CR TECHNOLOGY SYSTEMS

- ✓ Designed to reach the primary distribution ratings
- ✓ 25kA*1sec short circuit withstand current
- ✓ Internal-Arc IAC up to AFLR

ATR

Air-insulated MV metal-enclosed switchgear 24-36-40.5 kV

ATR

Air-insulated MV metal-enclosed switchgear 24-36-40.5 kV

Catalog: ATR - MV switchgear
Code: CRTS_Ctlg_ATR_24-36-40_MVswitchgear_2025_Rev2
Issued 2025 - Rev 2
C.R. TECHNOLOGY SYSTEMS SPA

SUMMARY

GENERAL DESCRIPTION

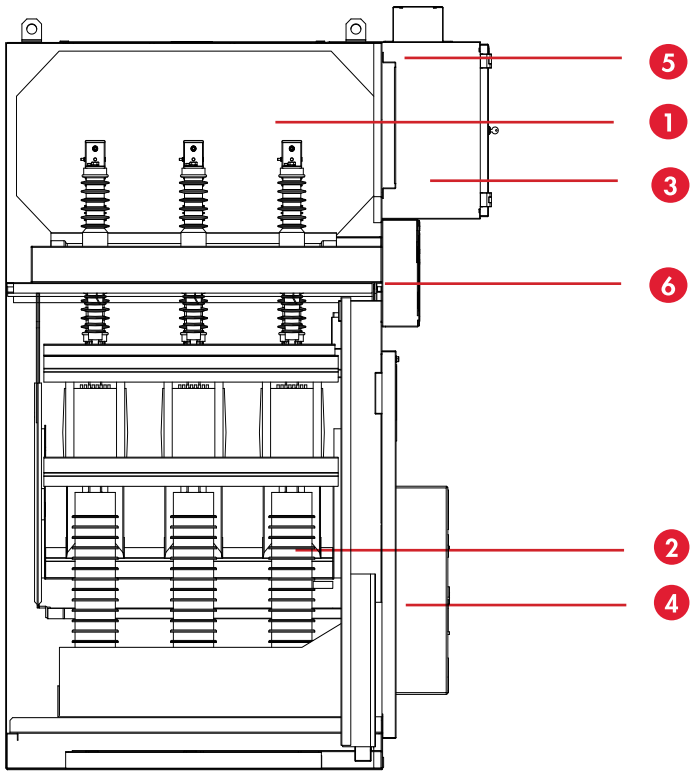
ATR is an air-insulated (AIS), metal enclosed medium-voltage (MV) switchgear, mainly used in secondary distribution power systems. In special configurations, i.e. confeaturing an air-insulated disconnector rated up to 25kA (1s) - as its main busbar is sized for a rated current of 2500A (in the ATR 36kV family) - it can be used in primary distribution systems. The switchgear is designed and standardized for indoor installations, in full compliance with the IEC standards. Depending on the configuration, it can be equipped either with gas-insulated load-break switches or with an air-insulated off-load disconnectors in for compartments equipped with a circuit-breaker.

STANDARDS

The switchgear and main apparatuses comply with the following standards:

IEC 60071-2	for the insulation coordination
IEC 60265-1	for the switch disconnectors
IEC 60470	for the contactors
IEC 60529	for the degree of protection
IEC 62271-1	for general purposes
IEC 62271-100	for the circuit-breaker from 1kV up to 52kV
IEC 62271-102	for the earthing switch in switchgear from 1kV up to 52kV
IEC 62271-200	for the switchgear from 1kV up to 52kV

MAIN COMPARTMENTS



1 MAIN BUSBAR COMPARTMENT

Busbars compartment is located on the top of the cubicle. It contains the main busbars interconnecting the cubicles and it grants the following features:

It is not possible to open the covers without using a proper tool

IP4X protection degree

2 MV CIRCUIT BREAKER AND CABLE COMPARTMENT

Cable compartment is located on the bottom of the cubicle. It contains switching devices, metering transformers, earthing devices. Moreover, this section hosts the power cable connection.

