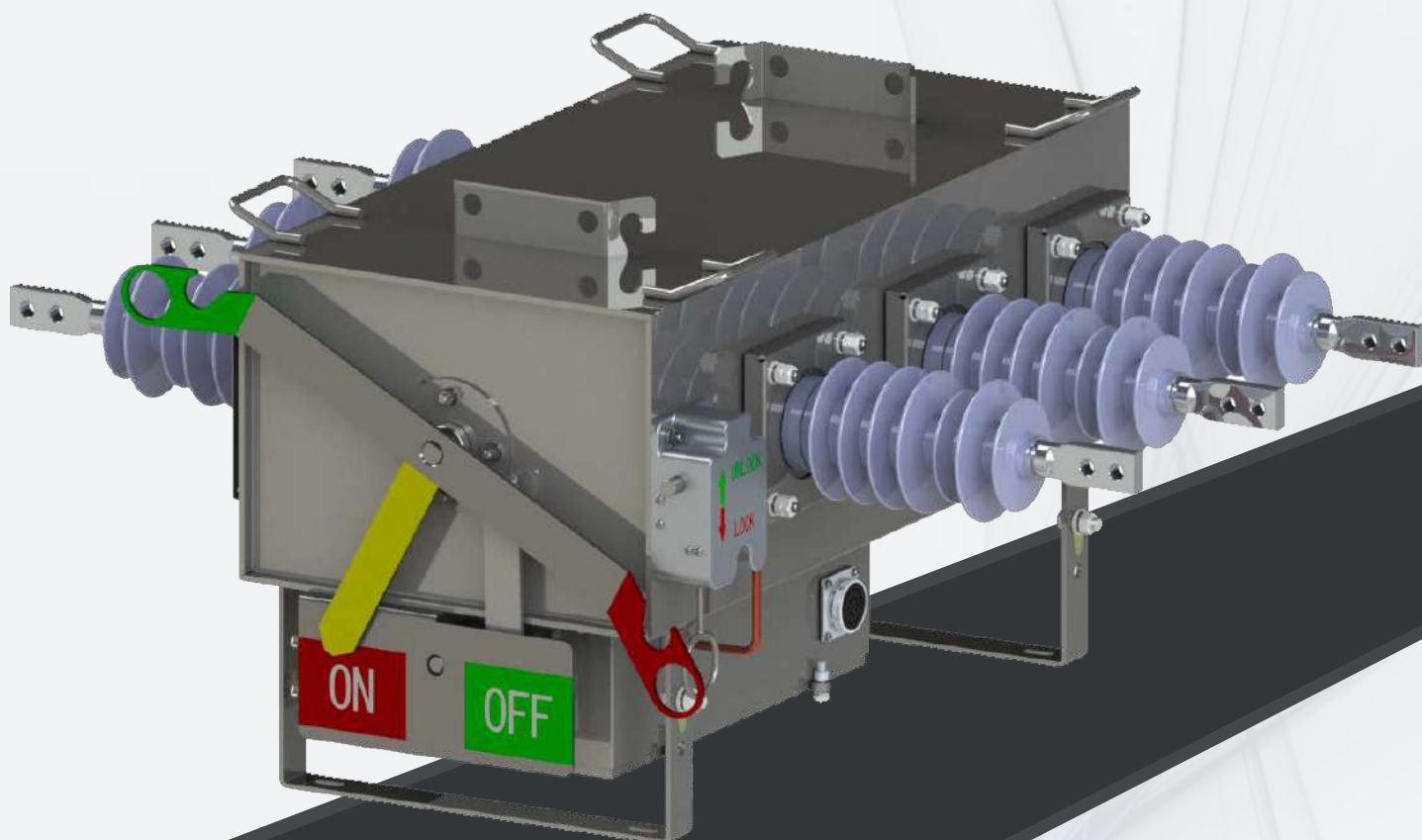


M-PLBS

Pole-Mounted SF6 Load-Break Switch
6kV,....40.5kV, 400A,..630,....1250A



according to



3B Energy can propose a huge number of Products related to Energy sector. We are active in the whole world of Power Transmission and Distribution. Medium Voltage switchgears, Medium Voltage switches, Low Voltage PC, Low Voltage MCCs with fix and withdrawable units, Transformers, Cabinets; 3B Energy can propose a wide range of Products for fulfilling any request and need.

