Medium Voltage Gas Insulated Compact Switchgear

EASY & SAFETY SECOND DISTRIBUTION BY NBP

CE

G-CERTi SYSTEM SERVICE

GKIR-0422-QC

ISO 9001:2015

HIGH RELIABILITY

EASY SETUP

ENVIRONMENT FRIENDLY

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Preface

The importance of the sustainability of electrical networks, the health of the employees of this industry and the value of space in different regions shows the need for compact switchgears with high reliability and greater safety than before.

Niroo Sahel Company using modern technologies and international standards, took a step in design and produce NBP -Gas Insulated Medium Voltage Compact Switchgears(up to 24KV) These switchgears are mostly used in distribution substations.

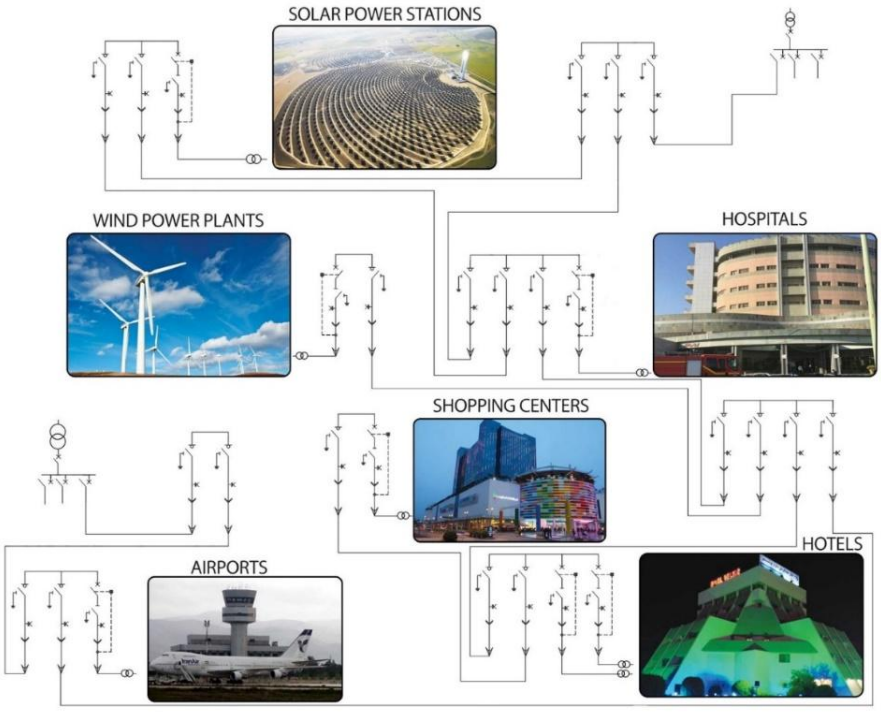
All electrical equipment and busbar placed in a compact space inside a stainless steel tank. SF6 is used for insulation, cooling and quenching internal arc. As a result, internal functions are maintenance-free.

Concerning the lack of access to live parts and busbars, switchgears of this kind have a high level of safety.

Compact dimension of these switchgears makes it possible for them to be used in compact substations and underground compact substations etc.

NBP's MV compact switchgears due to having **vacuum circuit breaker and load break switch** and , are good choice for protecting transformers, feeders and other medium voltage users. These

switchgears are capable of controlling and monitoring.



Customer Benefits

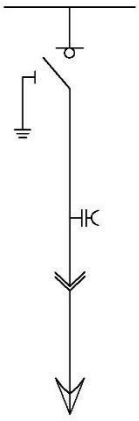
١. Compact dimensions
٢. Safely and easy operation for operators
٣. Easy to extend and upgrade
٤. Suitable for regions with high pollution (dust and humidity)
٥. Long service life
٦. High reliability and safety
٧. Live parts doesn't need maintenance
٨. Produce and tested according to IEC
٩. No live parts exposed
١٠. operations are carried out from the front of the Switchgear

NBP- GIS type is designed for use in the following places

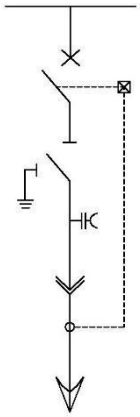
١ - Substations of secondary distribution network
٢ - Wind and solar power plants
٣ - Hotels, shopping centers, residential and office buildings
٤ - Airports, hospitals, tunnels and subways

NBP can be configured with a maximum of four modules in one SF6 tank with an internal busbar (one switchgear). To configure switchgears with more than four modules, as many tanks as needed can be joined together by use of an external busbar. The external busbar is fully insulated .Expandable bushings can also be added to NBP Switchgear.

Available modules:



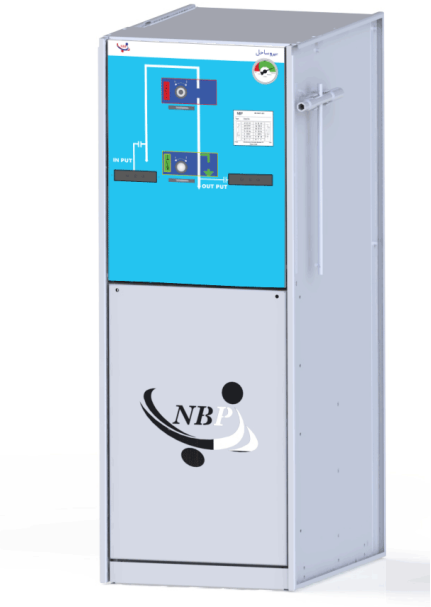
Load break switch (L)



Vacuum circuit-breaker (V)

Load Break Switch Module (L)

This module is a choice for switching feeder.
L-Module has three positions switch (close – open – earthing).
This switch is installed in a stainless steel tank,
which is connected to operation mechanism out of the tank using a connector.
Operation mechanism has separate operating shafts for close – open and earthing function with mechanical interlock in between each shaft.

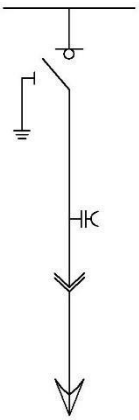


Characteristics:

- Busbar, 630A,up to 24 KV
- Latched single spring mechanism
- SF6 pressure indicator
- Capacitive voltage indicator
- Operating handle
- External padlock

Available Optional Features:

- Motor operation
- Integrated control and monitoring unit (ICMU)
- Remote Terminal Unit (RTU)
- Short circuit and earth fault indicator
- Ring core CT and current indicator
- Auxiliary contacts
- Low voltage compartment / top entry box
- Bushings for top extension
- Bushings for side connection
- Bushings for cable testing
- Integrated battery and charger
- Deep cable cover for double connection



Vacuum Circuit-Breaker Module (V)

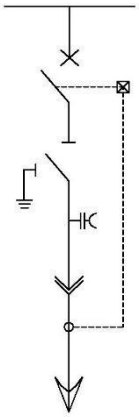
This module is a choice for protecting transformer, feeder and etc. Current interrupting occurs in a vacuum bottle and a three-position isolator switch is used below the VCB to isolation it from the output of the module.
Isolator switch and vacuum bottle are installed in a stainless steel tank, which is connected to operation mechanism out of the tank using two connector. Operation mechanism has separate operating shafts for VCB, isolator and earthling function with mechanical interlock in between each shaft.

Characteristics:

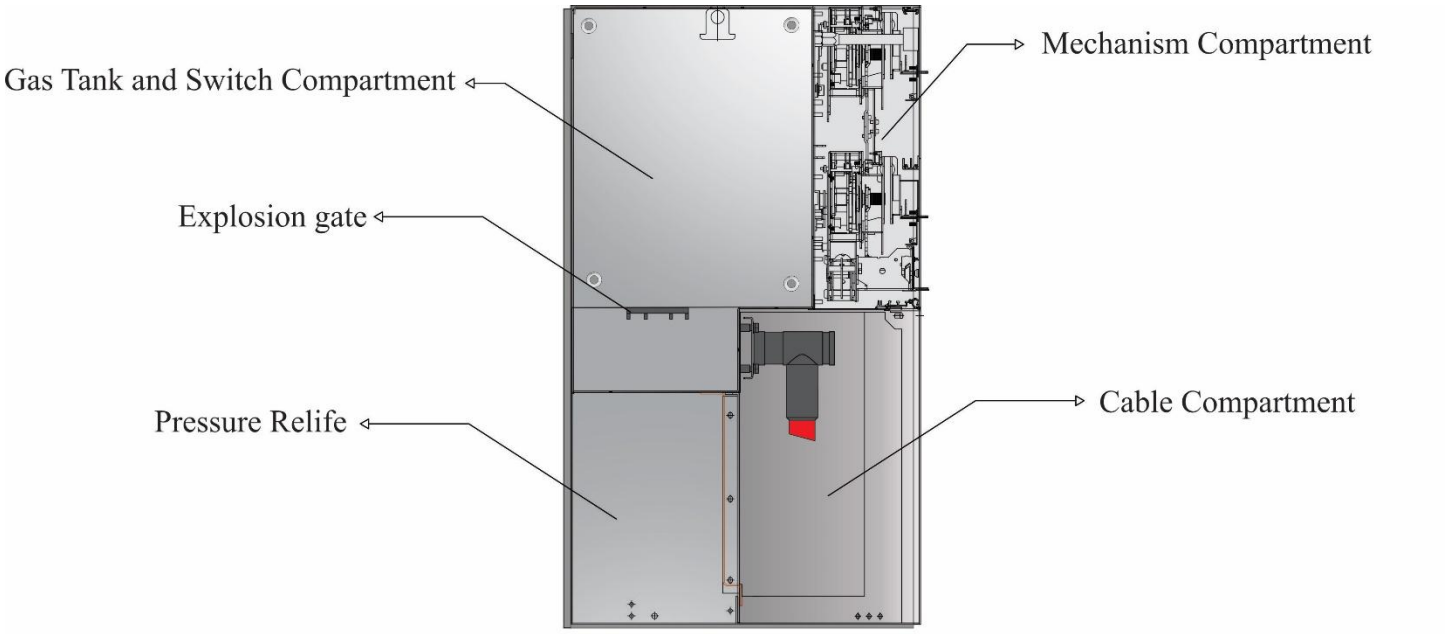
- Busbar, 630A, up to 24 kv
- Latched single spring mechanism
- Self-powered electronic protection relay with ring core CTs
- SF6 pressure indicator
- Capacitive voltage indicator
- Operating handle
- External padlock

