Enerswit+

Gas Insulated Ring Main Unit

Instruction Manual

12kV-24kV,…1250A,…25kA

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Contents

Foreword

Thank you for using high-quality power distribution products manufactured by Leistung Energie. We will always provide you with reliable switchgear equipment and perfect after-sales services. It is recommended that you shall read carefully the relevant product manuals before the operation. The operation shall be handled by the authorized staff.

If you need relevant training, please contact us. We will provide professional and considerate services for you. There is 24-hours free service hotline with a well-trained after-sales service team comprised of professional and technical personnel so that we provide you with professional technical services within the shortest possible time.

Contact details of Customer Service Center

Service:+86 592 6095918

Email: info@leistung-energie.cnom

1 Overview

XGN102 (Enerswit⁺) fixed type AC metal-enclosed SF6 insulated switchgear (hereinafter referred to as: Enerswit⁺) is a three-phase AC 50Hz indoor and outdoor switchgear device with a rated voltage of 12kV~40.5kV in the electrical power system. It complies with IEC 62271-200, IEC 62271-102, IEC 62271-100, IEC 62271-1. Under normal conditions, Enerswit⁺ can ensure its safe, reliable operation in the power grid with corresponding voltage level as long as it is within the range of technical parameters.

1.1 Product model, name and meaning

Model	Rated voltage (kV)	Rated current (A)	Rated short-time withstand current (kA)	Function module	Description
Not-extendable Enerswit⁺ -C	12/24	Expressed in thousand and hundred digits 01: 125A 06: 630A 12: 1250A	20/25	R	Cable connection module without earthing
				RE	Cable connection module with earthing
				C	Load break switch function module
				T	Fuse-switch combination function module
Extendable Enerswit⁺ -E				D	Vacuum circuit breaker function module
				CRb, RCb	Busbar segmental Load break switch function module
				DRb, RDb	Bus section vacuum breaker function module
				M	metering module
				P	voltage transformer module

Example:

Enerswit⁺ -C/120620-CCC represents that the RMU is a non-expandable share-box structure, and has a rated voltage of 12kV, rated current of 630A, and rated thermal stability current of 20kA; and the main connection combination is three load-switch circuits.

1.2 Main purpose and application

Enerswit⁺, mainly used in the secondary power distribution system in the distribution network, is a kind of electrical equipment that can improve the power supply reliability of the public power grid system. Enerswit⁺ is widely applied to medium/low voltage distribution switching stations, box-type substation, power distribution room for high-rise buildings, industrial power distribution, and outdoor kiosks.

1.3 Environmental conditions for use

1.3.1 Normal environmental conditions for normal operation

• Ambient air temperature: upper limit of +40℃ and lower limit of -15℃;

• Humidity: Daily average relative humidity not exceeding 95%, and saturated water vapor pressure not exceeding 2.2kPa;

• Monthly average relative humidity not exceeding 90%, and saturated water vapor pressure not exceeding 1.8 kPa;

• Altitude: Highest altitude for installation of the equipment is 1000m;

• ambient air environment shall be free from such obvious pollution as corrosion, flammable gases, and water vapor;

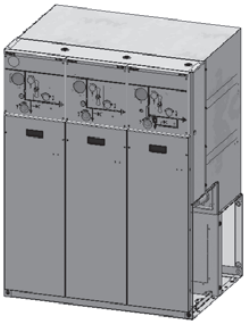
• Earthquake intensity does not exceed 8 degrees.

1.3.2 Special conditions of use

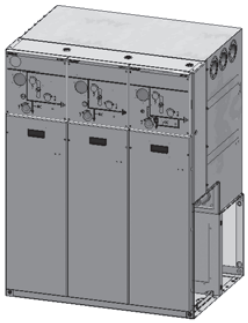
For special environmental conditions, the users need to obtain the approval of the manufacturer. The manufacturer must take into account each particular operating condition in advance, take measures and make recommendations to meet the requirements of the buyer

2 Structure

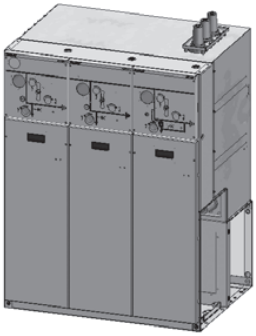
2.1 Enerswit+ -C series (Non- extendable)



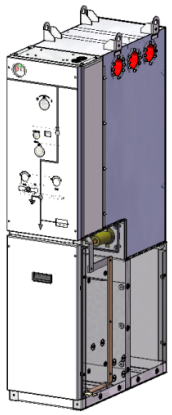
2.2 Enerswit+ - E series (Side extendable)



2.3 Enerswit+ - E series (Top extendable)



2.4 Enerswit+ -E-D series (side extendable for CB)



3 Technical data

3.1 Enerswit+ technical parameters

Item		Unit	Data	
Rated voltage		kV	12	24
Rated busbar current		A	630/1250 *	
Rated power frequency withstand voltage (Phase-earth, phase- phase) 1min		kV	42	50
Rated power frequency withstand voltage (Across isolation)		kV	48	60
Rated lightning impulse withstand voltage (Phase-earth, phase- phase)		kV	75	125
Rated lightning impulse withstand voltage (Across isolation)		kV	85	145
Load break switch (unit C)				
Rated short-time withstand current (4s)		kA	20	
Rated peak withstand current		kA	50	
Rated breaking current	closed breaking current	A	630	
	Active load breaking current		630	
	Cable charging current	A	10	16
Rated Load break switch and grounding switch short-circuit current (peak)		kA	50	
Closing and breaking grade		Grade	E3	E2
Fuse-switch combination (unit T)				
Rated current		A	125	
Transfer current		A	1750	1400
Short circuit breaking current**		kA	31.5	
Closing current (peak)**		kA	80	
Circuit Breaker (unit D)				
Rated current		A	630/1250 ***	
Rated short-time withstand current (4s)		kA	20	25
Rated short-circuit breaking current		kA	20	25
Closing current (peak)		kA	50	63
Other technical parameters				
Mechanical life	breaker D	Times	10000	
	Disconnecting switch DS		3000	
	Load break switch LBS		5000	
	Earthing switch ES		3000	
Annual leakage rate		% / year	≤0.01	
Gas moisture content (when 20℃)		μL/L	≤150	
Rated short-time power frequency withstand voltage of auxiliary circuit and control circuit		kV	2	
SF6 gas pressure (gauge pressure when 20℃) ****		Mpa	0.03	0.04

Note:

*- Busbar rated current can be up to 1250A, or subject to customer requirements.