3B Energy is very active and smart in assisting customers for finding Solutions related to Energy sector. We can support the customer during engineering phase of the plant, during purchasing steps, for the supply and after-sales services. 3B Energy is a real “turnkey” Solution provider; Package Substations, Transformer Substations, Mobile Cabinets; we can propose a complete solution set for letting the customer have one player only for his whole plant.

3B Energy can propose a complete and detailed list of Services which can cover each step of Engineering phase. Our technical staff is highly expert and professional and can support the customer starting from the base design of a single component till a complete apparatus for electrical application. We can design and project every component the customer may need: a single contact or a complete switching device, we can develop and engineer the technology for any product or application of Energy sector



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GENERAL FEATURES

The M-PLBS unit is a medium-voltage device for outdoor pole-mounted installations.

It uses SF6 gas for insulation and breaking. The M-PLBS unit is intended for use with overhead lines with voltage up to 36 kV and current up to 630 A.

The main characteristics of the M-PLBS unit are:

Ease of installation

- Compactness
- Pre-assembled unit
- Connection via bare wire and cable terminal
- Pole-mounted installation (alongside or on top)

Ease of use

- Insensitive to climatic conditions
- Easy and strong drive mechanisms
- Resistant to atmospheric agents
- Maintenance free

Personnel safety

- Suitable protection degree of drive mech. and live parts
- Clear and unequivocally defined indications
- Manual floor operation through hook-stick or transmission rods fixed on the support pole
- Motor-driven operation via electric local or remote control

Intrinsic safety of the device

- Assembly on specifically equipped production lines
- Use of appropriate and suitably tested materials
- Checking of all components and the end product



FUNCTIONAL FEATURES

The main active part of the M-PLBS unit is a load break switch derived from the similar device formerly and still used by 3B ENERGY on M-RING, compact unit in SF6: it is made of a moving element, connected with the incoming line terminals, and of a fixed contact connected with the outgoing terminals.

The position of the moving element is univocally determined and ensured by metal blocks; therefore the moving part allows to:

- open
- close

without possible mistakes by the operator.

The operating speed of the switch disconnecter does not depend on the actions of the operator and/or on the motor-drive, if present.

The insulators with long creepage distance for the connection with the overhead line can be made of cycloaliphatic resin, or silicone rubber, and guarantee long reliability under environmental conditions. The M-PLBS unit is equipped with independent operation mechanism on exceeding the dead centre both when opening and closing. A solution with energy storage drive mechanism, where the closing and opening can be controlled manually or via appropriate closing coils is available as well. On demand, the drive mechanism can be motor-driven for local and remote control, powered by a control unit with IP54 housing supplied on request.

A power source of 24 Vdc is required for the motor-drive and the control board, which may be supplied by an outdoor voltage transformer to be connected to the overhead line or by a photovoltaic panel (on demand). A series of 24 Vdc batteries inside the control board supply the power for the control board and relevant local and remote signalling, also during blackouts in the distribution network.

Furthermore, the control board may contain:

- a programmable voltage/time and current/time remote control for the selection of faulty medium-voltage sections
- low SF6 pressure indication device
- 50-5151N fault indicator with toroidal current transformers
- communication devices, such as modems, radio modems, or GSM modems
- electronic operation-counter

The M-PLBS unit is equipped with a series of interlocks which can execute the following functions on demand:

- interlock of electric and manual control
- interlock of local and remote electric control
- interlock for low SF6 pressure
- overcurrent interlock for medium-voltage current

The sealed casing of the M-PLBS unit is in welded stainless steel.

GAS SF6

SF6 gas has been used for more than 40 years as insulator and as means for electric arc extinguishing in electric medium and high-voltage devices, because of its excellent characteristics, which make it indispensable for such applications.

The impact on environment of SF6 gas is as follows:

- ✔ It does not participate in the chain of reactions causing the destruction of the ozone layer.
- ✔ It does not contribute to the acidification of rain.
- ✔ It does not have toxicity problems, in particular it is neither carcinogenic, nor bioaccumulable.

