

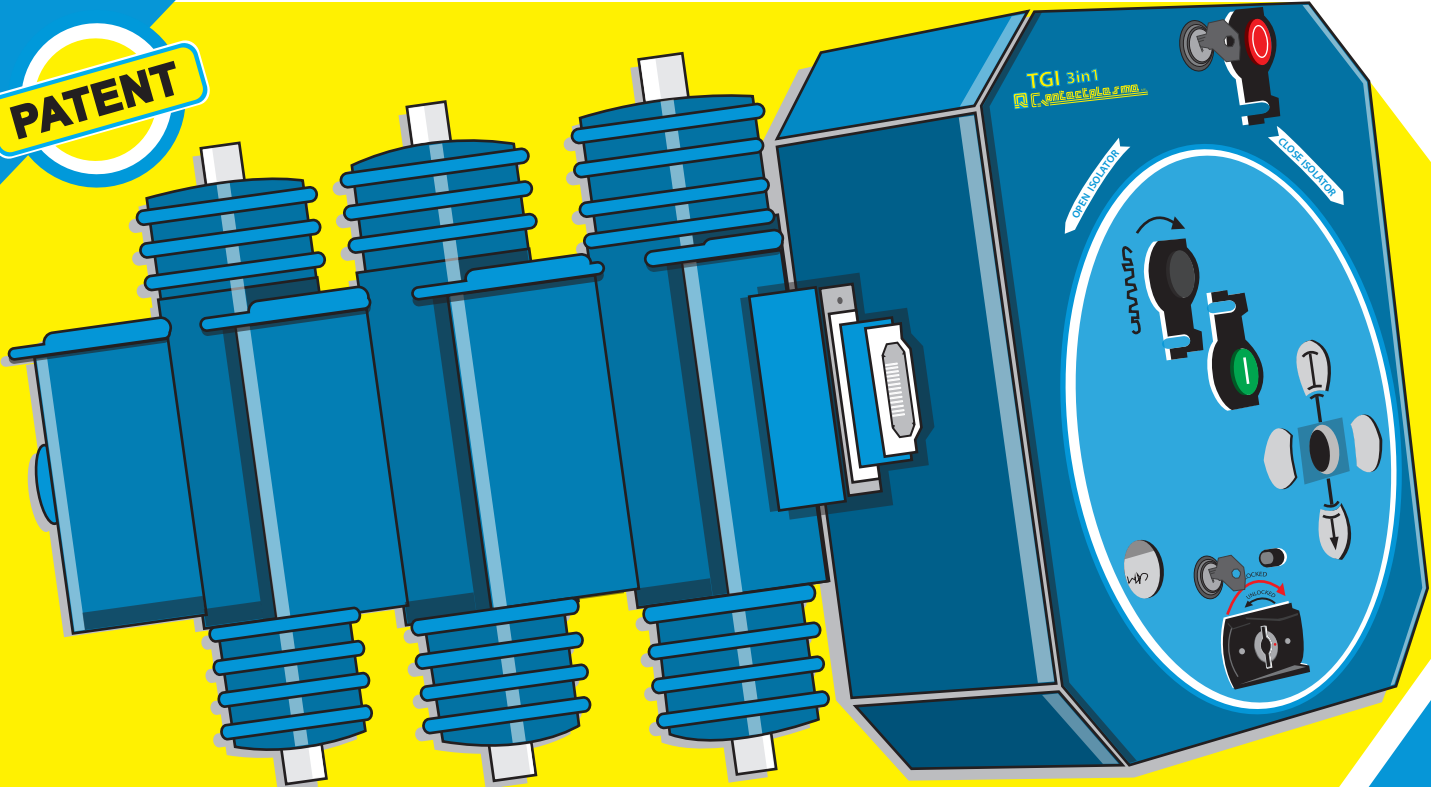


TGI



VACUUM CIRCUIT-BREAKER - AIR ISOLATOR - EARTHING SWITCH

PATENT



SIMPLE VERSATILE REMOVABLE VISIBLE ISOLATION

3 in 1

3 in 1

TGI

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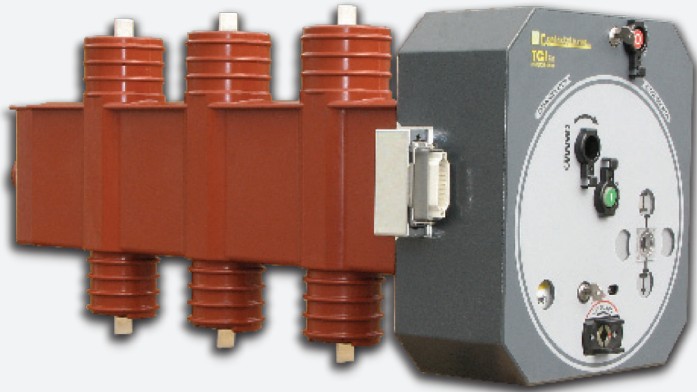
Via A. Gramsci, 2 26827 Terranova dei Passerini (LO) Italy

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3 IN 1

VACUUM CIRCUIT-BREAKER – AIR ISOLATOR – EARTHING SWITCH



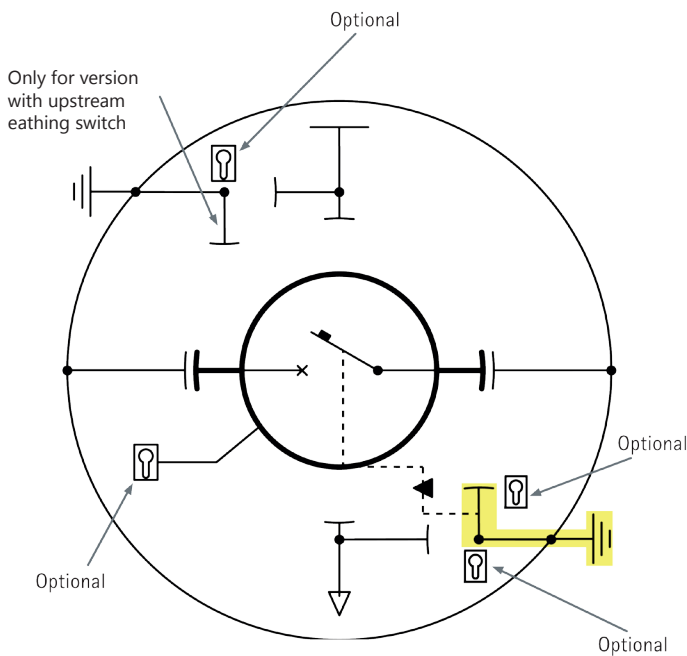
12 - 17,5 - 24 kV
630 - 800 - 1250 A
12,5 - 16 - 20 - 25 kA

Decades of experience Contactplasma srl in the field electromechanical devices for the breaking, isolation and power distribution, led the realization of a device at high performance: **TGI.**

TGI has vacuum breaking and visible isolation in air, these two features are irreplaceable qualities of this unit and they complete its points of strength. The breaking in vacuum is itself free of any type of maintenance, having the tendency to improve with increasing of load operations. The isolation in air allows to forget all the problems related to the use of gas; the air does not present the need to be contained in a sealed tank, self-resets in case of discharge, it is ecological and does not submit all environmental problems that may incur with the use and disposal of gas.

TGI embodies the logical evolution in the modern design of power distribution satisfying three different electrical installations requirements (breaking/interruption, isolation and earthing). TGI allows the execution of all those operations normally required in the exercise of secondary electrical distribution systems.

Purchasing TGI you can condensate, in only 50 cm width, all the functions of circuit-breaker, air rotary line isolator and earthing switch. The particular structure of the apparatus also allows both simple assembly of the constituent elements, both the easy replacement and modification.



Patented one line diagram

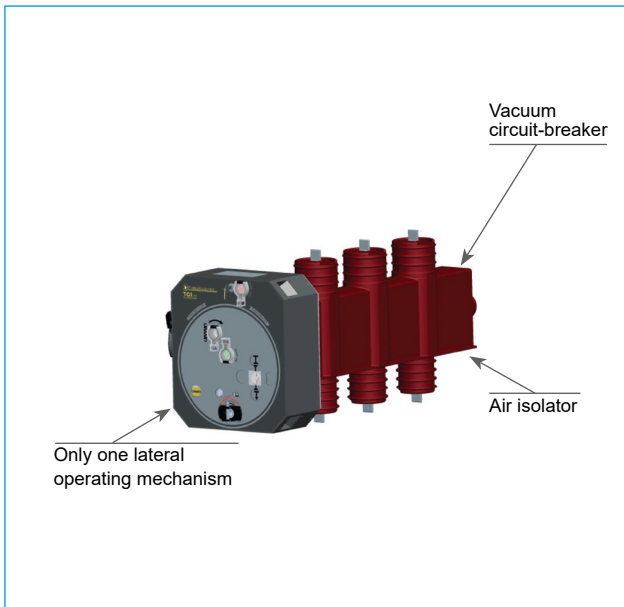
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3 IN 1

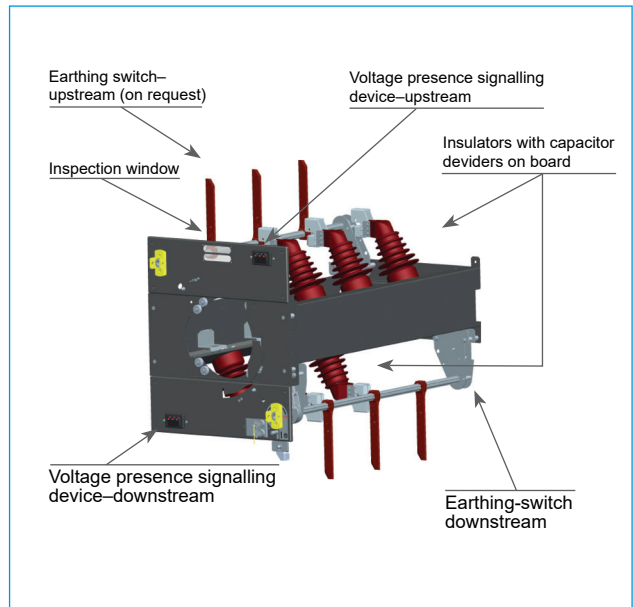
VACUUM CIRCUIT-BREAKER – AIR ISOLATOR - EARTHING SWITCH

TGI is composed by a mobile removable part and a fixed part. The rotating body complete with lateral operating mechanism constitutes the mobile

