GR1-VI & GR2-VI

Up to 24kV 21kA 630A
VI based T-type RMU

Safe | Reliable | Compact

The new age sustainable solution
for Electrical Switching

The switchgear specialist

TAMCO

www.tamco.com.my

TAMCO has been manufacturing medium voltage Ring Main Unit since early 1970's. The type GR1 & GR2 are upgraded with vacuum switching in TAMCO's proven SF_6 gas RMU design for higher short circuit & switching performance.

GR1 & GR2 are compact SF_6 insulated RMU designed to be used both indoors and outdoors. The product has long service life and requires virtually zero maintenance.

SAFETY & INTERLOCKS

GR1 & GR2 are Internal Arc Fault type tested up to 21kA for 1 sec (25kA for 1 sec as option). This offers the operator's safety in the unlikely event of internal arc fault.

The detailed instructions about operations & interlocks are screen printed on the front of the unit for fool-proof operation.

MAINTENANCE FREE

All switching parts susch as CB/DS/RSW is sealed for life inside a gas tank. All connections are via touch-proof that ensures no maintenance.

MAXIMUM RELIABILITY

TAMCO has upgraded its proven GR1 & GR2 series of RMU to VI based switching that provides better performance for switching operation.

SMART ADDITION

TAMCO's GR1 & GR2 comes with feature for extension on both sides. Also they can be communication ready with future motorisation possibility.

EASE OF OPERATION

Mimic diagrams and position indicators to guide the operators for operation. Additionally this reduces the chance of any undesired operation. This also ensures that no special training is required for the operators.

EASE OF INSTALLATION

Direct and simple operational procedure with mimic diagram reduces the need of operator's training.

DELIVERING PEACE OF MIND

INTRODUCTION

TAMCO has vast experience in manufacturing and supplying of GR1 type of RMUs, which were based on rotating arc circuit breaker (RACB). TAMCO has upgraded its GR series of RMU to VI based switching. GR1-VI & GR2-VI are SF_6 insulated vacuum switching based compact T-type Ring Main Units (RMU).

The primary innovation in GR1-VI & GR2-VI is its compact & flexible design up to 24kV that makes it to accommodate variety of indoor and outdoor installation without necessitating handling gas at site. Due to incorporation of vacuum interrupter, the product provides higher level of reliability in switching operation. Moreover it is equipped with all safety interlocks for safe and reliable operation.

KEY FEATURES

- SF_6 gas insulation with vacuum circuit breaker - No fire hazard
- Available for both Indoor and outdoor installation
- Minimal maintenance and sealed tank for life time
- Robotic welding of gas tank ensures leak free operation
- Robust construction
- Tee-off circuit breaker with integral protection system (self powered relay or time lag fuses)
- Ample bushing space for mounting current transformers
- Fully extensible options
- Internal arc classified and fully type tested according to latest IEC standards
- Motorised spring charging options for VCB & LBS
- Power cable termination and cable test facilities
- Remote control and monitoring with options for communication

CUSTOMER BENEFITS

- Ergonomic design for simple and quick operation
- Minimum footprints
- Optimum utilisation of space
- Lesser components in linkages
- Integral safety for peace of mind
- Easy installation and extension of RMUs
- Customer oriented after sales support
- Direct & easy connection to transformers
- Flange mounted design available as option

GENERAL

NORMAL SERVICE CONDITIONS

The GR1-VI & GR2-VI switchgear is designed for indoor, as well as outdoors installation without any additional enclosure.

Temperature: -5˚C to 40˚C.

Installation Altitude: Up to 1000m. At higher installation altitudes, the reduced voltage endurance must be taken into account.

Air Pollution: The ambient air must be free of corrosive or combustible gases or fumes and steam.

Air Humidity:

- maximum 24 h average of relative humidity 95% .
- maximum 24 h average of water vapour pressure 22 mbar
- maximum monthly average of relative humidity 90% .
- maximum monthly average of water vapour pressure 18 mbar

APPLICATIONS

- Building System
- Industrial System
- Energy & Infrastructure System
- Packaged Substation
- Mining Industry

For other values and special requirements, please contact the TAMCO Sales Office to your region.

TECHNICAL DATA

ELECTRICAL CHARACTERISTIC

GENERAL

Standards

Rated Voltage	kV	12 / 24	17.5
Rated Current	A	630	630
Rated Frequency	Hz	50	60
Rated Short Time Current	kA/3 Sec	21	21
Rated Short Circuit Making Current	kAp	52.5	54.6
Rated Short CIrcuit Symmetrical Breaking Current	kA	21	21
Rated Impulse Voltage (1.2/50)	kVp	75 / 125	95
Rated a.c 1 min pf Voltage	kV rms	28 / 50	38
Internal Arc Resistance	kA/1 Sec	21(AF) / 25(AFLR)	
Width 3 way	mm	1015	
Width 4 way	mm	1660	
Depth	mm	1240*	
Height	mm	1760*	

* Depth & Height may vary depending upon the configuration

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DESIGN

VI - BASED T-TYPE RMU

The principal unit is made up of ring switches and a tee-off circuit breaker placed in a SF_6 insulated common gas tank. It may be extensible or non-extensible type.

The thick walled gas tank provides rigidity with state-of-the-art welding and sealing techniques ensures, the integrity of gas seals over a long service life.

