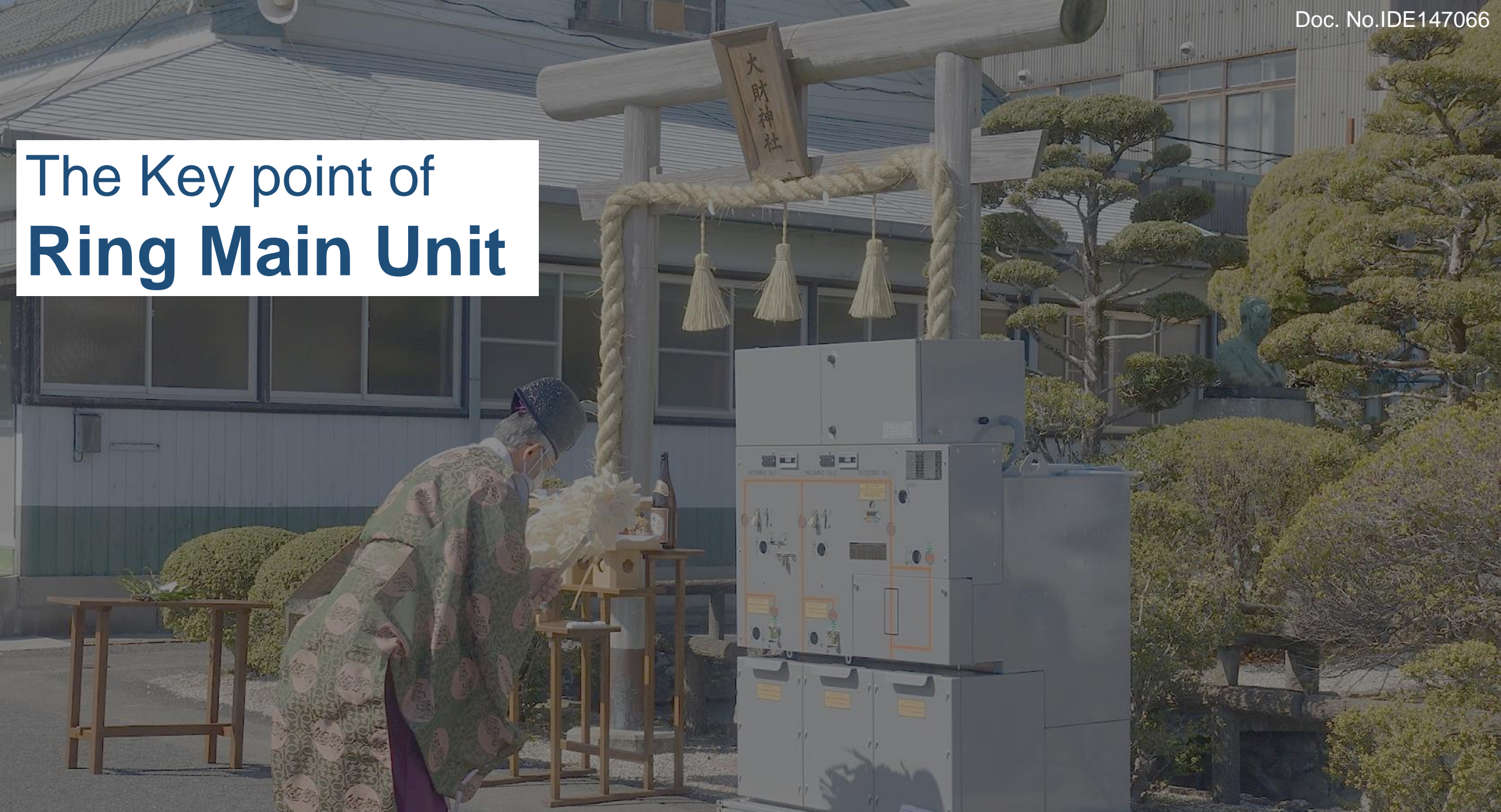


The Key point of **Ring Main Unit**



Ring Main Unit [GST20-B-YT]

24 kV SF₆ gas insulated switchgear



	LBS	ES
Mechanical endurance	M1 1,000 CO	M0 1,000 CO
Electrical endurance	E2	E1

Installation site

Indoor or outdoor with metal enclosure

Minimum ambient temperature

-5 °C

Maximum ambient temperature

40 °C

Altitude

Less than **1,000 m** above sea level

Rated voltage

24 kV

Rated current

630 A (2-IN), **200 A** (1-OUT)

Rated frequency

50 Hz

Rated short time withstand current (LBS, ES)

16 kA_{r.m.s} **1 sec.**

Rated short circuit making current (LBS, ES)

40 kA_{peak}

Rated power frequency withstand voltage

50 kV (Dry)

Lightning impulse withstand voltage

125 kV

SF₆ gas pressure

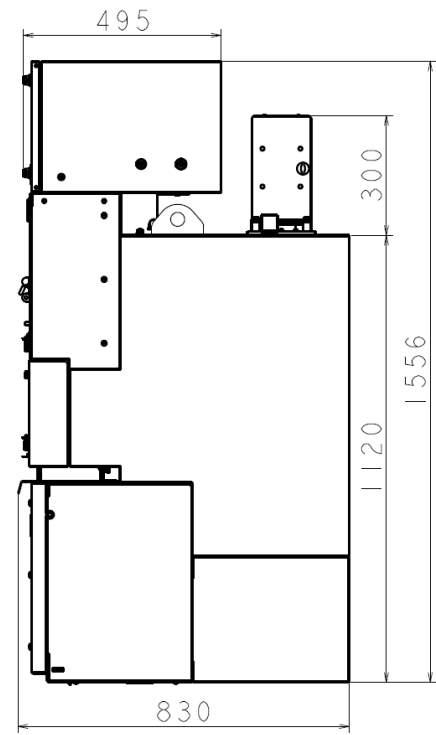
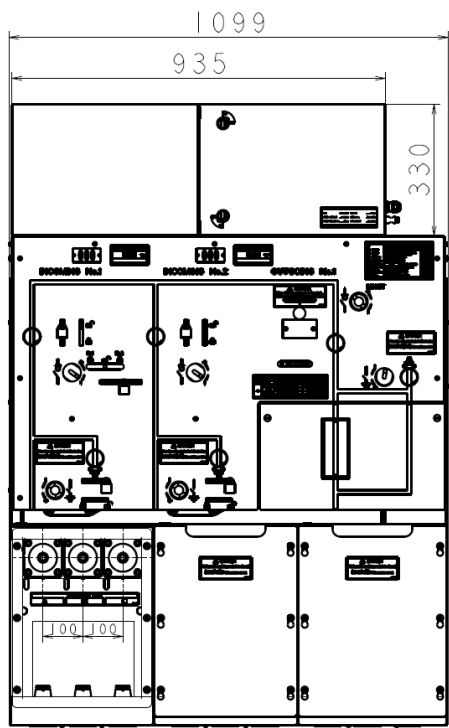
50 kPa·G (20°C)

