

JSB-2

7.2kV Medium Voltage Switchboard



Superior Compact Reliable

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JSB-2

-Superior- (Latest State of the Art Technology)

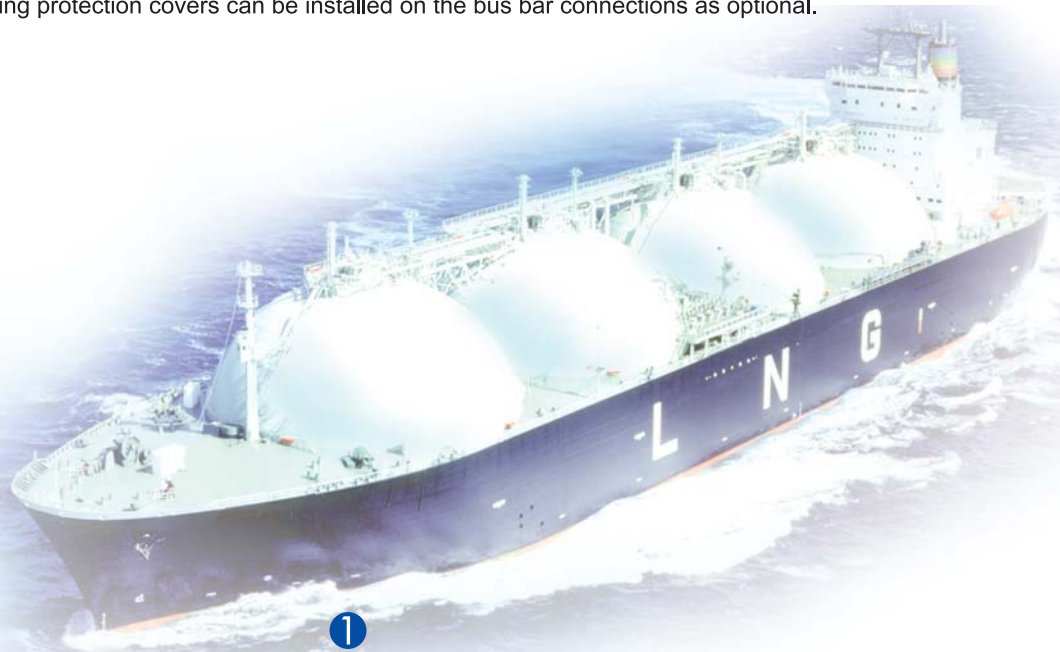
- Based on JRCS's wide experience of developing and producing switchboards for the marine industry, the JSB-2 has been designed using the latest advanced technology and provides a specification of 7.2kV with a short circuit capacity of 25kA as standard. A short circuit capacity of 40kA is available as optional.
- Equipped with a remote control & monitoring system interface, plant intelligence is easily developed.

-Compact- (Significant Downsizing)

- As a result of complete re-examination of all areas of the traditional medium voltage switchboard, JRCS has successfully achieved significant structural downsizing.
- This significant downsizing provides major space saving opportunities.

-Reliability- (Maximum Safety and Reliability)

