 61439-1,2.

EletraSub Overview

- Easy interchangeability of components
- Wall mounted and free standing designs
- Available in 2/14 way (3Pole) to 6/42 way (1 Pole) outgoing MCCB's
- Enclosure Protection Class up to IP66
- Bare copper / tin plated / silver plated / PVC sleeved copper busbars
- Enclosures available for indoor and outdoor applications
- Neutral and earth busbars can be rated up to 100% of the main busbar
- Internal separation up to Form-3a

Standards

- IEC 61439 -1 & 2
- IEC60068-3-3
- SASO
- IEC 60529
- IEC60068-2-57
- IEC62262
- IBC2006/SBC301
- IEC 61641
- SBC401

Test Certificate

- (ASTA /UL)

Technical Data

Enclosure Name			EletraSub
Electrical Data	Rated voltages	Rated operating voltage Ue	Up to 690 V
		Rated insulation voltage Ui	Up to 800V
		Rated impulse withstand voltage Uimp	Up to 8 kV
		Overvoltage category	Up to IV
		Material group	IIIa
		Degree of pollution	3
		Rated frequency	50/60 Hz
	Rated current	Busbar type	Pure copper bars, with 99.9%conductivity
		Rated current for Distribution Busbar In	Up to 630 A
		Conditional short circuit current Icc	Up to 50 kA @ 0.25PF
		Rated short-time withstand current Icw	Up to 50 kA @ 1 Sec
		Rated peak withstand current Ipk	105 kA
	Incoming and outgoing	Incoming feeders	Up to 630 A
		Distribution feeders	Up to 250 A
	Direct contact protection	Form of separation	Up to 3a
		Protection against electric shock	Yes
	Ventilation		Normal
Mechanical Characteristics	Recommended depth		225 mm
	Skid base height		50 mm
	Number of ways		Up to 14
	External degree of protection IP		Up to IP66
	Steel components	Sheet metal material	AluZinc steel Electrogalvanized /Stainless Steel
		Sheet metal thickness	Up to 2 mm
	Surface protection		Electrostatic powder coating/ Epoxy
	Standard colors		RAL7035*
	Panel mounting		Wall mounted and free standing
	Mechanical impact		Up to IK10
General	Installation environment	Ambient temperature (°C)	Up to 50°C*
		Relative humidity	Max 50% at 50°C
		Maximum altitude	Up to 2000m*
	Busbar	Busbar system	3 PH, Neutral and PE
		Busbar insulating material	PVC sleeving
		Busbar plating material	Bare / tin / silver

** For higher altitude, ambient temperature and special colors please contact* **alfanar**.

Standard Dimensions, Number of Ways and Ampere Rating

EletraSub Dimensions

Incoming Details	Outgoing Details			Dimensions		
	Pan assembly	No. of Poles	No. of Ways	H (mm)	W (mm)	D (mm)
MCCB (125A/160A/ 250A/400A /630A)*	MCCB (125A/160A/250A)	SPN	6	900	800	225
			12	900	800	225
			18	900	800	225
			24	1100	800	225
			30	1100	800	225
			36	1300	800	225
			42	1300	800	225

**For 400A/630A Extension box kit should be added.*

Incoming Details	Outgoing Details			Dimensions		
	Pan assembly	No. of Poles	No. of Ways	H (mm)	W (mm)	D (mm)
MCCB (125A/160A/250A/400A/630A)*	MCCB (125A/160A/250A)	TPN	2	900	800	225
			4	900	800	225
			6	900	800	225
			8	1100	800	225
			10	1100	800	225
			12	1300	800	225
			14	1300	800	225

**For 400A/630A Extension box kit should be added.*

EletraSub Accessories

Top Blank Extension Box Kit

Incoming Details	Dimensions		
	H (mm)	W (mm)	D (mm)
(400A/630A)	150	800	225
Optional (125A/160A/250A)	150	800	225

Bottom Blank Extension Box Kit

Incoming Details	Dimensions		
	H (mm)	W (mm)	D (mm)
(400A/630A)	150	800	225
Optional (125A/160A/250A)	150	800	225

Top Metering Extension Box Kit

Incoming Details	Dimensions		
	H (mm)	W (mm)	D (mm)
Outdoor Metering Box	200`	800	225

Side Blank Extension Box Kit

Incoming Details	Dimensions		
	H (mm)	W (mm)	D (mm)
Optional Side Blank Box	900	300	225
	1100	300	225
	1300	300	225

6 – Final Distribution Board (Eletra-LD)

alfanar final distribution board (**Eletra-LD**) is designed to be a safe and reliable switching device for the end user where the most important part in the network is human protection.

Eletra-LD board provides the safest solution for the final load in residential, commercial and industrial premises.

Eletra-LD Overview

- Easy interchangeability of components
- Internal separation up to form 3a
- Rated short-time withstand current (Icw) per 0.25s up to 25 kA
- Peak withstand current Ipk 52.5 kA
- Ingress protection up to IP66
- Flexibility to provide up to 60 ways

Standards

- IEC 61439 -1 & 3
- IEC60068-3-3
- SASO
- IEC 60529
- IEC60068-2-57
- IEC62262
- IBC2006/SBC301
- IEC 61641
- SBC401

Test Certificate

- (DEKRA/ASTA/KEMA)

Technical Data

Enclosure Name			Eletra-LD
Electrical Data	Rated voltages	Rated operating voltage Ue	415 V
		Rated insulation voltage Ui	500 V
		Rated impulse withstand voltage Uimp	Up to 4 kV
		Overvoltage category	Up to IV
		Material group	IIIa
		Degree of pollution	3
		Rated frequency	50/60 Hz
	Rated current	Busbar type	Pure Copper Bars, with 99.9%conductivity
		Rated current for Distribution Busbar In	Up to 250 A
		Rated diversity factor (RFD)	1
		Conditional short circuit current Icc	18 kA
		Rated short-time withstand current Icw	Up to 25 kA @ 0.25 Sec
		Rated peak withstand current Ipk	Up to 52,5 kA
	Incoming and outgoing	Incoming feeders	Up to 250 A
		Distribution feeders	Up to 63 A
	Direct contact protection	Form of separation	Up to 3a
		Protection against electric shock	Yes
	Ventilation		Normal
Mechanical Characteristics	Number of ways		Up to 60
	Degree of protection	External mechanical impacts strength IK	Up to IK08
		External degree of protection IP	Up to IP66
	Steel Component	Sheet metal material	AluZinc steel Electrogalvanized /Stainless Steel
		Sheet metal thickness	Up to 2 mm
	Surface protection		Electrostatic powder coating/ Epoxy
	Standard colors		RAL7035*
	Panel mounting		Wall mounted / Free standing
General	Installation environment	Ambient temperature (°C)	Up to 50°C*
		Relative humidity	Max 50% at 50°C
		Maximum altitude	Up to 2000m*
	Busbar	Busbar system	3 PH, Neutral and PE
		Busbar insulating material	PVC sleeving
		Busbar plating material	Bare / tin / silver

For higher altitude ,ambient temperature and special colors please contact* **alfanar.

