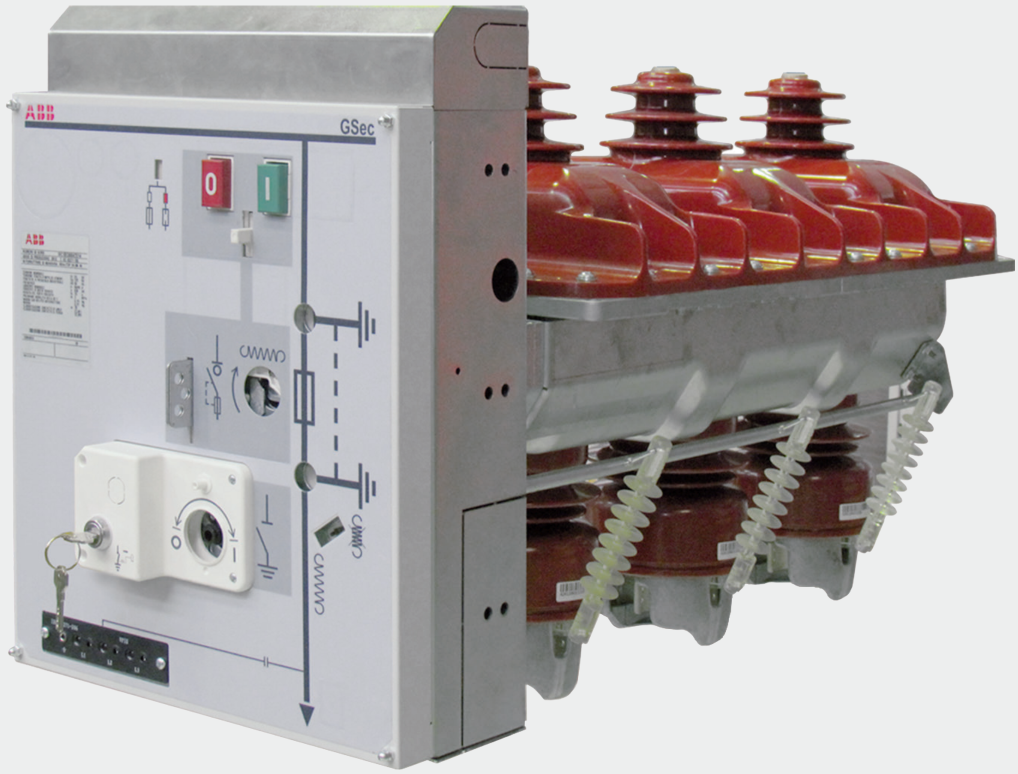
DISTRIBUTION SOLUTIONS

GSec

Gas-insulated switching and isolating apparatus



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GSec is a three-position SF6 gas-insulated switch-disconnector designed for use in medium voltage switchgear for secondary distribution up to 24 kV, 800 A, 25 kA. GSec is used in line ingoing/outgoing panels, in those with circuit breakers or in a combination with fuses. Typical applications are supplying lines, protecting transformers and use in ring networks. Thanks to its size, GSec can be installed in panels 375 mm in width or wider.

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its strengths, your benefits

Speed up your projects

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Maximize your output

Reduce number of components to be assembled, connected and interlocked
- Connection between the switch external earthing contact and earth of panel not needed thanks to metallic partition
- Capacitive sockets for voltage indicator (VPIS) already integrated in lower bushings
- Interlock with the door provided together with the apparatus

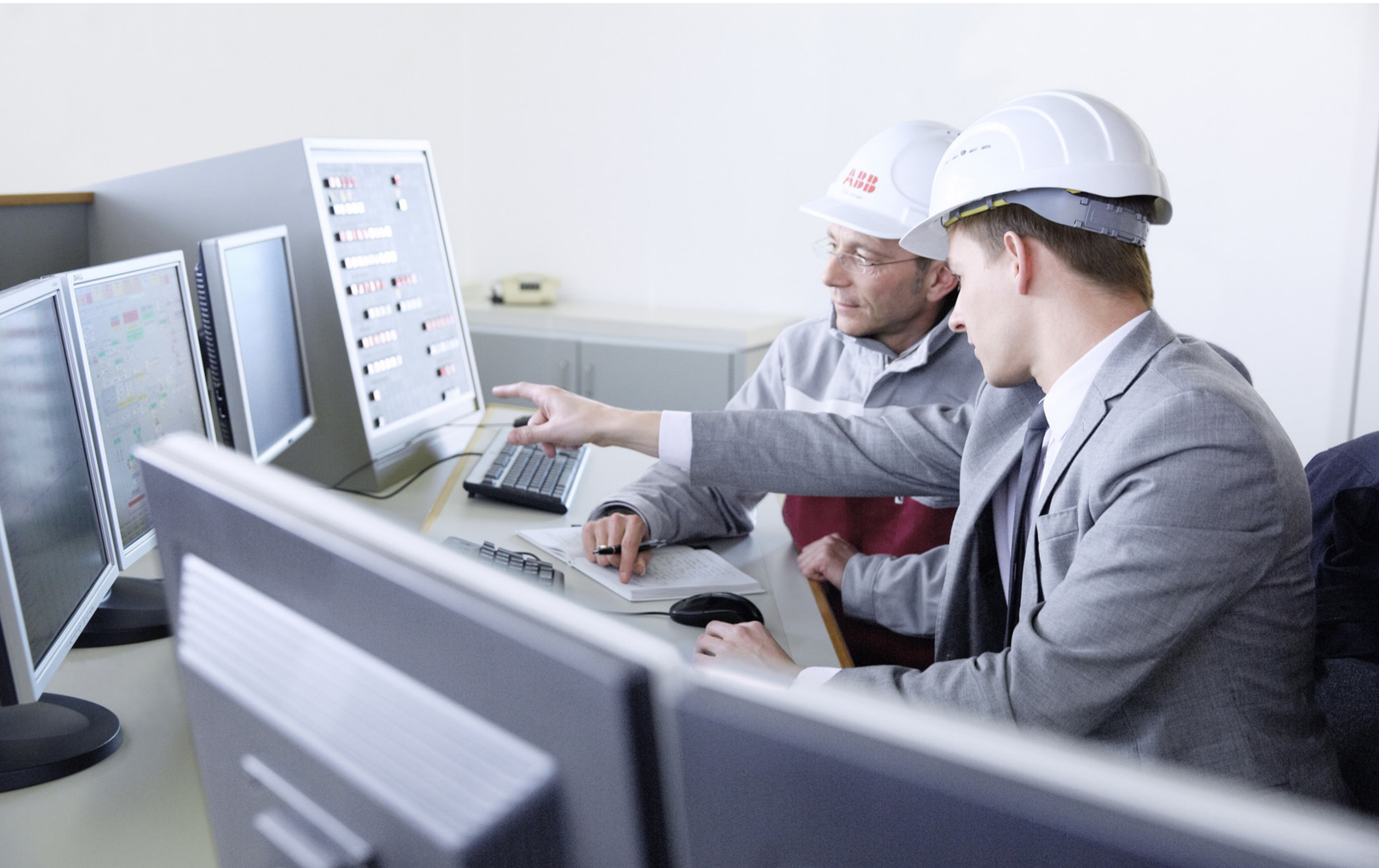
Reduce spares and maintenance
- Up to 5,000 close-open operations (M2) for line contact
- Gas tightness guaranteed as “Sealed for life” for over 30 years
- Dedicated training for installation and maintenance
- Specialized ABB Service personnel for installation and maintenance

Programs enabling OEMs to produce their own solution taking advantage of ABB products and know how
- Technical cooperation / license based on a modular concept of support allowing the OEM to choose in a flexible way the level of added value which better fits its individual needs

Efficiency
Optimize your investments

Panel material and time saving

- Lower part of enclosure in stainless steel providing metallic segregation, thus eliminating earthing bar need
- Additional capacitive post insulators not required thanks to capacitive dividers built into lower insulators
- Complete product, with front cover protecting the actuator and providing visual indications and synoptic
- Phase distance 230 mm, no need to add insulating dividers between phases



Reliability
Protecting your assets

Maximum level of safety for operators
- Lower part of enclosure in stainless steel provides metallic segregation between cable and busbar compartments (cable compartment fully earthed)
- Actuator operating speed independent on the operator
- Mechanical signaling of the state of apparatus connected straight to the operating shaft

Hazardous operations prevented
- Interlock between the line and earthing operations (separate lever seats)
- Interlock between earthing switch and door of cable compartment

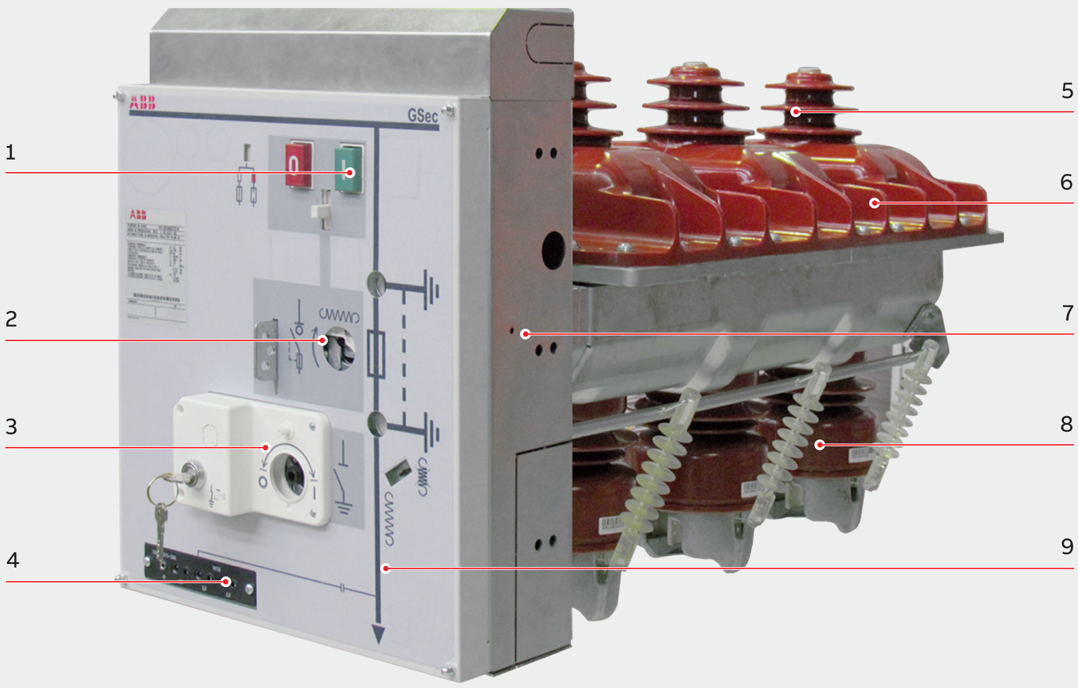
Good performance against external factors
- Long-lasting protection against external factors thanks to upper part in resin, filled with SF6
- Version tested for low temperature applications available

