



2025

# Transition to SF6-free Switchgear

## ABB SF6-free product portfolio introduction

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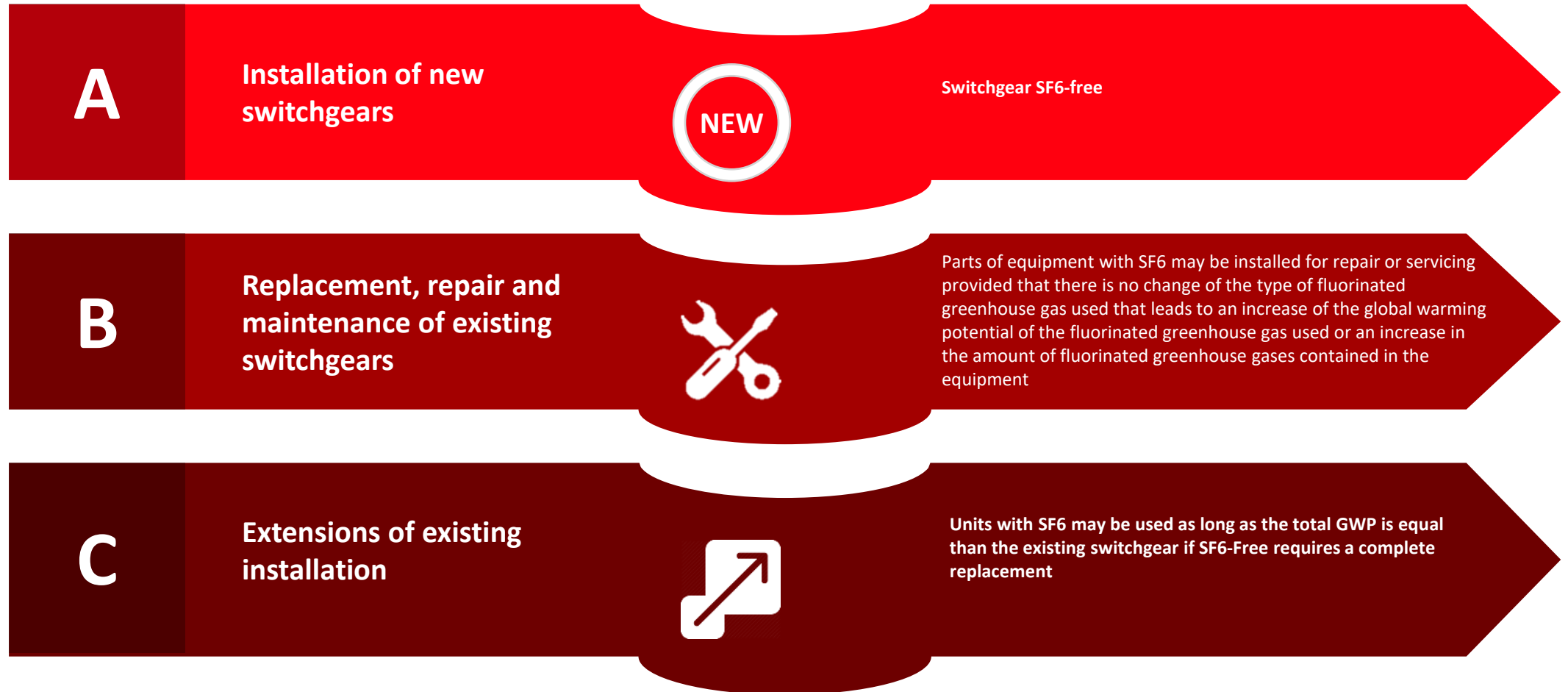
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# EU Regulation 2024/573 on fluorinated greenhouse gases

## The typical cases related to medium voltage switchgears



# ROADMAP

# The evolution of gas-insulated switchgear



## SF6 GIS

State of the art insulation technology, but with high GWP

- 1967 – First Indoor GIS
- 1980 – 3-ph encapsulated GIS
- 1995 – GIS with no gas handling on site



## First introduction of 12kV SF6-free

First installations:

- 2013 for SGIS
- 2015 for PGIS



## First to introduce 24/36/40.5kV SF6-free

- In 2015 for 36kV PGIS and 24kV SGIS
- In 2016 for 40.5kV PGIS
- In 2020 for 24kV PGIS