Therefore, the only feature that needs to be monitored is the potential greenhouse effect, and if we consider the overall quantity of SF6 in the atmosphere, its contribution is less than 0.002%, if compared to CO2.

The technological evolution and the introduction of ISO 9001 quality assurance systems ensure the production of completely sealed housings, suitable for a 30-year life without gas addition.

During the construction of 3B ENERGY products a series of actions are carried out in order to reduce emissions:

- ✔ The components subject to pressure are preliminarily and individually tested with eco-efficient liquids.
- ✔ Assemblies are carried out following operating instructions which ensure hermetically sealed joints.
- ✔ At the end of the assembly operations, an air-tightness test is carried out with molecular sensitivity levels.

Under today's conditions, the use and management of sulphur hexafluoride (SF6) guarantee the absence of emissions into the atmosphere, as well as the lack of negative consequences for the environment.

3B ENERGY acknowledging its role and the necessity to continue on the road of sustainable development commits itself to adopting all necessary measures in order to make its products compatible with the environment.

COMPLIANCE TO STANDARDS

The M-PLBS unit complies with the following technical regulations:

IEC EN 60694 - IEC 17-21 Common specifications for high-voltage switchgear and control gear standards

IEC EN 60129 - IEC 17-4 Alternate current switchgear and earthing switches for voltages above 1000V

IEC EN 60265/1 - IEC 17-9/1 High-voltage switches and switch disconnectors

Part 1: Manoeuvring switches and manoeuvring switches/breakers for voltages > 1kV and < 52 kV

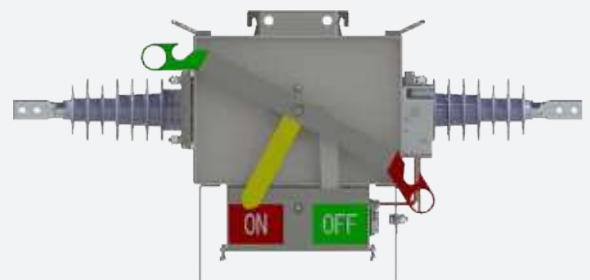
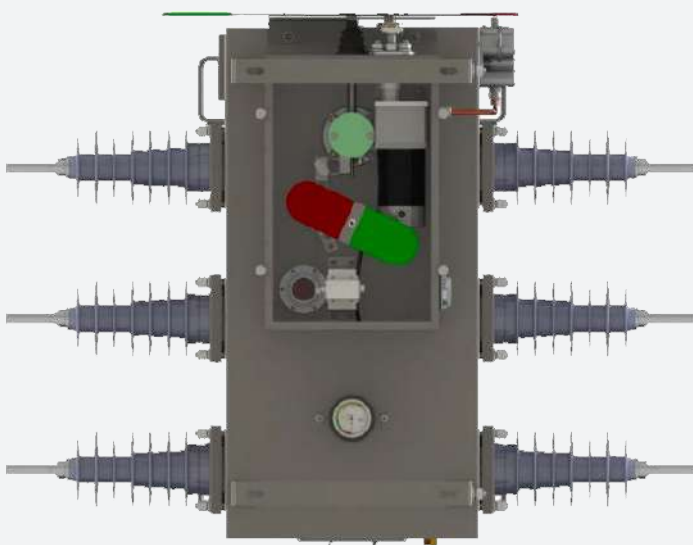
IEC EN 60298 - IEC 17-6 Prefabricated device with metal casing for 1-52 kV

All tests prescribed by national and international regulations in force have been carried out on the M-PLBS unit in the CESI laboratories (Milan) and in the internal laboratories of 3B ENERGY. In particular, all tests required by the IEC 60265-1 (IEC 17-9/1) regulations have been performed:

- ✔ dry and wet insulation tests
- ✔ heat tests
- ✔ breaking and short circuit making capacity
- ✔ short-duration and peak withstand current
- ✔ mechanical functioning tests

In addition routine tests are carried out on every produced unit, as prescribed by the Quality Control Plan, in order to certify the type compliance. The following tests are performed:

- ✔ measurement of the resistance of all main circuits
- ✔ switch disconnector speed detection
- ✔ air-tightness check
- ✔ insulation tests at power frequency
- ✔ interlock functional tests.