The ring switches are fault-make load-break in SF_6 gas with three positions: ON, OFF and EARTH. The circuit breaker is vacuum interrupter based switching, therefore providing safe, reliable & environmental friendly.

Mechanisms are manual independent spring assisted. They are mounted outside gas tank and therefore readily accessible. Access is protected by a hinged weather-proof and pad lockable door.

All cable terminals are positioned generally more than 900mm above ground level and are designed for use with inexpensible heat-shrink cable termination kits (the terminals are also compatible with plug-in elbows.

Integral cable test facilities are incorporated in the ring switches.

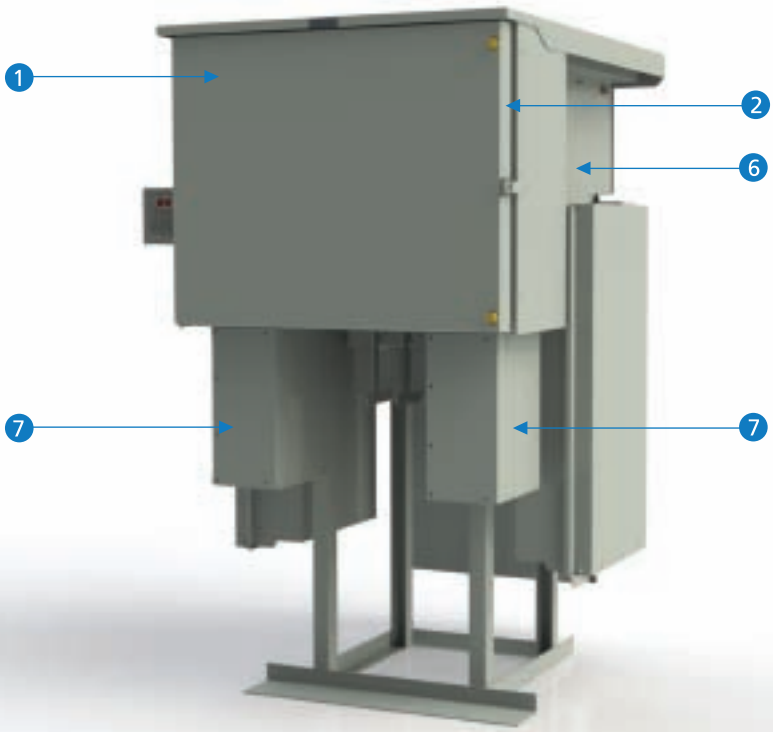
Neon potential indicators are provided on all circuits as standard.

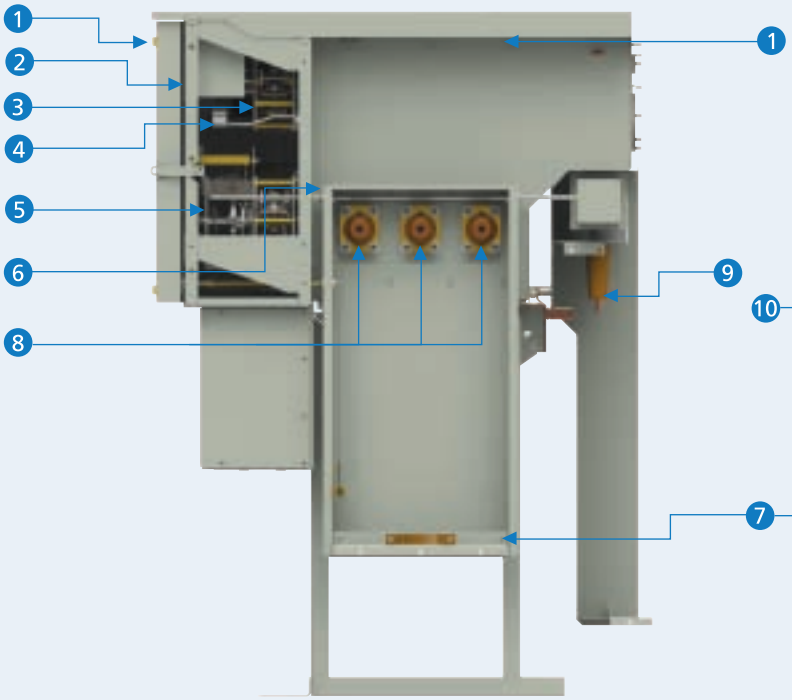
TAMCO's T-type RMU range is suitable for outdoor installation without the need for additional often expensive wheather-proof enclosures. Ingress protection is IP54.

- **IEC62271-100**
  High Voltage Circuit Breakers
  (1 kV - 52 kV)
- **IEC62271-200**
  High Voltage Metal Enclosed Switchgear (1 kV - 52 kV)
- **IEC62271-102**
  High Voltage Disconnectors & Earthing Switches
- **IEC62271-103**
  High Voltage Switches (1kV-52kV)
- **IEC62271-1**
  High Voltage Switchgear and Controlgear:
  Common Specifications
- **IEC60137**
  Insulated Bushing
- **IEC60529**
  Degree of Protection