## Move to F-gas free and PFAS-free insulation

24kV and 36kV SF6-free GIS offering before SF6 ban as per EU F-Gas regulations

- In 2024 24kV SGIS “block”
- In 2025 24kV SGIS “modular” & PGIS
- In 2027 36kV SGIS & PGIS



SF6 has been identified as the most potent Greenhouse gas with high **GWP = 25200**

**Dry air insulation with GWP=0** and reduced CO2 emission by 100%

**AirPlus™ insulation with GWP<1** and reduced CO2 emission by 99.99% with low pressure

Use of **dry air** as insulation with **GWP=0**



Compact footprint

Similar compact footprint with same look and feel as SF6 product offering

Similar compact footprint with same look and feel as SF6 product offering

Similar compact footprint with same look and feel as SF6 product offering



Huge installed base of more than 2M functional units around the globe

Start of the SF6-free GIS Installed base

**Installed base of more than 40,000 functional units to date**

Installed base of more than 40,000 functional units till date



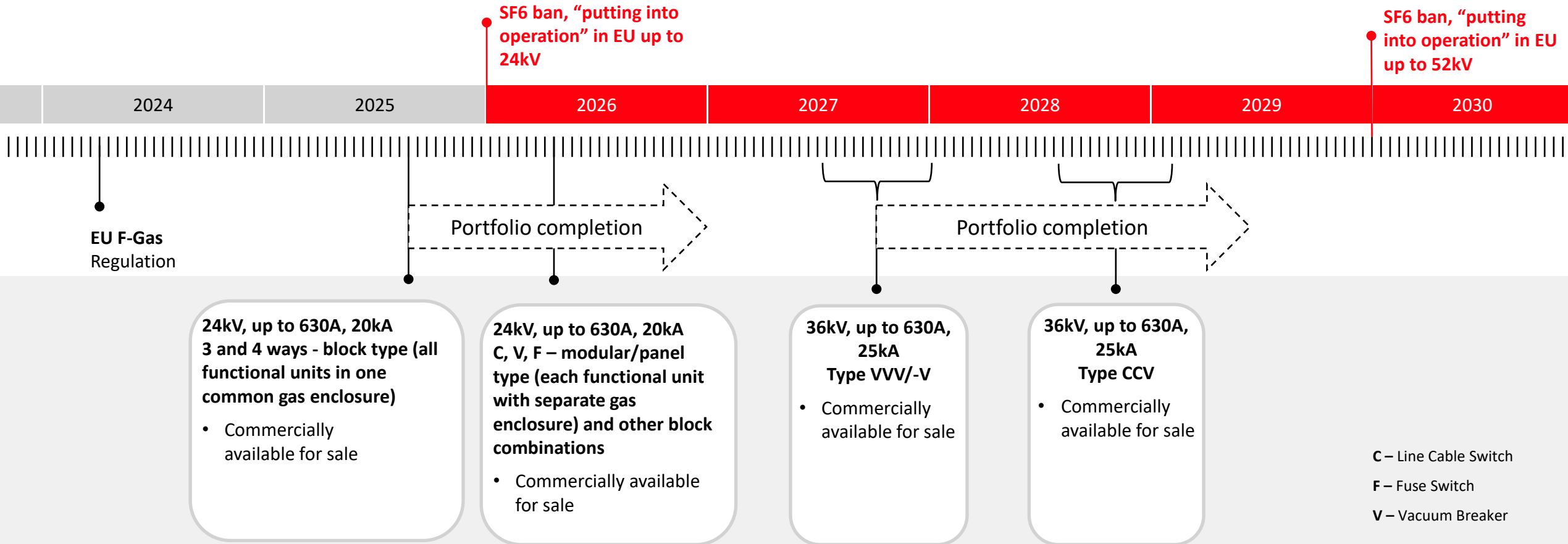
Partnering with our customers

Partnering with our customers

Partnering with our customers onwards starting with 24kV

# Product roadmap - IEC

## Secondary Gas Insulated SF6-free



**Secondary SF6-free GIS products will be ready within the EU ban**

Note: Pilot projects can be ordered 3-6 months earlier.

