

MEMF

MF3 Series

Air Circuit Breaker (ACB)



شركة ميمف للصناعات الكهربائية
MEMF Electrical Industries Co.



Summary

4 basic frame sizes

For your various requirements, the Air Circuit Breaker MF3 includes 5 basic frame sizes as followed.

MF3-2000
400A to 2000A

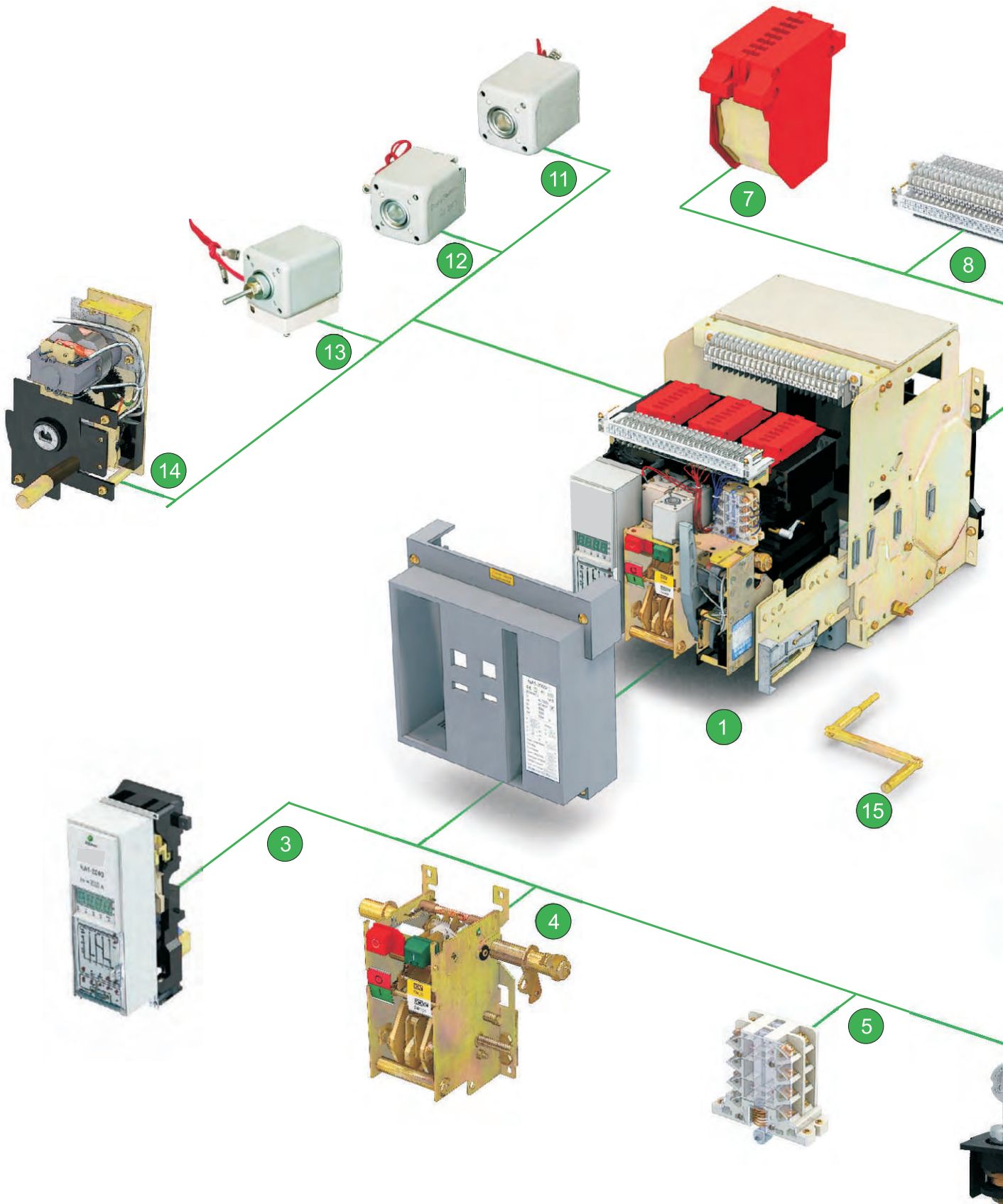


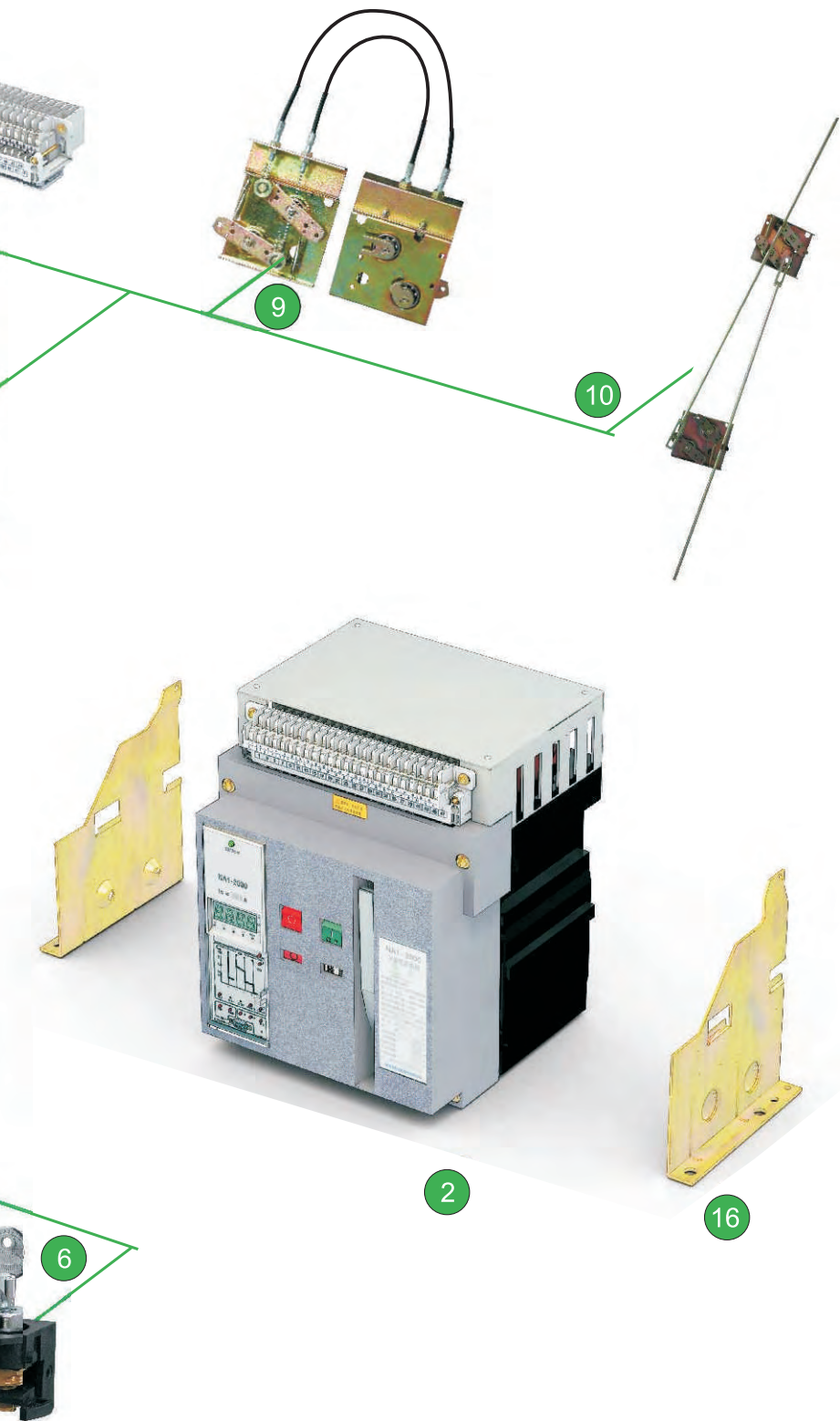
MF3-3200, 4000
2000A to 4000A



MF3-6300
4000A to 6300A







MF3 Air Circuit Breaker

- 1 Drawout type
- 2 Fixed type
- 3 Intelligent controller
- 4 Operating mechanism
- 5 Auxiliary contact
- 6 Locking-device
- 7 Arcing chamber
- 8 Secondary connecting part
- 9 Wire-cable mechanical interlock
- 10 Connecting-rod type mechanical interlock
- 11 Shunt electromagnet
- 12 Closing release
- 13 Under-voltage release
- 14 Motor-driven energy-storage mechanism
- 15 Rotary handle
- 16 Fixed plate

1. General

1.1 Application scope

MF3 series air circuit breaker is suitable for the circuit of AC 50Hz/60Hz with rated service voltage 400V, 690V and rated service current up to 6300A. It is mainly used to distribute electric energy and protect circuits and electric equipment against over-load, under-voltage, short-circuit and single-phase earthing fault.

With intelligentized and selective protection functions, the breaker can improve the reliability of power supply, and avoid unnecessary power failure. The breaker is applicable for power stations, factories, mines (for 690V) and modern high-buildings, especially for the distribution system of Intelligentized building.

1.2 Standard: IEC 60947-2.

2. Operation Conditions

2.1 Temperature Condition: $-5\sim 55^{\circ}\text{C}$ the average value within 24h shall not exceed 40°C (special situation excluded);

2.2 Altitude: $\leq 2000\text{m}$;

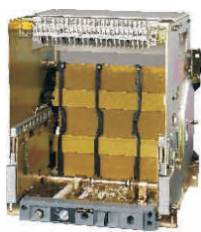
2.3 Pollution grade: Grade 3;

2.4 Air conditions:

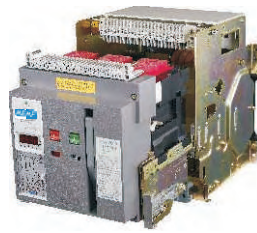
At mounting site, relative humidity not exceed 50% at the max temperature of $+40^{\circ}\text{C}$, higher relative humidity is allowable under lower temperature, RH could be 90% at $+20^{\circ}\text{C}$, special measures should be taken to occurrence of dews;

2.5 Note: Without the intelligent controller, the breaker functions as a switch-disconnector.

3. Structure



Drawer seat



Body

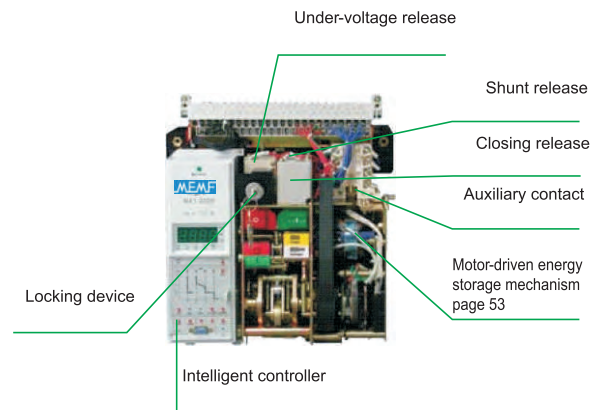
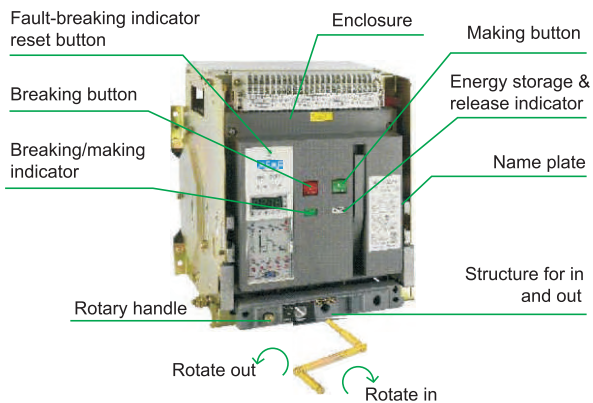