Available optional features:

- Motor operation
- Integrated control and monitoring unit (ICMU)
- Remote Terminal Unit (RTU)
- Auxiliary contacts
- Secondary protective relays type with external power source
- Ring core CT and current indicator
- Auxiliary contacts
- Low voltage compartment / top entry box
- Bushings for top extension
- Bushings for side connection
- Bushings for cable testing
- Integrated battery and charger
- Deep cable cover for double connection

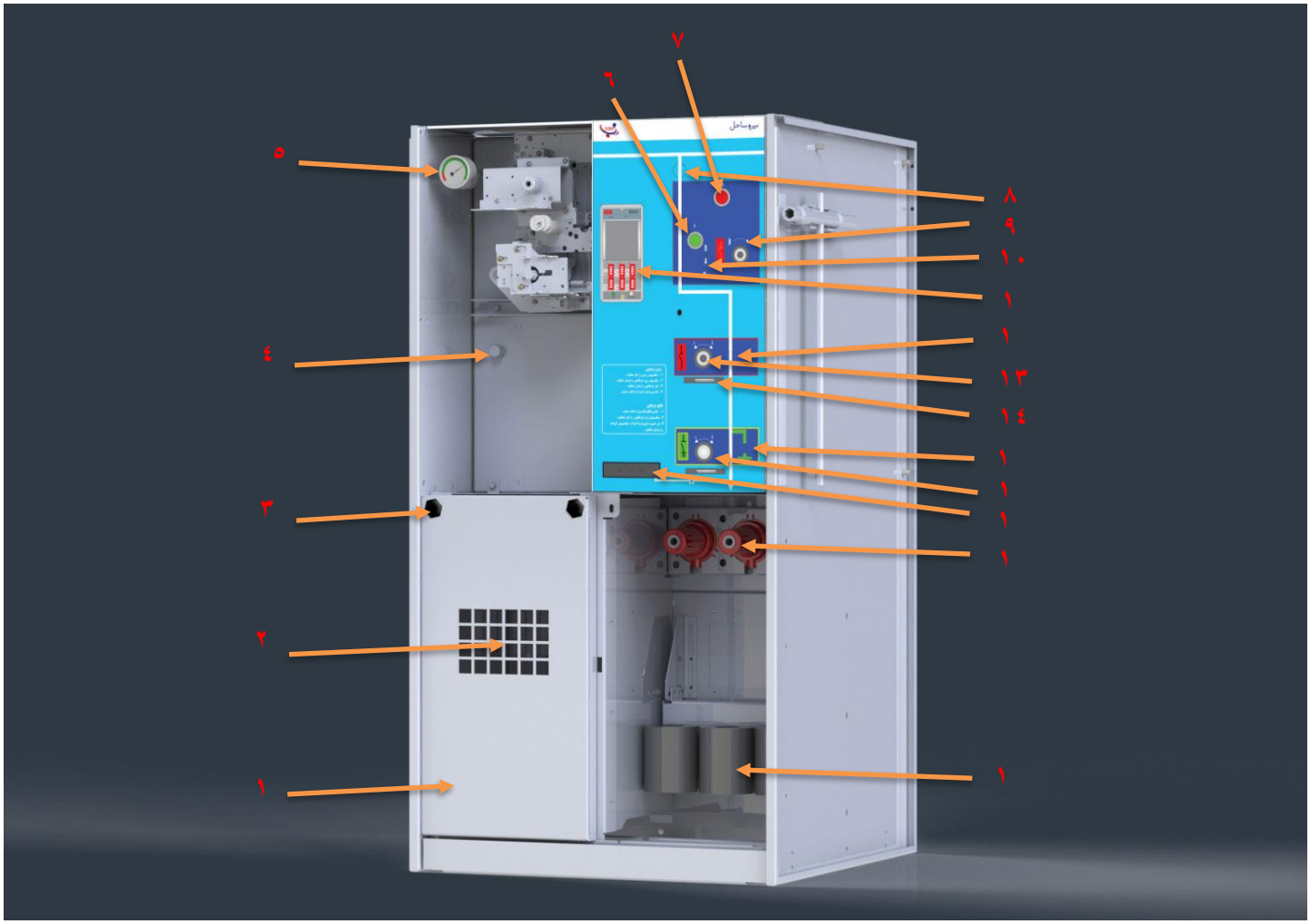


Compartments



Compartments

Arrangement



١. Door of cable compartment
٢. Door of cable compartment window
٣. Door of cable compartment screw
٤. Gas valve
٥. Gas manometer
٦. Close Push buttons
٧. Open push buttons
٨. VCB Position Indicator
٩. VCB Charging Shaft
١٠. Spring Charge Indicator
١١. Self Power Relay
١٢. LBS Position Indicator
١٣. LBS Oprating Shaft
١٤. Padlock Hole
١٥. E.s position indicator
١٦. E.s oprating shaft
١٧. Voltage indicator
١٨. Bushing type C
١٩. CT

Enclosure

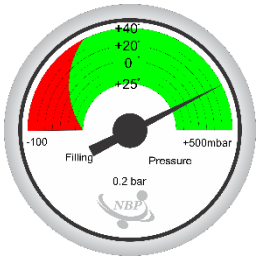
All live parts of switching function and cupper busbar are installed in a stainless steel tank. The stainless steel tank (gas tank) has protection degree of IP67, so internal functions are maintenance-free.
Electrical and mechanical bushings and rotating shaft penetrating the tank are clamped and sealed to the tank by high quality gas O-rings.

Gas Insolation

NBP uses SF6 gas (Sulphur hexafluoride 99.99%) for insulation and quenching internal arc. Gas Tanks have to pass a leakage test before gas filling. The first step in the leakage test is to evacuate all air inside the Gas tank and filling it with helium. After 48 hours, due to the characteristics of helium, this test will detect all possible leakages. If the Gas tank passes this test, the helium will be evacuated and replaced by SF6.

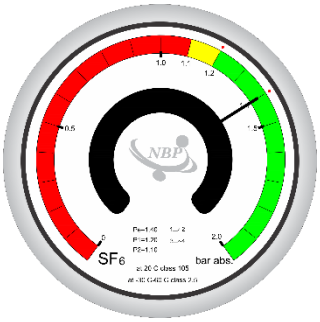
Manometer

For increasing the safety under operation of the switchgear, manometers used for each tank. Pressure of gas is 1.35 bar at 25°C and the switchgear does not require any gas handling, however, a leakage rate lower than 0.1 % per annum can be expected