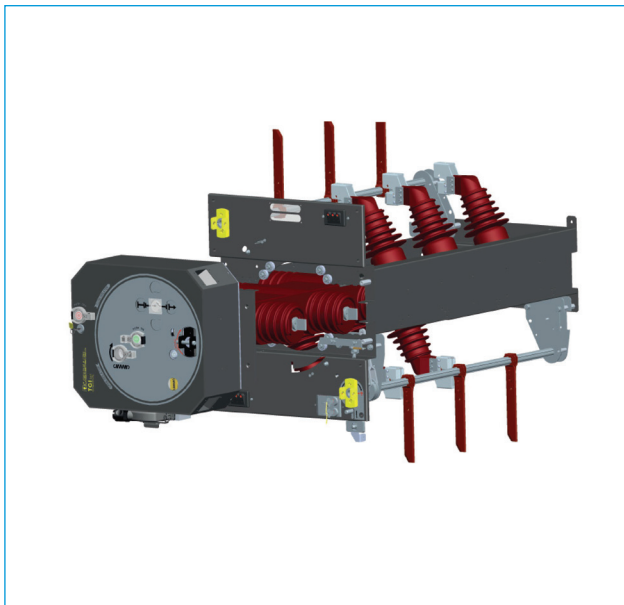
part, while the frame with the six insulators (with the possibility of capacitor dividers on board) and the earthing switch are the elements of the fixed part.



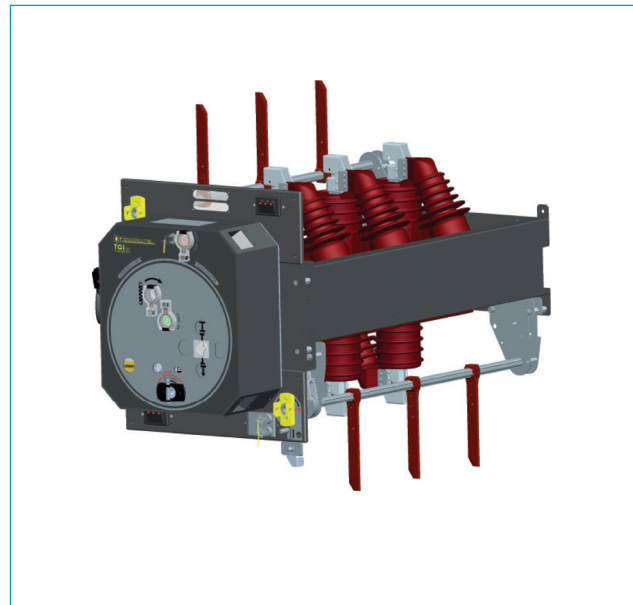
Rotating Body – Mobile part - Vacuum Circuit-Breaker, air isolator and operating mechanism



Frame – Fix part for the rotating body fitting

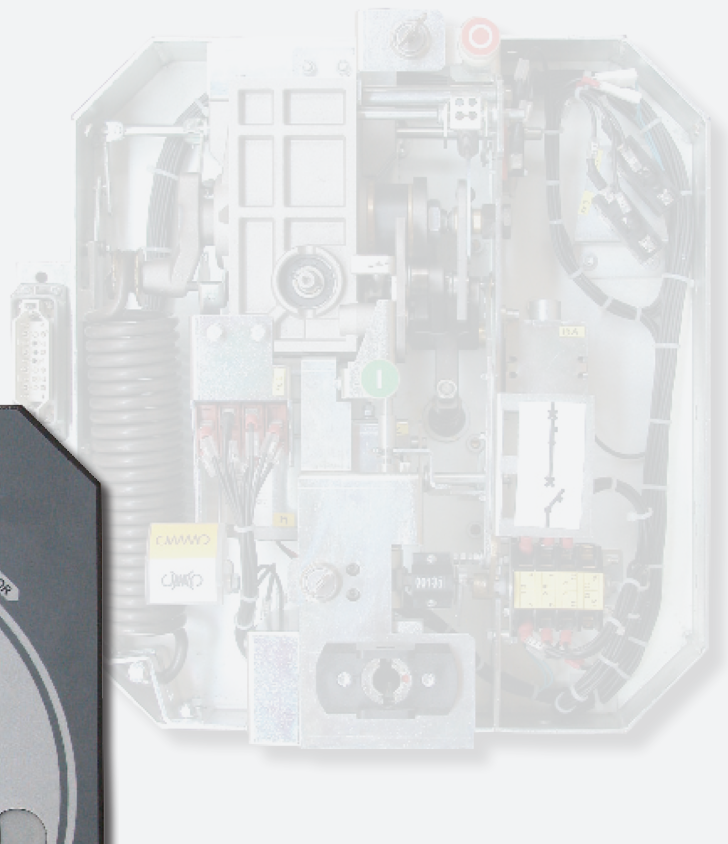


Fitting/Removal rotating body – frame



TGI – 3 in 1, one device for three functions:
 Vacuum circuit-breaker
 Air rotary isolator
 Earthing switch

SIMPLE AND VERSATILE



TGI type

The exercise of the power network is an activity that does not allow errors, that is why all devices interested in the operations of power control and distribution should be as simple and intuitive as possible.

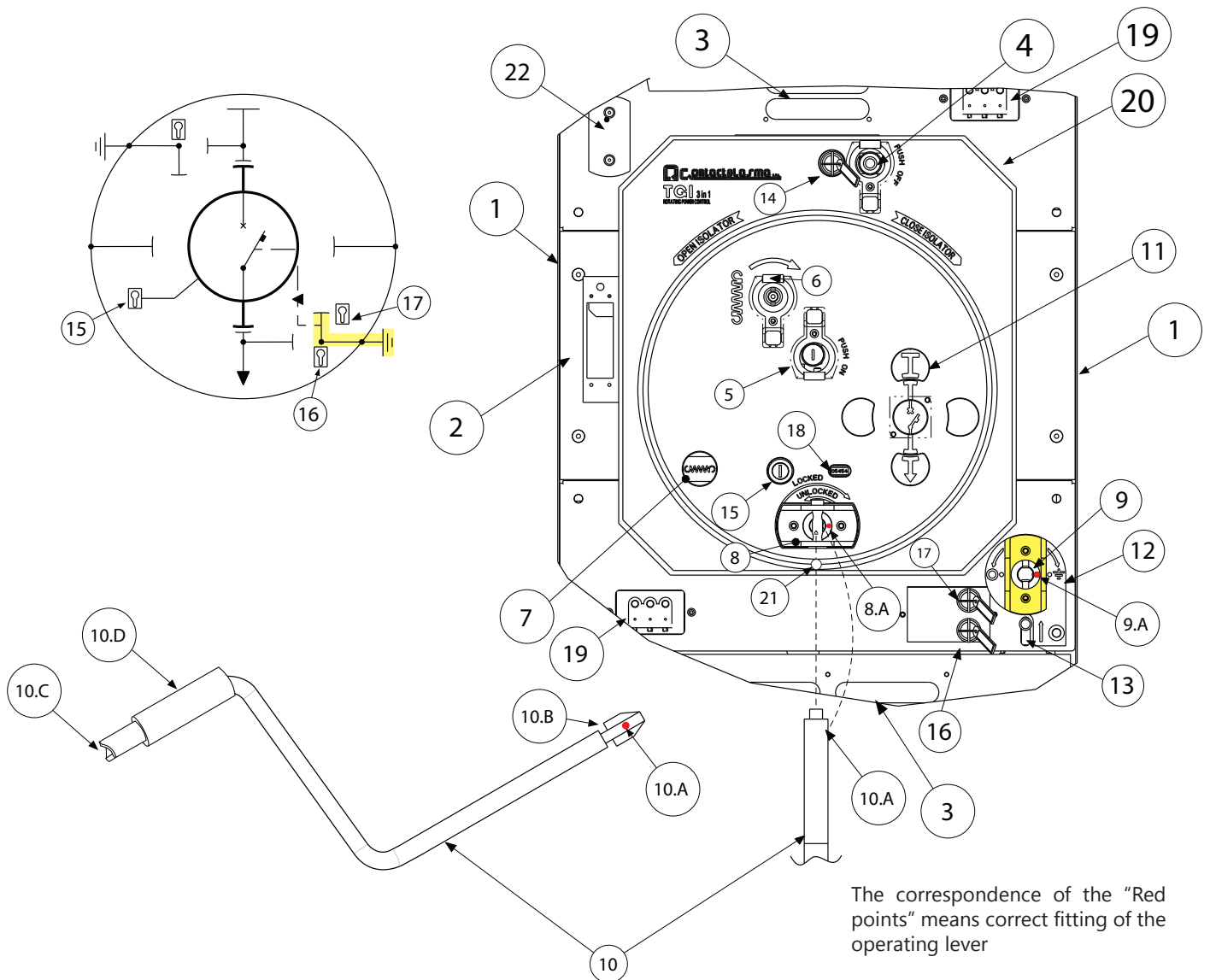
For this reason TGI has been designed to be:

- Simple maintenance thanks to the use of a fluent operating mechanism, easy to repair, to update and replace.
- Easy to use thanks to the clarity of the controls and the presence of a synoptic with detailed information and interactive, able to inform the operator about the line and the unit conditions.



