



**MINIBLOC-6**

**Ime quadri**



## MINIBLOC-6

**Minibloc-6** is the family of air insulated switchboards, up to **36kV** rated voltage, designed for MV secondary distribution. They were defined "metal enclosed", nowadays classified as **LSC2A-PM** according to loss of service continuity definitions.

**Minibloc-6** switchboards are also available in internal arc proof version **IAC AFLR** (front, sides, rear) in compliance with **IEC 62271-200** standard.





# MINIBLOC-6

Minibloc-6, **up to 24kV** rated voltage, offers a wide variety of functional units, which may be equipped with apparatus made by Imequadri:

- **RI6Q** SF<sub>6</sub> insulated load break switch, with or without fuses;
- **SRI6Q** disconnecting switch, combined with air or gas insulated primary brand circuit breakers, in removable version (by tools) or withdrawable version (fast);
- **SINTER** all-in-one multifunctional apparatus: made of a vacuum circuit breaker plus a gas disconnecting switch.

## STANDARDS AND CERTIFICATIONS

Minibloc-6 switchboards are tested in independent laboratories and certified according to IEC standards.



#### REFERENCE STANDARDS

CEI EN IEC 62271-200  
CEI EN IEC 62271-1, 62271-100, 62271-102, 62271-103 and 62271-105

#### ENEL HOMOLOGATIONS

DY800 with SINTER multifunctional apparatus  
DY803 with RI6Q load break switch

#### QUALITY SYSTEM

CSQ / IQNET  
ISO 9001:2015  
ISO 45001:2018

#### ENVIRONMENTAL MANAGEMENT

CSQ / IQNET  
ISO 14001:2015  
ISO 14067:2018-CFP Carbon Footprint

#### PERSONNEL SAFETY

Switchboards are designed and tested in compliance with IEC standards and are internal arc proof.

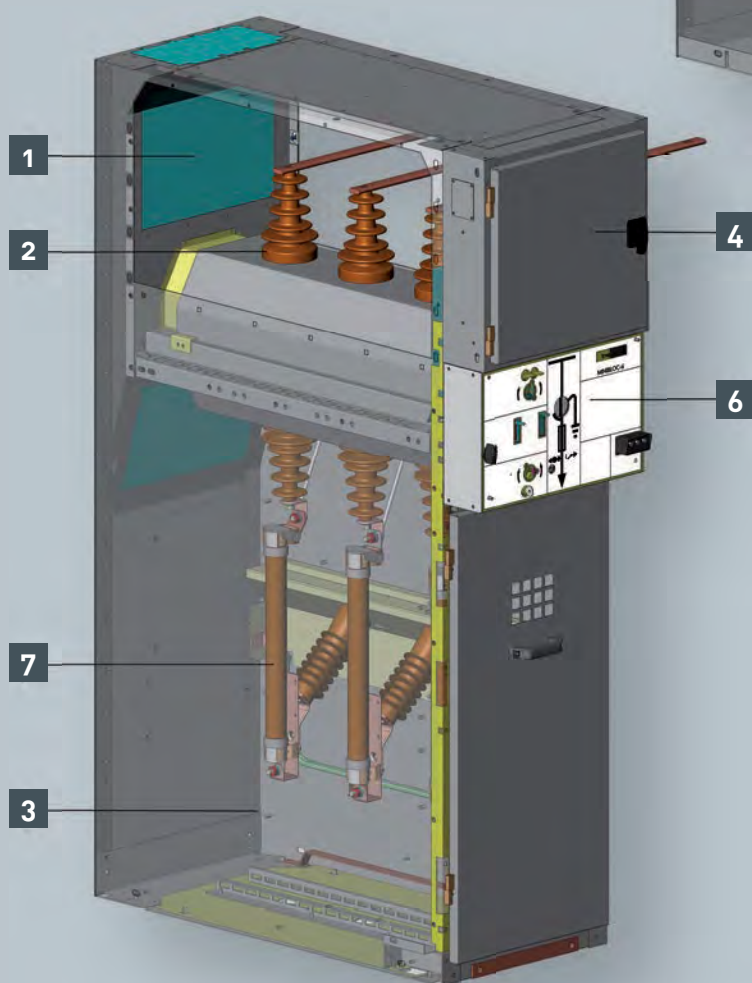
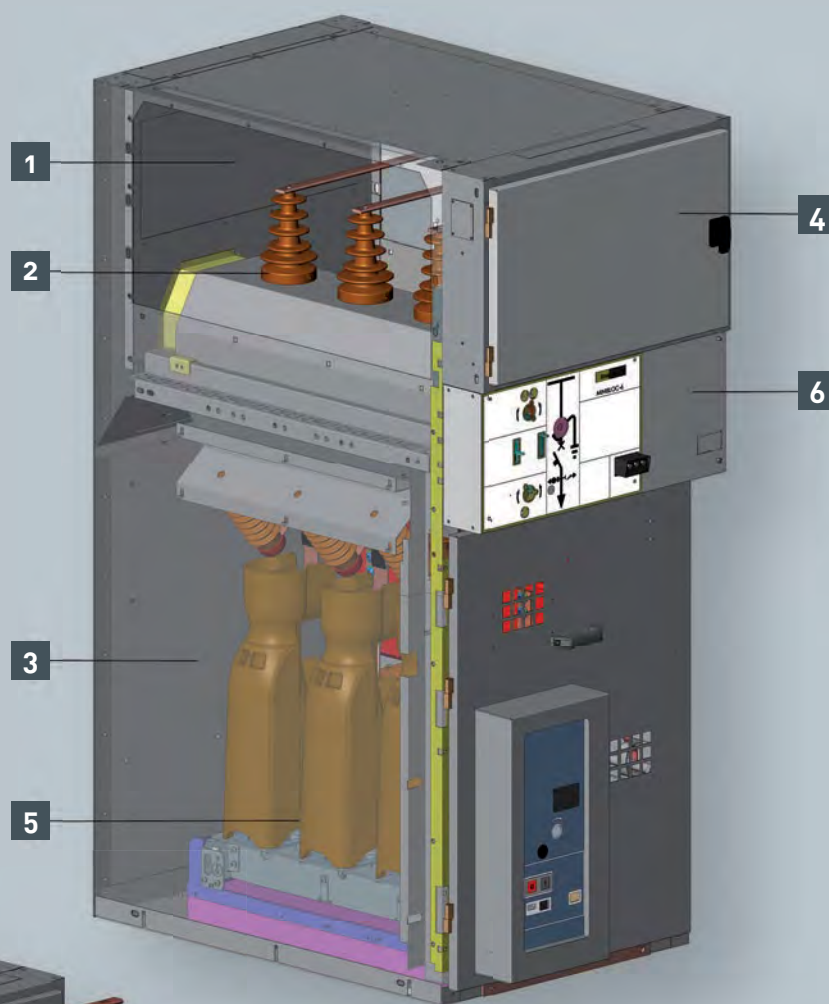
## TECHNICAL CHARACTERISTICS

Rated voltage	Ur (kV)	12 - 17,5 - 24
Test voltage (50-60 Hz/1 min)	Ud (kV)	28 - 38 - 50
Impulse withstand voltage	Up (kV)	75 - 95 - 125
Rated frequency	Fr (Hz)	50
Main bus-bars rated current	Ir (A)	630 - 800 - 1250
Load break switch rated thermal current	Ir (A)	630
Disconnectors rated thermal current	Ir (A)	630 - 1250
Rated short-time withstand current (1 sec)	Ik (kA)	16 - 20 - 25
Peak current	Ip (kA)	40 - 50 - 62,5
<b>Internal arc withstand current (IAC AFLR) version at 24kV for 1 sec</b>	<b>(kA)</b>	<b>16 - 21</b>
Enclosure protection degree*	IP	30
Internal protection degree	IP	20

\* for higher protection degree please ask Imequadri Duestelle SpA



# PRODUCT SPECIFICATIONS



### MAIN COMPONENTS

1. Omnibus bus-bars compartment
2. Disconnecting switch / load break switch
3. Cables compartment
4. LV compartment
5. MV circuit breaker
6. Operating mechanism compartment
7. Fuses

### SURFACE TREATMENT - PAINTING

Compartment enclosure is made of pre-treated galvanized steel sheet (sendzimir type) with powder painted RAL 7035 grey doors and textured paint bright effect.

### MAIN BUS-BARS

Bus-bars are made of bare electrolytic copper plate and are dimensioned to withstand the thermal and electro-dynamic stresses in case of from short circuit currents. The bus-bars go from one unit to another to make up the switchboard, without interposition of intermediate diaphragms, in order to make a continuous duct

### VOLTAGE TRANSFORMERS

Voltage transformers are resin-insulated and are used to supply measures and protections. They comply with CEI EN 61869 reference standards. Dimensions might be supplied in accordance to DIN 42600 standard.

### CURRENT TRANSFORMERS

The following applications are available:

- current sensors mounted on the circuit breaker;
- CT and VT combined sensors in compliance with IEC 60044-7 and 60044-8 standards;
- resin insulated CT mounted in the switchboard;
- phase ring transformers, also in compliance with CEI 0-16 standard;
- earth fault ring transformer, also in compliance with CEI 0-16 e CEI EN 61869.

### THERMOGRAPHIC INSPECTION WINDOWS

Upon request, Minibloc-6 may be equipped with thermographic inspection windows, either in cables or in bus-bars compartment.

### SERVICE CONTINUITY

Service continuity classification: LSC2A

Segregation classification: PM (metallic partition)

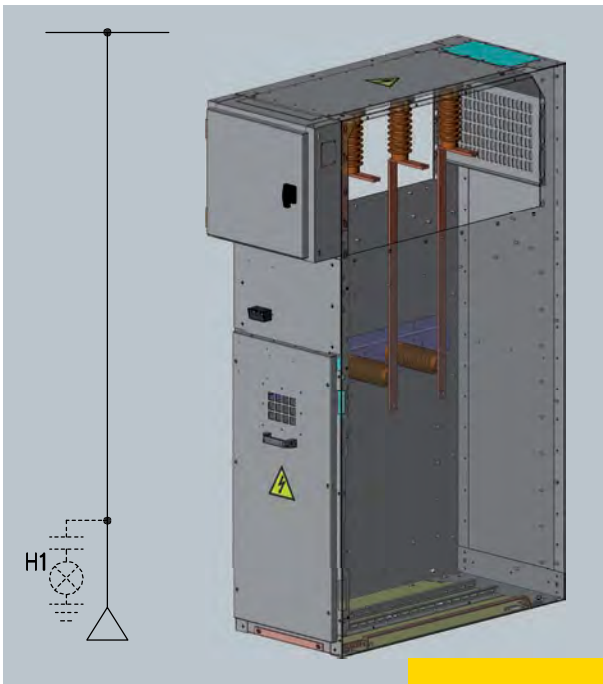
### PROTECTION RELAYS

The LV compartment may be equipped with the latest protection, control and monitoring devices, whether or not in compliance with CEI 0-16 standard.