Standard Dimensions, Number of Ways and Ampere Rating

Eletra-LD Outdoor up to 250 A

Number of Ways	H (mm)	W (mm)	D (mm)
12 Way	600	400	160
18 Way	700	400	160
24 Way	700	400	160
30 Way	800	400	160
36 Way	800	400	160
42 Way	900	400	160
48 Way	900	400	160
54 Way	1000	400	160

For more cutter space, 425 mm width is available.

Eletra-LD Indoor up to 250 A

Number of Ways	H (mm)	W (mm)	D (mm)
12 Way	600	400	140
18 Way	650	400	140
24 Way	700	400	140
30 Way	750	400	140
36 Way	800	400	140
42 Way	850	400	140
48 Way	900	400	140
54 Way	950	400	140

For more cutter space, 425 mm width is available.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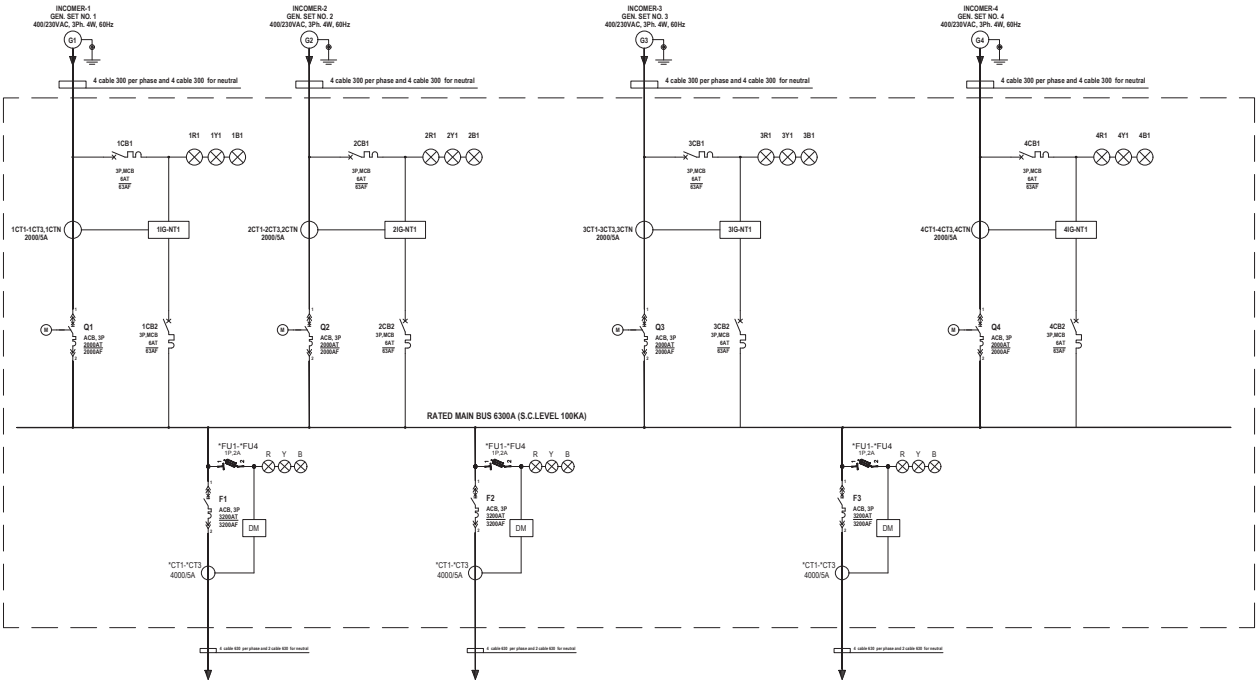
7 – Synchronizing Panel Board

alfanar's **EletraGear** Synchronizing Panels supply a large amount of power by using multiple generators working in parallel on load sharing.

These panels function both manually and with an automatic synchronizing function for one or more generators or breakers. They are widely used in synchronizing generators and offering multiplex solutions.

Our high quality range of **EletraGear** synchronizing panels are available with capacities that reach 12000 A, and are fabricated using high quality electrical components including copper busbar, insulation, wires/cable, PVC channels, transformers, meters and switches.

In an alternating current electric power system, synchronization is the process of matching the speed and frequency of a generator or other source to a running network. An AC generator cannot deliver power to an electrical grid unless it is running at the same frequency as the network.



- Rated insulation voltage 1000V
- Main busbars rated up to 12,000A
- Protection Class up to IP55
- Ambient temperature up to 40 °C
- Silver / tin plated / PVC sleeved copper busbars
- RAL 7035 color as standard, other colors on request
- Accessible from front / rear
- Cable/bus duct entry from top or bottom, with removable gland plates
- Type tested in accordance with IEC 61439 -1 & 2 standard for increased safety

** For higher ambient temperature please contact* **alfanar**

8 – Automatic Transfer Switches (ATS Panels)

alfanar's EletraGear Automatic Transfer Switches (ATS Panels) provide a solution that can handle transfer of critical loads to emergency sources with reliability. They ensure the continuity of electric supply to an installation with minimum interruption by making an automatic changeover from normal supply to emergency supply.

Automatic transfer switches are used to automatically change over from the main electrical supply to stand-by generators or generate on failure of the main supply.

When the main supply is restored, the system automatically changes back and stops the generator.

The stand-by generator will eventually be shut down after a short cooling down period.

