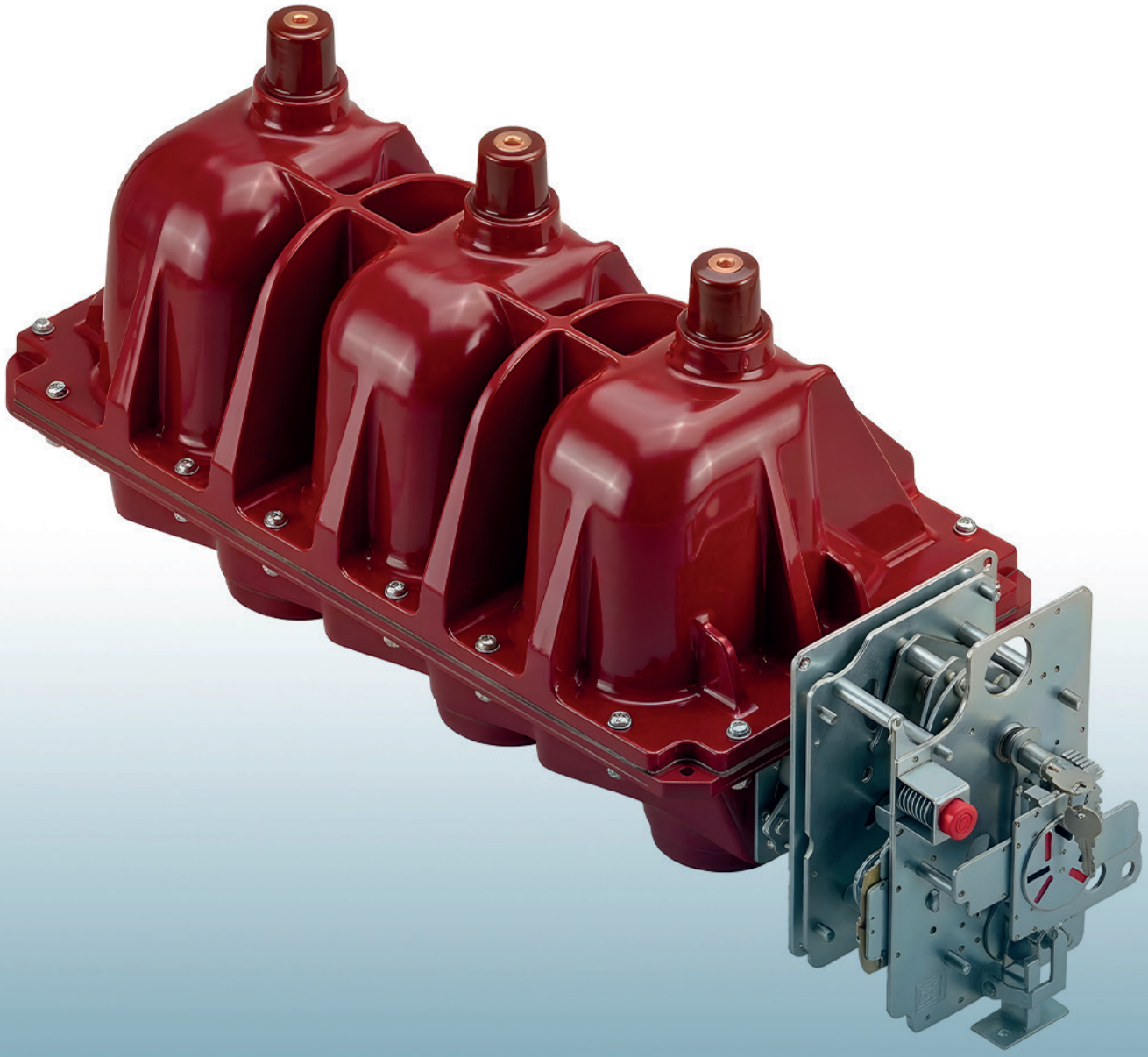
BONOMI



AIR-ON 24 kV

GAS FREE SOLUTION

Dry air insulated three position switch disconnector with vacuum interruption

Contents

AIR-ON: the medium-voltage switch that powers the future! 5

Advantages 6

Description 8

Standard and security 9

Working principle 10

Switching positions 11

Switch disconnector electrical features 12

Earthing switches 13

Standard components 14

How to build the order code 15

Base configuration 16

Accessories 17

How to build the kit code 18

Kit ordering table 19

24 kV incoming / outgoing line switch disconnector kit 20

24 kV switch disconnector kit combined with fuse link 21

24 kV switch disconnector or disconnector combined with earthing kit for CB cubicle 22