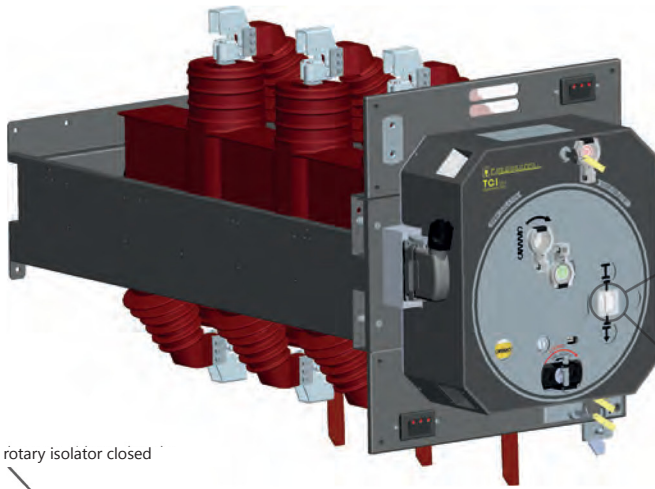
TGIR overturned type

SIMPLE AND VERSATILE

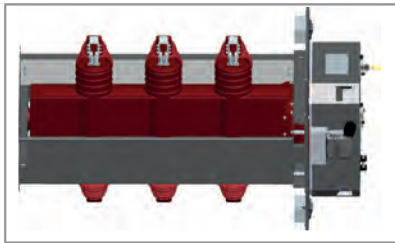
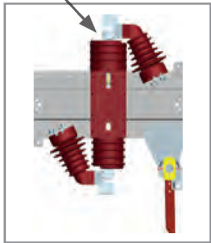


1	Side covers	10.C	Side for manual charging of closing spring
2	Auxiliary circuits connector (plug + socket)	10.D	Retractable knob
3	Inspection window	11	Isolator and C.B. position indication
4	Circuit breaker (C.B.) opening pushbutton with padlock facility optional	12	Earthing switch position indication
5	C.B. closing pushbutton with padlock facility optional	13	Unlock door
6	Manual charging of closing spring	14	Key lock C.B. in open position
7	Mechanical indication closing spring charged (yellow) / discharged (white)	15	Key lock isolator in open / closed position key free
8	Air rotary isolator operation seat	16	Key lock earthing switch in closed earth position key free
8.A	"Red point" indicator	17	Key lock earthing switch in open position
9	Downstream earthing switch operation seat	18	Counter of operations
9.A	"Red point" indicator	19	3ph voltage presence indicator
10	Air rotary isolator and earthing switch operating lever	20	Recessed handles for rotation and removal (4 sides)
10.A	"Red point" indicator	21	"Yellow" button for key lock air rotary isolator in open
10.B	Side for air rotary isolator and earthing switch operations	22	Eventual upstream earthing switch operation seat (optional)

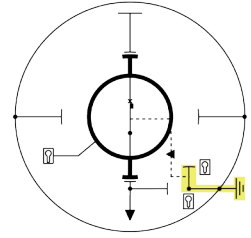
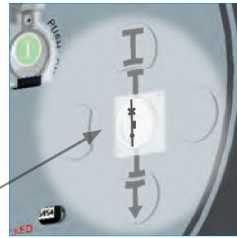
SIMPLE AND VERSATILE



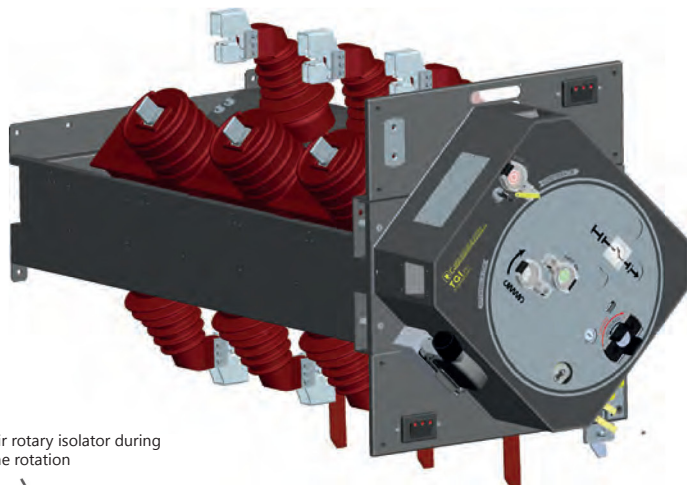
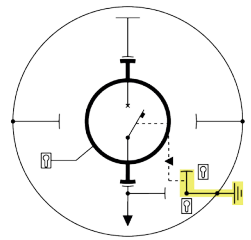
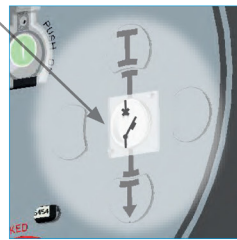
Air rotary isolator closed



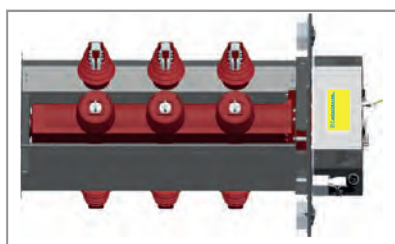
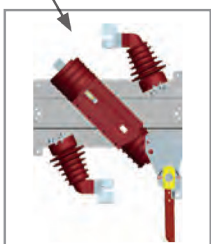
TGI - VACUUM CIRCUIT-BREAKER (ON)



TGI - VACUUM CIRCUIT-BREAKER (OFF)



Air rotary isolator during the rotation

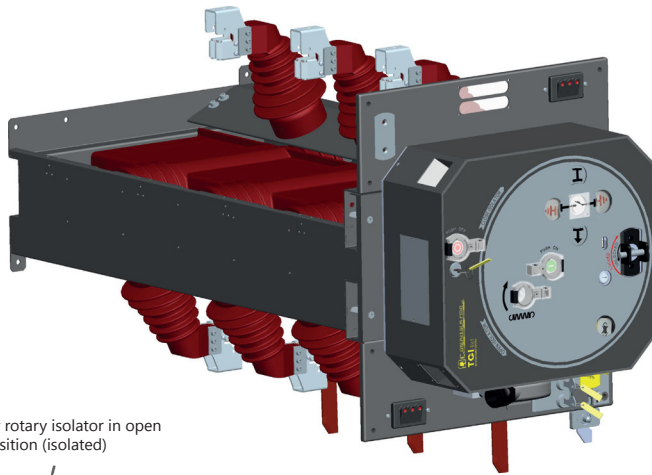


TGI - DURING ISOLATION

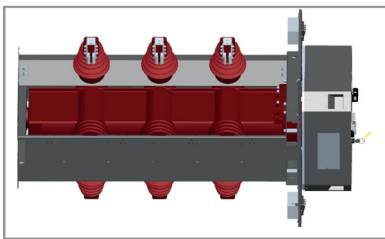
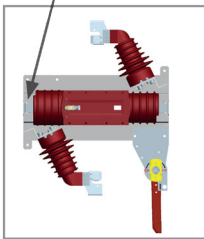


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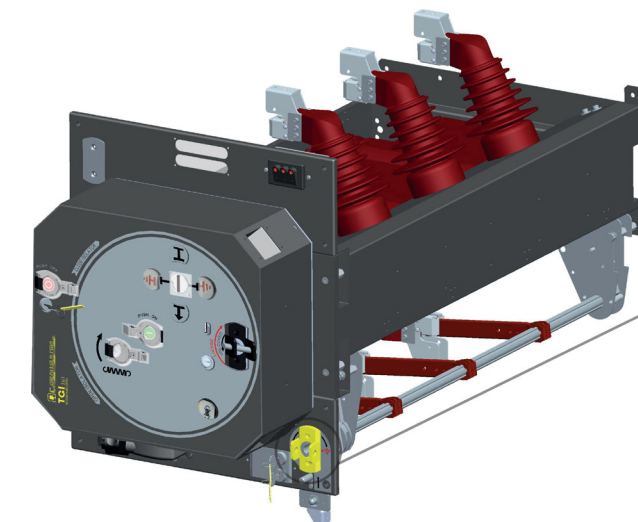
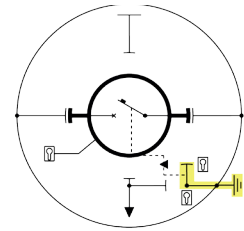
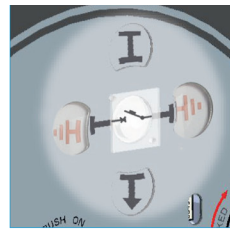
SIMPLE AND VERSATILE



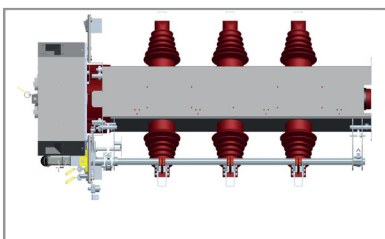
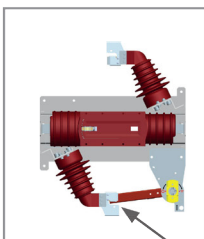
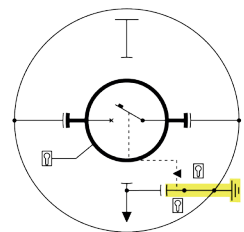
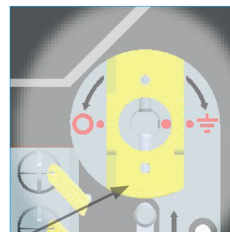
Air rotary isolator in open position (isolated)



TGI - ISOLATED



TGI - EARTH POSITION



Earthing-switch closed in earth position

The three functions, vacuum circuit-breaker, air isolator, and earthing-switch, are performed by a single device, composed of a rotating body plus a frame, which includes all interlocks required to comply all the Standards for safety and the correct sequence of operations.

OPERATION SEQUENCE "ON" COMMISSIONING

The operations sequence described on the following pages expose, the steps to made to put in function or out of fuction electrical line connected to the TGI.

The operations to perform to "ON" a line by the TGI unit are clear and simple. The internal mechanism of the operating de-

vice prevents any type of operator error, ensuring reliable feeder to each type power plant.

Focusing on putting out of function (page 9) should be emphasized that also in this case the TGI allows to perform, safely and intuitive operations of the breaking, di-

sconnection and earthing, necessary for the proper isolation of a line.

The set of mechanical blocks prevents each type of mistakes during these operations. The key locks shown are not strictly necessary for the proper and safe use of the device.