### COMPLIANCE WITH CEI 0-16 STANDARD

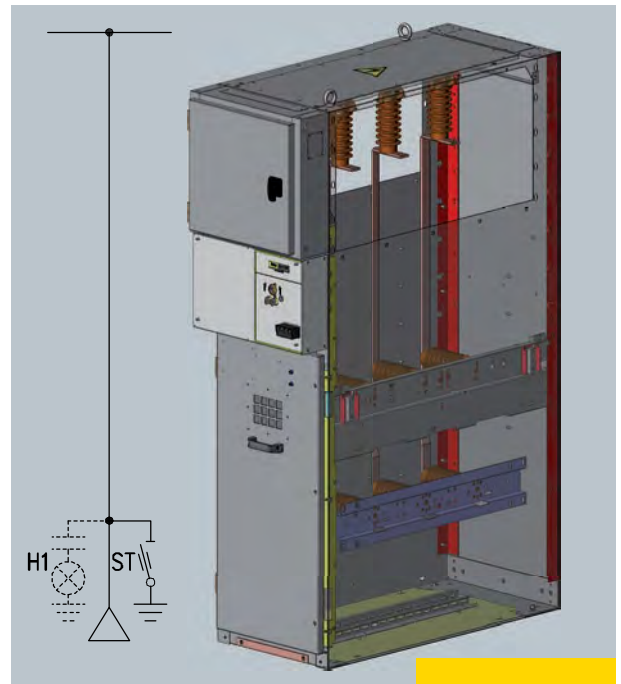
Minibloc-6 may be equipped with devices and components in compliance with CEI 0-16 standard, to connect to the Italian national CRI9.

# TYPICAL UNITS



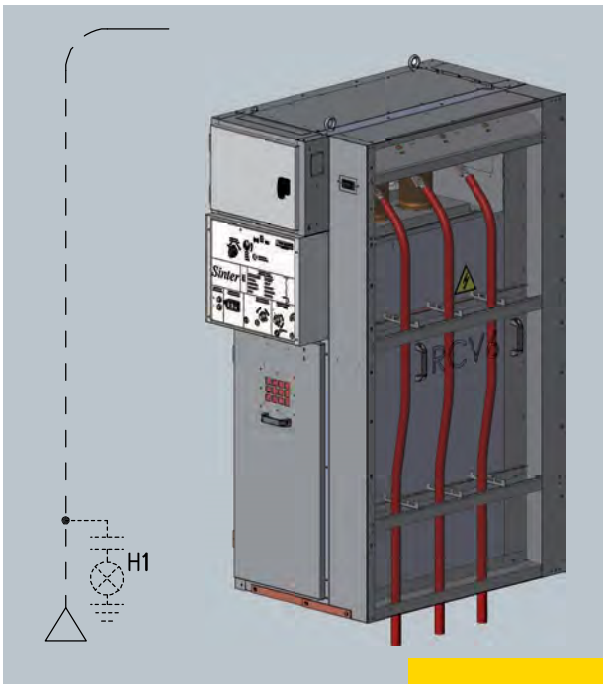
## CA6

Incoming or outgoing feeder unit (without operating mechanisms).  
In option, CTs and VTs.



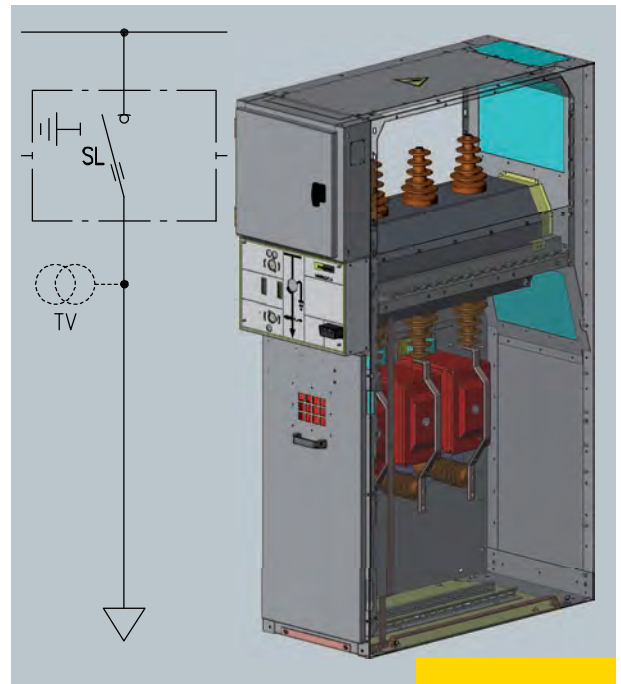
## CAT6

Incoming or outgoing feeder unit with cables earthing and STA6 earthing switch.  
In option, CTs or VTs.



## RCV6

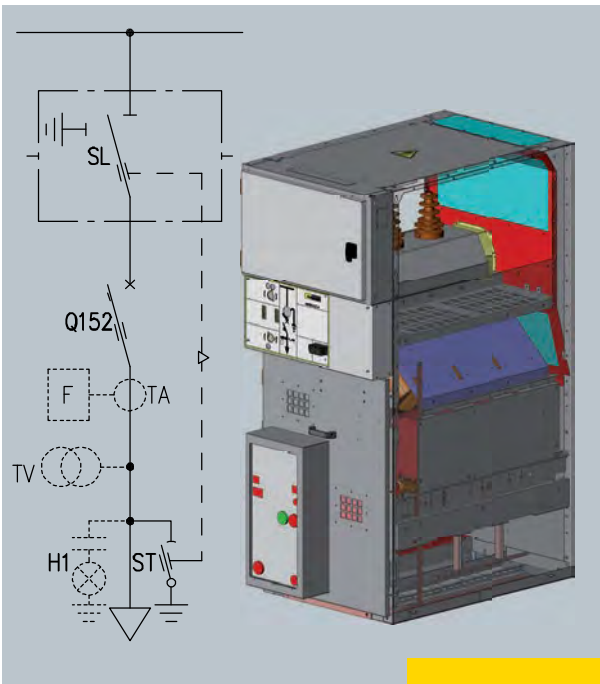
Incoming or outgoing feeder unit by cables from the bottom.



## SC6

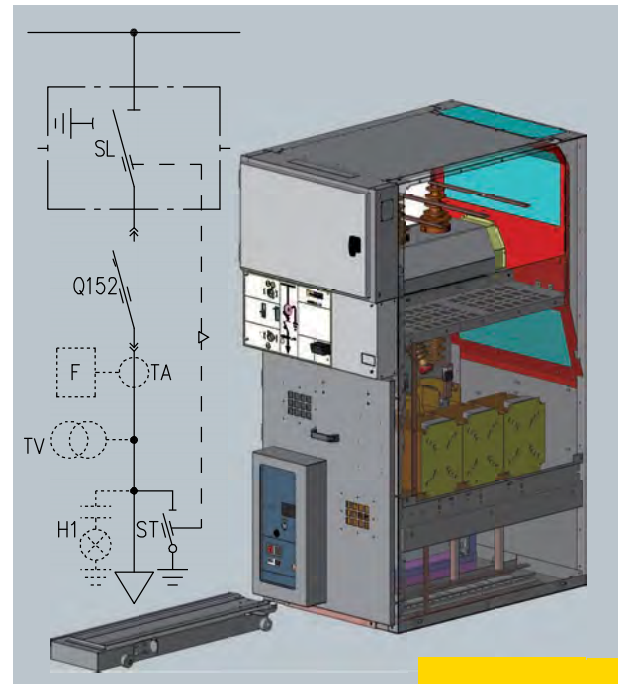
Incoming or outgoing feeder unit with RI6Q load break switch.  
In option, CTs or VTs.





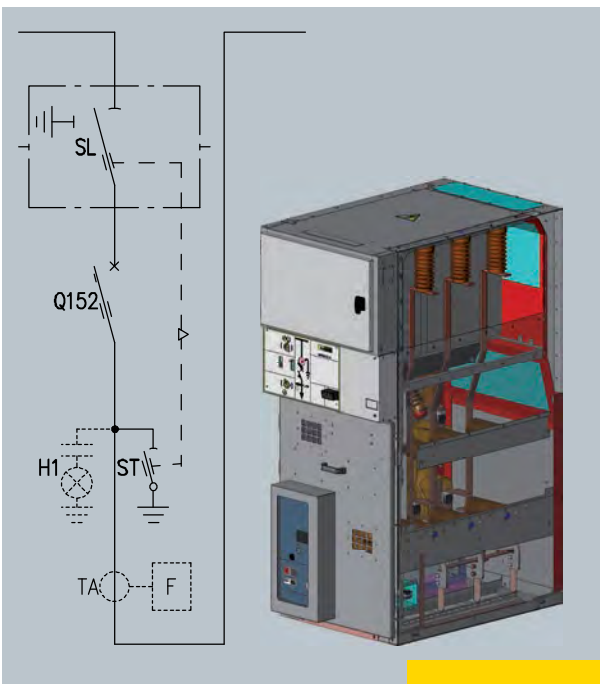
**ISF6**

Incoming or outgoing feeder unit with SRI6Q line disconnector, SF<sub>6</sub> or vacuum circuit breaker and ST6 cables side earthing switch. In option, CTs and VTs. Circuit breaker may be removed by tools.