**- is the expected value, subject to high voltage fuse.

***- Rated current of breaker unit circuit can be up to 1250A, or subject to customer requirements.

****- Relative pressure is 0.03Mpa, namely 0.3bar; absolute pressure is 0.13 Mpa, namely 1.3bar.

Relative pressure is 0.04Mpa, namely 0.4bar; absolute pressure is 0.14 Mpa, namely 1.4bar.

3.2 Mechanical characteristics parameters

3.2.1 Load break switch mechanical properties are shown in Table 2

No.	Name	Unit	Value
1	Three-phase closing synchronism	ms	≤2
2	Opening time (rated operating voltage)		30 ± 5
3	Closing time (rated operating voltage)	S	<10
4	Immediate opening speed (15mm after immediate opening)	m/s	3.0 ~3.3
5	Immediate closing speed (15mm after immediate closing)		3.2 ~3.5
6	Opening travel between contacts	mm	25-35
8	Total travel		40-50
9	loop resistance	μΩ	≤120

Note:

* Speed refers to the average speed 15mm after opening and before closing starting from the immediate opening and immediate closing.

3.2.2 Grounding switch mechanical properties are shown in Table 3

No.	Item	Unit	Parameters
1	Opening travel between contacts	mm	45 ± 2
2	Three-phase closing non-simultaneity	ms	≤2

3.2.3 Vacuum circuit breaker mechanical properties are shown in Table 4

No.	Name	Unit	Value	
1	Rated voltage	kV	12	24
2	Opening travel between contacts	mm	9±1	11±1
3	super stroke		4±1	
4	Center distance between phases		135±1	
5	Average closing speed	m/s	0.8-1.5	
6	Average opening speed		1.0-1.8	
7	Closing time (rated operating voltage)	ms	≤60	
8	Opening time (rated operating voltage)		18-45	
9	Three-phase contact closing and opening simultaneity		≤2	
10	Bounce time of closing of contacts		≤3	

Note:

* The average closing (opening) speed refers to the average speed within the contact stroke 7mm before (after) the closing (opening) of dynamic and static contacts. Only the speed value of phase A is measured.

3.2.4 Three-position disconnecting switch mechanical properties are shown in Table 5

No.	Name	Unit	Value
1	Center distance between phases	mm	135±1
2	Insulated distance between blade and main contact at the isolated position		≥33
3	Insulated distance between blade and grounding contact at the isolated position		≥33
4	Three-pole closing simultaneity	Mm	≤5
6	Maximum rated operating force of manual operation	N	≤250

3.3 Technical data of shunt release and operation motor

(1) Technical data of shunt release is shown in Table 6

Equipment name and code	Power consumption * VA/W	Remarks
Shunt release	220	Optional

Note: A. Rated voltage is AC/DC 220V、110V、48V、24V.

B. “*” represents approximate value.

(2) Technical data of electric actuator is shown in Table 7

Item	Unit	Data
Rated voltage	V	AC/DC 220V、110V、 48V、 24V
Motor power	W	40 *
Action time	S	≤10

Note: “*” represents approximate value.

4 Working principles

Enerswit+ structure is composed of main components: gas tank, LBS or Load break switch with fuse or vacuum circuit breaker, three-position disconnecting switch, operating mechanism, and mounting bracket. The reliability of each component ensures excellent performance of Enerswit+.

4.1 Stainless steel gas tank

Enerswit+ gas tank is made of stainless steel plates welded by the robot through laser welding. It encloses all high-voltage primary electrified components inside the high-strength stainless steel gas tank filled with SF6 gas. The gas tank contains such components as Load break switch, Fuse-switch combination, vacuum circuit breakers, three-position disconnecting switch, busbar, and branch busbar. This design achieves a more compact overall size of the device and directly grounds the external housing of the stainless steel gas tank, ensuring the safety and reliability of operation. The advanced robotic laser welding process guarantees the air-tightness of the gas tank, and its annual leak rate≤0.01% per year achieves the maintenance-free whole RMU for 30 years. Moreover, a reliable pressure relief valve is equipped inside the gas tank. When arc fault produces large amounts of gas inside the gas tank, the fast action of the device will quickly release the fault gases, thereby ensuring the safety of personnel and equipment.

4.2 LBS/Fuse-switches and its operating mechanism

4.2.1 Load break switch

Enerswit+ Load break switch adopts the advanced rotary puffer type arc extinction principle. The principle of rotary arc extinction: the Load break switch rotates around the static contact below the moving contact, and a rotating piston is installed on the moving contact and forms relative air-tightness with the air cylinder. The rotary piston has a nozzle structure. At the time of opening, SF6 gas is discharged from the nozzle at high velocity, so as to extinguish the arc. Since the Load break switch is enclosed inside an area filled with SF6 gas, the arc extinguishing, and insulating properties can be greatly improved.

Main features: simple and reliable structure, fast arc extinction, and high electrical performance, etc.

4.2.2 Fuse-switch

Enerswit+ Fuse-switch composite apparatus has the following working principle: When the protection circuit has a short-circuit, there are some differences in the time of actions since the three high-voltage fuse protectors may not have completed the same performance. When the first phase fuse blows, the fuse striker triggers the release system, and the Load break switch opens to cut off the fault current, thereby protecting the device.

4.2.3 Operating mechanism

Enerswit+ Load break switch and composite apparatus adopt independent reliable spring operating mechanisms to realize the functions of opening, closing, and grounding. The mechanism is mounted in front of the gas tank and behind the operation panel. The mechanism is a component that converts operation work into mechanical work. Its performance directly affects the mechanical properties of the Load break switch. Enerswit+ mechanism has a fast operation, without being affected by the operator. The mechanism of Load break switch and composite apparatus adopts the same mechanism, thus achieving the function of the rapid opening.