Drawout type breaker/switch-disconnector





Fixed plate for the fixed type breaker

Fixed type breaker/switch-disconnector



4. Main technical parameter

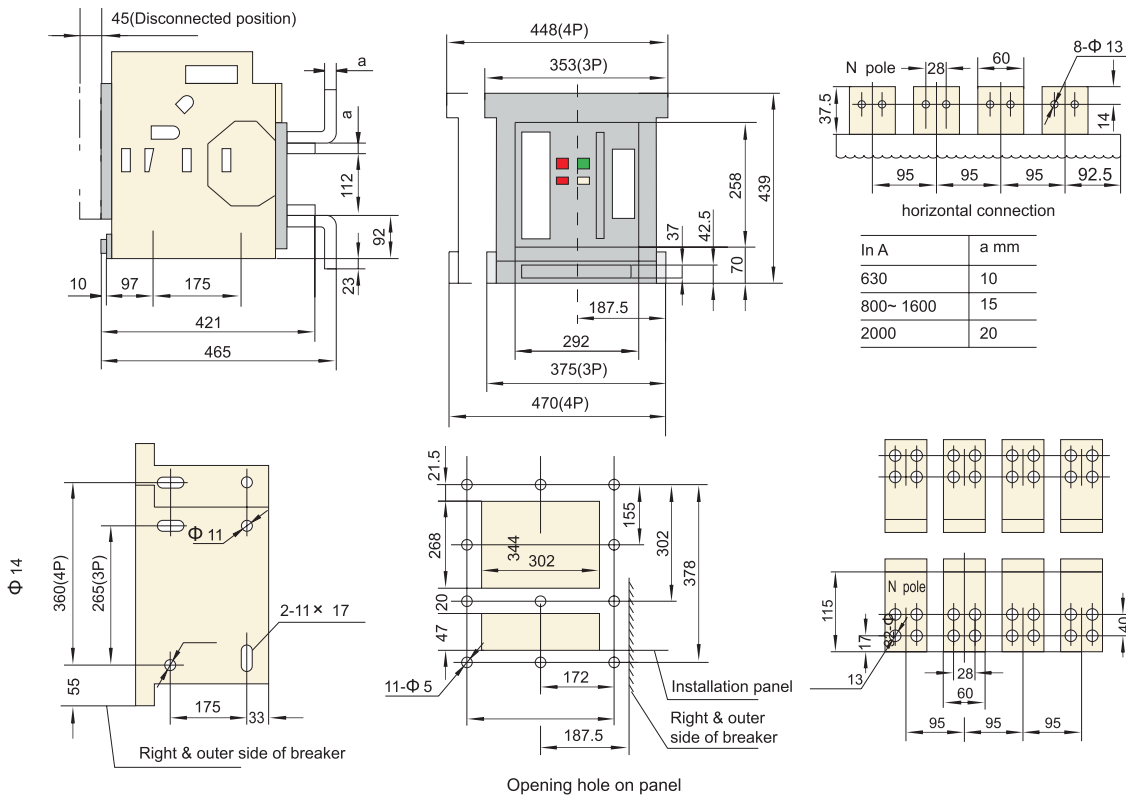
Type		MF3-2000						
								
Rated ultimate short circuit breaking capacity		I _{cu} =80kA 400V 50kA 690V						
Rated service short circuit breaking capacity		I _{cs} =50kA 400V 40kA 690V						
Rated short-time withstand current		I _{cw} =50kA 1s 400V 40kA 1s 690V						
Rated current I _n (A)		400	630	800	1000	1250	1600	2000
Number of poles		3, 4						
Rated voltage U _e (V)		400, 690						
Rated insulation voltage U _i (V)		1000						
Rated current of N-pole I _n (A)		100%I _n						
Fixed disconnection time (ms)		23~32						
Intelligent controller	Standard type (M)	●	●	●	●	●	●	●
	Communication type (H)	●	●	●	●	●	●	●
Operation performance	Electric life	5000						
	Mechanical life	Non-maintenance 10,000						
		Maintenance 20,000						
Connection pattern		Horizontal, Vertical						
Weight (kg)	Drawout 3P/4P	68/77			70/80		74/81	
	Fixed 3P/4P	42/51			43/52		45/53	

Type		MF3-3200, MF3-4000			
					
Rated ultimate short circuit breaking capacity		I _{cu} =80kA 400V 65kA 690V			
Rated service short circuit breaking capacity		I _{cs} =65kA 400V 65kA 690V			
Rated short-time withstand current		I _{cw} =65kA 1s 400V 50kA 1s 690V			
Rated current I _n (A)		2000	2500	3200	4000
Number of poles		3, 4			
Rated voltage U _e (V)		400, 690			
Rated insulation voltage U _i (V)		1000			
Rated current of N-pole I _n (A)		100%I _n			
Fixed disconnection time (ms)		23~32			
Intelligent controller	Standard type (M)	●	●	●	
	Communication type (H)	●	●	●	
Operation performance	Electric life	5000			
	Mechanical life	Non-maintenance 10,000			
		Maintenance 20,000			
Connection pattern		Horizontal, Vertical			
Weight (kg)	Drawout 3P/4P	94.5/117			119
	Fixed 3P/4P	52.5/65.5			

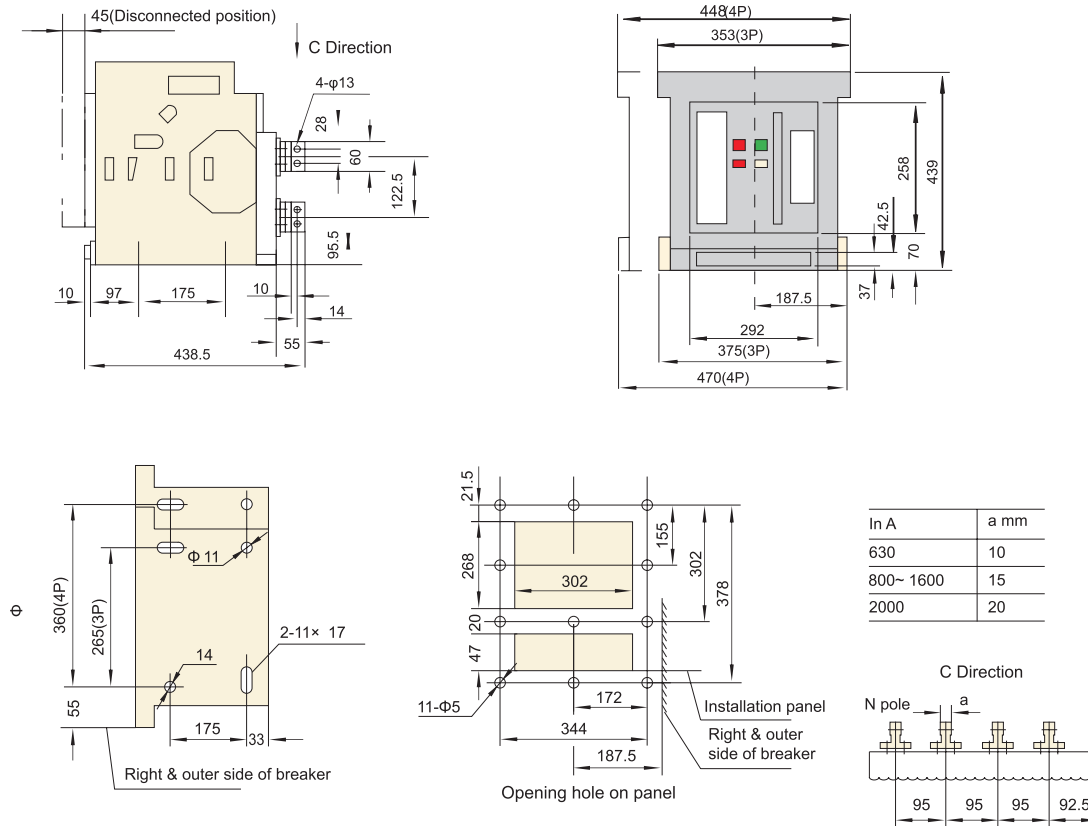


Type		MF3-6300		
Rated ultimate short circuit breaking capacity		I _{cu} =120kA 400V 85kA 690V		
Rated service short circuit breaking capacity		I _{cs} =100kA 400V 75kA 690V		
Rated short-time withstand current		I _{cw} =100kA 1s 400V 75kA 1s 690V		
rated current I _n (A)	4000	5000	6300	
Number of poles	3, 4			
Rated voltage U _e (V)	400, 690			
Rated insulation voltage U _i (V)	1000			
Rated current of N-pole I _n (A)	100%I _n			
Fixed disconnection time (ms)	23~32			
Intelligent controller	Standard type (M)	●	●	●
	Communication type (H)	●	●	●
Operation performance	Electric life	2500		
	Mechanical life	Non-maintenance 5000 Maintenance 10,000		
Connection pattern		Horizontal, Vertical		