ABB by your side
- Count on a worldwide presence for any support you may need

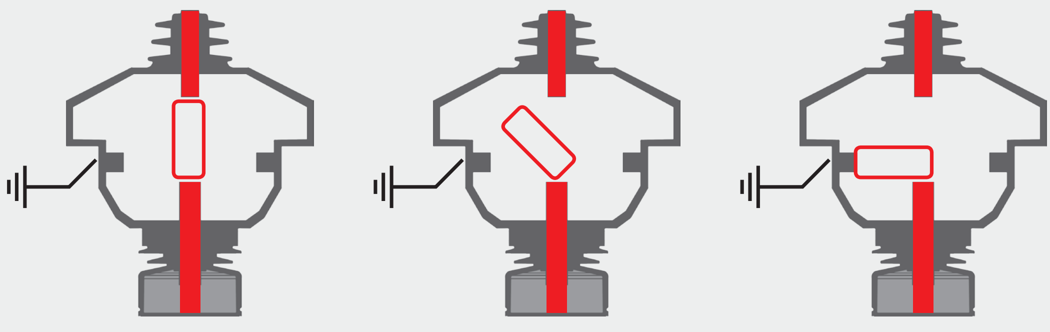
1. Description

GSec is a three-position SF6 gas-insulated switch-disconnector designed for use in medium voltage switchgear for secondary distribution.

GSec is used in line ingoing/outgoing panels, in those with circuit breakers or in a combination with fuses. Typical applications are supplying lines, protecting transformers and use in ring networks.



1 Opening and closing push-buttons
2. Line operating lever seat
3. Earth operating lever seat
4. Voltage indicators (if applicable)
5. Top insulators
6. Enclosure (power part)
7. Housing of the operating mechanism
8. Bottom insulators
9 Mimic diagram



Thanks to its size, GSec can be installed in panels 375 mm in width or wider.
The contacts of the three phases can be set to the following positions: LINE – OPEN – EARTH.

The enclosure of the GSec switch-disconnector consists of two half-shells, the top part being made of resin and the bottom part in stainless steel.
GSec apparatus is “sealed for life” in accordance with standard IEC 62271-1, wich means that the gas tightness is guaranteed for more than 30 years.
GSec has a wide range of “plug&play” accessories that can be easily installed and replaced from the front part of the apparatus.
The GSec series has been designed and tested in compliance with Standards IEC 62271-1, IEC 62271-102, IEC 62271-105 and IEC 62271-103.
The switch-disconnector has also been tested for use at low temperatures and type-approved for naval applications (Germanischer Lloyd register).

Safety
- The stainless steel bottom part of GSec provides metallic segregation between the cable and busbar compartments, ensuring that the two compartments are earthed and therefore making conditions safer for the personnel.
- Thanks to GSec design, it can be used to create switchgear with PM (Metallic Partitions) classification for the segregation between the busbar and cable compartments.
- Mechanical interlocks for the safety of the personnel.
- The door lock prevents the panel door from being opened when the GSec contacts are not in the earthed position. Vice versa, the lock prevents the switch-disconnector from setting to the open or line positions when the door is open.
- The operating lever with “anti-reflex” function.

Maintenance free
- The enclosure of GSec is guaranteed “sealed for life” for more than 30 years, in accordance with IEC 62271-1 standards
- Up to 5000 mechanical operations without maintenance for GSec with the 1S - Single spring operating mechanism
- Up to 1000 mechanical operations without maintenance for GSec with the 2S - Double spring operating mechanism

Reliability
- The apparatus can house VPIS voltage indicators in accordance with standard IEC 61958, for voltage detection on the cable side
- Mechanical signalling of the state of the apparatus connected directly to the operating shaft (Annex A of standard IEC 62271-102)

Ease of use
- Both the GSec operating mechanisms are equipped with springs so the operating speed is independent of the operator.
- The operating mechanism has two separate seats, one for line operation and one for earthing operation.

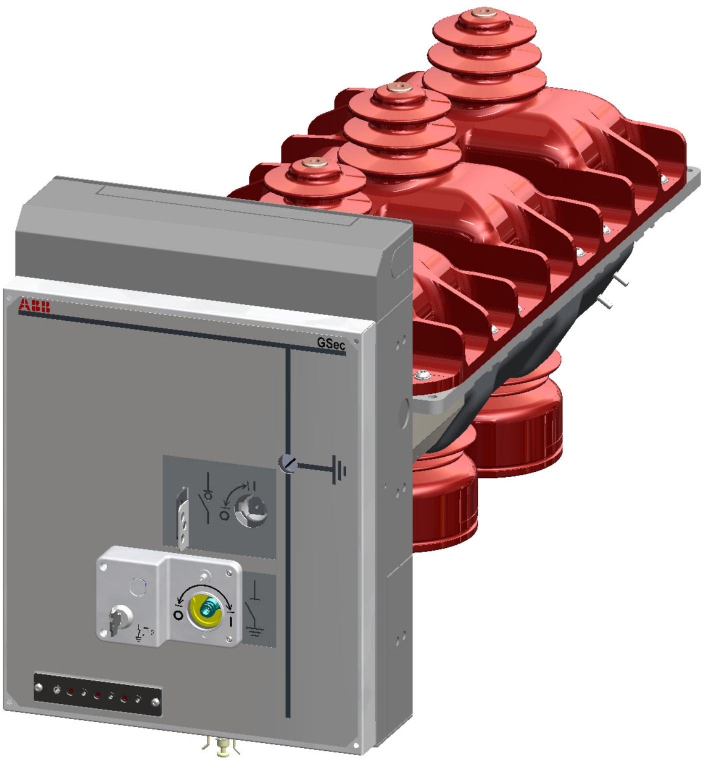
Customizing
- A full range of “plug & play” accessories that can be easily installed on the front part of the operating mechanism allows the apparatus to be adapted to suit many applications.
- GSec can be used for incoming/outgoing units, in combination with fuses, circuit breakers with lateral operating mechanisms, current and voltage transformers.

Compactness
- Thanks to the upper resin part it is possible to design small size apparatus and switchgear panel, while still ensuring a high level of insulation.
- The capacitive sockets for voltage indicator (VPIS) and the cable connections are already integrated in the apparatus bottom insulators. This allows to reduce the number of components of the the panel.

2. Selection and ordering

Types

a. GSec/T1
Three-position switch disconnector with 1S - Single spring operating mechanism.
Performs opening and closing operations at operating speeds independent of the operator.
This type is generally used for creating incoming/ outgoing units.



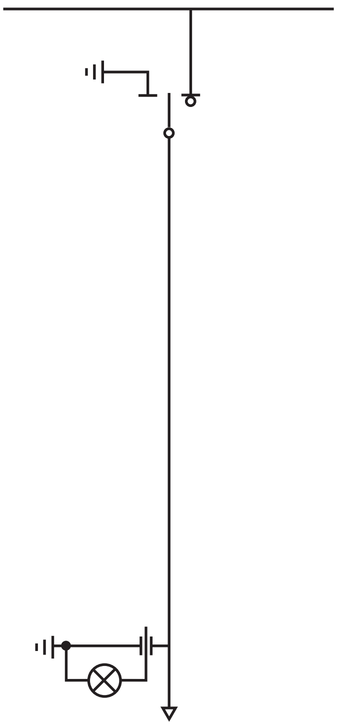


Fig. 1

Standard supply	Optional accessories
Switch-disconnector	Auxiliary contacts
1S - Single spring operating mechanism	Motor for the operating mechanism
Door interlock	VPIS voltage indicators
Operating lever	Key lock for line seat
	Key lock for earth seat
	Coil for preventing lever insertion in earth seat
	Gas presence indicators
	Coil for preventing lever insertion in line seat

b. GSec/T2
Three-position switch disconnector with 2S - Double spring stored energy operating mechanism.
Performs opening and closing operations at operating speeds independent of the operator.
This type is generally used for creating incoming/outgoing units.