Enclosure material

SUS304 stainless steel

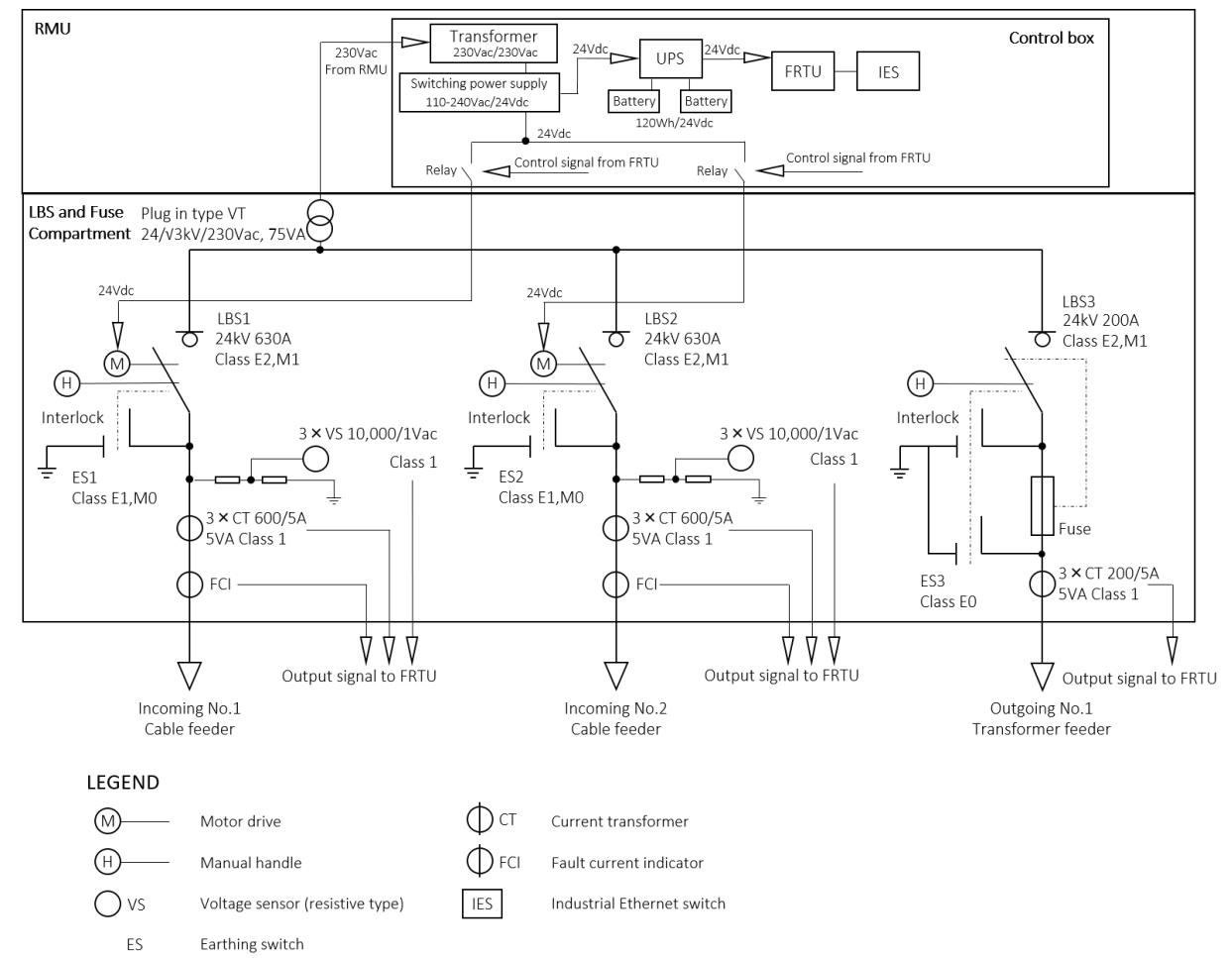
Ring Main Unit [GST20-B-YT]

24 kV SF₆ gas insulated switchgear



Total mass: 680 kg

Dimensions



Single line diagram

Distinctive Feature of Ring Main Unit

- ▶ Universal Design Panel
- ▶ Internal Arc Safety Device
- ▶ Low Gas Interlock System
- ▶ High Reliable Fuse Holder
- ▶ Durable AUX. Switch



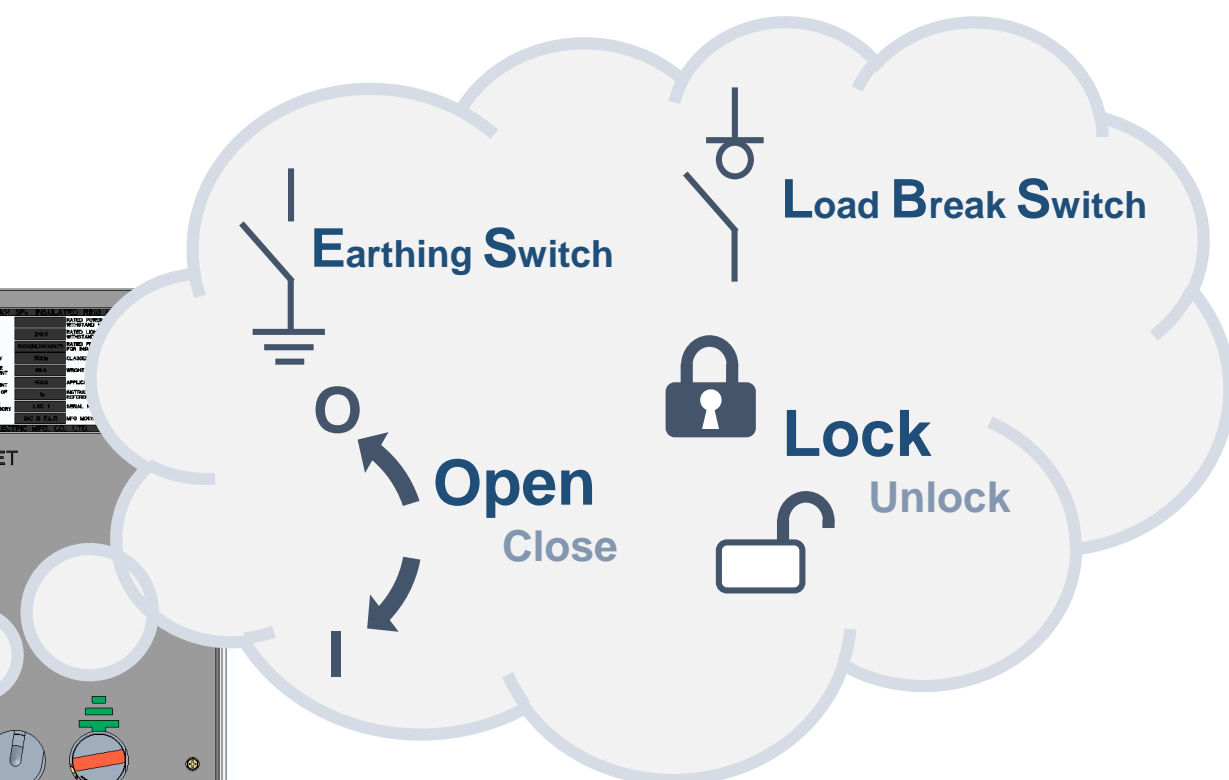
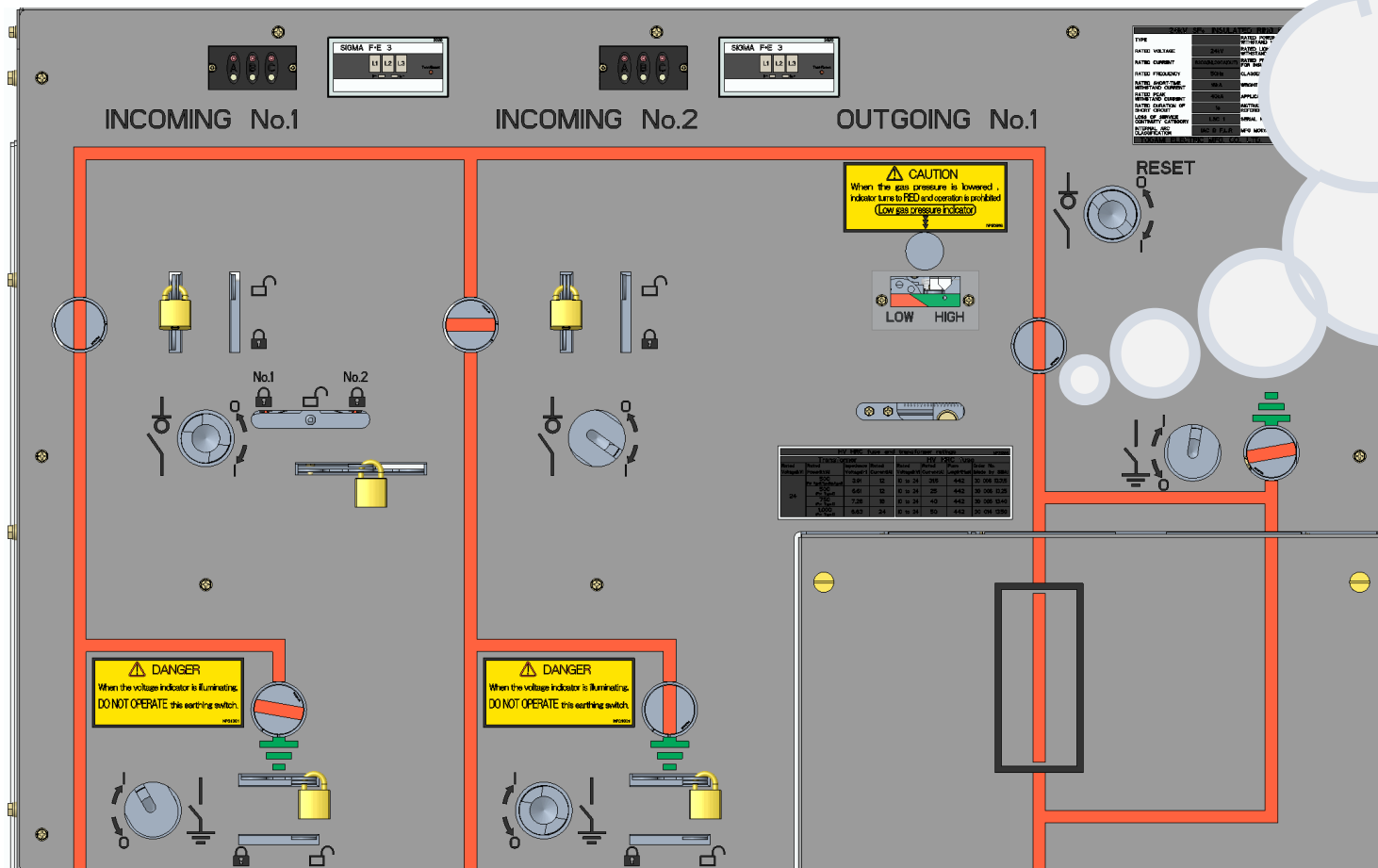
Outstanding Performance of Ring Main Unit