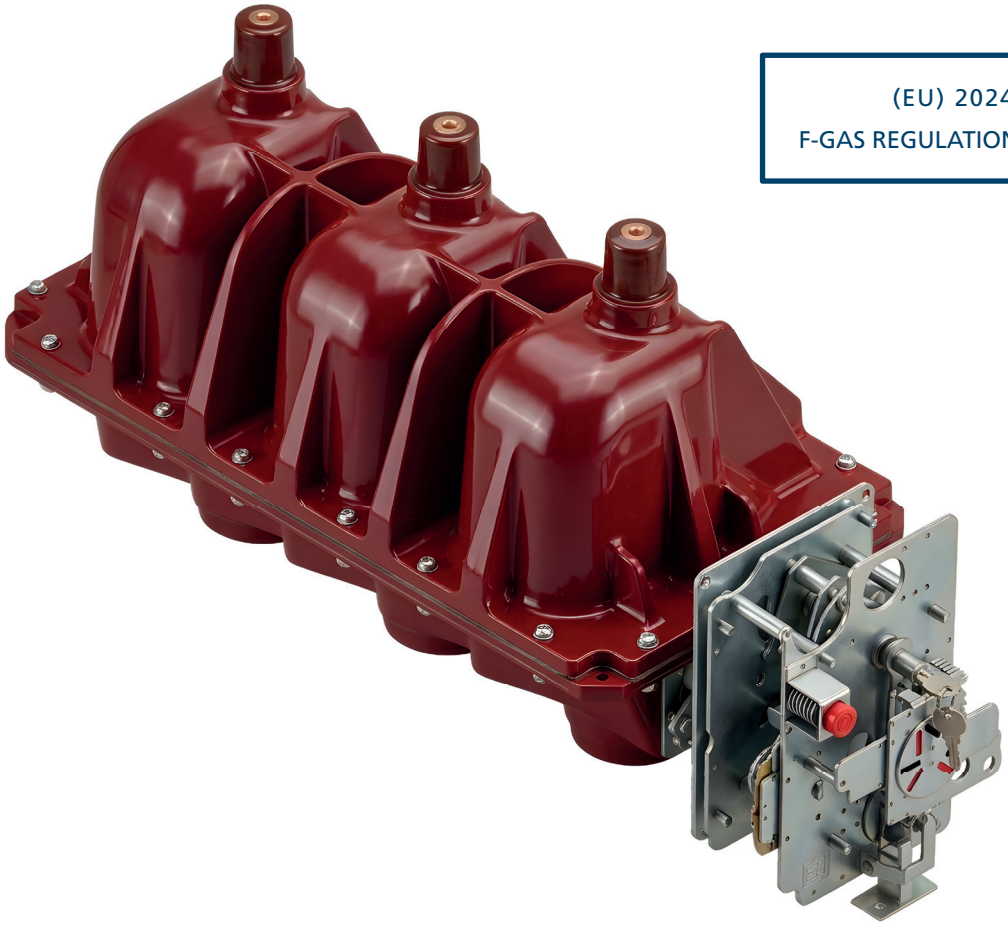
Engineering and design support 23

AIR-ON: THE MEDIUM-VOLTAGE SWITCH THAT POWERS THE FUTURE!

The AIR-ON is a new device used in medium voltage networks to ensure safe disconnection of electrical lines.

The integration of a vacuum bottle allows for controlled interruption of active loads, improving safety and reliability.

Thanks to the use of dry air as an insulating medium, the new AIR-ON has a GWP index of 0 and complies with the new European standard EU 2024/573.



(EU) 2024/573
F-GAS REGULATION COMPLIANT

GWP = 0

Dry air as insulating medium: no SF_6, compliant with the new European Regulation (EU) 2024/573.

VACUUM INTERRUPTION

The integrated vacuum bottle allows controlled interruption of active loads, improving safety and reliability.

SEALED FOR LIFE

Hermetically sealed epoxy resin casing, designed for an operating life of more than 30 years.

ADVANTAGES

ENVIRONMENTAL SUSTAINABILITY

Zero environmental impact: Thanks to the use of dry air, which is a natural and non polluting insulator, it is possible to eliminate SF_6 gas, known for its high GWP index.

Compliance with future regulations: The European Union and other authorities are progressively banning the use of SF_6, making this technology a strategic and sustainable choice.

0
GWP
vs. 24,300 for SF_6

GREATER SAFETY AND RELIABILITY

Vacuum bottle for controlled switching:

- The vacuum bottle allows for the controlled interruption of nominal currents, reducing contact wear and minimizing the electric arc.
- It ensures a safe and progressive separation of the circuit, preventing overvoltage spikes.

Reduction of operational risks:

- Greater protection for operators and equipment thanks to a more stable interrupting system.

BETTER TECHNICAL PERFORMANCE

Higher interrupting capacity:

- The interrupting module with a vacuum bottle allows for more efficient management of switching currents, improving performance compared to traditional disconnectors.
- Reduction of the electric arc effect, increasing the lifespan of components.

Optimal operation in challenging conditions:

- Dry air ensures excellent dielectric strength, even in environments with high humidity or extreme temperatures.
- Less chemical degradation compared to solutions with SF_6 gas.

SERVICE CONTINUITY AND REDUCED MAINTENANCE

30+ YEARS

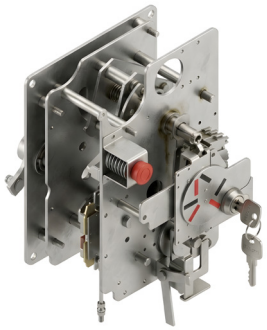
Main casing "sealed for life", guaranteed for more than 30 years, with a consequent reduction of maintenance work.

0 MAINTENANCE

No maintenance required for operating mechanisms.