Front: Clear O/C position status

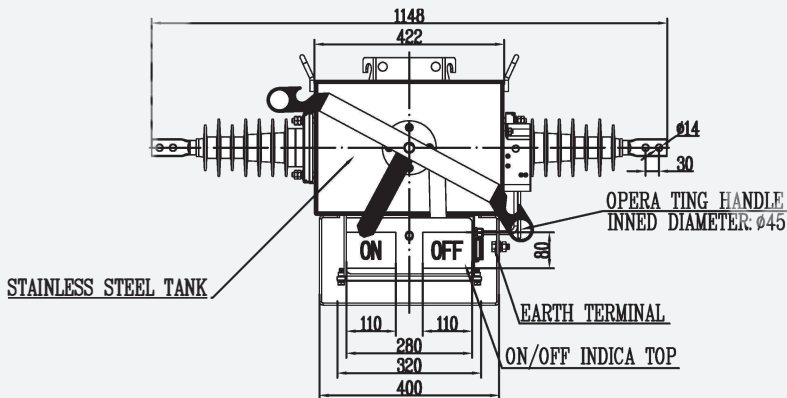
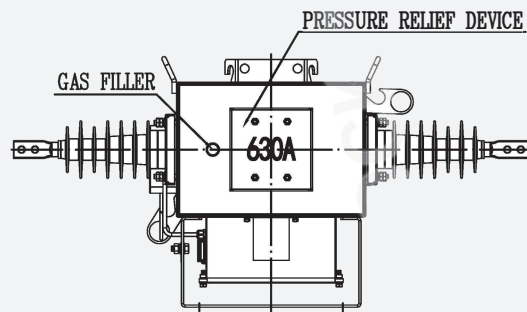
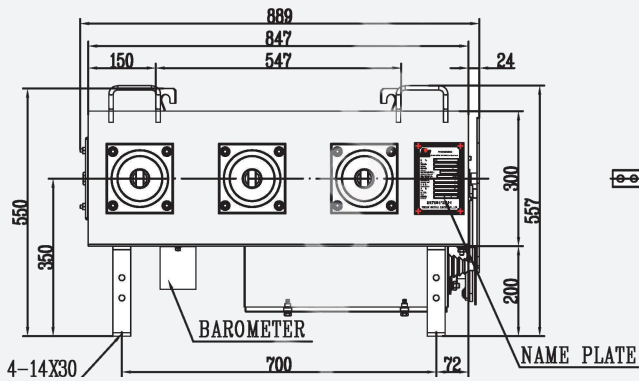
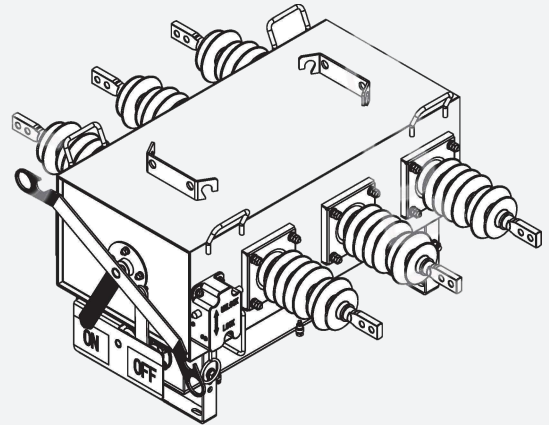
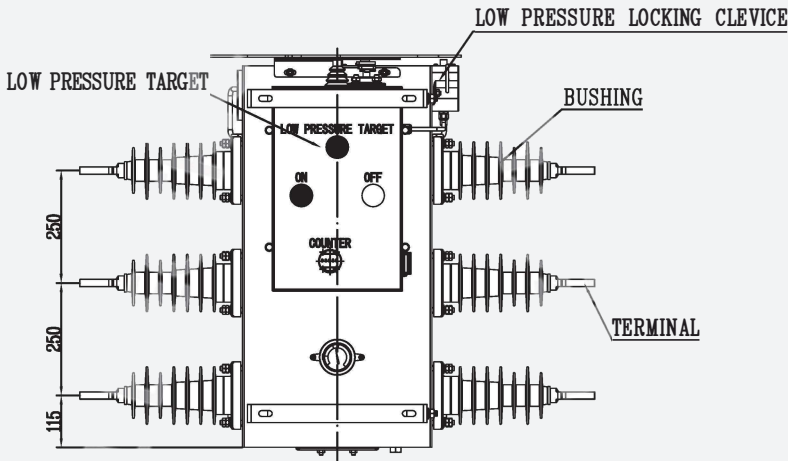