Features of cable compartment:

It is not possible to open the covers without using a proper tool

IP4X protection degree

The door has an inspection window, for the visual monitoring of disconnecotrs and MT cables position

3 LOW-VOLTAGE COMPARTMENT

Low-voltage compartment is located on the front - top of the cubicle. According to the functional type of the cubicle, it contains: protection relays, LV fuses, metering instruments, auxiliary relays, automatic circuit-breakers, terminal arrays, AC/DC supply, etc.

4 FRONT CONTROL OF MV CIRCUIT-BREAKER

It is located in the forepart of the MV cubicle. It contains the mechanical control of the circuit-breaker and the spring loading manual lever.

5 AUXILIARY CIRCUIT AND INTERCONNECTION DUCT

6 CONTROL COMPARTMENT FOR THE LINE/ EARTHING DISCONNECTOR

It is located on the forepart of the cubicle. It contains command for disconnector/switch-disconnector and related mechanical and key interlocks.
ATR switchgear can be designed with arc-proof configuration. It is supplied with a duct for the evacuation of the gases produced by an arc itself placed at the top, rear or bottom of the cubicle.

GENERAL FEATURES

ATR switchgear performances are guaranteed under the following operating conditions:

TEMPERATURE:

Minimum ambient temperature:
-5°

Maximum ambient temperature:
+55°

AMBIENT HUMIDITY:

Maximum daily average of relative humidity:
95%

Maximum monthly average of relative humidity:
90%

The normal operating altitude is up to 1.000 m above the sea level. Above it the switchgear can operate with the integration of a derating factor.

DEGREE OF PROTECTION

The degree of protection of the switchgear is conform to IEC 60529 standards and it is normally supplied with the following standard degree of protection:

IP4X	for the enclosure (higher degree on request)
IP2X	for the internal compartments

Higher degrees of protection are available on demand.

PAINTING OF EXTERNAL SURFACES

The painting is carried out using epoxy powders, suitable for processes such as washing, degreasing, phosphating, passivation and treatments with demineralized water.
The standard colour for metallic structures and doors is RAL 7035 – light grey (applied to front doors and side panels).Other colours are available upon request.
The minimum thickness of the internal painting is 80µm, while for the external part it is 120µm.

SAFETY EQUIPMENT

ATR switchgears offers a safe performance thanks to:

- The presence of electrical and mechanical interlocks specially designed to prevent any potential error in the operating sequence
- Maneuvers executable only with specific keys and levers
- Electrical and mechanical interlocks installed to prevent the access to compartments with components in service
- Operations can be performed remotely
- Possibility of equipping the cubicle with sensors suitable for preventive maintenance (temperature probes and electric arc)

SWITCHGEAR MAINTENANCE

C.R. Technology Systems relies on qualified and skilled personnel, able to operate preventive and predictive maintenance.
A proper maintenance limits product deterioration over time, which can cause a loss in terms of quality and improve the safety of the work environment and of the people that operate it. Moreover, maintenance activity has a direct effect on the footprint impact, as the product works longer, if properly maintained.
Hereby a set of good practices for a proper maintenance:

1. Create a checklist for routine maintenance
2. Periodically lubricate all moving mechanical parts
3. Check the condition of the coating and the outer casing
4. Replace the components before their obsolescence
5. Always follow the manufacturer's instructions, concerning timing and manner
6. Pay attention to warning signs, even if they do not lead to direct functional failures
7. Track and monitor of data to verify the lifespan of the product
8. Manually operate circuit breakers once a year, in order to keep contacts clean and help operating mechanisms move freely
9. Offer training courses to operators
10. Keep updated on maintenance procedures

