

Power distribution to the point

Modular · Safe · Intelligent



ModuVar

Under license of



MES

engineered solutions by **AKO**

Flexible solutions for energy distribution and MCC

ModuVar offers flexible solutions for all low voltage requirements up to 6300A. The basis for this flexibility is individually equippable functional units of different dimensions and configurations which have proven their efficiency according to the high requirements of IEC 61439-2 based on corresponding type test certificates.

Three main arguments describe the recipe for success of this evolutionary stage of a system that has been successfully established on the market for many years: Modularity, safety and intelligence.



MODULARITY

A variety of different panel types and ratings guarantee the individual and effective implementation of our customers' requirements. In the process, we can react precisely to the on-site environment due to a flexible design with different bus bar layers, cable connection possibilities from different directions or the type tested connection of a bus bar system.

The greatest advantage of this system, however is the combined variance in the selection of the main devices: The system is type tested with various components of established manufacturer brands.

SAFETY

Well-conceived constructive measures prioritise availability and personal safety to safeguard the user against the effects of any accidental arcs that occur. The successfully passed tests under internal arc conditions confirm this circumstance by certificate according to IEC/TR61641.

With both the active arc fault protection system and the implementation of a thorough insulated bus bar design, KÖHL also offers two recognized technologies for the further increase of personal and plant safety.

INTELLIGENCE

Today's standard scope of supply for state-of-the-art switchgears includes not only complex communication networks but also permanent condition monitoring for the evaluation of an intelligent predictive maintenance. Based on various protocols, data and measured values are automatically recorded, evaluated and supplied to the user for further utilisation, e.g. in parent energy management or SCADA systems.

Technical data

General characteristic values		
Standards and requirements		IEC/EN 61439-1, IEC/EN 61439-2, IEC/TR 61641
Ambient temperature	°C	-5 to +40, average value over 24 hours: +35
Protection class		IP 30/31 , 40/41, IP 54 according to IEC / EN 60529
Internal separation		Form 1; 2b; 3a; 3b; 4a; 4b
Connection type		Cable from below, cable from above Bus bar from below, bus bar from above
Bus bar position		Top rear, bottom rear
Panel widths	mm	400; 600; 800; 1000; 1200
Internal arc resistance		According to IEC / EN 61439-2 Supplement 1 resp. IEC / TR 61641 for testing under internal arc conditions in low voltage switchgears: Max. 725V, max. 65kA _{eff} , max. 300ms, criteria 1-7 resp. arc fault classes A, B, C
Installation requirements		Shake test, vibration test
Communication		Profibus, Profinet, Modbus

Electrical characteristic values		
Rated insulation voltage U _i	V	1000~ / 1200 = according to IEC/EN 60947-1
Rated operating voltage U _e	V	690 according to IEC 60038
Rated frequency	Hz	40-60
Rated bus bar current	A	1600 2000 2500 3200 4000 5000 6300
Rated short-time withstand current I _{cw} 1s	kA	65 80 80 100 100 100 100

Mechanical characteristic values		
Material / plate thickness	mm	Steel plate / planking: 1.5; doors / covers: 2
Surface treatment		Sendzimirised or structured powder coating on epoxy-polyester basis
Colour / painted surface		According to DIN 43656 / lightweight structure, layer thickness ≥ 40 µm
Gloss level		Glossy
Chemical resistance		Against benzole and benzine according to MAK Diluted acid 10% and diluted lye 10% according to MAK
Decontaminability		Decontaminable

ModuVar system overview and design



POWER PANEL

- Incoming, outgoing, coupling
- Fixed mounted or withdrawable technology
- ACBs or MCCBs (Type Schneider Electric or SIEMENS)
- 3-pole or 4-pole circuit breakers
- Several circuit breakers per panel
- Installation of ARCON® quenching device
- Individual panel dimensions



