

A photograph of a server room with rows of server racks. The racks are filled with server units, each with numerous indicator lights and small displays. The room is dimly lit, with a strong blue glow emanating from the server units, creating a futuristic and high-tech atmosphere. The perspective is from a low angle, looking down a long aisle between the racks.

SAS Products & System Portfolio

Low Voltage Switchgear

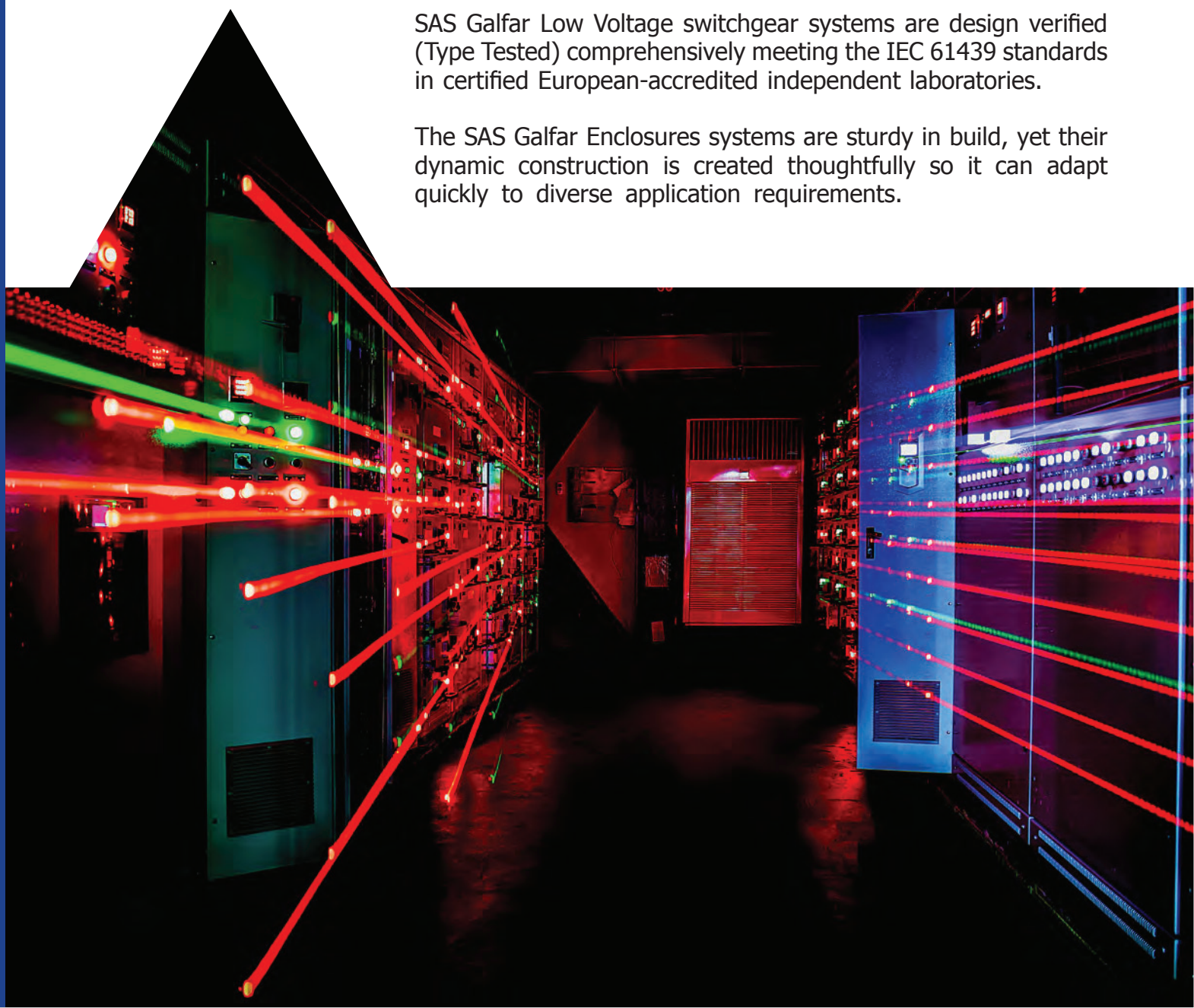
(Assemblies rated up to, and including 1000 V AC and 1500 V DC)

From design, engineering, assembly to testing and installation, each part of the LV Switchgear is crafted and put together at the SAS facility.

