

RDW1

Air circuit breaker



Description

RDW1 air circuit breaker which applied to power distribution network of AC 50/60Hz, rated operational voltage up to 690V, rated current up to 6300A. It's mainly used to distribute power and protect the circuit and equipments against damages of overload, short-circuit, under voltage and ground fault, and it has intelligent protection functions, provides accurated selective protection, improves power-supply reliability to avoid unnecessary power interruption. And it also has open type communication port, can realize remote control function and satisfy the requirements of control center and automatic system. This production without intelligent controller and sensor has insulation function. This product conforms to the standard of IEC60947-2

Normal operation condition and installation condition

- 3.1 Temperature: no more than +40°C, no less than -5°C, and average day temperature no more than +35°C. If customer requires condition of higher than +40°C, or lower than -25°C, it should be consulted with manufacture.
- 3.2 Installation location attitude no more than 2000m
- 3.3 Humidity: when the temperature at +40°C, it no more 50%
The higher humidity is accepted at the lower temperature. The average humidity of month should no more than 90%, and the average temperature of month should not lower than +25°C.
The condensation should be taken care when the humidity change.
- 3.4 Protection class: IP20
- 3.5 Using type: B type
- 3.6 Pollution type: 3 level
- 3.7 Installation type:
Type of circuit breaker main circuit, under voltage release, primary coil of power transformer is installation IV; type of Auxilliary circuit and control circuit installation is III.

Main technique parameter

Table 1

Model No.		RDW1-1000	RDW1-2000	RDW1-3200	RDW1-4000	RDW1-6300
Rated current (A)		200,400,630,800,1000	630,800,1000,1250,1600,2000	2000,2500,2900,3200	2900,3200,3600,4000	4000,5000,6300
Neutral rated current In(A)		100%In	100%In	100%In	100%In	50%In
Rated operating voltage (V)		AC 400	AC 400/690			
Frequency (Hz)		50/60Hz				
Number of poles		3P/4P				
Rated impulse withstand voltage Uimp (Kv)		AC 8	AC 12			
Rated isolation voltage Ui (V)		AC 690	AC 1000			
Power frequency withstand voltage(V) 1min		1890	2200			
Rated ultimate short circuit breaking capacity(Icu)	AC400V	42	80	100	100	120
	AC690V	-	50	65	85	85
Rated operating short circuit breaking capacity(Ics)	AC400V	32	65	80	80	100
	AC690V	-	50	65	65	75
Rated withstand current for short-time(Icw)	AC400V	20/30(0.5s)	65	80	80	100
	AC690V	-	40	50	50	75
Operation life(times) 2500A below 1time/3min; Above 2500A 1time/6min	Electrical life	7000	6500	3000	3000	1500
	Mechanical life	15000	15000	10000	10000	5000

AIR CIRCUIT BREAKER

Table 5

Protection characteristics type	Long delay Ir	Short delay Isd		Instantaneous Ii	Grounding Ig	Accuracy
		Reverse time limit	Fixed time limit			
Action current setting range	(0.4~1.0)In	(1.5~15)Ir1		(1.0~20)In	(0.2~1.0)In	±10%
Action time	≤1.05Ir1 No action within 2h > 1.3Ir1 action within 1h	0.1t	0.1~0.4s	-	0.1~1s	-

Note 1: The protection parameters must not be cross-set, and should comply with the $I_r < I_{sd} < I_{rd}$ rules;

Protection characteristics and functions of intelligent controller

Protection characteristics of intelligent controller

Note: t_L - setting time of long delay 1.5Ir, T_L - Action time of long delay

Table 6

1.5Ir Setting time	15	30	60	120	240	360	480	600	720	840	960
2.0Ir Action time	8.44	16.88	33.75	67.5	135	202.5	270	337.5	405	472.5	540

Note: t_L —the whole time with a long delay of 1.5Ir, and T_L -the action time with a long delay.

Short delay overcurrent protection characteristics

Short-delay overcurrent protection has a time limit and a reverse time limit. When the overload current is $< 8I_r$, the reverse time limit is set, and its characteristics are as follows: $I_{Tsd} = (8I_r) t_{sd}$, t_{sd} is the delay setting time;

When the overload current is $> 8I_r$, the reverse time limit is automatically converted to the time limit characteristic. The time limit characteristic is shown in Table 7, and the time error is $\pm 15\%$

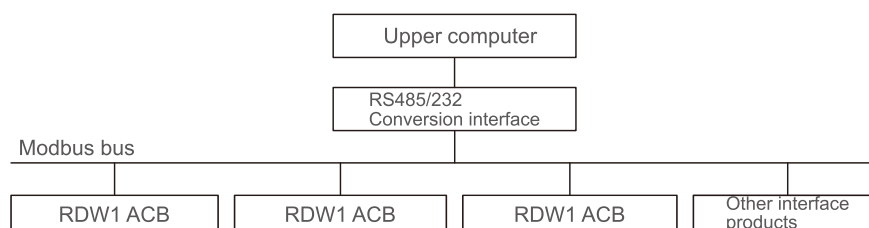
Table 7

Delay time (s)				Returnable time (s)			
0.1	0.2	0.3	0.4	0.5	0.14	0.23	0.35

H Type intelligent release

In addition to having all the functions of Type M, it also has an RS485 standard communication interface (the standard configuration is Modbus communication protocol), which can communicate in half-duplex or full-duplex. Through the communication interface, a local system with a master-slave structure (hereinafter referred to as the system) can be formed. 1-2 computers are used as the master station, and a number of intelligent circuit breakers or other communicable components are used as slaves. The system network structure is shown in the figure below, For the circuit breaker unit, the system can realize the long-distance "four remote" function; monitoring of various power grid parameters and operating parameters, monitoring of the current operating status of the intelligent circuit breaker, adjustment and download of various protection limit parameters, combined and sub-operation control of the intelligent circuit breaker, etc. The system is suitable for the construction and transformation of various power stations, power plants, small and medium-sized substations, industrial and mining enterprises, buildings and other distribution control systems.

For example: The connection diagram of the Modbus communication protocol interface is as follows:



Composition of the system

Sensor hardware structure of data communication network system

The intelligent circuit breaker provides a standard RS485 communication interface, which is drawn from the No.10 and No.11 outlets of the outlets of the circuit breaker; the communication medium connected to the system: Class A shielded twisted pair.

Network main characteristics

Two-way serial data transmission method, the product can provide a variety of communication protocol methods; Modbus, profibus-DP, DeviceNet, CAN, etc. The strict master-slave method, that is, the master station is the initiator and controller of the communication, and the slave station can only communicate with the master station, not directly with other slaves. Communication baud rate 4.8/9.6/38.4/76.8/153.6 kbps is adjustable. The default value is 9.6kbps, and the communication distance is 1.2km.

Monitoring software

The configuration software can realize the configuration and application of the required monitoring and management software according to different engineering requirements, and can realize operation monitoring operations and a variety of daily management functions.

System function

Remote control refers to the object that controls the slave system of each slave circuit breaker in the system through the master station computer. Click the remote control button with the mouse, and the system will provide the corresponding running state. After the operator enters the operation password, the remote control "close" or "open" instruction can be issued. The system transmits the instruction to the corresponding circuit breaker slave station, and after receiving the instruction, the slave station will operate the remote control results such as breaking, closing and storing energy according to the established timing.

Remote adjusting

Remote adjustment refers to setting the protection setting value of the slave station through the master station computer, selecting the corresponding object on the surface of the setting value stored in the master station computer, clicking the remote adjustment button with the mouse, the system will provide the protection setting value table of all the protection setting values of the corresponding object, After the operator enters the password, the required parameter can be selected from the parameter table, and then clicking the corresponding button, the master station will download the parameter to the remote adjustment result, and the slave station will modify its own protection setting value after receiving the instruction.

Remote monitoring

Remote adjustment refers to setting the protection setting value of the slave station through the master station computer, selecting the corresponding object on the surface of the setting value stored in the master station computer, clicking the remote adjustment button with the mouse, the system will provide the protection setting value table of all the protection setting values of the corresponding object, After the operator enters the password, the required parameter can be selected from the parameter table, and then clicking the corresponding button, the master station will download the parameter to the remote adjustment result, and the slave station will modify its own protection setting value after receiving the instruction.