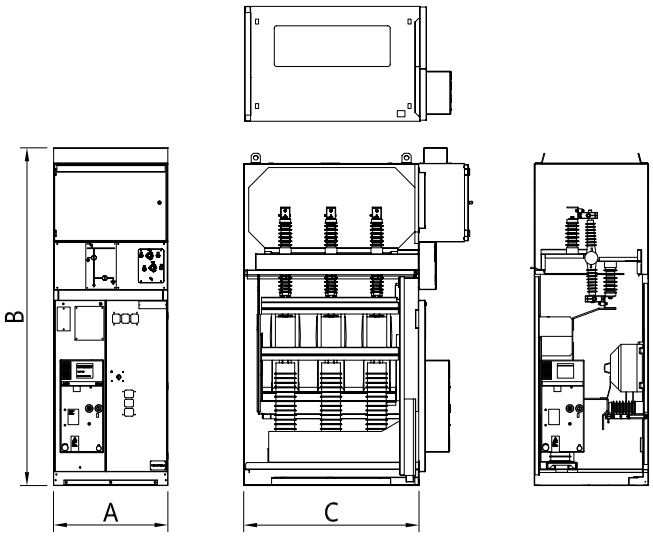
TECHNICAL DATA

Data Sheet ATR

Rated voltage	**kV**	24	36	40.5
Rated voltage at industrial frequency (1 min)	**kV**	50	70	95
Impulse Test Voltage (BIL)	**kV**	125	170	180
Main bars rated current	**A**	630 1250	630 1250 2000 2500	630 1250
Busbar	**A**	630 1250	630 1250 2500	630 1250
Short time rated current (1s)	**kA (1s)**	16 20 25	16 20 25	16 20 25
Peak withstand current (1s)		40/50/62.5	40/50/62.5	40/50/62.5
Rated frequency	**Hz**	50-60	50-60	50-60
IP protection degree		IP4X*	IP4X*	IP4X
Loss of service continuity class (LSC)		LSC2A/PM	LSC2A/PM	LSC2A/PM
Loss of service continuity class without switch device		LSC1/Natural air	LSC1/Natural air	LSC1/Natural air
Arc-proof version IAC AFL (1s) **	**kA (1s)**	20	20	20
Type of MV circuit-breaker chamber		Vacuum interruptor for 2000A - 2500A version SF6 interruptor for 630A - 1250A version		

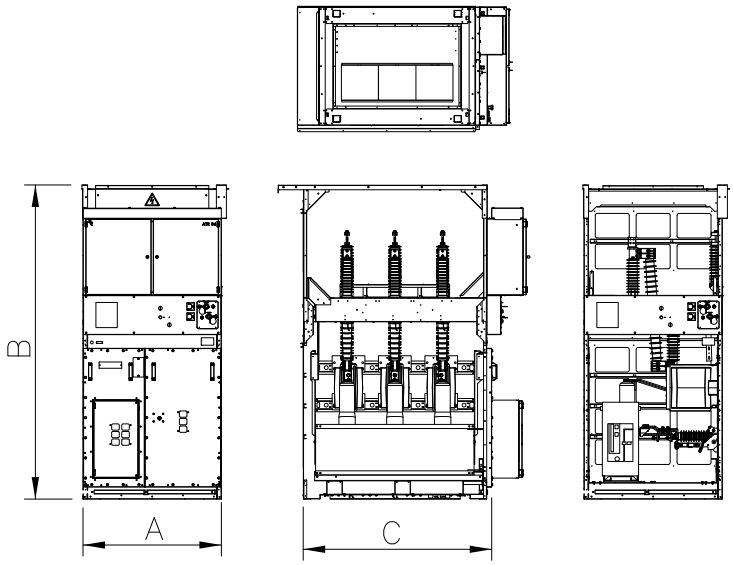
*Switchgear partition classification PM partition metallic * Up to IP54, upon request*
*** AFL or AFLR version is selected according to the room installation criteria. For Rear side walls installation, AFL design is supplied, no personnel can access to rear side of the switchgear.*