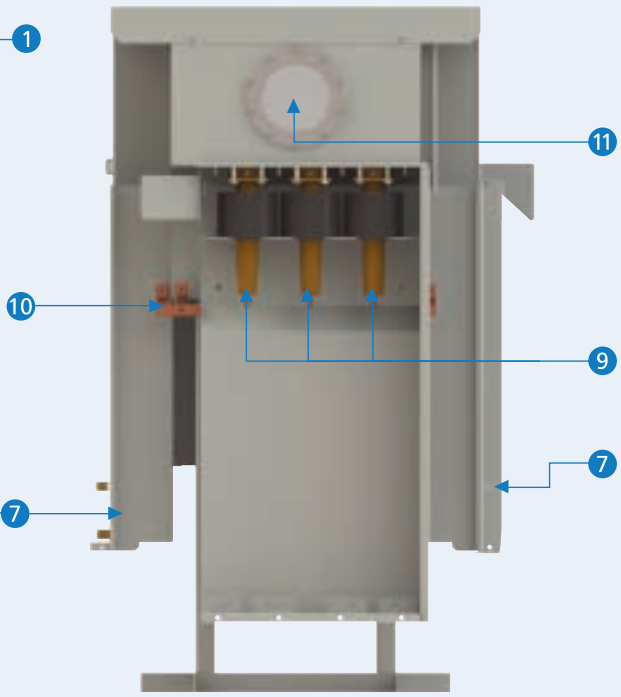
GENERAL ARRANGEMENT

1	Access Door
2	Facia & Mimic Diagram
3	Circuit Breaker Operation
4	Gas Tank Pressure Gauge
5	DS & Ring Switch Operation
6	Sealed SF_6 Tank
7	Cable Box
8	Ring Switch Bushing
9	Tee-Off Bushing
10	Earthing Point
11	Bursting Disc