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# SAFERING AIR AND SAFEPLUS AIR 24KV

Overview

# SafeRing/SafePlus product portfolio

High ratings - small footprint



12-24kV



36/40.5kV



12-24kV

## The standard RMU up to 24kV

- Up to 24 kV
- Up to 630 A
- Up to 21 kA/3s
- SF<sub>6</sub> insulation

## Compact switchgear up to 24kV

- Up to 24 kV
- Up to 630 A
- Up to 25 kA/3s
- SF<sub>6</sub> insulation

## The standard RMU up to 40.5kV

- Up to 40.5 kV
- Up to 630 A
- Up to 16 kA/3s
- SF<sub>6</sub> insulation

## Compact switchgear up to 40.5kV

- Up to 40.5 kV
- Up to 630 A
- Up to 20 kA/3s
- Up to 25kA/1s
- SF<sub>6</sub> insulation

## The Air version up to 12kV

- Up to 12 kV
- Up to 630 A
- Up to 20 kA/3s
- Dry air insulation

## The Air version up to 24kV

- Up to 24kV
- Up to 630 A
- Up to 20 kA/3s
- Dry Air insulation

SafeRing is a preconfigured Ring Main Unit, allowing expedited process of production and delivery

SafePlus is flexible switchgear allowing customizable solutions

# SafeRing/SafePlus Air 24kV

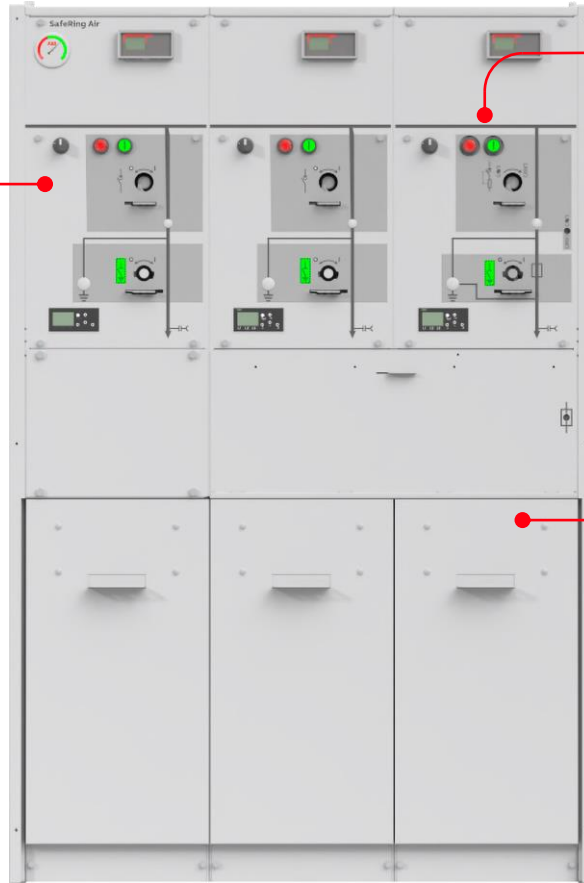
## Compact gas-insulated switchgear for secondary distribution



### Optimized user experience

Backward compatibility and seamless integration thanks to design with the same interface, footprint, and operations as the original SafeRing switchgear.

SafeRing Air switchgear is a pre-configured Ring Main Unit, allowing expedited process of production and delivery.



### Safe and reliable

The gas insulated switchgear technology is optimal for harsh climatic conditions, including high altitudes, pollution, high humidity and salty air conditions.



### Regulation-compliant and sustainable

Fully compliant with IEC standards and the EU F-gas regulation (EU) 2024/573. Global Warming Potential (GWP) = 0 thanks to the use of dry air as insulation and quenching medium.

# The next stage in the SF6-free journey

## SF6-free SafeRing/SafePlus Air 24kV - CCV

SF6-free gas insulated switchgear compliant with the EU F-gas regulation (EU) 2024/573

- Optional digital monitoring & diagnostics and grid automation
- Block type and modular design
- Availability of a quick-make short circuit device, to prevent gas blowout and impact on surroundings (arc-suppressor)
- Pressurized air enhances dielectric strength; reinforced compartments for mechanical rigidity and strength
- Replacing SF<sub>6</sub> requires more advanced technology for load interruption; covered by a well proven puffer based LBS