- ▶ Fast Tripping with Fuse Striker
- ▶ Very Low Gas-Leak Rate
- ▶ Durable Operating Mechanism



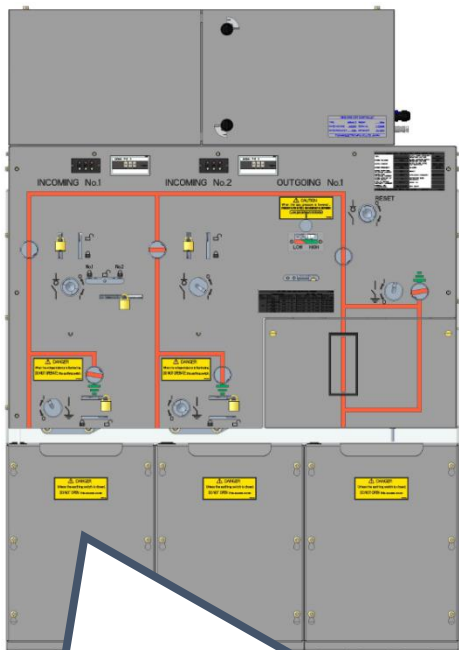
Universal Design Panel

User-friendly interface

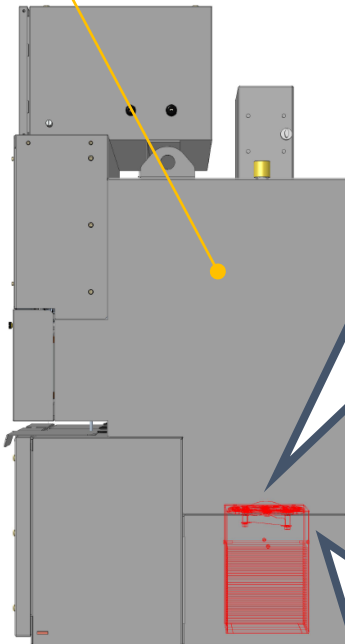


Internal Arc Safety Device

User-safety equipment



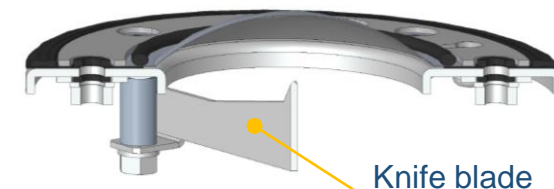
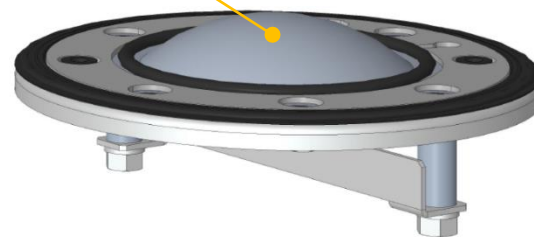
Gas compartment



Rupture Disk

In case of internal fault in RMU, The rupture disk bursts to relief the pressure. [Burst pressure:220 kPa]

Rupture disk



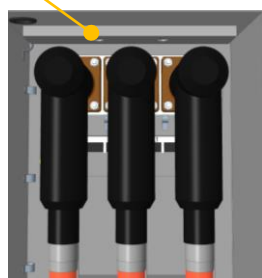
Knife blade

Arc Energy Absorber

This device is a thick iron plate Which is in the cable compartment.

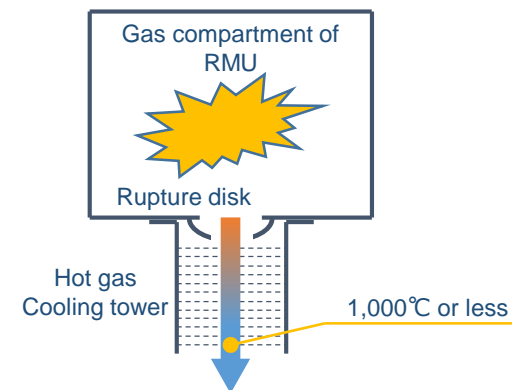
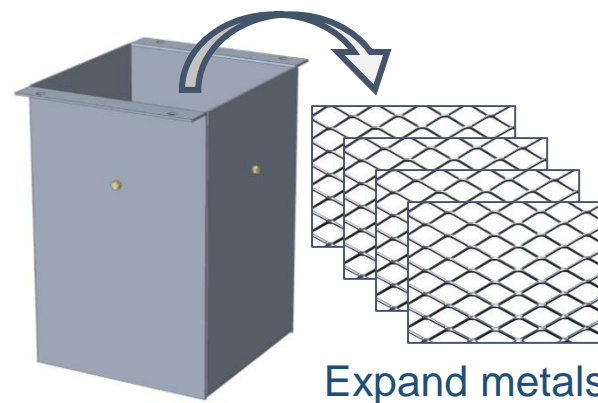
In case of internal fault in there, By melting the iron plate absorbs the arc energy.