The SAS LV switchboard designs are developed in-house by experienced professionals and technicians. They ensure that all statutory and mandatory processes are followed, which meet the International standards and the regulations set in place by local and regional authorities.

SAS Galfar Low Voltage switchgear systems are design verified (Type Tested) comprehensively meeting the IEC 61439 standards in certified European-accredited independent laboratories.

The SAS Galfar Enclosures systems are sturdy in build, yet their dynamic construction is created thoughtfully so it can adapt quickly to diverse application requirements.



One look, and it's obvious—SAS Galfar Enclosure Systems are elegant, and aesthetically pleasing. SAS Galfar uses its own branded enclosure systems for building the switchgear and control gear systems. If client requests, OEM enclosure systems are also created, which showcases our ability to fulfill client's needs and requirements at all costs.

Our capacity to construct complex panels with withdrawable motor control units and power switchgear that can carry large currents down to simple distribution boards that handle small loads at the consumer level; makes us a one-stop destination for all clients.

The surface treatment and the painting used on each of the panels make it highly corrosion-resistant. The non-metallic parts used in the assembly for insulation and support are tolerant of high temperatures.

Product Technical Specifications

LV Switchgear / Motor Control Centers/ Distribution Boards meeting IEC 61439 Standards.

Description	LVAC Switchgear
Bus bar Material	Electrolytic Grade Copper for Main and Distribution bus bars
Enclosure	2.5mm Sheet Steel, Free standing, Floor Mountable type.
Construction	Form 4B Construction ,IP 43/ 54
Shade /Thickness	RAL7032 for external, RAL9003 for internal, 70 micron (min) / 90 micron (average)
Cable Entry	Both TOP/ Bottom alternatives: Possible
Terminal Blocks	Disconnecting type for CT and VT secondary Circuits, Non Disconnecting types for AC/ DC and Control Circuits, Knife edge terminals for Alarm and SCADA circuits
CT/VT/Control Wiring	PVC Insulated , Stranded Copper Conductors , Tri Rated , 600/1000 V Grade, Flame retardant low smoke type meeting BS 6231, CT & VT secondary Circuits – 2.5 sq mm R,Y,B & Black, DC Circuits – 1.5 sq mm Grey, AC Circuits – 1.5 sq mm Black, Heater & illumination – 2.5 sq mm Black, Protective Earth – 2.5 sq mm Y/G, Other Colors on Request
Control wire markers (ferrules)	White PVC tubes with indelible marking as per client practice.
Labels	PVC/Traffolyte engraved Labels with Black lettering on White Background of different sizes
Mimic	Mimic shall be PVC, sticker type with good adhesive properties



Products Features

- 1000 V AC & 1500 V DC
- Designed as per IEC 62208 standards with galvanized iron sheet metal of 2.00mm thickness or more if specified
- Resistance to corrosion—IEC 60068-2-30 (test Db) at (40+/-3 deg C) and RM 95%.
- Design verification tests were done at DEKRA (KEMA quality) the Netherlands.