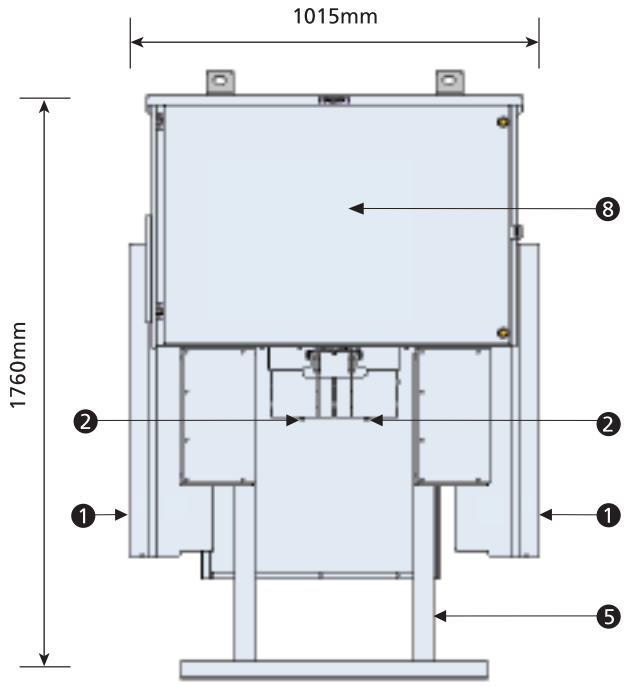
Side View



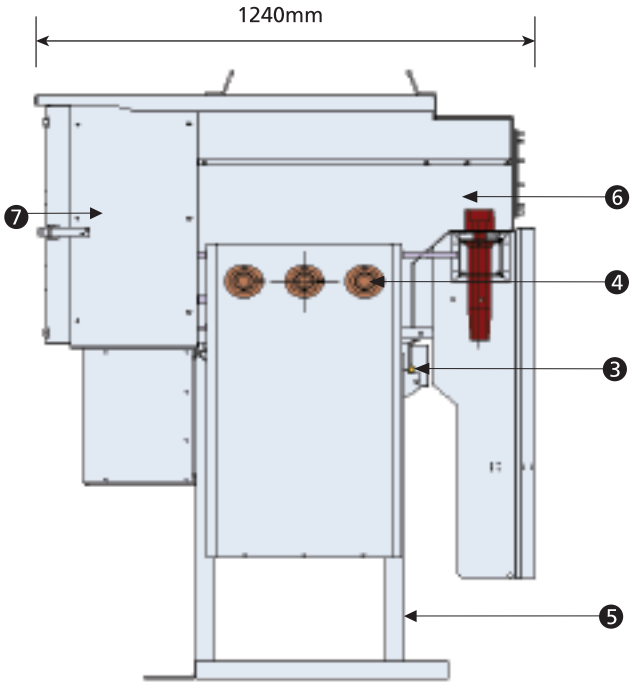
Rear View

TYPICAL SWITCHGEAR ARRANGEMENT

FOUNDATION ARRANGEMENT FOR
2 +1 STANDARD RMU

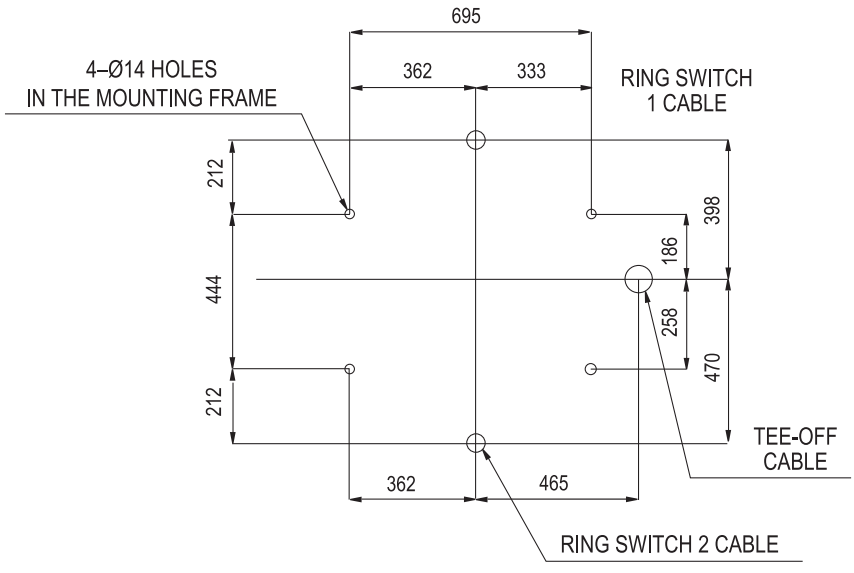


FRONT VIEW



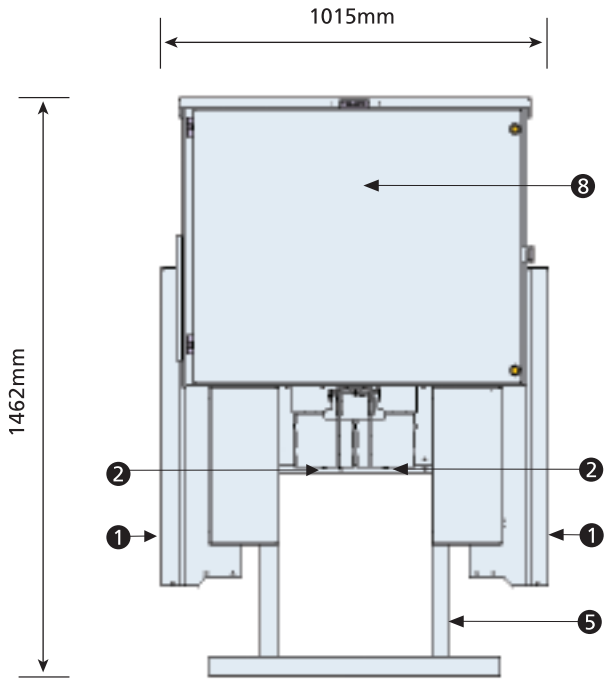
SIDE VIEW

1.	Cable Box
2.	Ring SW Test Access
3.	Earthingpoint
4.	Ring SW Bushing
5.	Mounting Frame
6.	SF_6 Gas Enclosure
7.	Mechanism Enclosure
8.	Access Door

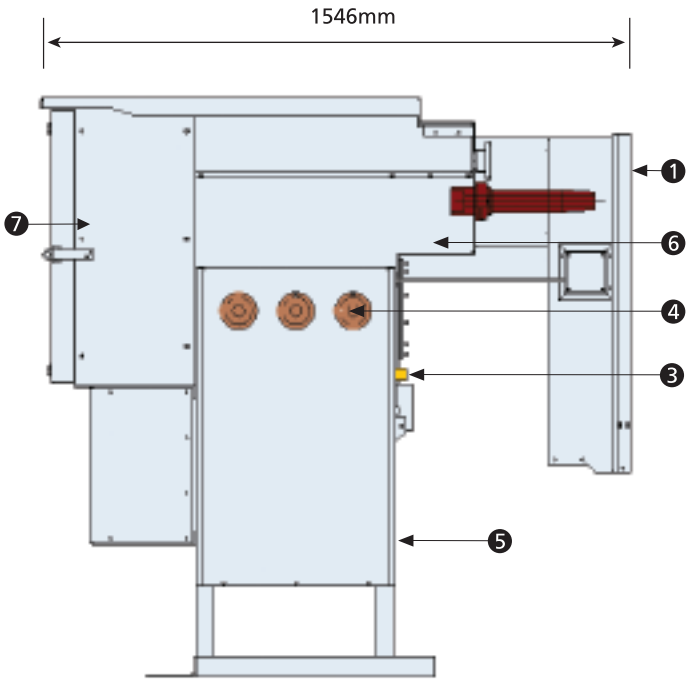


TYPICAL SWITCHGEAR ARRANGEMENT

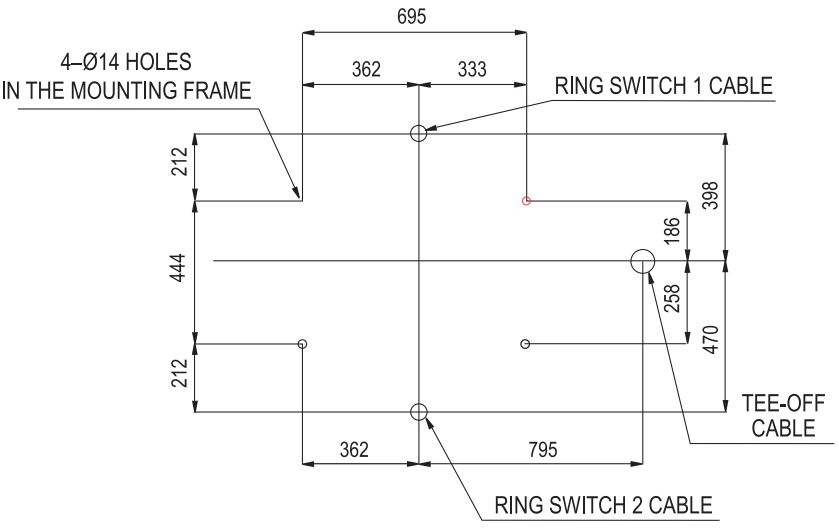
FOUNDATION ARRANGEMENT FOR
2 +1 EXTENDED RMU