Arc energy absorber



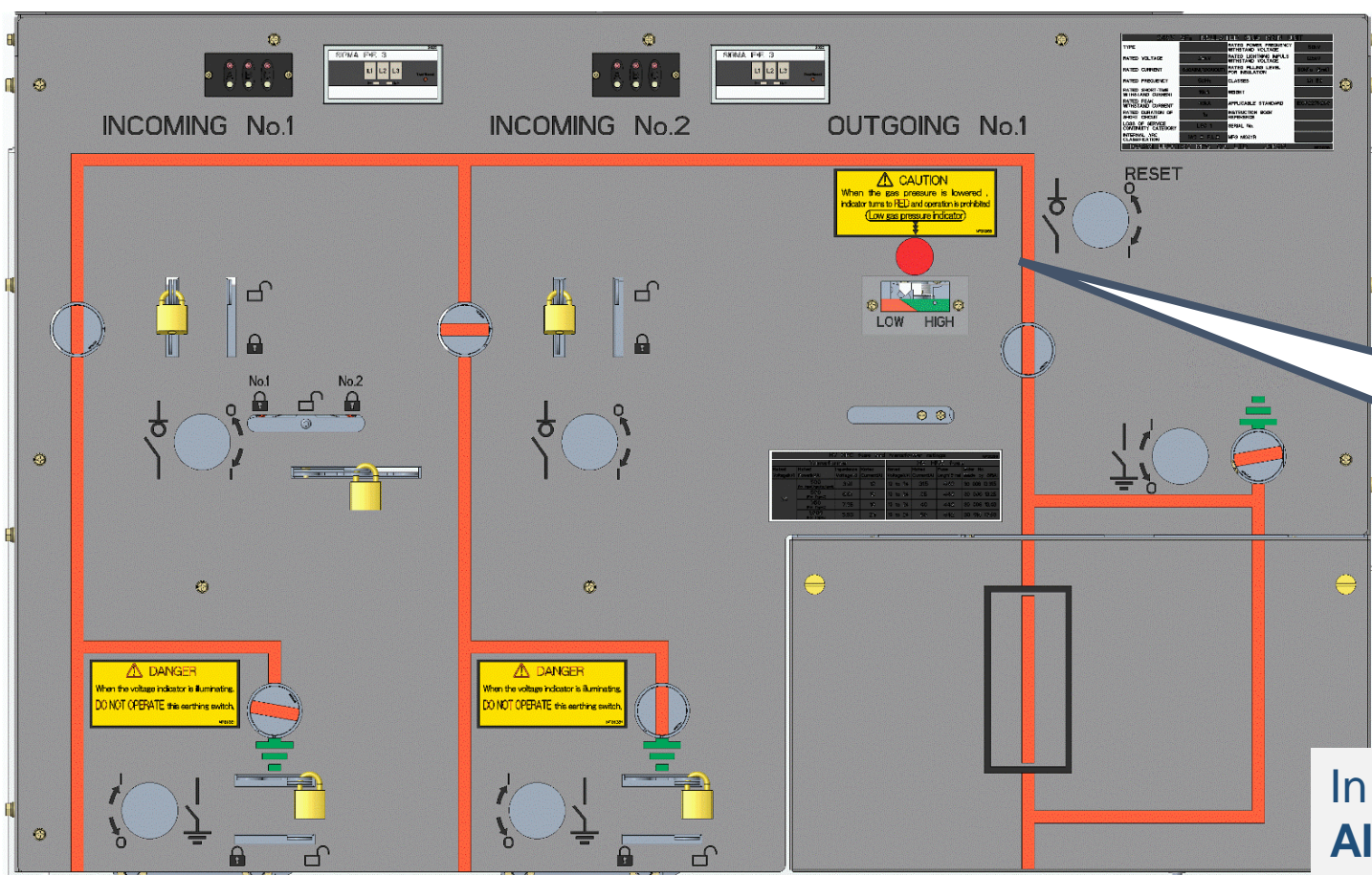
Hot Gas Cooling Tower

This device is like a chimney which has expand metals. These metals remove heat from the hot gas.

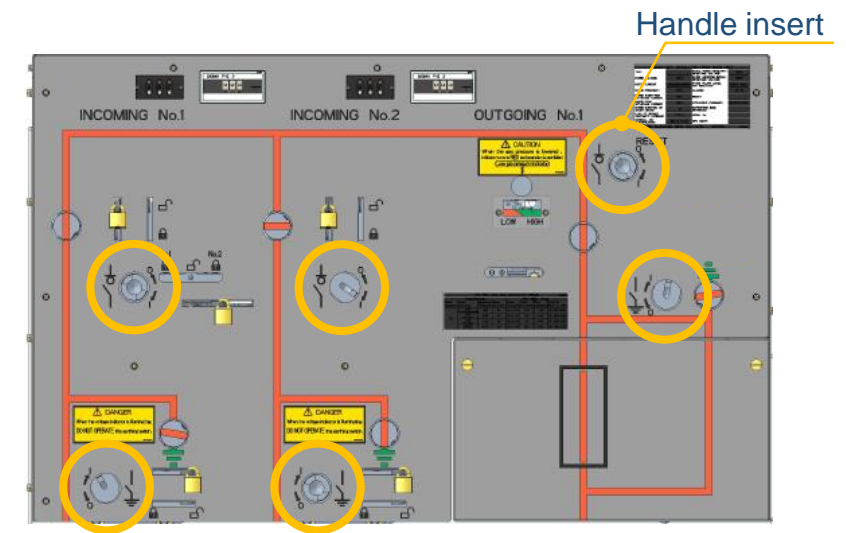


Low Gas Interlock System

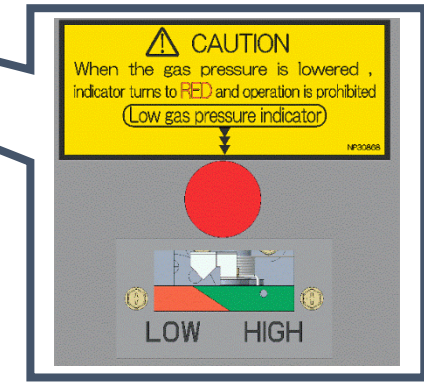
User-safety equipment



Low gas interlock is activated



Normal service condition

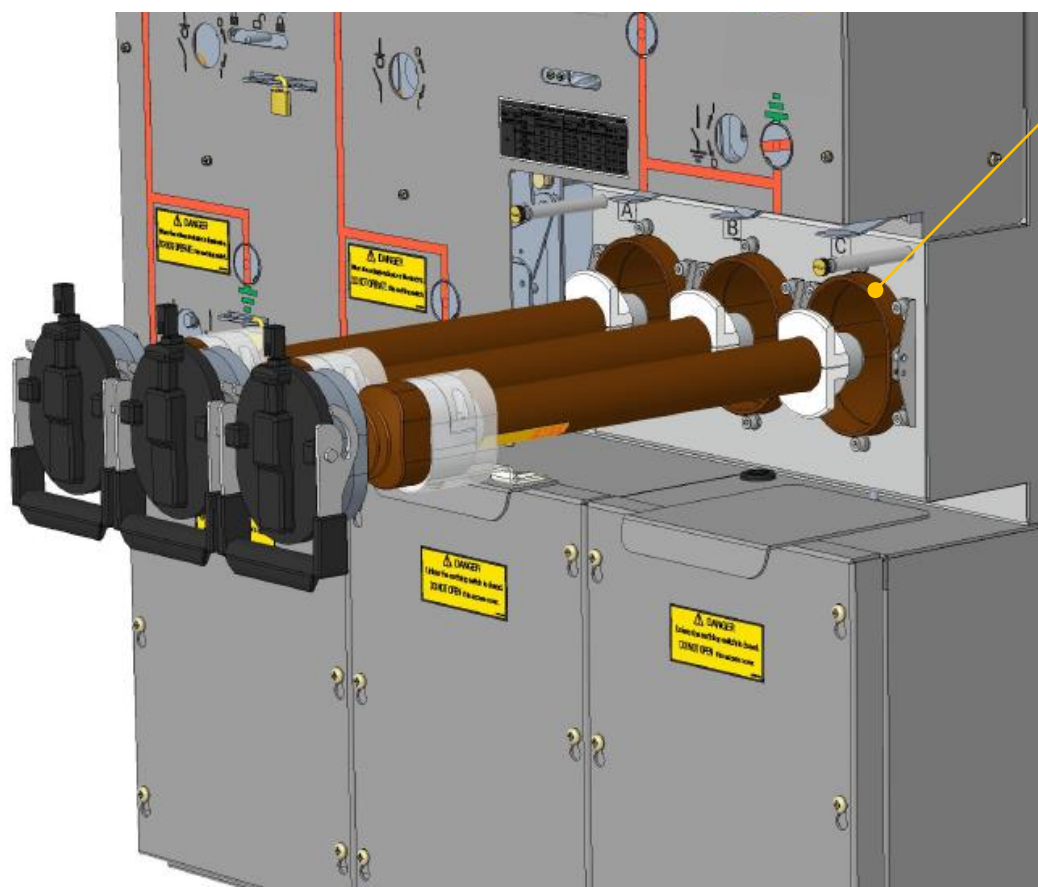


In case of low gas pressure [30 kPa·G or less],
All the operation of LBS and ES is prohibited.