(1) Operation cover

1. Density meter
2. The operating hole for the opening of the Load break switch
3. Observation window
4. Position indicator of the Load break switch
5. Release indicator of fuse
6. Opening knob of the Load break switch
7. Interlock pin
8. Operation hole of the grounding switch
9. Position indication of the grounding switch

(2) Opening and closing operation of the Load break switch

• Closing: When the operating handle is rotated clockwise for about 2.5 loops for energy storage, the closing half axle of the mechanism opens, and the energy storage spring releases energy and rapidly closes.

• Opening: The opening spring stores energy at the closing process. When the opening handle is rotated counterclockwise, the opening spring releases energy and realizes rapid opening.

(3) Opening and closing operation of the grounding switch

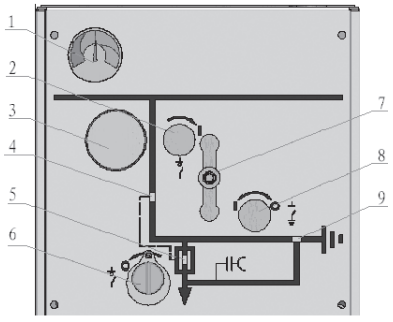
• Closing: When the operating handle is rotated counterclockwise to a certain angle, the spring action inside the mechanism realizes the rapid closing of the grounding switch.

• Opening: When the operating handle is rotated clockwise to a certain angle, the spring action inside the mechanism realizes the rapid opening of the grounding switch.

Matters for attention during operation:

a) Operation is allowed only when the grounding switch is at the opening state in the Load break switch;

b) The cable chamber can be opened only when the grounding switch is in the grounding state.



4.3 Vacuum circuit breaker and its operating mechanism

4.3.1 Vacuum circuit breaker

The vacuum circuit breaker adopted by Enerswit+ adopts the automatic pressure gel (APG) process. The vacuum interrupter and upper and lower outlet terminals are directly enclosed solidly in the epoxy resin, thus greatly reducing the circuit breaker adjustment and external pollution of the interrupter, and boosting the reliability of circuit breakers. Under the working conditions of frequent operation or long service life, the said circuit breaker has reclosing feature, exceedingly high operational reliability and long service life.

4.3.2 Three-position disconnecting switch

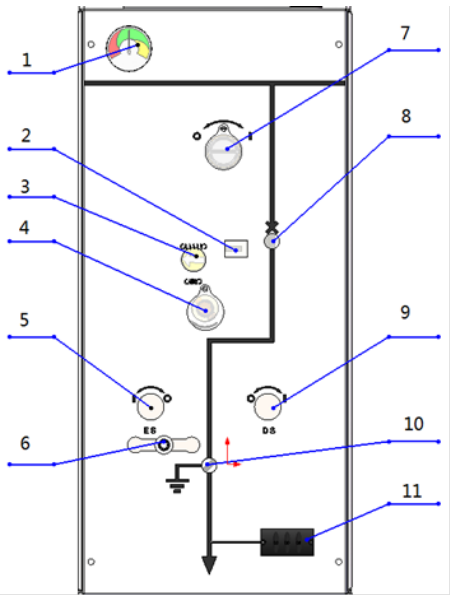
Three-position disconnecting switch adopted by Enerswit+ consists of a disconnecting switch and grounding switch. The disconnecting switch and grounding switch is operated by a set of the operating mechanism. The operating mechanism has manual and power-driven functions and has reliable interlocking to prevent faulty operation, ensuring safe operation. The disconnecting switch has a simple structure and reliable performance and can be easily installed and adjusted, and ease of maintenance and repair.

4.3.3 Operating mechanism

Enerswit+ adopts a reliable three-position disconnecting switch operating mechanism (closing, isolation, and grounding) as well as the circuit breaker operating mechanism. The mechanism is mounted in front of the gas tank and behind the operation panel. Enerswit+ vacuum circuit breaker mechanism has a fast operation and reliable mechanical properties.

(1) Operation cover

1. Density table
2. Counter
3. Energy storage indicator
4. Energy storage operation hole
5. Operation hole of earthing switch
6. Locking pin
7. Operation hole of opening and closing of circuit breaker
8. Indicator hole for closing and opening of circuit breaker
9. Operation hole of disconnecting switch
10. Position indicator of three-position disconnecting switch
11. Live display



(2) The operating mechanism of the circuit breaker

• Energy storage: When the operating handle is inserted into the energy storage operation hole and turned clockwise to a certain angle, the closing spring stores energy and the mechanism completes energy storage.

• Closing: When the manual knot is rotated clockwise to a certain angle, the closing spring action inside the mechanism realizes the rapid closing of the circuit breaker, while the opening spring stores energy.

• Opening: When the manual knot is rotated counterclockwise to a certain angle, the opening spring action inside the mechanism realizes the rapid opening of the circuit breaker.

(3) The operating mechanism of disconnecting switch

• Closing: When the operating handle is rotated clockwise to a certain angle, the spring action inside the mechanism realizes the rapid closing of the disconnecting switch.

• Opening: When the operating handle is rotated counterclockwise to a certain angle, the spring action inside the mechanism realizes the rapid opening of the disconnecting switch.

(4) The operating mechanism of the grounding switch

• Closing: When the operating handle is rotated counterclockwise to a certain angle, the spring action inside the mechanism realizes the rapid closing of the grounding switch.

• Opening: When the operating handle is rotated clockwise to a certain angle, the spring action inside the mechanism realizes the rapid opening of the grounding switch.

Matters for attention during operation:

a) The circuit breaker can only allow the opening and closing operation when three-position disconnecting switch reaches the specific location;

b) Prevent the mistaken opening or closing of the circuit breaker:

c) The circuit breaker allows the opening and closing operation only when the three-position disconnecting switch reaches a certain location;

d) The cable chamber can only be opened when three-position disconnecting grounding switch is grounded and the circuit breaker is at the closing position; (applicable to upper disconnecting circuit breaker)

e) The cable chamber can only be opened when three-position disconnecting grounding switch is grounded; (applicable to lower disconnecting circuit breaker)

4.4 Mounting bracket

Mounting bracket plays the role of supporting and fastening the gas tank, and also has good strength, corrosion resistance, and grounding performance. Enerswit+ mounting bracket adopts imported 2mm aluminized zinc plate processed by CNC machine tools and double bending process so that mounting bracket has such features as good corrosion resistance, high strength, lightweight, and a high degree of protection. It can be easily assembled. Mounting brackets of different heights are provided according to the user requirements.