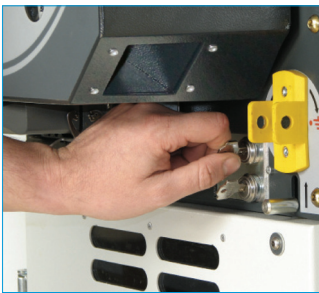
1 Close the panel door



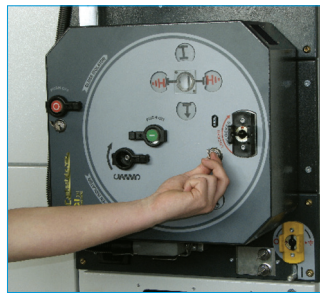
2 Unlock the earthing switch by the key (if available)



3 Open the earthing switch



4 Lock the earthing switch by the key (if available)



5 Unlock the air rotary isolator by the key (if available)



6 Unlock the air rotary isolator



7 Close the air rotary isolator by the rotation



8 Lock the air rotary isolator in position "close"



9 Lock the air isolator by the key (if available)



10 Unlock the opening push button by the key (if available)



11 Charge the spring



12 Close (ON) the vacuum circuit breaker

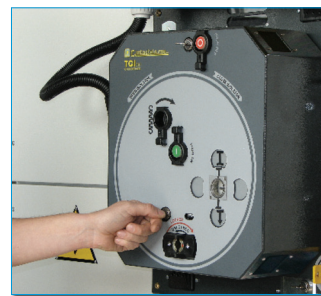
OPERATIONS SEQUENCE "OFF" DECOMMISSIONING



1 Open (OFF) the vacuum circuit-breaker



2 Lock the opening push button by the key (if available)



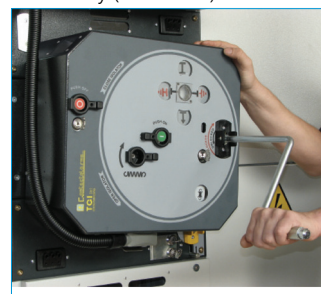
3 Unlock the air rotary isolator by the key (if available)



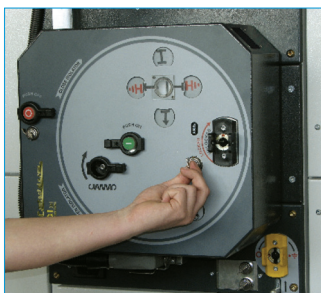
4 Unlock the air rotary isolator



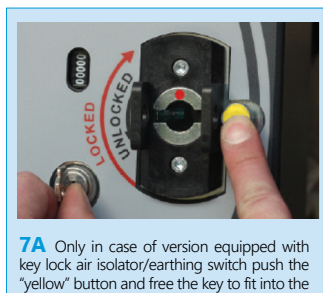
5 Isolation (by the rotation)



6 Lock the air rotary isolator in "open" position



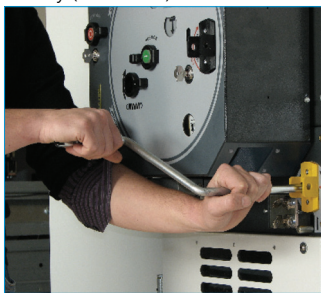
7 Lock the air rotary isolator by the key (if available)



7A Only in case of version equipped with key lock air isolator/earthing switch push the "yellow" button and free the key to fit into the earthing switch key lock



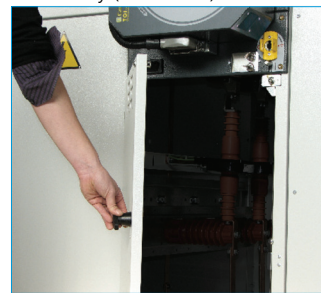
8 Unlock the earthing switch by the key (if available)



9 Close the earthing switch

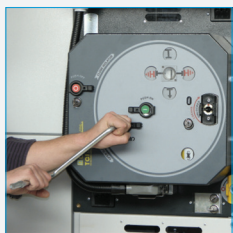


10 Lock the earthing switch by the key (if available)



11 Open the panel door

TEST



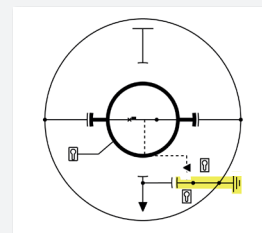
1 Charge the spring



2 Closing Test



3 Opening Test



4 Test position

The special design of the TGI allows the TEST of the vacuum circuit-breaker with air rotary isolator open (plant isolated). This test allows the operator to verify the electromechanical properties and integrity of the vacuum circuit-breaker without powering up the system connected to it.

OPERATOR SAFETY

The safety of personnel involved in the maintenance of electrical plant has always been a central prerogative in the company policy of Contactplasma srl. Given this premise then, we can say that the TGI not only limited to the application of standards, offering a long series of interlocks and additional segregations able to ensure the safety of workers also in the toughest conditions.

The air insulation allows to forget all those typical concerns of gas insulated equipment, in fact the air particular feature is to self-restore the dielectric capacity in case of discharge, has no need of maintenance and does not require sealed envelop that does not

allow a reliable visibility. For reasons related not only to the safety, but also the robustness and continuity of service, Contactplasma srl, has also limited to the minimum electrical interlocks, all safety systems are mechanical type and physically prevent the execution of incorrect operations by users.

Thanks to the unique rotating movement, TGI allows to carry out an isolation able to offer a complete segregation between live parts and accessible parts. This special type of isolation allows to carry out safely the mechanical test of vacuum circuit-breaker and relevant mechanism even if the line is out of service and isolated.

MECHANICAL INTERLOCKS

- **Anti-pumping main contacts device**
If the vacuum circuit-breaker is tripped is not possible accidental closing of the main contacts.
- **Mechanical interlock air rotary isolator and earthing switch**
Prevents the closing of the earthing-switch if the air isolator is not "open" and the closing of the air isolator if the earthing switch is not "open".
- **Mechanical interlock between vacuum circuit-breaker and air rotary isolator**
Opens (OFF) the vacuum circuit breaker when you insert the operating lever inside the air rotary isolator operation seat.
- **Mechanical interlock panel door**
Prevents the opening of panel door and access to the cable compartment, if the earthing switch is not closed and prevents the opening of the earthing switch with cable compartment panel door open.
- **Mechanical block - operating handle**
During the isolation and earthing operation it is not possible to extract the operating lever before completing entirely movements required to open \ close the air isolator or the earthing switch.
- **Mechanical block-auxiliary circuit connector (Optional)**
Opens the main circuit (OFF) if the auxiliary connector plug is removed from the socket. Prevent also the closing (ON) of vacuum circuit-breaker until the plug is not fitted into the socket

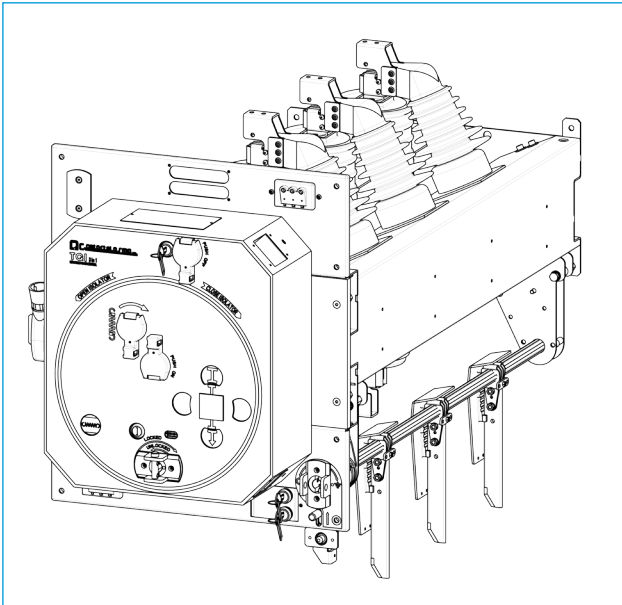
KEY LOCKS (Optional)

- **Key lock on air rotary isolator (rotation block)**
Prevents the possibility to insert the operating lever in the air rotary isolator operation seat blocking the rotation (both in open or close direction) and avoiding the accidental opening OFF (by inserting the operating lever) of the vacuum circuit breaker if closed ON.
- **Key lock on air rotary isolator in open isolated position**
Prevents the closing of the air rotary isolator without the presence of key.
- **Key lock air rotary isolator/earthing switch**
Prevents the closing of the earthing switch without the key released from the key lock in open position of the air rotary isolator. Prevents the closing of the air rotary isolator without the key released from the key lock in open position of the earthing-switch.
- **Key lock earthing switch - key free in open.**
Prevents the closing of the earthing without the presence of the key.
- **Key lock earthing switch - key free in closed**
Prevents the opening of the earthing without the presence of the key.
- **Key lock on the opening pushbutton**
Lock the vacuum circuit-breaker in open position (OFF)

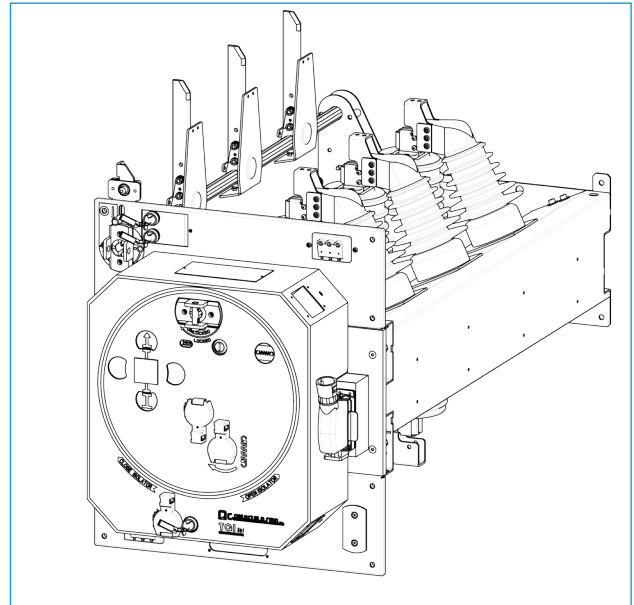
PADLOCK FACILITIES (Optional)

Prevent operator access to the controls that allow the following functions:
Opening pushbutton, closing pushbutton, manual charging of closing spring, operations on air rotary isolator, operations of the earthing switch.