Electrical tests as per IEC 61439

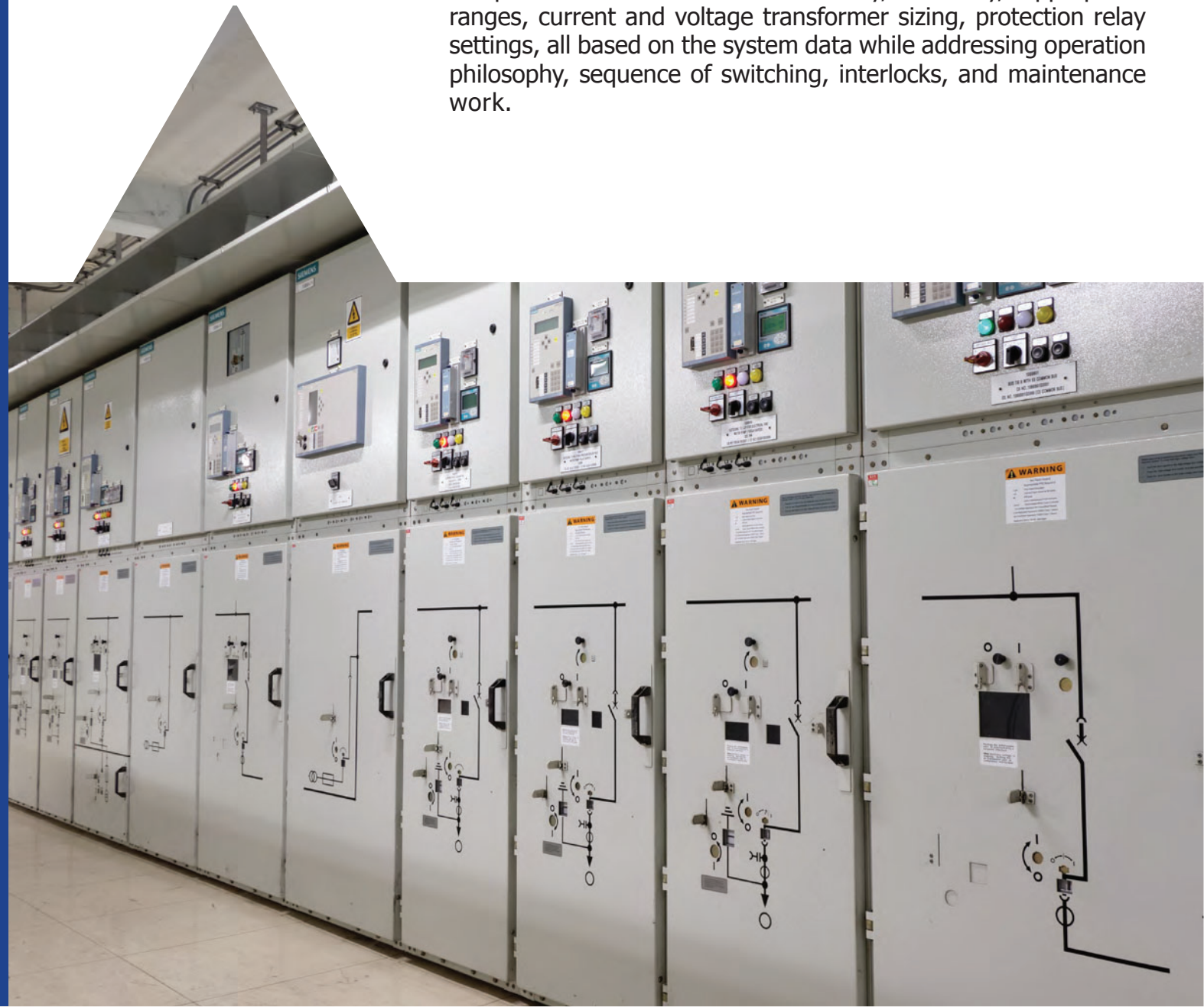
- 1.LV Panels tested as per IK10 impact test according to IEC 62262—designed according to the IEC 62208
- 2.Severity Class A for indoor and Severity Class B for outdoor—all design verified
- 3.Available in draw-out and non-draw out versions
- 4.Available in Form 4b and Form 2b construction with up to IP54 ingress protection

Medium Voltage Switchgear

(For voltages exceeding 1000 volts up to, and including 33 000 volts)

More complex than their lower voltage counterparts in both construction and operation, the SAS MV Power Switchgear falls in line with the requirements of the latest IEC and IEEE standards. The SAS design and technicians team possess the talent and skills to introduce the right fit for increased asset life, thus protecting the operations personnel by limiting any chances of injuries or accidents.

The design + technicians team carefully selects the right components in terms of functionality, accuracy, appropriate ranges, current and voltage transformer sizing, protection relay settings, all based on the system data while addressing operation philosophy, sequence of switching, interlocks, and maintenance work.



For essential quality checks, the SAS team performs the documented scheme verification and other routine tests (as defined by the Inspection Test Plan) before the equipment is put into use. Such tests (both in the factory and field) ensure a superior level of performance over time.

SAS Galfar uses Type Tested Power Switchgear from Original Equipment Manufacturers (OEM's) and performs the complementary but key activities involved: design, LV Compartment assembly, integration, testing, supervision of installation, and site acceptance tests, commissioning, warranty, and maintenance checks.