5. Product dimensions and weight

5.1 12kV Enerswit+ -C series gas-insulated Ring Main Units (Non- Extendable)

Mode of expansion	function unit	Combination method	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)
Non-scalable	Two loops	RT	720	755	1525	414
		RC	720	755	1525	387
		CT	720	755	1525	477
		CC	720	755	1525	450
	Three loops	CCC	1080	755	1525	675
		CCT, TCC	1080	755	1525	702
		CTT	1080	755	1525	729
	Four loops	CCCC	1440	755	1525	900
		CCCT	1440	755	1525	927
		CCTT	1440	755	1525	954
		CTTT	1440	755	1525	981
	Five loops	CCCCC	1800	755	1525	1125
	Six loops	CCCCCC	2160	755	1525	1360

5.2 12kV Enerswit+ -E series gas-insulated Ring Main Units (Extendable)

Mode of expansion	Function unit	Combination method	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)
Scalable	One loop	R, RE	360	755	1525	180
		C	360	755	1525	250
		T	360	755	1525	280
		CB	360	755	1525	300
	Two loops	RT	720	755	1525	414
		RC	720	755	1525	387
		CT	720	755	1525	477
		CC	720	755	1525	450
	Three loops	CCC	1080	755	1525	675
		CCT, TCC	1080	755	1525	702
		CTT	1080	755	1525	729
	Four loops	CCCC	1440	755	1525	900
		CCCT	1440	755	1525	927
		CCTT	1440	755	1525	954
		CTTT	1440	755	1525	981
	Five loops	CCCCC	1800	755	1525	1125
	Six loops	CCCCCC	2160	755	1525	1350

Note:

*- The above weights are approximate values.

**- If the Ring Main Unit adopts the top expansion scheme, an additional 250mm is added to the height.

6. Delivery and storage

6.1 Transport

• For transport, Enerswit+ must be enclosed and fastened within the packaging box in its entirety.

• When handling the RMU, it must be ensured that the RMU does not slide or tip over.

6.2 Delivery

The consignee is responsible for (but not limited to) carrying out the following tasks:

• Check the goods for integrity and damage upon its arrival (such as moisture and damage).

• In case of shortage and shipping damage, it must:

- make the record on the waybill as certificate,

- inform the consignor and the carrier in a timely manner.

6.3 Storage

RMU should be stored upright in a dry, well-ventilated, moisture-proof, and shock-proof indoor environment without the impact of harmful gases. For long-term storage, the moving parts should be coated with grease, and the environment is regularly checked for compliance with requirements.

7. Installation

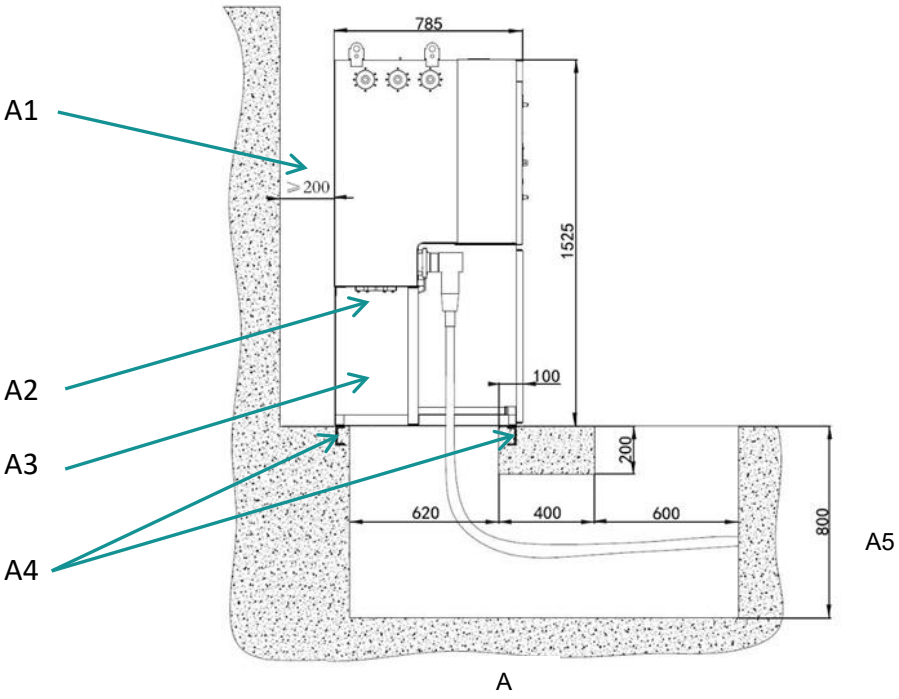
7.1 Design of foundation and cable Trench

• The construction of the installation foundation of RMU should comply with the local provisions of 《Electric power construction and technical specifications for acceptance》.

• The installation foundation of RMU generally adopts the secondary placement of concrete. The first is for the foundation for the installation of angle steel, channel steel or square steel of RMU. The second placement of concrete is for the supplementary layer of the ground floor. It generally has a thickness of 60mm. For the placement of concrete for the supplementary layer, the thickness is generally 60mm. During the placement of concrete for the supplementary layer, the height of concrete should be lower than the plane of the component by 1-3mm.

• During the design of civil engineering, the foundation elevation of RMU shall allow for the height of channel steel of the base cabinet. The embedded reinforcement steel plates are arranged vertically along with the framework based on the RMU at a gap of 1 to 1.5 meters. Refer to the below picture

• The basic framework is welded by channel steel and angle iron. The basic size requirements of the framework and the layout of the cable trench (see photos) have no strict requirements for the height of channel steel. 5# or 8# channel steel is allowed. The extendable distance of channel steel of the base frame is consistent with the size of the RMU framework, and its value is 785mm.