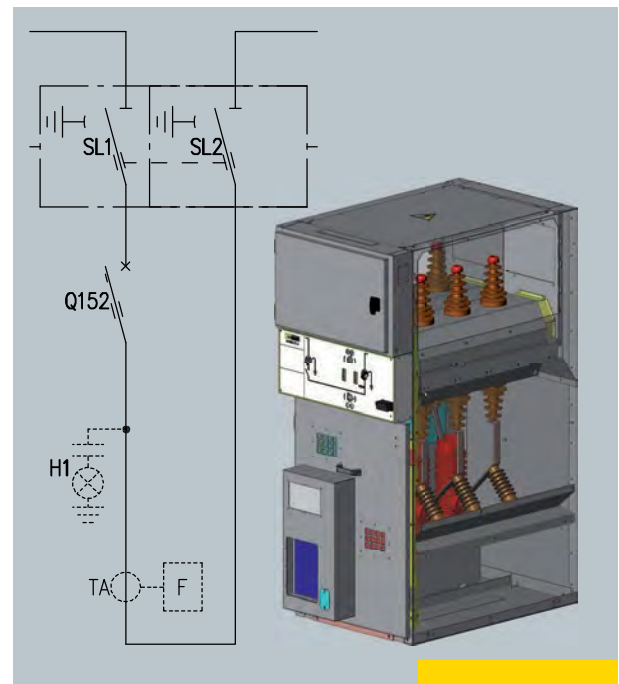
**ISF6E**

Incoming or outgoing feeder unit with SRI6Q line disconnector, withdrawable SF<sub>6</sub> or vacuum circuit breaker and ST6 cables side earthing switch. In option, CTs or VTs.



**ISFR6**

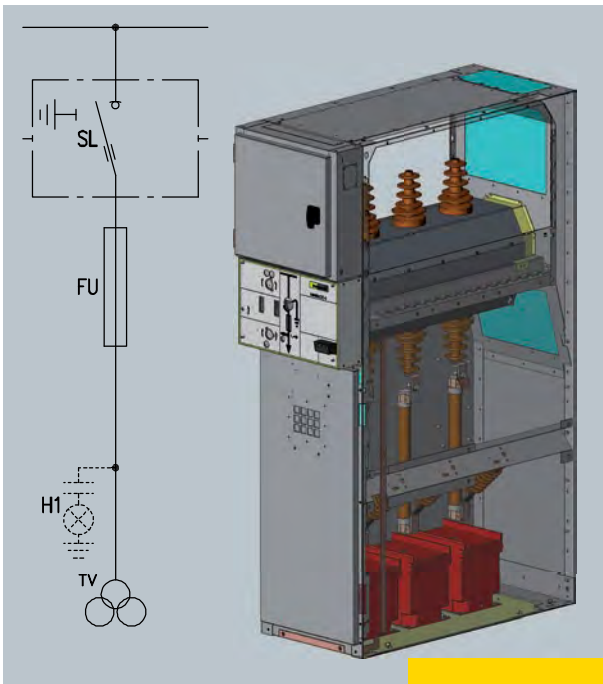
Bus feeder with right-side bus-bars uprising SF<sub>6</sub> or vacuum circuit breaker and ST6 line disconnector. In option, CTs or VTs. Withdrawable switch version available upon request.



**ISFRD6**

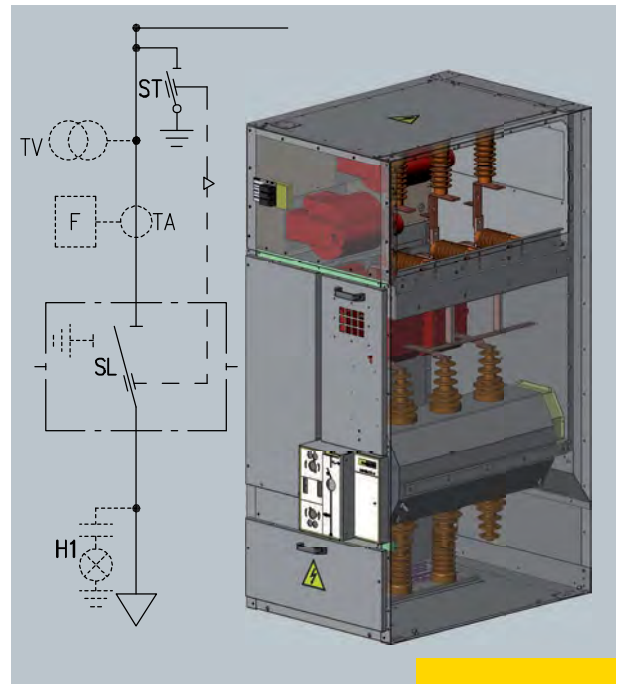
Double SRI6Q line disconnector unit, with SF<sub>6</sub> or vacuum circuit breaker and right-side bus-bars uprising. In option, CTs and VTs.

# TYPICAL UNITS



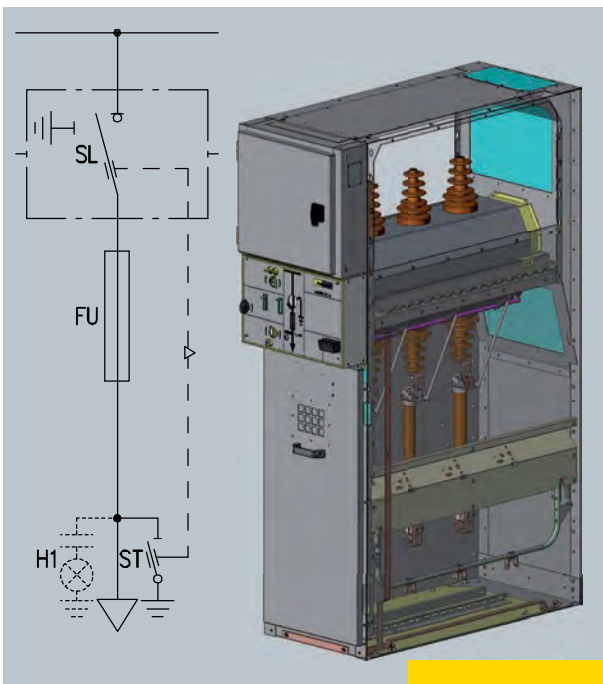
## MS6

Voltage measure unit with RI6Qms load break switch and fuses. 750mm-width version is available upon request in order to fit 5 VTs.



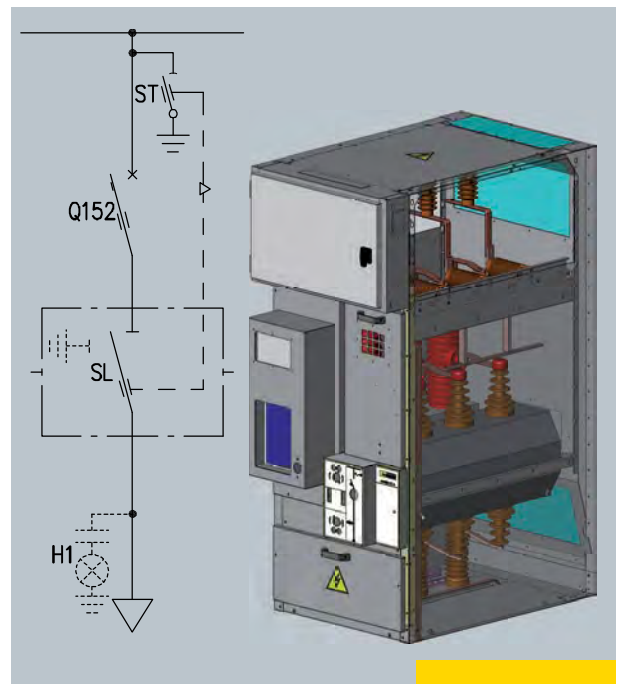
## SMA6

Incoming feeder unit from the bottom with SRI6Q line disconnector, CTs and VTs set-up and main bus-bars earthing. \* It is necessary to use cables terminations for reduced space with max height = 350mm.



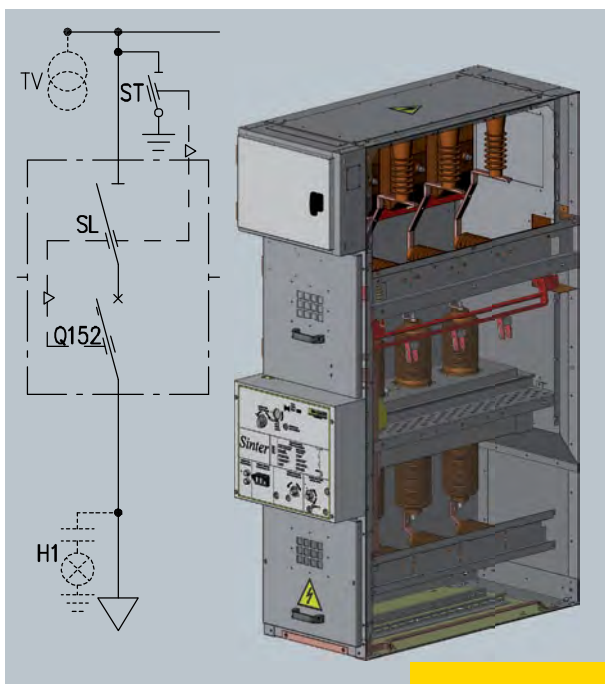
## SFSG6

Transformer protection unit with RI6Qsv load break switch, fuses and ST-SVR6 cables earthing switch.  
\* It is necessary to use cables terminations for reduced space with max height = 350mm.



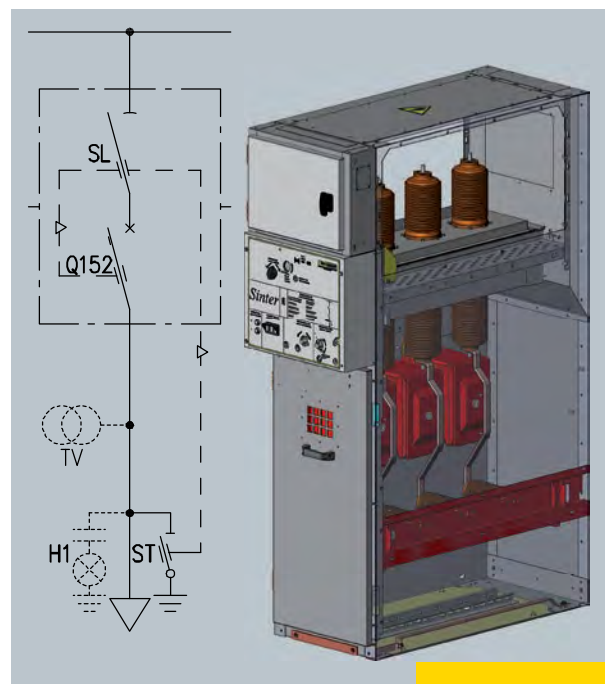
## SIF6-750

"Reverse" incoming feeder unit from the bottom with SF<sub>6</sub> circuit breaker and main bus-bars earthing.  
\* It is necessary to use cables terminations for reduced space with max height = 350mm.