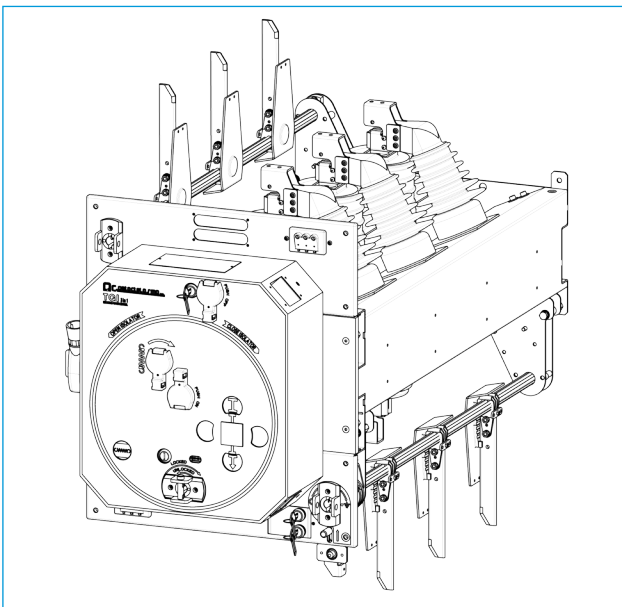
VERSIONS



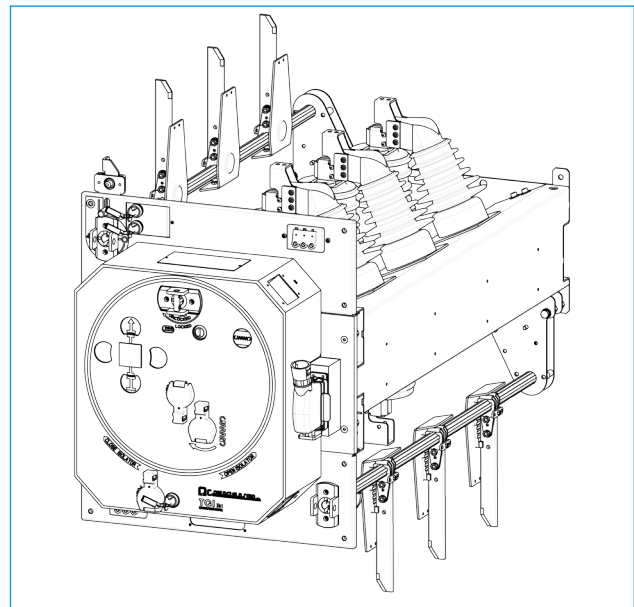
TGI - Earthing switch downstream



TGIR (overturned) – Earthing switch downstream



TGI - Earthing switch downstream and upstream



TGIR (overturned) – Earthing switch downstream and upstream

Contactplasma srl proposes two main versions: TGI that is the standard version and the version TGIR (overturned), having the possibility to receive power from bottom rather than from the top of the unit.

the possibility to install key locks and padlock facility. The earthing switch upstream has padlock facility.

Either in version **TGI** that in version **TGIR** it's possible to have custom solutions.

The earthing switch is applicable to both downstream and upstream the unit, as well as the capacitor dividers on board with voltage presence indicators. The earthing switch downstream is interlocked with the air isolator and offers

On request on board of TGI (incorporated in the frame insulators) are available the capacitor dividers downstream and/or upstream.

VISIBLE ISOLATION REMOVAL FACILITY



The isolation must be clearly indicated and possibly visible. TGI has both these functionalities, allowing to the operators direct visual inspection of the compartments in tension. Being isolated in air allows also a visual check of the state of isolation.

Mounted on a frame that allows full rotation of the entire device, TGI is removable during maintenance and installation. This easy operation allows to facilitate the assembly stages and then installation of the switchboard also in situation of reduced space.

Mounted inside switchboard of AIR 24 series , the unit TGI shows its positive features; this type of panels allows total and simple accessibility ensuring easy connection of cables and fluent installation.

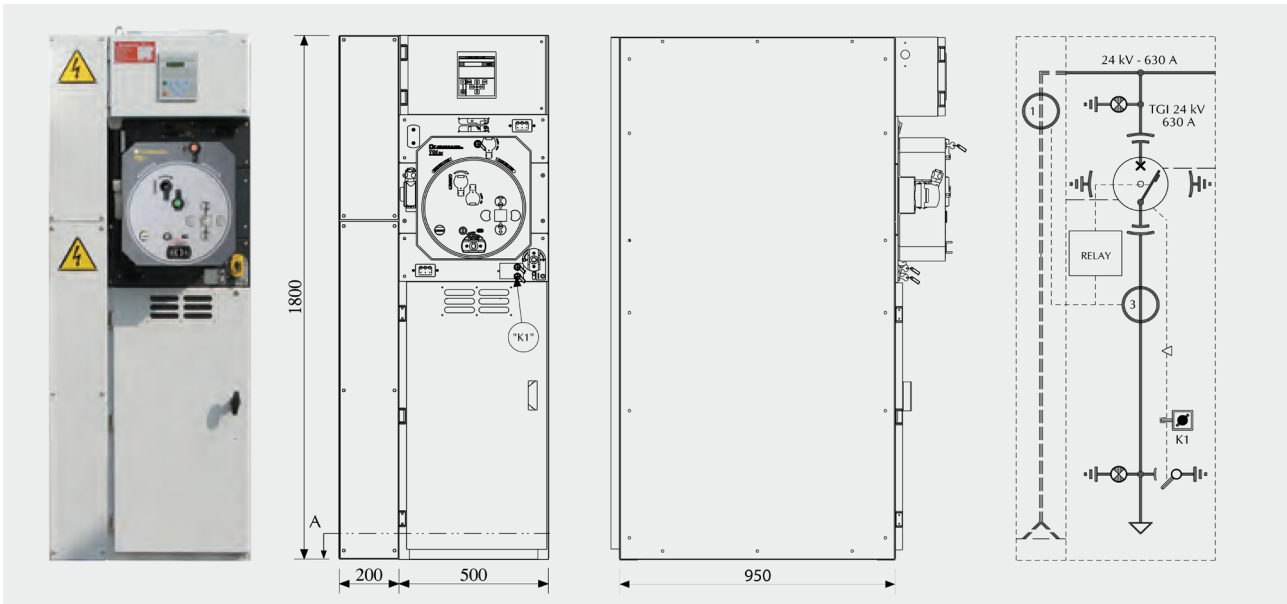


SWITCHBOARDS

Contactplasma srl, can also provide TGI installed in the properly dimensioned series AIR 24 switchboard. The versatility of the two elements joined together allows to develop the most disparate plant dynamics. The cables incoming and outgoing can be managed according to the installation needs and Your device can be adjusted and

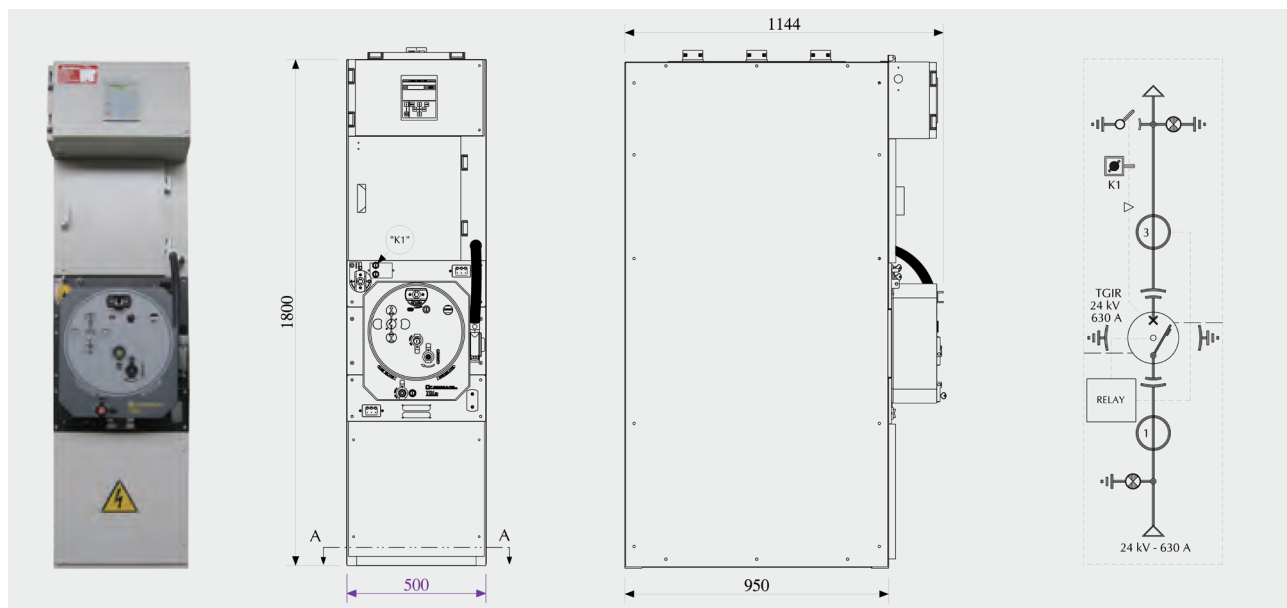
supplied respecting the different needs and requirement of the system design. The compact dimensions of TGI allow also the installation inside the same panel of current transformers (CT) and voltage transformers (VT) these last actually essential in electrical generation plants.

SWITCHBOARDS HAVING LEFT OR RIGHT INCOMING PANEL (incoming/outgoing cables from bottom) AC+IGT



This switchboard is of a conventional type, allowing the cables incoming/outgoing from the bottom. The incoming cables panel AC can be installed either on the left or right side of the IGT panel. There is also version suitable for bus-bars incoming /outgoing instead of cables.