SAFETY

- Maximum level of safety for operators.
- Operating speed of the actuator independent from the operator.
- Mechanical position indication directly connected to the power shaft.
- Prevention of dangerous operations.
- Interlock between line switch and earthing switch operations (separate operating seats).
- Interlock between the earthing switch and the cable compartment door.



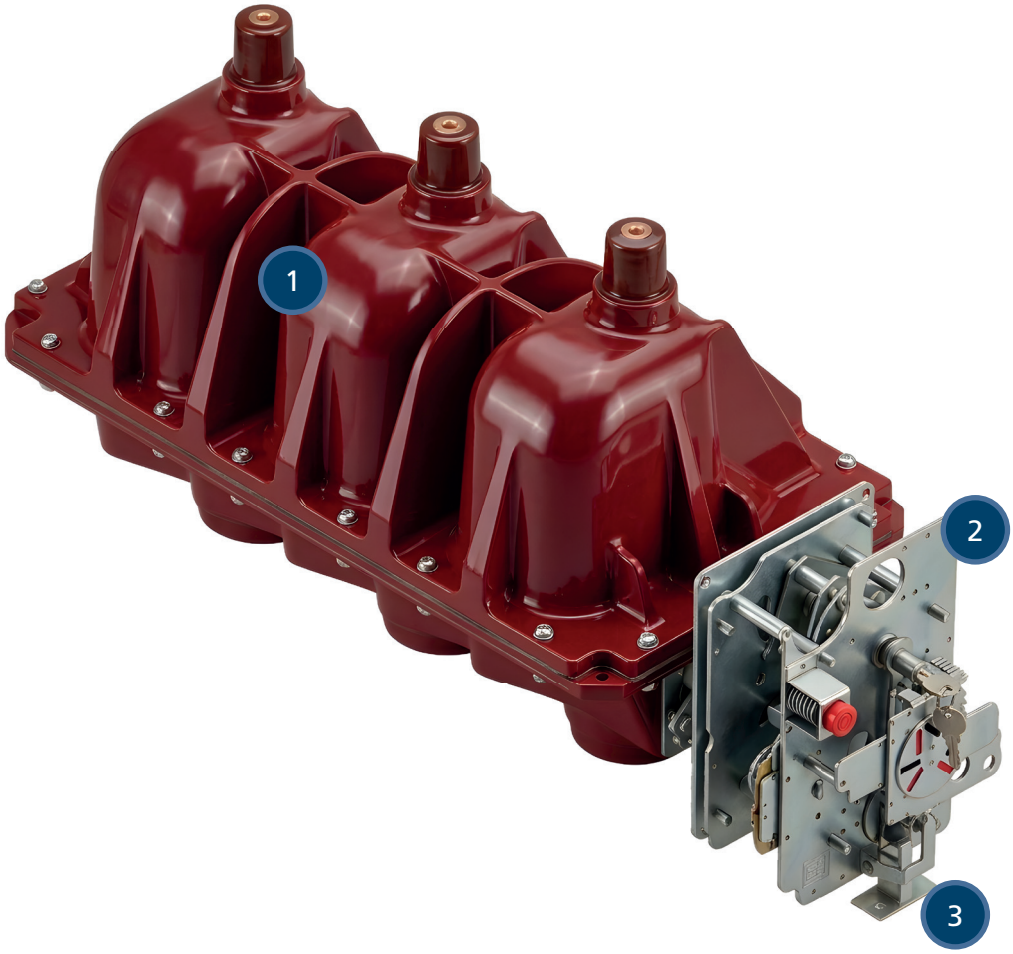
CUSTOMIZED PRODUCT

AIR-ON allows a high degree of customization: the kit, supplied with the basic elements only, can be customized in all its parts according to the needs of each customer.

This guarantees a tailor-made product that perfectly fits the technical, assembly and transport requirements of each application.

DESCRIPTION

One compact unit: a sealed dry-air switch disconnector, a spring-operated mechanism and a built-in safety interlock.



1

SWITCH DISCONNECTOR

Three positions — line, open, earth — in dry air, with vacuum bottle interruption. Epoxy resin enclosure sealed for life.

2

OPERATING MECHANISM BOX

Double spring-operated, speed independent from the operator. Ready for motor, trip coil and key interlocks.

3

INTEGRATED PANEL DOOR INTERLOCK

The panel door opens only with the switch in the earthed position, and no switching is possible with the door open.

STANDARD AND SECURITY

- The load break switch consists of two cast epoxy resin shells hermetically sealed to ensure a more than 30 years operating life.
- Mechanical interlocks for personnel safety.
- The door lock prevents the panel door from being opened when the switch contacts are not earth positioned. The other way around, the block also prevents from switch opening/closing operations when the door compartment is open.

STANDARDS

AIR-ON resins are designed and tested according to the following standards:

STANDARD	TITLE
IEC 62271-103	Switches for rated voltages above 1 kV up to and including 52 kV
IEC 62271-102	Alternating current disconnectors and earthing switches
IEC 62271-206	Voltage presence indicating systems
IEC 62271-105	Alternating current switch-fuse combinations
IEC 62271-200	AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
IEC 62271-100	Alternating current circuit breakers

DEVICE STRUCTURE

The disconnector consists of:

- Main contacts (for connection to the line)
- Vacuum bottle (for the safe interruption of load current)

WORKING PRINCIPLE

THREE OPERATING POSITIONS:

1

LINE

The circuit is closed and the current flows normally.