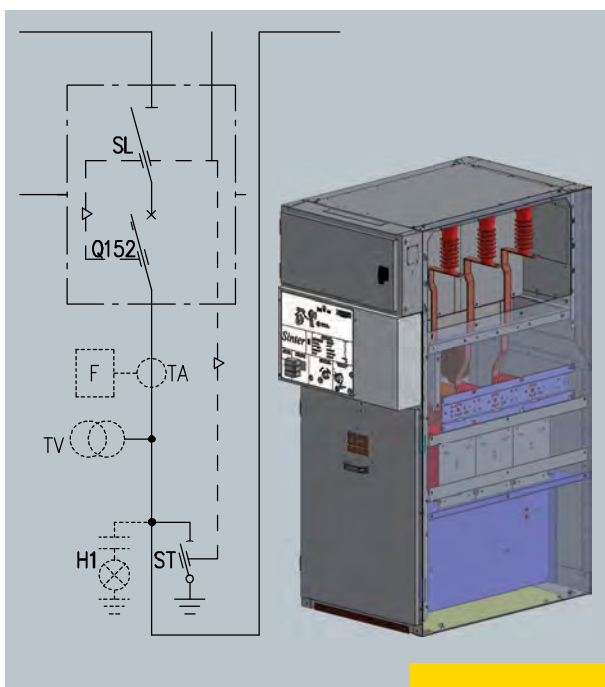
**SIF6**

Incoming feeder unit from the bottom with SINTER SF<sub>6</sub> insulated multifunctional apparatus and STR/1 main bus-bars side earthing switch. In option, CTs or VTs.  
 \* It is necessary to use cables terminations for reduced space with max height = 350mm.



**SINT6**

Incoming or outgoing feeder unit with SINTER SF<sub>6</sub> insulated multifunctional apparatus and STR/1 main bus-bars side earthing switch. In option, CTs or VTs.



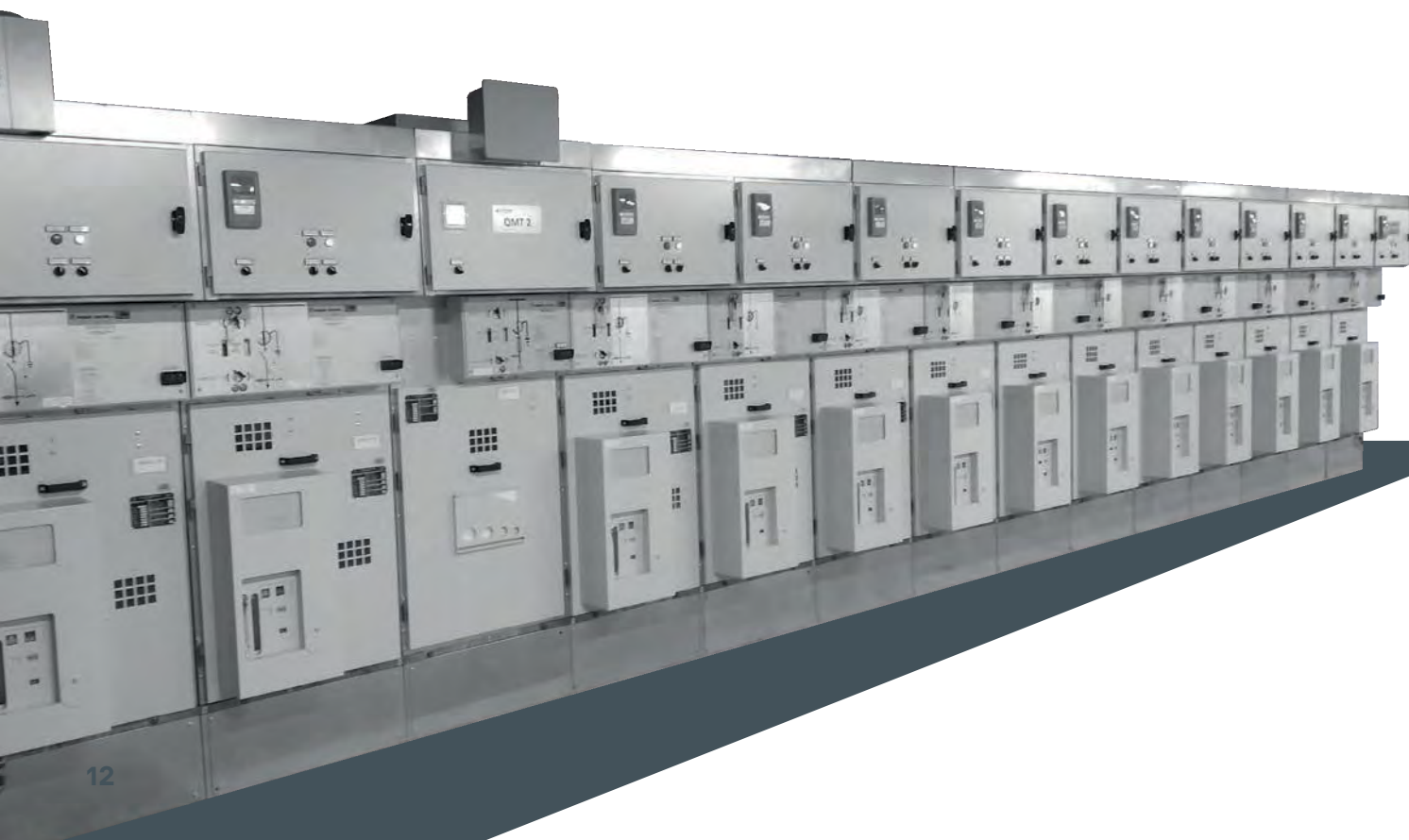
**SINTR6**

Incoming feeder unit with SINTER SF<sub>6</sub> insulated multifunctional apparatus, STR/1 main bus-bars side earthing switch and bus-bars uprising. In option, CTs and VTs.



# DIMENSIONS AND WEIGHTS

Cubicle	Cable termination	W mm	H mm	D mm	Weight kg
CA6	Standard	500/375	1.850	1.050	100/80
CAT6	Standard	500	1.850	1.050	120
RCV6	Standard	200/300	1.850	1.050	50
SC6	Standard	500	1.850	1.050	155
ISF6	Standard	750	1.850	1.050	470
ISF6E	Standard	750	1.850	1.050	500
ISFR6	Not applicable	750	1.850	1.050	480
ISFRD6	Not applicable	750	1.850	1.050	530
MS6	Not applicable	500	1.850	1.050	270
SMA6	Standard	500	1.850	1.050	520
SFSG6	Short – max height 350mm	500	1.850	1.050	170
SIF6-750	Short – max height 350mm	750	1.850	1.050	470
SIF6	Short – max height 350mm	500	1.850	1.050	265
SINT6	Standard	500	1.850	1.050	265
SINTR6	Not applicable	750	1.850	1.050	300





# INSTALLATION RULES

## FIXING SYSTEM

Minibloc-6 switchboards may be fixed to the floor using screw anchors or cement-made section bars.

## POSITIONING

Minibloc-6 switchboards are designed for incoming power and auxiliary cables from the bottom or, on request, from the top. The floor surface must be perfectly levelled and prepared in accordance to Imequadri Duestelle drawings relating to the foundations. Upon request, a 300mm lifting base may be supplied.

## ROOM

The switchboards must be installed in rooms guaranteeing environmental and working conditions in compliance with CEI EN IEC 62271-200 (ex CEI 17/6 – IEC 298) standard.

## WORKING CONDITIONS

- Temperature from – 5 ° C to + 40°
- Max average humidity 95%
- Max height a.s.l. 1000 m.

The switchboards are designed to be installed indoor, at standard environmental conditions, in not corrosive and not contaminant atmosphere. Special conditions of installation are to be verified with Imequadri Duestelle SpA.

## TYPES OF INSTALLATIONS

Minibloc-6 switchboards are available in the following versions and types of installations:

Rated current and internal arc duration	Accessible sides	Against the wall	Top exhaust channel	Out-of-cabin channel
16 kAxI <sup>†</sup>	AFL** / AFLR	✓	✓	*
21 kAxI <sup>†</sup>	AFL** / AFLR	✓	✓	*

\* version available upon request

### • Top exhaust channel

This solution allows installation of the switchboard against the wall (A) or free standing (B), since each compartment is provided with a flap guaranteeing protection from internal arc on four sides; gases are canalised upwards and each panel has its own outlet.

**\*\* access to the rear is forbidden when the switchboard is working**

### • Out-of-cabin channel

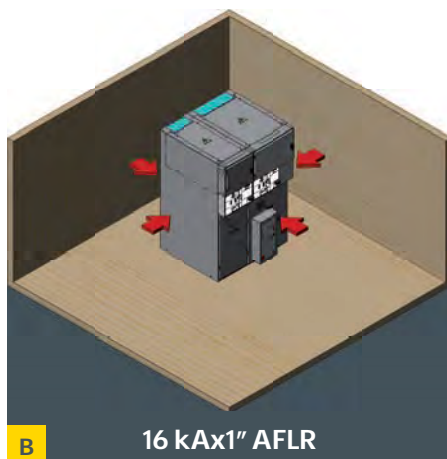
Version with outwards release of exhaust gases through a specific channel is available upon request, prior feasibility study.