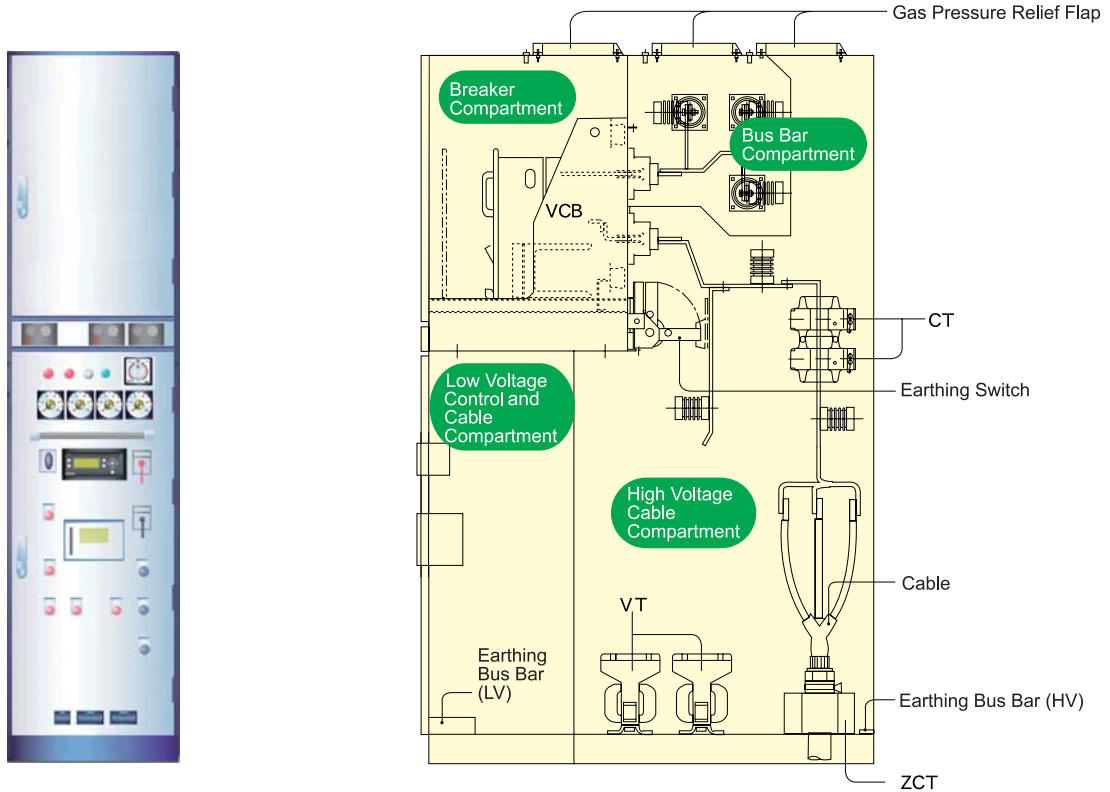
- The JSB-2 is fitted with an Earthing Switch and Mechanical Interlocks with VCB as standard for maintenance purpose.
Operation is accessible from the front panel and inside panel for enhanced safety.
- Electromagnetic locking can be provided for all doors with exclusive key locking for nominated engineer access only.
- Insulation levels are set at 28kV (AC12kV power system is applicable) thereby providing high durability against harsh marine environments and suitability for Insulated Neutral Power System applications.
- Gas Pressure Relief Flap fitted in the top of the cubicle are to minimize potential damage in case of any accidents such as arcing etc. Additionally, Gas Pressure Relief Duct can be installed as optional.
- Removable insulating protection covers can be installed on the bus bar connections as optional.



Structure

The JSB-2 is a metal-enclosed type switchboard, which successfully provides the combinations of major space saving by downsizing, latest HV technology, and improved structural strength.

The JSB-2 comprises of the Breaker Compartment, Main Bus Bar Compartment, High Voltage Cable Compartment, Low Voltage Control and Cable Compartment, which are separated by metal plates, thereby providing enhanced safety features.



Marine Classification Approvals

The JSB-2 has been type-approved and is compliant with the requirements of the leading Classification Societies. In addition, the JSB2 has been fully tested (such as internal arc fault tests) to meet the IEC Standards.



DNV, ABS, LR, BV

Interlock System

The JSB-2 interlock system is in compliance with IEC 62271-200 so that the front of the High Voltage Compartment cannot be opened without closing the earthing switch.

All interlock operations are accessible from the front door.

1) Open the Circuit breaker.



2) Open the VCB withdrawal handle slot cover and turn the VCB handle unit VCB is isolated at the test position.



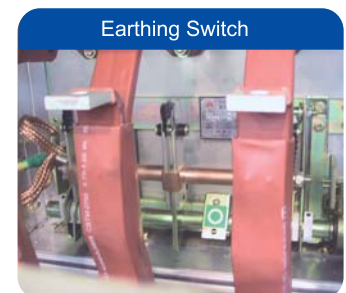
3) Open the earthing switch handle slot cover and turn the handle to close the earthing switch.



4) The door cannot be opened until the breaker is isolated and the earthing switch is set to the charge position.



5) The rear door of the HV cable compartment can be opened by the key retained inside the circuit breaker compartment.



VCB (Vacuum Circuit Breaker)

● Adoption of Low Surge Type VCB

High voltage electrical equipment will not be subjected to burnout damage due to high surge voltage since the advanced technological design of the VCB minimizes any surge voltage during the VCB opening.

● Configuration of metal shutters for enhanced safety and reliability

Independent mechanism of source / load side shutters, which can be padlocked during maintenance.