FRONT VIEW



SIDE VIEW

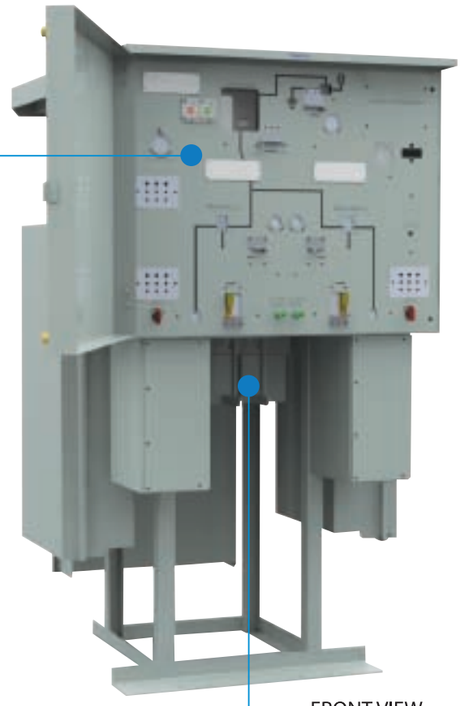


1.	Cable Box
2.	Ring SW Test Access
3.	Earthingpoint
4.	Ring SW Bushing
5.	Mounting Frame
6.	SF_6 Gas Enclosure
7.	Mechanism Enclosure
8.	Access Door

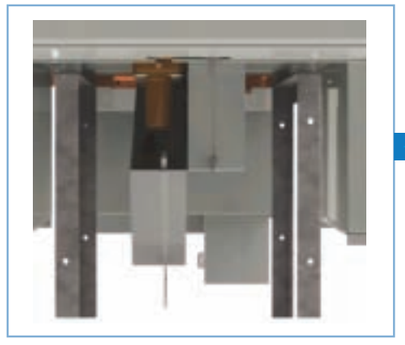
COMPONENTS

OPERATION

All operating positions and instructions are indicated on the main panel at the front of the unit. Full interlocking is provided to ensure operation in the correct sequence. Each of the switches can be padlocked in the ON, OFF or EARTH position.



FRONT VIEW



RING SWITCH TEST ACCESS

The bushing of cable connection are of EN50181 / 50180 type. Hence they come with in-built test facility. The cable box can be duly interlocked with RSW such that cable box can be opened only in EARTH position of RSW. As an option a seperate set of fully interlocked test facilities are provided. Access to test terminals is achieved by moving the appropriate RSW to EARTH position and opening the interlocked hinged cover.

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COMPONENTS

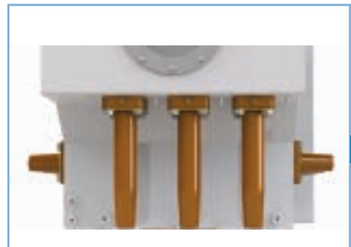
CB & DS MECHANISMS

Mechanisms are manual independent spring assisted. They are mounted outside the gas tank and therefore readily accessible. Access is protected by a hinged weather-proof and lockable door.

REAR VIEW

SEALED SF_6 Tank

The thick walled gas tank provides rigidity with state-of-the-art welding and sealing techniques ensures the integrity of gas seals over a long service life.



CABLE TERMINALS

All cable terminals are generally positioned more than 900mm above ground level and are designed for use with inexpensive heat-shrink cable termination kits (the terminals can also accept plug-in elbow).

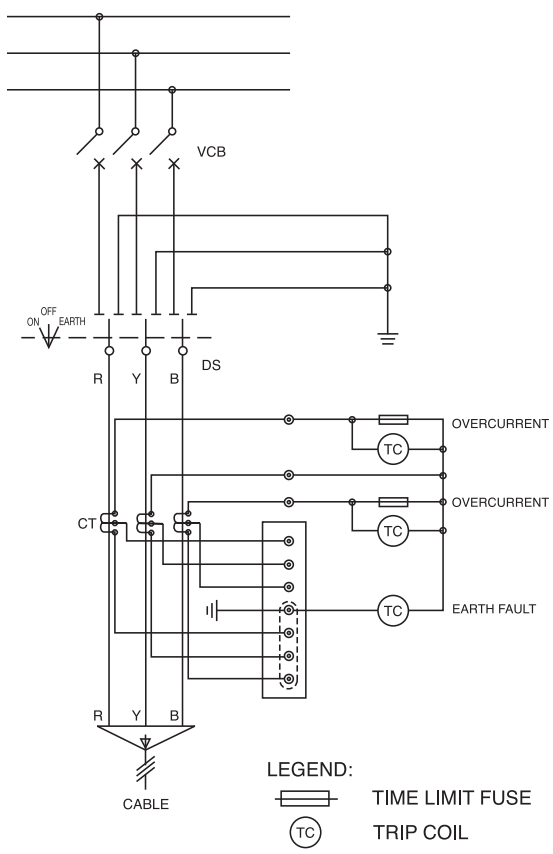
PROTECTION

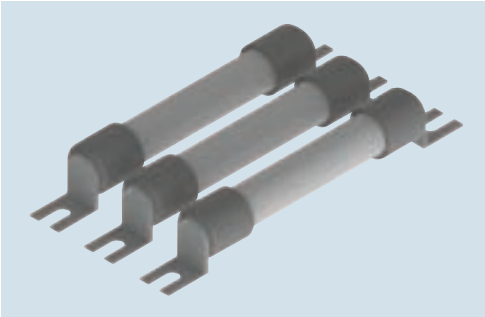
TLF is a cost effective solution without compromising the reliability. In this solution trip coil, which is normally shunted by TLF, receives feed from current transformer.