## SAFETY CLEARANCE



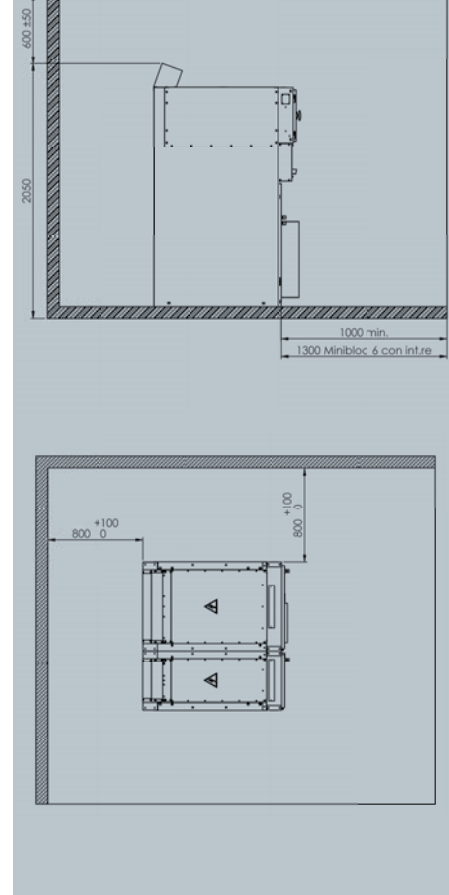
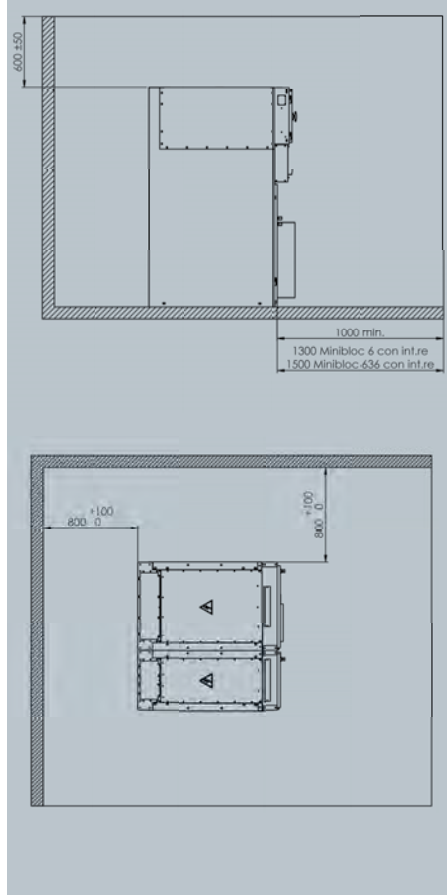
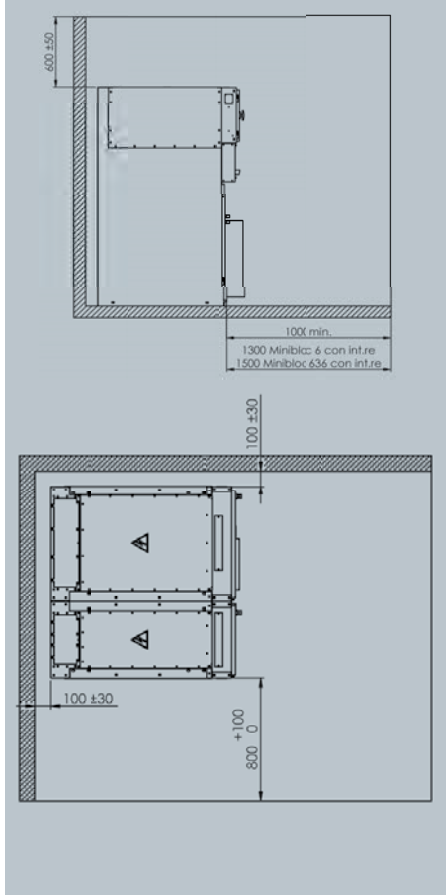
**A** 16 kAx1" AFL



**B** 16 kAx1" AFLR



**B** 21 kAx1" AFL





SEZ AR DI TERRA  
EARTHING SWITCH

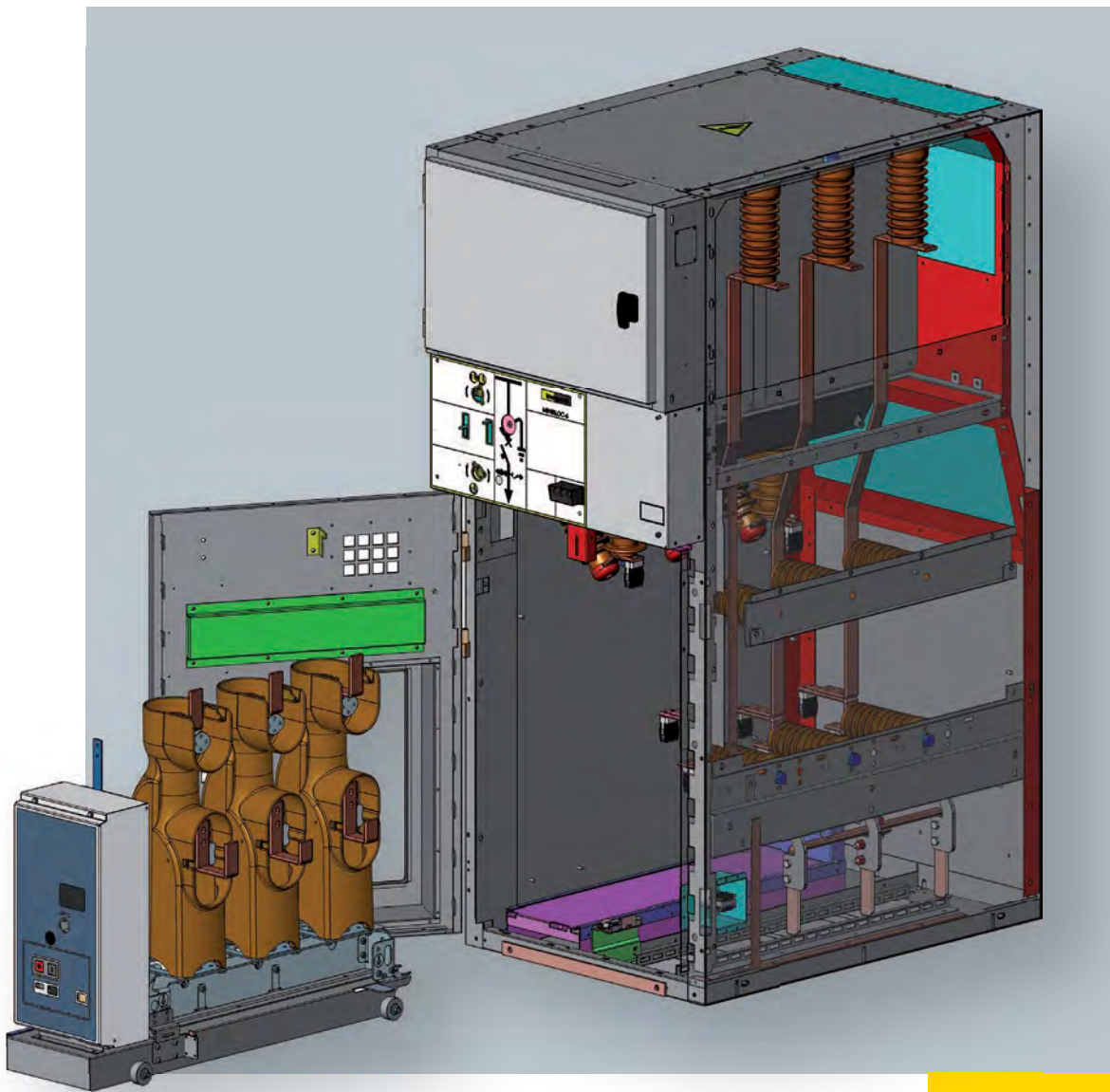
INFERBLOCCO  
LINEA  
LINE INTERLOCK

SEZIONATORE ROTATIVO  
ROTARY SWITCH

MNIBLOC-6



## MV WITHDRAWABLE CIRCUIT BREAKER



ISF6E cubicle, available with a rated current of up to 1250A, is designed to fit a withdrawable circuit breaker, thanks to a set of sliding contacts and a “plug and play” system to quickly disconnect auxiliary connections. The circuit breaker is first unblocked through an operating lever and then easily withdrawn through the trolley.

### BENEFITS

- maximum service continuity (according to LSC2A standard)
- fast replacement in **less of 100 seconds** in case of fault or failure
- easy access to cables compartment
- plug to quickly connect and disconnect the auxiliary circuit



**invequadrati duestelle spa**  
www.invequadrati.it

INTERRUTTORE  
CIRCUIT BREAKER



CARICA  
MOLLE  
SPRING  
CHARGE



INTERRUTTORE  
CIRCUIT BREAKER

*Sinter*



SEQUENZA  
OPERATION

ACCESSO ALLO SCOMPARTIMENTO  
ACCESS TO COMPARTMENT

- APRIRE L'INTERRUTTORE  
- OPEN THE CIRCUIT BREAKER
- APRIRE IL SEZIONATORE DI LINEA  
- OPEN THE SWITCH DISCONNECTOR
- CHUDERE IL SEZIONATORE DI TERRA  
- CLOSE THE EARTHING SWITCH
- APRIRE LA PORTA  
- OPEN THE DOOR