The fault record can record the following fault parameters:

The current values of phase A, B, C and N, voltage values of UAB, UBC and UCA, fault type and fault action at the time of fault are recorded in the fault database.

The current real-time current and voltage of each sub-station are displayed by computer bar graph and absolute value table, and the running status of each node is displayed by real-time curve.

Remote communication

Remote messaging refers to checking the slave station's model, closed and open status, protection settings, and the operation and other information of the slave station through the master station computer. The parameters submitted by the slave station circuit breaker to the upper computer mainly include: switch model, Switch status (closed/off), fault information, alarm information, various protection settings, etc.

Other function of system

In addition to the four remote operation control functions, the system can also perform a variety of management functions: accident alarm (information screen, screen promotion, event printing, sound alarm), event recording, maintenance listing, shift handover management, load trend analysis, multiple report printing, etc.

AIR CIRCUIT BREAKER

L Type intelligent controller

The L-type controller adopts a coded switch tuning method, which has four-stage protection characteristics such as overload long delay, short circuit short delay, instantaneous, and grounding. It has functions such as fault status and load current beam indication, but it is displayed digitally, and its functions are not as complete as the M and H types. The setting value is graded adjustment, which is for users to choose in general situations.

The operating voltage and required functions of the excitation tripper, undervoltage tripper, electric operating mechanism, energy release (closing) electromagnet, and intelligent controller of the circuit breaker are shown in Table 8.

Table 8

Item			AC (50Hz)		DC	
			220V	380V	110V	220V
Shunt release			24VA	36VA	—	—
Undervoltage release			24VA	36VA	24W	24W
Closed electromagnet			24VA	36VA	24W	24W
Motor operation mechanism	Rated current of frame size	2000A	85VA	85VA	85W	85W
		3200A, 4000A	125VA	125VA	125W	125W
		6300A	150VA	150VA	150W	150W
Power supply of Intelligent controller: AC220V, AC380V, DC220V, DC110V, power supply error ±15%						

Note: The reliable operating voltage range of the shunt release is 70%~110%, and the closing electromagnet and operating mechanism are 85%~110%

The performance of the undervoltage tripper of the circuit breaker is shown in Table 9

Table 9

Category		Undervoltage delay release	Undervoltage instantaneous release
Release action time		Delay 1, 3, 5s	Instantaneous
Release operating voltage value	$(30\% \sim 70\%)U_e$	Reliable disconnection of circuit breaker	
	$\leq 35\%U_e$	Circuit breaker cannot be closed	
	$(85\% \sim 110\%)U_e$	Circuit breaker can be reliably closed	
Within $\frac{1}{2}$ of the delay time, if the power supply voltage is restored to 85% U_e , The circuit breaker cannot be disconnected			—

Note: The delay time accuracy is $\pm 10\%$

Performance of auxiliary contacts

- ☐ The agreed heating current of the auxiliary contact is 6A;
- ☐ Auxiliary contact form: four sets of conversion contacts (standard configuration), please contact us for special requirements;
- ☐ Abnormal connection and breaking ability of auxiliary contacts;
- ☐ The connection and breaking capacity of the auxiliary contacts under abnormal conditions of use determined by the use is shown in the table

Table 10

Usage category	Connection			Breaking			Number of on-off operation cycles and operating frequency		
	U/ U_e	I/ I_e	$\cos\Phi$ or T0.95	U/ U_e	I/ I_e	$\cos\Phi$ or T0.95	Number of operation cycles	Number of operation cycles per minute	Power-on time (s)
AC-15	1.1	10	0.3	1.1	10	0.3	10	6 (or the same operating frequency as the main loop)	0.05
DC-13	1.1	1.1	6Pe	1.1	1.1	6Pe			

□ The connection and breaking capabilities of the auxiliary contacts under normal conditions are shown in the table 11

Table 11

Usage category	Connection			Breaking		
	U/U _e	I/I _e	cos Φ or T0.95	U/U _e	I/I _e	cosΦ or T0.95
AC-15	1	10	0.3	1	1	0.3
DC-13	1	1	300ms	1	1	300ms

Key and lock for the disconnecting position

The circuit breaker has the “Key and lock for the disconnecting position” accessory (according to the order requirements: three locks and two keys, two locks and one key, one lock and one key, etc.). Can lock the circuit breaker in the disconnected position. At this time, no matter whether the closing button or the energy release (closing) electromagnet is used, the circuit breaker cannot be closed.

Structure overview (see Figure 5 for the structure of the circuit breaker)

The fixed circuit breaker is mainly composed of a contact system, an intelligent controller, a manual operating mechanism, a motor operating mechanism, and a mounting plate.

The drawer type circuit breaker is mainly composed of a contact system, an intelligent controller, a manual operating mechanism, and a drawer base with a motor operating mechanism.

The circuit breaker is arranged in a three-dimensional manner, which has the characteristics of compact structure and small size. The contact system is enclosed in an insulating base plate, and each phase of the contact is also separated by an insulating plate to form a small chamber, and the intelligent controller, manual operating mechanism, and electric operating mechanism are arranged in front of it in turn to form their own independent units. If one of the units is broken, it can be removed and replaced with a new one.

The drawer type circuit breaker is composed of a plug-in circuit breaker and a drawer base. The guide rail in the drawer base can be pulled in and out, and the circuit breaker inserted is located on the guide rail to get out of the drawer, and the main circuit is connected by the insertion connection between the busbar inserted into the circuit breaker and the bridge contact on the drawer base.

The drawer type circuit breaker has three working positions: the “connection” position, the “test” position, and the “separation” position. The position change is achieved by screwing in or out of the handle. The indication of the three positions is displayed by the pointer on the beam of the low base of the drawer base.

When in the “connection” position, both the main circuit and the secondary circuit are turned on; when in the “test” position, the main circuit is disconnected and separated by insulating partitions. Only the secondary circuit is turned on, and some necessary action tests can be performed; when in the “separation” position, the main circuit and the secondary circuit are all disconnected. Moreover, the drawer type circuit breaker has a mechanical interlocking device. The circuit breaker can only be closed at the connection position or the test position, and the circuit breaker cannot be closed at the intermediate position between the connection and the test.

The interlocking mechanism of the circuit breaker (applicable to drawer type and fixed type) is shown in Figure 6. The user can use the interlocking mechanism separately to convert two or three units.

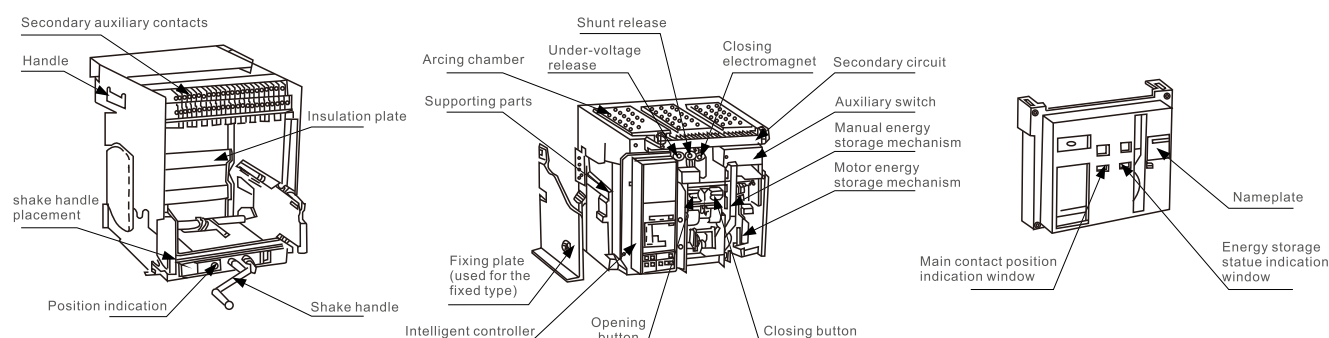


Figure 5 Structural diagram for circuit breaker

AIR CIRCUIT BREAKER

Lever interlock (for the same cabinet)