Safety Shutter opened at service position



Safety Shutter closed at drawn-out position



● Application of earthing switch with making capacity

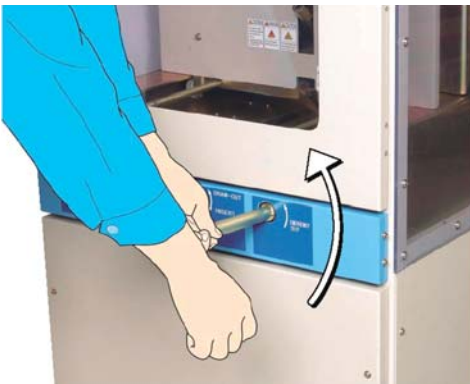
Making peak current of up to 65kA is ensured by the spring method.

Closing Earthing Switch



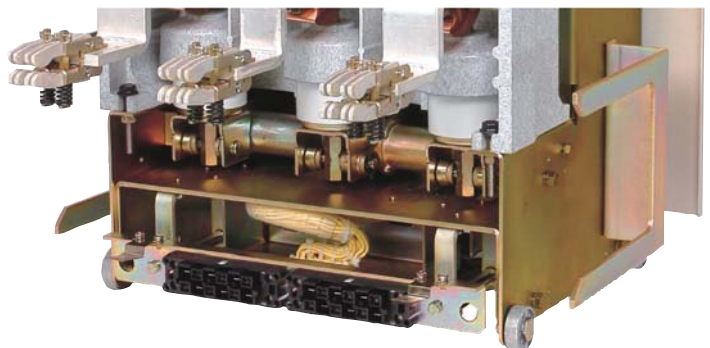
● Operator emergency trip mechanism mounted on the panel surface

Mechanical trip of circuit breakers is possible in case of the control source failure.



● Application of control circuit adapter enabling automatic connection

Implementation of a mechanical interlock for auxiliary circuits enhances the safety level.



● Ratings and Specification of VCB

Type		HS2006Y-06 Mf-EZS	HS2006Y-06 Mf-ELZS	HS2006Y-12 Mf-EZS	HS2506Y-06 Mf-EZS	HS2506Y-12 Mf-EZS
Rated voltage (kV)		7.2				
Rated normal current (A)		630		1250	630	1250
Rated short-circuit breaking current (kA)		20			25	
Rated short-time withstand current (1S) (kA)		20			25	
Rated peak withstand current (kA)		52			65	
Rated insulation level	Power frequency (kV)	60				
	Lightning impulse (kV)	20				
Rated frequency (Hz)		50/60				
Rated supply voltage of closing and opening devices (V)		100, 110, 200, 220 DC/AC If AC is required for trip control power, install a capacitor trip device separately.				
Opening time (s)		0.03				
Closing time at no-load (s)		0.04				
Rated operating sequence		O-3min-CO-3min-CO O-0.3s-CO-3min-CO or CO-15s-CO				
Number of mechanical operations		10,000				
Vacuum interrupter		Standard	Low surge	Standard		
Auxiliary contact		4a + 4b Closing capacity : DC100/200V : 5/3A, AC100/200V : 20/10A				
Position detection limit switch		Service position 2c + Test position 2c Making/breaking capacity (at inductive load) : 100~250V AC/DC 2A (NC contact) and 1.5A (NO contact)				
Trip coil disconnection monitor function		Provided (Terminal No.7)				
Standard		IEC 62271-100				
Earthing switch		Rated peak withstand current : 52kA or 65kA				

● Switchgear Standard for Marine Use Certified for VCB (HS2006Y 7.2kV 20kA)

LR and NK certified. ABS is in progress. (January 2006)



Multi Function Digital Protection Relay

General description

JSB-2 uses a manifold function digital relay for protecting generators, electric motors, transformer and cables. Providing easy maintenance, high performance and multifunction, this multi-function relay is factory adjusted to meet customers' requirements and specification.