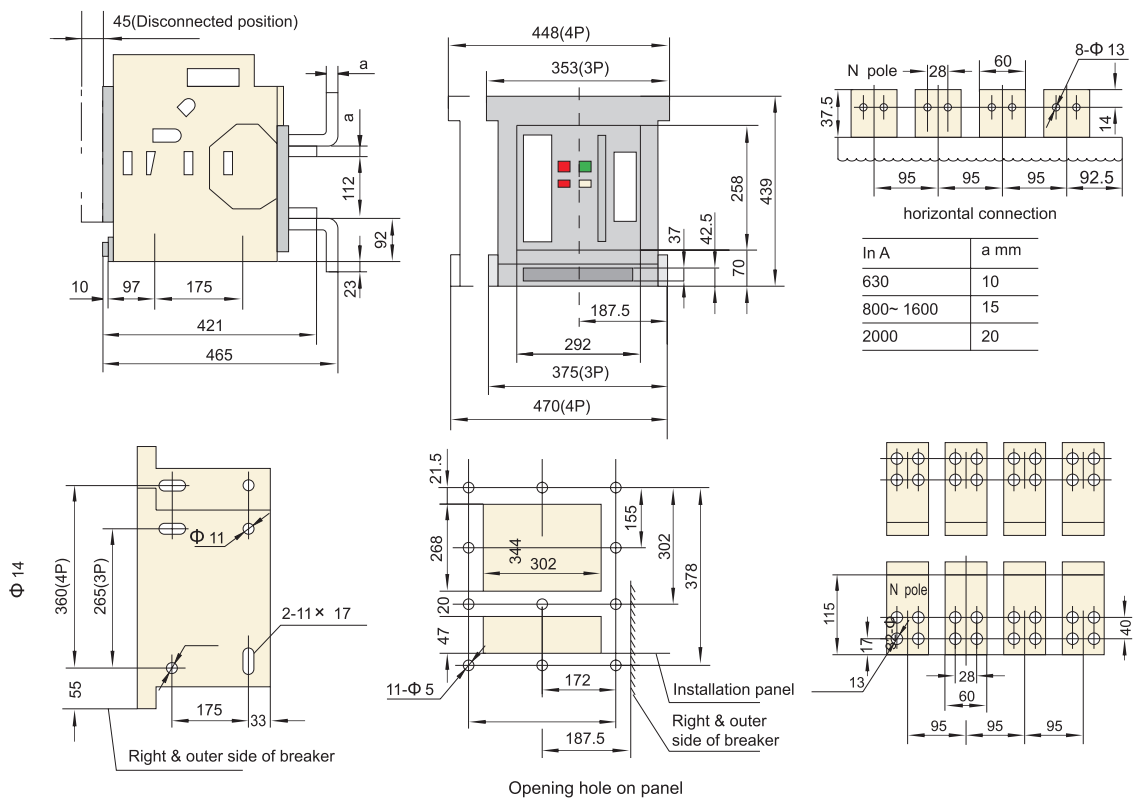
MF3-2000 Drawout-type



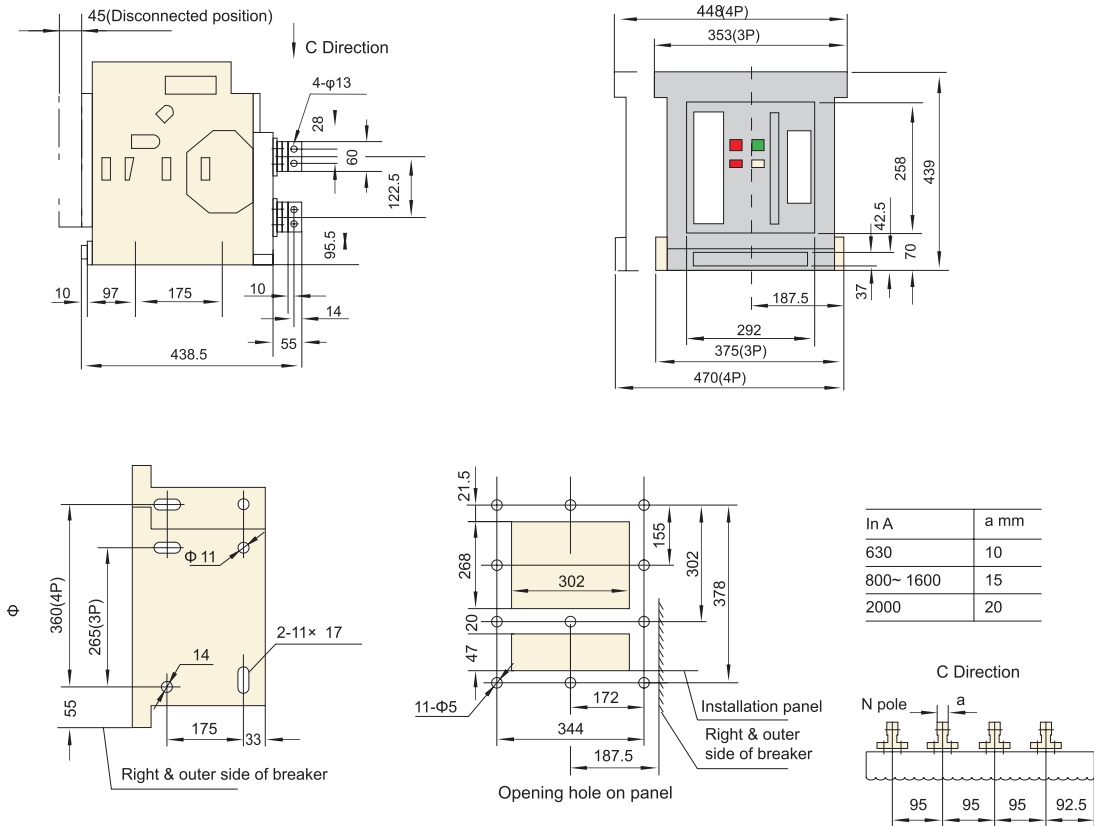
MF3-2000 Drawout-type, vertical, rear connection