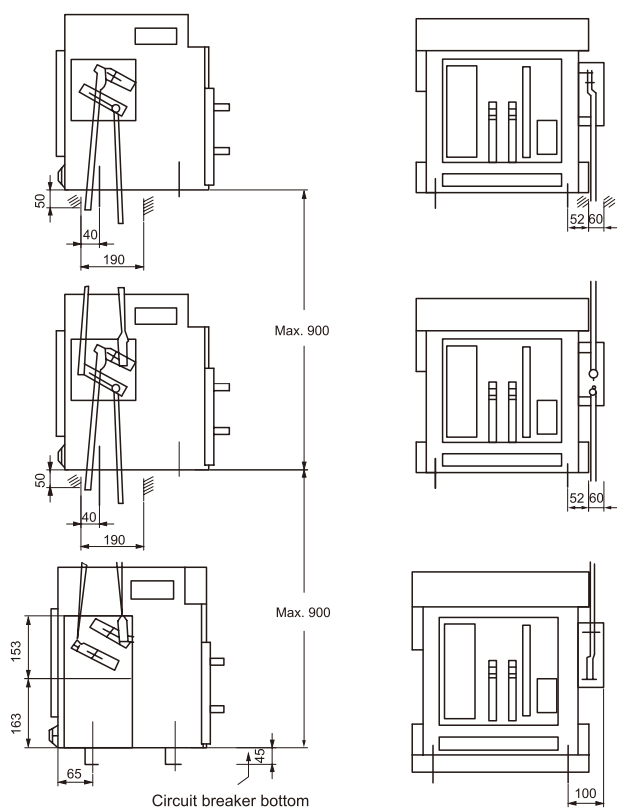
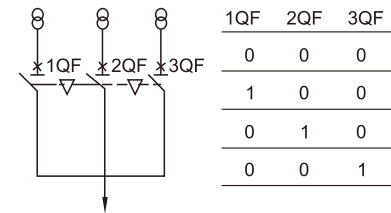


Figure 6 (A) Lever interlocking

Note: Three vertically mounted circuit breakers with a lever interlock.
If two circuit breakers interlocks only need to remove the top circuit breaker.

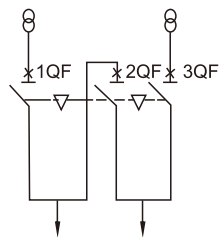
Circuit diagram Possible operation mode

Method 1: Three power sources can only be integrated into one circuit breaker



1QF	2QF	3QF
0	0	0
1	0	0
0	1	0
0	0	1

Method two: two power supplies with up to two circuit breakers



1QF	2QF	3QF
0	0	0
1	0	0
0	1	0
0	0	1
1	1	0
0	1	1
1	0	1

Soft interlock (Available for horizontal and vertical, suitable for between adjacent cabinets or in the same cabinet)

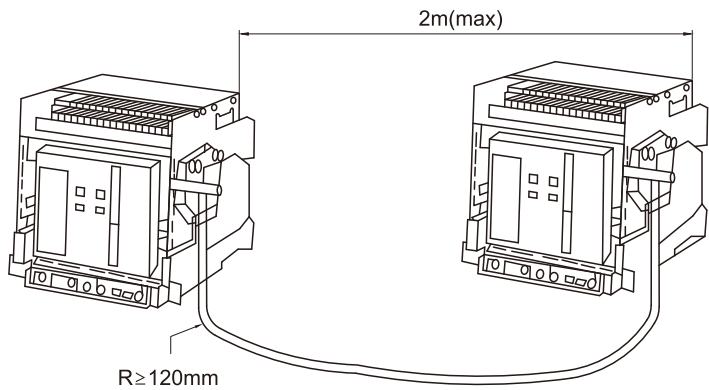
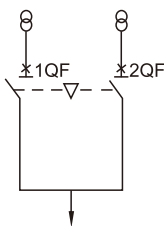


Figure 6 (B) Steel cable and rope interlocking

Circuit diagram Possible operation mode



1QF	2QF
0	0
0	1
1	0

Grounding fault protection method

The controller is divided into two different protection methods, one is the difference type (T), and the controller protects according to the sum of the three-phase current and the current vector on the neutral line. According to the number of poles of the circuit breaker, it is divided into three forms: 3PT, 4PT, and (3P+N)T, which are shown in the figure below (a, b, and c). The other method is ground current type (W). The controller directly takes the output current signal of an additional current transformer between the neutral point of the main power supply and ground for protection. The transformer is between the N line and the PE line, see Figure d below.