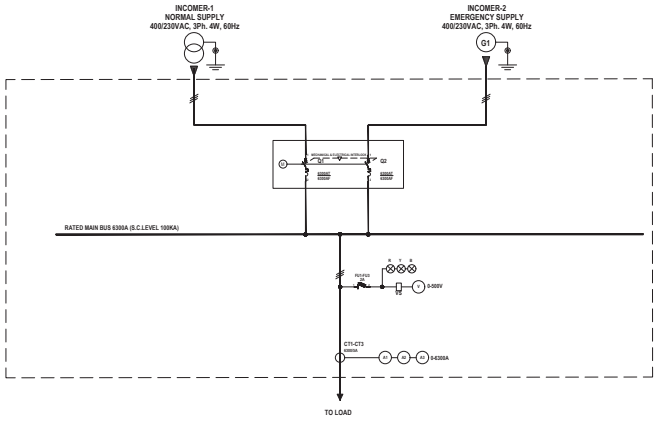
- Rated insulation voltage 1000V
- Busbar short-circuit withstand capacity up to 100kA for 1 sec
- Main busbars rated up to 6300A
- Neutral and earth busbars rated up to 100% of the main busbar

ATS Type

1. Change-over Switch

Logic table

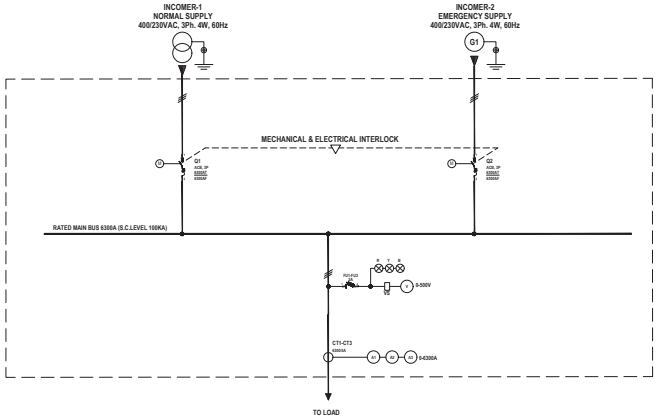
Condition	Q1	Q2
Incomer -1 & 2 Healthy	1	0
Incomer -1 Fail	0	1
Incomer -2 Fail	1	0



2. Breaker Type

Logic table

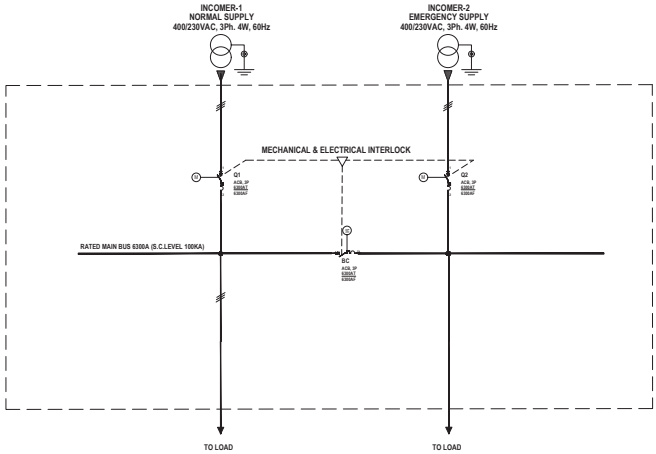
Condition	Q1	Q2
Incomer -1 & 2 Healthy	1	0
Incomer -1 Fail	0	1
Incomer -2 Fail	1	0



3. Parallel Operation

Logic table

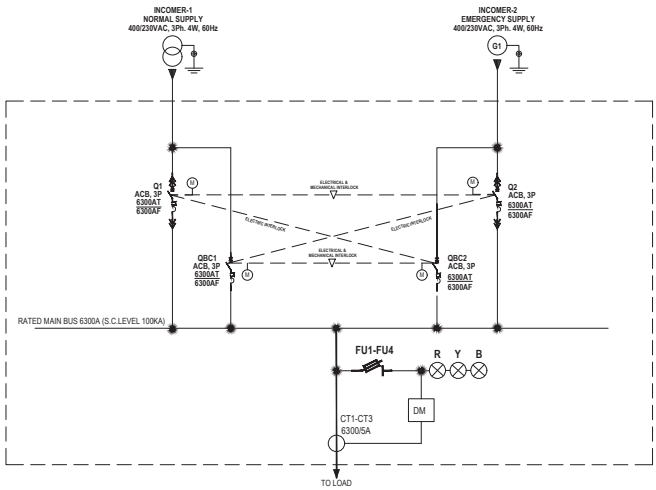
Condition	Q1	Q2	BC
Incomer -1 & 2 Healthy	1	1	0
Incomer -1 Fail	0	1	1
Incomer -2 Fail	1	0	1
Manual parallel operation	1	1	1



4. Bypass Breakers

Logic table

MODE	Q1	Q2	QB1	QB2
Off Mode	0	0	0	0
Normal (Q1)	1	0	0	0
Emergency (Q2)	0	1	0	0
Bypass (QB1)	0	0	1	0
Bypass (QB2)	0	0	0	1



9 – Power Factor Correction Capacitors (PFC)

alfanar power factor correction panel is used to bring the power factor of an AC power circuit closer to 1 by supplying reactive power of the opposite sign, adding capacitors that cancel the inductive effects of the load, which reduces transmission losses and improves voltage regulation at the load.

Correction may be applied by a utility to improve the stability and efficiency of the transmission network. Individual electrical customers who are charged by their utility for low power factor may install correction equipment to reduce those costs.