In the end, aligning the product to satisfy the requirements laid out by the local regulations is conducted to ensure supreme performance at all times.

Product Technical Specifications

General Technical Data – Compliant to IEC 62271-1; 62271-200; 62271-100

Note: In each of the versions mentioned below, a manually operated Earth switch with fault making capacity interlocked with the VCB for safe operation in accordance with IEC 62271-102 is included.

Rated Voltage –kV	3.6/ 7.2 /12/ 17.5
Service Voltage -kV	3.3/ 6.6/11/13.8
Service Frequency-HZ	50/60
Power Frequency withstand Voltage-kV	10/20/38/38
Rated Impulse Withstand Voltage -kV	40/60/75/95
Short Time withstand – kA/ 3 seconds	20/25/31.5/40/50
Internal Arc Withstand- kA/1Second	20/25/31.5/40
Peak Withstand Current –kA	50/63/80/125/150
Electrical Endurance	274 (Class E2)
Mechanical Endurance	20,000
Vacuum Circuit Breaker	35-70
Closing Time- ms	25-40
Opening Time- ms	40-55
Breaking Time- ms	
Degree of Protection-IEC 60529	IP4X

Rated Voltage –kV	24
Service Voltage -kV	22
Service Frequency-HZ	50/60
Power Frequency withstand Voltage-kV	50/65
Rated Impulse Withstand Voltage -kV	125
Short Time withstand – kA/ 3 seconds	20/25/31.5/40
Internal Arc Withstand- kA/1Second	20/25/31.5/40
Peak Withstand Current –kA	50/63/80/100
Electrical Endurance	274 (Class E2)
Mechanical Endurance	20,000
Vacuum Circuit Breaker Closing Time- ms Opening Time- ms Breaking Time- ms	35-70 25-40 40-55
Degree of Protection-IEC 60529	IP4X

Rated Voltage –kV	36
Service Voltage -kV	33
Service Frequency-HZ	50/60
Power Frequency withstand Voltage-kV	95
Rated Impulse Withstand Voltage -kV	185
Short Time withstand – kA/ 3 seconds	25/31.5
Internal Arc Withstand- kA/1Second	25/31.5
Peak Withstand Current –kA	63/80
Electrical Endurance	274 (Class E2)
Mechanical Endurance	20,000
Vacuum Circuit Breaker Closing Time- ms Opening Time- ms Breaking Time- ms	55-80 25-40 <=60
Degree of Protection-IEC 60529	IP4X



Products Features

A. Type-tested switchgear ranges available from 3.3 kV to 33 kV acquired from OEM's. However, all key activities like design, LV compartment assembly, integration, testing, supervision of installation & site acceptance tests, commissioning, warranty & maintenance checks are done in-house.