2

INTERMEDIATE (line open)

Transition state before connecting to ground, ensuring the isolating distance.

3

GROUND

The circuit is connected to ground to ensure safety during maintenance operations.

Actuation mechanism that synchronizes the movement between the vacuum bottle and the main contacts.

Dry air insulation, avoiding the use of SF_6.

1

PHASE 1: CLOSING TO "LINE" POSITION

NORMAL STATE

- The switch disconnector is closed and the main circuit is active, with current flowing through the contacts.
- The vacuum bottle is closed but does not carry the main curren.

2

PHASE 2: OPENING TO "INTERMEDIATE" POSITION

LOAD INTERRUPTION

The vacuum bottle opens first:

- The contacts inside the bottle separate.
- The electric arc generated is quickly extinguished by the vacuum, preventing air ionization.
- The current is cleared before the main contacts of the switch disconnector open.

3

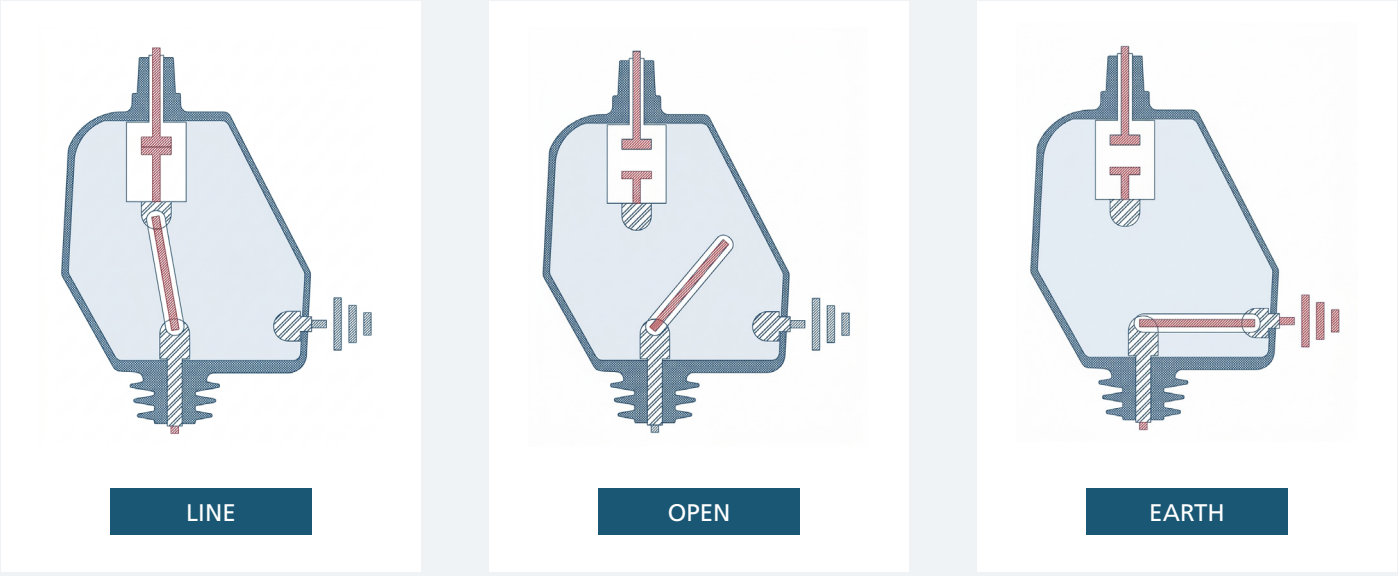
PHASE 3: CLOSING TO "GROUND" POSITION

SAFE MAINTENANCE

- After reaching the intermediate position, the switch disconnector can close to the ground position.
- This operation ensures the safe grounding of the circuit, allowing maintenance work on the system wi-thout risk to the operator

SWITCHING POSITIONS

A single moving contact and a vacuum bottle, coordinated by the mechanism, cover the three operating positions in a fixed, safe sequence.



LINE

Main contacts closed, current flowing normally.
Vacuum bottle closed, not carrying the main current.

OPEN

Vacuum bottle opens first and clears the current; the main contact then reaches the isolating distance.

EARTH

Main contact closed on the earthing side for safe maintenance.

Arc in vacuum, not in air. The current is always interrupted inside the vacuum bottle, before the main contacts separate: no arc reaches the dry-air insulation.