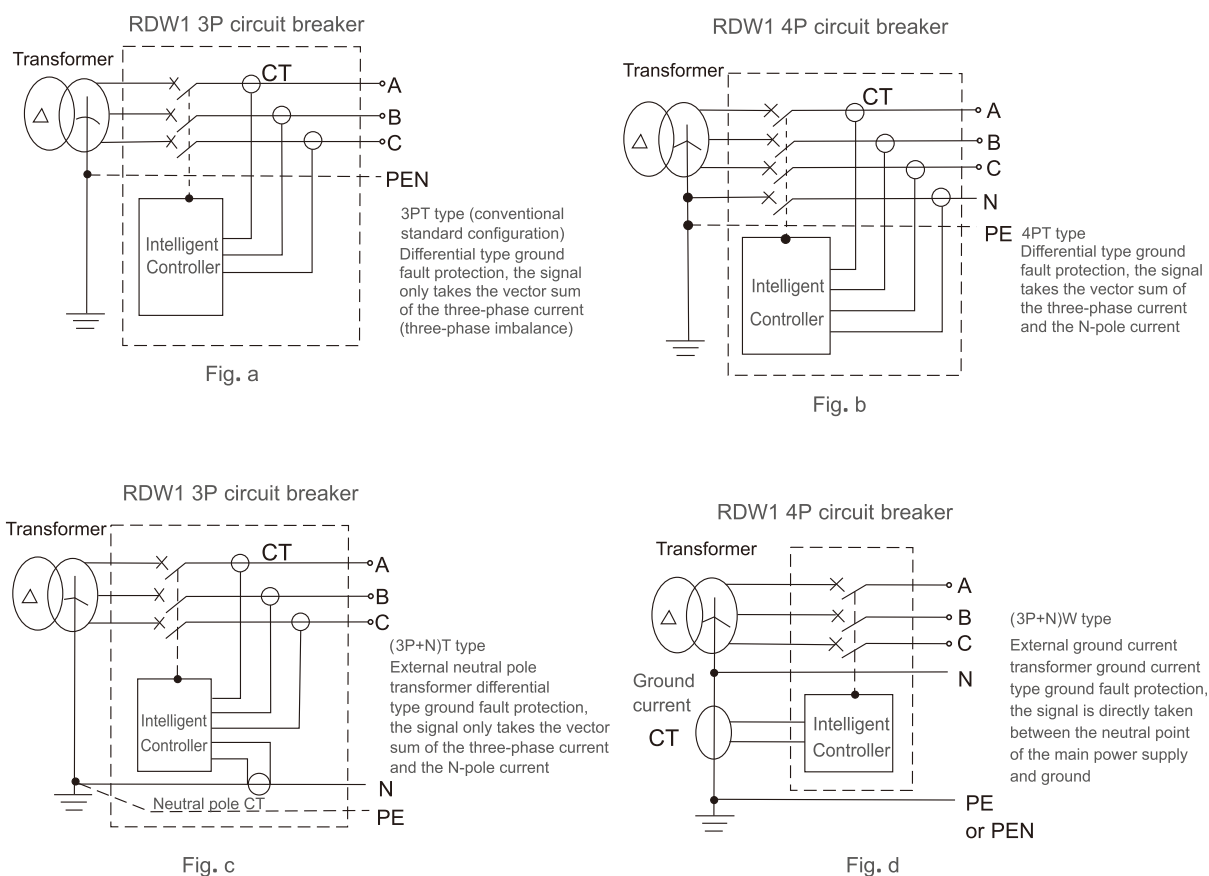


Figure 7(A) Ground fault protection method

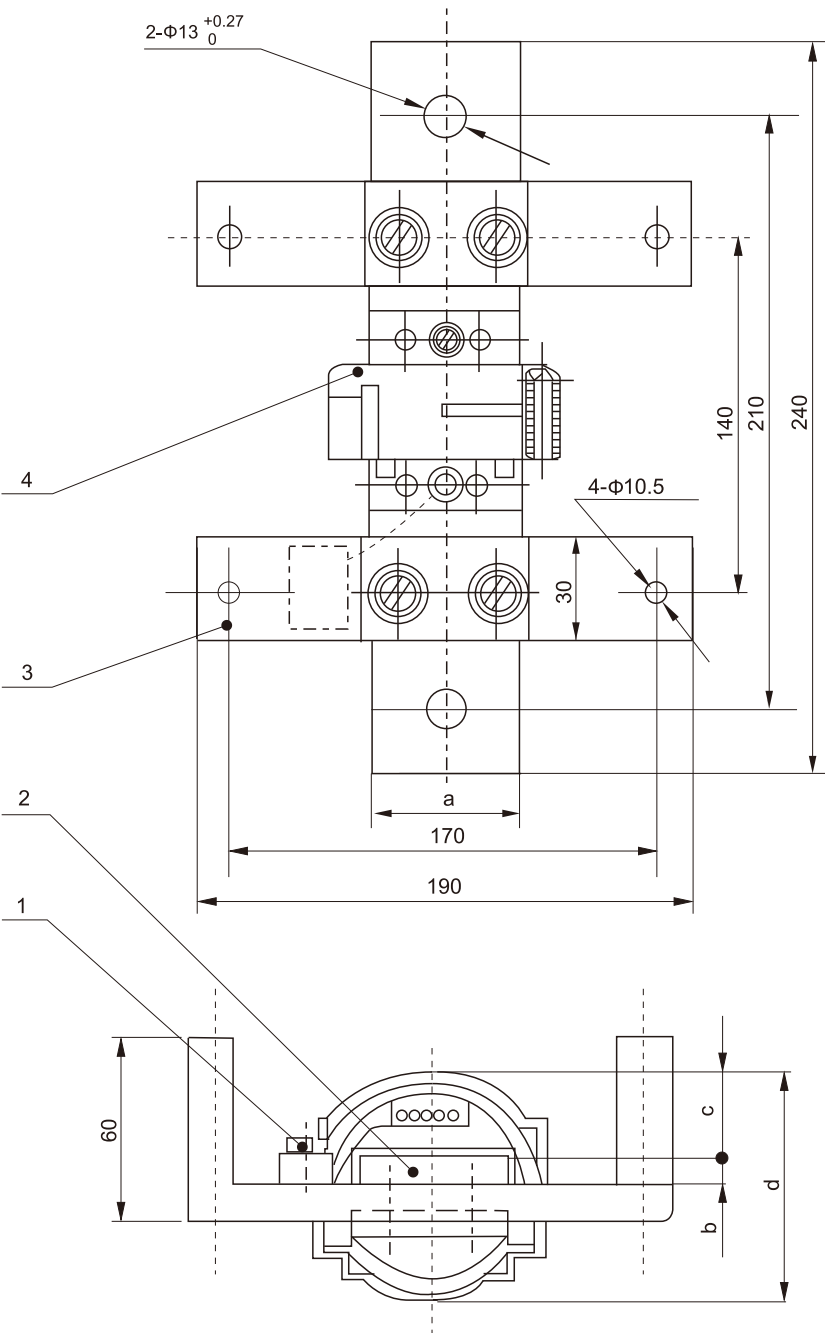
External grounding single-phase grounding protection device (see Figure 7)

An external transformer (neutral pole transformer or ground current transformer) is provided to the user as an accessory. The user sets it into the busbar by himself, and connects the connection (length is 2m) to the secondary terminal blocks #25 and #26 of the circuit breaker.

Phase partition

Used to increase the insulation strength between busbars (for drawer type).

AIR CIRCUIT BREAKER



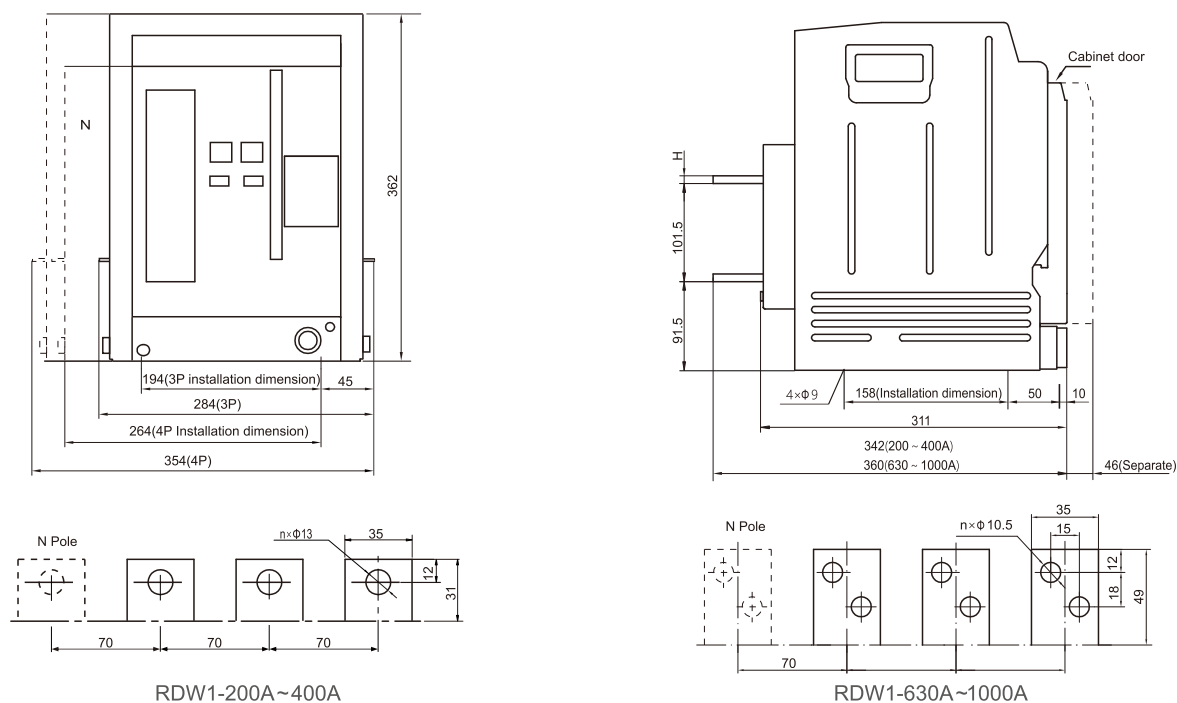
1. Wiring board 2. Busbar 3. Fixed board 4. Transformer

Inm(A)	a	b	c	d
2000	60	12.5	34	Φ89
3200	80	20	35	Φ109.5

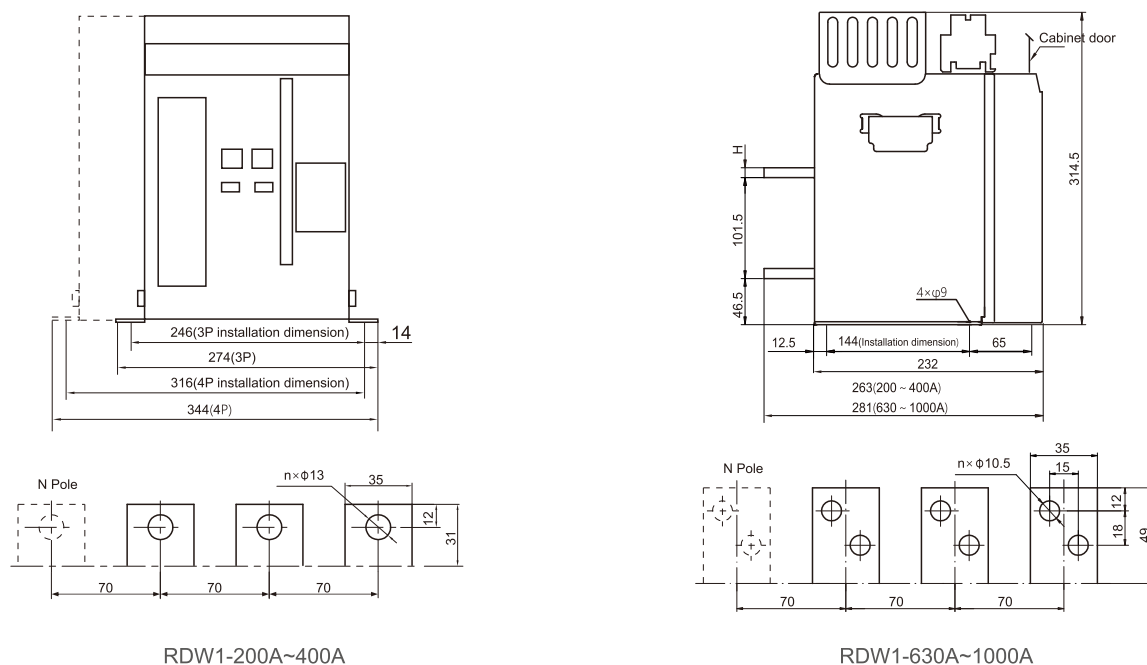
Figure 7 (B) Dimensions and installation dimensions of ground fault protection device