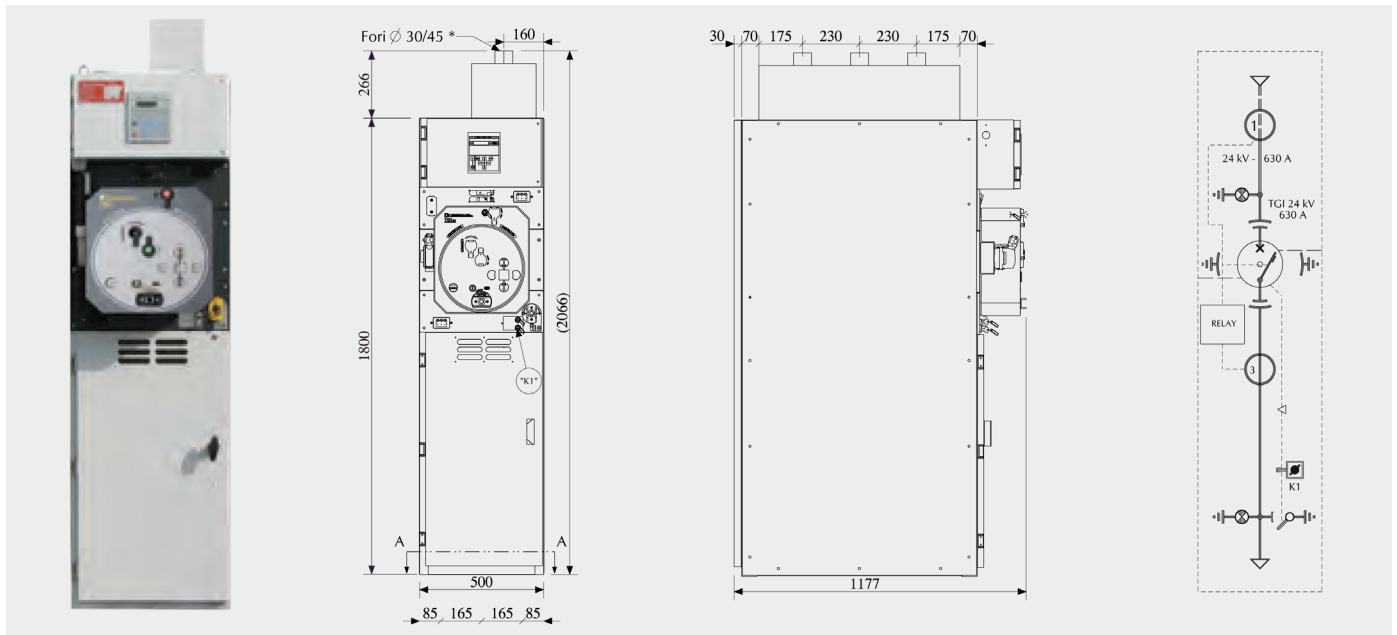
OVERTURNED SWITCHBOARDS (incoming from bottom / outgoing from top) IGTR



This switchboard is of a conventional type, allowing the cables incoming/outgoing from the bottom. The incoming cables panel AC can be installed either on the left or right side of the IGT panel. There is also version suitable for bus-bars incoming /outgoing instead of cables.

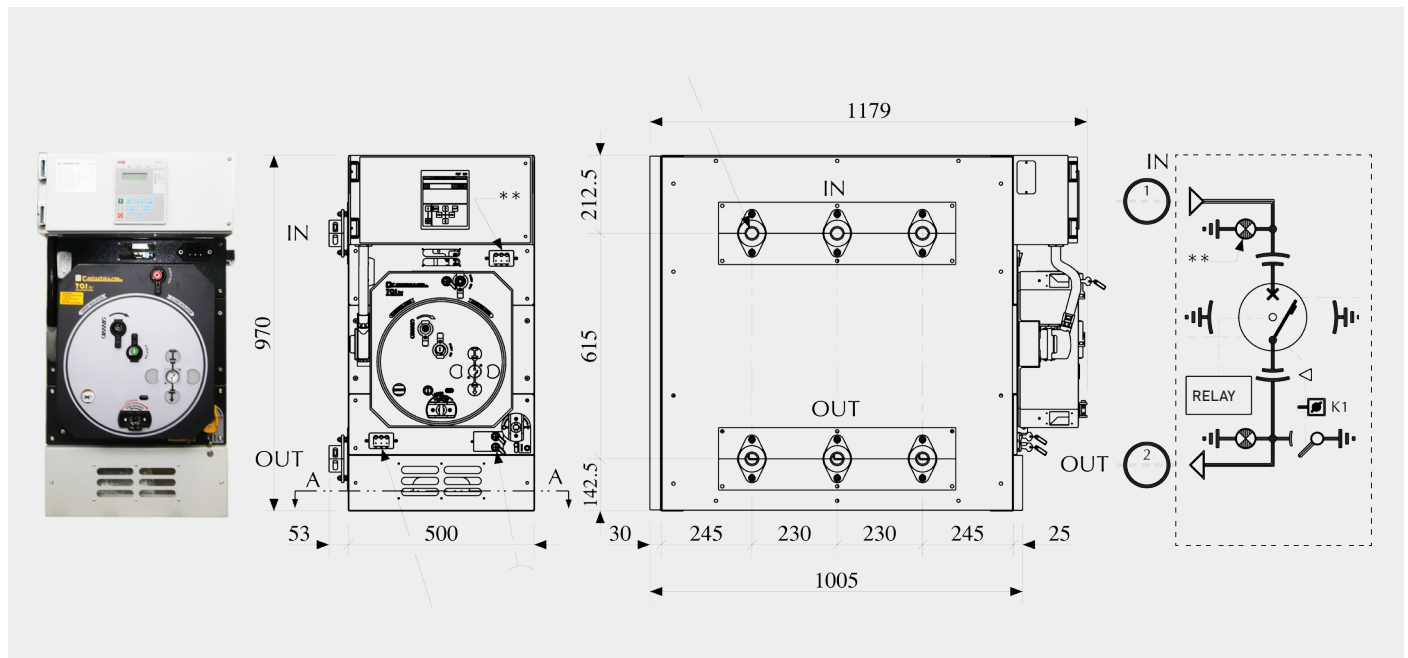
SWITCHBOARDS

SWITCHBOARDS WITH TOP INCOMING (outgoing from bottom) IGT-A



This type of switchboard allows the arrival of the cables from the top, in the practical box installed on top of AIR24 where it is also possible to install the toroidal type current sensors for the detection of ground currents. This panel allows, where there is a need and opportunity, to install in 50 cm only switchboard with top incoming cables.

SPECIAL COMPACT SWITCHBOARDS IGT-S

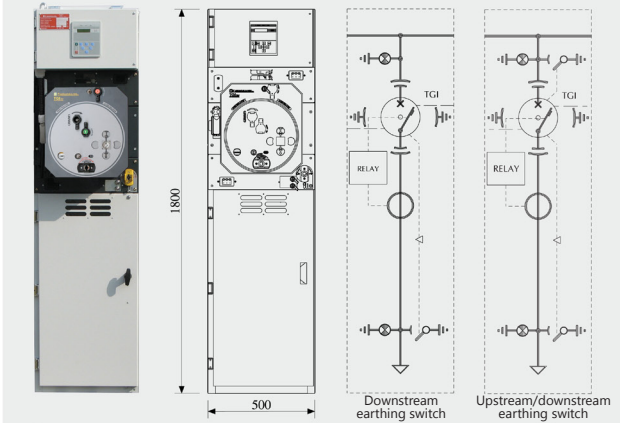


The TGI allows the realization of special panels of reduced dimensions for installations in narrow spaces, tunnels, and galleries. With the entry of the cables directly on the side of the compartment (left or right side) you get a panel complete with protection relay that requires only 1 meter in height for installation, in 50 cm wide.

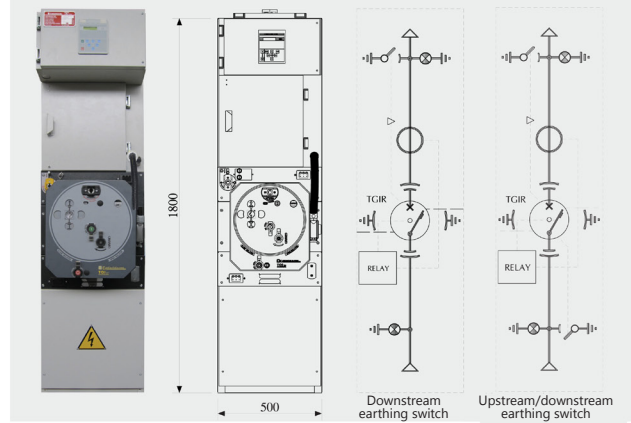
SWITCHBOARDS

MAIN PANEL TYPES

IGT – equipped with TGI



IGTR – equipped with TGIR overturned



The modular panels of AIR 24 series equipped with TGI (IGT type panel) and TGIR overturned version (IGTR type panel) allow to condense into just 50 cm all the functions of “traditional” Medium Voltage Panel composed by line isolator, circuit-breaker and earthing switch.