- ▶ Inaccessible to handle inserts.
- ▶ Electrically interlock for remote operation

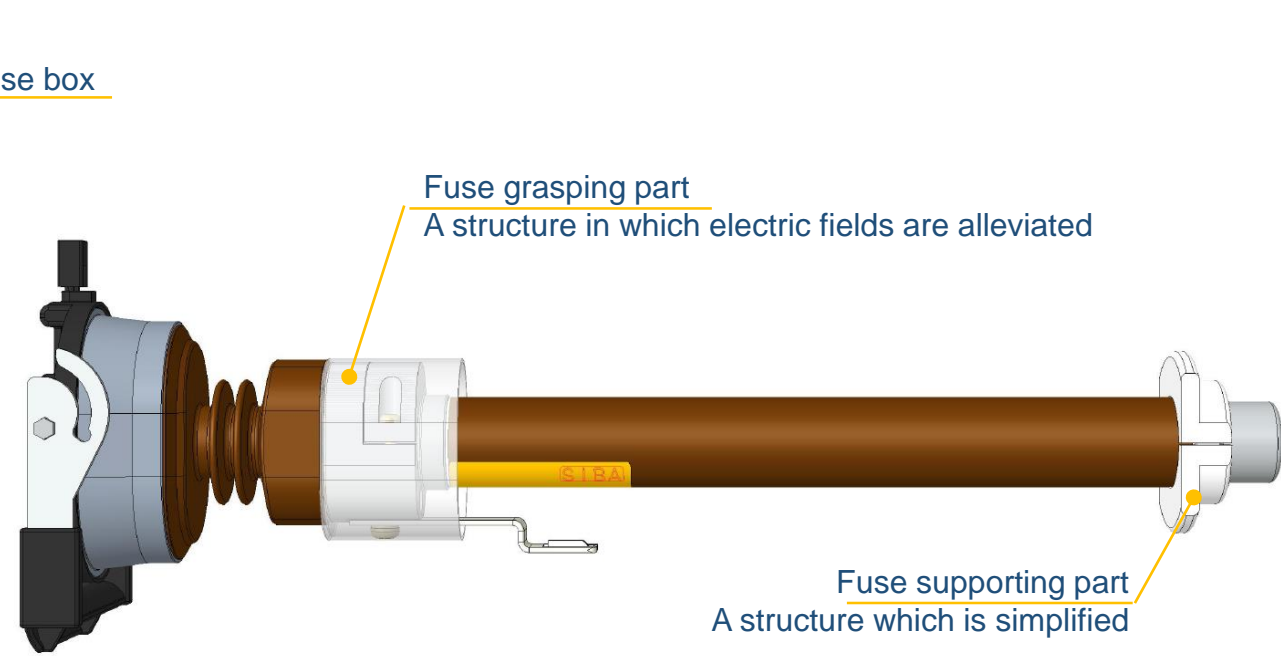
High Reliable Fuse Holder

Contribution of grid-reliability



Fuse box

Fuse box
[Withdrawn fuse holder]



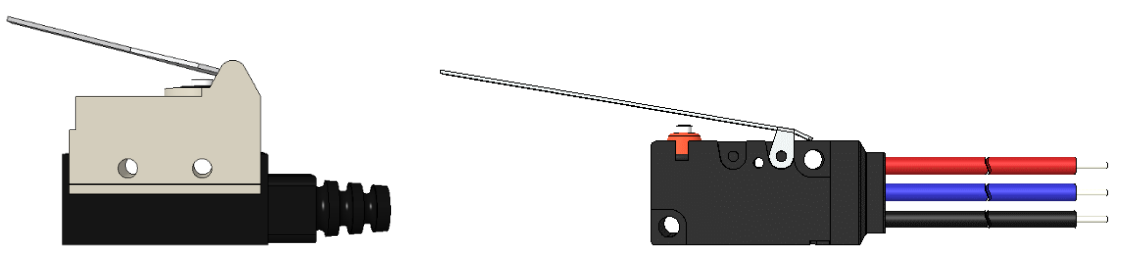
Fuse grasping part
A structure in which electric fields are alleviated

Fuse supporting part
A structure which is simplified

Fuse holder
Low partial discharge design

Durable AUX. Switch

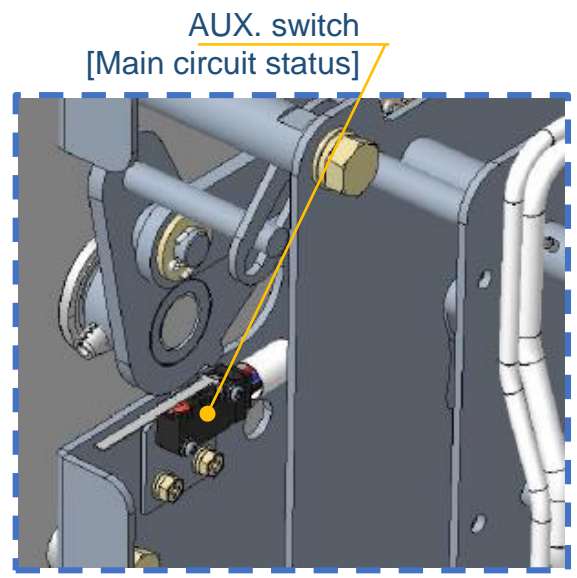
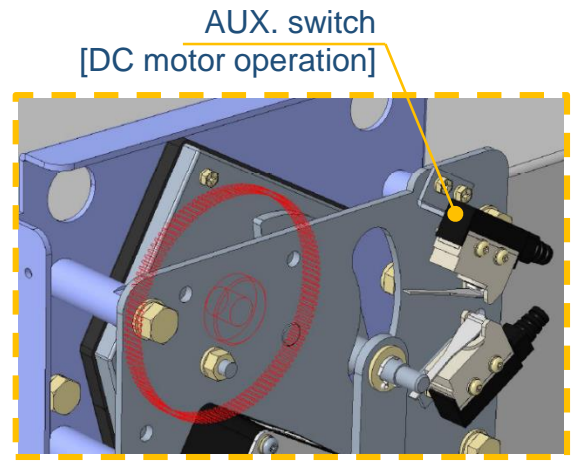
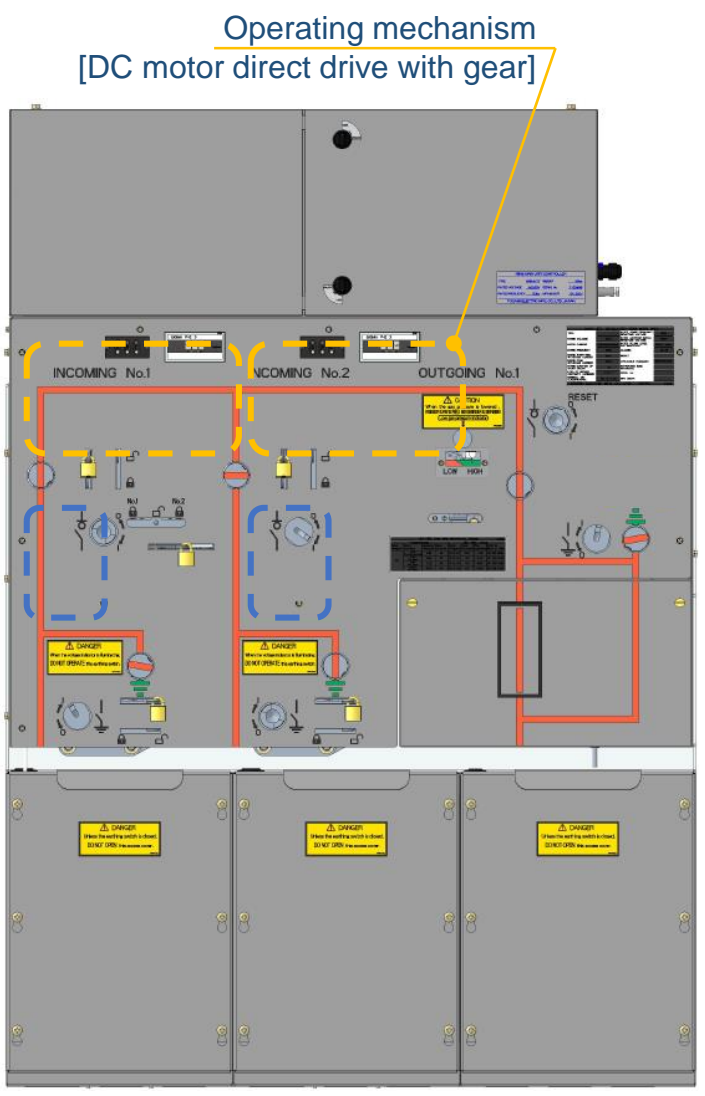
Contribution of grid-reliability



Our RMU has "IP 67" AUX. switches.