Rear: Highly reliable explosion-proof valve, Inflatable/deflation integrated device

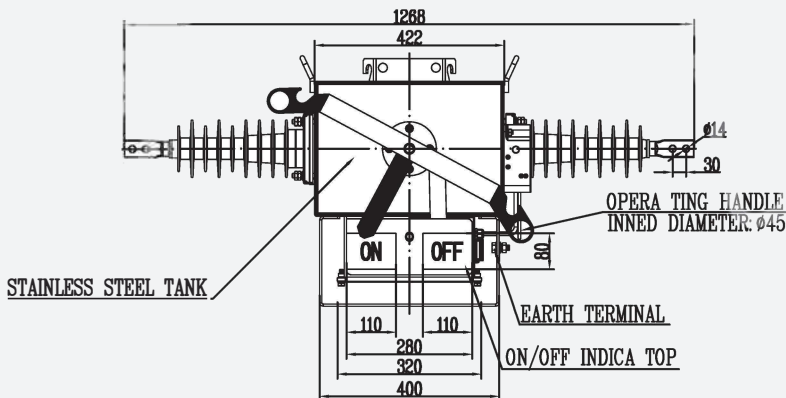
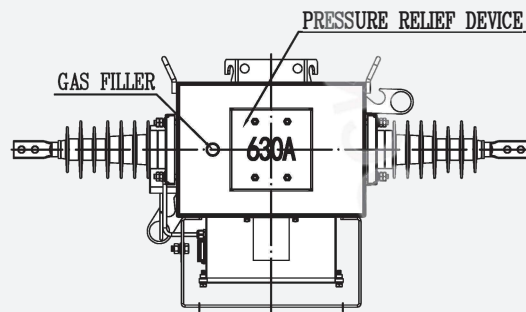
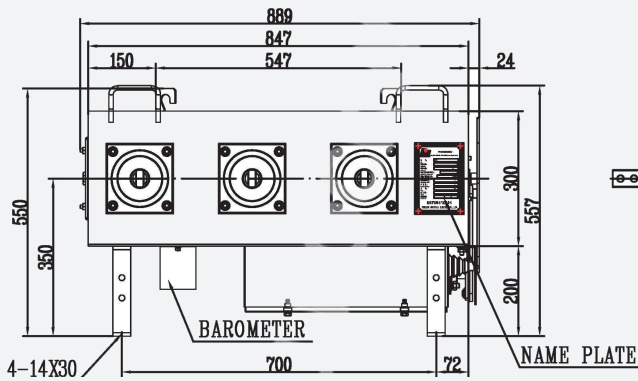
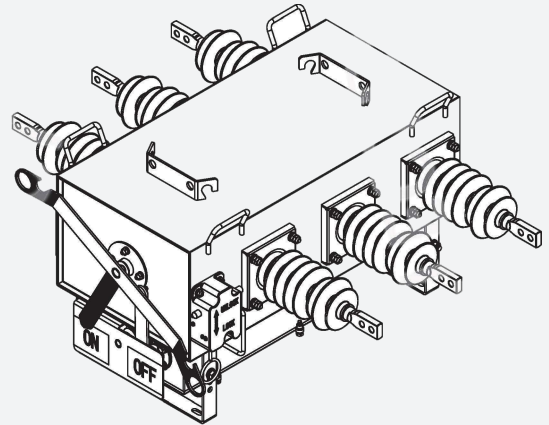
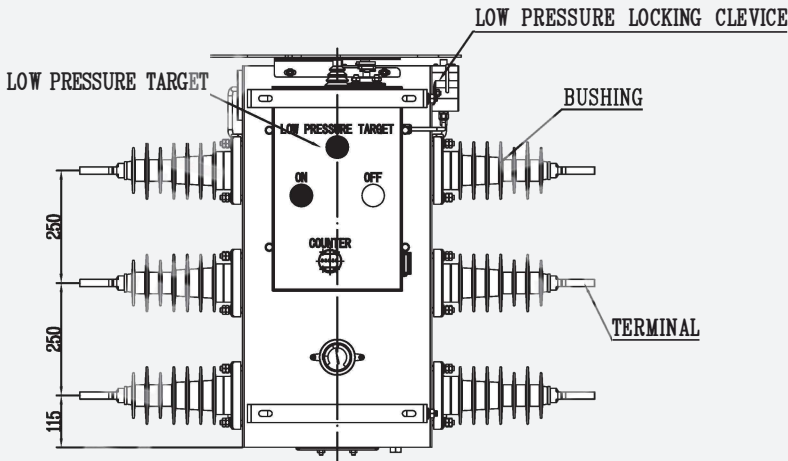
TECHNICAL DATA