SWITCH DISCONNECTOR ELECTRICAL FEATURES

LINES WITCH DISCONNECTOR		
Rated voltage - U_r	kV	24
Athmospheric impulse withstand rated voltage earthing phase - U_p	kV	125
Athmospheric impulse withstand rated voltage disconnecting distance - U_p	kV	145
Rated short duration power frequency withstand voltage 1 min - U_d	kV	50
Rated short duration power frequency withstand voltage 1 min. disconnector distance - U_d	kV	60
Rated frequency - f_r	Hz	50
Rated current in continuous service - I_r	A	630
Short time withstand current - I_k	kA	20
Current peak value of short duration - I_p	-	52
Short circuit time - t_k	s	1
Level of protection	-	IP30
Active load breaking current - I_{load}	A	630
Open loop breaking current – I_{loop}	A	630
Vacuum line breaking current - I_{lc}	A	1.5
Vacuum cables breaking current - I_{cc}	A	16
Mechanical operation class	-	M1 (1000 CO)
Electrical operation class	-	E3
Short-circuit making capacity (making)	kA	16

EARTHING SWITCHES

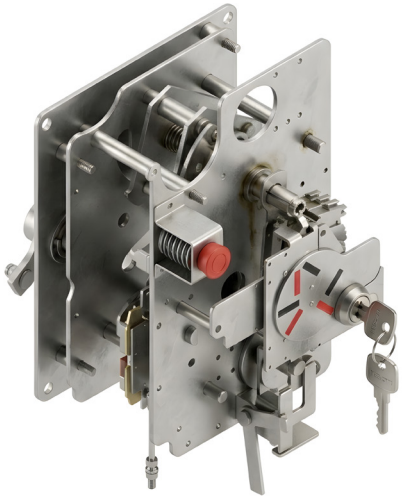
LINE EARTHING SWITCH ST1		
Short time withstand current - I_k	kA	20
Current peak value of short duration - I_p	kA	52
Short circuit time - t_k	s	1
Short-circuit breaking capacity (making)	kA	52
Mechanical operation class	-	M2
Electrical operation class	-	E2

TRANSFORMER PROTECTION EARTHING SWITCH ST2		
Short time withstand current - I_k	kA	1
Current peak value of short duration - I_p	kA	2,6
Short circuit time - t_k	s	1
Short-circuit breaking capacity (making)	kA	2,6
Mechanical operation class	-	M2
Electrical operation class	-	E2

STANDARD COMPONENTS

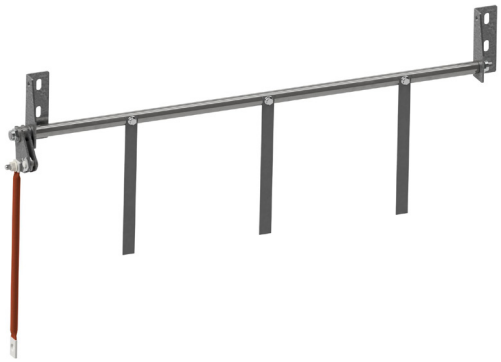


24 kV three-position switch disconnector



Three-position operating mechanism

Optional: motorization · key interlocks · trip coils · integrated door interlock



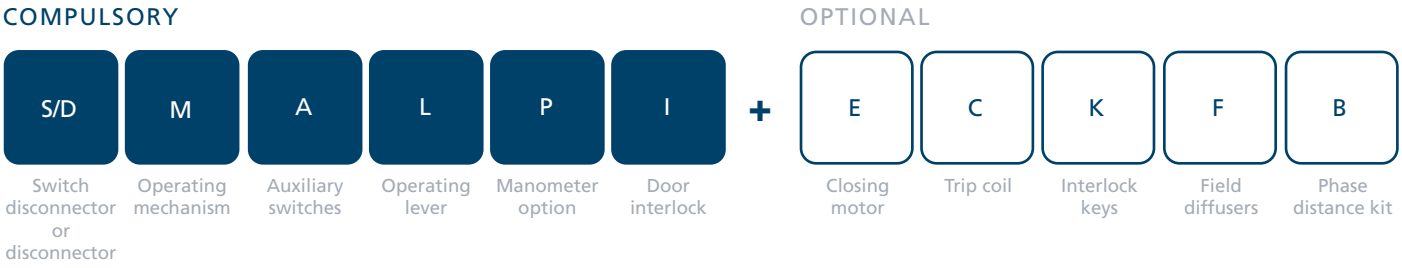
Fuse tripping kit and transformer protection earthing switch (ST2)



Operating lever

HOW TO BUILD THE ORDER CODE

The configuration is written as a string of digits. The first six are compulsory and describe the base machine; the following ones are optional and add functions on the operating mechanism or on the switch disconnector.



EXAMPLE **S M A L P 1 I + E3 C3 K1 F1**

Switch disconnector with manometer without switch, 110 Vdc closing motor, 110 Vdc trip coil, open line interlock key and open field diffusers.

CONFIGURATION RULES

R1 · MANDATORY

When the disconnector version (D) is selected, the open line interlock key K1 is mandatory.

R2 · MANDATORY

When a closing motor (E1–E4) is selected, a trip coil (C1–C4) is mandatory: the motor closes the machine, the coil opens it remotely.

R3 · INCOMPATIBLE

A closing motor (E1–E4) cannot be combined with the closed line interlock key K4: that position stays manually operated.

1

Base machine

Choose S or D, with mechanism M — A and I are included.

2

Manometer

Declare P0, P1 or P2. One option only.

3

Remote control

Add motor E and, mandatorily, trip coil C.

4

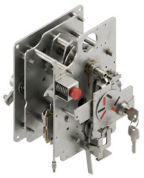
Interlocks & dielectric

Add keys K1–K4, diffusers F1 / F2 and kit B.