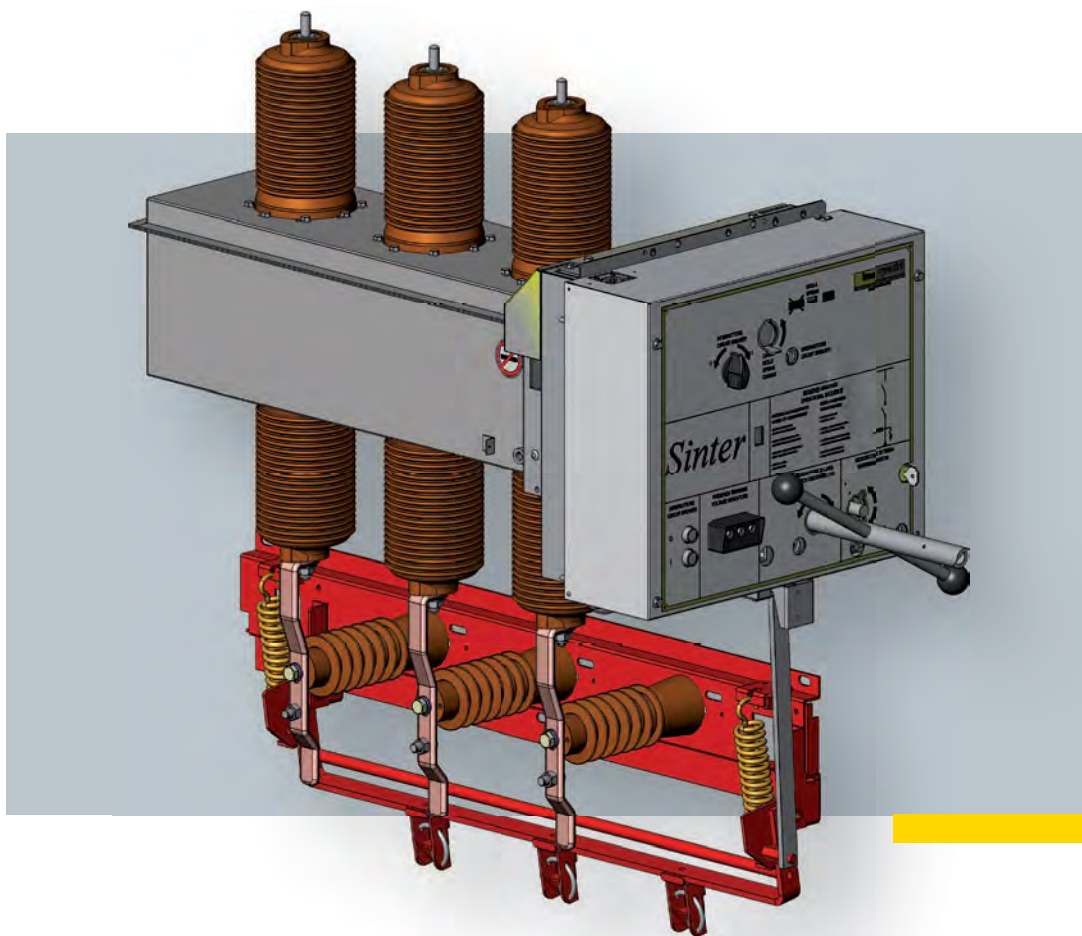
PRESENZA TENSIONE  
VOLTAGE PRESENCE



SEZIONATORE  
SWITCH DISCON

## SINTER

Minibloc-6 switchgears may be equipped with SINTER multifunctional apparatus, combining a vacuum circuit breaker and a SF<sub>6</sub> line disconnector in only one device. The switchboard is **a third smaller** than a traditional cubicle, in which the circuit breaker and the line disconnector are separated, although functionally equivalent.



### MAIN FEATURES

- short travel, low weight and low speed of the contacts require limited energy (compared to other breaking technologies), assuring limited wear in the system as well as very little maintenance;
- stored energy operating mechanism whose speed does not depend on the operator;
- a wide range of accessories to satisfy any customer's expectations;
- a single, stainless steel structure filled with SF<sub>6</sub> (300g), sealed for life, to ensure sturdiness and reliability through time.

#### REFERENCE STANDARDS

CEI EN IEC 62271-1, 62271-100, 62271-102

CEI EN IEC 60529

CEI EN 60447

#### ENEL HOMOLOGATIONS

DY800 with Minibloc-6 MV switchboard

## TECHNICAL CHARACTERISTICS

Insulation voltage	(kV)	24
Insulation level and withstand voltage to earth and between phases:		
- impulse	(kV)	125
- industrial frequency	(kV)	50
Insulation level and withstand voltage between open contacts:		
- impulse	(kV)	145
- industrial frequency	(kV)	60
Rated frequency	(Hz)	50
Rated current	(A)	630
Short-timer current *	(kA)	12,5 – 16
Corresponding peak current	(kA)	31,5 – 40
Short circuit rated duration		1 sec
Electric duration class IEC 62271-100		E2
Rated short circuit breaking power *	(kA)	12,5 – 16
Operating sequence		O – 0,3 sec – CO – 30 sec - CO
Mechanical class IEC 62271-100		M2

\* for higher current values please ask Imequadri Duestelle SpA



## COMPONENTS

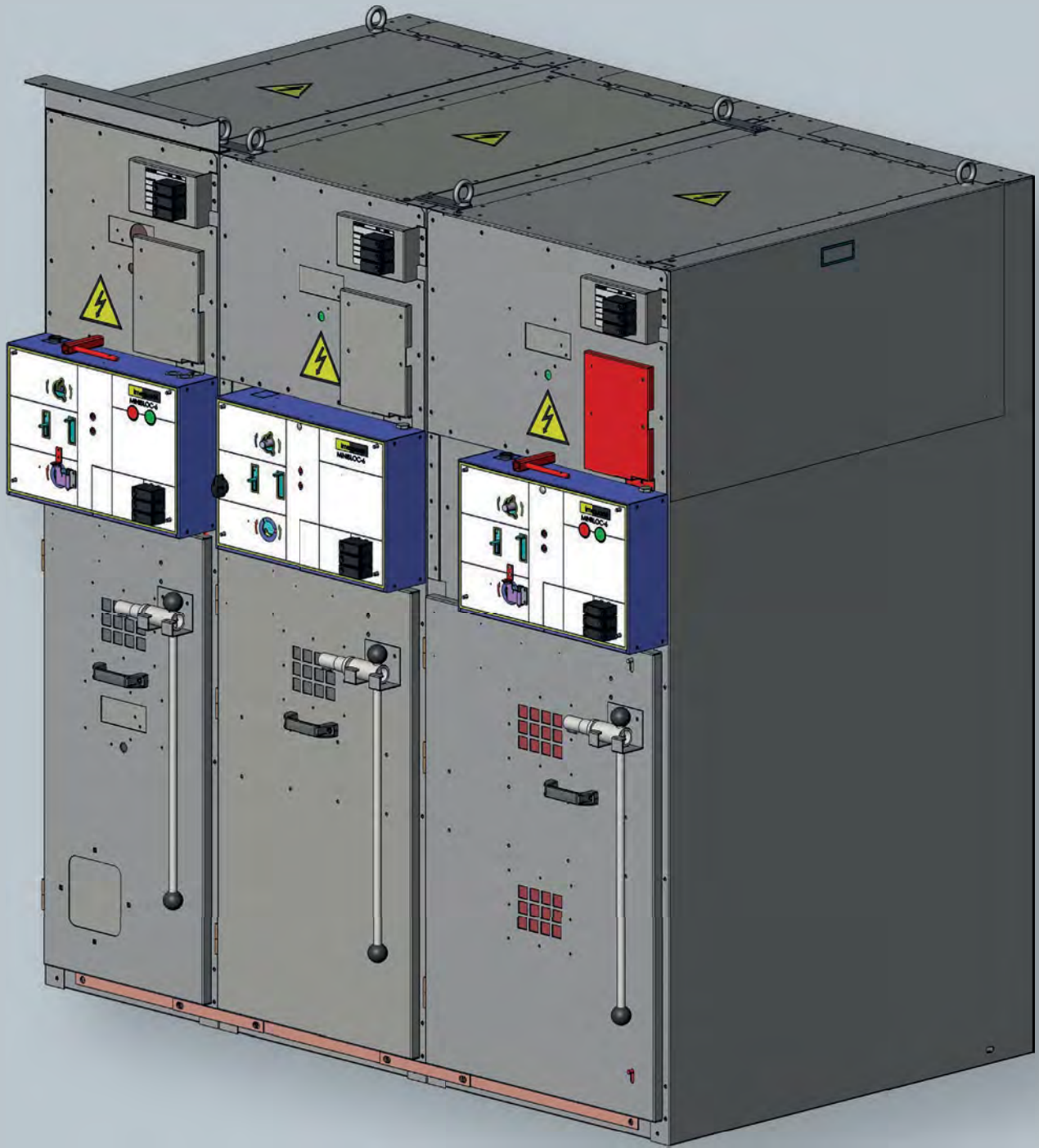


### VACUUM BOTTLE

1. Mobile contact terminal
2. Ceramic insulator
3. Fixed contact terminal

### BENEFITS

- \* Vacuum breaking technology
- \* Vacuum contacts protected against oxidation and contamination
- \* Vacuum bottles held inside resin insulators
- \* Bottles protected against crashes, dust and humidity
- \* Working in several environmental conditions
- \* Scarce working energy
- \* Stored energy operating mechanism with standard anti-pumping device
- \* Easily customisable through a complete range of accessories
- \* Lifetime sealed structured
- \* Reduced dimensions
- \* Stoutness and reliability
- \* Limited maintenance
- \* Wrong and dangerous operations prevented by proper blocks
- \* High environmental sustainability



# MINIBLOC-6 DY803 ENEL HOMOLOGATED VERSION

Cubicle	Description	Cable termination	W mm	H mm	D mm	Weight kg
Minibloc-6 LE 16	Incoming or outgoing motorised feeder unit	Standard	500	1.850	1.050	155
Minibloc-6 T 16	Transformer protection unit	Standard	600	1.850	1.050	170
Minibloc-6 UTM 16	Motorised measure unit	Standard	700	1.850	1.050	190
Minibloc-6 RC 16	Cable rising unit	Standard	350	1.850	1.050	90
Minibloc-6 TMA 10/15/20	Self-protected VT unit	Not applicable	350	1.850	1.050	200
Minibloc-6 400 IM 16	Incoming or outgoing motorised feeder unit	Standard	700	1.950	1.150	180
Minibloc-6 400 TM 16	Transformer protection unit	Standard	700	1.950	1.150	210
Minibloc-6 400 UM 16	Motorised measure unit	Standard	700	1.950	1.150	210
Minibloc-6 400 RC 16	Cable rising unit	Standard	700	1.950	1.150	110
Minibloc-6 400 TMA 10/15/20	Self-protected VT unit	Not applicable	700	1.950	1.150	230







## MINIBLOC-636

Minibloc-636, 10 kV rated voltage, may be equipped with apparatus made by Imequadri, such as RI6Q36 SF<sub>6</sub> insulated load break switch, combined with either SF<sub>6</sub> or vacuum primary brand circuit breakers.