A

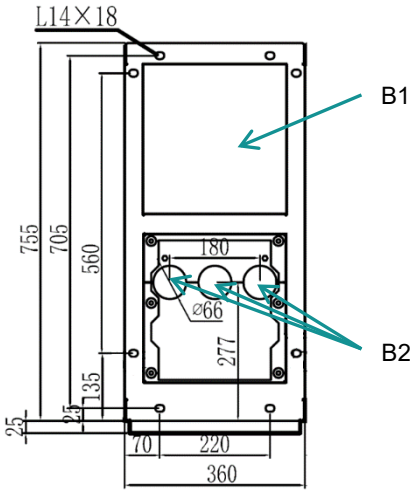
A1：Not less than 200mm.

A2：Pressure relief valve.

A3：Pressure relief direction.

A4：10# channel steel (higher than ground by 10mm).

A5：800mm is for reference, According to the cable size, the user can adjust it.



Fron side
B

B1： Pressure relief area

B2： Cable outgoing area. Note: The actual project drawings shall prevail

7.2 Installation of RMU

7.2.1 Packaging removal

• RMU packaging shall be removed at the installation site.

• tools required:

- Cutter for removing packaging.

- Crowbar for removing packaging.

• When transporting the device, please wear gloves for construction purposes.

• After packaging, the waste materials such as wooden boxes, and plastic enclosures and so on shall be categorized and recycled for recovery processing.

7.2.2 Inspection and placement before installation

After unpacking the RMU, first check whether the product nameplate, certification, etc. are consistent with the orders, and whether the packing list is consistent with the physical objects. If it is correct, then remove dust from the surface of the product and arrange the product for installation.

7.3 Installation of cable terminal

7.3.1 Specifications of the external cone-shaped tube of Enerswit⁺ series:

Function program code	R, RE	C	T	D
European-style bolt 630A external cone-shaped tube	•	•	•*	•

7.3.2 Selection of touch-type cable terminal

• General touch-type cable head commercially available can be adapted to the Enerswit⁺ series gas-insulated RMU.

• Specifications of supporting touch-type cable head:

Function program code	R, RE	C	T	D
European-style bolt cable head (630A)	•	•	•*	•

European-style bolt cable head (630A)

Note: Please read carefully the instruction manual of the cable head provided by the supplier of cable head before installing the cable head.

7.3.3 Installation of single cable terminal

7.3.3.1 Installation of European-style bolt cable terminal (630A)

• Open the cover of the cable compartment in front of the RMU, and use a dry cloth to clean the external cone sleeve.

• Select the correct cross-sectional area and the corresponding cable head according to the design requirements of the electric system drawing.

• Place the three cable terminals over the outer cone sleeve, and use dedicated tightening torque provided by the supplier of cable terminal to fasten the bolts to the sleeve. The force of torque may be adjusted according to the instruction manual provided by the supplier of cable head.

• fasten high-voltage cables to the cable support of RMU, and tighten the cable hoop.

• connect the grounding line of the outer shielding layer of cable terminal to a dedicated grounding copper bar inside the cable chamber.

• Clean dust and debris from the cable chamber, and check all fastening bolt for tightness.

• If there is no abnormal situation after check, install the cover plate of the cable compartment.

7.3.3.2 Installation of cable head with lightning arrester

• Open the cover plate of the cable compartment in front of the Ring Main Unit, and use a dry cloth to clean the external cone sleeve.

• Select the correct cross-sectional area and the corresponding cable head according to the design requirements of the electric system drawing.

• Place the three cable heads over the outer cone sleeve, and use dedicated tightening torque provided by the supplier of cable head to fasten the bolts to the sleeve.

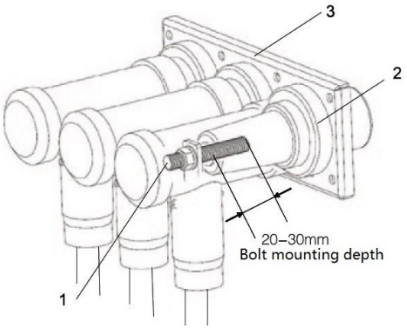
• After fastening the cable head, fasten the rear lightning arrester to the back of the front cable head.

• Fasten high-voltage cables to the cable support of RMU, and tighten the cable hoop.

• Connect the grounding line of the outer shielding layer of cable head and the lightning arrester to the dedicated grounding copper bar inside the cable chamber.

• Clean dust and debris from the cable chamber, and check all fastening bolt for tightness.

• If there is no abnormal situation after check, install the cover plate of the cable compartment.



*- Fastening bolts of the cable connector

**- Load sleeve

***- The lower plate of the load sleeve

7.3.4 Installation of dual cables

• Open the cover of the cable compartment in front of the RMU, and use a dry cloth to clean the external cone sleeve.

• Select the correct cross-sectional area and the corresponding cable head according to the design requirements of the electric system drawing.

• Place the three front cable heads over the outer cone sleeve, and use dedicated tightening torque provided by the supplier of cable head to fasten the bolts to the sleeve.

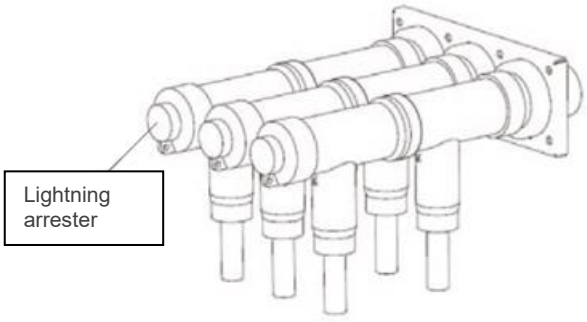
• After fastening the front cable head, fasten the rear cable head to the back of the front cable head.

• Fasten front and rear high-voltage cables to the cable support of RMU, and tighten the cable hoop.