BASE CONFIGURATION



S / D — body



M — operating mechanism



L — operating lever



P1 — manometer

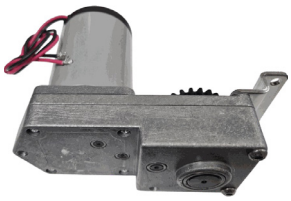


P2 — manometer with

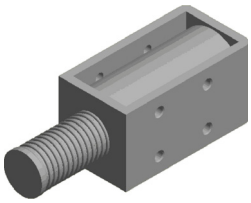
DIGIT	DESCRIPTION
S	Switch disconnector
D	Switch disconnector
M	Operating mechanism (double spring-operated)
A	Auxiliary switches: 3NO+3NC line closed, 2NO+2NC disconnected, 3NO+3NC earth closed, 2NO+2NC fuse-blown detection
I	Integrated door interlock — the cubicle door can be opened only with the switch disconnector in the earthed position
L	Operating lever
P0	No manometer
P1	Manometer without switch (flex tube) — local reading only
P2	Manometer with switch (flex tube) — pressure switch for remote signallin

One platform: every version is built on the same body and the same operating mechanism. Phase-to-phase distance can be increased to 230 mm with kit B; dielectric performance can be increased with field diffusers F1 / F2.

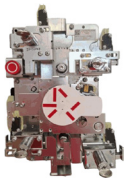
ACCESSORIES



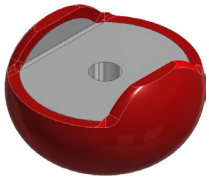
E — closing motor



C — opening trip coil



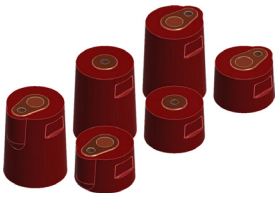
K — key interlocks



F1 — open diffuser



F2 — closed diffuser



B — phase distance kit 230 mm

DIGIT	DESCRIPTION
E1	Closing motor 24 Vdc
E2	Closing motor 48 Vdc
E3	Closing motor 110 Vdc
E4	Closing motor 220 Vdc
C1	Opening trip coil 24 Vdc
C2	Opening trip coil 48 Vdc
C3	Opening trip coil 110 Vdc
C4	Opening trip coil 220 Vdc

DIGIT	DESCRIPTION
K1	Open line interlock key
K2	Open earth interlock key
K3	Closed earth interlock key
K4	Closed line interlock key
F1	Open field diffuser — through busbar
F2	Closed field diffuser — terminal busbar
B	Kit for phase distance 230 mm

Key interlocks release the key only in the defined position, so the operating sequence of a substation can be imposed mechanically. Up to four keys can be installed on the same mechanism. Rules R2 and R3 apply (see order code page).

HOW TO BUILD THE KIT CODE

Add-on kits are ordered with their own five-position code, independent from the switch disconnector configuration. Every position is declared, in this order:

A · B · C	210 · 230	W3 · W5 · W7	T · VT · –	I
1 — Kit type	2 — Pole pitch (mm)	3 — Compartment width 375 / 500 / 750 mm	4 — Fuse length 442 / 292 mm	5 — Capacitive insulator

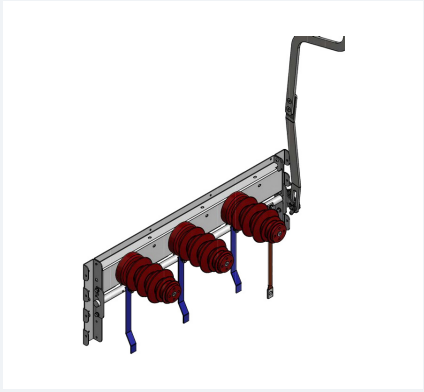
EXAMPLE **C 210 W5 T I**

Fuse release and earth switches kit, pole pitch 210 mm, compartment width 500 mm, fuse length 442 mm, with capacitive insulator.



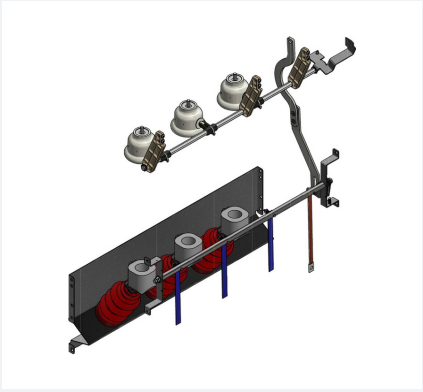
A Fuse release kit

Fuse-holder assembly with release mechanism, carried by the pole busbar.



B Earth disconnector kit

Earthing switch assembly on its own frame, with operating lever.



C Fuse release + earth switches kit

Both functions combined; the only kit for which a fuse length is declared.

The pole pitch must be consistent with the phase distance of the switch disconnector: standard in the base configuration, 230 mm when kit B is installed. Capacitive insulators allow voltage presence to be checked without opening the compartment.