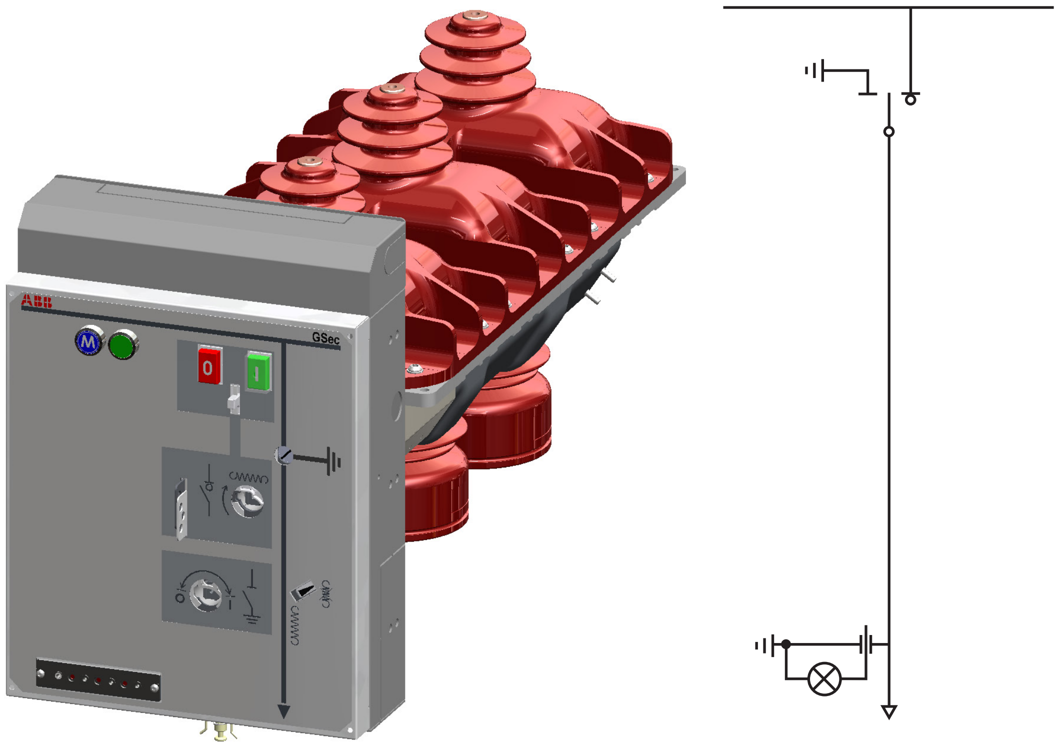


Fig. 2

Standard supply	Optional accessories
Switch-disconnector	Auxiliary contacts
2S - Double spring operating mechanism	Motor for the operating mechanism
Door interlock	VPIS voltage indicators
Operating lever	Key lock for line seat
	Key lock for earth seat
	Coil for preventing lever insertion in earth seat
	Shunt opening release
	Shunt closing release
	Gas presence indicators

2. Selection and ordering

Types

c. GSec/T2F

Three-position switch disconnector with 2S - Double spring stored energy operating mechanism.
Suitable for use in combination with fuses, e.g. for transformer protection units.

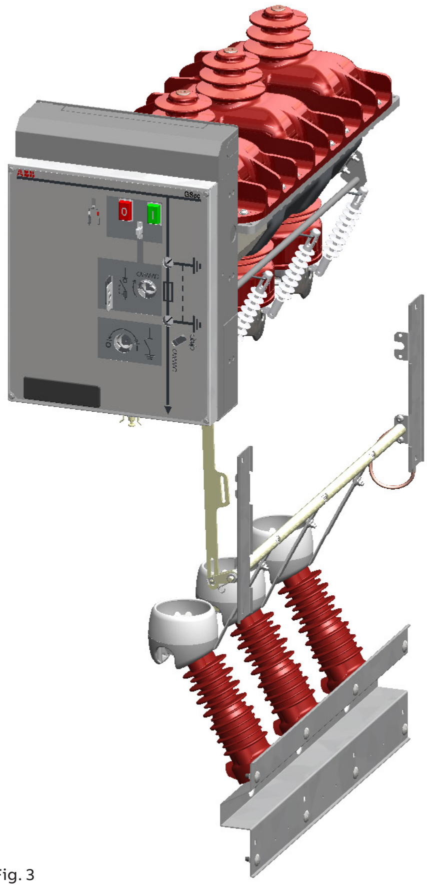
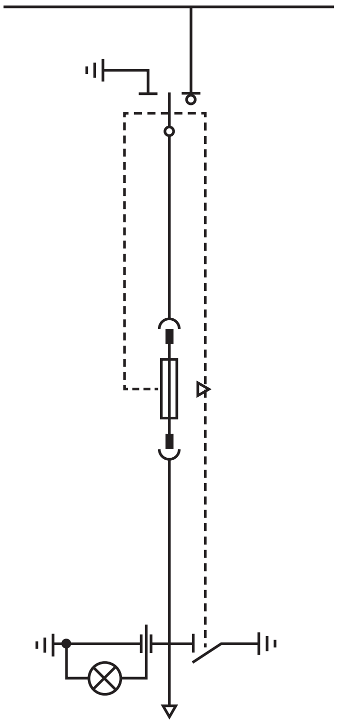


Fig. 3

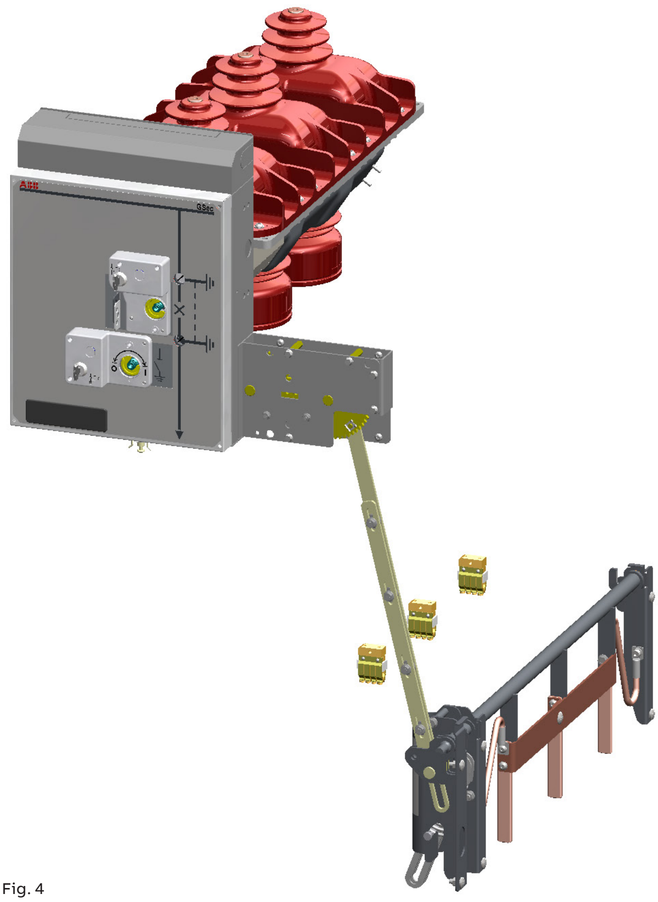


Standard supply	Optional accessories
Switch-disconnector	Auxiliary contacts
2S - Double spring operating mechanism	Motor for the operating mechanism
Door interlock	VPIS voltage indicator
Operating lever	Fuses blown signalling contact.
Fuses blown indicator	Key lock for line seat
Tripping system in case of blown fuses	Key lock for earth seat
Separate earthing switch 5 kAp with relative transmission (*)	Coil for preventing lever insertion in earth seat
Fuse holder (*)	Shunt opening release
	Shunt closing release
	Gas presence indicators

(*) Components supplied loose

d. GSec/IB

Three-position switch disconnector with 1S - Single spring operating mechanism.
Suitable for use in panels with circuit breaker for incoming/outgoing use.



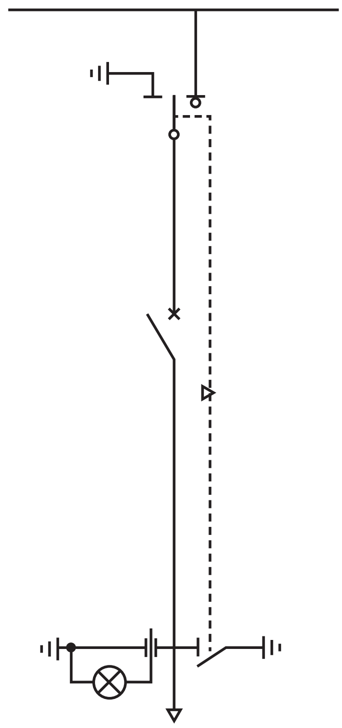


Fig. 4

Standard supply	Optional accessories
Switch-disconnector	Auxiliary contacts
1S - Single spring operating mechanism	Motor for the operating mechanism
Door interlock	VPIS voltage indicator
Operating lever	Key lock for line seat
Separate earthing switch 62.5 kAp with relative transmission (*)	Key lock for earth seat
	Coil for preventing lever insertion in earth seat
	Gas presence indicators
	Coil for preventing lever insertion in line seat

(*) Components supplied loose

2. Selection and ordering

Electrical characteristics		GSec/T1 and GSec/IB (*)		
Rated voltage	**kV**	**12**	**17.5**	**24**
Power frequency withstand voltage (50/60 Hz, 1 min)				
- Line to line and line to earth	kV	28 (1)	38	50
- Between open contacts	kV	32	45	60
Lightning impulse withstand voltage (BIL 1.2/50 µs)				
- Line to line and line to earth	kV	75	95	125
- Between open contacts	kV	85	110	145
Rated frequency	Hz	50 / 60	50 / 60	50 / 60
Rated current (40 °C)	A	800	800	630
Rated short-time withstand current	kA	25 (2s)	20 (3s)	16 (3s) / 20 (3s)
Making capacity (peak current)	kAp	65	54.5	54.5
Making capacity of separate earthing switch (GSec/IB)	kAp	62.5	62.5	62.5
Breaking capacity acc. to ed. 2011 IEC 62271-103 par- 5016.1				
- Active load	A	800	800	630
- No-load transformers	A	16	16	16
- No-load lines	A	25	25	25
- No-load cables	A	50	50	50
- Ring circuits	A	800	800	630

Electrical characteristics		GSec/T2 and GSec/T2F (*)		
Rated voltage	**kV**	**12**	**17.5**	**24**
Power frequency withstand voltage (50/60 Hz, 1 min)				
- Line to line and line to earth	kV	28 (1)	38	50
- Between open contacts	kV	32	45	60
Lightning impulse withstand voltage (BIL 1.2/50 µs)				
- Line to line and line to earth	kV	75	95	125
- Between open contacts	kV	85	110	145
Rated frequency	Hz	50 / 60	50 / 60	50 / 60
Rated current (40 °C)	A	800	800	630
Rated short-time withstand current	kA	25 (2s)	20 (3s)	16 (3s) / 20 (3s)
Making capacity (peak current)	kAp	41.5	41.5	41.5
Making capacity of separate earthing switch (GSec/T2F)	kAp	5	5	5
Breaking capacity acc. to ed. 2011 IEC 62271-103 par- 5016.1				
- Active load	A	630	630	630
- No-load transformers	A	16	16	16
- No-load lines	A	25	25	25
- No-load cables	A	50	50	50
- Ring circuits	A	630	630	630