In the event of a fault the fuse ruptures, diverting all the fault current through the trip coil, tripping the breaker. A residually connected trip coil provides instantaneous earth fault protection.

Advantages Of TLF

- Low cost solution with reliability
- Simple to replace the blown fuse
- Proven protection mechanism





PROTECTION

RECOMMENDED TLF SETTINGS

Power Transformer Rating	Current Transformer Ratio						TIme Lag Fuse Rating					
	22 kV	17.5 kV	13.8 kV	11 kV	6.6 kV	3.3 kV	22 kV	17.5 kV	13.8 kV	11 kV	6.6 kV	3.3 kV
kVA	Amp						Amp					
200	50/5	50/5	50/5	50/5	50/5	50/5	3	3	3	3	5	10
315	50/5	50/5	50/5	50/5	50/5	100/5	3	3	3	5	7.5	7.5
500	50/5	50/5	50/5	50/5	50/5	100/5	5	5	7.5	7.5	12.5	12.5
630	50/5	50/5	50/5	50/5	100/5	150/5	5	7.5	7.5	10	7.5	10
800	50/5	50/5	50/5	50/5	–	–	7.5	7.5	10	12.5	–	–
800	50/5	50/5	50/5	100/5	150/5	150/5	7.5	7.5	10	7.5	10	12.5
1250	50/5	50/5	100/5	100/5	150/5	300/5	10	12.5	7.5	10	10	10
1600	50/5	100/5	100/5	150/5	150/5	300/5	12.5	7.5	10	12.5	12.5	12.5
2000	50/5	100/5	100/5	150/5	200/5	–	15	10	12.5	10	12.5	–
2500	50/5	100/5	150/5	150/5	300/5	–	17.5	12.5	15	12.5	10	–
3000	50/5	100/5	150/5	200/5	300/5	–	17.5	15	12.5	12.5	12.5	–

RELAY PROTECTION

The relay provides for a wide range of protection settings for most applications. Fast power-up of relay also provides immediate protection and can detect faults instructing the CB to trip in less than 40 ms.

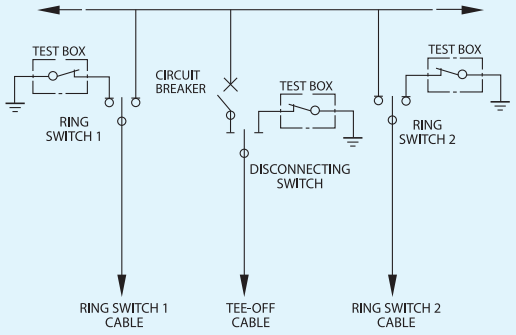
The relay has a self monitoring device and diagnostic routine that constantly checks the operation of the relay automatically.

PRODUCT CONFIGURATIONS

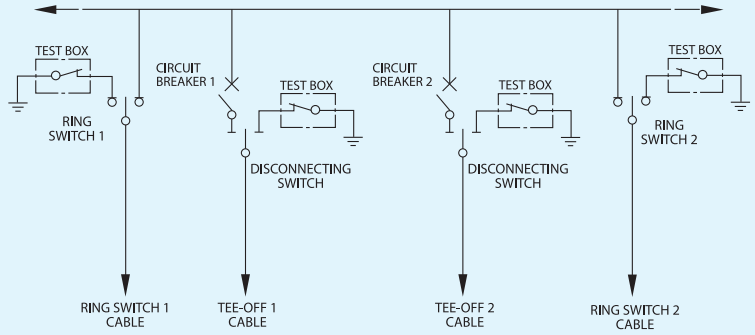
Due to the diverse customer applications & requirements, GR series of RMU are available in various configurations. This manual provides the typical guidelines for installation, operation & maintenance of 2+1 & 2+2 configurations.

All configurations are available optionally with extensible feature.

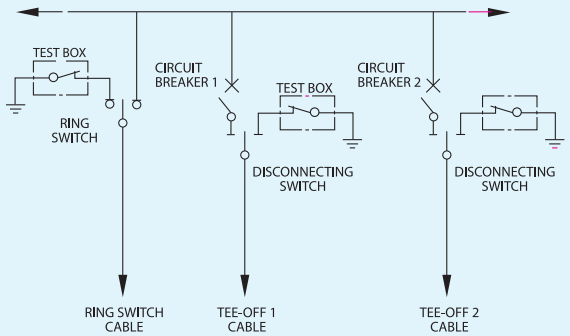
2+1: 2X Ring Switches + 1XCircuit Breaker (GR1-VI-21 & GR2-VI-21)



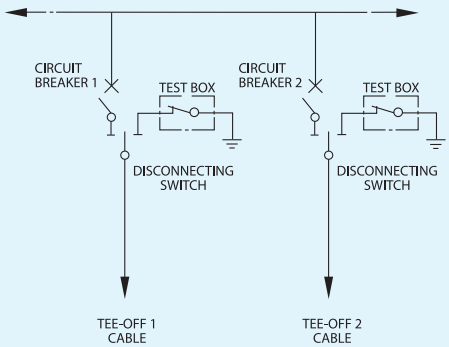
2+2: 2X Ring Switches + 2XCircuit Breaker (GR1-VI-22 & GR2-VI-22)