Technical Data

Enclosure Name			EletraGear
Standards			IEC 61921 Power Capacitors Low-Voltage Power Factor Correction Banks- Edition 2 2017-06
	Apparatus	Reactive power Qn	600 KVAr
Electrical Data	Rated voltages	Rated voltage Ue	440 V
		Rated insulation voltage Ui	800 V
		Rated impulse withstand voltage Uimp	Up to 6 kV
		Degree of pollution	3
		Rated frequency	Up to 60 Hz
	Rated current	Capacitance tolerance	*-5%, +10%
		Connection type	Three-phase
		Rated current for main distribution busbar In	Up to 1600 A
		Rated diversity factor (RFD)	1
		Conditional short circuit current Icc	Up to 50 kA
		Rated short-time withstand current Icw	Up to 50 kA
		Rated peak withstand current Ipk	Up to 105 kA
		Overload protection	1.5 In
		Maximum permissible over voltage	1.1 x Un
	PFC type	Fixed	Yes
		Automatic	Yes
	Head circuit breaker protection	Without circuit breaker	Yes
		With circuit breaker	Yes
	Steps	Numbers	Up to 12
		Capacitors type	Dry type capacitors
		Contactors	Switching
	Reactors	Detuned	5.67%
		Detuned	7%
	Direct contact protection	Form of separation	1 Up to 2a
		Protection against electric shock	Yes
	Temperature control		Automatic power factor controller
	Ventilation		Forced
Mechanical Characteristics	Degree of protection	External mechanical impacts strength IK	Up to IK10
		External degree of protection IP	Up to IP54
	Steel components	Frame material	AluZinc steel / EGS
		Frame thickness	Up to 3 mm
		Sheet metal material	AluZinc steel / EGS
	Surface protection		Electrostatic powder coating
	Standard colors		RAL7035*
	Panel mounting		Free standing
General	Installation environment	Ambient temperature (°C)	Up to 50°C*
		Relative humidity	Max 50% at 50°C
		Maximum altitude	≤ 2000 m*
	Busbar	Busbar system	3*PH, Neutral and PE
		Busbar insulating material	Bare / tin / silver / sleeving

For higher altitude ,ambient temp and special colors please contact* **alfanar.

10 – Motor Control Centers (EletraGear Plus)

The Motor Control Center is a combination of motor starters, power feeders and interlocking relays in a modular enclosure. **alfanar** Controlgear (**EletraGear Plus**) is a compact solution allowing for better control, design and safe electrical system with its most advanced technology for drawer units "IDS system".

EletraGear Plus Overview

- New compact drawout motor starter solution tested, (IDS German technology)
- Tested for Internal Arc Fault as per IEC-61641 for 100KA, 300 m.sec (Classified as PSC)
- Tested to withstand vibration caused by an earthquake of magnitude 8 on Richter scale, in accordance with IEC 60068-3-3, making **EletraGear Plus** design extremely suitable for sites with seismic risk
- Fully compartmentalized (fixed/drawout) design conforming to form of separation Form-4B
- RAL7035 color is the standard, other colors can be provided upon request
- Neutral and earth busbars can be rated up to 100% of the main busbar
- Can be interfaced with the Building Management System (BMS) for monitoring and controlling the loads
- Number of motor starter draw our module up to 20 (75mm) or up to 10 (150mm)

Standards

- IEC 61439 -1 & 2
- IEC60068-2-57
- IEC 60529
- IBC2006/SBC301
- IEC62262
- SBC401
- IEC 61641
- SASO
- IEC60068-3-3

Test Certificate

- (ASTA / KEMA)

Types of Starter

Draw-out Module	Fixed Module		
• Direct On-line	• Direct On-line	• Star/Delta	• Auto Transformer
• Star/Delta	• Soft Starter Unit	• Variable Speed Drive	
• Feeder			

Technical Data

Enclosure Name			EletraGear Plus
Electrical Data	Rated voltage	Rated operating voltage Ue	Up to 690 V
		Rated insulation voltage Ui	Up to 1000 V
		Rated impulse withstand voltage Uimp	Up to 12 kV
		Overvoltage category	Up to IV
		Material group	IIIa
		Degree of pollution	3
		Rated frequency	50/60 Hz
	Rated current	Busbar type	Pure copper bars, with 99.9%conductivity
		Rated current for main distribution busbar In	Up to 6300 A
		Rated short-time withstand current Icw (1@Sec)	Up to 100 kA
		Rated short-time withstand current Icw (3@Sec)	Up to 65 kA
		Rated peak withstand current Ipk	Up to 220 kA
		Rated current for dropper distribution in draw-out solution	Up to 1000 A
		Conditional short circuit current Icc	100 kA @ 0.2PF
	Incoming and outgoing	Incoming feeders	Up to 6300 A
		Distribution feeders	Up to 6300 A
		Motor feeders	250 A (110 KW@DOL or 45KW@SD)
	Arc fault containment	Prospective short-circuit current	Up to 100 kA @ 300 ms
	Direct contact protection	Form of separation	Up to 4b
		Protection against electric shock	Yes
	Seismic withstand capability test and induced vibrations		Yes
	Ventilation		Forced / Normal
	Number of drawer per section		Up to 20
	Degree of protection	External mechanical impacts strength IK	Up to IK11
		External degree of protection IP	Up to IP55
	Steel components	Frame thickness	Up to 3 mm
		Sheet metal material	AluZinc steel Electrogalvanized /Stainless Steel
	Surface protection		Electrostatic powder coating/ Epoxy
	Standard colors		RAL7035*
	Panel mounting		Free standing only
General	Installation environment	Ambient temperature (°C)	Up to 50°C*
		Relative humidity	Max 50% at 50°C
		Maximum altitude	Up to 2000m*
	Busbar	Busbar system	3 PH, Neutral and PE
		Busbar insulating material	PVC sleeving
		Busbar plating material	Bare / tin / silver

For higher altitude, ambient temperature and special colors please contact* **alfanar

IDS Technology (Draw-out solution)

Heavy industry production plants have the enormous potential of electrical energy failures, it is important to ensure safe energy distribution and avoid even the smallest failures which could cause widespread damage.

To solve this potentially serious problem and reduce the risk of electrical failure, **alfanar** has developed **EletraGear Plus**, a new safety philosophy that uses modular switchboard systems in draw-out technology to produce the most efficient contacting device ever designed.

The innovative safety feature is the contacting device.
The finger contacts and the pressure contacts use different methods to reduce and eliminate the undesired effects of magnetic forces by reinforcing the contacting pressure.