Insulation level				
Rated voltage	kV	12	24	36
Power frequency withstand voltage, 50 Hz				
- to earth and between phases	kV	28	50	70
- across the isolating distance	kV	32	60	80
Lightning impulse withstand voltage				
- to earth and between phases	kV	75	125	170
- across the isolating distance	kV	85	145	195
Current ratings				
Rated normal current	A	400/630/800/1250		
Mainly active load breaking current	A	400/630/800/1250		
Number of breaking operations CO	times	400		
Line-charging breaking current	A	50	50	2
Cable-charging breaking current	A	50	50	40
Earth fault breaking current	A	50	50	130
Cable charging breaking current under earth fault conditions	A	28	28	80
No-load transformer breaking current	A			20
Short-circuit ratings				
Short-time withstand current, I _k	kA/s	20 kA/4 s	20 kA/4 s	20 kA/4 s
Peak withstand current	kA	50	50	50
Short-circuit making current	kA	50	50	50
Number of making operations				
- main switch 50 kA (CL E3)	times	5	5	5
- main switch 31.5 kA (CL E3)	times	10	10	10
- earthing switch 50 kA (CL E2)	times	3	3	3
- earthing switch 31.5 kA (CL E3)	times	5	5	5
Ambient air temperature limits		-40°C...+60°C		
Mechanical endurance (number of CO operations)				
- main switch	times	5000	5000	5000
- earthing switch	times	2000	2000	2000
Filling pressure (+20°C)	bar (abs)	1.4-1.5	1.4-1.5	1.8-1.9
Alarm pressure (+20°C)				
- density switch	bar (abs)	1.2	1.2	1.65
- density gauge	bar (abs)	1.2	1.2	1.6
- low gas lock-out mechanism	bar (abs)	1.1	1.1	1.6
Weight				
Composite bushing	kg	115	125	135
Porcelain bushing	kg	125	135	155
Motorize		Add 20kg		
Degree of protection of the mechanism box		IP67		