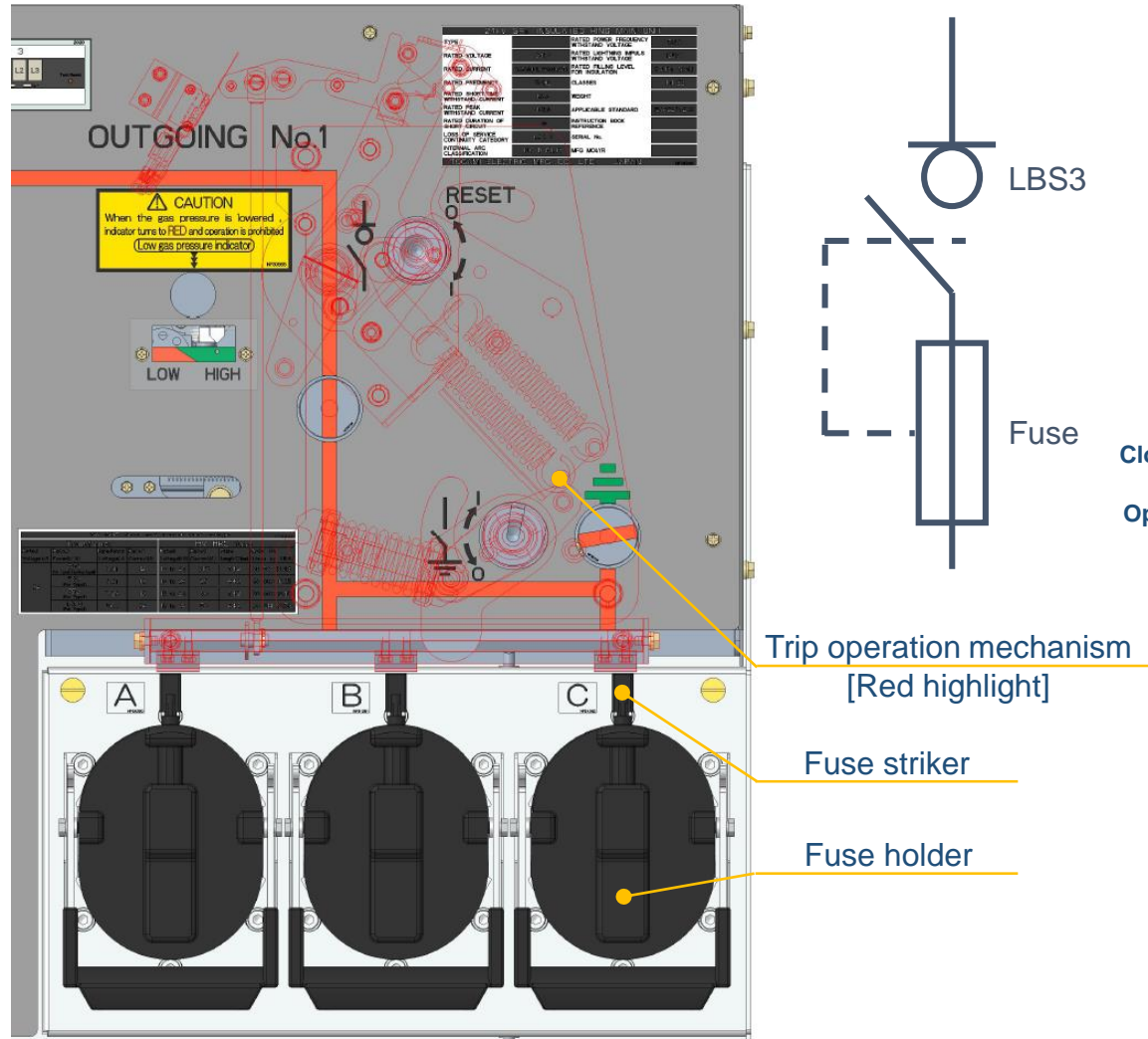
6
Dust tight
Category 1, 8hrs

Ingress Protection **IP 67** 7
Temporary immersion
30 min.

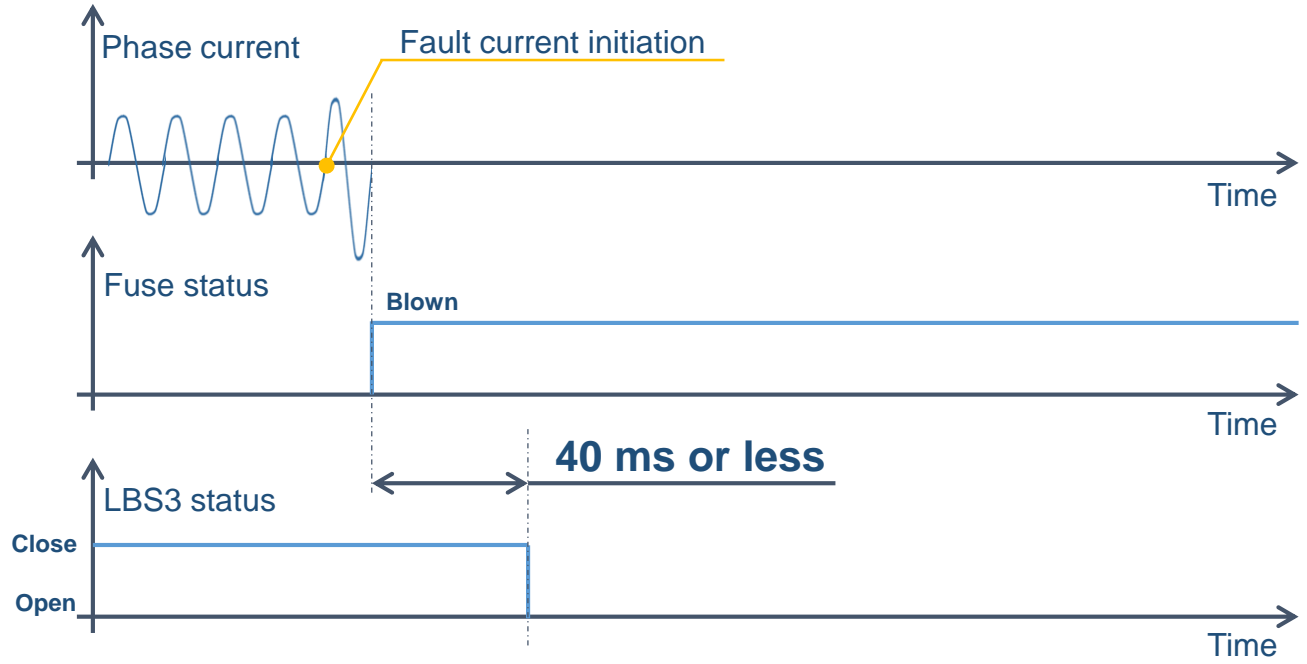
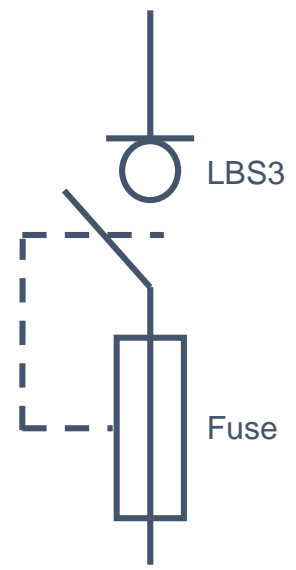