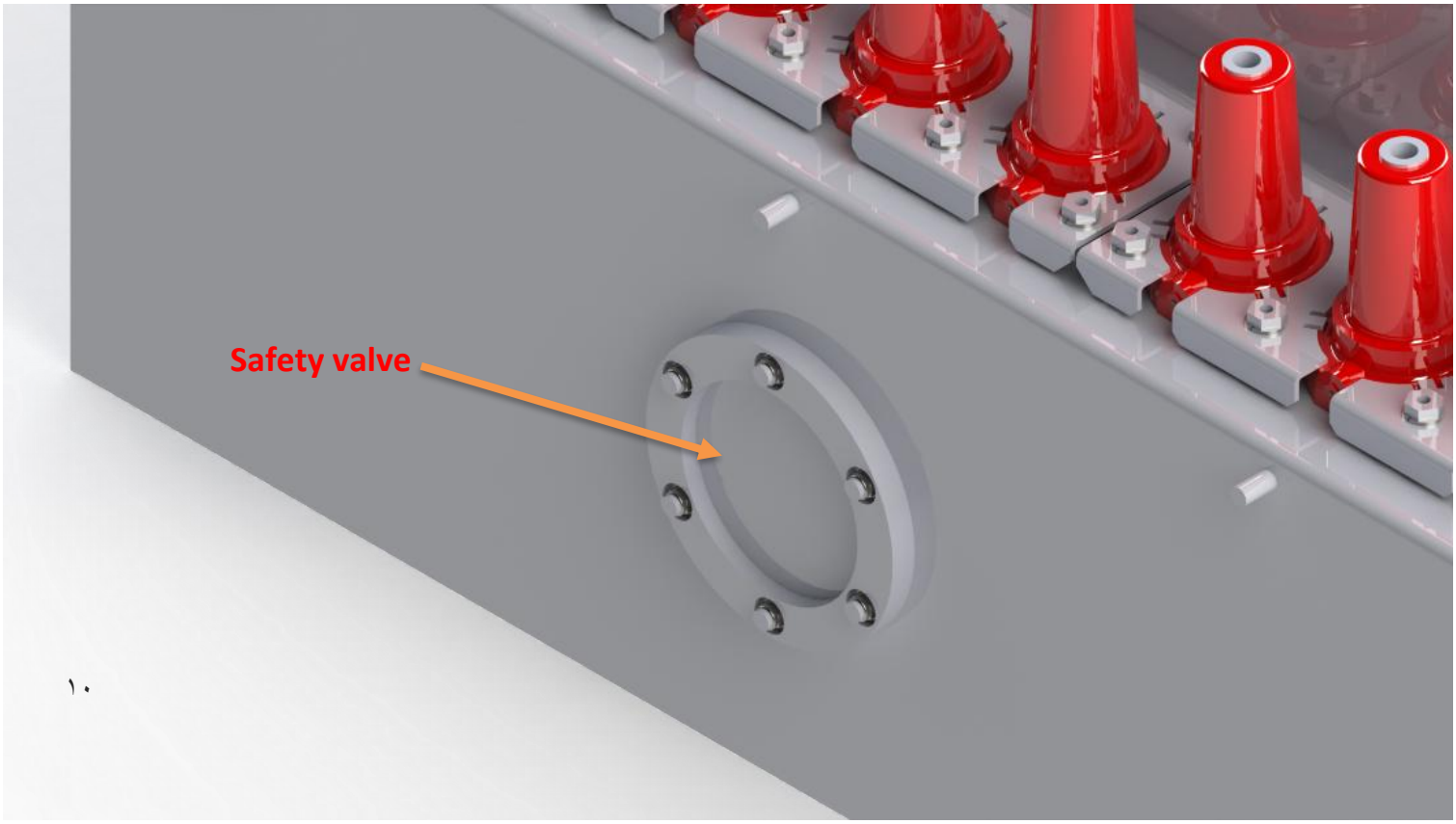
Optional*

In case of need remote control need, manometers can be equipped with alarm and trip contacts.



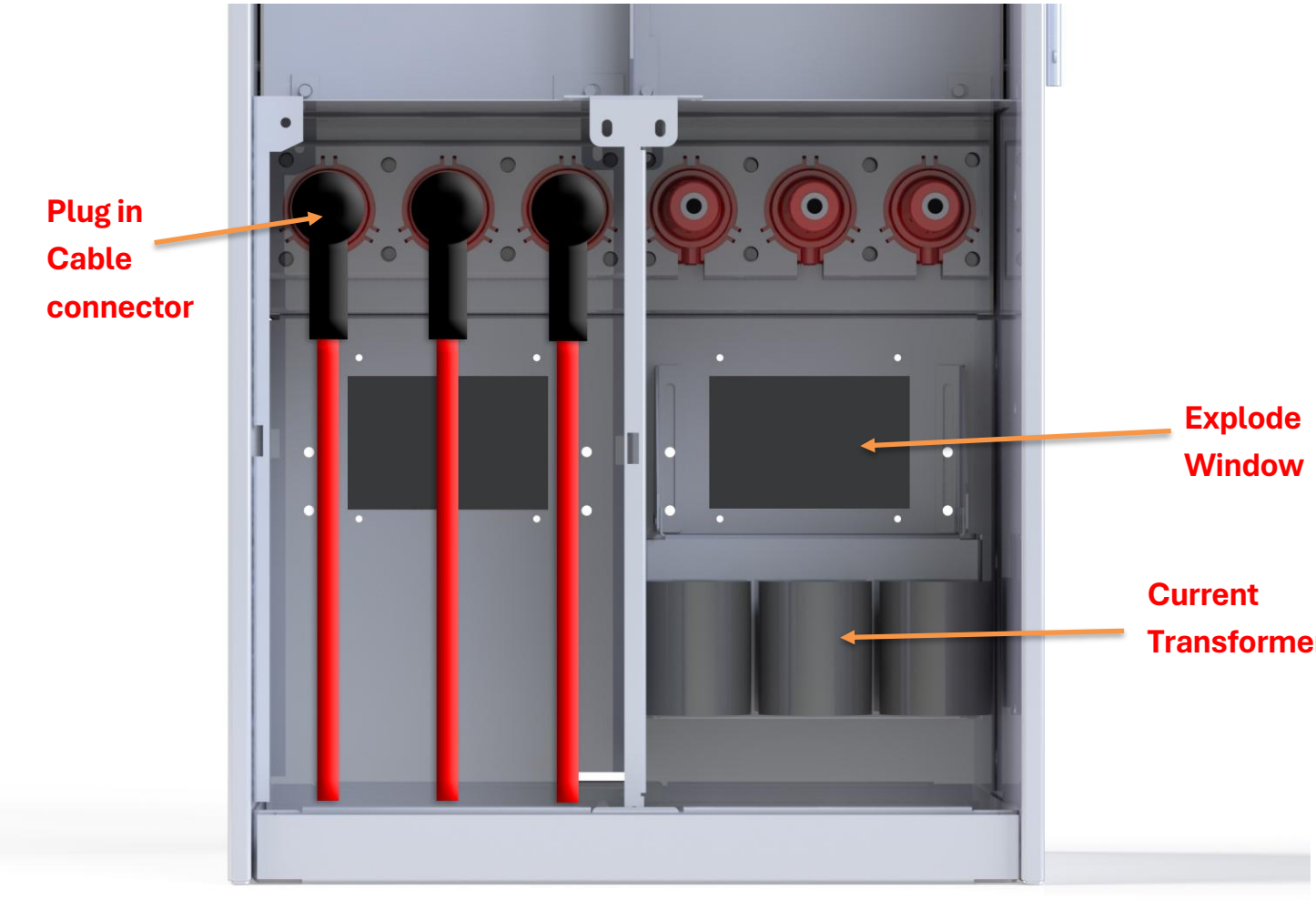
Safety Valve

The safety valve is located at the bottom of the stainless steel tank so that Gas can evacuate if any short circuit occurs inside the tank.



Cable Compartment

Three epoxy resin plug-in bushing (interface C) are in one compartment for connecting MV-cable to switchgear. also epoxy resin used as the main capacitor supplying the voltage indicating systems. The bushings are designed according to IEC 60137