Overall dimension and installation dimensions

□ RDW1-1000 3P/4P (Withdrawable type) Overall dimension and installation dimension



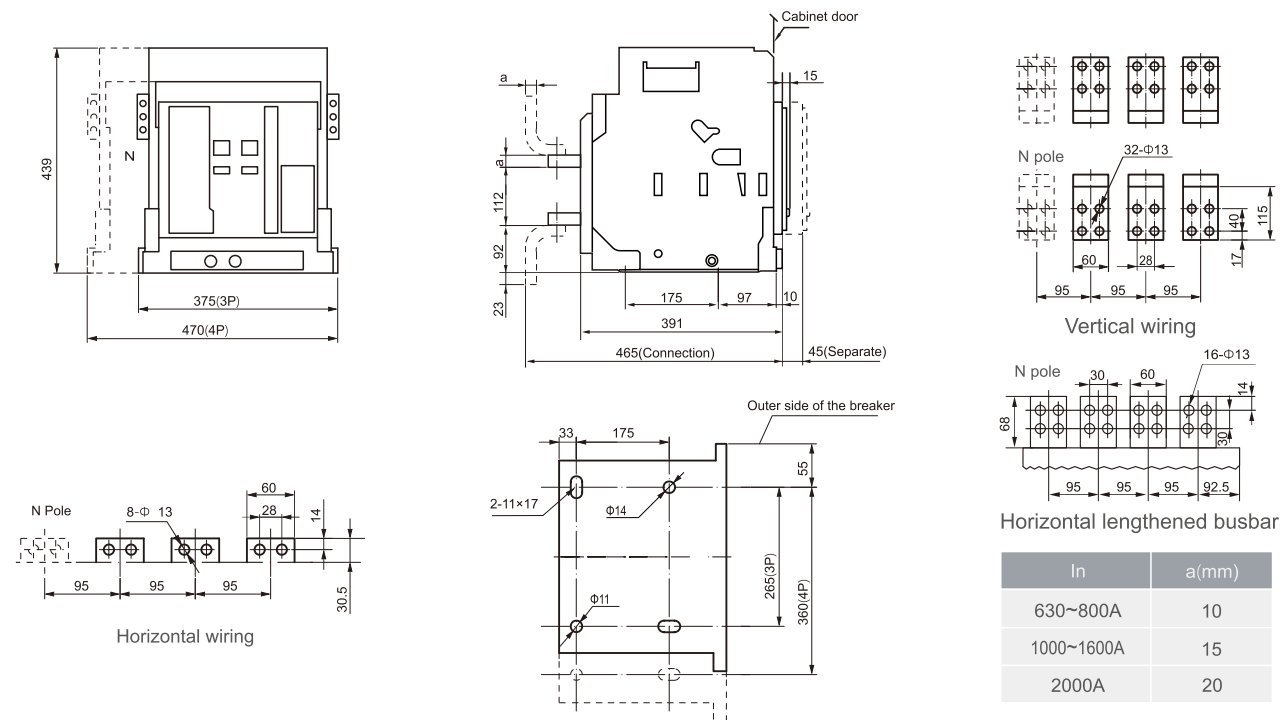
□ RDW1-1000 3P/4P (Fixed type) Overall dimension and installation dimension



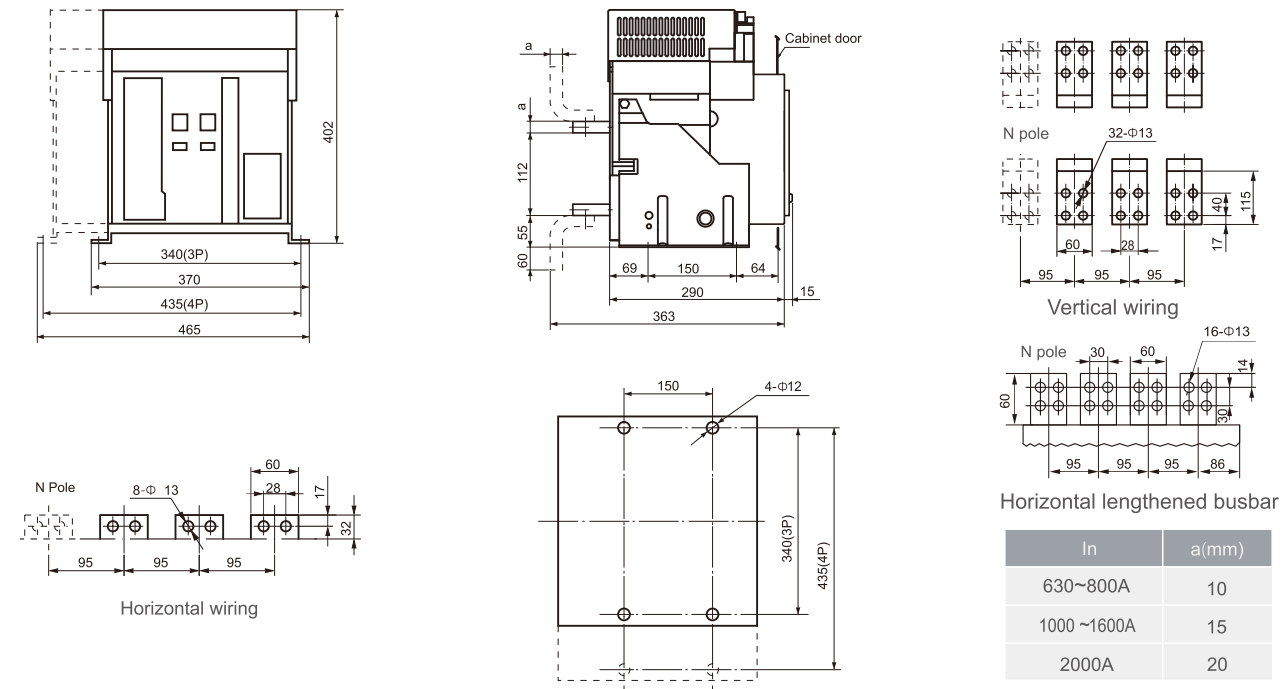
Rated current (A)	200, 400	630	800, 1000	Remark
Busbar thickness H (mm)	6	8	10	—
QTY n	6	12	12	3P
	8	16	16	4P