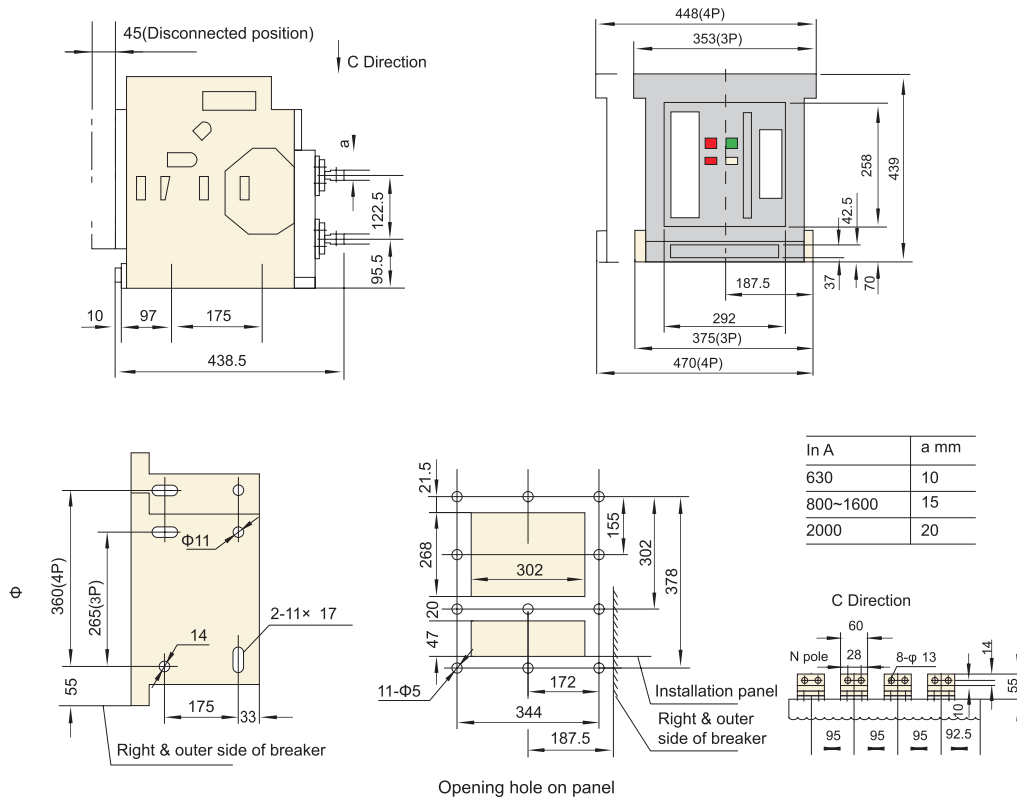
MF3-2000 Drawout-type

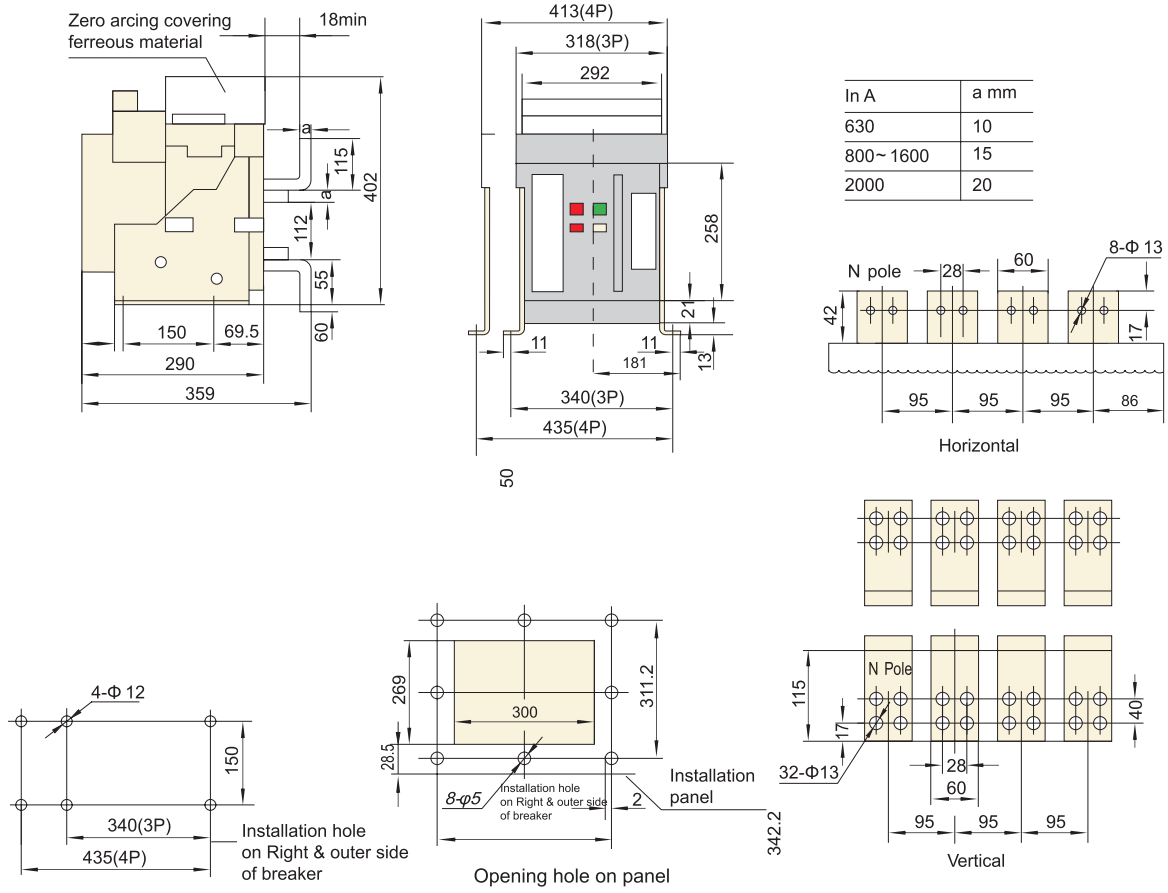


MF3-2000 Drawout-type, vertical, rear connection

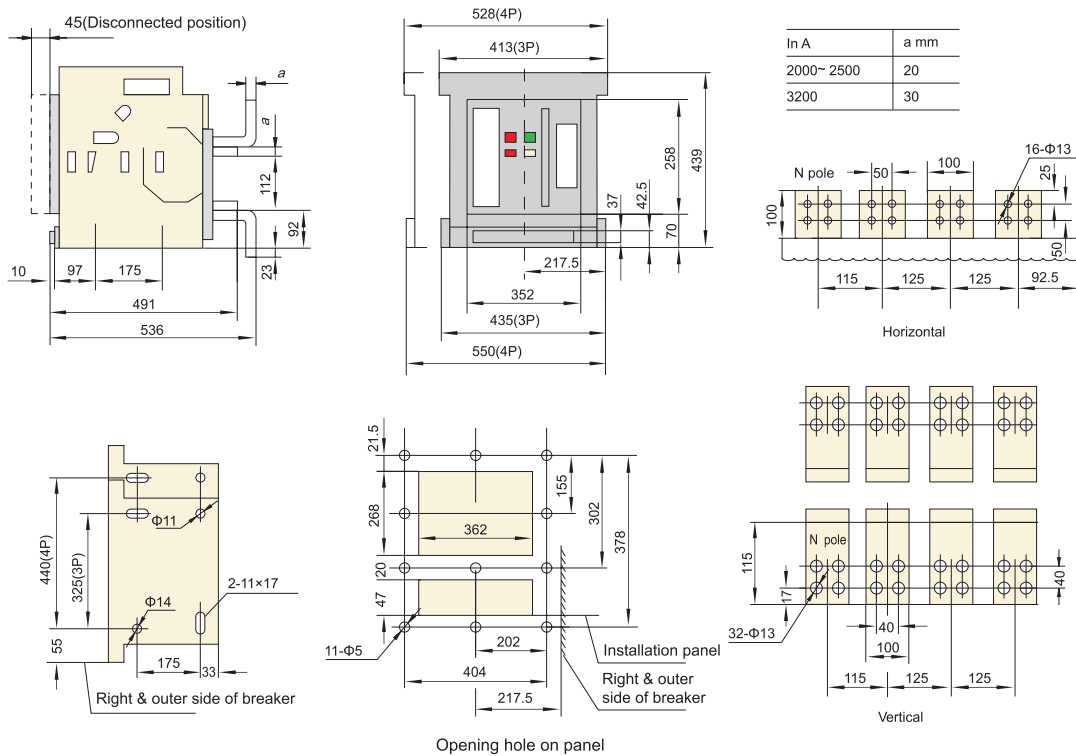


Drawout-type, horizontal, rear connection

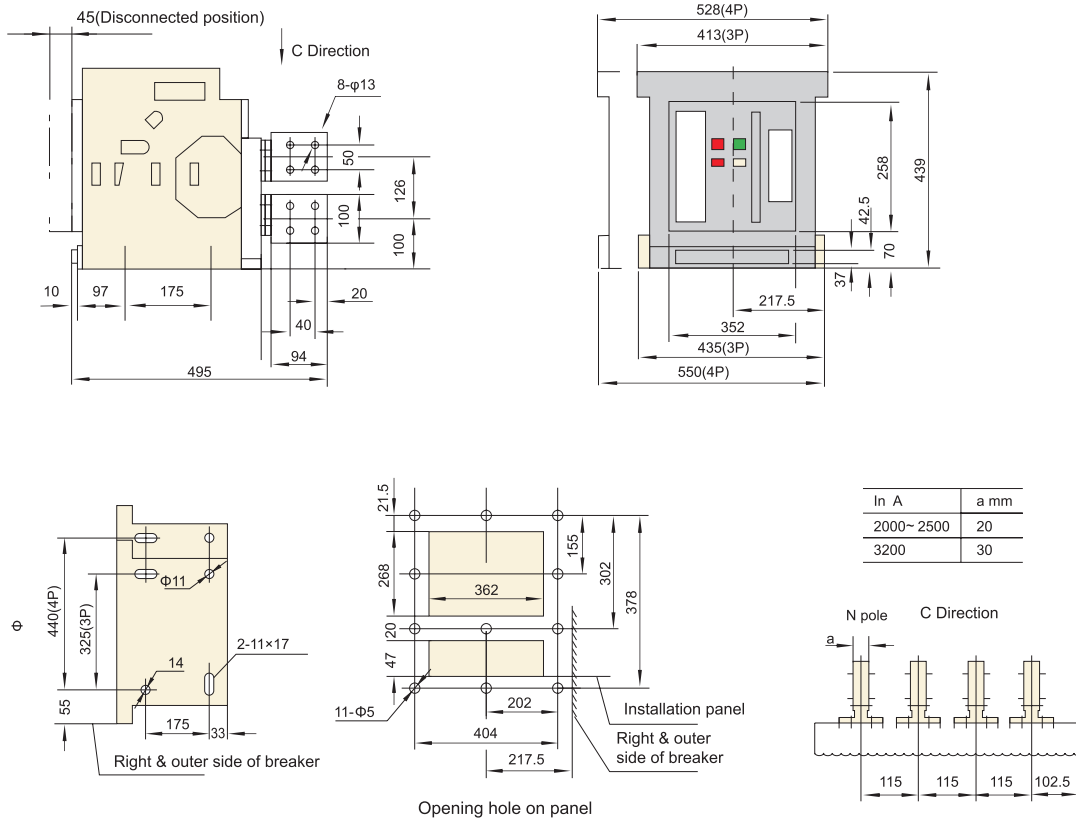




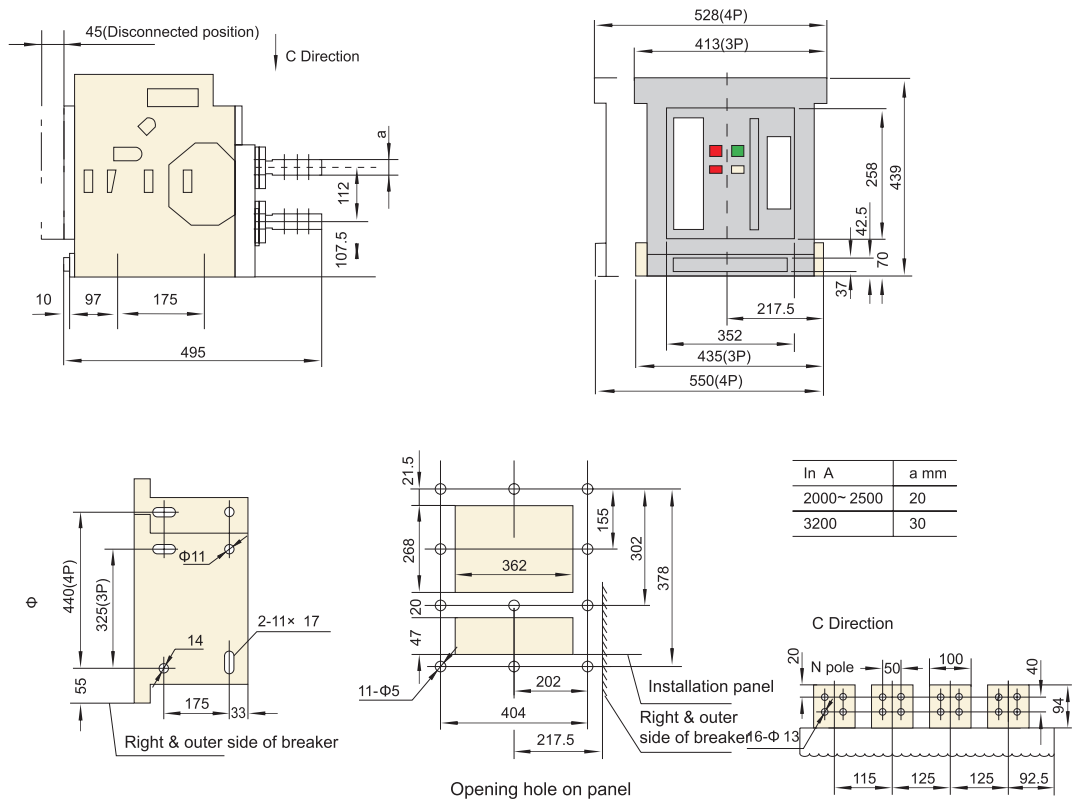
MF3-3200 Drawout-type

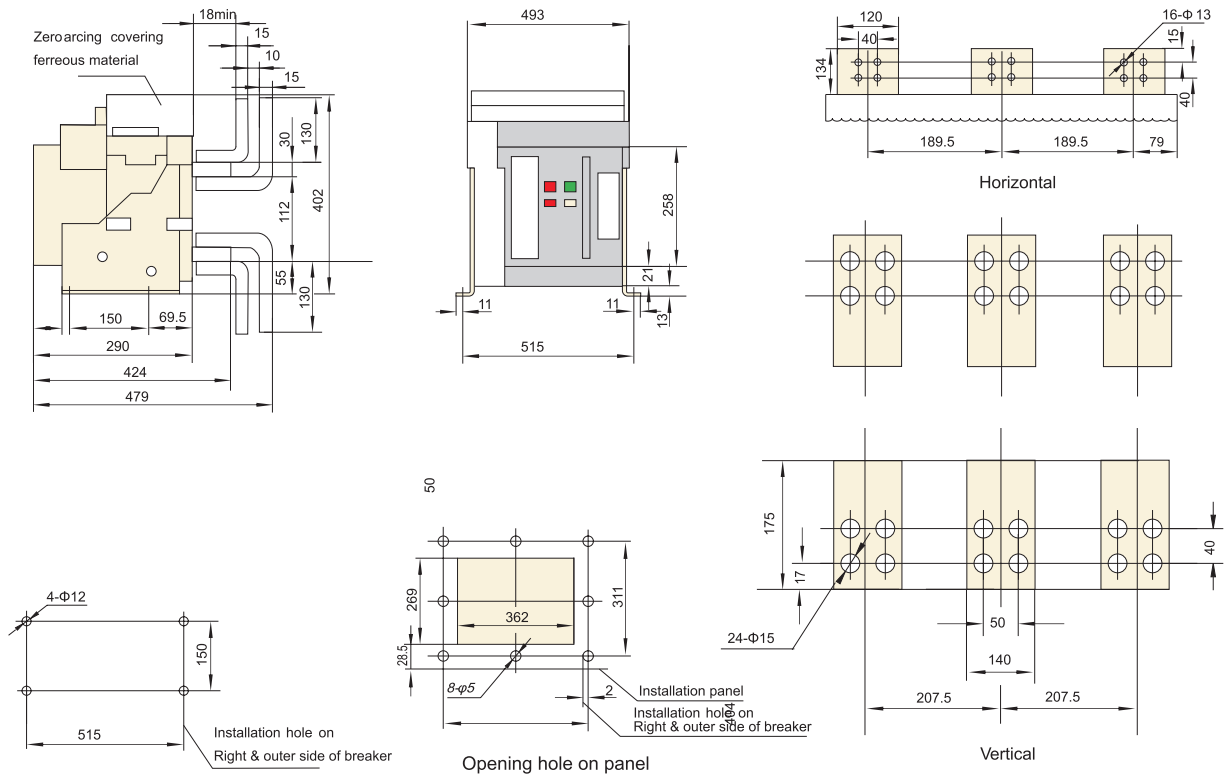
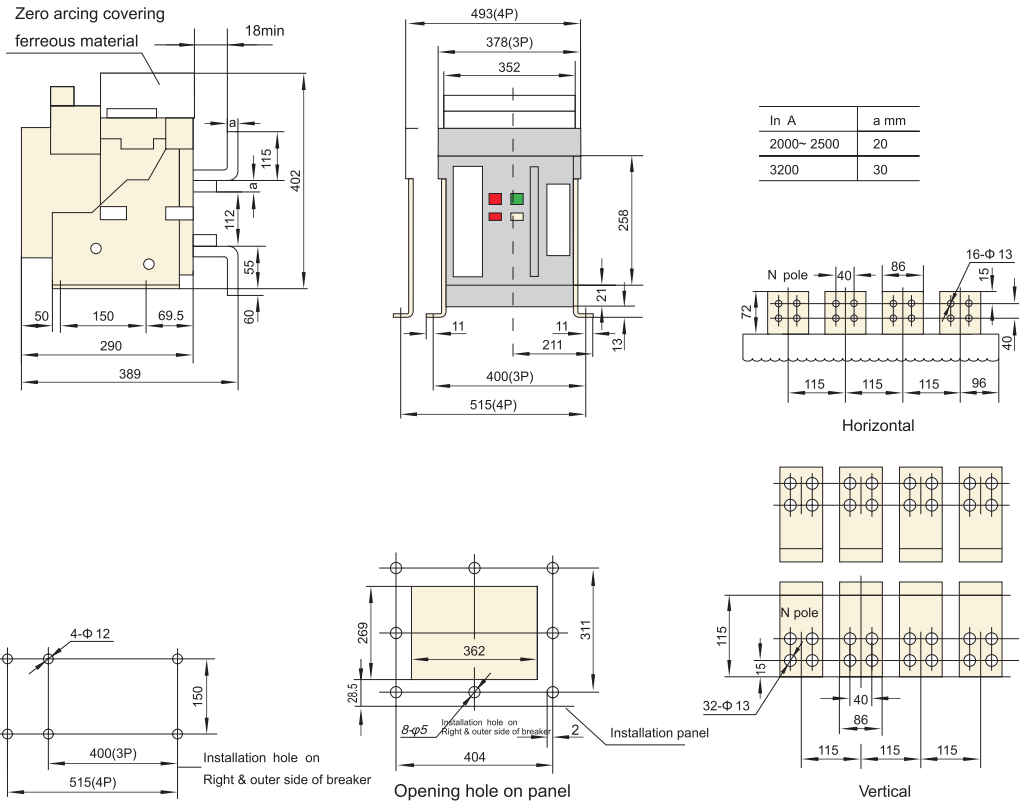