(*) Ref. to section 4 for detailed ratings for each version
(1) Consult ABB for 42 kV version

Mechanical and electrical performance		
Electrical endurance of the line contact	class	E3 - up to 5 makings and 100 rated current interruptions
Electrical of the earth contact	class	E2 - up to 5 makings
Mechanical endurance of the line contact with operating mechanism 1S - Single spring	class	M2 - 5000 mechanical operations
Mechanical endurance of the line contact with operating mechanism 2S - Double spring	class	M1 - 1000 mechanical operations
Mechanical endurance of the earth contact	class	1S - Single spring M1 - 2000 mechanical operations
		2S - Double spring M0 - 1000 mechanical operations

Other characteristics		
Distance between the phases	mm	230
SF_6 gauge pressure	bar	0.48
Weight of SF6 contained	kg	0.21
Internal volume	l	25
IP protection class		IP2X
Operating temperature (4)		
- Min	°C	-5
- Max	°C	+40 (5)
Storage temperature		
- Min	°C	-25 (7)
- Max	°C	+40 (5)
Maximum installation altitude (6)	m	4000

(4) In accordance with standard IEC 62271 for temperature below -5 °C please ask ABB
(5) Consult ABB for higher values
(6) Consider the KA correction factor for the insulating components, in accordance with standard IEC 62271-100
(7) Dedicated version for storage temperature -40 °C available. Please ask ABB.

Standards used

Standard	Title
IEC 62271-1	High-voltage switchgear and controlgear - Part 1: Common specifications.
IEC 62271-102	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches.
IEC 62271-103	High-voltage switchgear and controlgear - Part 103: Switches for rated voltages above 1 kV up to and including 52 kV.
IEC 62271-105	High-voltage switchgear and controlgear - Part 105: Alternating current switch-fuse combinations.

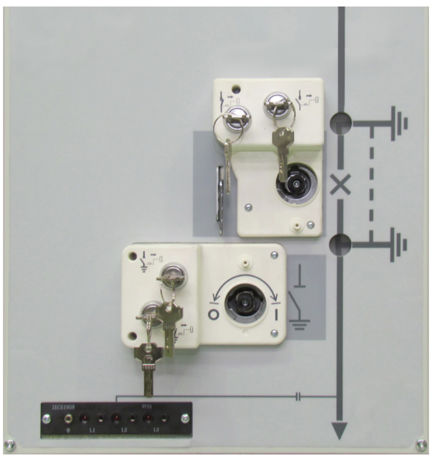
2. Selection and ordering

Accessories

a. Key locks
Allow each of the operation seat of the apparatus (line and earth) to be locked in the open or closed positions. Up to a maximum two keys for the line and two keys for the earth can be used.
Three types of keys are available. standard, Ronis and Profalux.
The line switching lock of switch-disconnectors with the 2S - Double spring operating mechanism cannot be locked in the closed position.

b. Pre-engineering for padlocks
Allows padlocks to be housed so as to lock the apparatus in the open, line or earthed positions. Up to three padlocks can be used per apparatus.
The maximum diameter of the padlock latch is 6 mm. It is part of the standard equipment for all GSec apparatus. The padlocks are not supplied.

Key locks		**Gsec/T1 Gsec/IB**	**Gsec/T2 Gsec/T2F**
		1S operating mechanism - Single spring	**2S operating mechanism - Double spring**
Line	2 free keys - 1 open and 1 closed	x	
	1 key free - open	x	x
	1 key free - closed	x	
Earth	2 free keys - 1 open and 1 closed	x	x
	1 key free - open	x	x
	1 key free - closed	x	x



c. Auxiliary contacts
Allow the position of the apparatus to be signalled to a remote location. 4 auxiliary contacts are available for the line and 4 for the earth. Each contact can be used as a normally closed (NC) or normally open (NO) circuit.

Maximum rating	AC	DC
Voltage [V]	250	250
Current [A]	16	0.3

d. VPIS voltage signalling devices
The switch-disconnector can be equipped with VPIS (Voltage Presence Indicating System) voltage signalling devices in accordance with standard IEC 61958. These indicators detect the presence of voltage in the cables connected to the switch-disconnector itself. Phase concordance can also be performed with these devices.
Note: the voltage signalling devices do not require the use of additional capacitive dividers and post-insulators.
GSec is equipped with capacitive dividers built into the lower insulators.

2. Selection and ordering

Accessories

e. Motor for the GSec/T1 and GSec/IB (-MAD) operating mechanism

The motor automatically loads the spring of the 1S – Single spring operating mechanism for line operations.
This allows the switch-disconnector to be operated by remote control.
The switch-disconnector's closing (Tclose) and opening (Topen) times are less than 5 seconds (see diagram in Fig. 5).

Motor for 1S actuator	dc	ac / dc		
Voltage	24V	48V	110V	220V
Current with load	<3A	<1.6A	<0.7A	<0.3A
Inrush current	<13A	<10A	<5A	<2A
Rated power (±10%)	50W	50W	50W	50W
Spring loading time (Ts1)	3-4s	3-4s	3-4s	3-4s
Operation time (Tclose/Topen)	<5s	<5s	<5s	<5s

If the motor functions in a faulty way, the switch-disconnector can always be operated in the manual mode with the operating lever.

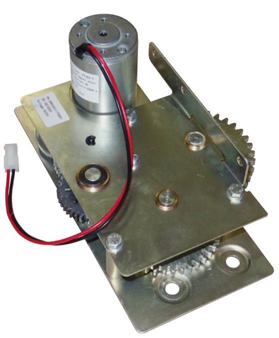
f. Motor for the GSec/T2 and GSec/T2F (-MAD) operating mechanism

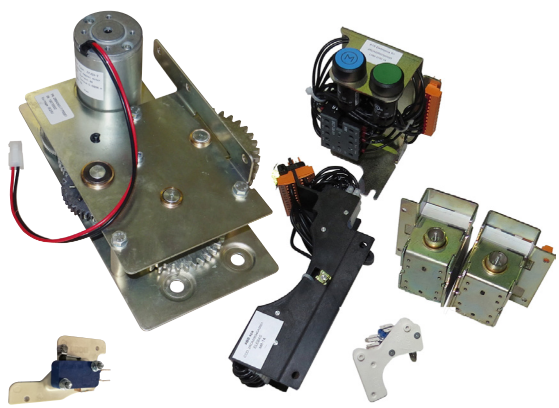
The motor automatically loads the spring of the 2S – Double spring operating mechanism for line operations.
Thanks to this motor and the closing and opening releases, the switch-disconnector can be operated by remote control.
When the motor is installed, the springs take less than 4 seconds to load, as indicated in the diagram of Fig. 6.

Motor for 2S actuator	dc	ac / dc		
Voltage	24V	48V	110V	220V
Current with load	<4A	<2A	<0.9A	<0.45A
Inrush current	<13A	<11A	<5.5A	<2.5A
Rated power (±10%)	50W	50W	50W	50W
Spring loading time (Ts2)	3-4s	3-4s	3-4s	3-4s
Total closing time-CO (Tclose)	<5s	<5s	<5s	<5s
Total closing time-CO (Tclose)	<0.3s	<0.3s	<0.3s	<0.3s
Total opening time (Tclose)	<0.3s	<0.3s	<0.3s	<0.3s

The motor unit is available with the following operating modes:

- CCO (Charge - Close - Open) in three separate operations: the motor loads the springs of the operating mechanism, then closing and successive opening are obtained in two separate actions performed by push-buttons or releases.
- CO (Charge and close - Open) in two separate operations: the motor loads the springs of the operating mechanism and the release closes the disconnector. Opening is obtained by means of a separate action. If the motor functions in a faulty way, the disconnector can always be operated in the manual mode with the operating lever.





g. Opening shunt release -MBO4 (for GSec/T2 and GSec/T2F)

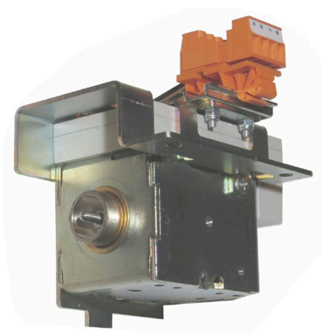
This electromechanical device opens the line contact of the apparatus after the electromagnet has been energized. The total opening time of the switch-disconnector contacts (Topen, see Fig. 6) is 300 ms.

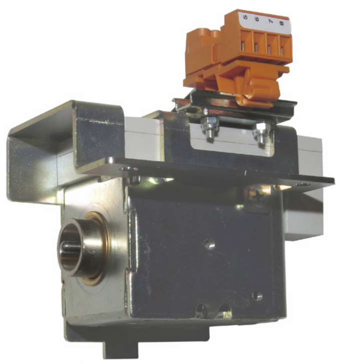
Characteristics	AC (50-60 Hz)	DC
Power supply voltage LV [V]	48, 60	24, 48, 60
Power supply voltage HV [V]	110-127, 220-250	110-132, 220-250
Inrush power consumption	200 VA	200 W

h. Closing shunt release -MBC4 (for GSec/T2 and GSec/T2F)

This electromechanical device closes the line contact of the apparatus after the electromagnet has been energized.
The total closing time of the switch-disconnector contacts (Tclose, see Fig. 6) is 300 ms.