AIR CIRCUIT BREAKER

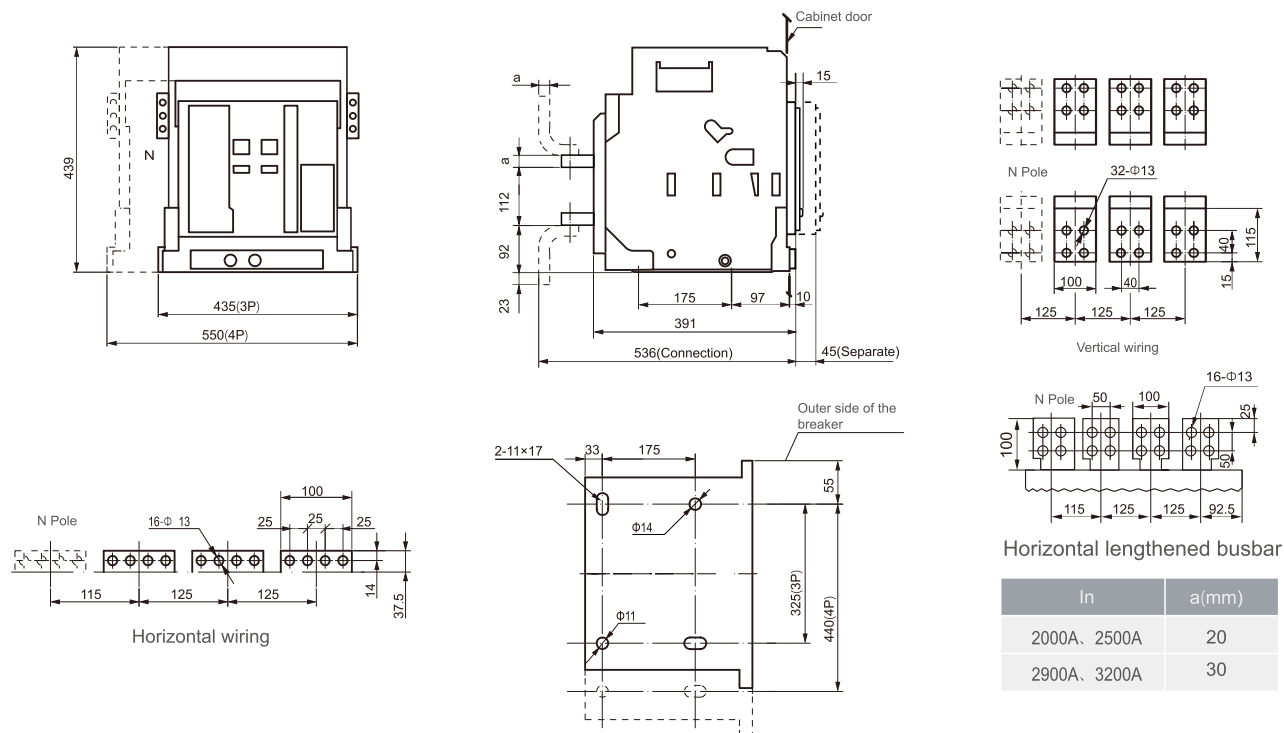
□ RDW1-2000 3P/4P (Withdrawable type) Overall dimension and installation dimension



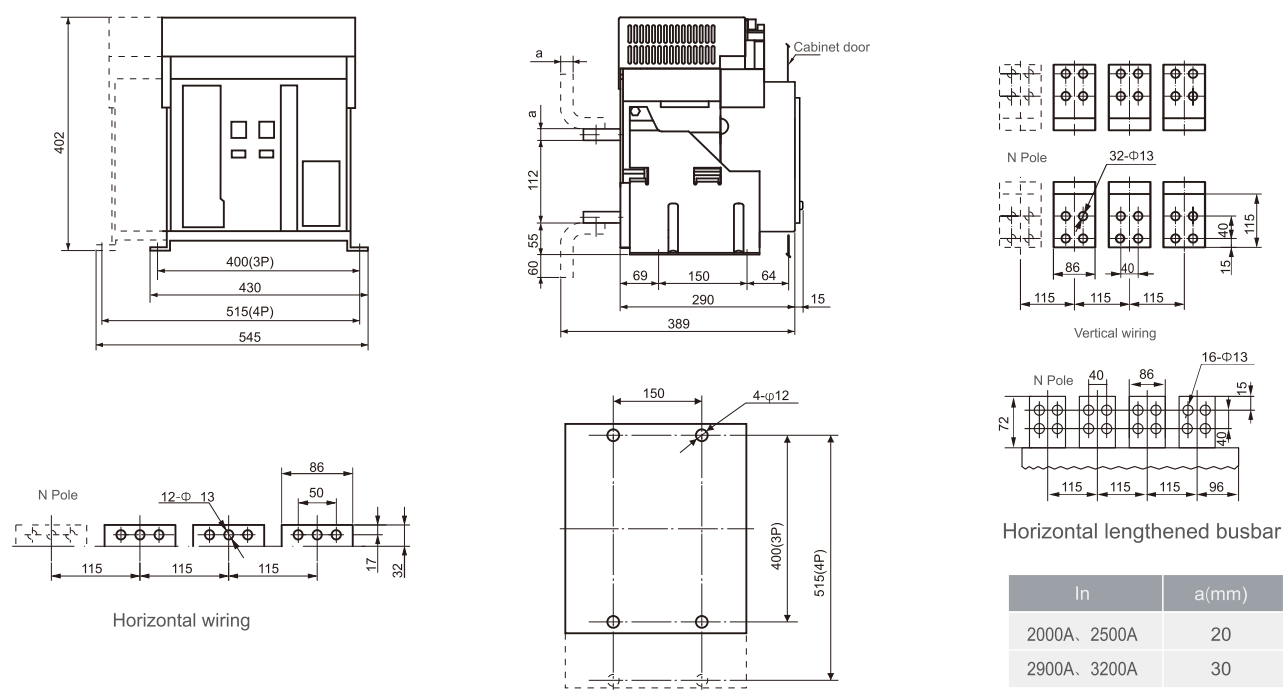
□ RDW1-2000 3P/4P (Fixed type) Overall dimension and installation dimension



□ RDW1-3200 3P/4P (Withdrawable type) Overall dimensions and installation dimensions