MF3-3200 Drawout-type, horizontal, rear connection

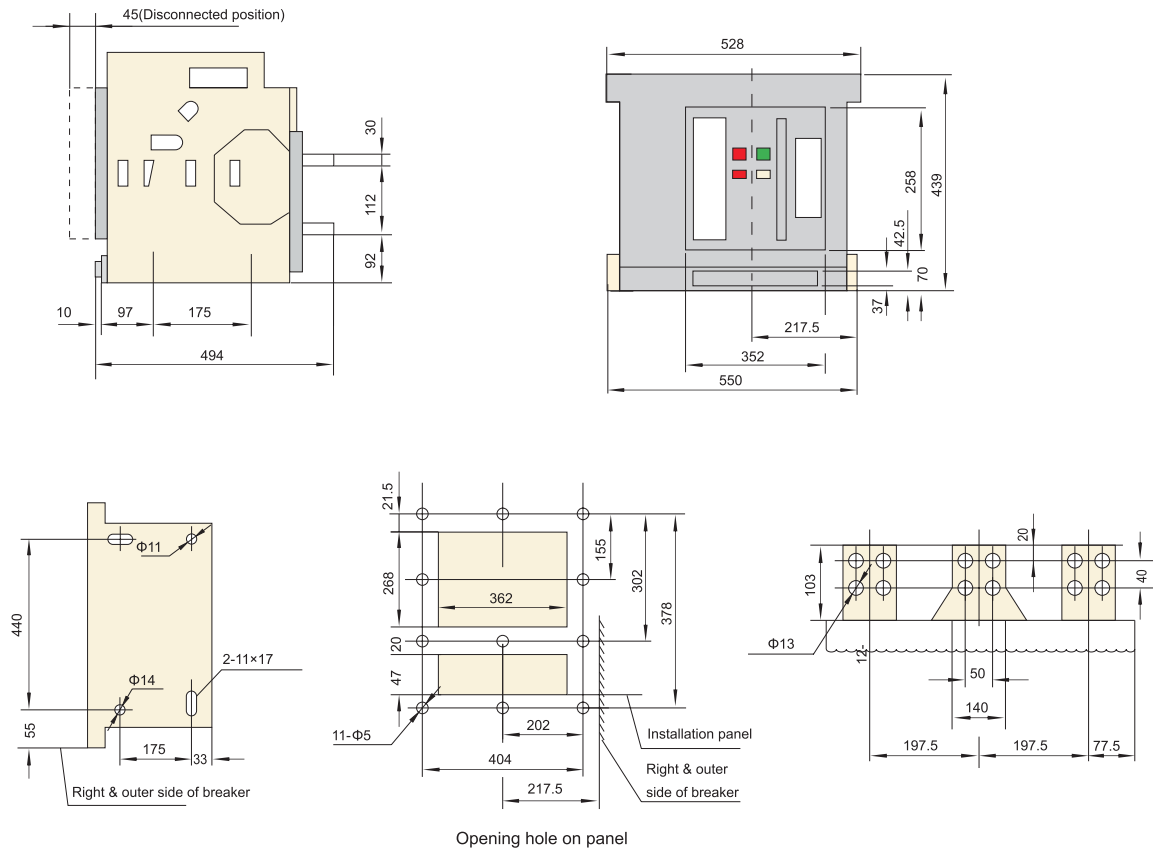


MF3-3200 Drawout-type, horizontal, rear connection

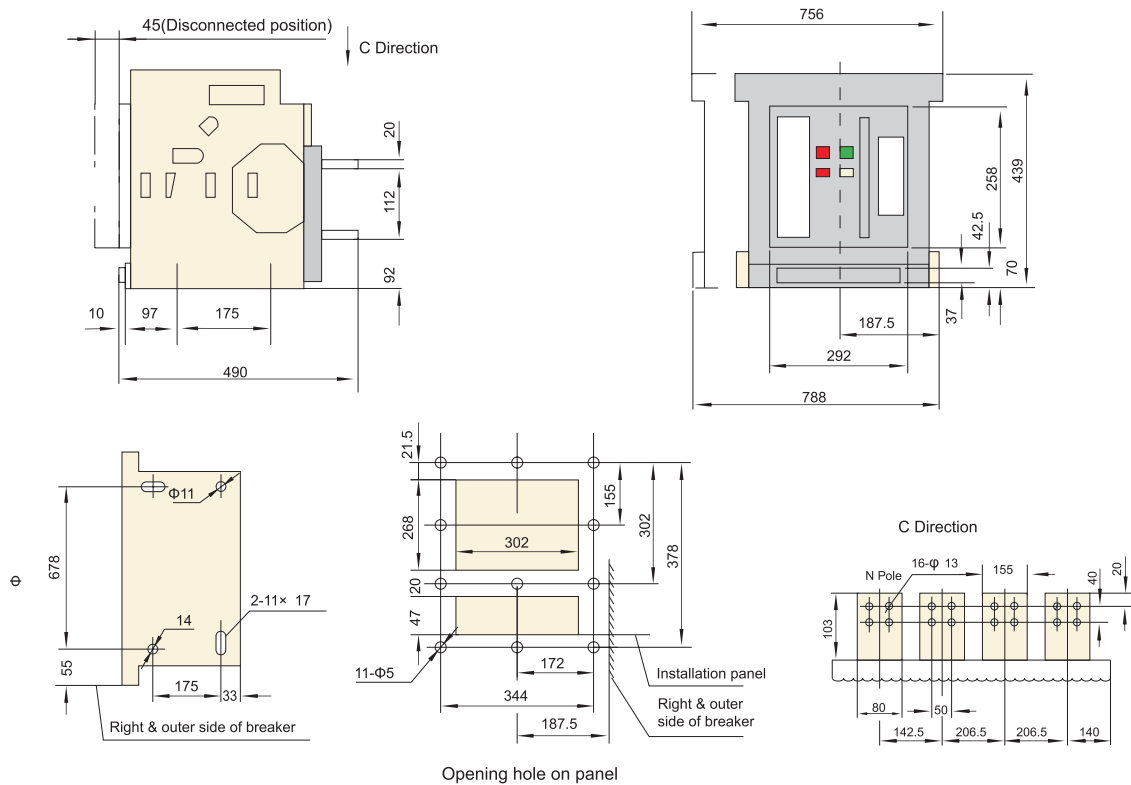




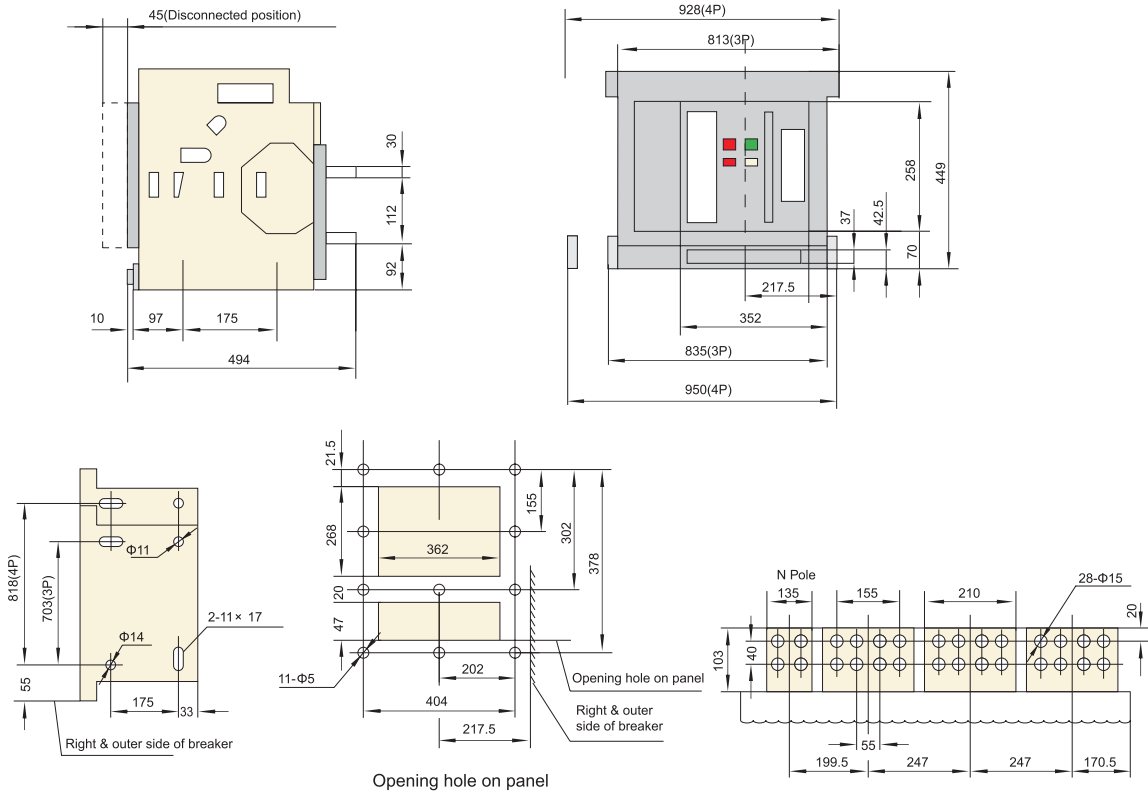
MF3-4000 Drawout-type (3P)