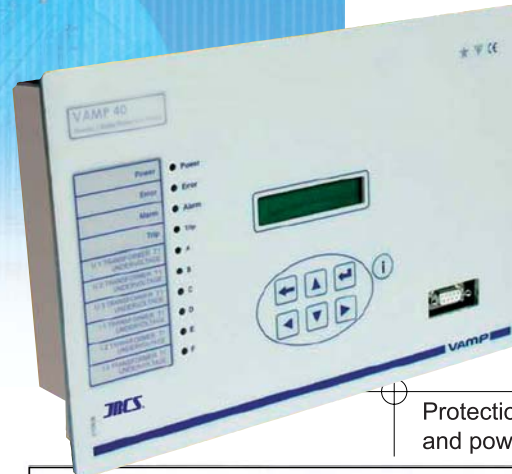
In addition to the protection function, communication function is also available. A variety of data can be also monitored from host system.

Additionally, parameter setting up, control setting up, various editor and fault record etc. programs can be opened on a computer.

Function

Protection for generator

Protection for electric motor and power supply



Main technical data/ VAMP 210

Auxiliary voltage, Uaux (optionally 18...36 Vdc)	40...265 V ac / dc
Rated phase current In	1A or 5A
Rated neutral current In	1A or 5A
Rated measuring range	0...50 x In
Rated measuring range	0...5 x In
Thermal withstand	4 x In (continuous) 100 x In (for 1 s)
Rated voltage Un	50...120 V (configurable)
Voltage measuring range	0...175 V (100 / 110 V)
Voltage withstand (continuous)	250 V
Rated frequency fn	45...65 Hz
Frequency measuring range	16...75 Hz
Digital inputs	6 pcs
Internal operating voltage	+48 V dc
Trip contacts	2 pcs
Alarm contacts	5 pcs
Tests and environment	
Emission	EN 55022
Immunity	IEC 60255-22-1, IEC 60255-11, EN 61000-4-6, EN 61000-4-5, EN 61000-4-4, EN 61000-4-3, EN 61000-4-2
Insulation test	IEC 60255-5
Surge voltage	IEC 60255-5
Vibration shock	IEC 60255-21-1
Operating temperature	-10...+55° C
Relative humidity	<95 % no condensation allowed
Degree of protection (IEC 60529)	IP54, flush mounted
Weight	4.2 kg
Dimension (w x h x d)	209 x 155 x 225 mm
Protection stages	
Overcurrent protection	
Overcurrent stage	I> 50/51
Overcurrent stage	I>> 50/51
Overcurrent	I>>> 50/51
Voltage restrained	
overcurrent/underimpedance	I> 51V
Unbalance protection	I> 46
Residual current protection	
Residual current stage	I> 50N/51N
Residual current stage	I>> 50N/51N
Residual current stage	I>>> 50N/51N
Directional earth fault stage	I> 67N
Residual overvoltage protection	
Residual voltage stage	U> 59N
Residual voltage stage	U>> 59N
Residual voltage stage	U>>> 64F3 or 27F3

Voltage protection	
Overvoltage stage	U> 59
Undervoltage stage	U<> 59
Undervoltage stage (pos. phase seq.)	U< 27
Undervoltage stage (pos. phase seq.)	U<< 27
Power protection stages	
Thermal overload stage	T> 49
Underexcitation stage	Q< 40
Overexcitation	U> 24
Reverse power stage	P< 32
Reverse power stage	P<< 32
Underimpedance	Z< 32
Underimpedance	Z<< 32
Underimpedance	X< 40
Underimpedance	X<< 40
Frequency protection stages	
Overfrequency stage	f> 81H
Overfrequency stage	f>> 81H
Over/underfrequency stage	f>< 81L
Over/underfrequency stage	f><< 81L
Frequency stage	dI/dt 81RL
Arc protection (option)	
Arc protection stage	ArcI> 51L>
Arc protection stage	Arc I>> 51NL>
Other	
Disturbance recorder	All analogue channels and binary inputs / outputs
Circuit breaker failure protection	TCS 50BF
Trip circuit supervision	TCS 60
Measurements	
Phase currents	IL1, IL2, IL3, IL
Residual current	I< (A)
Current unbalance	I< (A), I< (%)
Phase and line voltages	U<1, U<2, U<3, U<4, U<5
Residual voltage	U<
Frequency	f
Power factor	P, Q, S
Power factor	PF
IQ diagram	IL
Note: 1) with VAMPSET software	
Communication protocols	
IEC 60 870-5-103	
Transparent TCP/IP	
Modbus TCP	
Modbus RTU	
Profibus DP	
SPA	
DNP 3.0	