SWITCHGEAR TYPE - ATR 24KV 630A 1250A



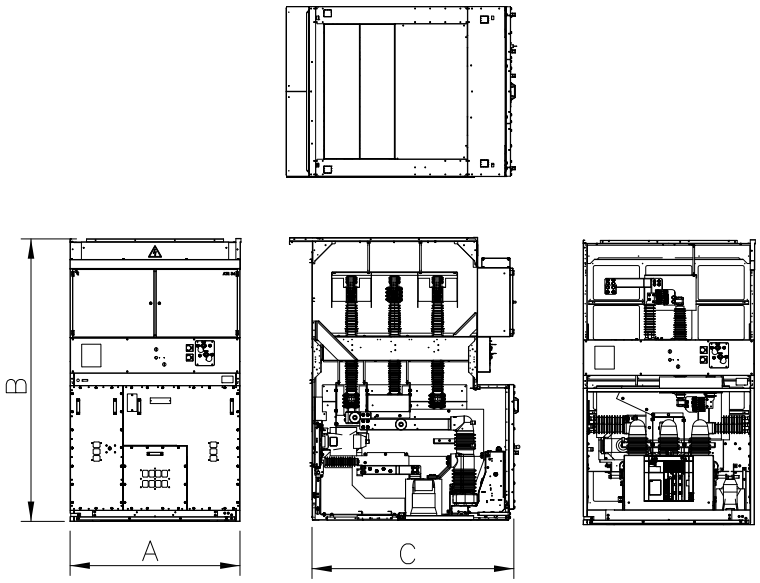
Rated current (A)	630	1250
A. Length (mm)	750	750
B. Height (mm)	2200	2200
C. Depth (mm)	1150	1150
Estimated weight (kg)	600/ 650	600/ 650

SWITCHGEAR TYPE - ATR 36KV 630A 1250A



Rated current (A)	630	1250
A. Length (mm)	1100	1100
B. Height (mm)	2500	2500
C. Depth (mm)	1460	1460
Estimated weight (kg)	900	900

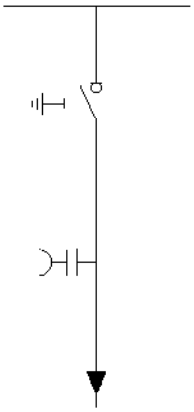
SWITCHGEAR TYPE - ATR 36KV 2000A / 2500A



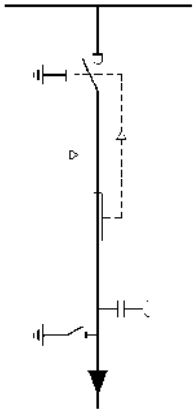
Rated current (A)	2000	2500
A. Length (mm)	1500	1500
B. Height (mm)	2500	2500
C. Depth (mm)	1760	1760
Estimated weight (kg)	1500	1500

SINGLE-LINE DIAGRAMS

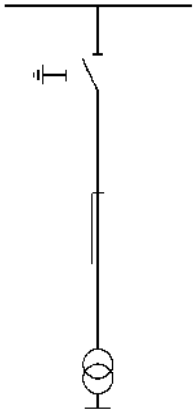
Type ATR - 01
Switch unit



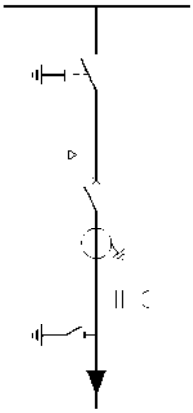
Type ATR - 02
Fuse Switch Disconnector unit



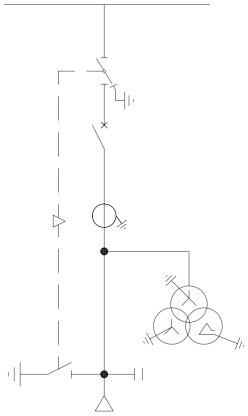
Type ATR - 03
Switch unit and Metering



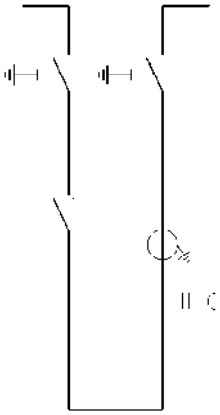
Type ATR - 04
Circuit breaker unit 630A/1250A