FUSE SWITCH DISCONNECTOR PANEL

- Outgoing cable circuits up to 630A
- Fixed mounted or plug-in technology
- Horizontal fuse switch disconnectors (Jean Müller SASIL plus)
- Vertical fuse switch disconnectors (Various types available)
- High packing density
- Easy installation of additional units

Proven safety acc. IEC 61439-2



PLUG-IN TECHNOLOGY PANEL

- Outgoing cable and motor circuits up to 630A
- High component variety
- Individual internal separation
Possible up to Form 4b with separate doors
- Main and auxiliary power pluggable
- Distribution bus bar separated by default
- Low maintenance
- Easy installation of additional units

UNIVERSAL INSTALLATION PANEL

- Outgoing cable and motor circuits
- Fixed mounted technology
- Power-factor compensation
- Installation board
- Automation board
- Direct feeder
- Individual panel dimensions
- Freely configurable

ModuVar system overview and design

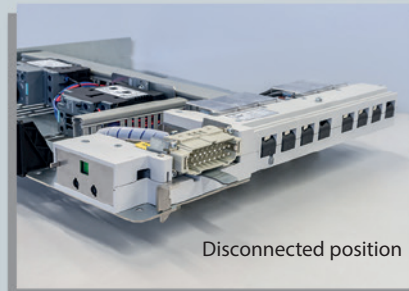


WITHDRAWABLE UNIT TECHNOLOGY PANEL

- Outgoing cable and motor circuits up to 630A (Type Schneider Electric or SIEMENS)
- Retention of the protection class in test and disconnected position
- Maximum operational fail-safety due to forced user guidance
- Standardized operating concept for all withdrawable unit sizes: Quarter, half and full drawer units
- Innovative contacting technology
- Embedded insulated distribution bus bar

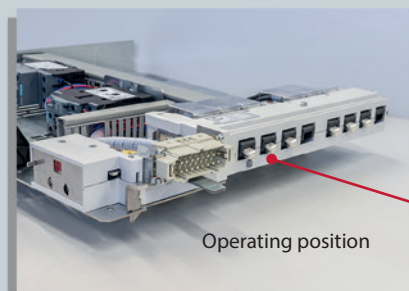


- Continuously embedded isolated distribution bus bar system with individual tap connection.

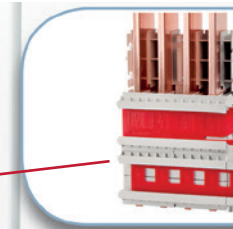


Disconnected position

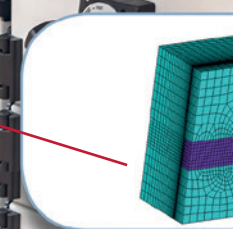
- Withdrawable units up to 630A resp. 250kW with retention of the protection class in test and disconnected position.



Operating position



- The special arrangement contact increases the contact force in the case of a short circuit



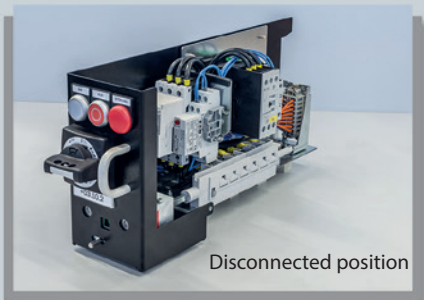
- From the disconnected position to the operating position



Proven safety acc. IEC 61439-2

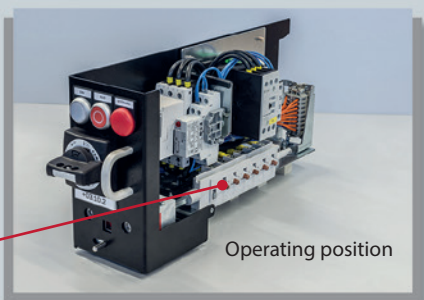


- Extensive internal separation of functional space up to the quarter withdrawable unit size.



Disconnected position

- Including quarter and half withdrawable units up to 63A and/or 22kW with the same contact technology.