**Block design  
VVV**



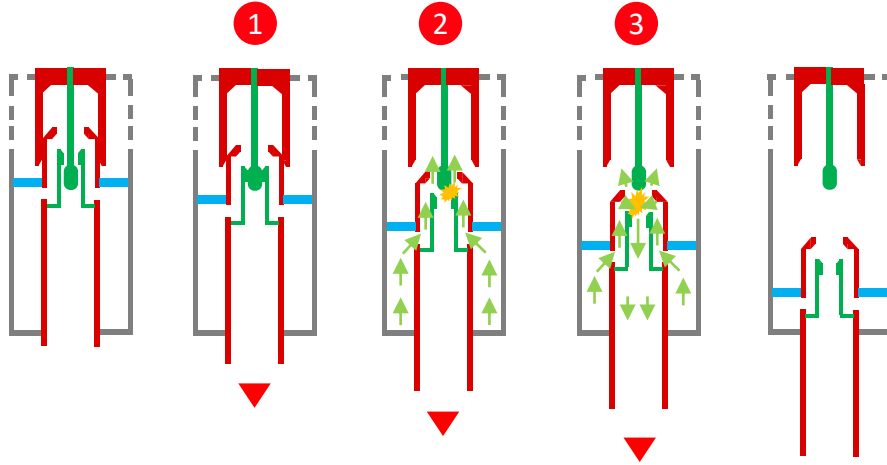
**Modular  
design C**



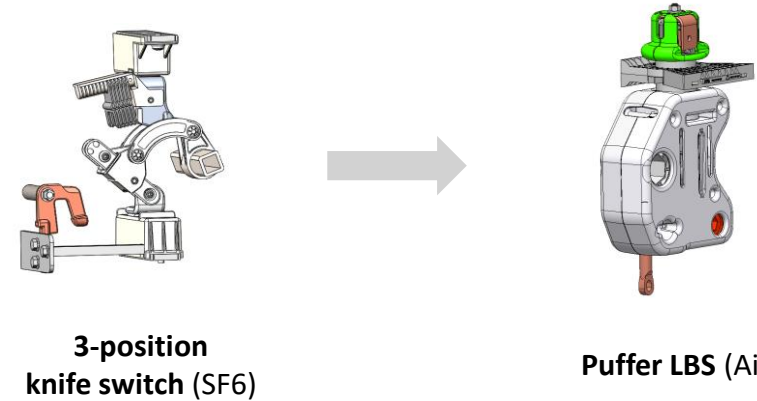
**Modular  
design V**

# Puffer type load break switch (LBS)

Innovative operation, reliable performance



- 1 The piston compresses the gas.
- 2 At the same time, the arcing tulip contact generates an arc.
- 3 Pressurized gas from the compression volume blasts into the arcing zone and helps to extinguish the arc

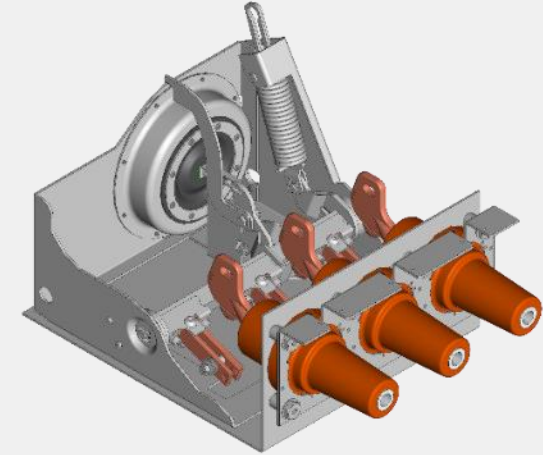


- ABB designed an optimized puffer-type LBS for SF6-free applications that interrupts load currents (630 A) in dry air in a reliable manner.
- The new LBS has excellent interruption performance with no additional disconnecter needed.
- Puffer-breaking is a proven technology used in SF6 breaking for HV and MV applications.
- ABB has a reliable, cost-effective and easy-to-use LBS solution for the new generation of SF6-free secondary switchgear.

# Active arc flash mitigation solutions

## Innovative arc-suppressor technology

<b>Technology type</b>	Mechanical-based internal arc-detection and mitigation devices, which short circuit incoming feeder
<b>Dedicated product or optional function</b>	Optional devices for ABB SafeRing / SafePlus switchgear
<b>Application</b>	Medium voltage
<b>Operating time</b>	Less than 30 -50 ms
<b>Total arc clearing time</b>	30 - 50 ms
<b>Certifications</b>	Tested according to IEC
<b>Enables increased personnel safety during maintenance</b>	Yes
<b>Enables arc mitigation 24x7</b>	Yes