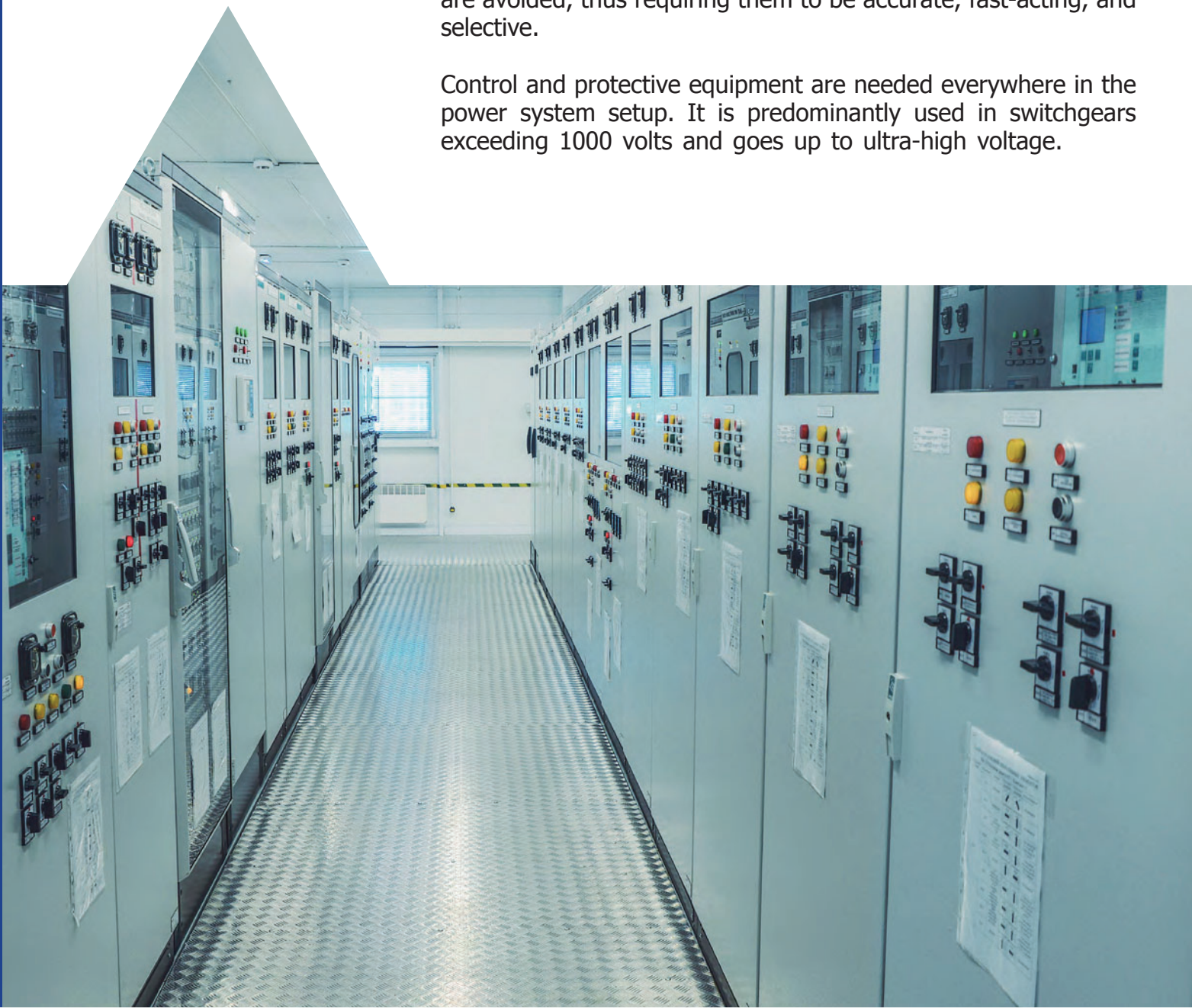
- Air-insulated switchgear designed as per IEC 62271 standards. Complies with all the requirements of the latest IEC/IEEE standards.
- Completed all factory acceptance tests
- Complete field installation supervision
- Full testing and commissioning
- Warranty and annual maintenance plus service available

Control, Protection and Substation Automation

Switchgear protection is necessary for any system providing power to electrical loads. Protection can be built into a switching device, an external relay that swiftly identifies abnormalities in a power system and initiates tripping of the associated switching device.

Then, it must detect and isolate the faulty part of the network with minimum or no damage while ensuring that bad disconnections are avoided, thus requiring them to be accurate, fast-acting, and selective.

Control and protective equipment are needed everywhere in the power system setup. It is predominantly used in switchgears exceeding 1000 volts and goes up to ultra-high voltage.



The SAS Substation Automation System accomplishes switching operations, manages interlocks, and interfaces with its protection equipment. The SAS team is adept at providing Substation Control and Protection solutions – whatever the requirement from the end-user be; for all power systems to facilitate generation, transmission, distribution and efficient utilization of electric energy.

It has references in delivering protection systems, including up to 400 kilovolts.