Operating position

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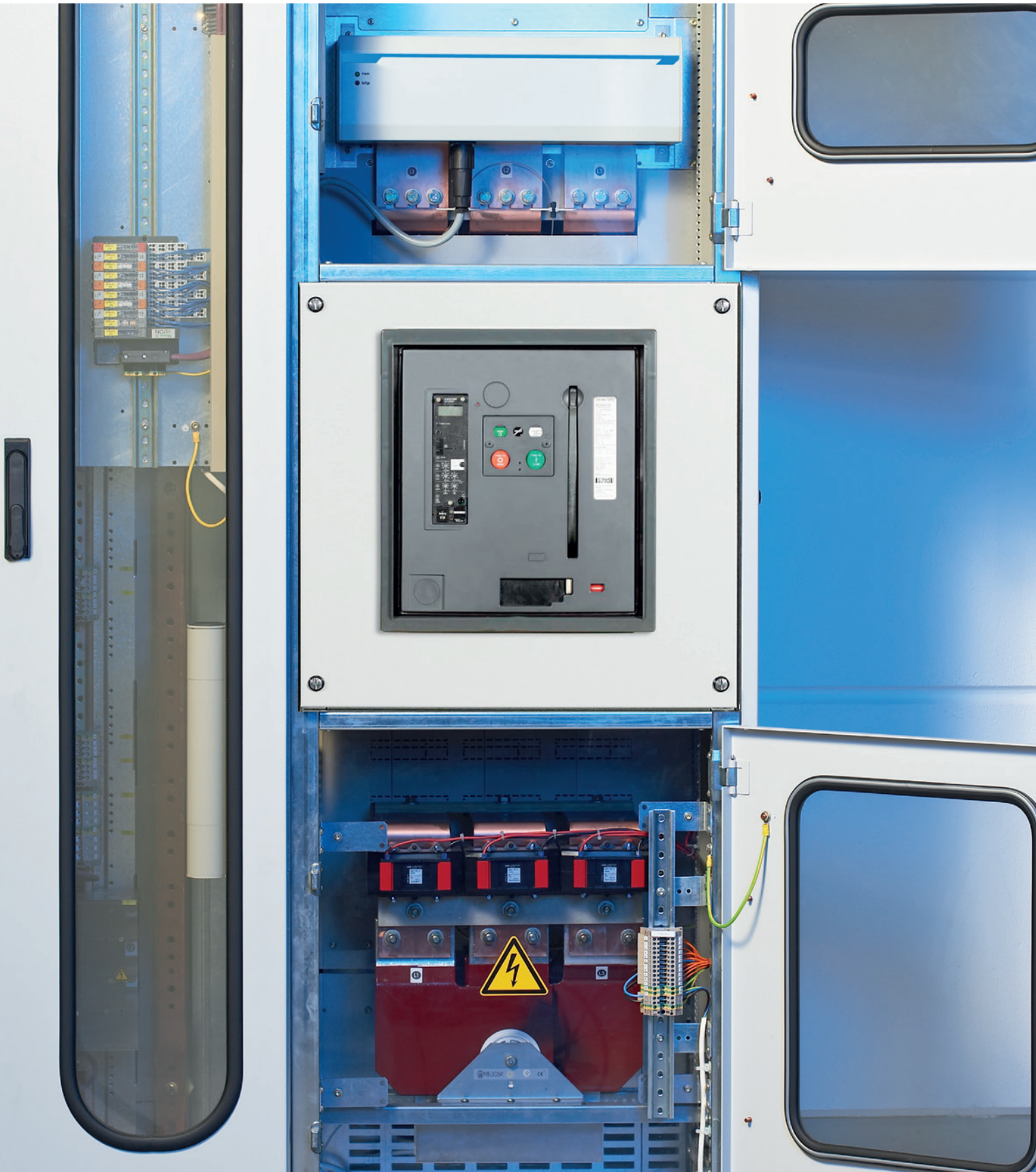
tion in four easy steps with integrated operational fail-safety.