Characteristics	AC (50-60 Hz)	DC
Power supply voltage LV [V]	48, 60	24, 48, 60
Power supply voltage HV [V]	110-127, 220-250	110-132, 220-250
Inrush power consumption	200 VA	200 W





2. Selection and ordering

Accessories

j. Coil to prevent the operating lever insertion in the line seat -RLE5 (for GSec/T1 and GSec/IB)
When the coil is not supplied, it prevents the lever from being fitted into the line seat.
This accessory is only available for the 1S - Single spring operating mechanism.

DC Power supply voltage [V]	24, 30, 48, 60, 110, 220, 240
Rated power [W]	250
Continuous power [W]	5
Inrush time [ms]	150

k. Coil to prevent the operating lever insertion in the earth seat -RLE3
When the coil is not energized, it prevents the lever from being fitted into the earth seat.
This accessory is supplied as an alternative to the key lock for the earth switching lock.

DC Power supply voltage [V]	24, 30, 48, 60, 110, 220, 240
Rated power [W]	250
Continuous power [W]	5
Inrush time [ms]	150

l. Fuses blown signalling contact
When a fuse blows, a kinematic chain activates an indicator that can be seen on the front of the panel (part of the standard equipment for all GSec/T2F devices).
A signalling contact can also be requested so as to transmit information about blown fuses by remote control.
The contact can be normally closed (NC) or normally open (NO).

m. Pressure gauge / Density switch
The pressure gauge displays the pressure of the gas inside the apparatus and provides an analog indication of the value.

Pressure gauge
Two types are available:
m1 Pressure gauge: the information can only be seen on the front of the panel
m2 Pressure gauge with remote signalling: the information is displayed on the front of the panel and can also be transmitted by means of wiring and a terminal box.
The alarm value setting is 0.30 bar gauge (1.30 bar absolute), while the blocking value setting is 0.25 bar gauge (1.25 bar absolute).

m1

Density switch

m3 The density switch allows to monitor the gas pressure taking into account also the temperature and provides an alarm that signals when the pressure is low, according the indication in the table below. The state of the signals can also be transmitted by remote control via dedicated wiring and a terminal box.

Signal	Description	Gauge pressure (bar)
Ok	Correct operating pressure	0.48-0.30
Low	Indicates the minimum gas level for which operation of the switch-disconnector is guaranteed	0.30-0.25
Very low	The switch-disconnector cannot be operated	<0.25

Replacement of the accessories

Some of the GSec accessories can be replaced by the customer (c), while others must be replaced in the ABB factory or by authorized Service personnel (S).

Accessory		Fitting or Replacement
a	Key locks	S
b	Provision for padlocks	S
c	Auxiliary contacts	C
d	VPIS voltage signalling devices	C
e	Motor for GSec/T1 and GSec/IB (-MAD) operation	S
f	Motor for GSec/T2 and GSec/T2F (-MAD) operation	S
g	Shunt opening release –MBO4 (for GSec/T2 and GSec/T2F)	C
h	Shunt closing release –MBC4 (for GSec/T2 and GSec/T2F)	C
j	Coil to prevent operating lever from entering line position -RLE5 (for GSec/T1 and GSec/IB)	S
k	Coil to prevent operating lever from entering the earth position -RLE3	S
l	Fuses blown signalling contact	S
m	Pressure gauge	S
n	Temperature compensated gas density gauge	S

C: customer
S: ABB factory or Service center

m2

m3

3. Specific product characteristics

a. Power part

The enclosure of the GSec switch-disconnector consists of two half-shells, the top part being made of resin and the bottom part in stainless steel.
Smaller sized apparatus can be created thanks to the top part in resin while still guaranteeing a high insulation capacity.
The stainless steel part provides metallic segregation between the cable and busbar compartments, ensuring that the cable compartment is fully earthed and therefore making conditions safer for the personnel. GSec can be used to create panels in the PM (Metallic Partitions) class because it provides metallic segregation between the busbar and cable compartments of the panel.
The power section of GSec is filled with SF6 gas at 0.48 bar gauge pressure. The gas is used as an interruption and insulation medium. Gas tightness is guaranteed for 30 years, in accordance with the specifications established by standard IEC 62271-1. GSec apparatus is called "sealed for life" for this reason.

The GSec contacts can set to the following positions:

- LINE: The line contacts are closed
- OPEN: the apparatus ensures that there is insulation between the cable side and busbar side
- EARTH: the contacts on the cable side are earthed.

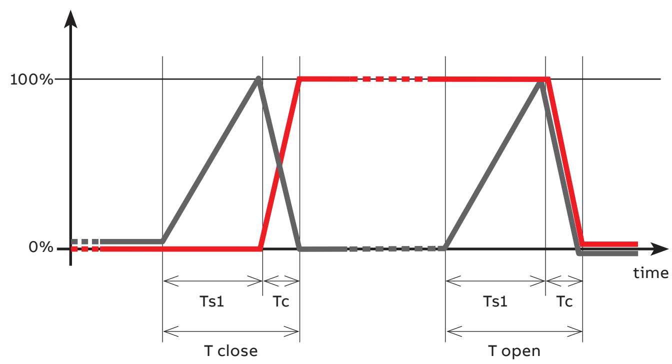
A mechanical signal visible from the front of the apparatus indicates the position of the contacts.
In accordance with annex A of standard IEC 62271-102, this device is connected straight to the operating shaft.
The capacitive sockets for the voltage signalling devices (accessory available on request) are housed inside the three bottom insulators.
Moreover, the cable connection can be created on the apparatus without the need for a cross-beam for the insulators. This cuts down on the number of components that need to be installed in the panel.

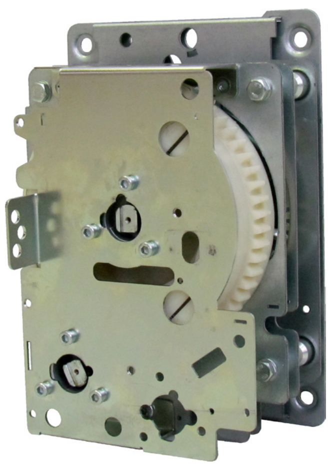
b. Operating mechanism

The GSec switch-disconnector can be equipped with two types of operating mechanisms:
- 1S - Single spring
- 2S - Double spring.

Both operating mechanisms have separate lever seats for the line and earthing operations and both can be equipped with a motor for loading the springs. Even when a motor is installed for loading the springs, it is always possible to operate GSec in the manual mode in case of emergency.

1S - Single spring operating mechanism
- It opens and closes the GSec line contacts. The energy required for the operation is obtained by compressing a spring with a lever, which closes (or opens) the device once dead center has been passed. The operating speed is independent of the operator.
- It opens and closes the earth contact at operating speeds independent of the operator. In the case of GSec/IB units, it also closes and opens the separate earthing switch at operating speeds independent of the operator.
- Manual operation: with the operating lever
- Automatic or remote controlled operation: with motor





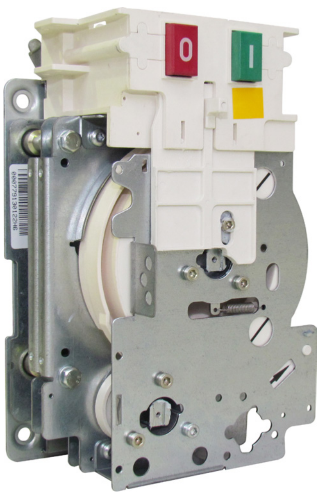
(red line)	Position of the line contact
(grey line)	Spring load state
Ts1	Spring loading time
	- manual operation: depends on the operator
	- motor-driven operating mechanism = 3-4 s.
Tc	Contact opening or closing time < 0.3 s.
Tclose	Total closing time < 5 s. (motor driven operating mechanism)
Topen	Total opening time < 5 s. (motor driven operating mechanism)

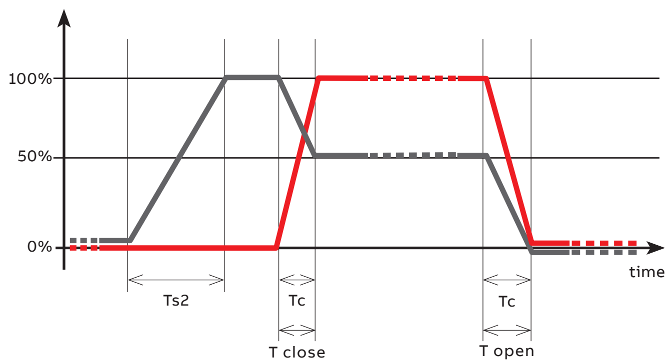
Fig. 5 - Diagram of 1S - Single spring operating mechanism operation.

3. Specific product characteristics

2S - Double spring operating mechanism

- It opens and closes the GSec line contact using the energy stored in two springs: the springs of the operating mechanism are loaded by means of a lever, after which the switch-disconnector is operated by pressing the closing and opening push-buttons. The springs must be reloaded after a closing and opening cycle. The operating speed is independent of the operator.
- It opens and closes the earth contact at operating speeds independent of the operator. In the case of GSec/T2F units, it closes and opens the separate earthing switch at operating speeds independent of the operator
- Manual operation: using the operating lever and push-buttons
- Automatic or remote controlled operation: with a motor and opening and closing coils
- The contacts of the switch-disconnector also open even if only one fuse blows (GSec/T2F)
- The load state of the springs is signalled by an indicator on the front of the panel

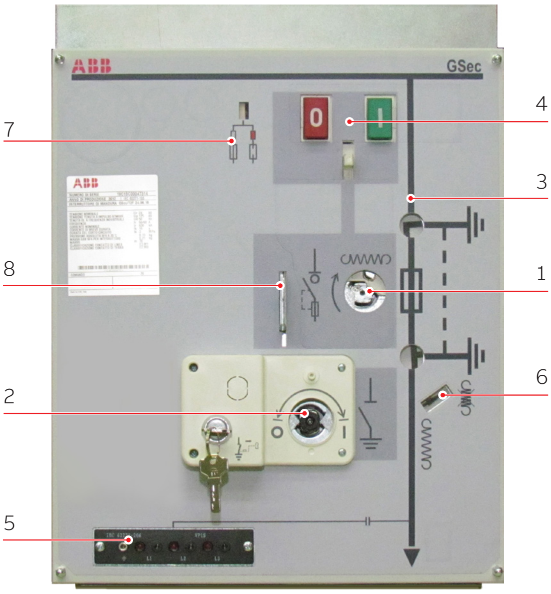




(red line)	Position of the line contact
(grey line)	Spring load state
Ts2	Spring loading time
	- manual operation: depends on the operator
	- motor-driven operating mechanism = 3-4 s.
Tc	Contact opening or closing time < 0.3 s.
Tclose	Total closing time < 0.3 s.
Topen	Total opening time < 0.3 s.