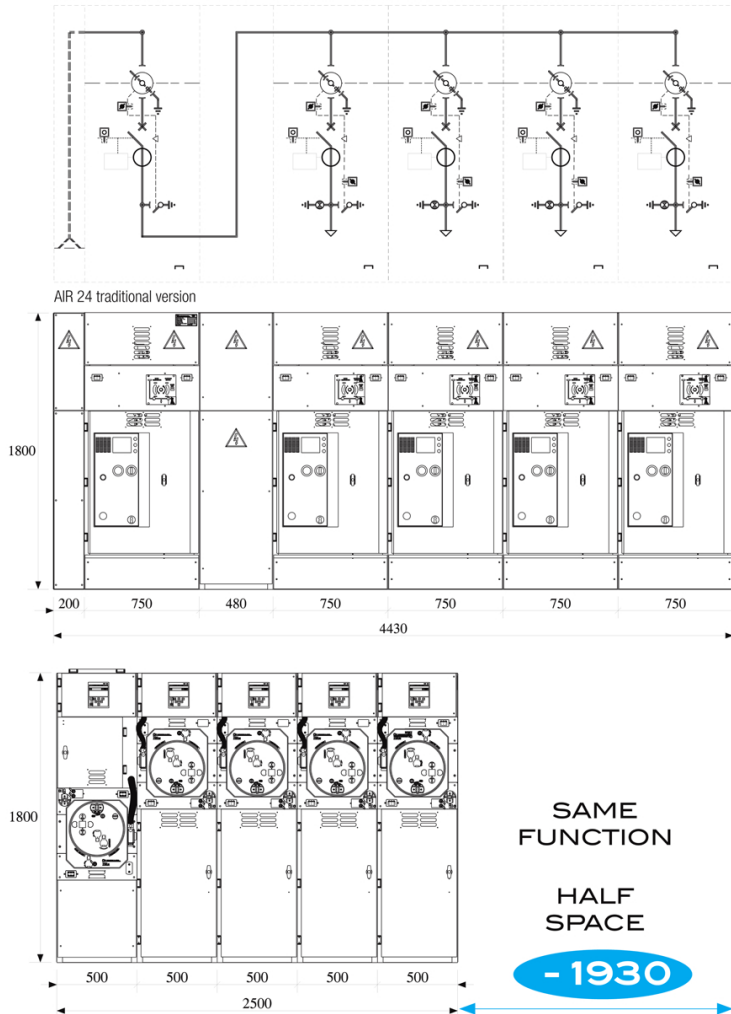
Modular and compatible with all other panels of AIR 24 series, allow to realize various combinations to meet all the needs of modern Medium Voltage systems.

Suitable for installation inside booths, kiosks, containers and prefabricated structure, or on request available in “outdoor” versions which don't requires any further protection to withstand to the weather conditions.



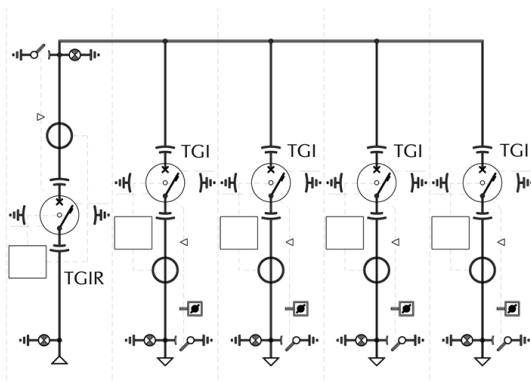
Outdoor Version

SWITCHBOARDS



The extremely compact dimensions of "new generation" MV panels equipped with TGI allow a remarkable space recovery. Compared to a "traditional" switchboard of our AIR 24 series equipped with off load isolator, earthing switch and separated circuit-breaker, carrying out the same functions, the use of "new generation" switchboards equipped with TGI optimizes the spaces, compacting the dimensions and reduce installation costs minimizing the environmental impact.

AIR 24 new generation with TGI

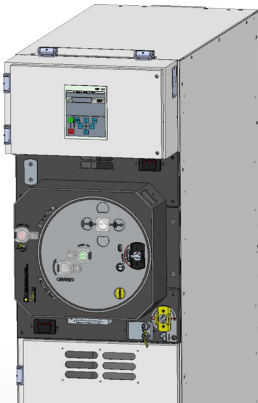


SWITCHBOARDS

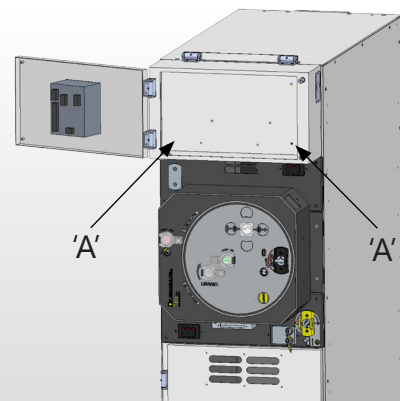
The uniqueness of TGI structure adds to the extreme compactness a total safety accessibility of all compartments during installation and routine maintenance of the switchboard. This is TGI alchemy to combine compact dimensions and accessibility.



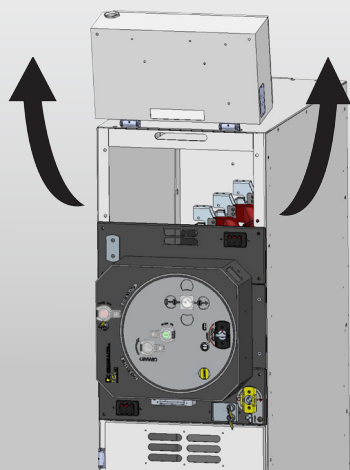
Low Voltage (LV) Box



The tipper LV Box allows easy and simple access to the busbars compartment during installation and maintenance.

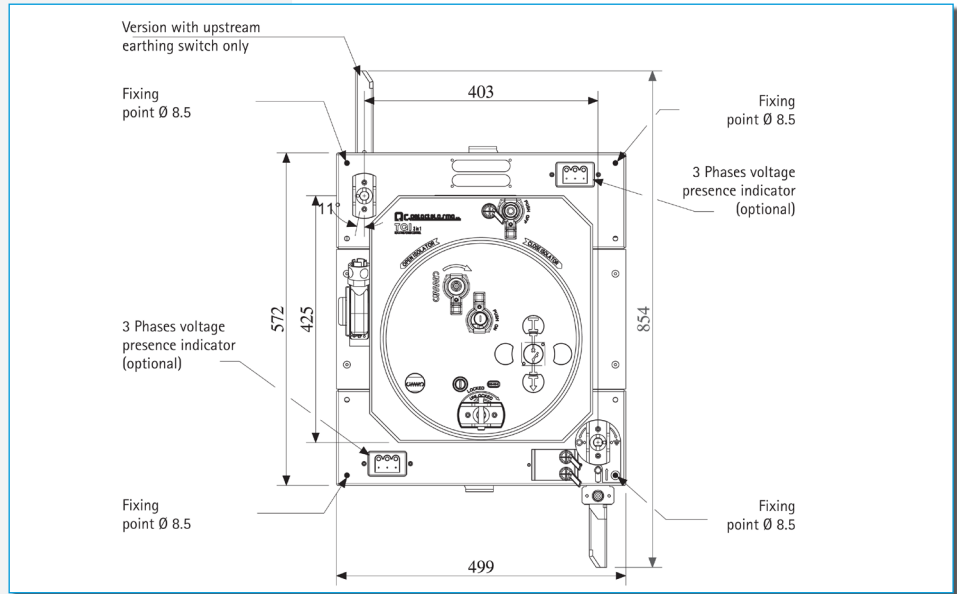


By removing the two fixing screws 'A' you have the possibility to overturn the LV Box.