Fast Tripping with Fuse Striker

Contribution of grid-reliability



LBS3 on outgoing feeder



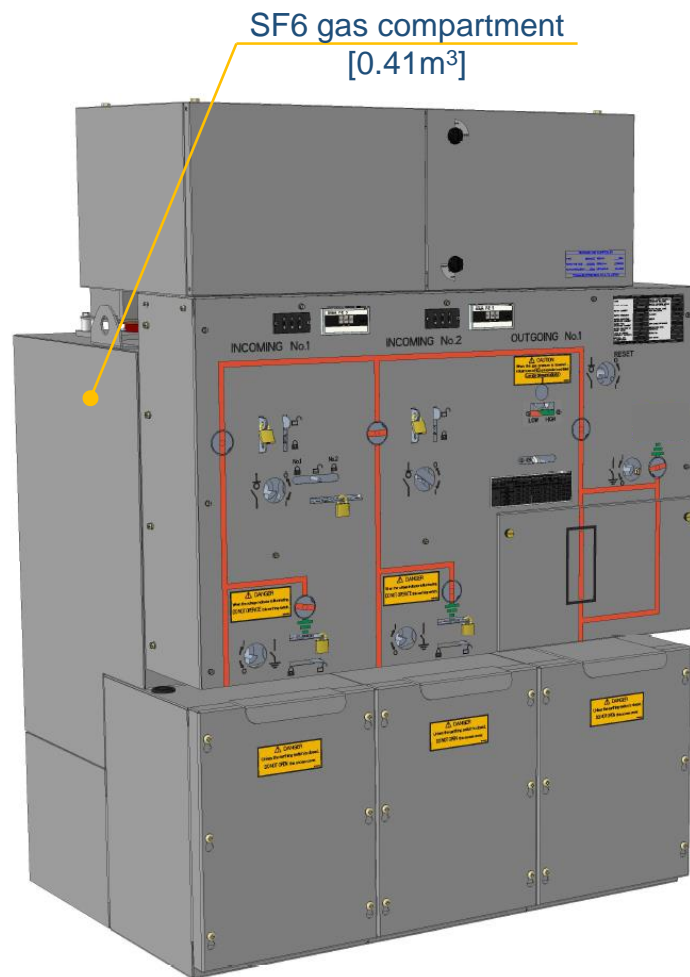
Out going feeder has a LBS and HRC fuse. By mean of the fuse striker it operates As a **switch-fuse combination**.

When LBS3 is closed. The spring in the trip operation device is charged to be able to trip.

If the fuse blows, the fuse striker is released And automatically LBS3 is immediately tripped by mechanical links.

Very Low Gas-Leak Rate

Contribution of grid-reliability



Acceptable gas-leak rate

As routine test

0.1 %/year

IEC

0.026 %/year

Togami

Rated SF₆ gas pressure

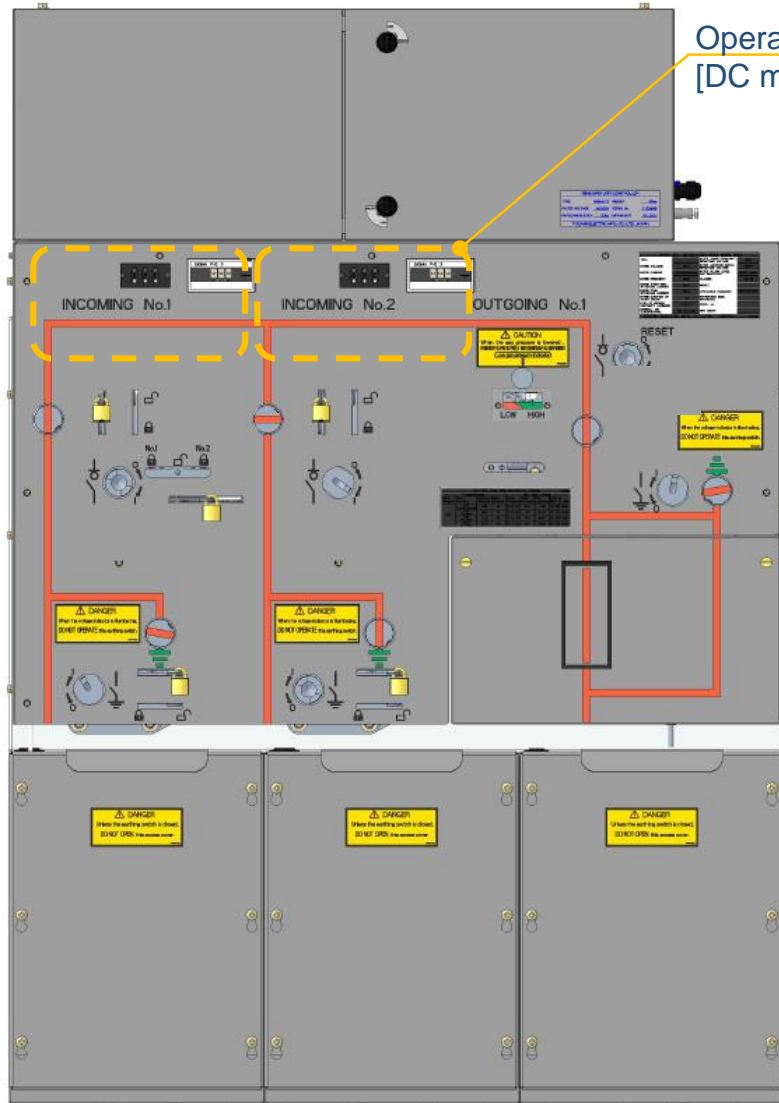
50 kPa·G (20°C)

Minimum functional gas pressure

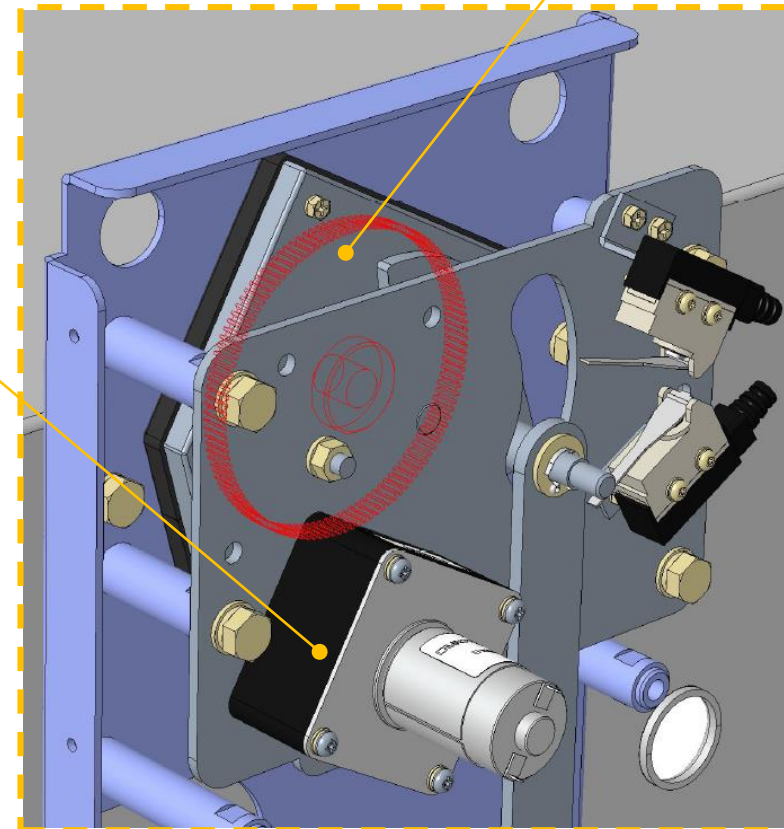
25 kPa·G (20°C)

Durable Operating Mechanism

Contribution of grid-reliability



Operating mechanism
[DC motor direct drive with gear]



DC motor

Gear inside the protection case

The operating mechanism is a simple linkage and DC motor direct drive with gear.
The gear in the case is protected from dust.

No need to grease in the service life.

Feature

- ▶ Universal Design Panel
- ▶ Internal Arc Safety Device
- ▶ Low Gas Interlock System
- ▶ High Reliable Fuse Holder
- ▶ Durable AUX. Switch

Performance

- ▶ Fast Tripping with Fuse Striker
- ▶ Very Low Gas-Leak Rate
- ▶ Durable Operating Mechanism



Make society, Earth, and
the future prosperous!