Product Technical Specifications

Description	Relay & Control Panels
Form of Construction	Free Standing , Floor Mounting Door handle – swing type Three point mechanism with Padlock facility with lifting hooks on TOP plate
IEC Standard for the enclosure	IEC 62208
Degree of Ingress Protection in accordance with IEC 60529	IP54
Access	Front and rear for Relay Panels Rear for Control Panels
Shade	RAL 7032 – Exterior RAL 9003- Internal Base Frame & Sub Rack – RAL 9005(Black) Mounting Plates – RAL 9003
Paint Thickness	Average 90 microns
Cubicle Dimensions	Approx. 2300X800X800 mm (HXWXD)
Gland Plate thickness	2.5 mm or better
Bus bar Material	Electrolytic grade Tinned copper 99.98 % purity for earth Bus

Description	Relay & Control Panels
Protective Earth – Cross section Area	200 sq mm.
Cable Entry	Bottom
Mimic	Plastic, good adhesion sticker type 132 kV – RAL 5005 for Control Panels
Terminal Blocks	Disconnecting type for CT and VT secondary Circuits Non-disconnecting types for AC/ DC and control circuits Knife edge terminals for Alarm and SCADA circuits
CT/VT/Control Wiring	PVC Insulated , stranded copper conductors , Tri Rated , 600/1000 V Grade , Flame retardant low smoke type meeting BS 6231 CT secondary Circuits – 2.5 sq mm- R,Y,B & Black VT secondary Circuits – 2.5 sq mm- R,Y,B & Black DC Circuits – 1.5 sq mm Grey AC Circuits – 1.5 sq mm Black Protective Earth – 2.5 sq mm Y/G
Labels	PVC/ Traffolyte engraved Labels with Black lettering on white Background of different sizes

Products Features

- High-performance solutions for reliable control, protection, operation, and monitoring of electrical substations
- Designed and tested in Europe
- Expertise ranging from 11 kV to 400 kV system levels
- In-house design team who possess expertise and proficiency in utilization of different types and makes of protection systems curated and perfected to suit customer requirements
- Full compliance with modern numerical protections, configurations, and applications
- Expertise in designing conventional control or substation control & monitoring systems
- Panels entail dead front or modular rack arrangements with protective glass doors.
- Come equipped with control equipment and protection relays
- Enclosures tested to IP 54
- OHL/ cable, transformer, reactor, Busbar protection systems

Local Control Centers (LCC) for Gas Insulated Switchgear

LCC performs a significant role in substations with all the critical functions required to operate and maintain the GIS.

Gas Insulated Switchgear (GIS) are employed in indoor transmission substations. They constitute switching devices and instrument transformers placed inside airtight chambers filled with inert gas to achieve the desired dielectric strength compactly. The controls of such devices are provided in panels positioned as close as possible to the GIS.

The LCC works in a decentralized strategy—each bay is provided with a dedicated panel. These panels consist of the conventional control, measuring and monitoring components with interlocks between the switching devices and the bay control unit (part of the substation control & monitoring system –SCMS), thus allowing the backup to ensure efficient power flow.



Uninterrupted availability of the transmission voltages is vital for powering a large part of a city or a community. Hence, the switchgear layout, the operational possibilities, system interlocks and energy management are complex and pose challenges for the power system engineer.

Having manufactured several LCC's, the SAS team has devised and created conventional and programmable simulators to replicate the GIS for performing tests and checks.

We carry a unique distinction of being an independent approved LCC manufacturer by utilities in the region.

Product Technical Specifications

Description	Local Control Cubicle
Form of Construction	Free Standing , Floor Mounting Door handle – swing type Three point mechanism with Padlock facility with lifting hooks on TOP plate
IEC Standard for the enclosure	IEC 62208
Degree of Ingress Protection in accordance with IEC 60529	IP54
Shade	Exterior - RAL 7032 (texture finish) Interior - RAL9003 (semi glossy)
Paint Thickness	Average 90 microns
Cubicle Dimensions	Approx. (HXWXD) =2400X1200X800 mm/ 2400x1600x800mm/2400X1050X900 mm
Enclosure Sheet Thickness	2.5 mm

Description	Local Control Cubicle
Gland Plate thickness	2.5 mm or better
Bus bar Material	Electrolytic grade Tinned copper 99.98 % purity for earth Bus
Protective Earth – Cross section Area	200 sq mm.
Cable Entry	Bottom
Mimic	Plastic, good adhesion sticker type
Terminal Blocks	Disconnecting type for CT and VT secondary Circuits, Non Disconnecting types for AC/ DC and Control Circuits, Knife edge terminals for Alarm and SCADA circuits
CT/VT/Control Wiring	CT secondary Circuits – 2.5 sq mm- R,Y,B & Black VT secondary Circuits – 2.5 sq mm- R,Y,B & Black DC Circuits – 1.5 sq mm Grey AC Circuits – 2.5 sq mm Black Protective Earth – 2.5 sq mm Y/G
Labels	PVC engraved Labels with Black lettering on White Background of different sizes