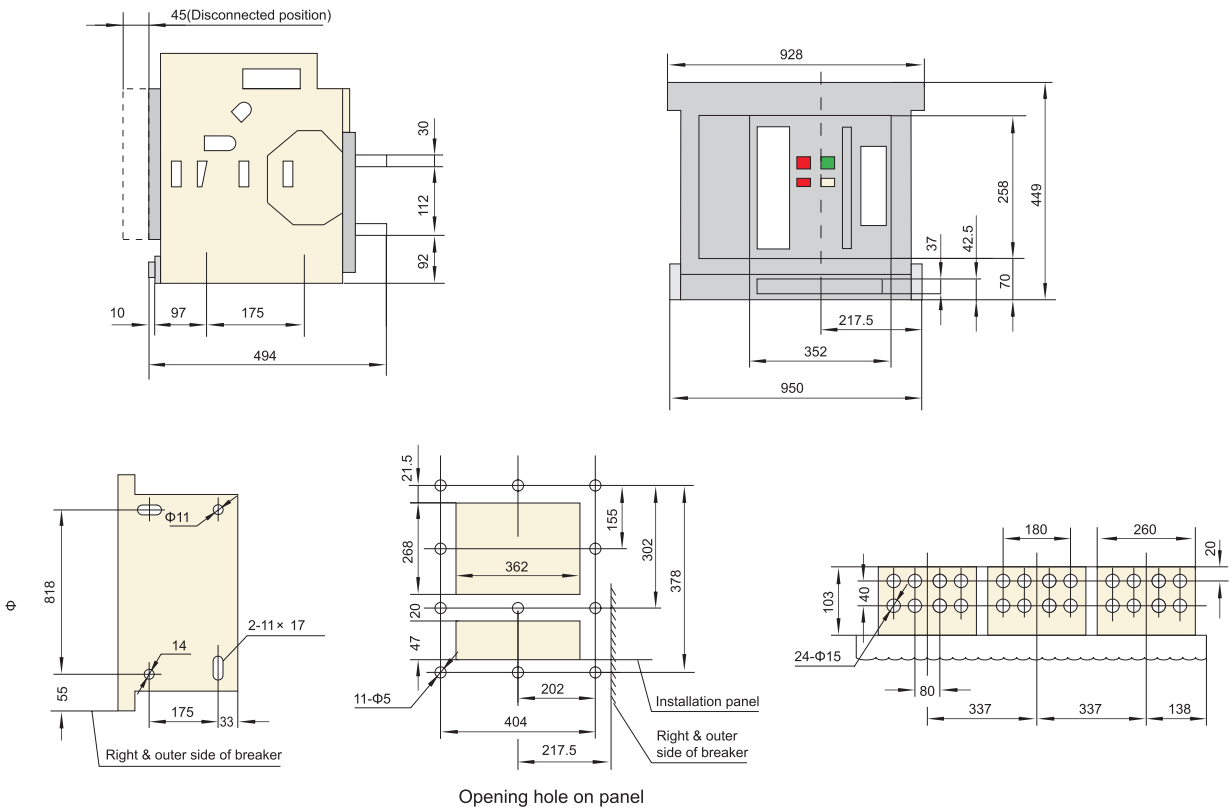
MF3-4000 Drawout-type (4P)



MF3-6300 (In=4000A,5000A) Drawout-type



MF3-6300 (In=6300A) Drawout-type (3P)



6.2 MF3-2000, 3200, 4000, 6300

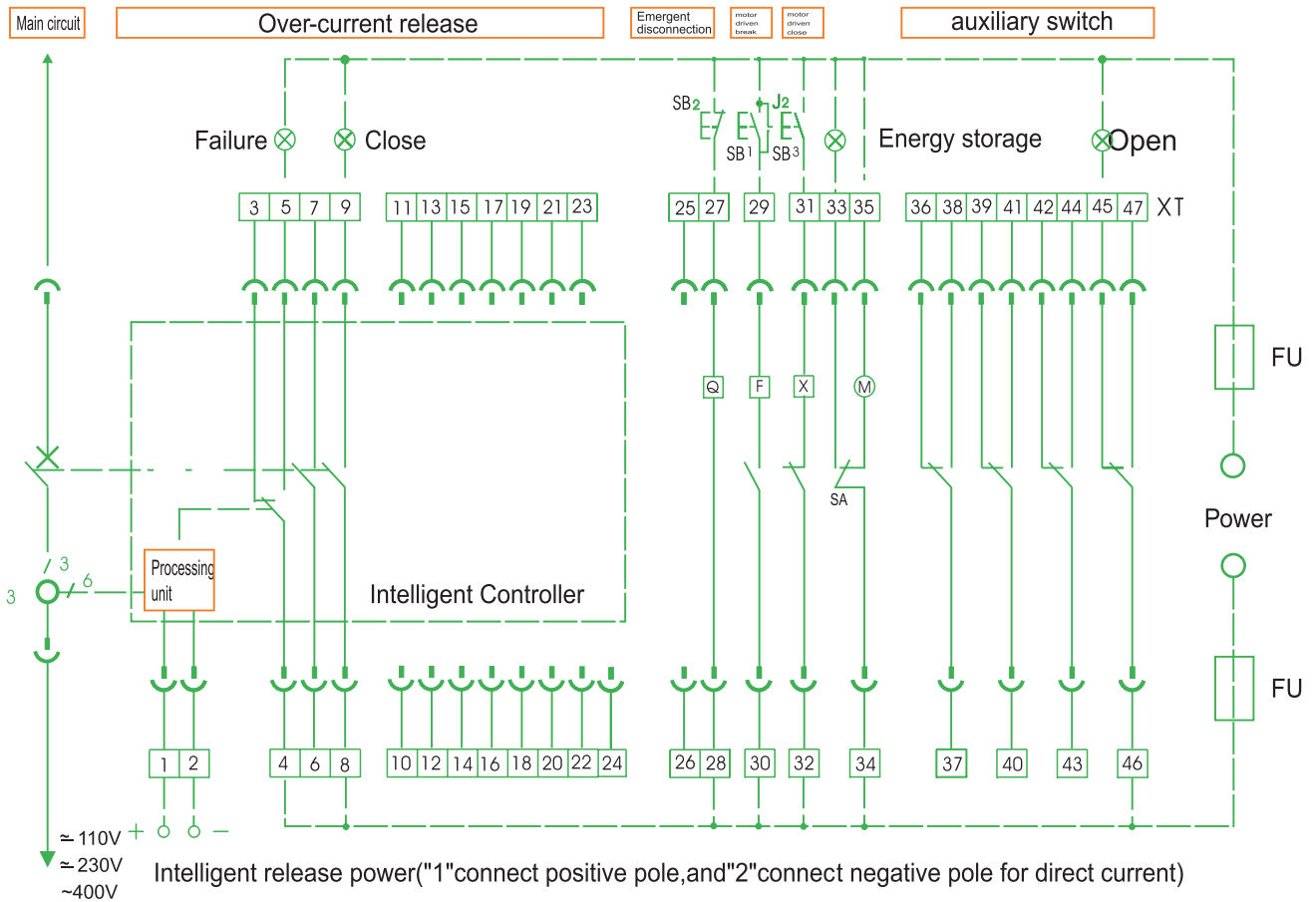


Fig 1: Standard type (M type)

- Sb1 Shunt button SB2 Under-voltage button SB3 Making button SA position switch
- Q Under-voltage release or under-voltage time-delay release F Shunt release
- X Closing release M Energy-storage motor XT Connecting terminal

Note: If control voltage of Q, F, X is different from each other, they can be connected to different power. If model ST intelligent release is DC, it must pass through U1 and U2 before directly connected to terminal 1 or 2. Circuit explanation for signal output

- a. Broken-line parts shall be provided by customers.
- b. Terminals 6# ~7# can output NC (normal close) contact if that is required by users.
- c. Terminal 35# can be directly connected to power (automatic pre-storing energy), alternatively connect power after connecting NO button (manual-controlled pre-storing energy).

In order to avoid the damage to shunt release and closing elect romagnet, one group of NO (shunt release) or NC (closing electromagnet) contact should be separately connected to the control circuit.

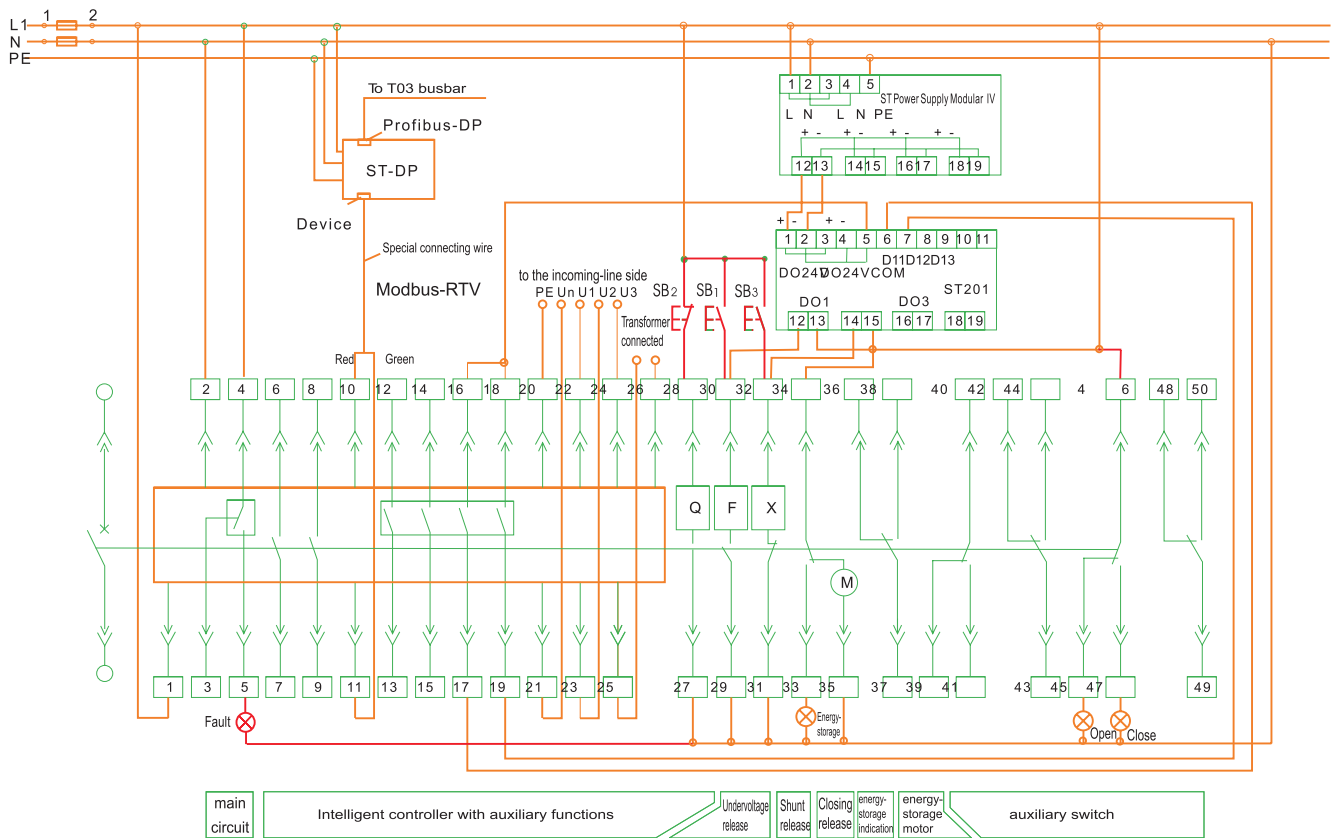


Fig 2: Communication type (H type)