Fig. 6 - Diagram of 2S - Double spring operating mechanism operation.

c. Front cover

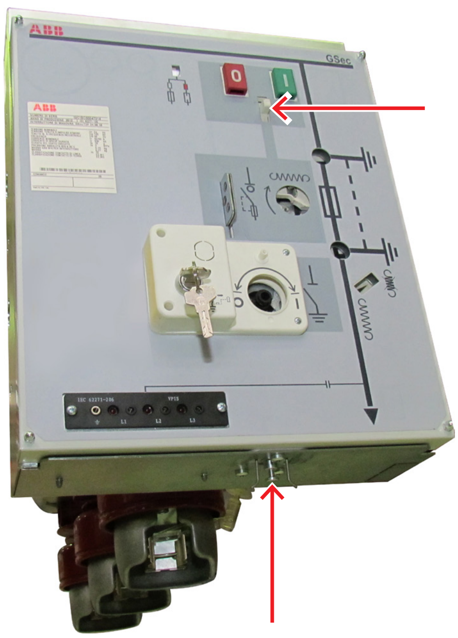


1. Lever seat line operating
2. Lever seat earth operating
3. Mimic diagram
4. Operating mechanism push-buttons
5. Voltage signalling device
6. Springs loaded indicator (only for the 2S - Double spring operating mechanism)
7. Blown fuses indicator (only for GSec/T2F)
8. Pre-engineering for padlocks

d. Mechanical interlocks

GSec has been designed to ensure maximum safety for the operators. It therefore features the following interlocks:

- Interlock between the line and earthing operations obtained by means of separate lever seats
- Panel door interlock thanks to the door lock device: the cable compartment can only be accessed when the earthing switch is closed. Moreover, the earthing switch cannot be opened or the panel be put into service unless the door has been closed. The cables can still be tested with the door open by removing the front guard from the apparatus.
- Interlock for the push-buttons of the 2S - Double spring operating mechanism: these push-buttons cannot be operated when the operating lever is connected.
- Motor interlock: if the operating mechanism is a motor operator, operation of the motor is disabled when the operating lever is in the line lock.



3. Specific product characteristics

GSec has been tested with ABB CEF fuses for transformer protection to IEC 60282-1/ DIN 43625 standards.

Three fuses (one for each phase) for transformer protection can be connected in series with the switch-disconnector.
Selection of the fuses according to the voltage and power of the transformer, must be made in conformity with the data indicated in the table below.

Transformer protection and choice of fuses
When the isolators are used to control and protect transformers, they are fitted with a particular type of current-limiting fuses which guarantee selectivity with other protection devices and can take the high transformer connection currents without deteriorating.
In this case, protection against overcurrents on the medium voltage side of the transformer is not indispensable since this task is carried out by the protection provided on the low voltage side.
Protection on the medium voltage side can be entrusted just to the fuse, which must be chosen taking into account the no-load connection current since this can be the same or 10 times more that the rated current depending on the power of the transformer and the type of laminations used (hot-rolled or grain oriented).
Maximum inrush current occurs when the circuit breaker closes at peak voltage.
A further result to be guaranteed is protection against faults in the low voltage winding and in the part of the connection between this and the circuit breaker on the secondary, thus avoiding the use of fuses with rated current which is too high, in order to ensure tripping within a short time even under these fault conditions.
Rapid calculation of the short-circuit current at the secondary terminals of the transformer and on the supply side of the circuit breaker on the secondary, if installed at a significant distance, allows the tripping time to be verified on the fuse blowing curve.
The usage table given below takes both the required conditions into account, i.e. rated current high enough to prevent untimely fuse blowing during the no-load connection stage and, in any case, of a value which guarantees protection of the machine against faults on the low voltage side.

Choice of fuses for transformer protection

Rated voltage of the transformer [kV]	Transformer power rating [kVA]																		Rated voltage of fuses U_N [kV]
	25	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	
	Rated current of fuse I_N [A]																		
3	16	25	25	40	40	50	63	80	100	125	160 (1)	–	–	–	–	–			3.6/7.2
5	10	16	25	25	25	40	40	50	63	80	100	125	160 (1)	–	–	–			
6	6	16	16	25	25	25	40	40	50	63	80	100	125	160 (1)	–	–			
10	6	10	16	16	16	20	20	25	31.5	40	50	63	80	100	125	16 0(1)			12
12	6	6	10	16	16	16	20	20	25	40	40	50	63	80	100	125	160 (1)		
15	6	6	10	10	16	16	16	20	20	25	40	40	50	63	80	100	125 (1)		17.5
20	6	6	6	10	10	16	16	16	20	20	25	31.5	40	50	63	80	100 (1)		24
24	6	6	6	6	10	10	16	16	16	20	20	25	40	40	50	63	80	100 (1)	

(1) SIBA fuse

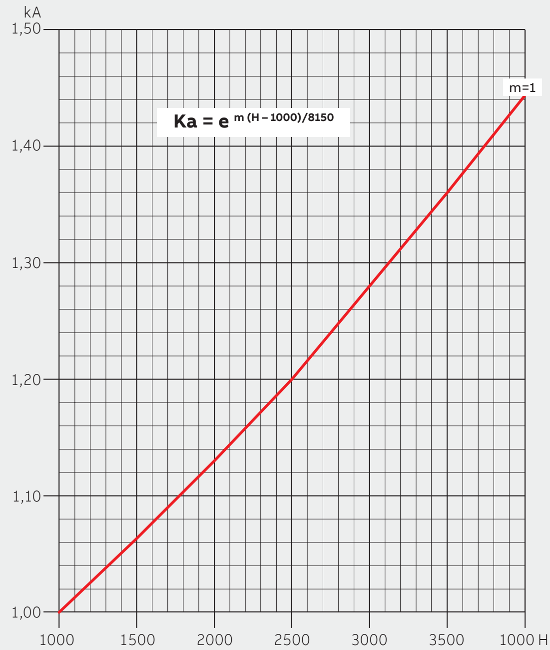
The values in the table were calculated in accordance with Standards IEC 60787 and IEC 62271-105. The transformer is assumed to function in the following operating conditions:
- maximum long-time overload: 150%
- magnetizing inrush current: 12 x In for 100 ms
- transformer short-circuit voltage in accordance with Standard IEC 60076-5
- operational ambient conditions of fuses: standard.

The table gives the rated current of the fuses with reference to the supply voltage and transformer characteristics.
The choice of fuse must be re-calculated if different specifications are concerned.
Please consult ABB if fuses other than ABB CEF and SIBA SSK are used.

Altitude

The insulating properties of the air diminish as the altitude increases. This must be taken into account with regard to the external insulation of the equipment.
The phenomenon must always be considered when the insulating components of equipment that must be installed at more than 1000 m above sea level are designed.
In this case, one must consider a correction coefficient that can be taken from the graph on the following page, created in accordance with the indications provided by Standards IEC 62271-1.
The example below gives a clear interpretation of the indications described above.

Graph for establishing correction factor Ka depending on the altitude



Example
- Installation altitude 2000 m
- Use at 12 kV rated voltage
- Power frequency withstand voltage 28 kV rms
- Impulse withstand voltage 75 kVp
- Ka factor found from the graph = 1.13.

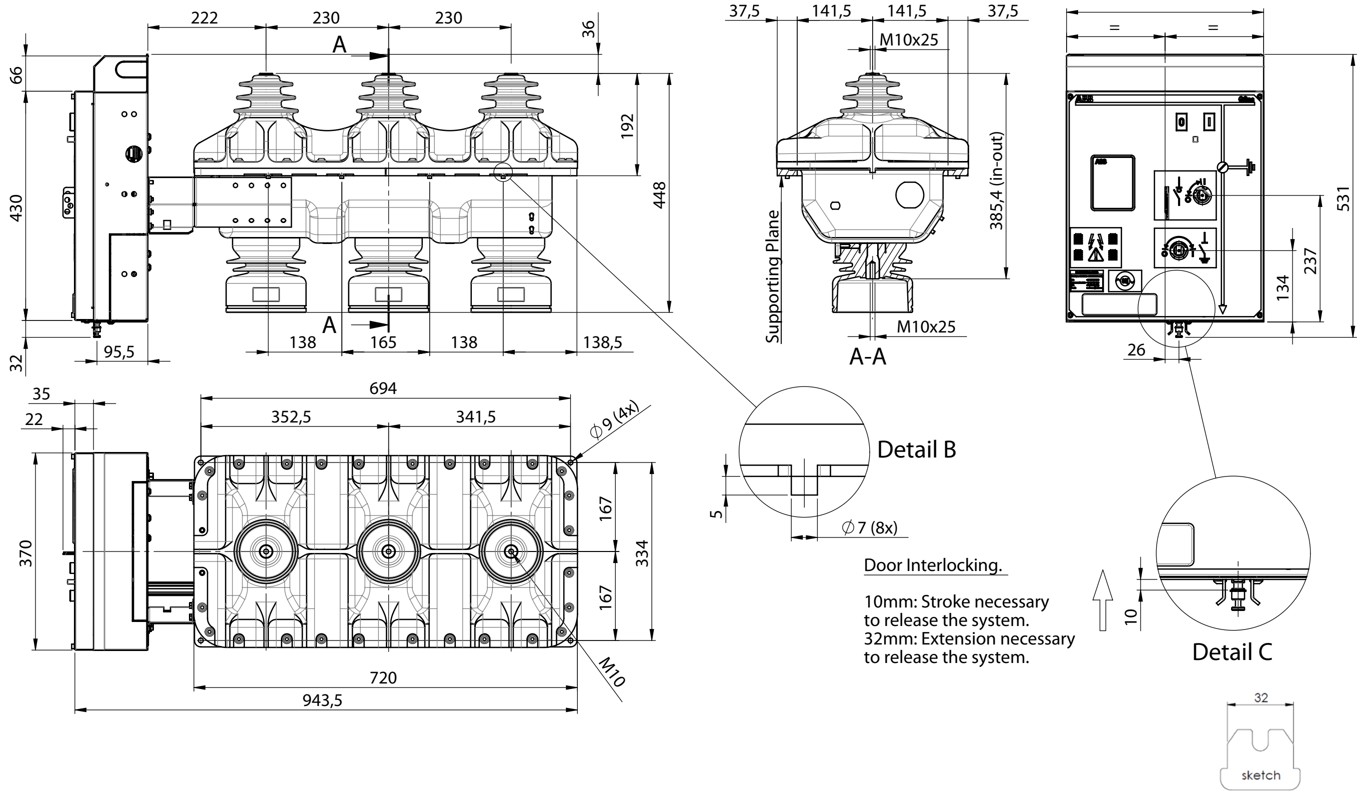
In view of the aforementioned parameters, the equipment must withstand (during tests at zero altitude, i.e. at sea level):
- power frequency withstand voltage:
  28 x 1.13 = 31.6 kVrms
- impulse withstand voltage equal to:
  75 x 1.13 = 84.7 kVp.