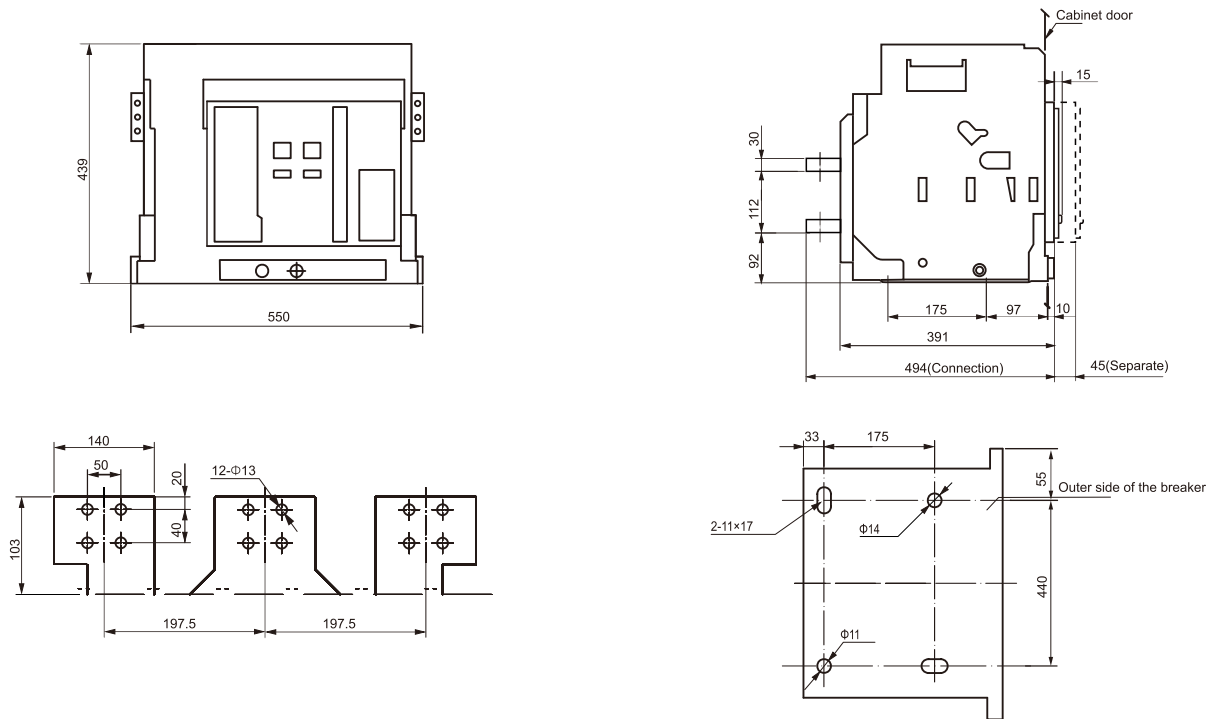


□ RDW1-3200 3P/4P (Fixed type) Overall dimensions and installation dimensions

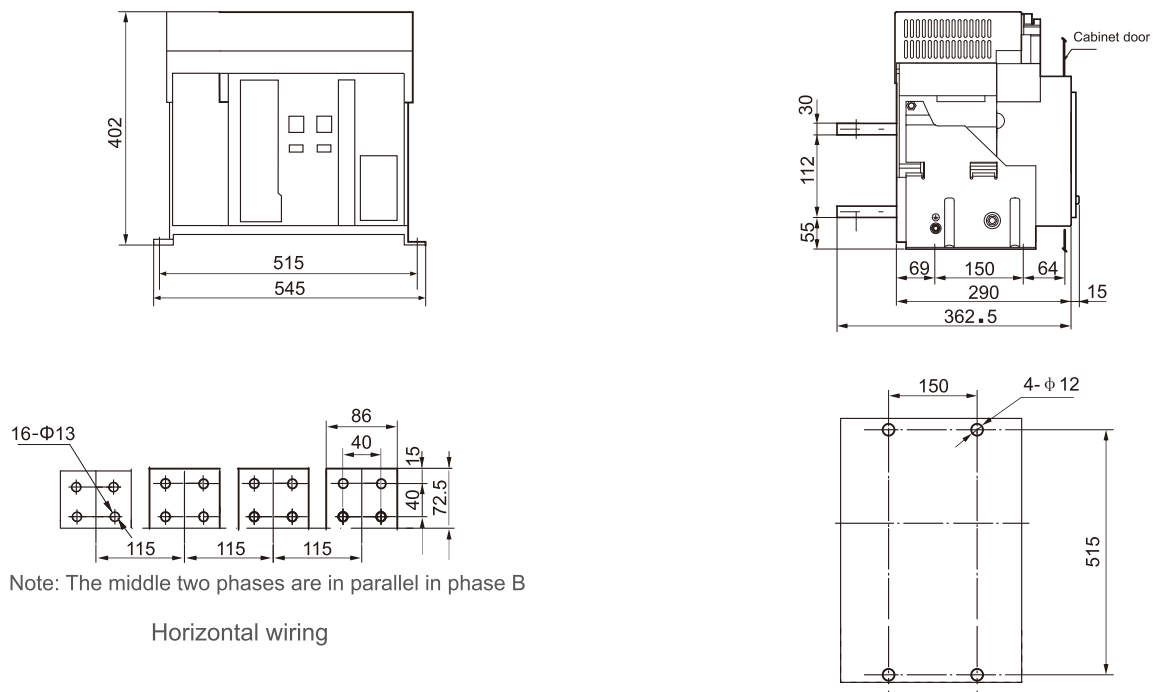


AIR CIRCUIT BREAKER

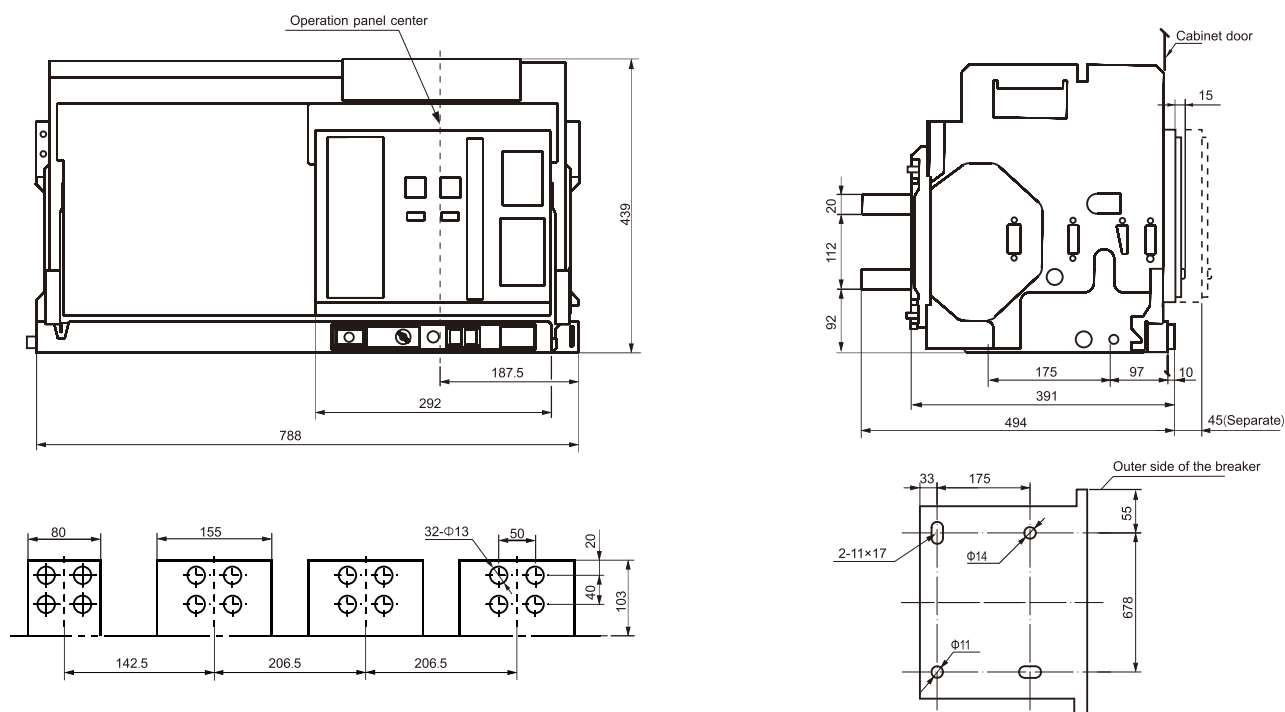
□ RDW1-4000 3P (Withdrawable type) Overall dimension and installation dimension



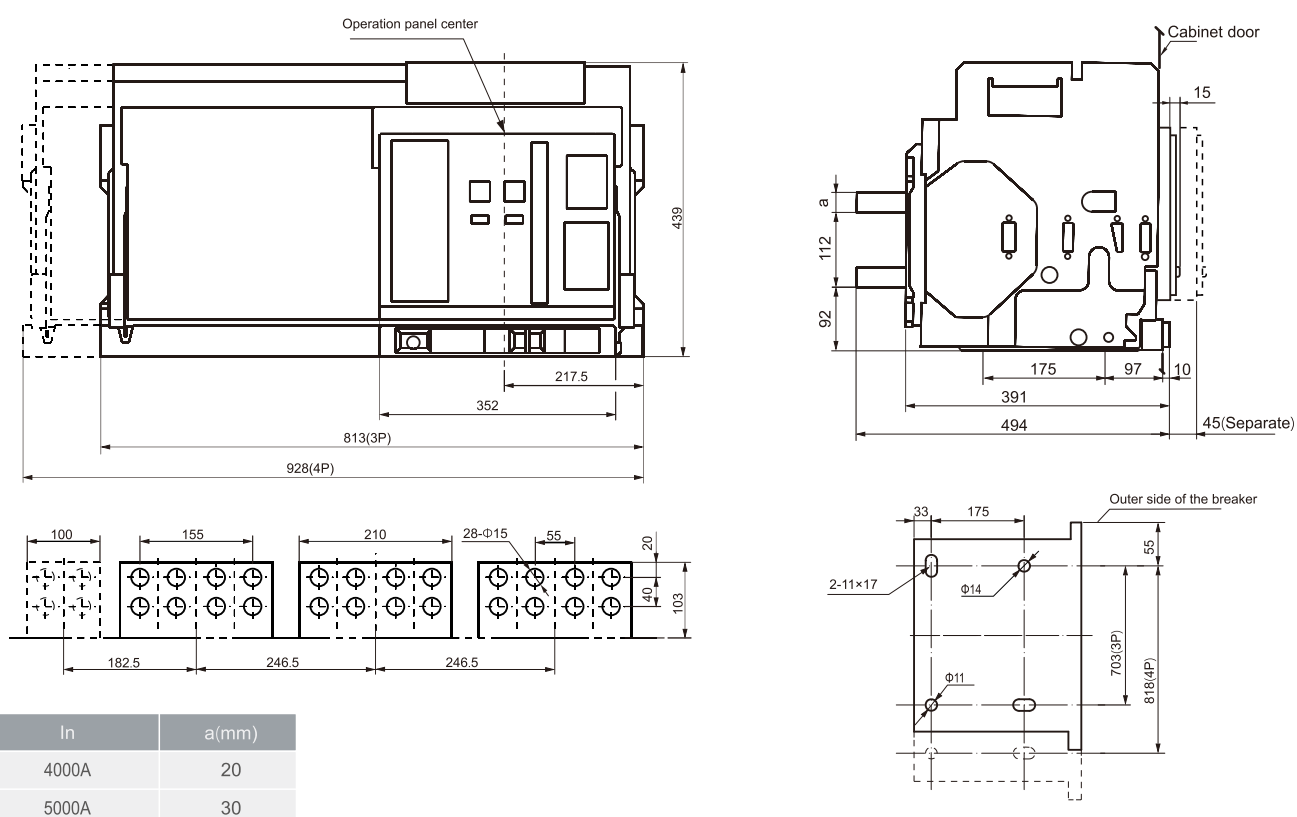
□ RDW1-4000 3P (Fixed type) Overall dimension and installation dimension