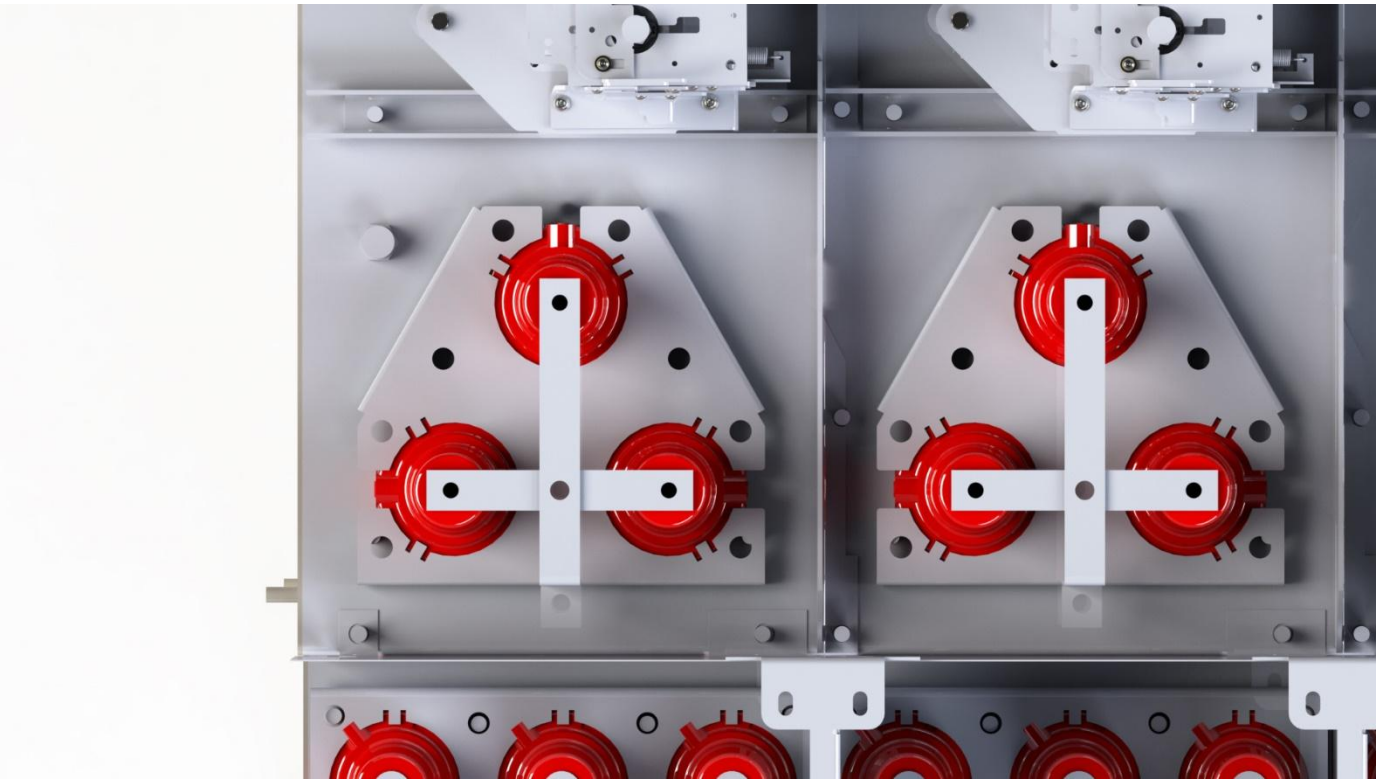
bushing & cable connector

epoxy resin plug-in bushing (interface C)

The cable compartment covers also have mechanical interlock. Each module has a separate cable compartment, which is divided from others modules.
plug-in cable connector is used for connecting cables.

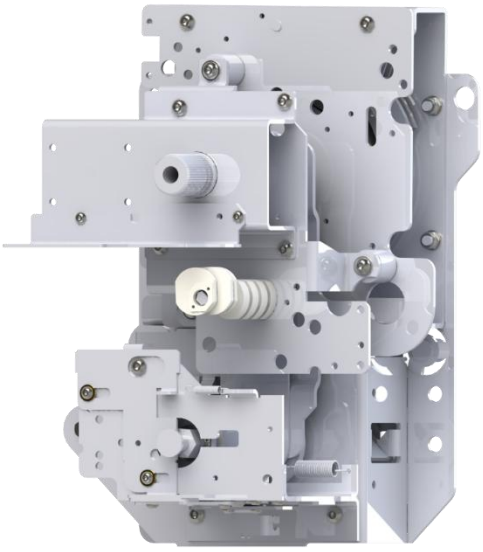
Cable test bushings (optional)

As an option, L modules can be equipped with cable test bushings situated behind the lower front cover.



Mechanism of Operation and Interlocks

Operating mechanisms are situated outside the gas tank behind an aluminum doors (3 mm). Aluminum doors are covered with a polycarbonate foil. These foils contain the mimic diagram of the main circuit integrated with the position indicators for the switching devices.
Degree of protection: IP4X.Operation speed of these mechanisms is not related to the operator.
All operating mechanisms are equipped with position indicators for all switches.
In order to achieve true indication, indicators are directly connected to the operating shafts of the switches inside the gas tank.

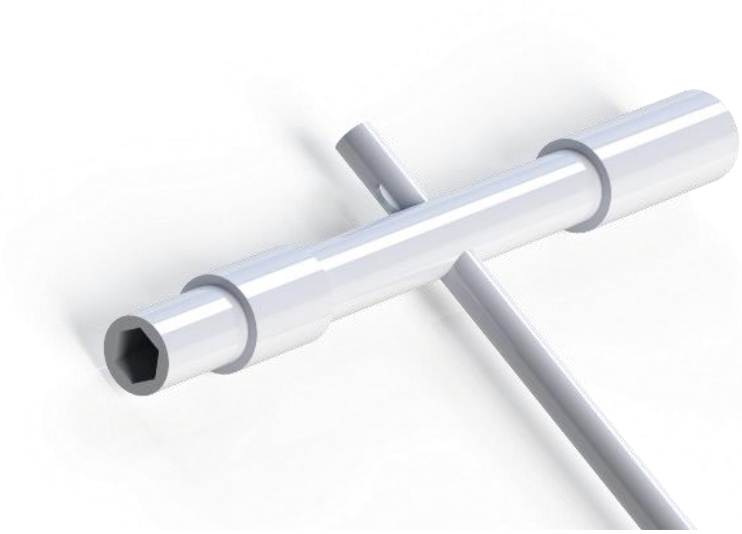


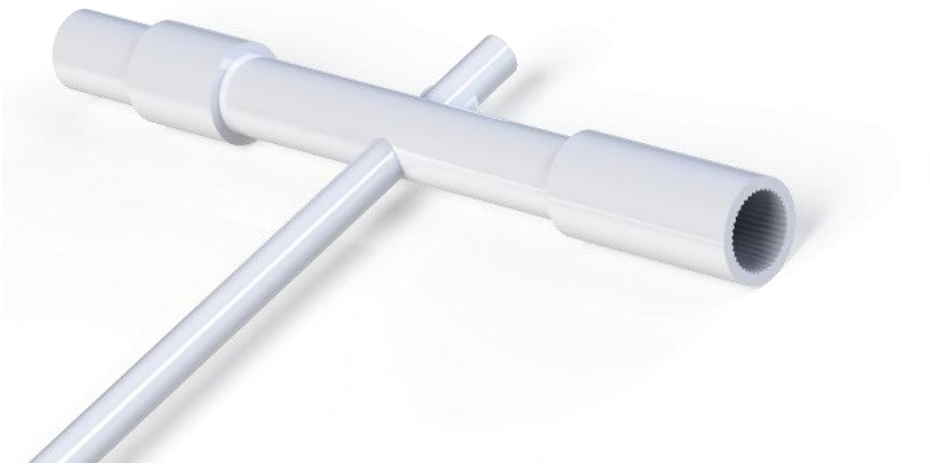
Handle

NBP has particular handle for operating mechanism. The handle has two different ends into shafts. Hexagon head is used for operating earthing switch and groove head for operating Load Switch and Vacuum circuit Breaker Charging and.

For easy operating, it’s better for operator to stay in front of module and hold the handle at an angle of 45.

The operating handle has an anti-reflex system which prevents an immediate re-operation of the switch





Interlocks

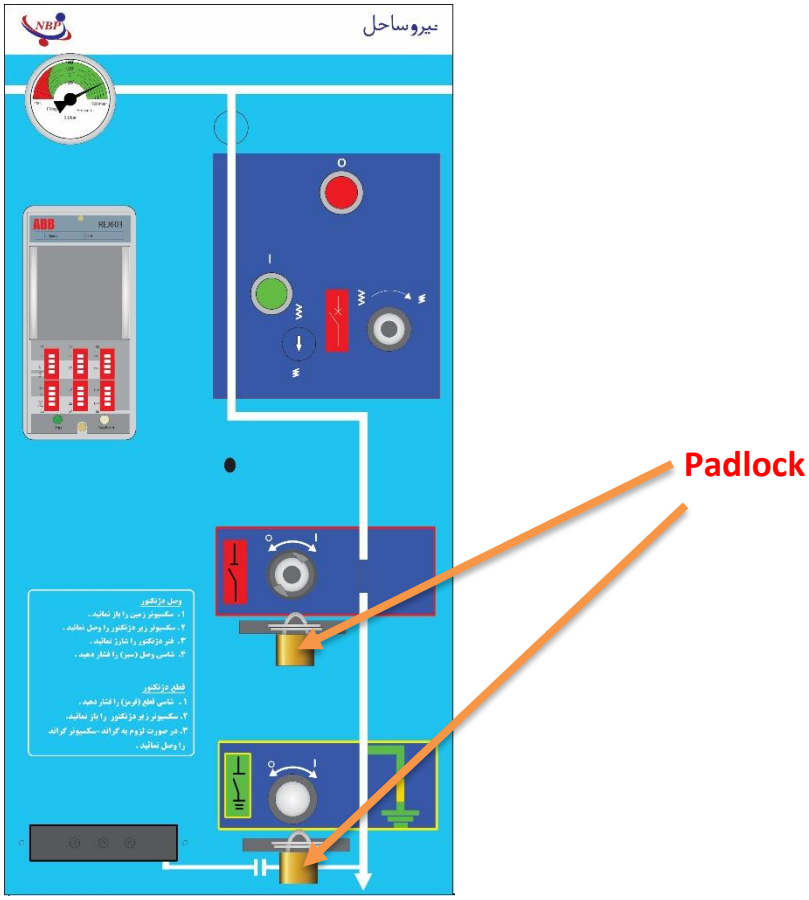
Mechanical interlocks are very important for the operation and safety of the operator. Standard interlocks are used between keys and components in NBP switchgears.