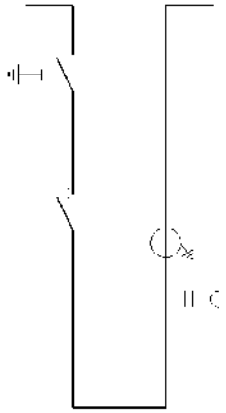
Type ATR - 04
Circuit breaker unit 2500A



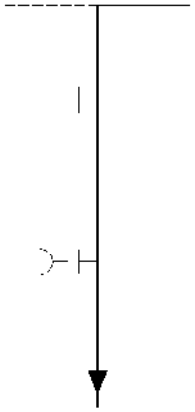
Type ATR - 05
Bus Tie- Riser unit with switch



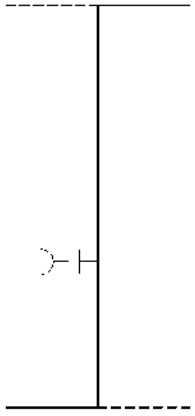
Type ATR - 06
Bus Tie - Riser unit



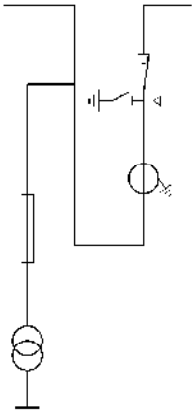
Type ATR - 07
Incoming Cable Connection unit



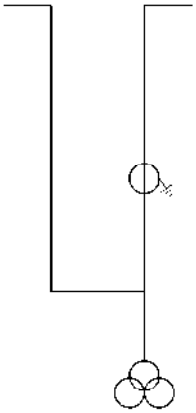
Type ATR - 08
Bus Riser unit



Type ATR - 09
Metering unit



Type ATR - 10
Busbars Metering unit

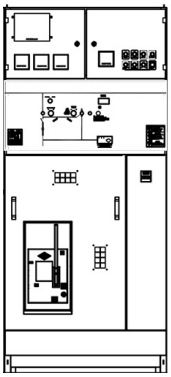


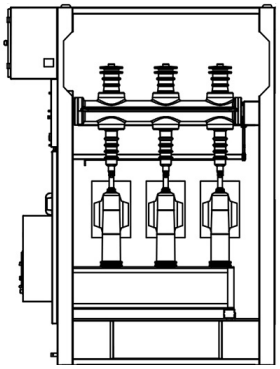
SWITCHGEAR SERVICE CONTINUITY

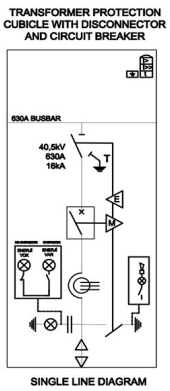
Loss of Service Continuity (LSC) categories describe the ability of switchgear to maintain part or all of the main circuit in service during a localized fault.
ATR switchgear is classified as LSC-2A, which means that if an accessible compartment is open (excluding a single-bar busbar compartment), at least one busbar remains energized, and other functional units remain operational. Unlike LSC-2, LSC-2A switchgear allows the busbars to remain live even when the circuit-breaker and cable compartments are out of service.

NEW PRODUCT FAMILY: ATR 40

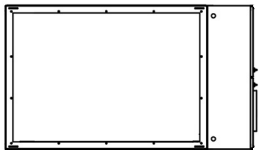
SWITCHGEAR TYPE - ATR 40.5KV 630A 1250A | FEEDER WITH CIRCUIT-BREAKER





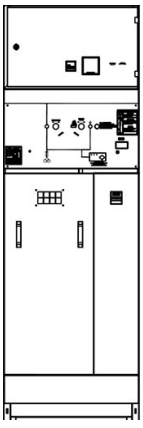


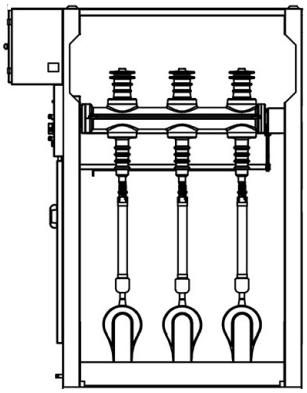
Rated current (A)	630	1250
A. Length (mm)	1000	1100
B. Height (mm)	2250	2250
C. Depth (mm)	1720	1460
Estimated weight (kg)	900	900