In this case, equipment with 17.5 kV rated voltage characterized by 38 kVrms insulation levels at power-frequency with 95 kVp impulse withstand voltage is required for installations at an altitude of 2000 m above sea level with 12 kV operating voltage.

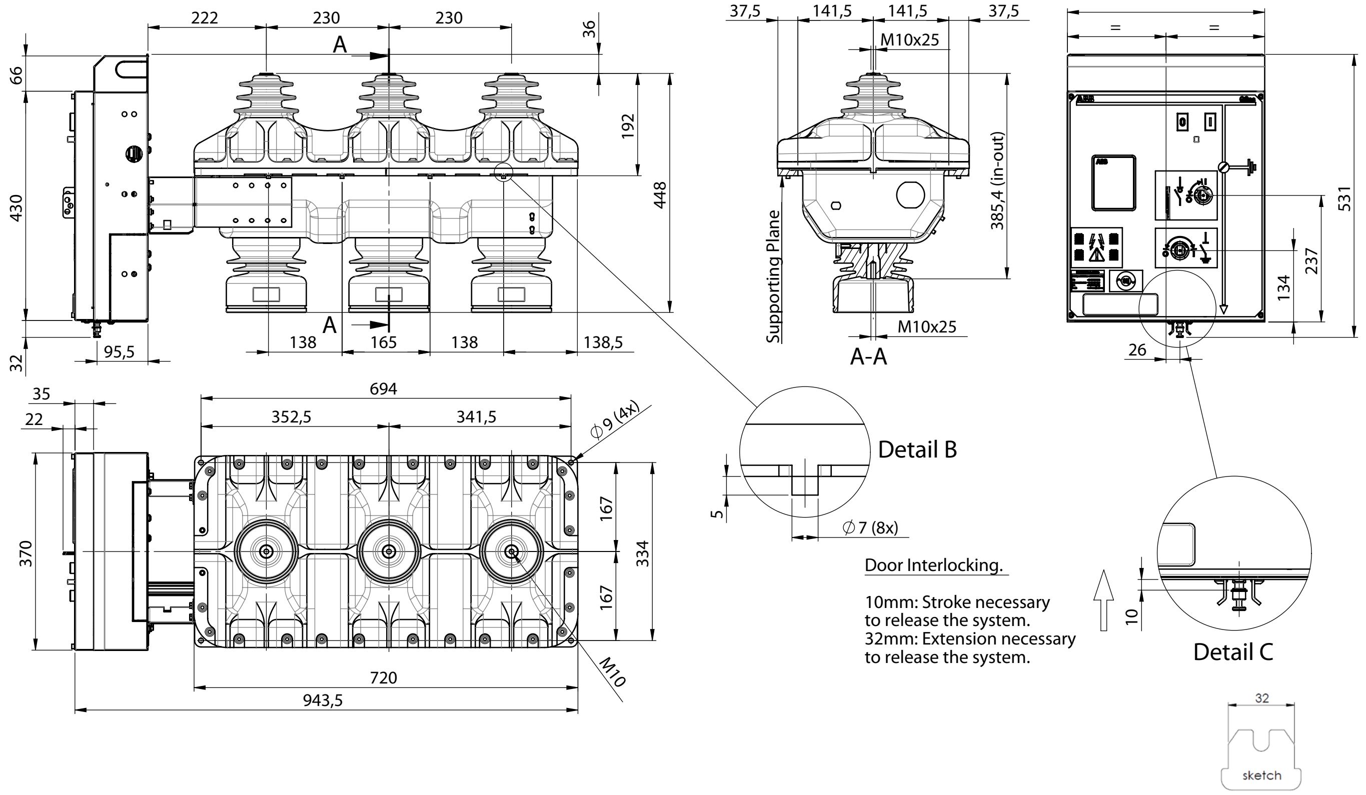
H = altitude in meters;
m = value with reference to power frequency and atmospheric impulse withstand and line-to-line voltages.

4. Overall dimensions

GSec/T1	
TN	2RDA017740A0001
Type	12.08.25
	17.08.20
	24.06.16
	24.06.20
Weight [kg]	70