Main technical data/ VAMP 40

Auxiliary voltage, Uaux	40...265 V ac / dc
Rated phase current In	1A or 5A
Rated measuring range	0...50 x In
Rated neutral current	1A / 5A
- Ioi	0.2A / 1A
- Ioi	0...5 x In
Rated residual voltage Un	50...120 V (configurable)
- voltage measuring range	0...175 V (100 / 110 V)
Rated frequency fn	45...65 Hz
- frequency measuring range	16...75 Hz
Digital inputs	2 pcs
- external operating voltage	+18...265 V dc
Trip contacts	2 pcs
Alarm contacts	3 pcs
Tests and environment	
Emission	EN 55022
Immunity	IEC 60255-22-1, IEC 60255-11, EN 61000-4-6, EN 61000-4-5, EN 61000-4-4, EN 61000-4-3, EN 61000-4-2
Insulation test	IEC 60255-5
Surge voltage	IEC 60255-5
Vibration shock	IEC 60255-21-1
Operating temperature	10...+55° C
Relative humidity	<95 % no condensation allowed
Degree of protection (IEC 60529)	IP54, flush mounted (with optional seal)
Weight	5 kg
Dimension (w x h x d)	280 x 195 x 545 mm
Protection stages	
Overcurrent protection	
Overcurrent stage	I> 50/51
Overcurrent stage	I>> 50/51
Overcurrent stage	I>>> 50/51
Unbalance protection	I> 46
Thermal overload stage	T> 49
Residual overcurrent protection	
Directional / non-directional earth fault stage	I>>> 67N
Directional / non-directional earth fault stage	I>> 67N
Non-directional earth fault stage	I> 50N / 51N
Non-directional earth fault stage	I>> 50N / 51N
Residual overvoltage protection	
Residual voltage stage	U> 59N
Residual voltage stage	U>> 59N
Auto-reclosure function	
AR function	0 → 1 79
- five (5) shots	

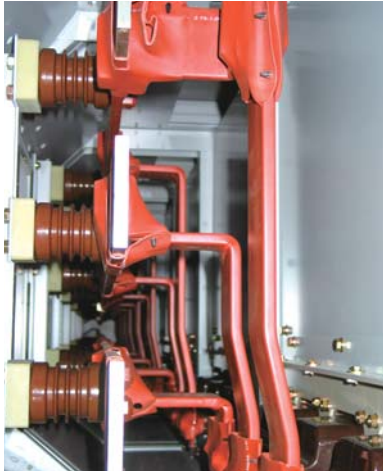
Motor protection	
Phase reversal / incorrect phase sequence protection	I>>> 47
Stall protection	I>> 48
Frequent start protection	N> 66
Undercurrent protection	I< 37
Thermal overload protection	T> 49
Second harmonic stage	
Inrush current detector	68
Arc protection (option)	
Arc protection stage	ArcI> 51L>
Arc protection stage	Arc I>> 51NL>
Other	
Disturbance recorder	All analogue channels and binary inputs / outputs
Circuit breaker failure protection	TCS 50BF
Trip circuit supervision	TCS 60
Latched trip	86
Measurements	
Phase currents	IL1, IL2, IL3, IL
Residual current	I< (A), I< (%)
Current unbalance	I< (A), I< (%)
Average and maximum current	I<
Residual voltage	U<
Frequency	f
Phasor diagrams ¹⁾	
Note: 1) with VAMPSET software	
Harmonics from phase currents: THD, harmonics 2 nd to 15 th by phase	
Condition monitoring	
CB wear	
CB supervision	
Communication protocols	
IEC 60 870-5-103	
Transparent TCP/IP	
Modbus TCP	
Modbus RTU	
Profibus DP	
SPA	
DNP 3.0	



Safety & Maintenance

● Bus Bar Protection Cover (Option)

The bus bars are insulated with the halogen free insulating protection tube to prevent electrical shock and short circuit. In addition, the removable insulation covers can be installed on the jointed parts.



● Earthing Bus Bar

A copper Earthing Bus Bar is provided at the bottom of the High Voltage Cable Compartment.



● Low Voltage Control and Cable Compartment

The terminal blocks for each control cable connecting the external equipment and low voltage control equipment are installed in this compartment.

The higher level arrangement for the VCB Compartment contributes to more space being available for the Low Voltage Cable Compartment and the easy connection of external control cables.