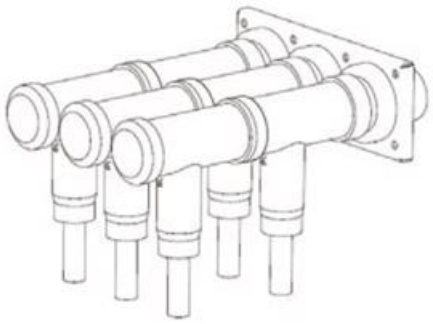
• Connect the grounding line of the outer shielding layer of cable head to the dedicated grounding copper bar inside the cable chamber.

• Clean dust and debris from the cable chamber, and check all fastening bolt for tightness.

• If there is no abnormal situation after check, install the cover plate of the cable compartment.



Schematic diagram of installation of cable head with lightning arrester



Schematic diagram of installation of dual cables

Note:

The above refers to the general steps of installation. For detailed installation, please refer to the instruction manual of installation provided by the supplier of cable head.

7.4 Installation of busbar-couple connector

The busbar-couple connector is applicable to Enerswit+ series scalable gas-insulated RMU products and can meet the user requirements for multiple loops and multiple functions. Enerswit+ has two extendable methods: side expansion and top expansion. Thus, the busbar-couple connector also has two modes of installation.

7.4.1 Installation step of side expansion (Enerswit+ - ES series):

• place two or more Enerswit+ -ES series products on the foundation channel steel at a predetermined interval.

• Before installing the busbar-couple connector “BL-S”, first remove the plug of busbar insulation, and then clean with cleaning detergent the contact surfaces and sealing surfaces of the internal sleeve of the busbar on the two RMUs requiring the combination.

• fasten the RMU (base cabinet) on the foundation to the channel steel with bolts, and fasten the M10 bolts to the four holes for the installation plate of RMU, ensuring that the RMU will not move under an external force.

• Align the RMU (combined cabinets) requiring a parallel arrangement with the main cabinet through positioning pins.

• apply the dedicated grease to the surface of busbar coupler “BL-S” (anti-corrosion and sealing).

• place the three “A, B, C” busbar couplers into the inner cone sleeves of the base cabinet, and fasten the grounding cable of the busbar coupler to a dedicated grounding hole with bolts.

• Push the parallel cabinet to the base cabinet slowly through positioning pins, so that the position of the three busbar couplers will not shift, and that the connecting holes of the two RMUs are accurately aligned until they closely touch the base cabinet.

• connect and fasten the two RMUs with bolts.

7.4.2 Installation step for top expansion (Enerswit+ - ET series):

• place two or more Enerswit+ -ET series products on the foundation channel steel at a predetermined interval.

• fasten the RMU (base cabinet) on the foundation to the channel steel with bolts, and fasten the M10 bolts to the four holes for the installation plate of RMU, ensuring that the RMU will not move under an external force.

• Align the RMUs (combined cabinets) requiring a parallel arrangement with the main cabinet (base cabinet) and fasten the two RMUs with bolts, and then fasten the parallel cabinets to the channel steel with bolts.

• Before installing the busbar-couple connector “BL-TThe advanced clean with cleaning detergent the contact surfaces and sealing surfaces of the internal sleeve of the busbar on the two RMUs requiring a parallel arrangement.

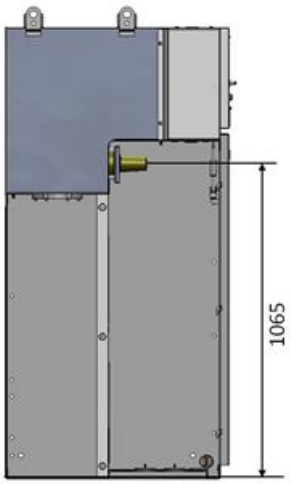
• place the three cable caps at one end of the busbar coupler “BL-T” over the external cone sleeve of the base cabinet, and the three cable caps at the other end over the external cone sleeve of the parallel cabinet; then use dedicated fastening torque to fasten bolts to the sleeves.

• connect the grounding line of the external shielding layer to the dedicated grounding holes.

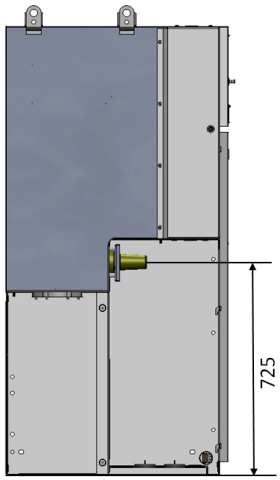
• for the installation of many RMUs, refer to the above steps.

Note: The above refers to the general steps of installation. For detailed installation, please refer to the instruction manual of installation provided by the supplier of cable head.

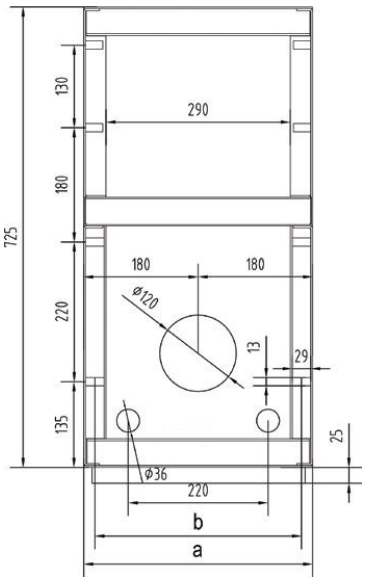
7.5 Installation diagram of the bottom plate of RMU



Height of cable chamber of functional unit C



Height of cable chamber of functional unit T

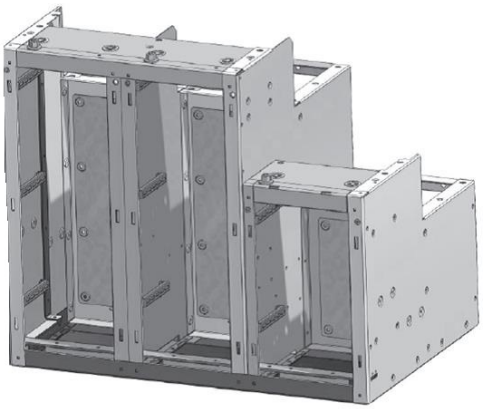


The dimension diagram of holes for installation of the bottom plate of RMU

The dimension diagram of holes for installation of 12kV Enerswit+ series RMU

Unit	a (mm)	b (mm)
1 loop	360	320
2 loop	720	680
3 loop	1080	1040
4 loop	1440	1400
5 loop	1800	1760
6 loop	2160	2120