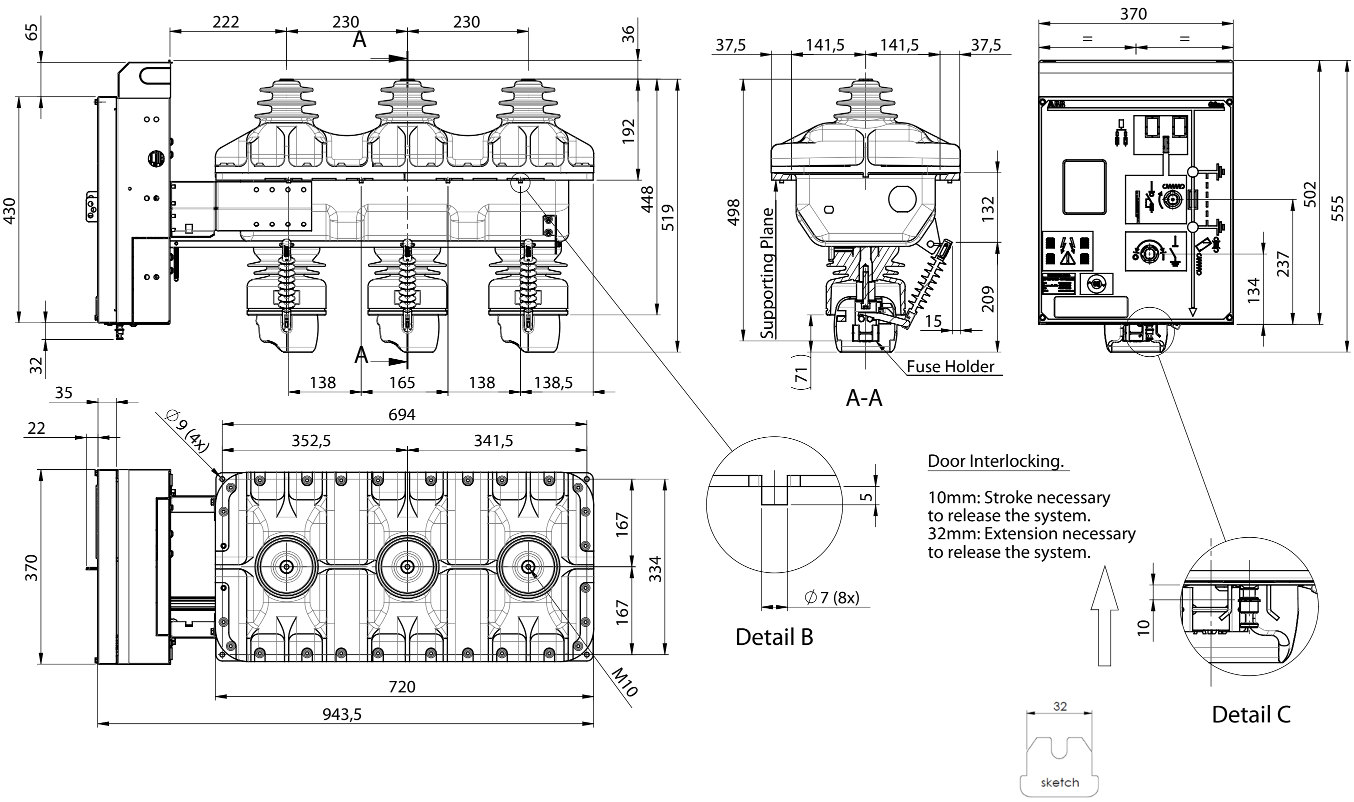


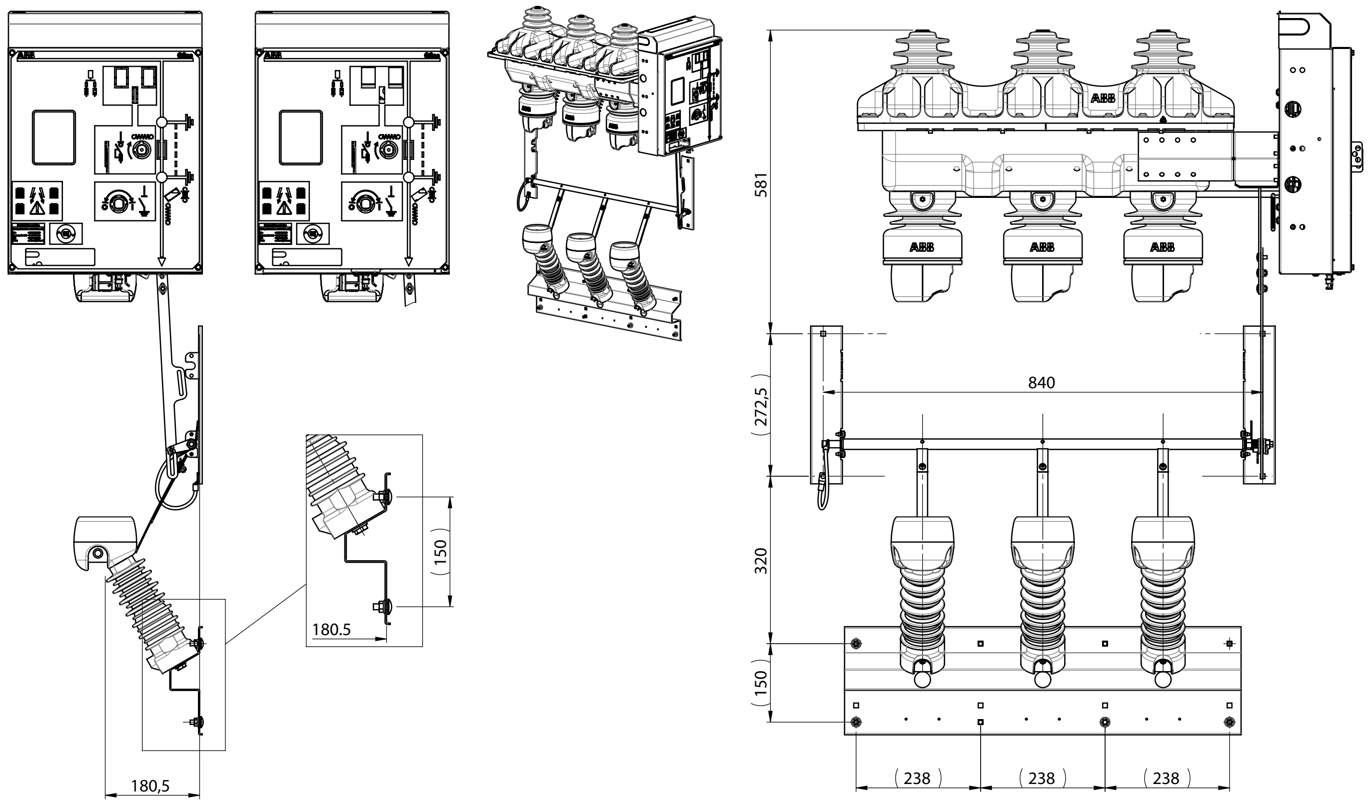
GSec/T2	
TN	2RDA017740A0001
Type	24.06.16
Weight [kg]	70



4. Overall dimensions

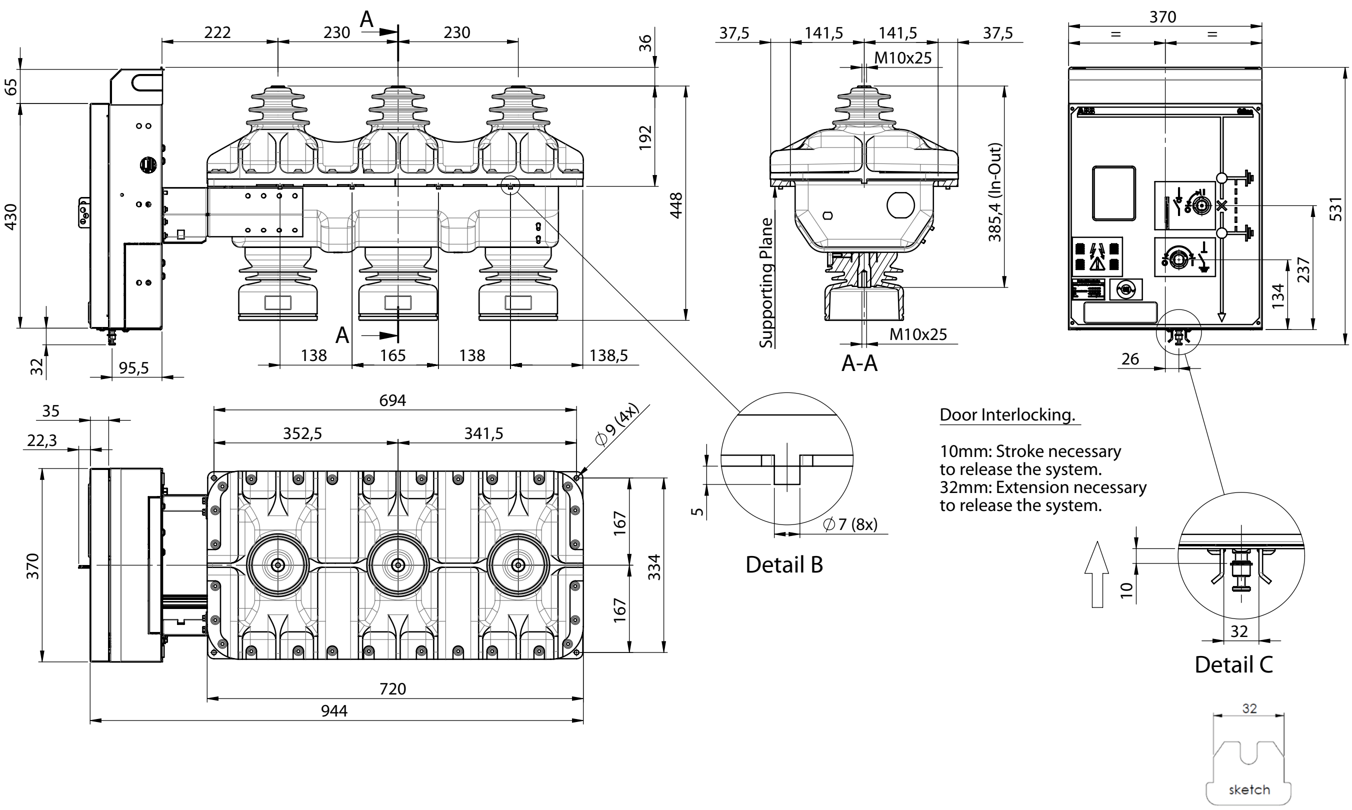
GSec/T2F	
TN	2RDA017731A0001
Type	12.08.25
	17.08.20
	24.06.16
	24.06.20
Weight [kg]	70

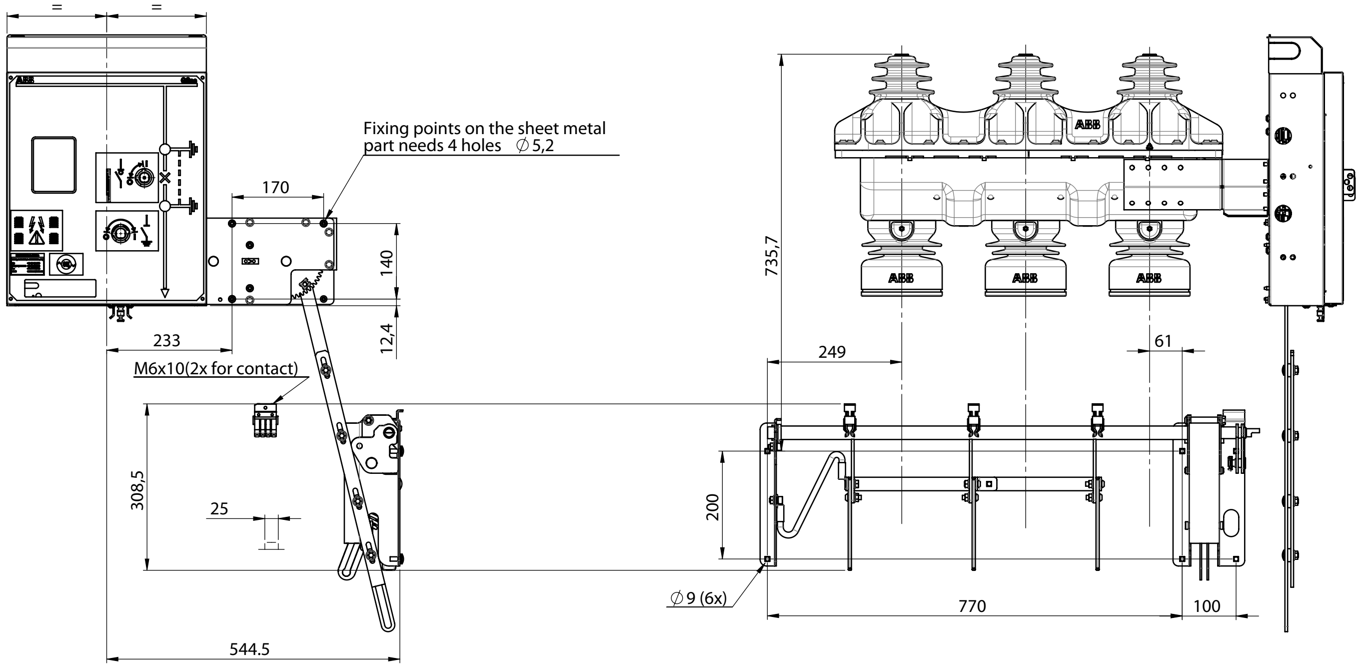



150
180.5
180,5
581
272,5
840
320
150
238
238
238
ABB

4. Overall dimensions

GSec/IB	
TN	2RDA017728A0001
Type	12.08.25
	17.08.20
	24.06.16
	24.06.20
Weight [kg]	70




=
=
Fixing points on the sheet metal part needs 4 holes ∅ 5,2
170
140
12,4
233
M6x10(2x for contact)
308,5
25
544.5
735,7
249
61
200
∅ 9 (6x)
770
100
ABB

Notes

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1VCP000470 - Rev. F, en - Technical catalogue - 2021.01 - (GSec) (gs)