● High Voltage Cable Compartment

The generator and load side engine power cable are connected in the High Voltage Cable Compartment. The other equipment such as VT and CT etc. are also installed in this compartment.



● Inspection Window (Option)

An inspection window installed in the High Voltage Cable Compartment allows visual examination to detect any internal problem.



● Pressure Relief Flaps

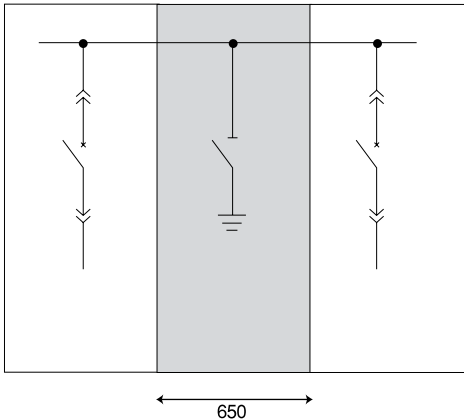
The Pressure Relief Flaps are provided in the top of the cubicle to release gases which occur at the time of an arc explosion.



Maintenance Tools

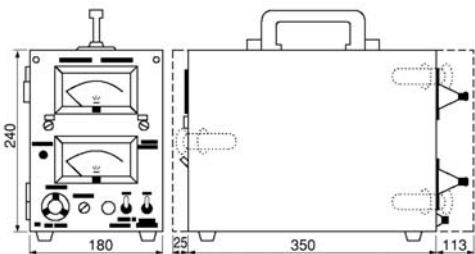
● Main Bus Bar Earthing Switch (Option)

The earthing system provided for each breaker can be also used for the main bus bar. If for added safety a main bus bar earthing switch is fitted, 650mm wide panel will be necessary.



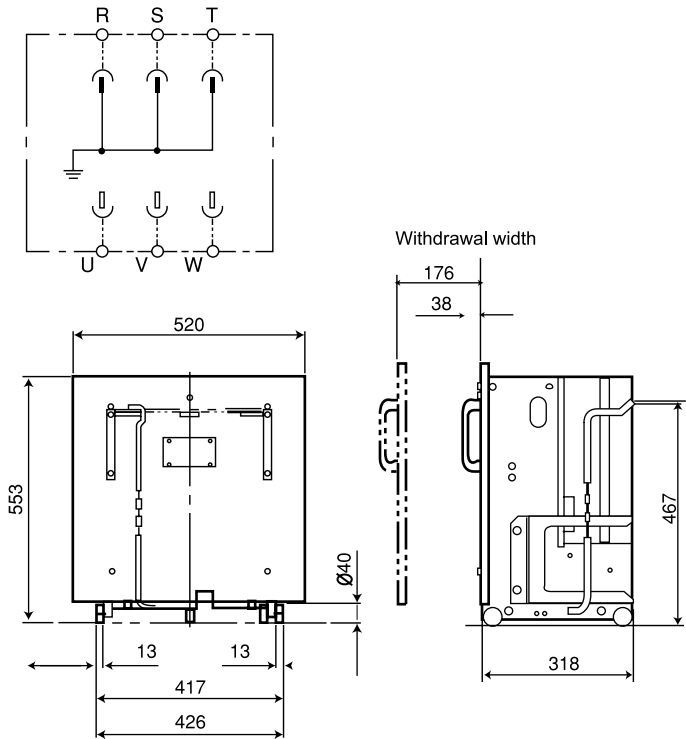
● Vacuum Checker (Standard)

The vacuum checker is a withstand voltage tester which is provided to check the state of the vacuum in the bulb.



● Earthing Devices (Standard)

Earthing devices are provided for earthing of the main bus bar. The main bus bar can be earthed automatically by drawing out the VCB connected to the main bus bar and installing the earthing devices into its position.