Appendix :Applicable standard

General	IEC62271-1	High-voltage switchgear and controlgear – Part 1: Common specifications for alternating current switchgear and controlgear
Ring main unit (RMU)	IEC62271-200	High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
Load break switch(LBS)	IEC62271-103	High-voltage switchgear and controlgear – Part 103: Alternating current switches for rated voltages above 1 kV up to and including 52 kV
Switch fuse combination	IEC62271-105	High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV
Earthing switch (ES)	IEC62271-102	High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches

Appendix :Electrical endurance

Electrical endurance	LBS	ES
	E2	E1 5 making operation (40 kA _{peak} , 16 kA _{r.m.s})

**Table 3 – Test duties for general purpose switches –
Test duties for three-phase tests on three-pole operated,
switches**

Test duty		Test voltage	Test current	Number of cycles of operations		
Description	TD			Class E1	Class E2	Class E3
Mainly active load current	TD _{load2}	U _r	I _{load}	10	30	100
	TD _{load1}		0,05×I _{load}	20	20	20
Closed-loop distribution circuit current	TD _{loop}	0,20×U _r	I _{loop}	10	20	20
Cable-charging current	TD _{cc2}	U _r	I _{cc}	10 ^a	10 ^a	10 ^a
	TD _{cc1}		0,1 - 0,4×I _{cc}	10 ^a	10 ^a	10 ^a
Line-charging current	TD _{lc}	U _r	I _{lc}	10 ^a	10 ^a	10 ^a
Short-circuit making current	TD _{ma}	U _r	I _{ma}	2 making operations	3 making operations	5 making operations
Earth fault current	TD _{ef1}	U _r	I _{ef1}	10	10	10
Cable- and line-charging current under earth faults	TD _{ef2}	U _r	I _{ef2}	10	10	10

^a In the case of the switch is defined as a class C2 switch and if one restrike occurs during the test series, 6.101.8 is applicable

Excerpt from IEC62271-105:2011

Appendix :Type test report

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20TC200208 

Test Report

TEST OBJECT SF6 gas insulated ring main unit

DESIGNATION GST20-B-Y
24 kV 630 A 50 Hz 16 kA 1 s

APPLICANT Togami Electric Mfg. Co., Ltd.
1-1 Ohtakara-kitamachi Saga 840-0802, Japan

MANUFACTURER Togami Electric Mfg. Co., Ltd.
1-1 Ohtakara-kitamachi Saga 840-0802, Japan

DATE OF TESTS 2019-02-18 ~ 2020-01-17

ISSUED NUMBER 20TC200208

The test object, constructed complying with the description, drawings and photographs incorporated in this Test Report has been subjected to the performance tests in accordance with **IEC 62271-200:2011** subclauses 6.2.9, 6.6, 6.9, 6.101

The values obtained and the general performance are considered to comply with the above Standard and to justify the ratings as listed on page No.4 ~ 5.
This Test Report applies only to the test object. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.
This Test Report comprises 250 sheets in total.

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Test results in this report are within the scopes accredited by KOLAS, which signed the ILAC-MRA.



Prepared by 
Kim, Ji-hwan

Approved by 
(Technical manager) Kim, Geun-yong

Date of issue 2020-03-26

President 



111, Hanggaul-ro, Sangnok-gu, Ansan-si, Gyeonggi-do, 15588 Korea | TEL: (031) 8040-4114

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20TC200207 

Test Report

TEST OBJECT High voltage switch(LBS) in SF6 gas insulated ring main unit

DESIGNATION GST20-B-Y
24 kV 630 A 50 Hz 16 kA 1 s

APPLICANT Togami Electric Mfg. Co., Ltd.
1-1 Ohtakara-kitamachi Saga 840-0802, Japan

MANUFACTURER Togami Electric Mfg. Co., Ltd.
1-1 Ohtakara-kitamachi Saga 840-0802, Japan

DATE OF TESTS 2019-02-15 ~ 2020-01-16

ISSUED NUMBER 20TC200207

The test object, constructed complying with the description, drawings and photographs incorporated in this Test Report has been subjected to the performance tests in accordance with **IEC 62271-103:2011** subclauses 6.2, 6.8, 6.102

The values obtained and the general performance are considered to comply with the above Standard and to justify the ratings as listed on page No.4.
This Test Report applies only to the test object. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.
This Test Report comprises 65 sheets in total.

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Test results in this report are within the scopes accredited by KOLAS, which signed the ILAC-MRA.



Prepared by 
Kim, Ji-hwan

Approved by 
(Technical manager) Kim, Geun-yong

Date of issue 2020-03-26

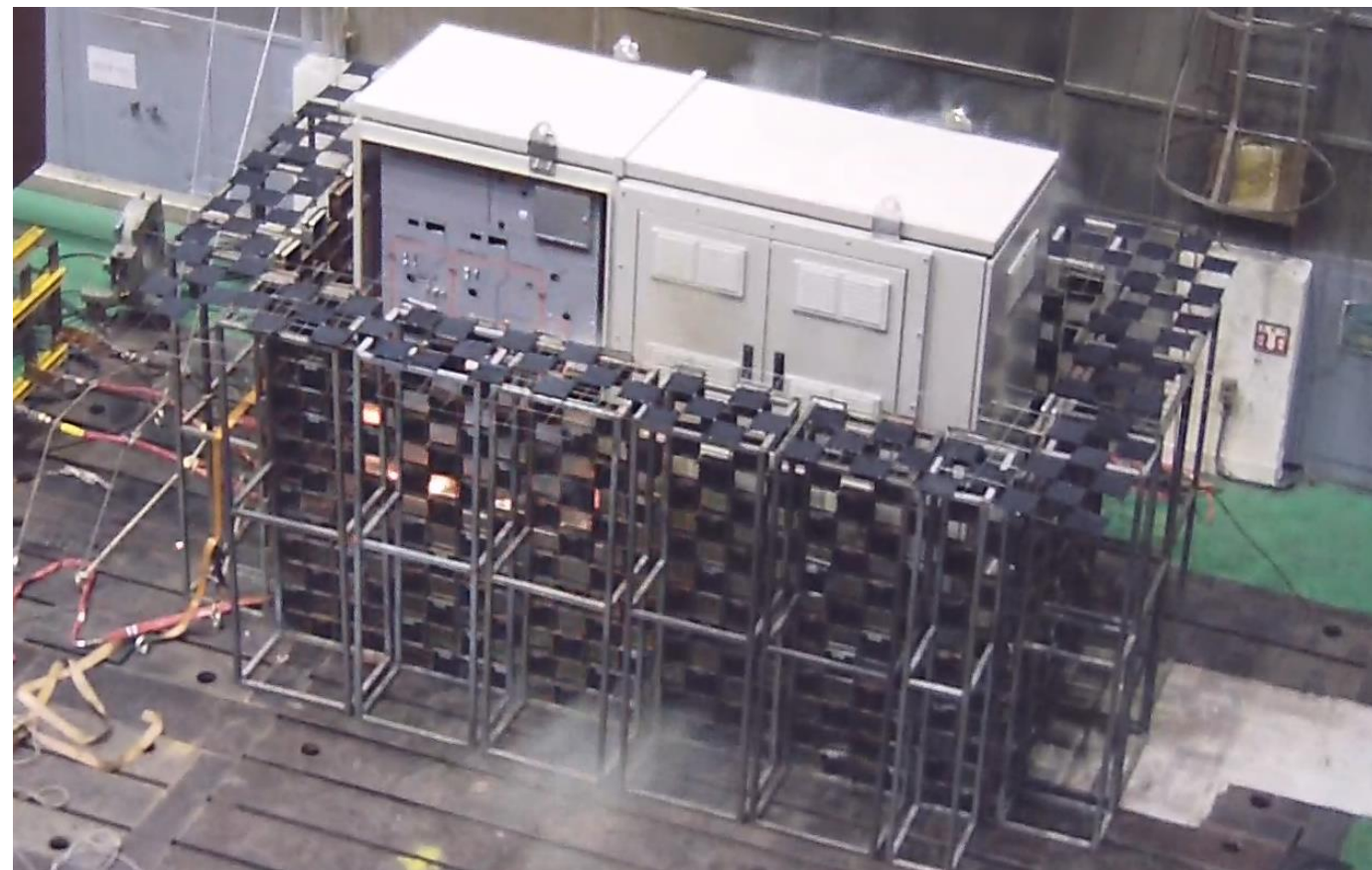
President 



111, Hanggaul-ro, Sangnok-gu, Ansan-si, Gyeonggi-do, 15588 Korea | TEL: (031) 8040-4114

Appendix :Internal arc test

Our RMU is certificated in STL (according to IEC62271-202)
With unit substation Type III enclosure



16kA,1 sec. IAC-A(Door open condition)
Arc ignited in the cable compartment (CC)



Indicators after the test
Arc ignited in RMU



Indicators after the test
Arc ignited in CC

IAC-A



Indicators after the test
Arc ignited in RMU



Indicators after the test
Arc ignited in CC

IAC-B