1#, 2#: Auxiliary power input

13#: M is wireless, H is open signal

15#: M indicates long time-delay tripping signal, H is wireless

17#: Unloading output of No1 signal

19#: output common line of contacts

21#: Fault tripping signal output

ST-DP: DP Transformer device

12#: Overload pre-alarm signal output

14#: M is short-circuit tripping signal, H is closing signal

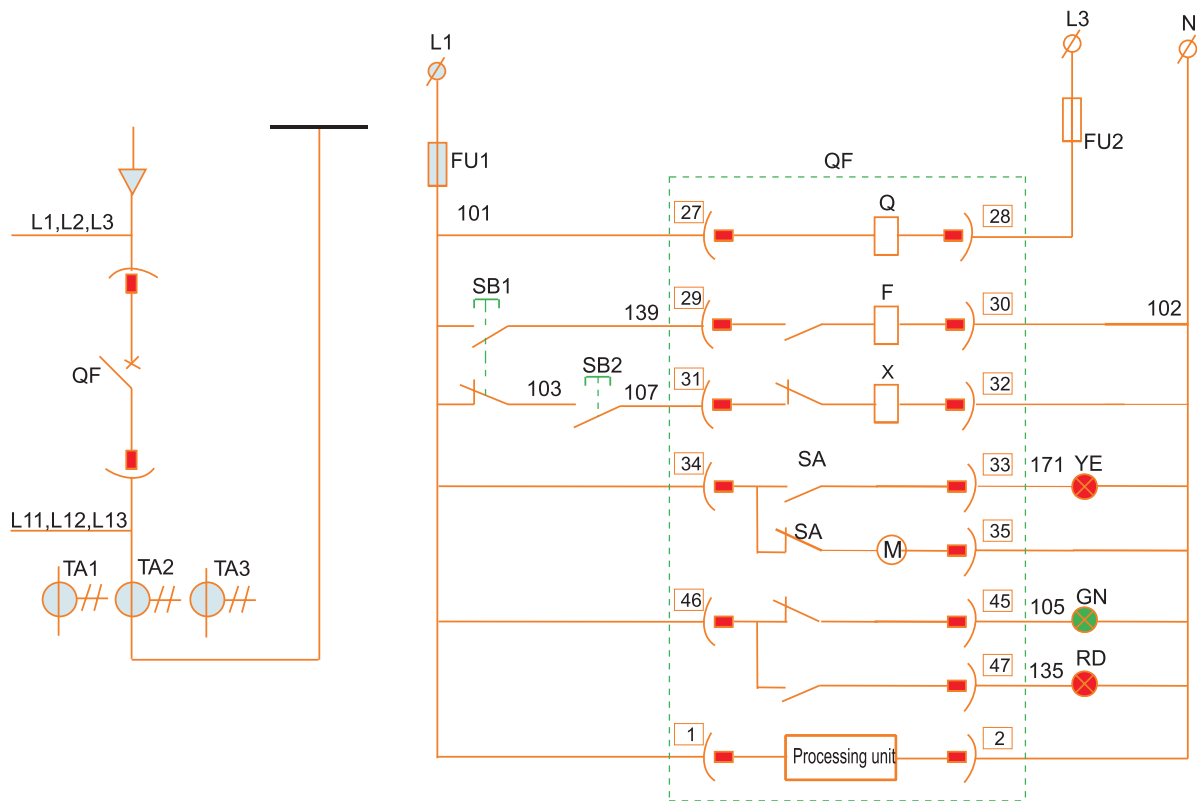
16#: Earthing tripping or alarm signal output or leakage alarm signal

18#: Unloading output of No.2 signal

20#: Self-diagnose alarm signal output

22#, 23#, 24#: A,B,C Three-phase power input terminal

Signal receiving-circuit operation circuit



QF: Circuit breaker MF3 □

FU1~2: Fuse RT14-20/10A

SB1~2: Button LA18-22 Each one for red and green

YEHL: Signal indicator AD11-25~230V Yellow

GNHL: Signal indicator AD11-25~230V Green

RDHL: Signal indicator AD11-25~230V Red

Number inside the broken-line circle, is the terminal number on terminal block of MF3 body (MF3 Inner components)

Q: Under-voltage coil~400V

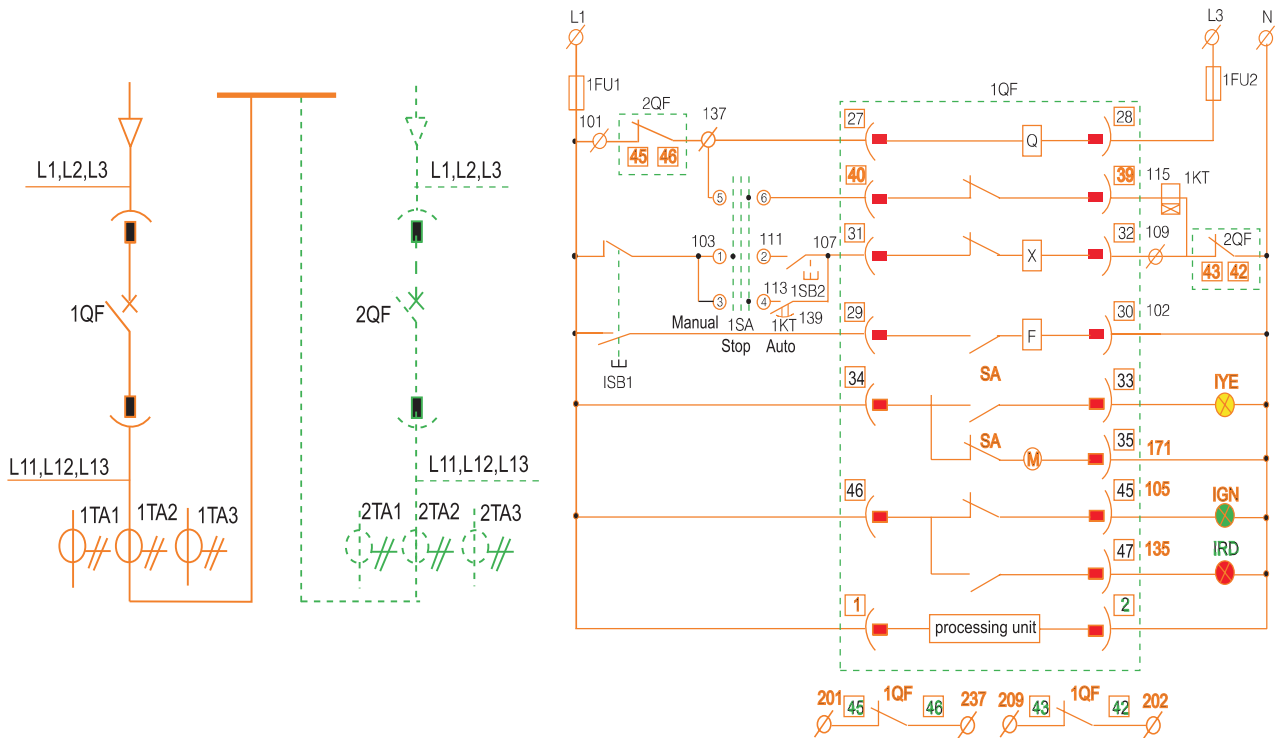
F: Shunt coil~230V

X: Closing release~230V

M: Energy-storage motor~230V

SA: Motor limit switch

Dual receiving-circuit auto-switching operation circuit



- 1QF, 2QF: Circuit breaker MF3□
- 1FU1~2: Fuse RT14-20/10A
- 1SB1~2: Button LA18-22 Each one for red and green
- 1SA: Change-over switch LW12-16/4.0081.1
- 1KT: Time-delay relay JS14A~230V
- 1YEHL: Signal indicator AD11-25~230V Yellow
- 1GNHL: Signal indicator AD11-25~230V Green
- 1RDHL: Signal indicator AD11-25~230V Red
- Number inside the broken-line circle, is the terminal number on terminal block of MF3 body
- (MF3 Inner components)
- Q: Under-voltage coil~400V
- F: Shunt coil~230V
- X: Closing release~230V
- M: Energy-storage motor~230V
- SA: Motor limit switch

7. Installation

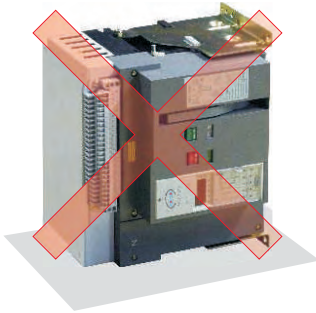
7.1 Installation

7.1.1 Unload the breaker from the soleplate of package. If it is drawout type, firstly pull out the handle under the drawer-base of breaker, and plug it into the hole on central part of plastic cover under the drawer-base crossbeam, anticlockwise turns the handle, body will slowly slide along the outside of drawer-base. When the guide rod points to separated position and handle can't be rotated any longer, pull out the handle and firmly grasp the aluminum handle on drawer-base, pull out the breaker body and remove it from the base, then move the base from the soleplate and clean up the dirty things inside the drawer-base.

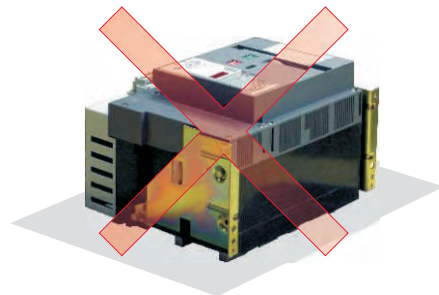
Possible positions



Possible positions



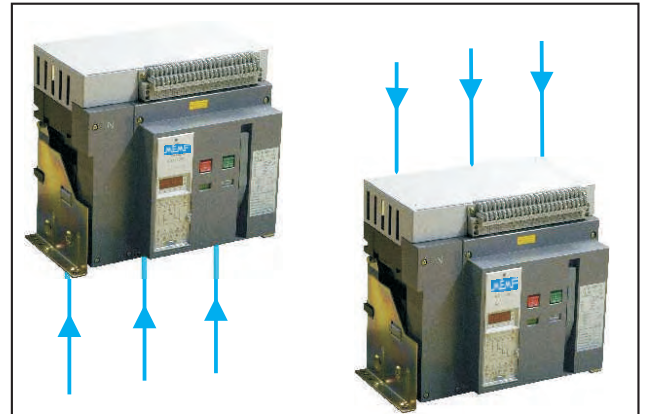
Possible positions



7.1.2 Check the insulation resistance with a 500V megger, resistance should not be less than 20Ω when ambient temperature is $20\text{C}^{\circ} \pm 5\text{C}^{\circ}$ and relative humidity is 50%~70%. Otherwise dry it.