Products Features

- Custom-made panels suited for dynamic operations, and provide complex operational safety interlocks, control and monitor GIS
- Panels with IP 54 ingress protection
- Optimized solutions for multi-vendor GIS, approved by several utilities
- Design capability for developing logics, scheme diagrams
- Expert-designed PLC-based simulator which replicates as GIS
- Programs for system interlocks developed for different feeder types, and various utilities for manufacturers

Automation Project

Water: switching, control & instrumentation to facilitate optimal use of Water through recirculation, desalination, irrigation, district cooling and treatment that are all process-based applications related to efficient use of water.

Oil and Gas: control and operation of higher power motors are put into practice utilizing medium voltage starters and soft starters or variable frequency drives. The control, protection, monitoring and measurements work like it is in the lower voltage range.

Across oil and gas industries as well as water and energy, the SAS switching control and instrumentation system help put together all process-based applications into effect.

Process control, instrumentation, measurement, and monitoring of the electrical system associated with the above applications need versatile products, avant-garde resources, and experience.

To develop the right techniques and achieve seamless integration



of field instruments that measure physical parameters and convert them to electrical equivalents, the right automation equipment, switching devices, and the program algorithm must be created to achieve the desired operation.

The most critical ingredient here is the acquired experience that is needed to craft the perfect integration of all these to build an efficient system that must be flexible to allow expansion and modification without major constraints.

SAS Galfar incorporates the above tenets effectively in delivering and installing systems for the process-based automation systems in all the projects across our operating sectors.

Products Features

- Complete switching, control & instrumentation
- Instrumentation from reputed companies like E&H
- Optimal use of water, recirculation, desalination, irrigation, district cooling & treatment. All process-based applications related to efficient use of water.
- Complete automation solutions available for district cooling plants, pumping stations, and sewage treatment plants compliant with devices and softwares of major OEMs: ABB, SE, Rockwell Automation etc.
- Seamless integration and functioning with multi-vendor products and systems
- Full service available—from document preparation, providing clarifications to programming and verification by simulation methods
- Design, architecture, system description, process flow, I/O list, Boolean diagram, Ladder Logic available
- Complete factory acceptance tests—from hook-up with instruments to VFD and metering equipment
- Site acceptance tests to demonstrate functional aspects and performance tests along with redundancy checks



SAS Services

SAS Services

Site measurements plus power studies, related analysis, and subsequent maintenance are essential to maintain a smooth and clean power supply. It may start from simple methods of proficient load management or filtering, passive or active; the solutions needed to fulfill the aforementioned goal are numerous. SAS Power takes pride in providing expert services to solve all power-related challenges, which sets the ground for power to function optimally.

Engineering Services

- Power quality—harmonic calculation and recommendation of filter sizing
- Technical studies—use of conventional calculations and time-proven software to determine the appropriate values used in the configurations and settings to be adopted
- Retrofit, annual & preventive maintenance—perform upgradation, repair, replacement and maintenance works on planned shutdowns on extremely short durations to keep the plant interruptions to the minimum



Technical Studies

- Short circuit analysis
- Protection discrimination & coordination
- Power factor correction
- Heat load Calculation
- Arc Flash analysis
- Lightning protection
- CT/ VT calculations and sizing
- Battery sizing
- Relay setting calculations

Retrofit, Annual & Preventive Maintenance

- Teams available on call 24x7, for all service and maintenance requirements
- Protection modifications—replacement of old or obsolete protections
- Modifications—remote end main1 and main 2 line protections replacement with new relays
- Replacement of LV capacitor banks
- LV Circuit breakers replacements for enhanced capacity

Miscellaneous Services

- Designing, assembly, testing, and commissioning of fault monitoring systems
- Designing, assembly, and testing of automatic voltage regulator for transformers
- Create remote telemetry unit panels for power and water applications
- Create control panels for motor controls employing soft starters, variable frequency drives
- Create SCMS/SCADA panels
- All-inclusive training (classroom and on-field) on usage, compliance, operations related to our entire range of products and activities