1+2: 1X Ring Switches + 2XCircuit Breaker (GR1-VI-12 & GR2-VI-12)

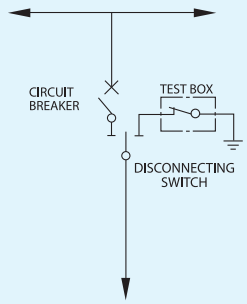


0+2: 2XCircuit Breaker (GR1-VI-02 & GR2-VI-02)

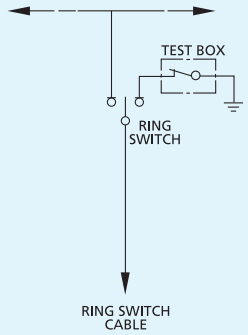


PRODUCT CONFIGURATIONS

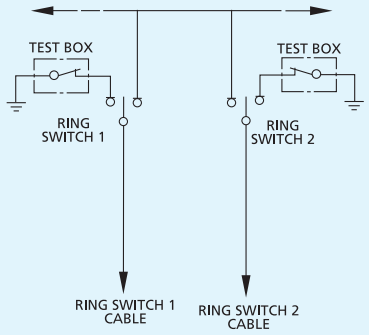
0+1: 1XCircuit Breaker (GR1-VI-01 & GR2-VI-01)



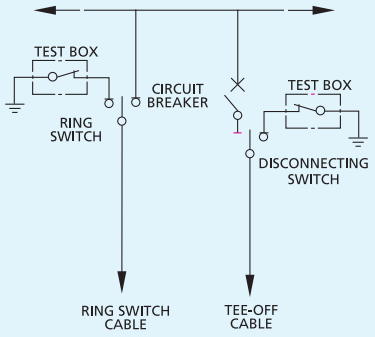
1+0: 1XRing Switches (GR1-VI-10 & GR2-VI-10)



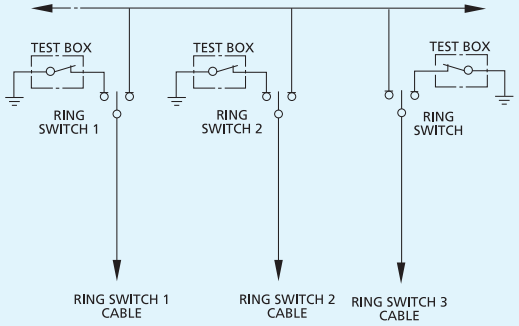
2+0: 2XRing Switches (GR1-VI-20 & GR2-VI-20)



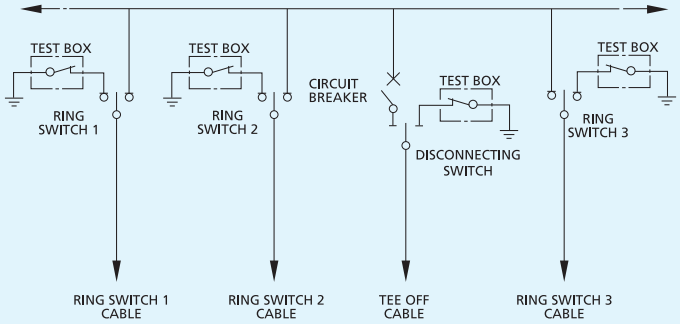
1+1: 1XRing Switches + 1XCircuit Breaker (GR1-VI-11 & GR2-VI-11)



3+0: 3XRing Switches (GR1-VI-30 & GR2-VI-30)



3+1: 3XRing Switches + 1XCircuit Breaker (GR1-VI-31 & GR2-VI-31)



SAFETY

TAMCO's T-type RMU is designed to maximise safety in installation, operation and maintenance. It complies with the latest IEC standards and fitted with all mandatory interlocks and padlocks as recommended by the international standards.

INTERLOCKS

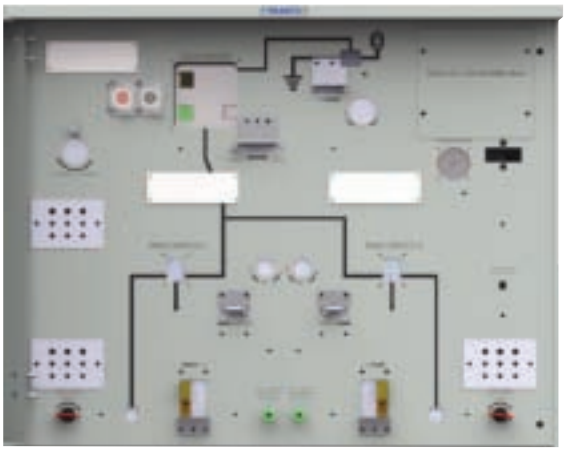
- VCB / Disconnector Interlock
  - Disconnector can be operated only when VCB is in "OFF" condition.
  - VCB can't be operated, when isolator is accessed.