## TECHNICAL CHARACTERISTICS

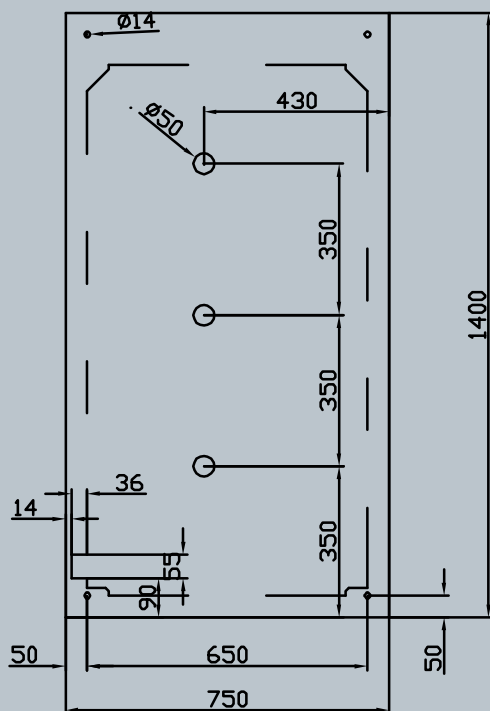
Rated voltage	Ur (kV)	36
Test voltage (50-60 Hz/1 min)	Ud (kV)	70
Impulse withstand voltage	Up (kV)	170
Rated frequency	Fr (Hz)	50
Main bus-bars rated current:	Ir (A)	
- standard	Ir (A)	630
- on request	Ir (A)	1250
Load break switch rated thermal current	Ir (A)	630
Disconnecter rated thermal current	Ir (A)	630 – 1250
Rated short-term withstand current (1 sec)	Ik (kA)	16
Peak current	Ip (kA)	40
Internal arc withstand current IAC AFLR version at 36kV for 1 sec	(kA)	16
Outside enclosure protection degree	IP	3x
Inside protection degree	IP	2x

## DIMENSIONS AND WEIGHTS

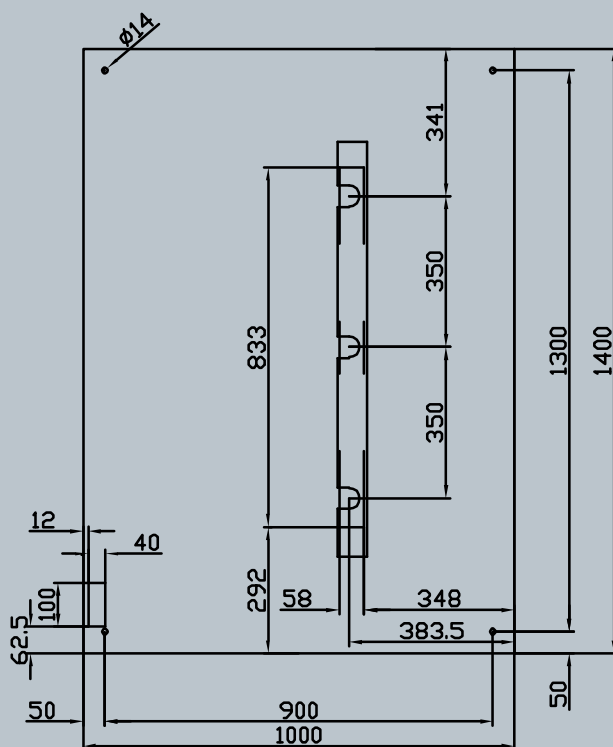
Cubicle	Description	W mm	H mm	D mm	Weight kg
CA636	Incoming or outgoing feeder unit	750	2.250	1.400	150
CAT636	Incoming or outgoing feeder unit with line disconnector and earthing switch	750	2.250	1.400	175
RCV636	Incoming feeder unit by cables from the bottom	500	2.250	1.400	150
SC636	Incoming or outgoing feeder unit with RI6Q LBS	750	2.250	1.400	220
ISF636	Incoming or outgoing feeder unit with SRI6Q disconnecting switch, SF6 or vacuum circuit breaker and ST6 cables side earthing switch	1000	2.250	1.400	610
ISFRD636	Double SRI6Q line disconnector unit, with SF6 or vacuum circuit breaker and right- or left side bus-bars uprising	1500	2.250	1.400	1.250
MS636	Voltage measure unit with RI6Qms LBS and fuses	1000	2.250	1.400	600
SFSG636	Transformer protection unit with RI6Qsv LBS, fuses and ST-SVR6 earthing switch	750	2.250	1.400	230

# FOUNDATIONS

SCOMPARTI L750



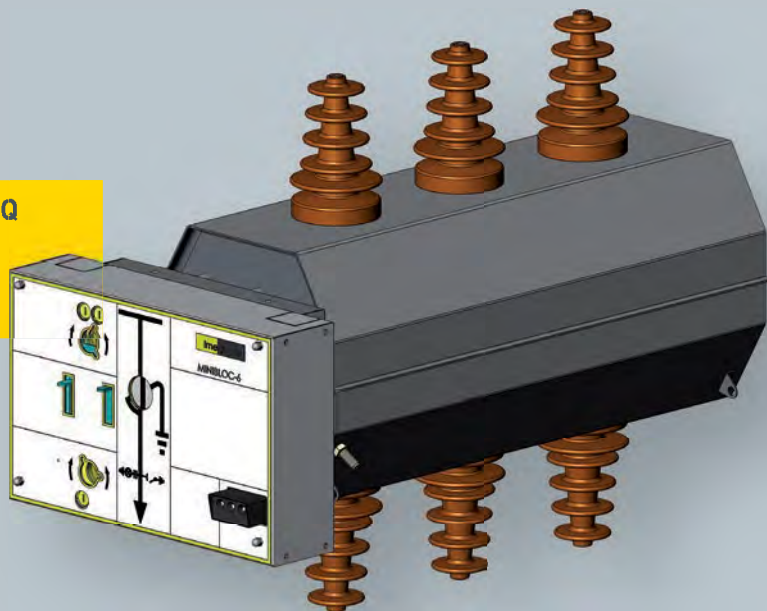
SCOMPARTI ISF636  
CON INTERRUTTORE HD4



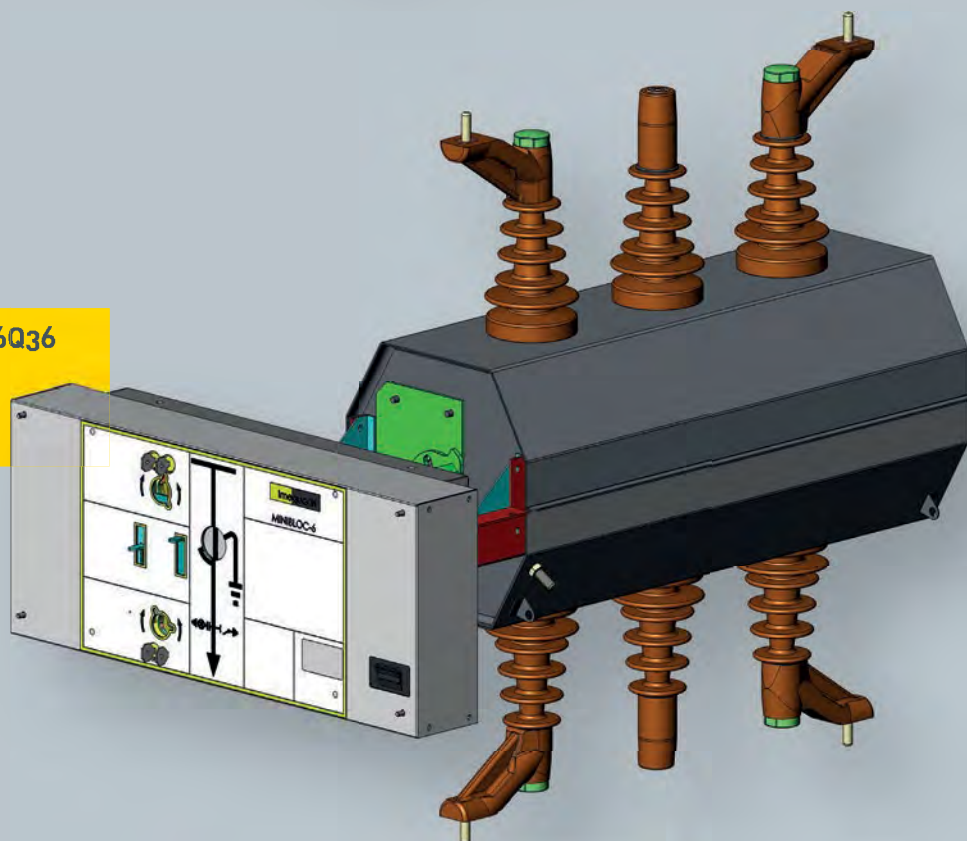


# APPARATUS

RI6Q



RI6Q36



## SF<sub>6</sub> INSULATED LOAD BREAK SWITCHES - RI6Q AND RI6Q36

### MANUFACTURING TECHNOLOGY

The insulating and breaking agent used for RI6Q and RI6Q36 load break switches is **Sulphur Hexafluoride** (SF<sub>6</sub>), a non-toxic, non-flammable inert gas, widely known for both its highly dielectric characteristics and thermal conduction properties which allow a quick arc extinguishment.

### CHARACTERISTICS

The load break switch is designed with a double switching rotating moving contact, guaranteeing reliability of the dielectric withstand when the load break switch is in open position. The active parts are inside a sturdy stainless steel structure, lifetime sealed and guaranteed according to IEC 60694 and IEC 62271-103 standards, and for which refill is not needed. An over-pressure valve is placed in the lower part of the enclosure, to guarantee the gas exit in case of accidental pressure increase over 2.5 bars, resulting in a further process of securing the switch.

### TECHNICAL SPECIFICATIONS

The internal capacity of the container is of 70 litres, with a relative working pressure of 0.35 bar – or 135 Kpa as an absolute value for the RI6Q (24kV), and of 0.50 bar – or 150 Kpa as an absolute value for the RI6Q36 (36kV) at an environmental temperature of 20 °C. Six inside/outside bushings are mounted on the metallic enclosure, filled with 500g of SF<sub>6</sub> gas, allowing MV conductors connection. Bushings are made of epoxy resin and with coolingfoil (creepage > 350mm), in order to guarantee no partial discharges.