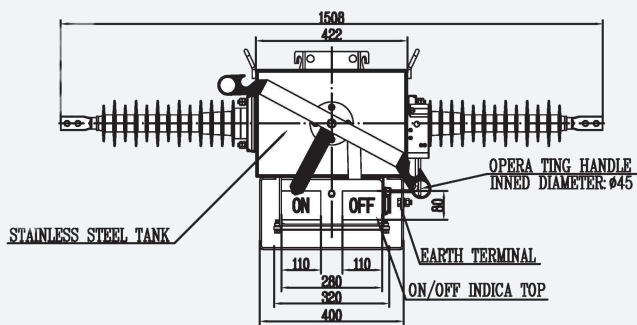
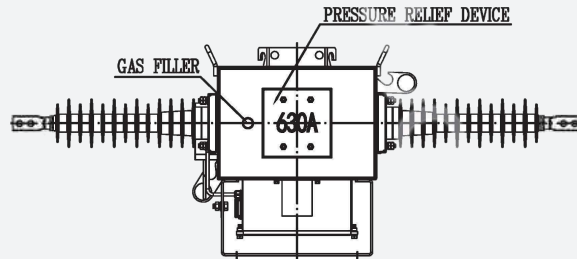
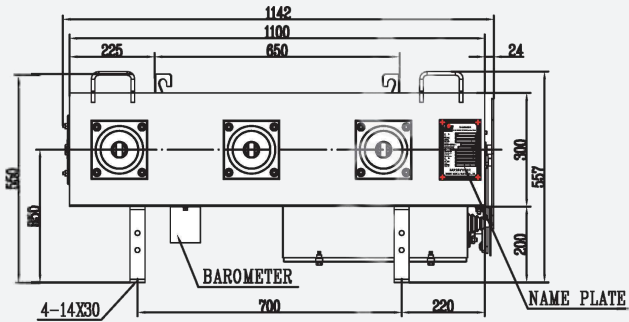
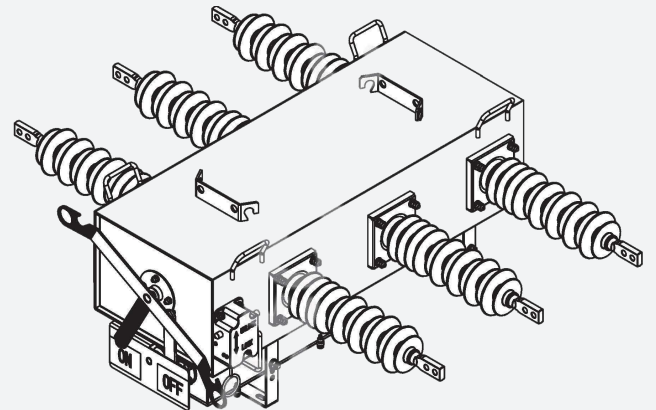
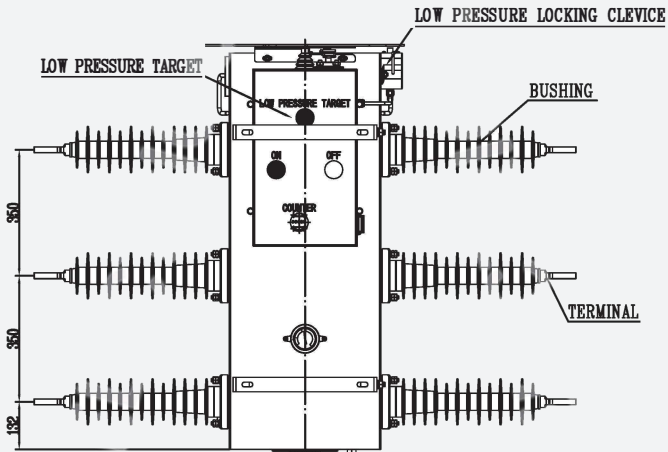
DIMENSIONS - 12kV



DIMENSIONS - 24kV



DIMENSIONS - 36kV





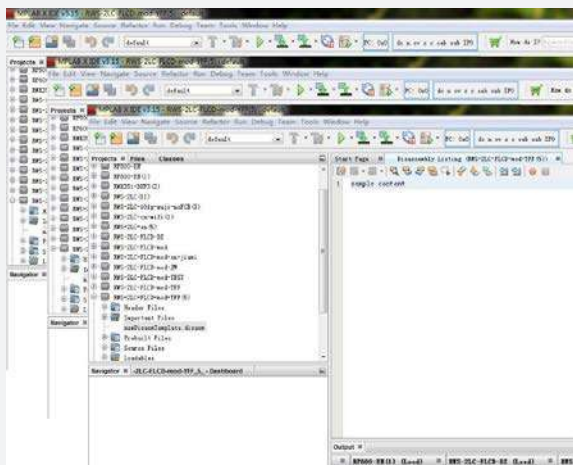
M-PLBS with remote control board and remote protection control

Main Components

- ✓ Local (automatic/manual) or remote control system with switch/transmitter: modem, radio modem, GSM modem Local/remote opening/closing blocking system for low pressure
- ✓ Auxiliary system with battery and metering/charging devices, failure control and protection (low voltage switches and fuses)
- ✓ Remote control system with programmable electronic unit, voltage/time or current/time and blocking Signalling for closing and opening blocking at low pressure SF6, LBS closed/open, local/remote control, manual / automatic, transformer failure, active auxiliary devices and blocking
- ✓ Terminal blocks and plugs/sockets for auxiliary cables, for VT's, and external sources