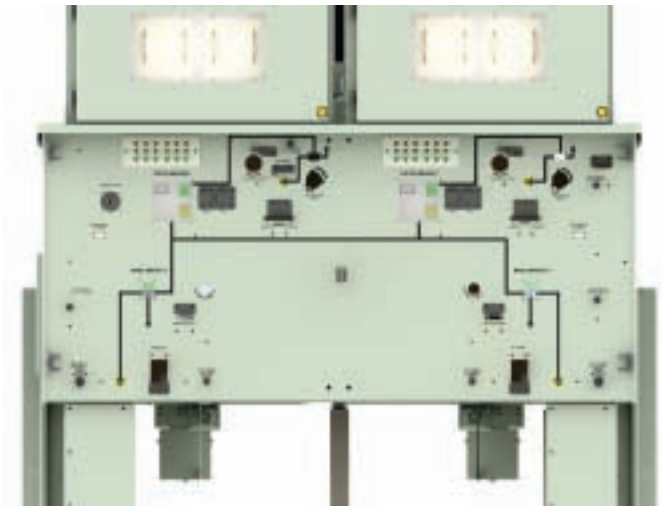
- Cable Access *
  - The cable access cover can't be open unless the cable is connected to "EARTH".
  - Disconnector/Ring Switch operation is not possible if the cable access cover is "OPEN".

- Cable Test Access
  - The cable test access cover can't be open unless the cable is connected to "EARTH".
  - Disconnector/ Ring Switch operation is not possible if the cable test access cover is "OPEN".

- Point of Isolation*
  - Restricts the Disconnector / Ring Switch to be moved to "ON" position if the POI is established (i.e. closed).

* Optional features available upon customer request



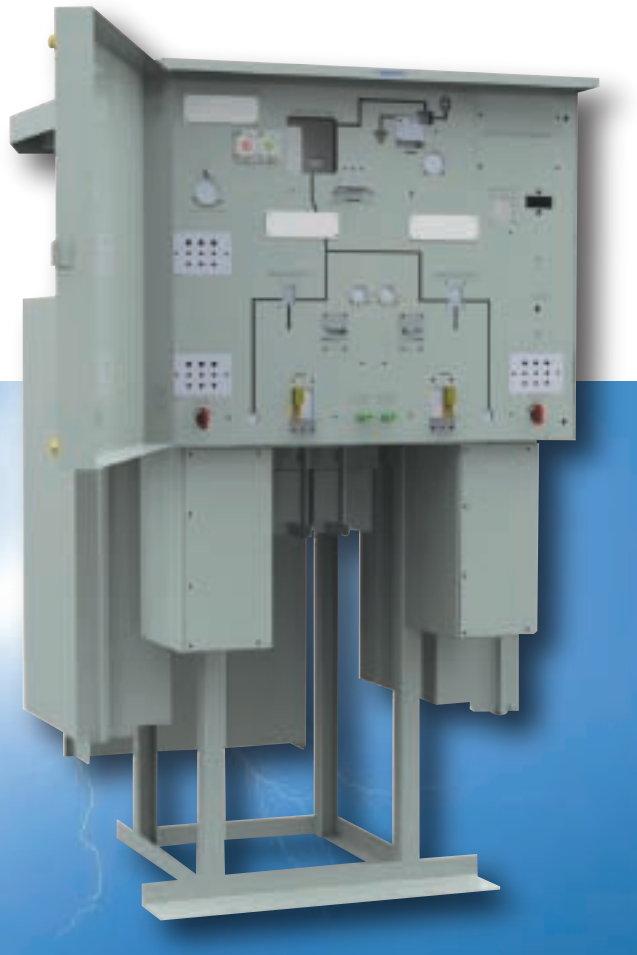


SAFETY

TAMCO regards safety as the most important aspect of switchgear design and operation and the following proven safety features have been incorporated into GR series of RMU.

- No exposure to live parts
- Positive interlocks to prohibit unintended operations
- Comprehensive padlocking facilities
- Mimic diagram and position indicators to guide the operator
- Full fault rated earthing switches
- The isolator and ring switches have three distinct position viz. ON, OFF and EARTH
- Arc fault tested at 21kA for 1 sec.

TAMCO operates a Quality System in line with ISO 9001, ISO 1400 & OHSAS 18001



SAFETY

TYPE TESTS

GR series of RMU have undergone all the mandatory, supplementary and additional type tests requested by different clients as per latest IEC standards.

TAMCO has performed all the type tests at international laboratories at CESI, KEMA, IPH etc. Additional type tests have been carried out on GR series of RMU to prove its robustness, reliability and safety.

ROUTINE TESTS

To ensure quality and reliable products delivered to its customers, TAMCO performs the following routine tests on each of its product before delivery:

- Visual inspection and checks
- Power frequency test
- Partial discharge
- Mechanical and electrical operation sequence
- Measurement of main circuit resistance
- SF_6 Leak detection test

TAMCO is a part of Larsen & Toubro conglomerate. We design, manufacture and market a wide range of medium voltage electrical systems, control and automation systems, electrical products and metering and protection systems.

GR1-VI & GR2-VI are Tamco's compact SF_6 insulated vacuum range designed to match international standards of quality. It makes your applications safe, uses space economically and diminishes hazards. GR1-VI & GR2-VI saves your time and energy, enhancing cost optimisation. Used in a wide range of application, this is the eco-friendly choice.

GR1-VI & GR2-VI: Building safe, reliable and efficient electrical networks

"We believe tomorrow is not just the extension of today. Its a whole new era. An era where innovation revolutionizes the thoughts."

www.tamco.com.my

GR1-V1 & GR2-V1_R0

TAMCO

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