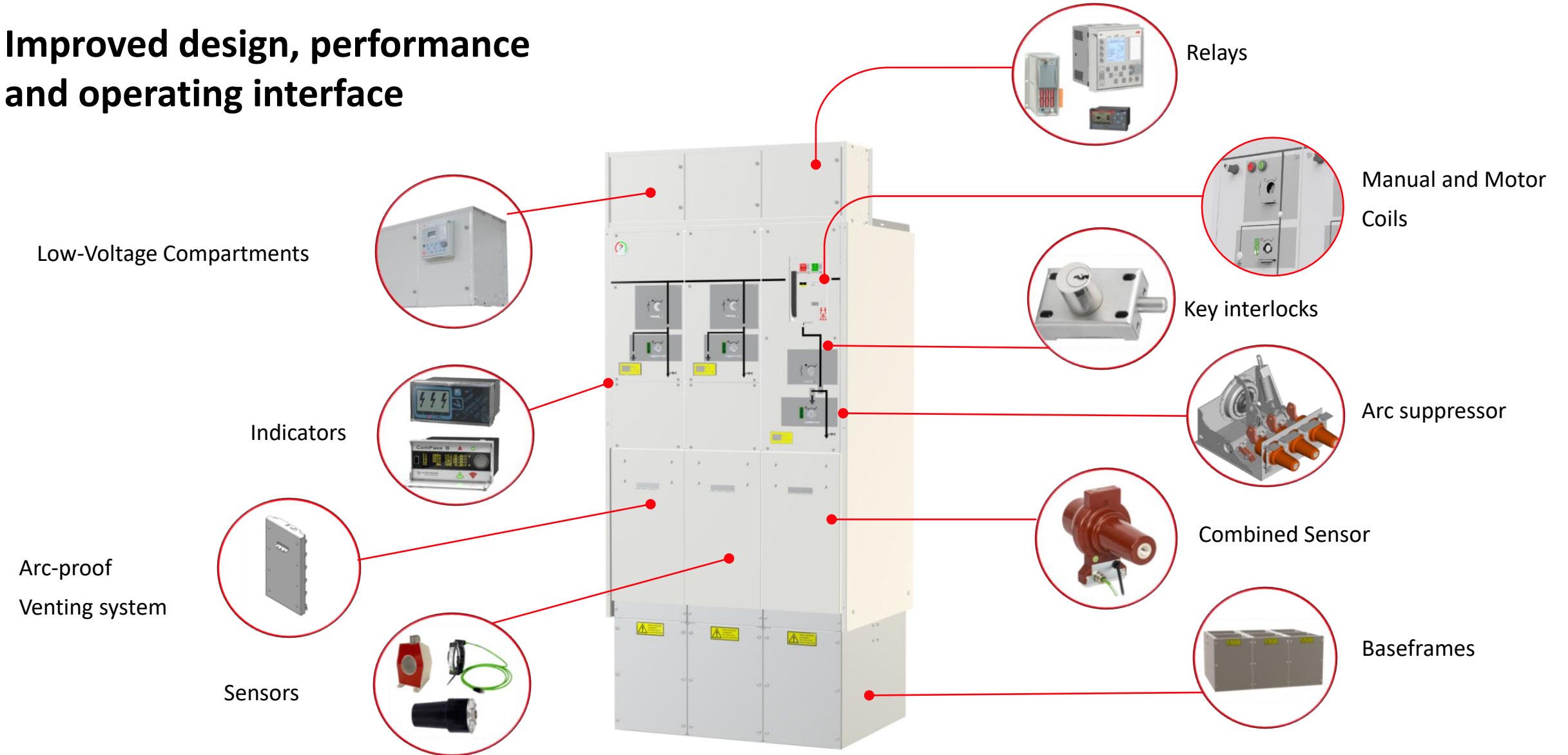


- Quick-make short-circuit device with a mechanical pressure detector installed inside the sealed gas compartment
- No fatal pressure increase, no arcing gases
- Reacts on pressure increase within 30-50 milliseconds
- Operation tested from 2kA up to 20kA
- Good solution for crowded areas, closed rooms, underground installations, etc.
- IAC classified swg increase safety by using arc-suppressor



Improve safety, reduce damage

# Improved design, performance and operating interface



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## Safety

### Our #1 priority

- High level of operator safety with internal arc proof classification - AFLR with various gas exhaust variants
- Same interface and operation - reduced need of training.
- Mechanical interlocks prevent unsafe operations
- Loss of service continuity - LSC2 and LSC2A
- Increased safety by using arc-suppressor
- Virtually maintenance-free switchgear minimizes operations and reduces risk to operators
- Key interlocks available for additional safety



Safety is a real-life experience,  
integrated into SafeRing and  
SafePlus at every level of design

**AABB**