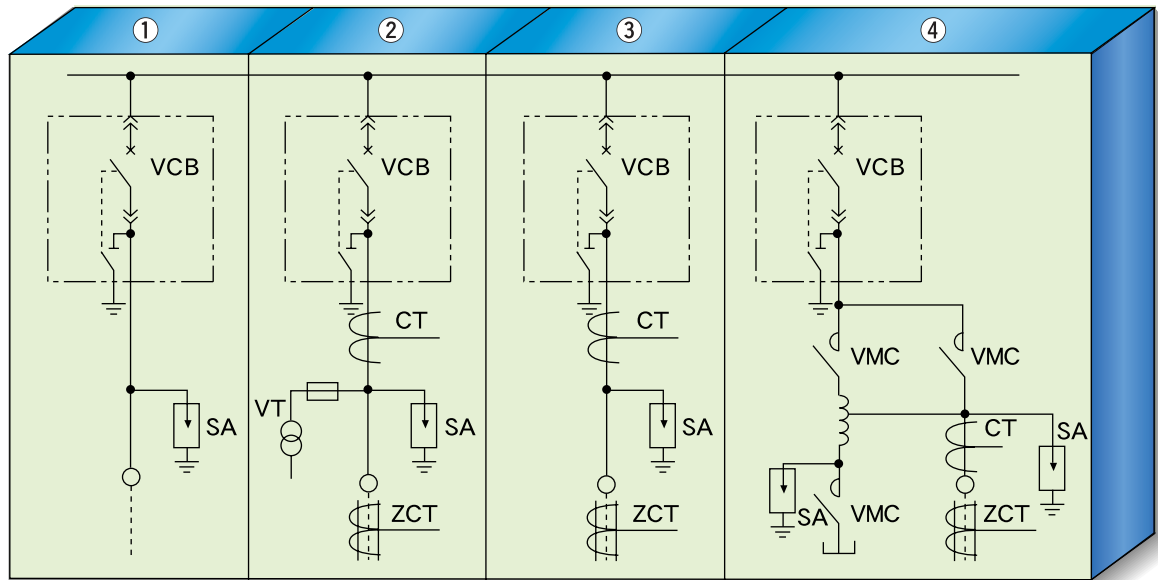
● Lifter

The lifter is used for when the drawn-out VCB is removed from the panel and moved to another location. Modifications on the dimensions of the lifter can be modified depending on the dimensions limits of any room.

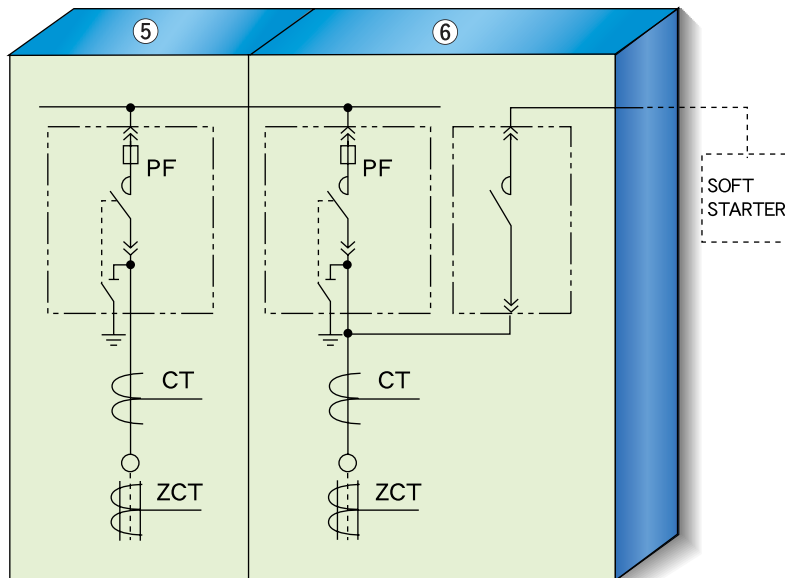
Standard Specification

Height	2300mm
Width	850mm
Depth	1250mm



Example

SAs (surge absorber) are installed in 630AF VCB.