Cable Compartment Interlocks

Each module is equipped with mechanical interlock of Cable Compartment cover and it is impossible to remove the Cable Compartment cover with the switch in close position. To access the Cable Compartment, first the earthing switch should be closed. In addition, it will be impossible to operate modules before the Cable Compartment cover is mounted properly.

Padlock

Each mechanism is equipped with a padlocking device. When adding a padlock, access to operate the mechanism will be impossible. The diameter of suitable padlocks is 4 - 8 mm.



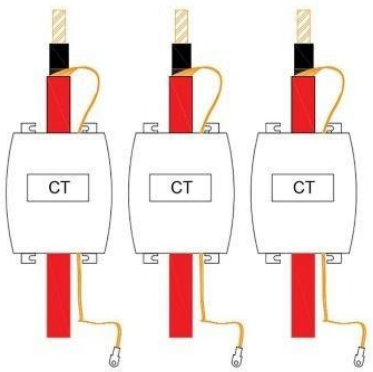
Protection by Relay

All secondary relays can be installed on V-Module.

Default relay for V-Module is self-Powered Relay

Self -Powered Relay can be installed on the front of modules, attached on the aluminum door. When the auxiliary power is not available, self-powered relays are the best choice for protection, because they utilizes energy from power of the ring core CTs (current-transformer). Ring core CTs are used for relay's energy utilizing and diagnosis for protection. The self- powered relay is capable of diagnosing over load, short-circuit and earth-fault.

Note:
Guide for installing CT, cable and cable termination.



Voltage Indicators

All modules of NBP have voltage indicator. Voltage indicator can be used to perform phase comparison and to test the voltage presence indicator.

Voltage indicators indicate only presence of the medium voltage in outgoing bushing. It is advised to control the absence or presence of the voltage using a voltage detector (potable low voltmeter).

Three terminals devised beside the indicators for this matter.

Voltage indicator installed on the front of each module.

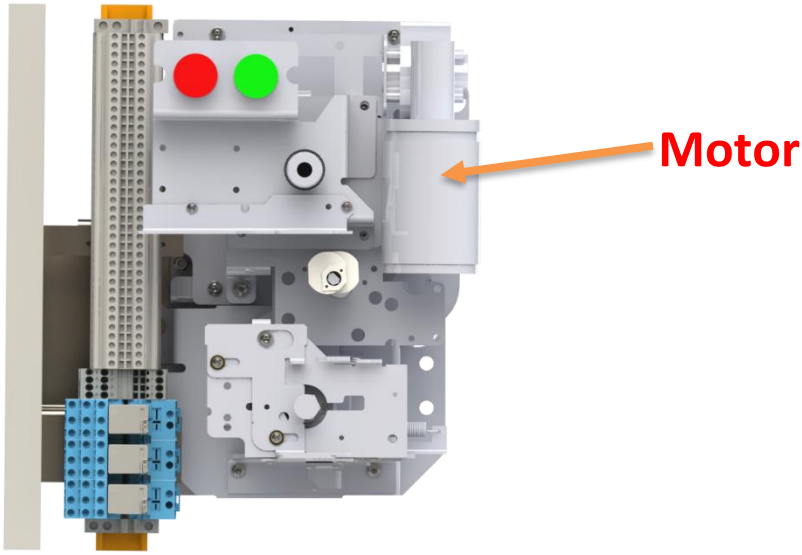
Fault Indicators (Optional)

Installing a fault indicator on the NBP switchgear is optional. The indicator is usually placed on the front panel of the L-module. Fault indicators detect short circuit and earth faults in each phase. Fault indicator has different features.

Motor Operation (Optional)

A Motor operation can perform closing and opening of Load-Break Switches, charging the springs of the mechanisms for the VCB.
However, it cannot be used for the disconnector in the V-Module and all earthling switches. All motor devices require DC voltage.
If the control voltage is either 110 or 220 VAC, a rectifier is integrated in the control unit.

Test voltage for tables below is +10/-15 % for motor operations and closing coils and +10/-30% for trip coils and opening coils. The motor and coils can easily be mounted to the mechanisms after delivery.



Characteristics of motor operation C module

Rated voltage (V)	Power(W)	Closing time (S)	Opening time(S)	Peak start current(A)	Fuse
٢٤	٨٥-٩٠	٧-١٠	٧-١٠	١٤,٥	١٠
٤٨	١٥٠-١٥٥	٤-٦	٤-٦	١٣,٥	٦
١١٠	٨٥-٩٠	٧-١٠	٧-١٠	٣,٢	٢
٢٢٠	٨٥-٩٠	٧-١٠	٧-١٠	١,٨	٢

Characteristics of motor operation V module

Rated voltage (V)	Power(W)	Closing time (S)	Opening time(S)	Peak start current(A)	Fuse
٢٤	١٨٥-١٩٠	٩-١٦	٤٠-٦٠	١٤,٥	١٠
٤٨	٢٢٥-٢٣٠	٥-٩	٤٠-٦٠	١٣,٥	٦
١١٠	١٧٥-١٨٠	٨-١٣	٤٥-٦٠	٣,٢	٢
٢٢٠	١٥٥-١٦٠	٨-١١٨	٤٥-٦٠	١,٨	٢

Automation

All NBP's modules and switchgears are available to monitoring, control, measurement and supervision functionalities including feeder automation devices with wired and/or wireless communication interfaces and power supply back-up.

and they can be connected to any system for controlling and monitoring.
we can be delivered integrated Smart Grid unit to be fitted upper the switchgear .
All secondary devices within the switchgear unit are powered by a 24V DC battery. The battery is charged by its charger, which needs external power supply

Technical data

Technical Data	Unit	V-Module Vacuum Circuit Breaker	L-Module Load Switch	Earthling Switch Disconnector
Rated Voltage	KV	٢٤	٢٤	٢٤
Rated Current	A	٦٣٠	٦٣٠	
Rated Frequency	Hz	٥٠	٥٠	٥٠
Rated Short Time Power Frequency Withstand Voltage	KV/1min	٥٠	٥٠	٥٠
Rated Lightning impulse Withstand Voltage	KV	١٢٥	١٢٥	١٢٥
Rated Short Time Current	KA/1Sec	٢٠	٢٠	١٦
Making Capacity	KA	٤٠	٤٠	٤٠
Breaking Capacities active Load	A	٦٣٠		
Breaking Capacities Off Load Cable Charging	A	١٤٠		
Breaking Capacities earthing Fault	A	١٦٠		
Electrical and mechanical classes		E2, M1	E3, C2, M1	
Rated Operating Sequence		O –0. 3s – CO –180s – CO	O – 0,3 s – CO – 15s – CO	
Mechanical Life	Times	٢٠٠٠ close/open	١٠٠٠ close/open	١٠٠٠close/open
operations on short circuit current	Times	٥	٥	
operations for mainly active	Times	١٠٠	١٠٠	

Applicable standards

IEC 62271 – 1 Common specifications for high-voltage switchgear and controlgear standards	
IEC 62271-200	**AC metal –enclosed switchgear and controlgear for rated voltage above 1 KV and up to and including 52 KV**
IEC 62271-100	**High voltage AC circuit-breakers**
IEC 62271-102	**High voltage AC disconnector and earthling switches**
IEC 62271-103	**Switches for rated voltages above 1 kV and less than 52 kV**
IEC 60255	**Electronic protection relays**
IEC 60529	**Degrees of protection provided by enclosures (IP code)**
IEC 61243-5	**Voltage detection system (VDS)**

Normal service conditions for indoor switchgear according to IEC 62271-200

Maximum Ambient temperature	**°C +40**
Minimum Ambient temperature	**°C -20**
Average temperature of 24 hours	**°C +35**
Relative humidity max	**٩٠ %**
Altitude for installation above sea level	**Max 1780 m**

The switchgear is designed for operation in a normal, non-corrosive and uncontaminated atmosphere.

Factory routine tested

NBP switchgears are tested in factory through a routine testing procedure according to IEC62271-200.

Factory routine tests:

- Power frequency withstand voltage test
- Secondary insulation test
- Timing of close & open VCB test
- Measurement of resistance of the main circuits
- Mechanical operations check
- Control of the gas leakage
- Check of sequence secondary wiring
- Check of sequence power line
- Visual inspection and check

SAFTY

NBP switchgear have a high level of safety for users. Using the following notes, users can safely operate the switchgear:

١. For any reason and by various factors internal arc is made inside the gas tank that the equipment does not withstand and causes an increase in the volume of gas or temperature inside the tank; a safety valve is installed behind the switchgear, which can prevent damage to the operator and other equipment by releasing gas through itself.

٢. For any reason short circuit made inside the cable compartment or bushing, gas and any other thing, will exit from the lower part of the cables which prevent damage to the operator and other equipment.

٣. Between the electrical components of the NBP switchgears, Mechanical interlocks have been installed to prevent operator errors.