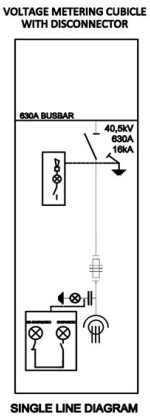


Top view

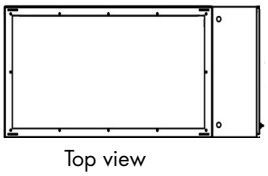
SWITCHGEAR TYPE - ATR 40.5KV 630A | BUSBAR METERING UNIT





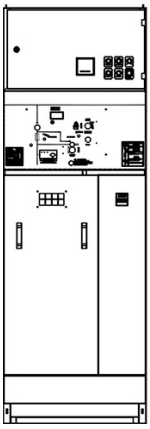


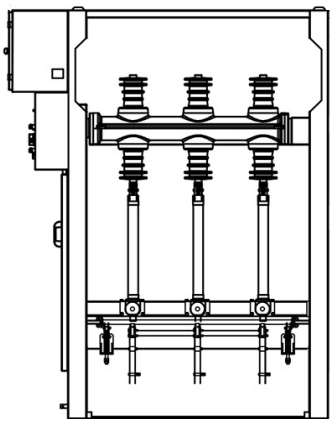
Rated current (A)	630
A. Length (mm)	750
B. Height (mm)	2250
C. Depth (mm)	1720
Estimated weight (kg)	900

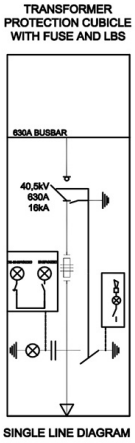


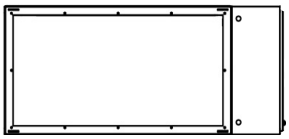
Top view

SWITCHGEAR TYPE - ATR 40.5KV 630A | ONLOAD FUSE DISCONNECTOR UNIT





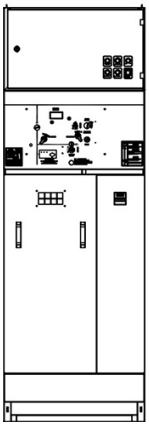


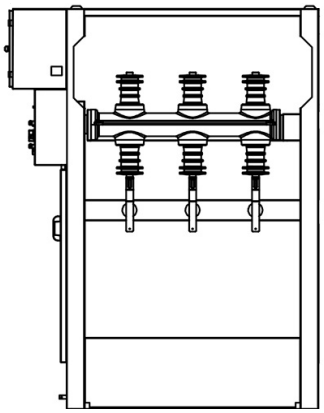


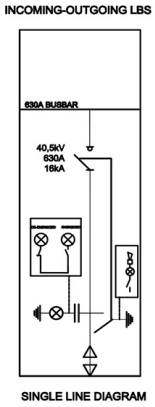
Top view

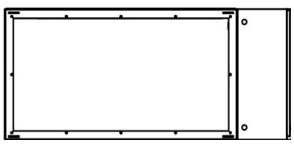
Rated current (A)	630
A. Length (mm)	750
B. Height (mm)	2250
C. Depth (mm)	1720
Estimated weight (kg)	900

SWITCHGEAR TYPE - ATR 40.5KV 630A | ONLOAD DISCONNECTOR SWITCH









Top view

Rated current (A)	630
A. Length (mm)	750
B. Height (mm)	2250
C. Depth (mm)	1720
Estimated weight (kg)	900

MAIN EQUIPMENT

CIRCUIT-BREAKER

ATR can host gas-insulated or vacuum-insulated circuit breakers for short-circuit interruption and for isolation of the systems connected to the cubicle.
In accordance with the specific applications, circuit breakers have different voltage levels (up to 40.5kV), rated current (up to 4000A) and breaking capacity (upto 50kA). Customized circuit breakers can be installed inside the switchgear.
C.R. Technology Systems mostly uses circuit breakers of the main brands like ABB, Schneider Electric, Eaton, Siemens.