For more technical information & features scan QR code

For human safety, most industrial companies have defined the operation of their electrical switchgears into three major lines to avoid accidents by the hazard potential of electrical energy:

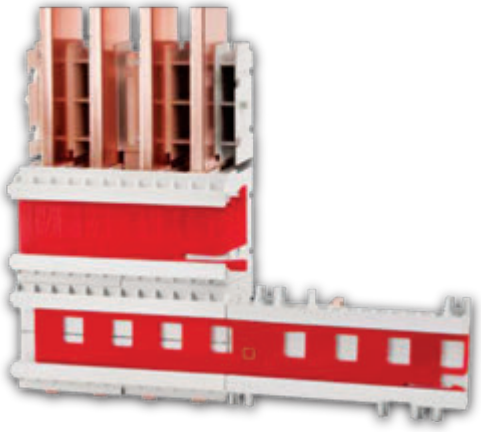
Third line	**Regulation**	Using special cloth and following the electrical safety rules
Second Line	**Limitation**	Additional mechanical measures
First Line	**Prevention**	Measures of encapsulation of parts which are live (contacting device)

IDS System Features

- Contacting device, vertical bus section and power plug form a hermetic encapsulation, creating an arc fault-free zone.
- 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.
- Vertical bus section insulation is strong enough to prevent movement of the vertical busbars which could influence the contacting pressure of the plug system.
- Contacting device is constructed to avoid any loss in contacting pressure during a short circuit.
- Moving the drawer to “operating position” or “testing position” will not influence the protection degree of the switchgear.
- Moving to operating position is possible while the whole power cabling remains fixed.
- The auto cleaning feature of the contacting device makes it maintenance free.
- The construction of the contacting device and its dimensions reinforce the contacting pressure during a short circuit.
- Each power contact is insulated between other contacts and against earth.
- The contacting device is free from mechanical tolerances which could influence the contacting pressure.
- All power contacts and control plugs are concealed behind the drawer frame.

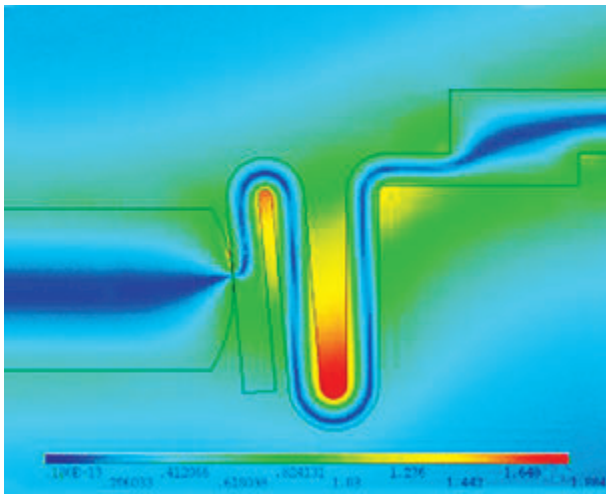
Arc Safe Vertical Bus Section

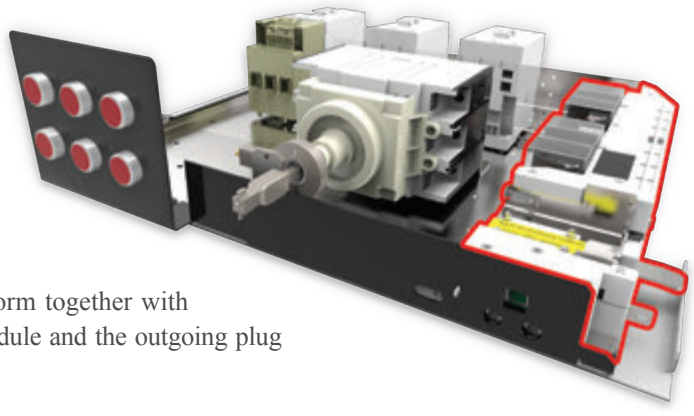
- The vertical bus section is completely insulated from phase to phase.
- The “Automatic Shutter” is mechanically interlocked, and can be padlocked.
- Any change of drawer modules can be rearranged while voltage is live.
- Accredited testing laboratories have certified the bus duct as “arc safe”.



Innovative Pressure Contact

- The pressure contact within the contacting module is developed to reinforce the contacting pressure in case of a short circuit, “instead of pushing out effect for the traditional fingers contacts during short circuit”.
- The contact surface has an auto cleaning feature that uses the rotation motion of the dust and sand, an advantage over traditional finger contacts inserted in joints which require continual cleaning.
- The special outline of the internal copper-layer increases the contacting-pressure.

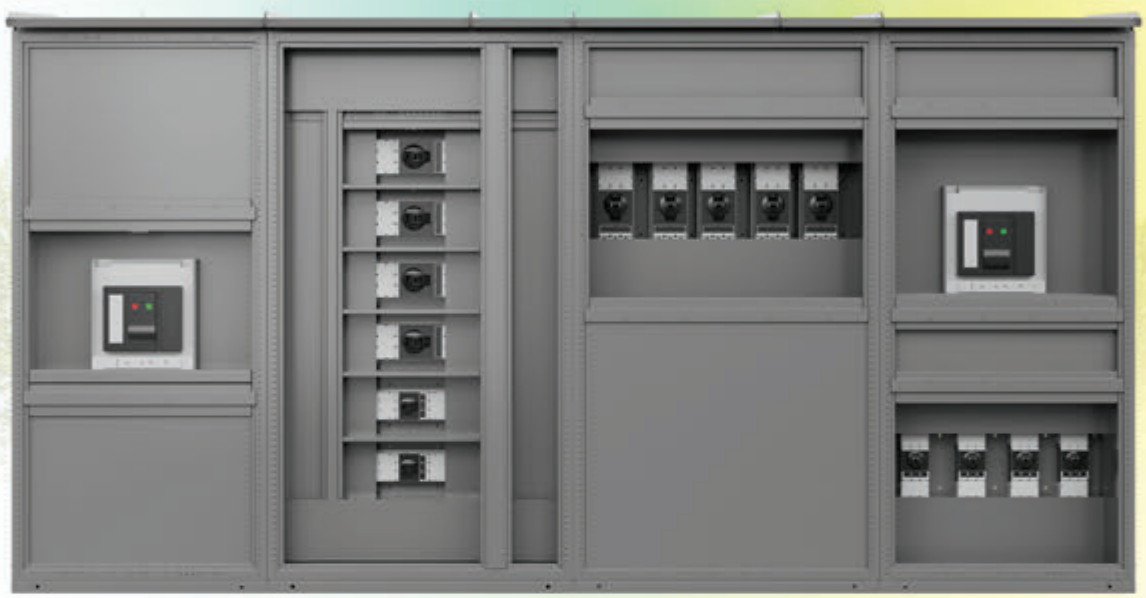




Arc Fault Free Contacting Device

The movable and switchable contacting modules form together with the vertical bus section insulators of the busbar module and the outgoing plug (outgoing module) to create an arc fault free zone.