٤. All operations mechanism of switches have padlocks for user's safety.

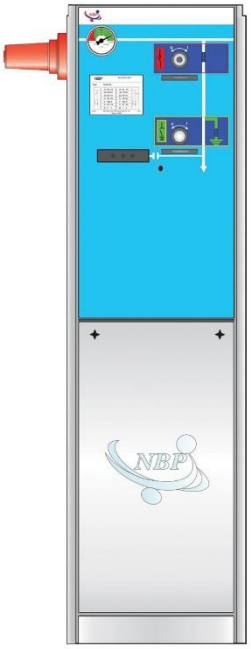
٥. Using fixed and moving mimic on module doors for showing position of switches to operator.To ensure the presence of voltage at the output of the module, a capacitor voltage indicator is used.Where cables are not connected, the earthing switch must be locked in closed position or the bushings must be fitted with dead end receptacles before the unit is energized.

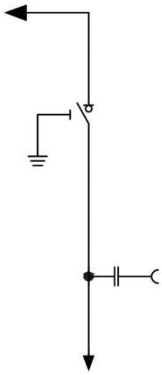
End-of-life

Protecting the environment is the responsibility of all. Niroosahel Co have obligated to assure environmentally clean processes, high recyclability and facilitate end-of-life recycling for our products.

More than 90%of the materials used in NBP switchgears can be recycled (all stainless steel ,iron, cupper, aluminum ,thermoplastic , wooden pallet)

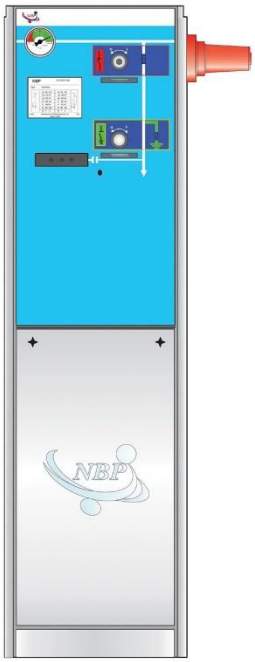
Models

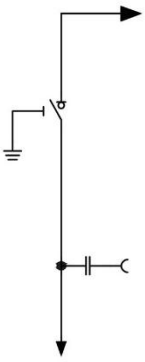




Height: 1335 mm
Depth: 754 mm
Width: 500 mm
Weight: 168 Kg

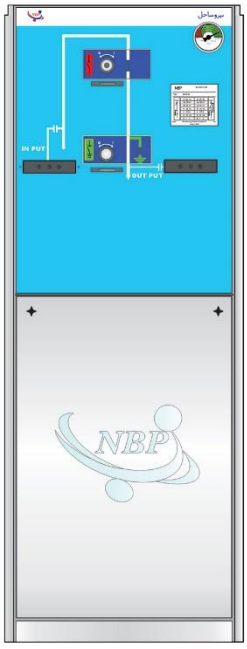
L/E.L Model

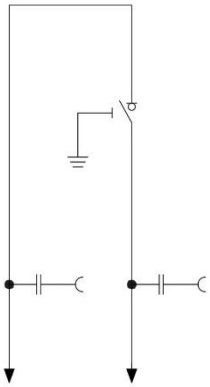




Height: 1335 mm
Depth: 754 mm
Width: 500 mm
Weight: 168 Kg

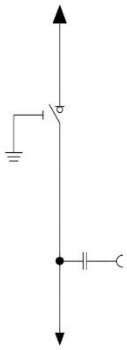
L/E.R Model





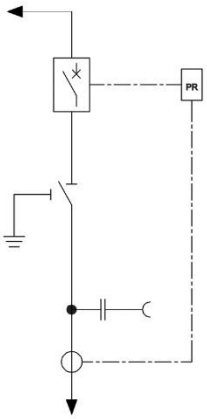
Height: 1470 mm
Depth: 754 mm
Width: 550 mm
Weight: 190 Kg