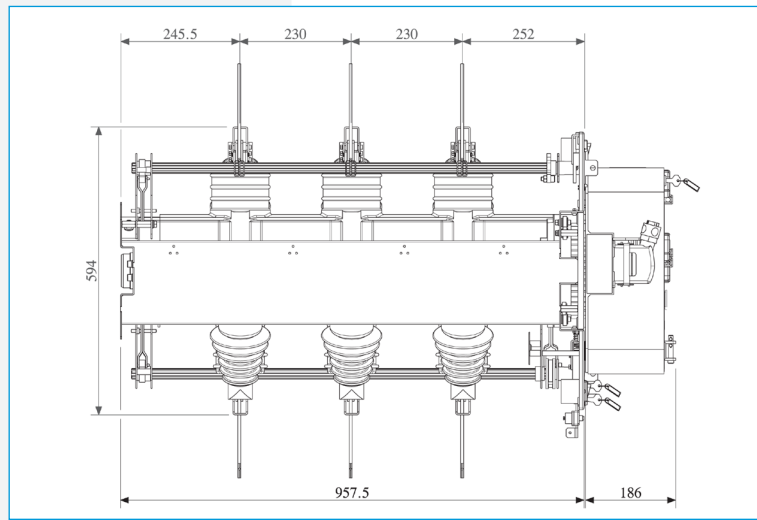


OVERALL DIMENSIONS

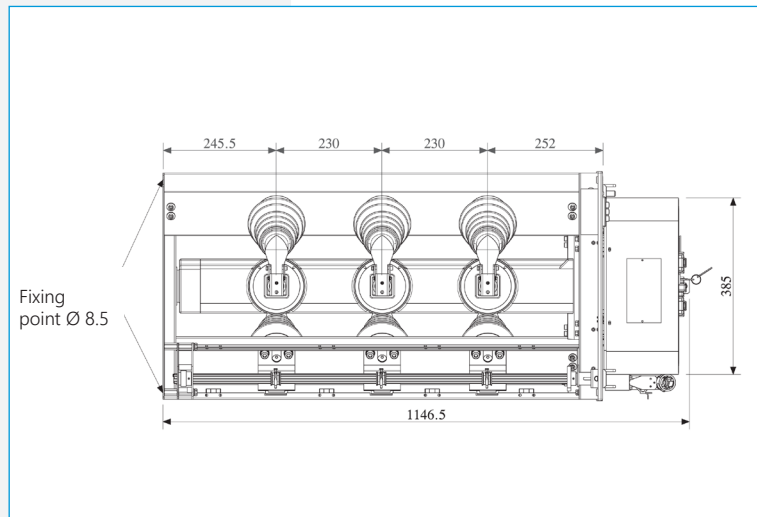
TGI 630/800/1250 A



TGI 630/800A



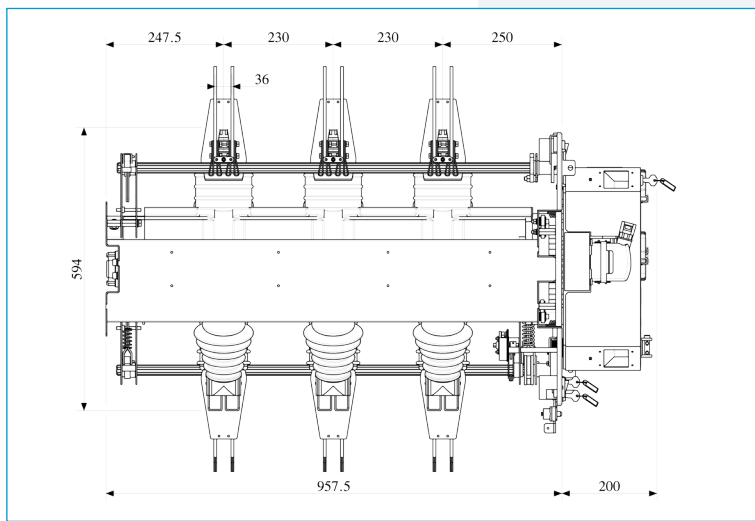
TGI 630/800A



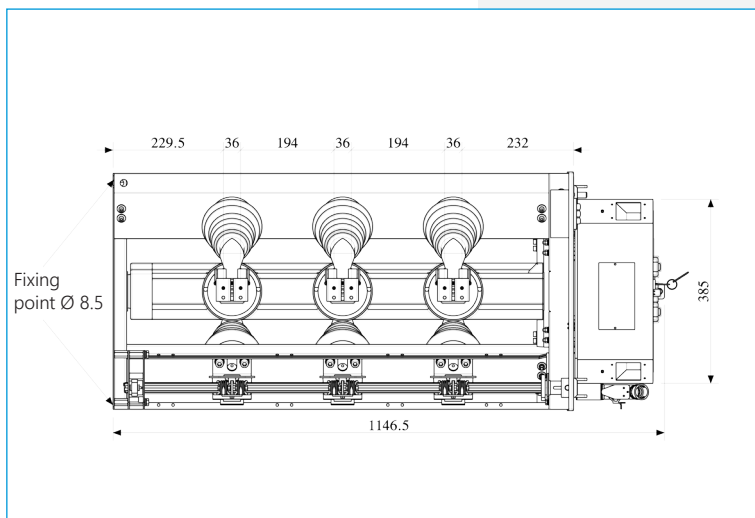
OVERALL DIMENSIONS

- Weight 55.0 kg (630 A) - without frame
- Weight 58.0 kg (1250 A) - without frame

12,5-16 kA versions overall dimensions.
For the other versions the maximum
dimensions are the same



TGI 1250 A



TGI 1250 A

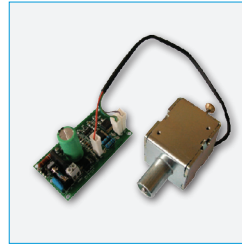
ACCESSORIES



TGIM1
Spring charging geared motor 230 V ac (vacuum circuit-breaker VCB)

TGIM2
Spring charging geared motor 24 V dc (VCB)

TGIM3
Spring charging geared motor 110 V dc (VCB)

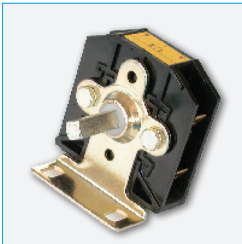


TGIMU1
Undervoltage release 230 V ac (VCB)

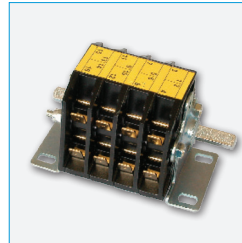
TGISPMU
Electronic card for undervoltage release protection (VCB)

TGIMU2
Undervoltage release 24 V dc (VCB)

TGIMU3
Undervoltage release 110 V dc (VCB)



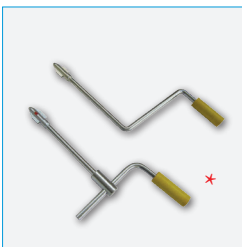
TGI89T
Auxiliary contacts 1NO+1NC
Earthing-switch



TGICA52
Auxiliary contacts 2NO+2NC (VCB)

TGICA521
Additional auxiliary contact 1NO (VCB)

TGICA522
Additional auxiliary contact 1NC (VCB)



TGILM (Standard)
Operating lever

* **TGILMC** (Optional)
Compact operating lever for reduced spaces



TGIFC2FC3
Micro-Switch 1NO+1NC position open and 1NO+1NC position closed
Air rotary isolator



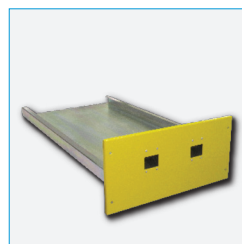
TGIFC1
Signalling contact spring charged/discharged



TGIDCPT1
3 phases capacitor dividers on board with voltage presence indicator –upstream

TGIDCPT2
3 phases capacitor dividers on board with voltage presence indicator –downstream

Photo represents the voltage presence indicator only

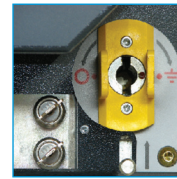
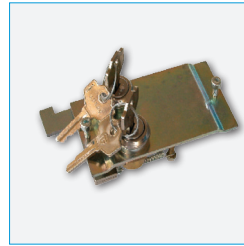


TGISM1
Metallic segregation for reserve panel

ACCESSORIES

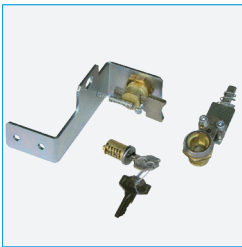


- Padlock facility VCB** (padlock excluded)
- TGIBLPO** opening pushbutton
- TGIBLPC** closing pushbutton
- TGIBLM** spring charge

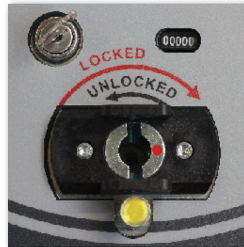


- TGIBCS1**
Key lock earthing-switch - key free in open
- TGIBCS2**
Key lock earthing-switch - key free in closed earth position

TGIBCS1 + TGIBCS2
Key lock air isolator/earthing switch (same key).



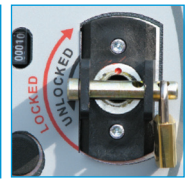
- TGIBVCB1**
Key lock in open position – VCB



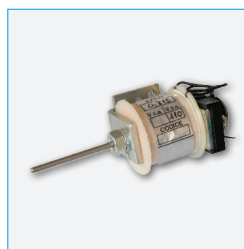
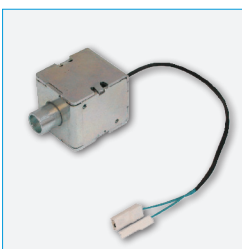
- TGIBCS1**
Key lock rotary air isolator (rotation block)
- TGIBCS2**
Key lock rotary air isolator in position open
Push the yellow button to free the key and lock the air isolator



- TGIBMCA**
Mechanical block – auxiliary circuit connector (VCB)



- TGIZABST**
Rod for padlock facility – air isolator and earthing-switch (padlock excluded)



- TGIM01**
Shunt opening release 230 V ac (VCB)
- TGIM02**
Shunt opening release 24 V dc (VCB)
- TGIM03**
Instantaneous shunt opening release 230 V ac - 110 V dc (VCB)
- TGIM04**
Instantaneous shunt opening release 24 V dc (VCB)

- TGIM05**
Instantaneous shunt opening release 48 V dc (VCB)

- TGIMC1**
Shunt closing release 230 V ac 110 V dc (VCB)

- TGIMC2**
Shunt closing release 24 V dc (VCB)

00006GM_TGI-ING_C_rev00

GENERAL CHARACTERISTICS

Circuit-breaker		TGI 12			TGI 17			TGI 24		
Pole centre distance	mm	230			230			230		
Standards	IEC 62271-100 CEI 17-1									
Rated voltage	Ur [kV]	12			17.5			24		
Rated insulation voltage	Us [kV]	12			17.5			24		
Withstand voltage at 50 Hz	Ud (1') [kV]	28			38			50		
Impulse withstand voltage	Up [kV]	75			95			125		
Rated frequency	Fr [Hz]	50-60			50-60			50-60		
Rated normal current (40°C)	Ir [A]	630	800	1250	630	800	1250	630	800	1250
Rated breaking capacity	Isc [kA]	12.5	-	-	12.5	-	-	12.5	-	-
		16	16	16	16	16	16	16	16	16
		20	20	20	20	20	20	20	20	20
		25	25	25	25(*)	25(*)	25(*)	25(*)	25(*)	25(*)
Rated short-time withstand current (3s)	Ik [kA]	12.5	-	-	12.5	-	-	12.5	-	-
		16	16	16	16	16	16	16	16	16
		20	20	20	20	20	20	20	20	20
		25(*)	25(*)	25(*)	25(*)	25(*)	25(*)	25(*)	25(*)	25(*)
Making capacity	Ip [kA]	31.5	-	-	31.5	-	-	31.5	-	-
		40	40	40	40	40	40	40	40	40
		50	50	50	50	50	50	50	50	50
		63(*)	63(*)	63(*)	63(*)	63(*)	63(*)	63(*)	63(*)	63(*)
Operation sequence	O-0.3s-CO-15s-CO									
Opening time	[ms]	10 - 30			10 - 30			10 - 30		
Arcing time	[ms]	10 - 15			10 - 15			10 - 15		
Total breaking time	[ms]	20 - 45			20 - 45			20 - 45		
Closing time	[ms]	25 - 45			25 - 45			25 - 45		
Operating temperature	[°C]	-5 ÷ +40			-5 ÷ +40			-5 ÷ +40		
Tropicalization	IEC 60068-2-30 IEC 60271-2-1									
Electromagnetic compatibility	IEC 62271-1									
(*) On request										



Certificate UNI EN ISO 9001:2015

Field of Application

Engineering and design, research, development and manufacture of: Medium Voltage Vacuum Circuit-Breakers; Medium Voltage Switch-Disconnectors; Metal-Enclosed Medium Voltage Switchboards; Ring Main Units and Panels; Low Voltage Switch-Disconnectors and Switch-Disconnectors-Fuses; Low Voltage Change-over Switches; Deviators and By-Passes Customer service. Know-how transfer.

00006CM_TGH-ING_C_rev00



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 L.V. - M.V. ELECTROMECHANICAL AND ELECTROTECHNICS TECHNOLOGICAL RESEARCH

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