□ RDW1-4000 4P (Withdrawable type) Overall dimension and installation dimension

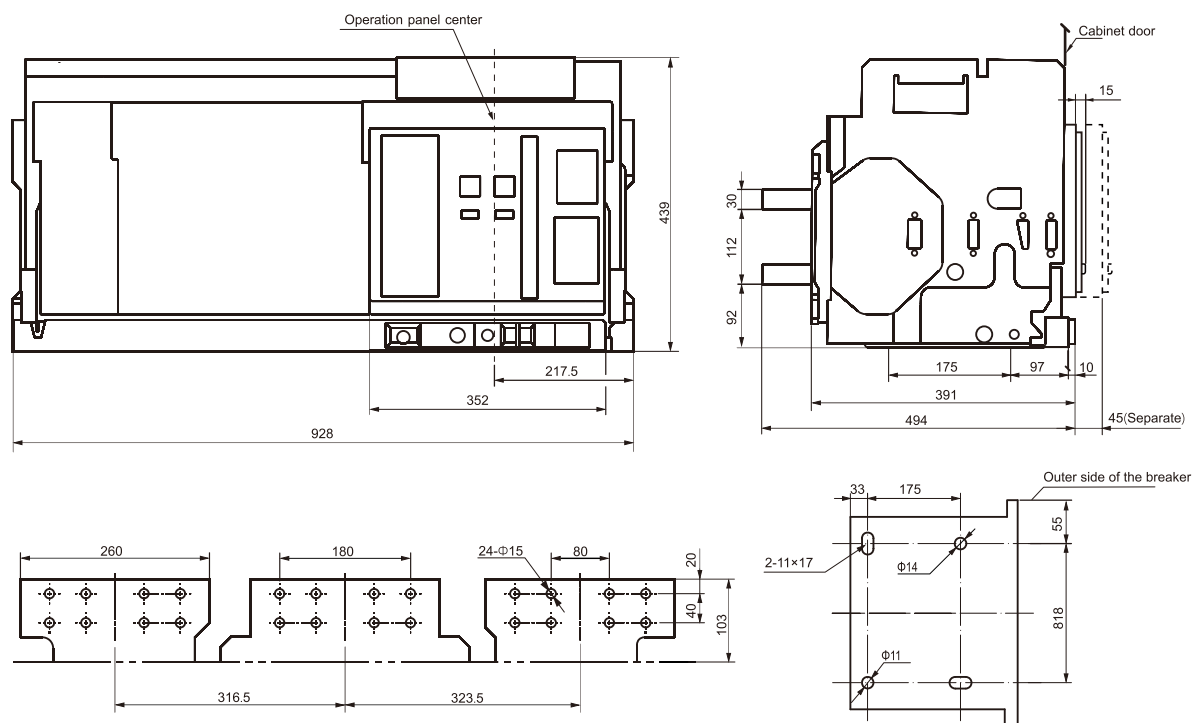


□ RDW1-6300 3P/4P 4000A/5000A (Withdrawable type) Overall dimension and installation dimension

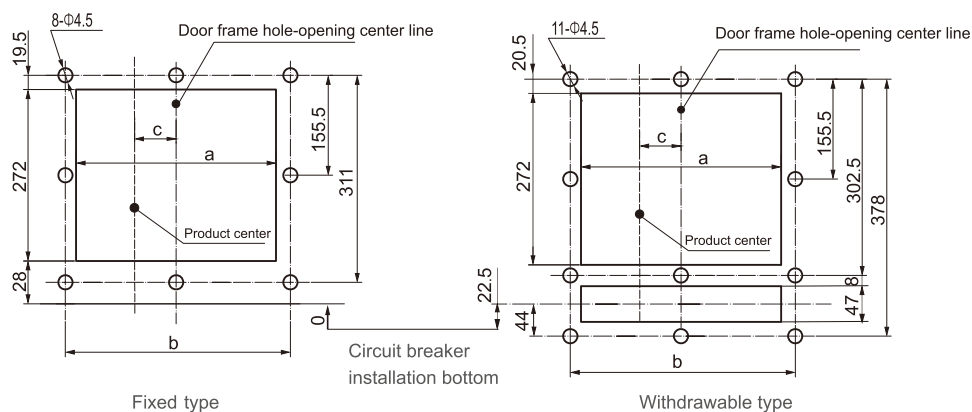


AIR CIRCUIT BREAKER

□ RDW1-6300 4P 6300A (Withdrawable type) Overall dimension and installation dimension



When used with the complete sets of cabinet, the door frame dimension and its installation dimension to see the below diagram, and use ST2.9×9.5-F-H to fixed when installation

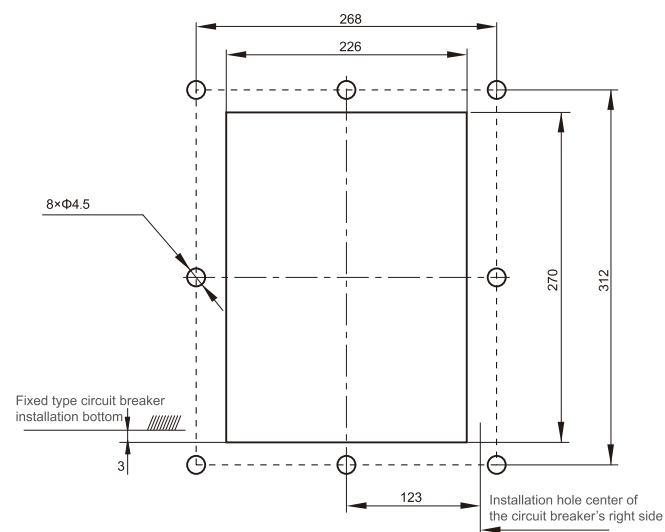


Frame size Inm(A)	a(mm)	b(mm)	c(mm) 3P	c(mm) 4P
2000	306	346	0	47.5
3200	366	406	0	57.5
4000/3P	366	406	57.5	—
4000/4P Withdrawable type	306	346	—	206.5
6300	366	406	189(4000/5000 3P)	
	366	406	246.5(4000/5000 4P、6300 3P)	

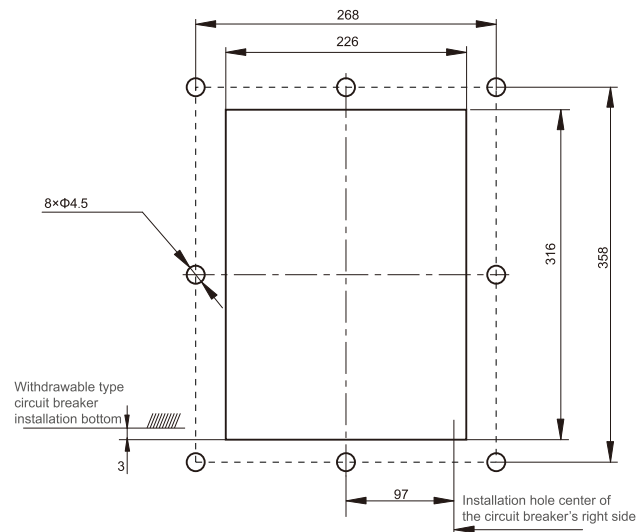
RDW1-2000~6300 Door frame hole-opening dimension and installation dimension

□ RDW1-1000 Withdrawable type/Fixed type door frame hole-opening dimension and installation dimension

□ RDW1-1000 Fixed type door frame hole-opening dimension



□ RDW1-1000 Withdrawable type door frame hole-opening dimension



□ The specification and the quantity of the connection busbar to see below table (for reference)

Rated current (A)	External busbar specification(mm)	QTY for each pole	Rated current (A)	External busbar specification(mm)	QTY for each pole
630	40×5	2	2900	100×10	6
800	50×5	2	3200	100×10	4
1000	60×5	2	3600	100×10	5
1250	80×5	2	4000	100×10	5
1600	100×5	2	5000	100×10	6
2000	100×5	3	6300	100×10	8
2500	100×5	4	Note: When use 6300/4000A, it's better to use 5 pcs of 100×10 for each pole		