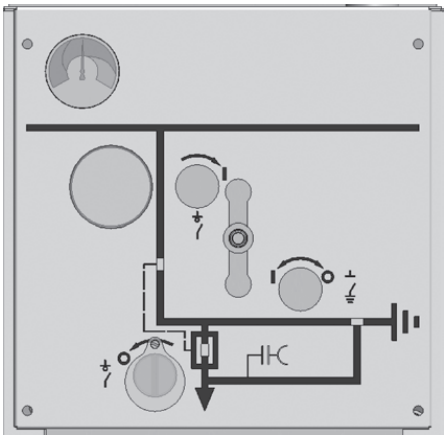
7.6 Grounding of RMU



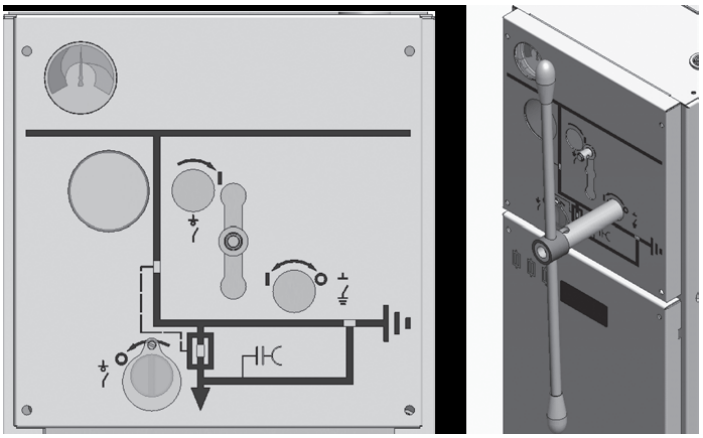
8. Commissioning

8.1 Opening and closing of the door of the cable compartment

8.1.1 Before opening the door of the cable compartment, rotate the opening knob counterclockwise on the operation panel of the Load break switch and open the Load break switch.



8.1.2 Then, pull the intermediate interlock pin upward to expose the operation hole of the grounding switch, and then insert the operating handle into the operation hole of the grounding switch and rotate it counterclockwise, so that the grounding switch is closed.



8.1.3 Unscrew the bolts on the cover plate of the cable compartment, and lift the cover plate of the cable compartment, and then pull out the cover plate of the cable compartment.

8.1.4 For closing the cable compartment, the steps are the reverse order of the above.

8.2 Optional high-pressure fusion tube

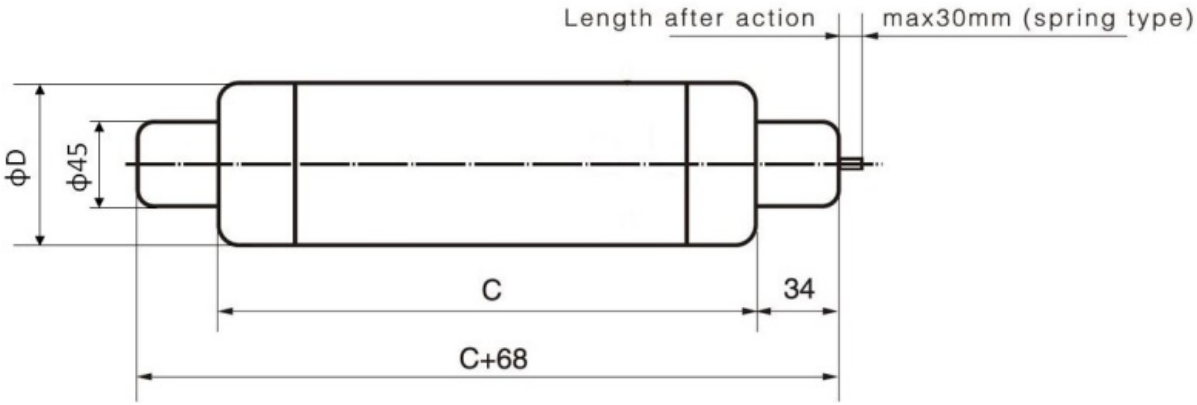
8.2.1 Enerswit⁺ fuse

Enerswit⁺ optional products are protective, spring-type high voltage fuse for transformers. Note the following parameters when selecting products:

- Rated voltage
- Rated capacity of the transformer
- Rated current of the fuse
- Size and diameter of fuse

8.2.2 Table of size of Enerswit+ fuse

Rated voltage Ur (kV)	Rated current of fuse Ir (A)	C (mm)	D (mm)
12	6.3-63	292*	51
	50-125	292*	76
	160, 200	292*	88



8.2.3 Table of models of high-voltage fuse

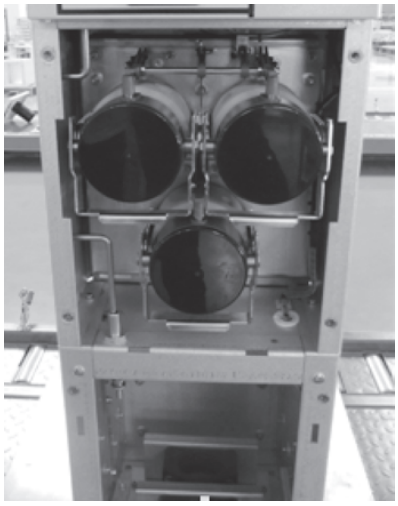
Model	rated capacity of the transformer (kVA)	rated current of fuse (A)
Chinese model: XRNT-12 Foreign model: SDLAJ-12	50	10
	75	10
	100	16
	125	16
	160	16
	200	20
	250	25
	315	31.5
	400	40
	500	50
	630	63
	800	80
	1000	100
	1250	125
	1600	160
	2000	-

Note:
*- The above figures are for reference only. At the time of selection, it is determined according to the characteristic curve of fuse selected.