L Module



Height: 1465 mm
Depth: 754 mm
Width: 370 mm
Weight: 168 Kg

L/T Module



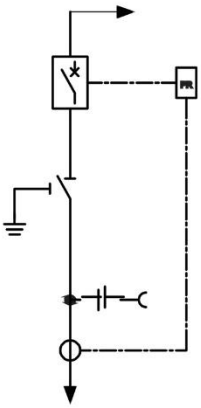
Height: 1335 mm

Depth: 754 mm

Width: 500 mm

Weight: 198 Kg

V/E.L Module



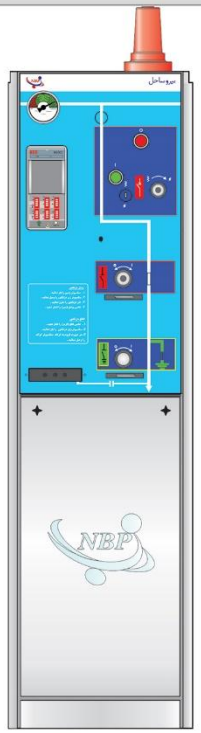
Height: 1335 mm

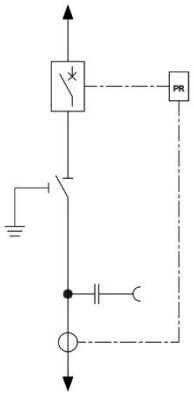
Depth: 754 mm

Width: 500 mm

Weight: 198 Kg

V/E.R Module





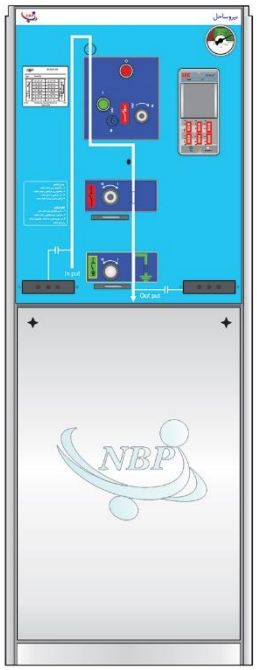
Height: 1465 mm

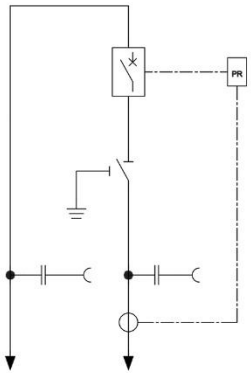
Depth: 754 mm

Width: 370 mm

Weight: 198 Kg

V/T Module





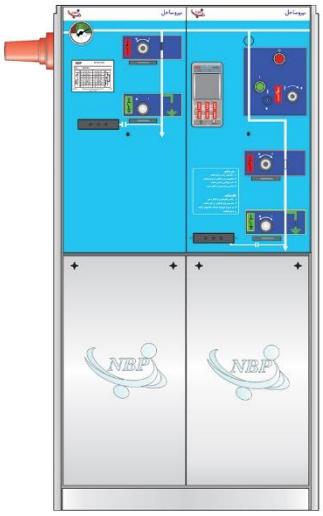
Height: 1470 mm

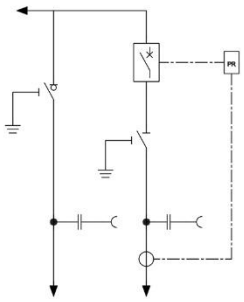
Depth: 754 mm

Width: 550 mm

Weight: 225 Kg

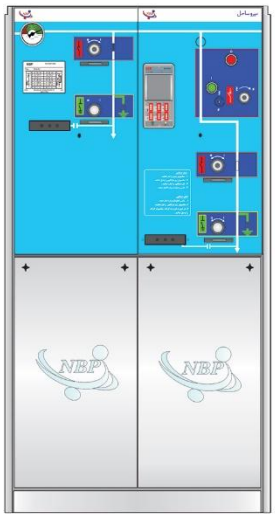
V Module

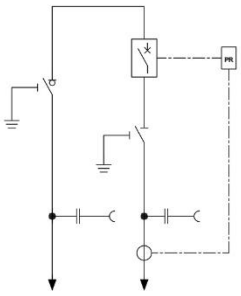




Height: 1335 mm
Depth: 754 mm
Width: 830 mm
Weight: 286 Kg

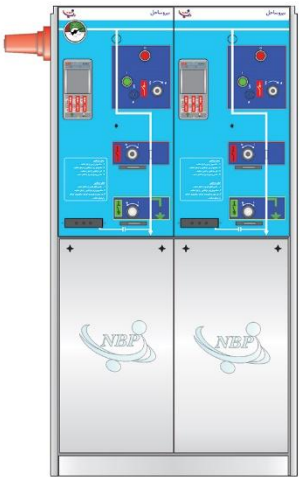
LV/E.L Module

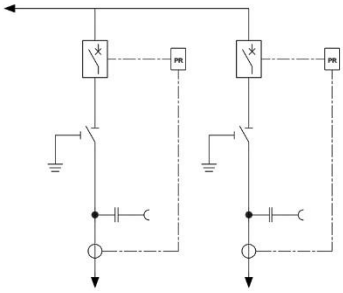




Height: 1335 mm
Depth: 754 mm
Width: 700 mm
Weight: 279 Kg

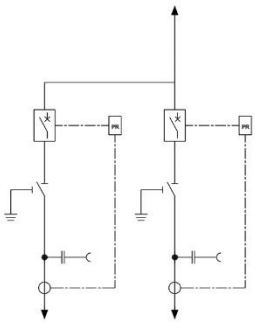
LV Module





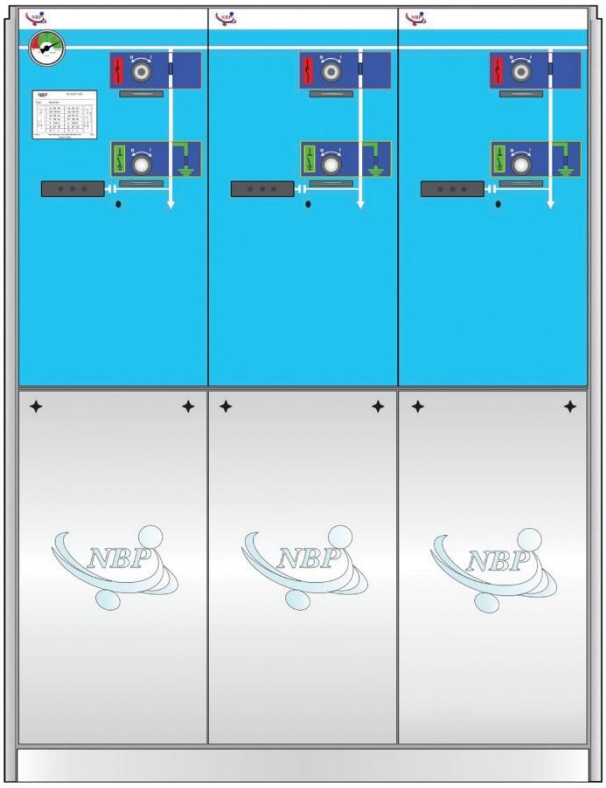
Height: 1335 mm
Depth: 754 mm
Width: 830 mm
Weight: 316 Kg