DESIGN FEATURES

- Two bus bar layers permit coupling in a single panel.
- Two panel depths let customers save space at low current ratings.
- Two connection directions offer highest flexibility in new and existing systems.
- Extensive testing measures guarantee the high quality standard.

Why everything is under control again in about 2 milliseconds



Active arc fault protection

The safety system for people and equipment

To counter the physical forces of an accidental arc with an additional barrier for the protection of people and equipment and prevent the development of a dangerous flue gas mixture, KÖHL has been offering its customers a technical solution with **active arc fault protection systems** for many years. This solution can be directly installed in new systems at delivery or retrofitted into endangered existing systems.

ACTIVE ARC FAULT PROTECTION SYSTEM

The technology is based on the “prevention, not limitation” principle. The pioneer in this area is ARCON® – this system has successfully passed all tests of the General Association of German Insurance Companies GDV and VdS Damage Prevention GmbH and been certified according to the fire insurance guidelines VdS 2349 “Malfunction-Free Electrical Installations”.

An **active arc fault protection system** effectively limits the existing arc energy and quickly extinguishes the accidental arc. After the elimination of faults and quenching device exchange, the system is immediately ready for operation again.

Exchanging system parts, components and equipment within the output range of the switchgear as a result of the effect of the accidental arc is not necessary.



Example: ARCON®

FUNCTIONAL PRINCIPLE

- **Recognition of arc fault emergence:**
Detection of light flash in connection with overcurrent
- **Extinguishing of the accidental arc:**
Generation of a 3-phase short circuit within 2ms to concentrate the fault energy within a defined range
- **Determination of the place of origin of the accidental arc:**
Monitoring of the individual bus bar sections
- **Isolation of the affected area:**
Deactivation of the affected incoming circuit breaker



Example: ARCON®

ModuVar in use

DATA CENTRES

State-of-the-art IT companies and data centres require impressive amounts of energy nowadays to cover the rising requirement of the population for permanent connection to IT systems. In this case in particular, high requirements are set on continuous availability of the energy supply as downtimes in the area of IT result in the highest financial losses.

In regard to these conditions, our portfolio draws on practically unlimited resources:

- **ModuVar** offers passive protection against failures in combination with flexible solutions for the redundant, intelligent distribution of energy.
- An **active arc fault protection system** increases safety and reduces the time until recommissioning to a minimum in case of an accidental fault.
- Using the permanent condition monitoring system **TOR**, cyclical downtimes for maintenance are replaced by a targeted, intelligent predictive maintenance.

(PETRO-) CHEMICAL PRODUCTION PLANTS

Today, chemical and petrochemical production plants with global business undergo a constant further development process, whose effects naturally do not stop at the supplying power distribution systems! The main focus lies on the flexible extension or exchange possibility of incoming feeders and outgoing circuits, but also and mainly on the absolute safety of the systems due to the partly very dangerous ambient conditions.

With almost unlimited expandability to both sides and modular structure of the panels, **ModuVar** offers the ideal solution. For the numerous outgoing circuits, the use of the withdrawable unit technology is preferred due to a quick and easy reaction ability to new requirements.

In the process, the continuous IEC testing and measures for passive and active arc fault protection at the highest level guarantee the necessary safety for people and plant.

POWER PLANTS

All kinds of power plants continue to form the backbone of the worldwide energy supply. Here, the processes necessary for power generation are distributed over all kinds of applications, especially with regards to low voltage internal consumption in complex structures and a variety of sizes.

In this case, the most important properties of switchgears include fail-safety to prevent severe consequences on the one hand and the intelligent connection to SCADA systems to control and analyse the abovementioned processes on the other.

The individuality of the **ModuVar** panel types and applications always convince with the appropriate solution for a wide variety of challenges, acting as the perfect interface to the parent I&C technology with diverse communication paths.

Industry-specific application examples



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Non-binding technical data and figures.
Subject to change.



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POWER DISTRIBUTION SYSTEMS

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