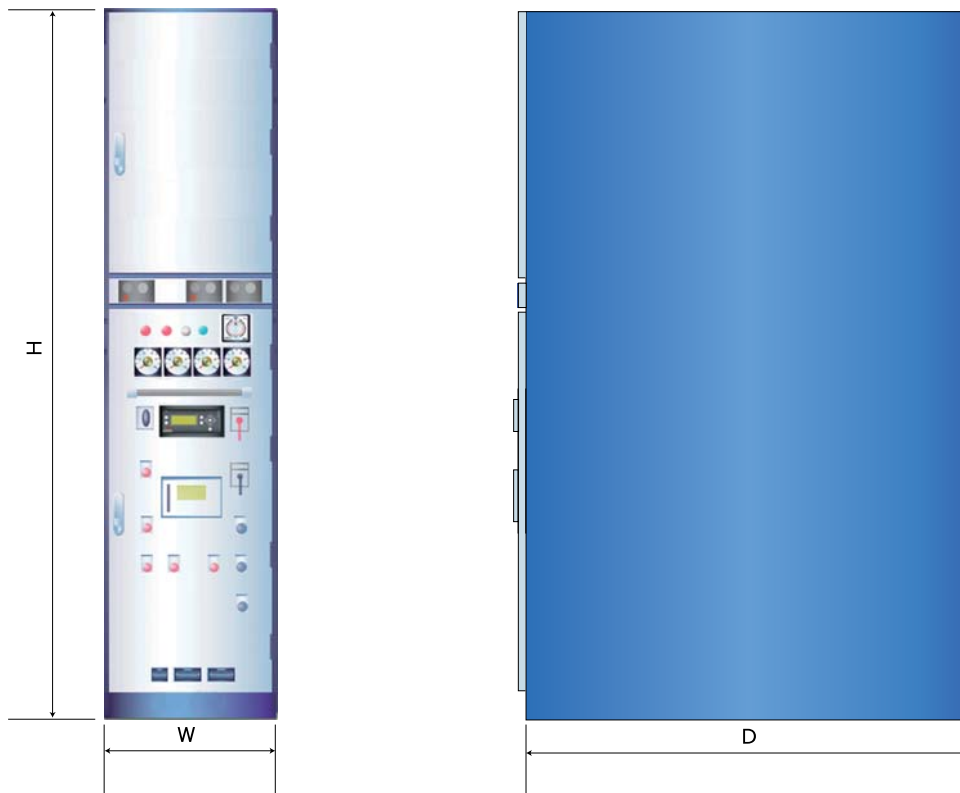
● **Application Example of VCB and VMC**

Type	VCB			VMC
	630A	1250A	2000A	200A / 400A
① BUS-TIE PANEL		●	●	
② GENERATOR PANEL	●	●		
③ FEEDER PANEL	●	●		
④ AUTO TRANSFORMER	●			● (fixed type)
⑤ MOTOR PANEL	●	●		●
⑥ SOFT START MOTOR PANEL				●

Specification & Ratings

Type	JSB-2
Structure	Metal-enclosed type
Rated Insulation Voltage	AC 7.2kV
Rated Operating Voltage	AC 6.6kV
Rated Frequency	50/60Hz
Applicable Standard	JEM IEC 62271-200 (IEC 60092-508)
Applicable Classification Society	NK, JG, LR, ABS, DNV, BV, KR, CCS
Ambient Temperature	-10°C~45°C (Option : 50°C)
Bus Bar Rated Capacity	Maximum : 2000A
Bus Bar Short-circuit Capacity	25kA/1sec (Option 40kA/1sec)
Degree of Protection	IP42 (Option : IP43)

Standard Dimensions

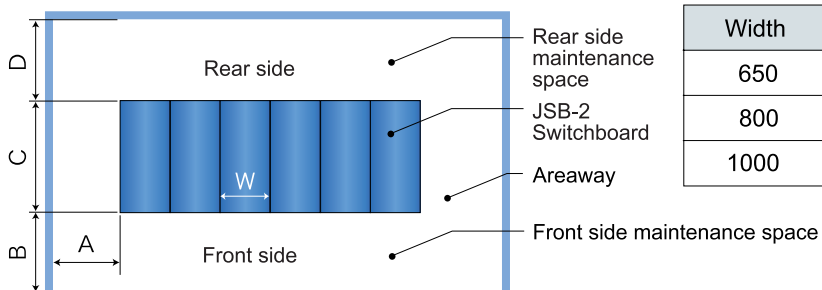


Type	Rated Voltage (kV)	Rated Short-time Current(kA)	VCB Rated Current (A)	Dimensions (mm)		
				W ¹⁾	D	H
JSB-2	7.2	2.5	630	650	1500	2400 ²⁾
			1250			
			2000	700		

1) 2000A frame will not be applicable for IEC 62271-200.

2) The fixing angle 100mm will be supplied separately.

Installation Arrangement



Width	Height	A	B	C	D
650	≥ 3100	≥ 800	≥ 1800	≥ 1500	≥ 800
800					≥ 800
1000					≥ 1000

(mm)



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