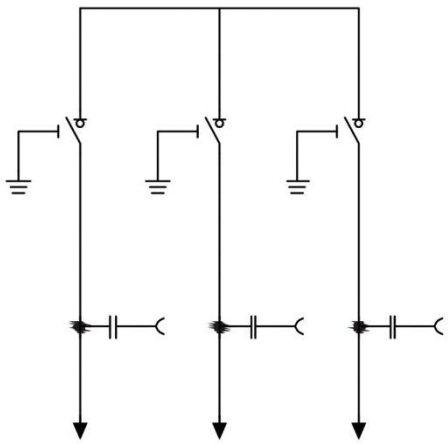
VV/E.L Module



Height: 1465 mm
Depth: 754 mm
Width: 700 mm
Weight: 316 Kg

VV/T Module





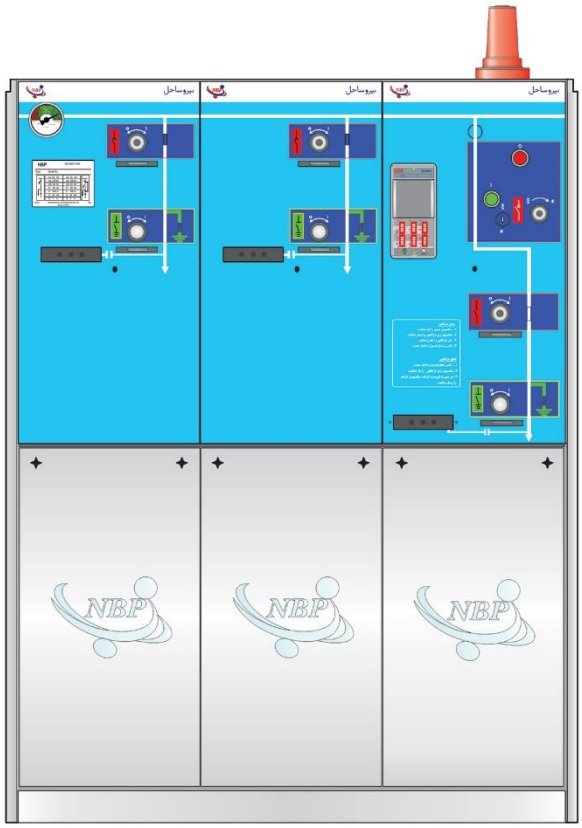
Height: 1335 mm

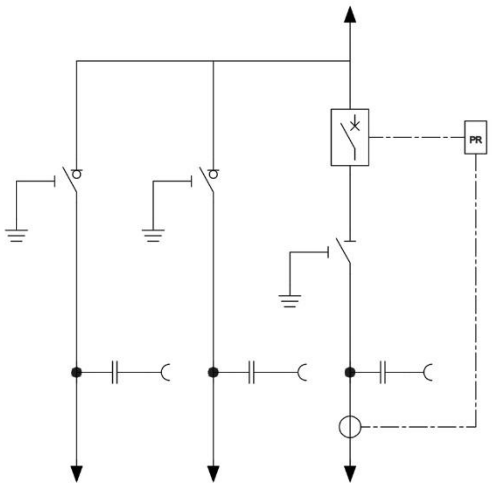
Depth: 754 mm

Width: 1025 mm

Weight: 315 Kg

LLL Model





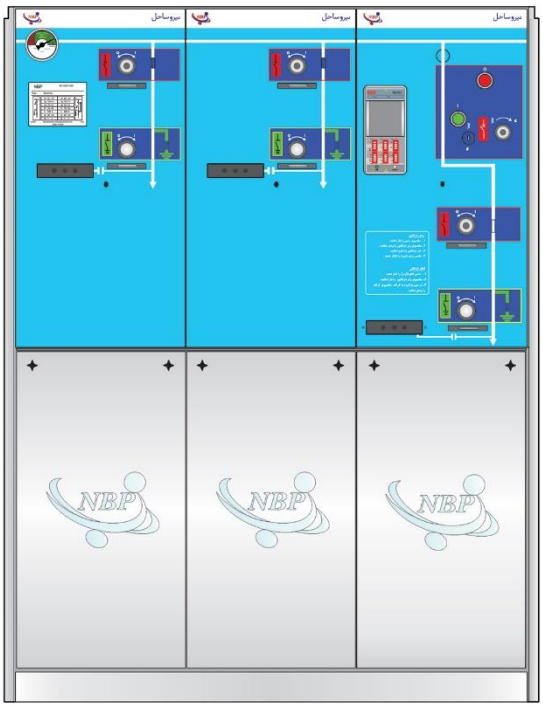
Height: 1465 mm

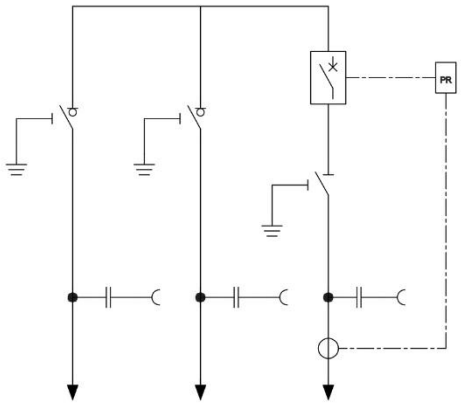
Depth: 754 mm

Width: 1025 mm

Weight: 352 Kg

LLV/T Module





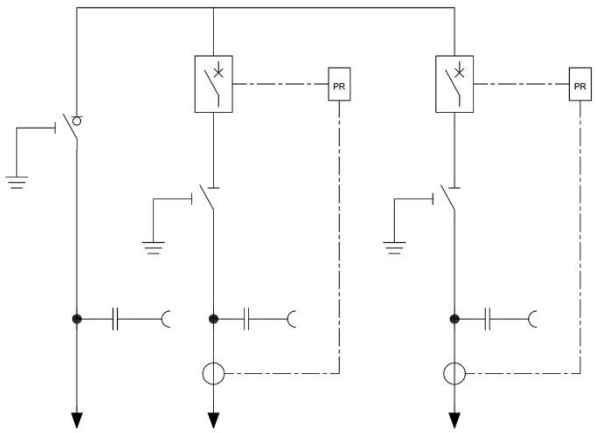
Height: 1335 mm

Depth: 754 mm

Width: 1025 mm

Weight: 345 Kg

LLV Module



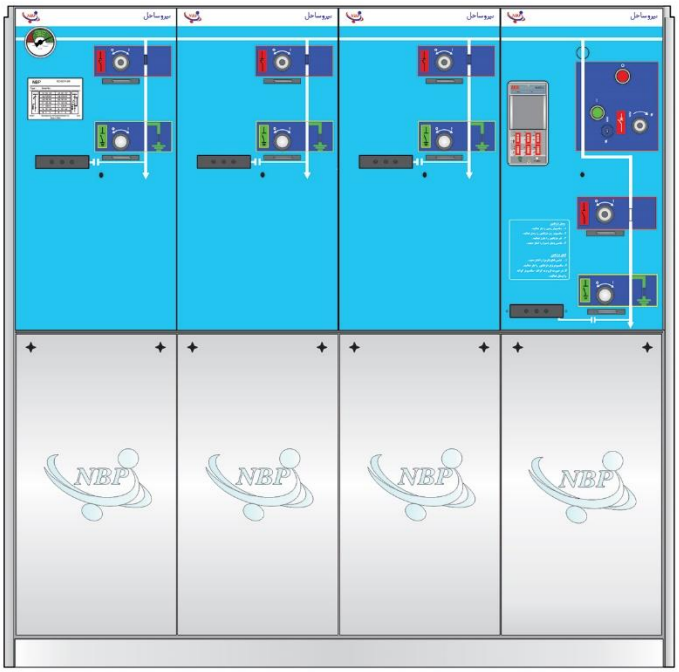
Height: 1335 mm

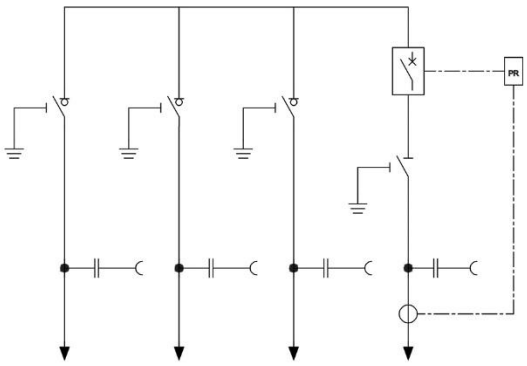
Depth: 754 mm

Width: 1025 mm

Weight: 368 Kg

LVV Module





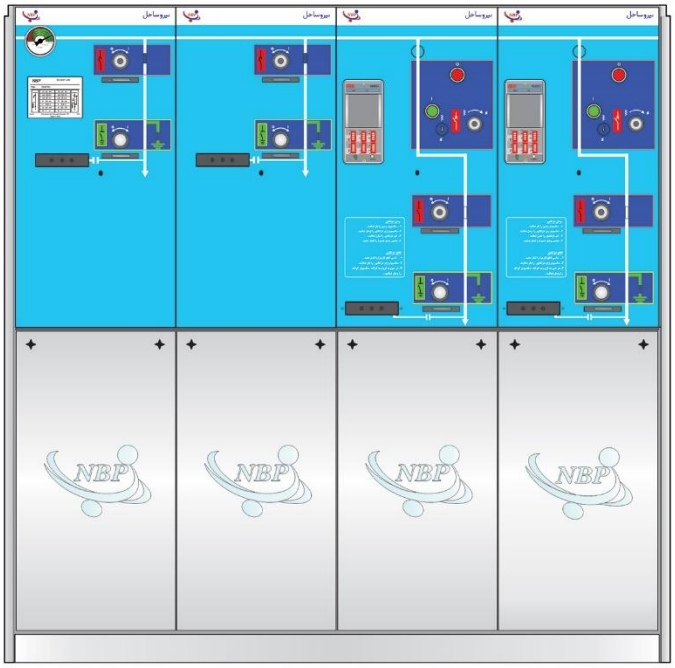
Height: 1335 mm

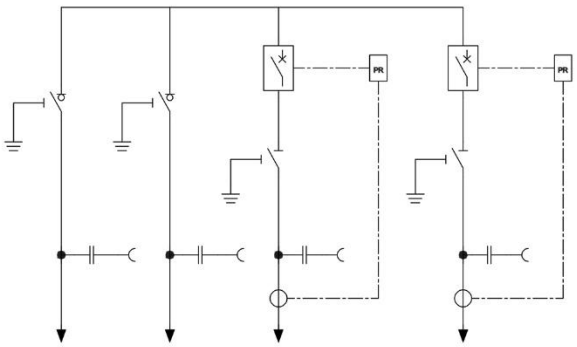
Depth: 754 mm

Width: 1350 mm

Weight: 450 Kg

LLLV Module





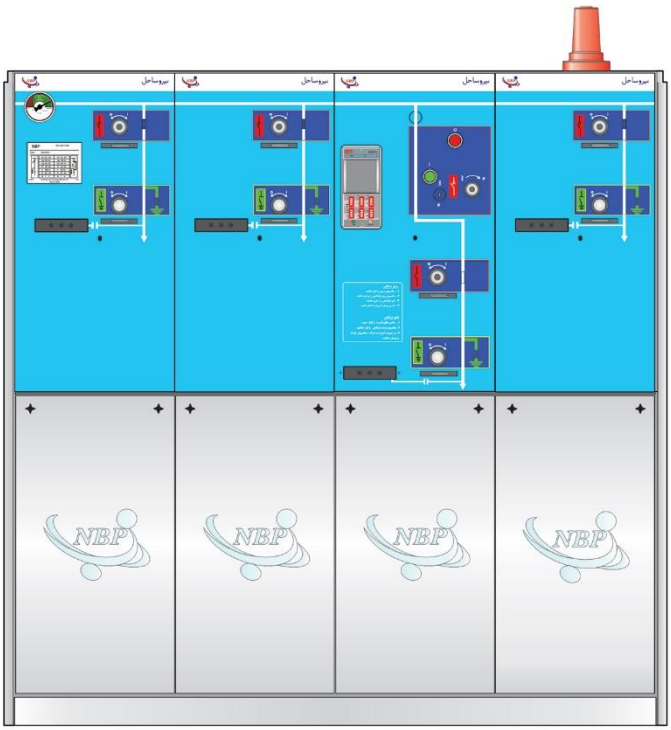
Height: 1335 mm

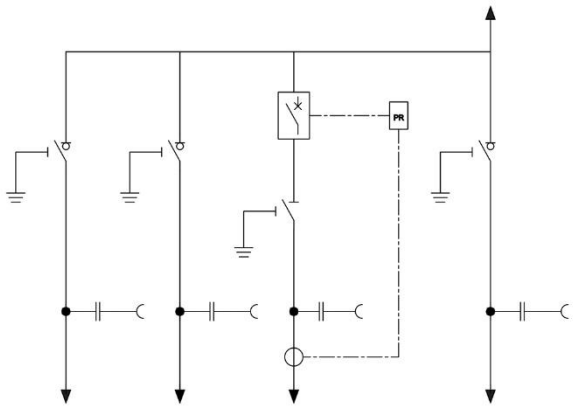
Depth: 754 mm

Width: 1350 mm

Weight: 462 Kg

LLVV Module





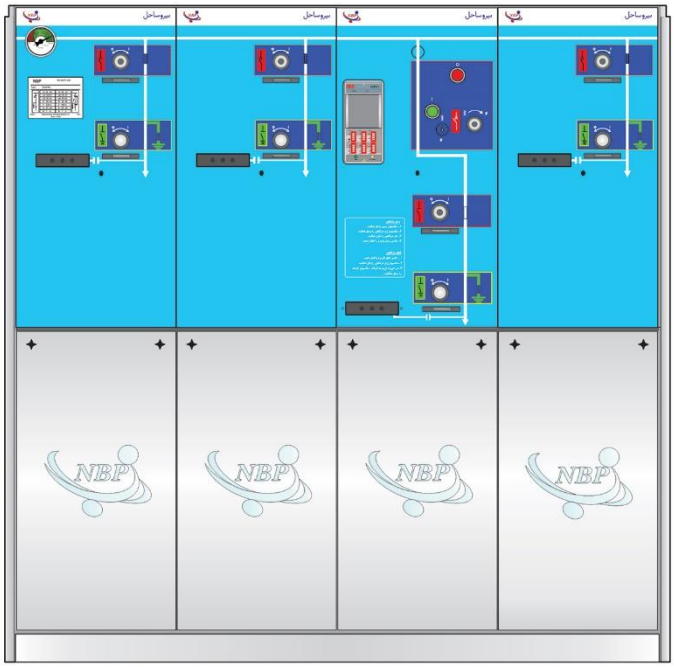
Height: 1465 mm

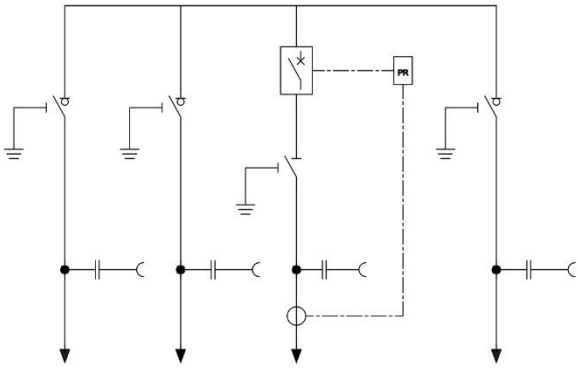
Depth: 754 mm

Width: 1350 mm

Weight: 457 Kg

LLVL/T Module





Height: 1335 mm

Depth: 754 mm

Width: 1350 mm

Weight: 450 Kg

LLVL Module

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Specifications subject to change without notice