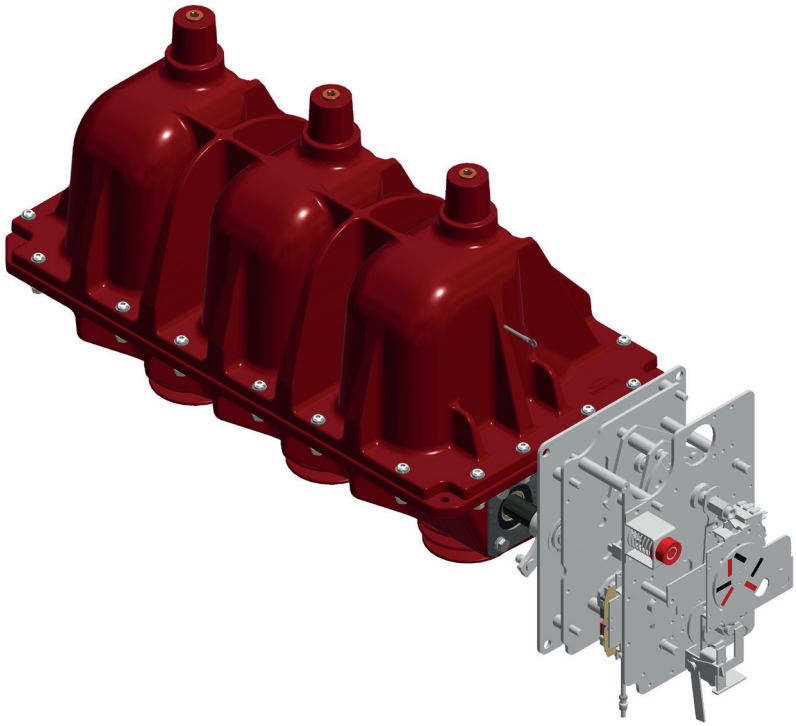
KIT ORDERING TABLE

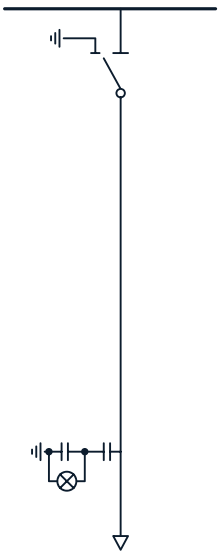
Released combinations

Kit · pitch	W3 · 375 mm	W5 · 500 mm	W7 · 750 mm
A 210	●	●	-
A 230	●	●	-
B 210	-	-	●
B 230	-	-	●
C 210	●	●	-
C 230	-	●	-

KIT CODE	DESCRIPTION
A 210 W3 – I	Fuse release kit, pole pitch 210, width 375 mm
A 230 W3 – I	Fuse release kit, pole pitch 230, width 375 mm
A 210 W5 – I	Fuse release kit, pole pitch 210, width 500 mm
A 230 W5 – I	Fuse release kit, pole pitch 230, width 500 mm
B 210 W7 – I	Earth disconnector kit, pole pitch 210, width 750 mm
B 230 W7 – I	Earth disconnector kit, pole pitch 230, width 750 mm
C 210 W3 T I	Fuse release + earth switches, width 375 mm, fuse 442 mm
C 210 W3 VT I	Fuse release + earth switches, width 375 mm, fuse 292 mm
C 210 W5 T I	Fuse release + earth switches, width 500 mm, fuse 442 mm
C 210 W5 VT I	Fuse release + earth switches, width 500 mm, fuse 292 mm
C 230 W5 T I	Fuse release + earth switches, width 500 mm, fuse 442 mm

24 kV INCOMING / OUTGOING LINE SWITCH DISCONNECTOR KIT





SINGLE-LINE DIAGRAM

APPLICATION

Incoming / outgoing line

Line switch disconnector with capacitive insulators shelf

24	630	20	0
kV	A	kA · 1s	GWP

STANDARD COMPOSITION

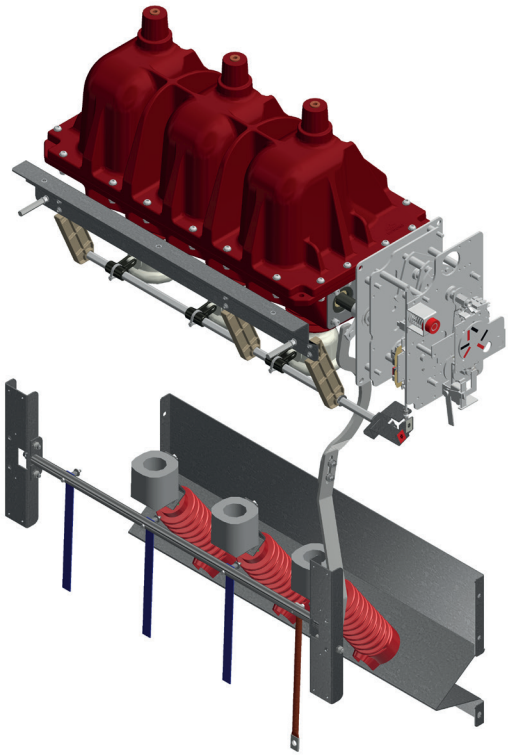
- 24 kV switch disconnector
- Manual or motorized L operating mechanism
- Capacitive insulators shelf