800V LV Switchgear



RATINGS	
Switchgear Type	EletraGear (MDB-MULTI SECTIONS)
Applicable Standards	IEC-61349-1&2
Contractual Language	English
Climate Ambient Temperature (°C)	50
Max. Installation Altitude	0-1000 m
Location of Installation	Outdoor
Design Ambient Temperature (°C)	50
Switchgear Arrangement	Front & Rear / Front only
Accessibility	Front & Rear / Front only
Form of Internal Separation	Up to Form-4B
Degree of Protection (External)	IP-55 (OUTDOOR)
Gaskets	Yes Material : SPONGE RUBBER FLAT 20X3 mm
Incomer Connection	Cable (Incomer Entry BOTTOM)
Outgoing Cable Entry	BOTTOM Entry / Cable Chamber
Ventilation Openings	FORCED
Paint Minimum Thickness	Min 80 microns
Corrosion Category	C4 / C5 as per ISO 12944 - 2
Color	RAL-7038
Operating Voltage	800V AC (other voltages available on request)
Insulation Voltage	1000 V
Frequency	50/60Hz
Rated Impulse Withstand Voltage	8.0 kV (Busbar)
Dielectric Test Voltage	2200 V 60 Hz
Switch Board Rating	4000A, 800V AC,50/ 60Hz
Busbar System	Three Phase + Earth (3P+3W+E)

12 – Customer Reference

New IEC Std 61439

alfanar IEC 61439 series of standards uses the same structure as other series within IEC (e.g. IEC 947).
Part 1: General rules, details requirements that are common to two or more generic types of assembly.
Part 2: Each generic type of assembly has a product specific part within the series of standards.

New standard IEC 61439 recognizes that:

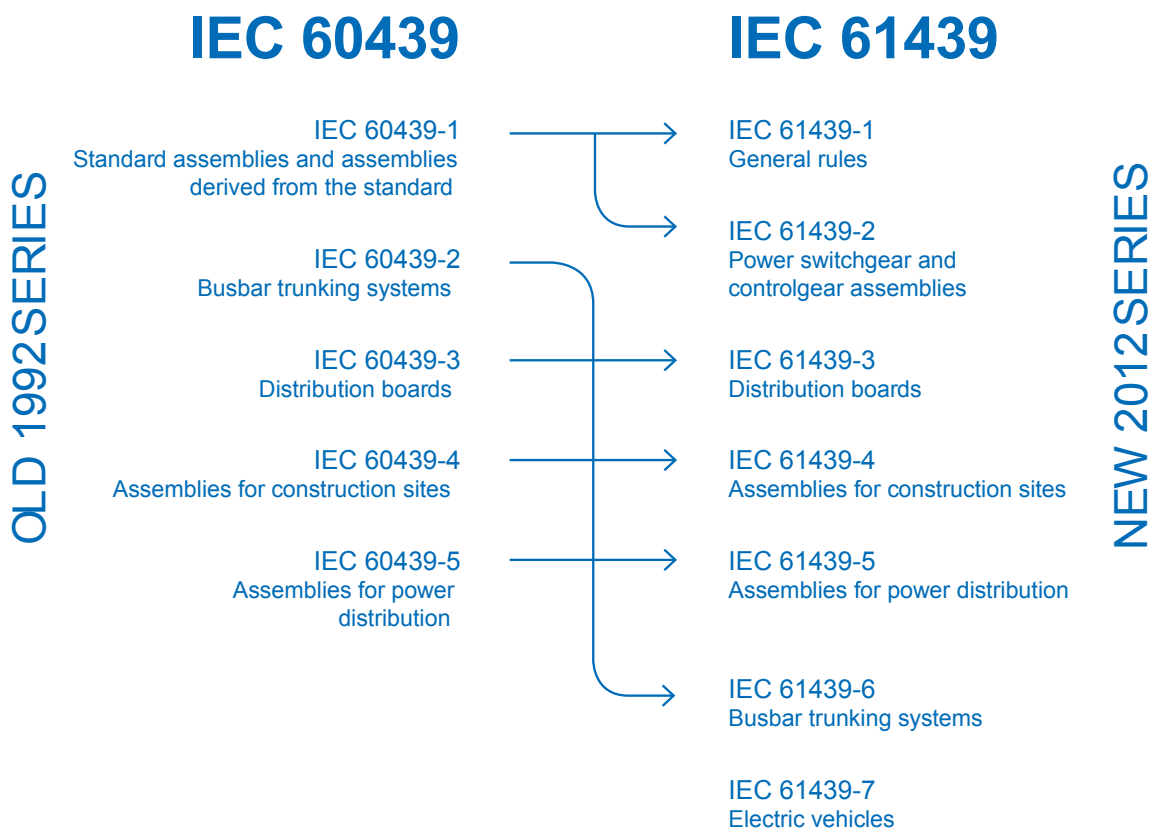
- Assemblies are multifaceted.
- Components can be connected in infinite combinations.
- Interactions between the various elements of an assembly, thermal, magnetic, etc., all affect the performance of individual circuits and the assembly as a whole.

Fundamental changes:

- IEC 61439 introduced radical changes.
- The categories of TTA and PTTA have been discarded in favor of a design 'verified assembly'.
  - 60439: TTA (Type Tested) or PTTA (Partially Type Tested) assemblies.
  - 61439: Design verification and routine verification for every assembly.

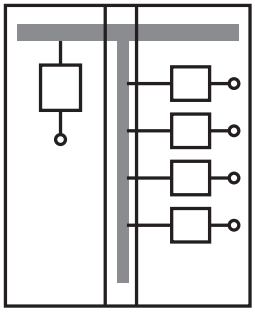
Clearly defined responsibilities:

- The manufacturer is responsible for internal configuration of the assembly and its performance.
- Customers/ specifiers are responsible for specifying the inputs and outputs of the assembly and to define the interfaces between the assembly and the outside world.