MEASUREMENT TRANSFORMERS AND SENSORS

Current and voltage transformers are epoxy resin insulated and they are used to perform measurement and protection of the plant. These transformers can have one or more secondary winding with performance and precision classes tailored to the functional requirements of the connected instruments, according to specific needs.

PROTECTION RELAYS AND COMMUNICATION PROTOCOLS

The digital protection relay, or numeric relay, uses a microprocessor to analyze power system voltages and currents for the purpose of detecting faults in a system. Protection relays are used to protect the feeder, transformer, generator, and other interconnected equipment.
C.R. Technology Systems mostly uses protection relays of the main brands like ABB, Schneider Electric, GE, Siemens.

Digital protection relays have communication protocol ports, allowing it to become an element in a SCADA system. Communication protocol ports may include MODBUS TCP/IP, RS485, IEC61850.

A SCADA system counts with BCU/RTU modular devices, communicating with IEC61850 and IEC61104 protocols. The digitalization of the plant allows to reduce substation footprint and save up to 80% of copperwiring. Moreover, the redundancy control systemand IED devices (Intelligent Electronic Device) grant ahigh continuity of service and reduction in the number of on-site interventions, which can be solved remotely.

SURGE ARRESTERS

It is a protection device used to protect equipment against overvoltage caused by lighting or external agents. It is connected to wires (power phase line, signal line, zero line) and to the ground line.
In the event of a direct or indirect impulsive overvoltage transients caused by a lightning bolt, it absorbs the main current capacity, discharging it to the ground, eliminating damages to persons or properties.

SPACE HEATERS

Enclosure heaters or switchgear space heaters are designed to maintain temperature and minimize moisture inside electrical and mechanical equipment enclosure.

MAIN BUSBAR

The main busbar is formed of conductors of copper or aluminum, supported by supporting insulators, that interconnect the loads and the sources of electric power.
On request, it is possible to have the following versions of busbars:

- Copper;
- Aluminum;
- Silvered copper;
- Tinned copper;
- Bars with insulating material (resin or heat shrinkable sheath).

SMART EQUIPMENT

C.R. Technology Systems has created two monitoring systems for the prevention and mitigation of phenomena related to overtemperature and electrical arc.

TEMPERATURE DETECTION

Sensors used are the latest technological finding in the field of temperature measurement inside medium-voltage switchgears. They are wireless and batteryless sensors.
Through SAW (Surface Acoustic Wave) technology it is possible to record the temperature in all its critical points inside the switchgear in order to comply with an efficient and effective measurement plan. In this way it is possible to obtain an improvement in the functionality of the system both from a technical and an economic point of view.
The main components are the following:

1 

2 

1. Sensors that provide surface temperature and operatein presence of current. These sensors have been designed specifically for power circuit monitoring, like air-insulated medium-voltage switchgears, and feature high dielectric strength. By design, they do not impact the electric performance of the equipment and preserve its dielectric properties. They are certified according to IEC62271 for their dielectric strength and operationfree of partial discharge inside the cubicle.

2. This receiving antenna, operating at a frequency of 434 MHz, can be used as:
   - emission antenna for SAW sensors (when connected to the transceiver/platform);
   - probe for partial discharge measurements (when connected to the transceiver/platform, with Partial Discharge Detection feature).