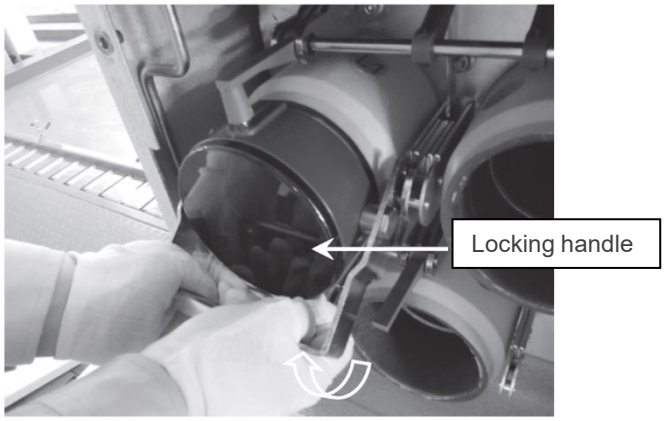
8.3 Installation of high-voltage fuse
8.3.1 Rotate the opening knob counterclockwise on the operation panel and open the Load break switch (according to 8.1.1).

8.3.2 Then pull the intermediate interlock pin upward to expose the operation hole of the grounding switch, and then insert the operating handle into the operation hole of the grounding switch and rotate it counterclockwise, operate the grounding switch to the closing position. (According to 8.1.2)

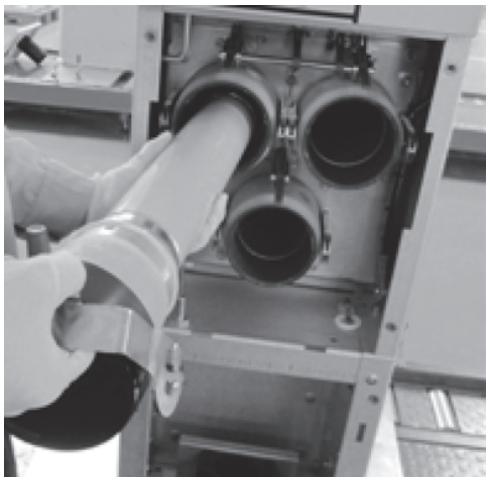
8.3.3 Unscrew the bolts on the cover plate of the cable compartment, and lift the cover plate of the cable compartment, and then pull out the cover plate of the cable compartment. (According to 8.1.3)



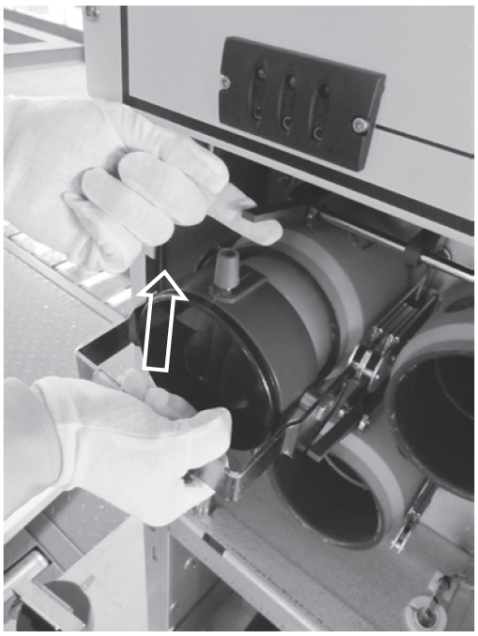
8.3.4 Pull the locking handle of the fuse cylinder and remove the fuse cover. If the original fuse requires replacement, it is enough to replace the old fuse with a new one.



8.3.5 Insert the assembled fuse steadily into the fuse cylinder and push it inwards tightly.



8.3.6 When installing new fuse, make sure that the firing pin on the fuse cylinder must point to the pulling plate of the release fuse.



8.3.7 Close the locking handle of the fuse cylinder and close the cover of the fuse cylinder.

8.3.8 After having installed all fuses, fasten the cover of the fuse compartment with locking bolts.

8.3.9 After the interlock pin of the fuse compartment is pulled down, the loop of the Fuse-switch composite apparatus is put into use.

9. Maintenance

Enerswit+ series products are maintenance-free power distribution equipment. The said equipment is maintenance-free for 30 years. After it is properly installed and powered on, it is sufficient to add the lubricating oil to the moving parts of the operating mechanism regularly without the need for maintenance.

Note: To prevent accidents, please apply the lubricating oil to the operating mechanism during the time of maintenance.

9.1 Gas pressure and monitoring

Under normal operating conditions, there is no need for a special examination of Enerswit+. But before it is put into operation, check the pressure air meter on the panel of RMU to ensure that the SF6 gas inside the gas tank is in a normal state.

Enerswit+ gas tank is made of stainless steel plates welded by the robot through laser welding, so as to guarantee the gas tank strength and airtightness. The annual leak rate of 0.01%/year ensures that there is no need for injecting gas during the entire life cycle of RMU. At 20℃, the SF6 gas gauge pressure inside the gas tank shows a pressure of 0.03 Mpa（0. 03 Mpa for 12kV, 0. 04Mpa for 12kV）.

The density meter of the RMU assembly is shown below.

When installing the density meter, there are two cases: first, relative pressure; density meter pointer points to the rated pressure value 0.03 Mpa (or 0.3bar); second, absolute pressure, the density meter pointer points to the rated pressure value of 0.13 Mpa (or 1.3bar). Moreover, when using the density meter, the pointer does not vary with changes in ambient temperature.

9.2 Environmental protection

90% of the materials used by Enerswit+ products are metal materials. After the service life of the product expires, the materials can be recycled, without damaging the environment. The SF6 gas can be recycled through the dedicated SF6 gas recovery unit upon its expiry of the service life, without exerting an adverse impact on the environment.

10. Instructions for order

When placing orders, the users should state:

- model, name, and scheme of RMU
- Rated voltage, rated current, quantity required
- mechanism with manual operation / electric operation and the voltage of electric operation indicated
- name and quantity of spare parts
- If a user has other special requirements, they shall indicate so before ordering

11. Files and attachments

- Accompanying files generally include:

a. product certificate (report of factory inspection)

b. The instruction manual of installation

c. Packing list

- Annex

a. Operating handle

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