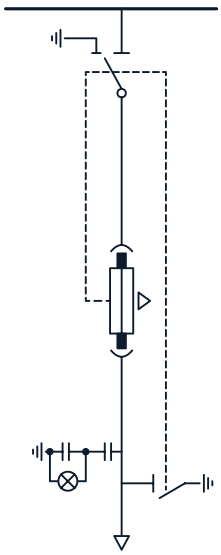
OPTIONAL ACCESSORIES

- Operating lever
- Key lock (1 key free with closed switch disconnector)
- Key lock (1 key free with open switch disconnector)
- Key lock (1 key free with closed ES)
- Key lock (1 key free with open ES)

24 kV SWITCH DISCONNECTOR KIT COMBINED WITH FUSE LINK

KIT CONFIGURATOR · KIT C — e.g. C 210 W5 T I





SINGLE-LINE DIAGRAM

APPLICATION

Transformer protection

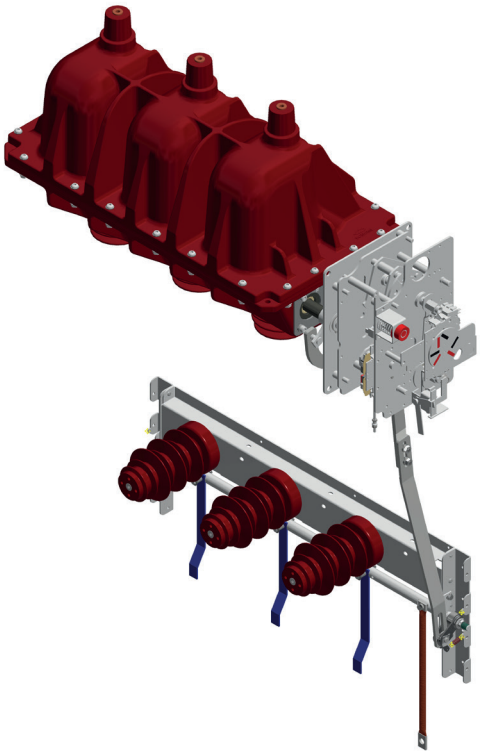
Switch disconnector combined with fuse link and ST2 earthing switch

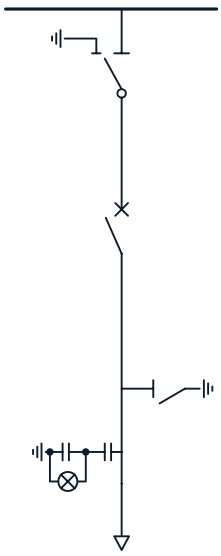
24	630	20	0
kV	A	kA · 1s	GWP

STANDARD COMPOSITION	OPTIONAL ACCESSORIES
24 kV switch disconnector	Operating lever
T operating mechanism	24–230 V opening coil
Fuse holder kit	Key lock (1 key free with open switch disconnector)
ST 12/24 earthing switch	Key lock (1 key free with closed ES)
Voltage indicator device	Key lock (1 key free with open ES)

24 kV SWITCH DISCONNECTOR OR DISCONNECTOR COMBINED WITH EARTHING KIT FOR CB CUBICLE

KIT CONFIGURATOR · KIT B — e.g. B 210 W7 – I





SINGLE-LINE DIAGRAM

APPLICATION

CB cubicle

Switch disconnector or disconnector with earthing kit

24	630	20	0
kV	A	kA · 1s	GWP

STANDARD COMPOSITION
24 kV switch disconnector or disconnector
Manual or motorized L operating mechanism
ST 12/24 earthing switch
Voltage indicator device

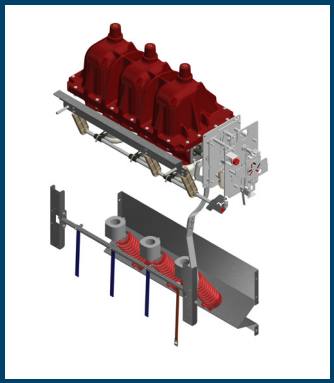
OPTIONAL ACCESSORIES
Operating lever
24–230 V opening coil
Key lock (1 key free with open switch disconnector)
Key lock (1 key free with closed ES)
Key lock (1 key free with open ES)

ENGINEERING AND DESIGN SUPPORT

Gruppo Bonomi Smart Grid division is also an external partner for specific technical requirements.

FROM DRAWING TO TYPE TEST

Our engineering department can support the customer with project drawings, construction drawings and assistance in the set-up of production for panel builders, also including type tests based on the IEC reference.



CONFIGURATION RULES

PROJECT DRAWINGS

Layouts and arrangement drawings to integrate AIRON in the customer's switchgear.

CONSTRUCTION DRAWINGS

Detailed drawings for manufacturing the panel around the switch disconnector.

PRODUCTION SET-UP

Assistance to panel builders in setting up and starting production.

IEC TYPE TESTS

Support with type tests based on the applicable IEC standards.

MODULARITY

Thanks to the modular structure of our devices and the ability to produce under licence, OEMs can flexibly choose the solution that best suits their needs.

COMPLETE KITS

Ready-to-install AIR-ON kits.

CONSTRUCTION DRAWINGS

Detailed drawings for manufacturing the panel around the switch disconnector.

LICENSED PRODUCTION

Manufacturing under licence by the OEM.

BONOMI
moving energy since 1928

Via A. Mercanti 17
25018 Montichiari (BS) - Italy
info@gruppo-bonomi.com
+39 030 96 50 304