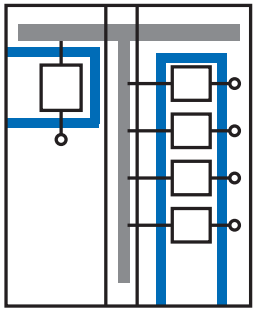


Separation Forms

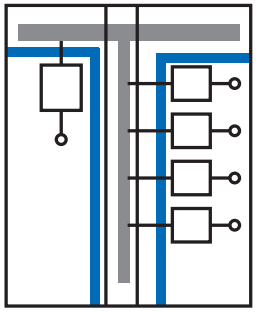
Technical Data



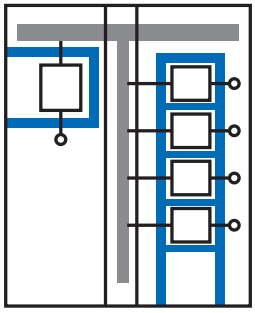
Form 1



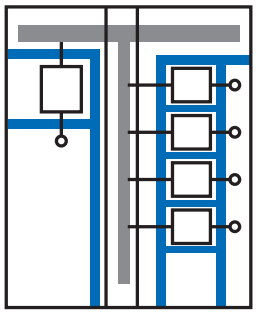
Form 2a



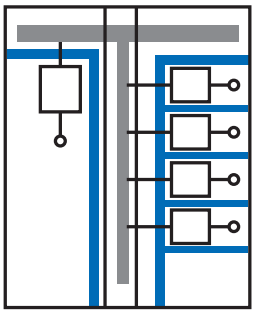
Form 2b



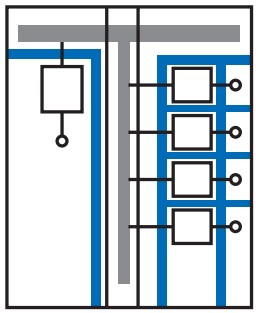
Form 3a



Form 3b



Form 4a



Form 4b

Busbar

Separation

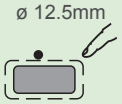
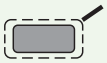
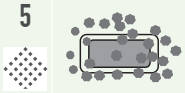
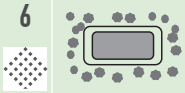
Form	IEC Standard Definition	Specific Recommendations
1	No Internal separation	Protection over busbar for customer safety
2a	Separation of busbars from the functional units	Terminals not separated from busbars
2b	Separation of busbars from the functional units	Terminals separated from busbars
3a	Separation of busbars from the functional units and of all functional units from each other	Terminals not separated from busbars
3b	Separation of busbars from the functional units and of all functional units from each other	Terminals separated from busbars
4a	Separation of busbars from the functional units and of all functional units from each other, also separation of terminals from any functional unit	Terminals in the same compartment as associated functional units
4b	Separation of busbars from the functional units and of all functional units from each other, also separation of terminals from any functional unit	Terminals are not in the same compartment as the associated functional units

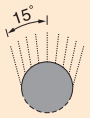
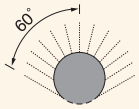
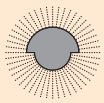
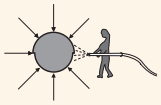
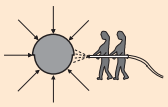
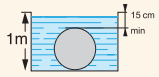
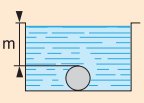
Ingress Protection (IP)

Standard IEC 60529 (February 2001) indicates the degree of protection provided by electrical equipment enclosures against accidental direct contact with live parts and against the ingress of solid foreign objects or water.

The IP code comprises 2 characteristic numerals and may include an additional letter when the actual protection of persons against direct contact with live parts is better than that indicated by the first numeral.

The first numeral characterizes the protection of the equipment against penetration of solid objects and the protection of people. The second numeral characterizes the protection of the equipment against penetration of water with harmful effects.

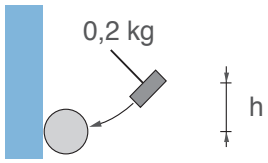
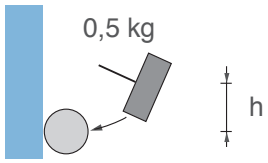
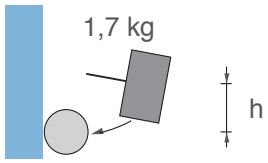
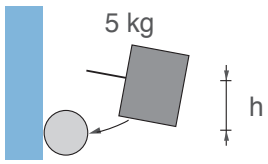
Protection Against Solid Bodies Data Table			
		Protection of Equipment	Protection of Persons
0	Tests	Non-protected	Non-protected
1	ø 50mm 	Protected against the penetration of solid objects having a diameter greater than or equal to 50 mm	Protected against direct contact with the back of the hand (accidental contacts).
2	ø 12.5mm 	Protected against the penetration of solid objects having a diameter greater than or equal to 12.5 mm.	Protected against direct finger contact.
3	ø 2.5mm 	Protected against the penetration of solid objects having a diameter greater than or equal to 2.5 mm.	Protected against direct contact with a Ø 2.5 mm tool.
4	ø 1mm 	Protected against the penetration of solid objects having a diameter greater than or equal to 1 mm.	Protected against direct contact with a Ø 1 mm wire.
5		Dust protected (no harmful deposits).	Protected against direct contact with a Ø 1 mm wire.
6		Dust tight.	Protected against direct contact with a Ø 1 mm wire.

Protection Against Liquids Data Table		
0	Tests	Non-protected
1		Protected against vertical dripping water, (condensation).
2		Protected against dripping water at an angle of up to 15°.
3		Protected against rain at an angle of up to 60°.
4		Protected against splashing water in all directions.
5		Protected against water jets in all directions.
6		Protected against powerful jets of water and waves.
7		Protected against the effects of teporary immersion.
8		Protected against the effects of prolonged immersion under specified conditions.

Level	Protected Against Access To Hazardous Parts With
A	With the back of the hand.
B	With the finger.
C	With a ø 2.5 mm tool.
D	With a ø 1 mm tool.