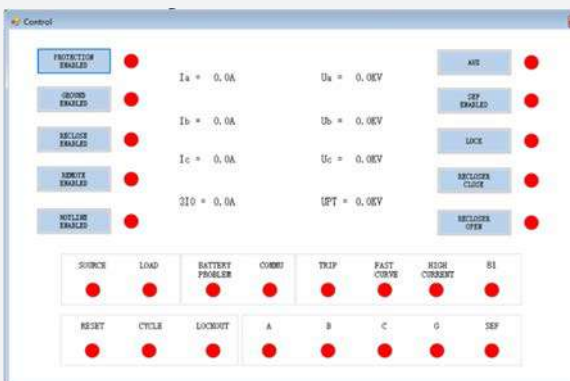


PC software for controller Testing, Setting, programming, Update.

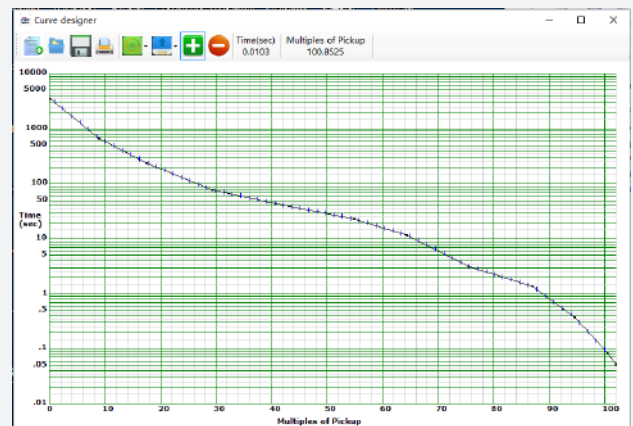


Parameter name	Value	Unit	Parameter name	Value	Unit	Parameter name	Value	Unit	Parameter name	Value	Unit	Parameter name	Value	Unit	Parameter name	Value	Unit			
Backstop (0-1)	0		Backstop count (0-4)	3		1st delay time (0-00-00.00)	4.00	S	4th delay time (0-00-00.00)	4.00	S	2nd delay time (0-00-00.00)	10.0	S	3rd delay time (0-00-00.00)	4.00	S	5th delay time (0-00-00.00)	4.00	S
P.0C1 (0-1)	0		Operating mode (0-4)	1		Sequence Coord. (0-1)	0		OPLOCK (0-5)	4		Pickup current (0-10-100.00)	1.00	A	Delay					
P.0C2 (0-1)	0		Activate shot (0-5)	2					Pickup current (0-10-100.00)	1.00	A	Delay								
P.0C3 (0-1)	0		Operating mode (0-4)	1					Pickup current (0-10-100.00)	1.00	A	Delay								
P. Fast curve (0-1)	0		Curve type (0-14)	3					Pickup current (0-10-100.00)	1.00	A	Time								
P. Delay curve (0-1)	0		Curve type (0-14)	3					Pickup current (0-10-100.00)	1.00	A	Time								
G.0C1 (0-1)	0		Operating mode (0-4)	2					Pickup current (0-10-100.00)	1.00	A	Delay								
G.0C2 (0-1)	0		Activate shot (0-5)	2					Pickup current (0-10-100.00)	1.00	A	Delay								
G.0C3 (0-1)	0		Operating mode (0-4)	1					Pickup current (0-10-100.00)	1.00	A	Delay								
G. Fast curve (0-1)	0		Curve type (0-14)	3					Pickup current (0-10-100.00)	1.00	A	Time								
G. Delay curve (0-1)	0		Curve type (0-14)	3					Pickup current (0-10-100.00)	1.00	A	Time								
M.0C1 (0-1)	0		Operating mode (0-4)	2					Pickup current (0-02-6.00)	1.00	A	Delay								
M.0C2 (0-1)	0		Activate shot (0-5)	2					Pickup current (0-02-6.00)	1.00	A	Delay								
SEP (0-1)	0		Operating mode (0-4)	1					Pickup current (0-02-6.00)	1.00	A	Delay								
M. Fast curve (0-1)	0		Curve type (0-14)	3					Pickup current (0-02-6.00)	1.00	A	Time								
			Curve type (0-14)	3					Pickup current (0-02-6.00)	1.00	A	Time								

Easy Interface



Programmable Time-Overcurrent curve





Note



Note



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