The transceiver is used for the switchgear monitoring. It can be optimized for the installation inside metallic structures, enabling a worldwide license-free use.
It features various options for additional measurement inputs, partial discharge detection, digital I/O to various communication interfaces. This customizable set of options creates a simple and easy to use platform, which can be either autonomous or connected to a network, with remote monitoring carried out by C.R. Technology Systems (on demand).

ARC-FAULT DETECTORS

The fast detection system uses light-wave sensors which detect the luminescence generated by the arc to ensure the circuit-breaker intervention on the load side or the feeder side, minimizing the duration of the electrical arc in less than 70 ms. In this way, it is possible to limit system faults andto isolate the fault point, thus guaranteeing a higherservice continuity and a faster and a more efficientsystem restoration.
Knowing the trigger point of the arc, the reconstructionprocess is more effective, and it can ensure theimprovement of the plant and its loyalty.

PR.E.SE. RFID SENSORS

PR.E.SE. solution (PRedictive Electrical SEnsors) permits a wireless constant moniroting of temperature of the electrical equipment, based on the RFID technology (Radio Frequency Identification) in UHF band. These sensors play an important role in the prevention of the overheating of electrical devices (critical temperature >120°C) due to overload, corrosion, loose connections and difficult environmental conditions and permit predictive maintenance of the electrical insulation.
The sensors allow improving the performance of the system and extend its life cycle. Their technical features allow a number of advantages:

- Adaptable: tags can be applied to any type of surface and environment, and in any weather condition.
- Reliable: tags are batteryless and do not require maintenance after their application.
- Modularity: sensors are equipped with a modular and scalable architecture. A large number of uniquely addressable sensors can be applied.
- Economic advantage: the technology based on radiofrequency allows lower costs than the traditional ones.
- Accuracy: sensors with ID prevent reading errors
- Retrofit: sensors can be integrated in operational plants, enlarging their lifespan.
- Tailor-made products: thanks to the different shapes and surfaces of the sensors, and the possibility of integrating them in a variable number according.

TYPE TESTS

Type tests certifications are issued by a certifying authority, internationally recognized. They are carried out in independent, duly accredited test laboratories.
ATR certificates contain a record of a series of type tests carried out strictly in accordance with a recognized standard.

Short-circuit and peak withstand current test: provides verification of the short-circuit ratings assigned by the manufacturer, as design data reviews, quality control checks and stage inspection of various power system equipment in accordance with clause 4, items e) to p) inclusive and also s) of IEC 62271–100:2008.

Dielectric test: provides verification of the dielectric performance of a circuit-breaker in accordance with the requirements of clause 4, item b) of IEC62271–100:2008.

The certificate comprises those tests necessary to prove compliance with the following requirements:

- industrial frequency voltage test
- impulse voltage test;
- radio interference voltage test.

Three-phase short-circuit making and breaking test: verifies the short-circuit ratings on the main circuit and earthing circuits. To pass the test, the two results must correspond. It is carried out in accordance with the standard IEC 62271-200:2011 and IEC62271-102:2003.

KEY STRENGTHS

High-performance applications
Rating up to 2500A - 25kA

Sustainable chioce
SF6 Free

Reduced dimensions for fit in an eHouse
Compact & air-insulated design

New MV switchgear under development
ATR 40,5kV for Private point of connections to Terna

Smart layout
Easy maintenance

Tailor-made project
Multi-brand protction Relay

C.R. TECHNOLOGY SYSTEMS S.P.A.

HEADQUARTERS
Via Rossaro, 9
24047 Treviglio (BG) - Italy
Ph. +39036334981
VAT 01637141001

LEGAL HEADQUARTERS
Via Crescenzio 82
00193 Roma
Italy

PRODUCTION HUB
Via Stezzano 7E
24050 Zanica (BG)
Italy

QUARTER
Via dell'industria 57
01100 Viterbo
Italy

QUARTER
23 Avenue Hédi Nouira
Immeuble Mohamed Chérif
Nabeul, 8000
Tunisia

For further information contact us
info@crtsgroup.com

www.crtsgroup.com

CONNECTING THE POWER