IK Code “Mechanical Impact Test”

The European Standard EN 50102/IEC 62262 defines a coding system (IK code) for indicating the degree of protection provided by electrical equipment enclosures against external mechanical impact.

		h (cm)	Energy (J)
00		Non-protected	
01		7.5	0.15
02		10	0.2
03		17.5	0.35
04		25	0.5
05		35	0.7
06		20	1
07		40	2
08		30	5
09		20	10
10		40	20

Standard NF C 15-100 (May 1991 edition), section 512, table 51 A, provides a cross-reference between the various degrees of protection and the environmental conditions classification, relating to the selection of equipment according to external factors.

Practical guide UTE C 15-103 contains tables showing the specifications required for electrical equipment (including minimum degrees of protection), according to the locations in which they are installed.

Arc Flash Protection

alfanar panels conform to: IEC 61641: 2008 – 01
International standards (IEC / ANSI) guidelines are different but the objectives are the same, i.e. defining minimum safety level for operators.

The terms Internal Arc Containment and Arc Resistance are used interchangeably, yet the assessment criteria remain the same. If these criteria are achieved by the panel, then the test is a success.

Assessment criteria for the internal arc test:

- Correctly secured doors, covers, etc. do not open.
- Parts of the assembly (which may cause a hazard) do not fly off.
- Arcing does not cause holes in the external parts of the enclosure.
- Indicators do not ignite (made from black cretonne).
- The protective circuit is still operational.
- The arc is to be confined in the same area where it was ignited.

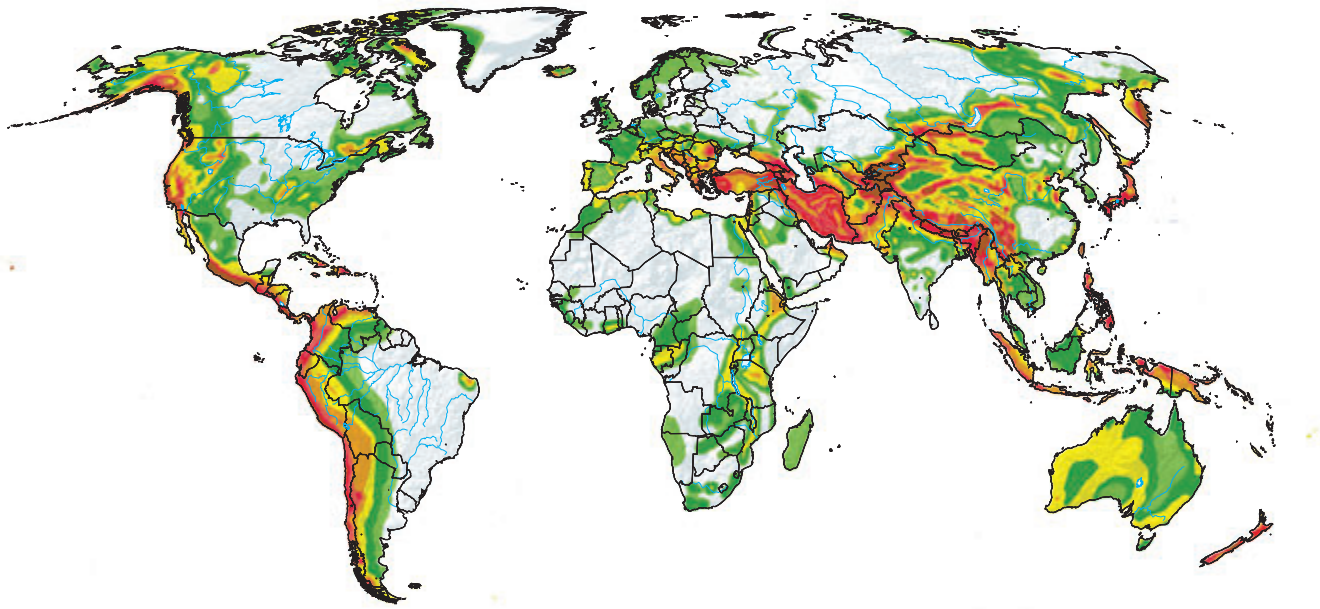
*For **alfanar**'s real test videos scan QR code*

Anti-seismic Switchboards and Withstand for Vibration

alfanar panels conform to:

- Environmental Testing - Part 2-57: Tests – Test Ff:
  Vibration Time-history method; [CEI EN 60068-2-57]

- Environmental Testing - Part 3:
  Guidance Seismic Test Methods for Equipments; [CEI EN 60068-3-3]



GLOBAL SEISMIC HAZARD MAP

Zone	Earthquake Effect	Richter Magnitude
Zone 0	Not felt by people	0-2
	Felt little by people	2-3
	Ceiling lights swing	3-4
Zone 1	Wall cracks	4-5
Zone 2	Furniture moves	5-6
	Some buildings collapse	6-7
Zone 3	Many building destroyed	7-8
Zone 4	Total destruction	8-Up

Proper mounting of the equipment is the single most important factor in withstanding a seismic event. The foundation must be level and continuous under the entire assembly. The foundation must be designed to withstand the reaction loads imposed on it by the equipment during a seismic event.

Definitions

The following list is the main standards which refer to the most common low voltage electrical applications and report their publication years.

The standards might have been amended, but the relevant amendaments are not mentioned here.

Standard	Title
IEC 61439-1	Low-voltage switchgear and controlgear assemblies - Part 1: General rules
IEC 61439-2	Low-voltage switchgear and controlgear assemblies - Part 2: Particular requirements for busbar trunking systems (busways)
IEC 61439-3	Low-voltage switchgear and controlgear assemblies - Part 3: Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards
IEC 60529	Degree of protection provided by enclosures (IP Code)
IEC 62262	Degree of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
IEC 61641	Low-voltage switchgear and controlgear assemblies - guide for testing under conditions of arcing due to internal fault
IEC 60068	Environmental Testing
IBC2006/SBC301	Saudi Building Code Structural – Loading and Forces
SBC401	Saudi Building Code Structural Electrical
SASO	Saudi Standards, Metrology and Quality Organization
IEC 60831	Shunt power capacitors of the self-healing type for AC systems having a rated voltage up to and including 1000 V
IEC 60947-1	Low-voltage switchgear and controlgear - Part 1: General rules
IEC 60947-2	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers
IEC 60947-3	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

Notes

Notes

Notes

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