The load break switch may take three different positions:

- a) closed switch
- b) open switch
- c) earthing switch (with closing power)

### OPERATING WITH FUSES

**RI6Qsv and RI6Q36sv** load break switches may be combined with three MV fuses for transformer protection, in compliance with IEC CEI EN 62271-105 standard. In order to choose the proper fuse rated current, in compliance with CEI EN 60282-1 standard, it is necessary to check data shown in the underlying table, which considers any circuits requirements (transformer off load connection current, transformer wind up faults, short circuit current on secondary terminals).

## MINIBLOC-6

Rated voltage kV	Operating voltage kV	Transformer power (kVA)																	
		25	50	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	
7,2	3,3	16	25	40	50	50	80	80	100	125	125	160*	200*						
	5	10	16	31,5	40	40	50	63	80	80	125	125	160*						
	5,5	10	16	31,5	31,5	40	50	50	63	80	100	125	125	160*	160*				
	6	10	16	25	31,5	40	50	50	63	80	80	125	125	160*	160*				
	6,6	10	16	25	31,5	40	50	50	63	80	80	100	125	125	160*				
12	10	6,3	10	16	20	25	31,5	40	50	50	63	80	80	100	100	125*	200*		
	11	6,3	10	16	20	25	25	31,5	40	50	50	63	80	100	100	125*	160*		
17,5	13,8	6,3	10	16	16	20	25	31,5	31,5	40	50	50	63	80	80	100*	125*	125*	
	15	6,3	10	10	16	16	20	25	31,5	40	50	50	63	80	80	100*	125*	125*	
24	20	6,3	6,3	10	10	16	16	25	25	31,5	40	40	50	50	63	80	100*	125*	
	22	6,3	6,3	10	10	10	16	20	25	25	31,5	40	40	50	50	80	80	100*	

\* ask Imequadri Duestelle SpA

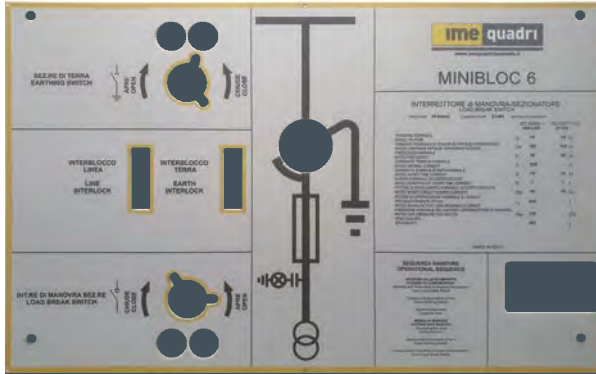
## MINIBLOC-636

Rated voltage kV	Operating voltage kV	Transformer power (kVA)																	
		25	50	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	
36	30					10		10	16	20	25	31,5	31,5	50	50	63	63		
	31,5					10		10	16	20	25	25	31,5	50	50	63	63		
	33					6,3		10	16	20	25	25	31,5	40	50	50	63		
	34,5					6,3		10	16	20	25	25	31,5	40	50	50	63		

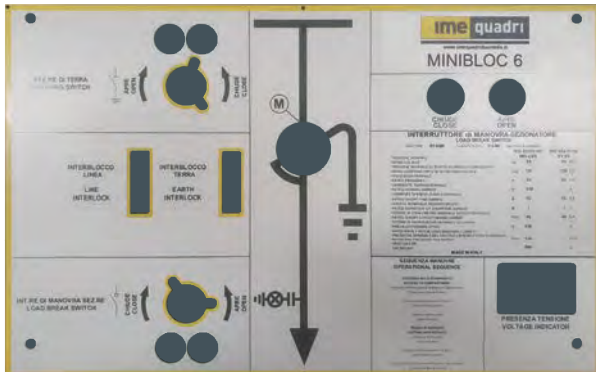
## SF<sub>6</sub> DISCONNECTING SWITCHES

**SRI6Q** with rated current of 400-630-1250A

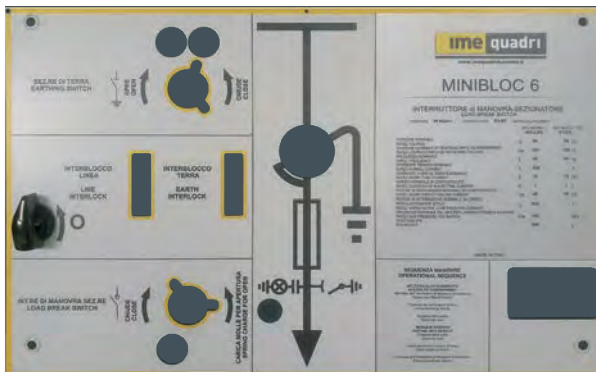
**SRI6Q36** with rated current of 400-630A



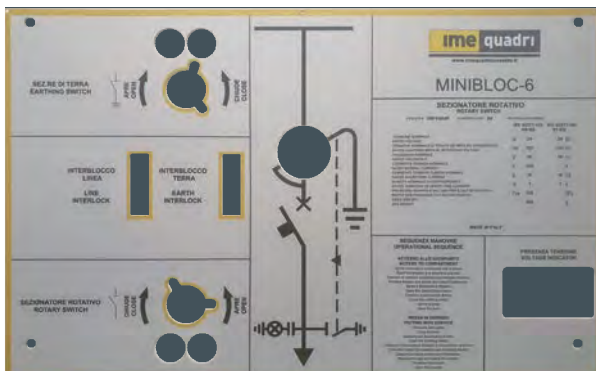
**R16Qms operating mechanism - MS6 unit**



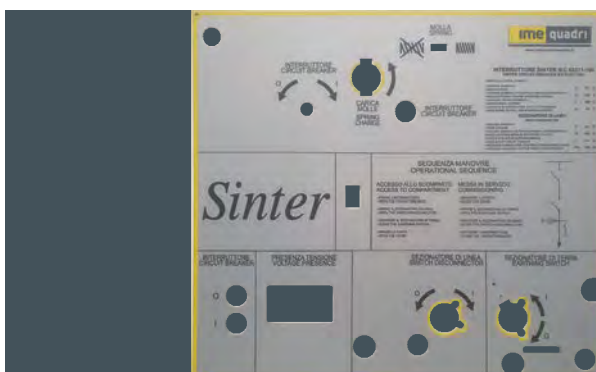
**R16Qm motorised operating mechanism - SC6 unit**



**R16Qsv operating mechanism - SFSG6 unit**

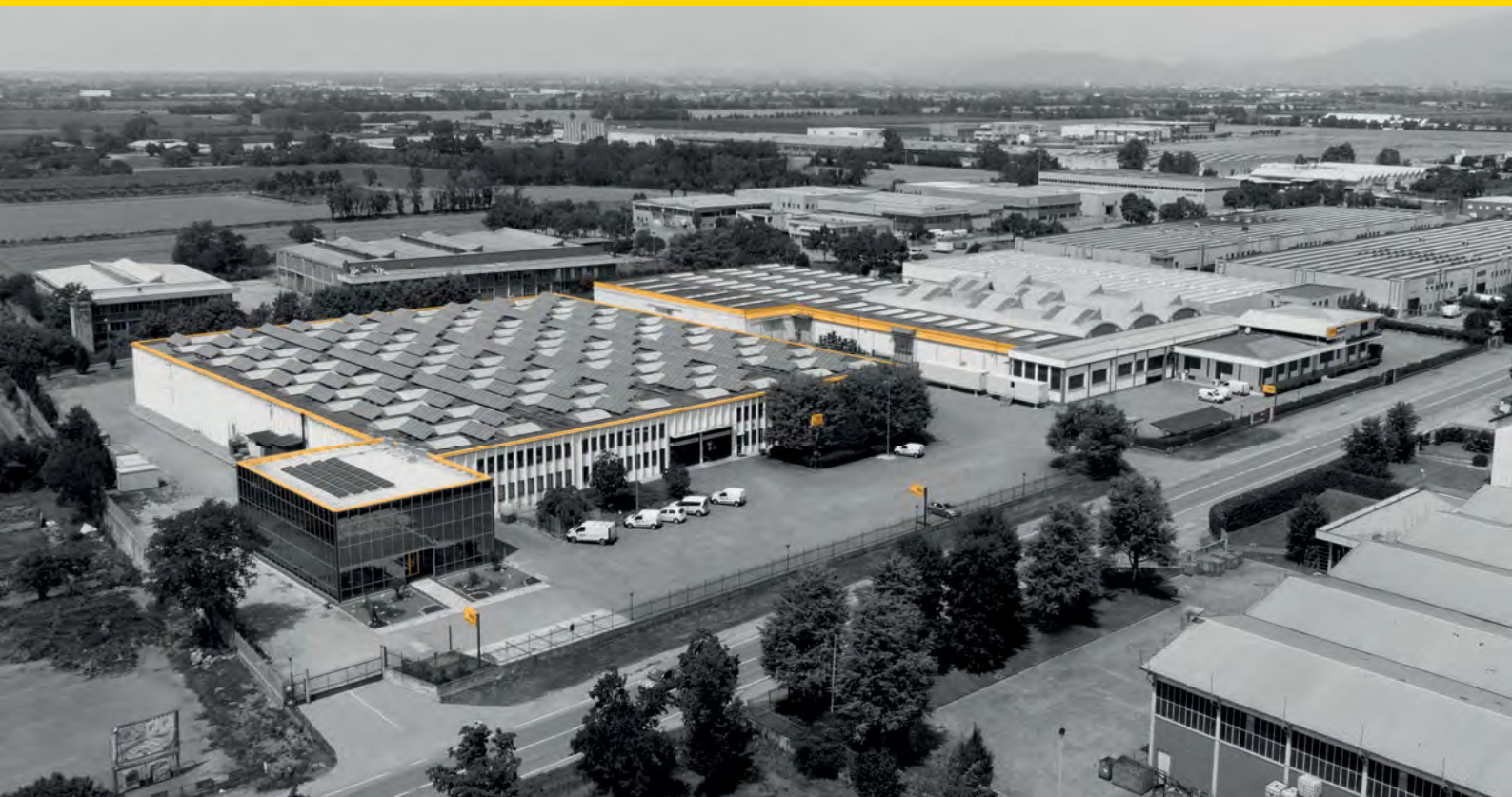


**R16Qisf6 operating mechanisms - ISF6 / ISFR6 units**



**SINTER operating mechanism - SINT6 / SINTR6 units**





## ime quadri

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