7.1.3 Power supply

MF3 devices can be supplied either from the top or from the bottom without reduction in performance, in order to facilitate connection when installed in a switchboard.

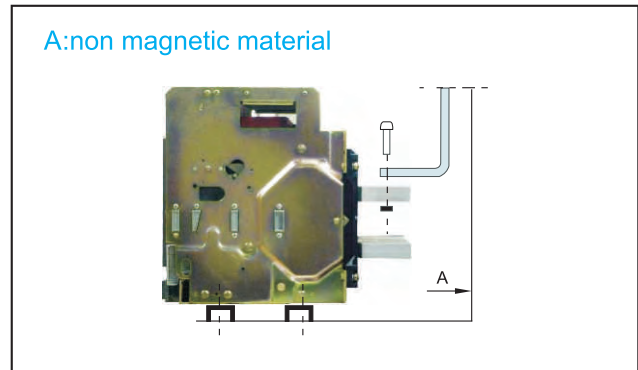


7.1.4 Put the breaker (fixed-type) or drawer-base (drawout-type) into the installation-bracket, and make it fixed, directly connect the cable wire of main circuit to the bus wire of fixed-type circuit breaker. Alternatively put breaker body onto the slideway of drawer-base. Plug the handle into installation hole, clockwise turns it until the under-part of drawer-base points at the connection position and “click” sound is heard. It indicates that breaker body has been connected to its place, then connect the cable of main circuit to drawer-base.

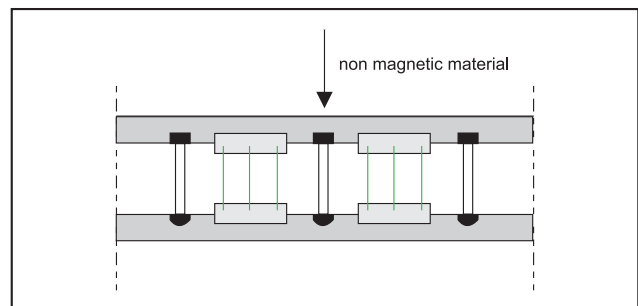
Mounting the circuit-breaker
It is important to distribute the weight of the device uniformly over a rigid mounting surface such as rails or a base plate. This mounting plane should be perfectly flat (tolerance on support flatness: 2 mm). This eliminates any risk of deformation which could interfere with correct operation of the circuit breaker.
MF3 devices can also be mounted on a vertical plane using the special brackets.



7.1.5 Partitions
Sufficient openings must be provided in partitions to ensure good air circulation around the circuit breaker; Any partition between upstream and downstream connections of the device must be made of nonmagnetic material. For high-currents, of 2500 A and upwards, the metal supports or barriers in the immediate vicinity of a conductor must be made of non-magnetic material a; Metal barriers through which a conductor passes must not form a magnetic loop.

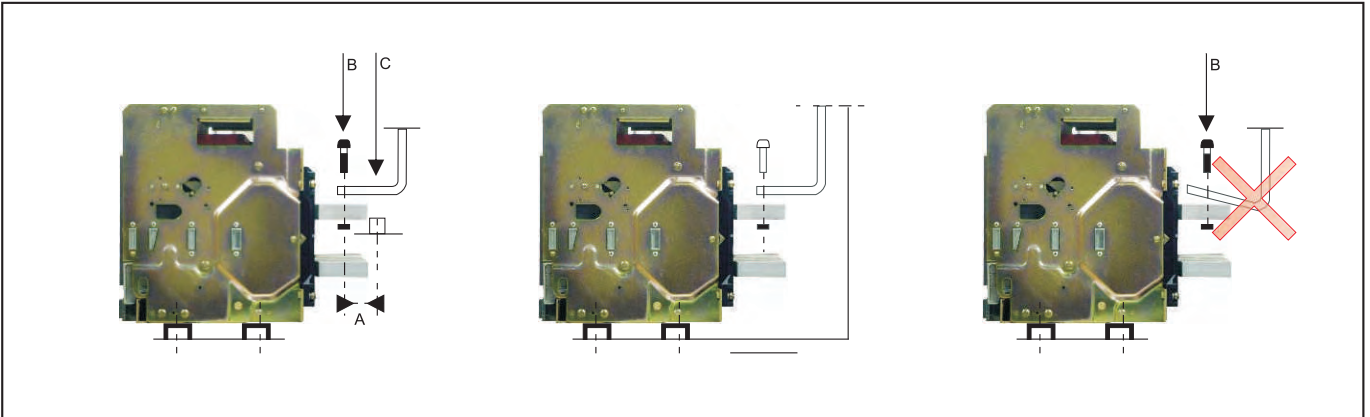


Busbars
The mechanical connection must be exclude the possibility of formation of a magnetic loop around a conductor



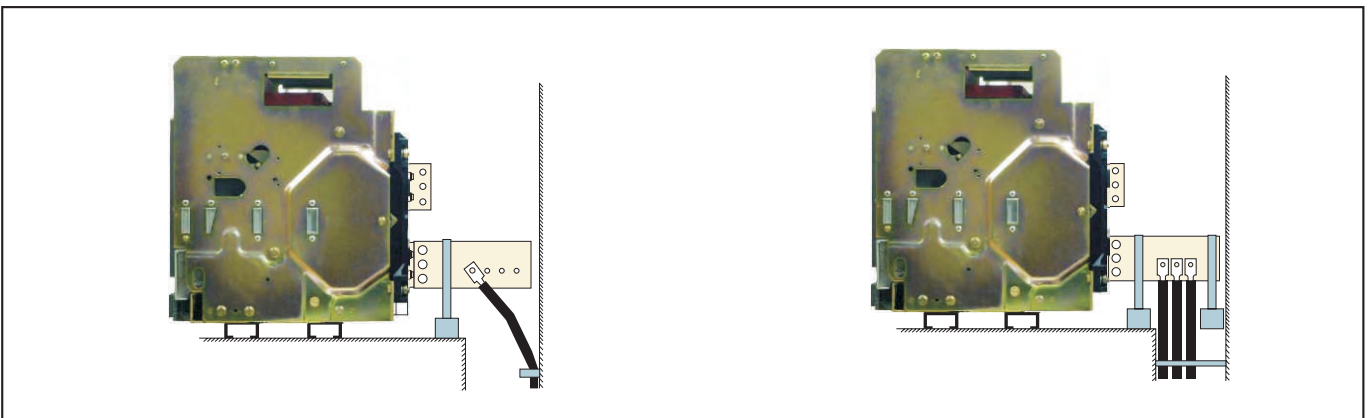
7.1.6 Busbar connections

The busbars should be suitably adjusted to ensure the connection points are positioned on the terminals before the bolts are inserted. The connections are held by the supporter which is fixed to the framework of the switchboard, in this way the circuit breaker terminals do not have to support its weight. (This support should be placed close to the terminals).



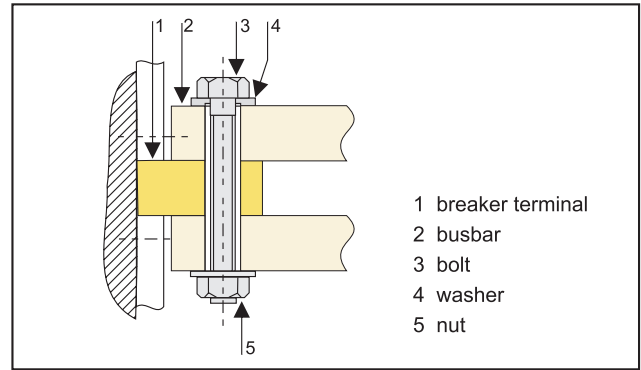
7.1.7 Main circuit adopts cable connection

Users should not apply too strong mechanical strength on the terminals of Air Circuit Breaker. Extend the bus-bar of circuit breaker with connecting bus-bar, position the wiring piece of cable before inserting bolts; the cable should be fixed on the frame of distributing cabinet firmly.



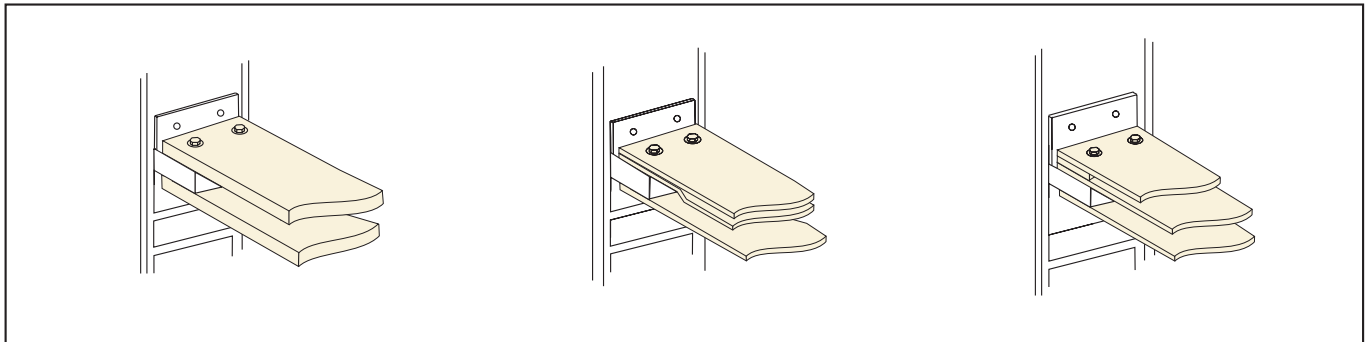
7.1.8 Clamping

Correct clamping of busbars depends on the tightening torques used for the nuts and bolts, etc. Over-tightening may have the same consequences as under-tightening. For connecting busbars to the circuit breaker, the tightening torques to be used are shown in the table below. These values are for use with copper busbars and steel nuts and bolts, class 8.8.



- 1 breaker terminal
- 2 busbar
- 3 bolt
- 4 washer
- 5 nut

Examples



Preferred tightening torque for MF3's tightening components

Type of screw	Application	Preferred tightening torque
M4	Screws for secondary terminals	11Nm
M10	Installing bolts of Air Circuit Breaker	45Nm
M12	Connection terminals	50Nm

Connected position	Test position	Disconnected position	Drawout position
1. Both main circuit and control circuit are connected. 2. Normal application conditions	1. The main circuit is disconnected, and the control circuit is connected. 2. Test application conditions.	Neither the main circuit nor the control circuit is connected.	Main body is out of the drawer seat.

7.2 Wiring the secondary circuit according to electric principle diagram.

Note: Bolts, nuts, gaskets shouldn't be left inside the drawer seat to avoid being blocked.

7.3 Operation

Check the rated voltage of the following components whether conforms to the power voltage . Such as under voltage release, shunt release, closing electromagnet, motor-driven mechanism and intelligent controller

7.4 Maintenance

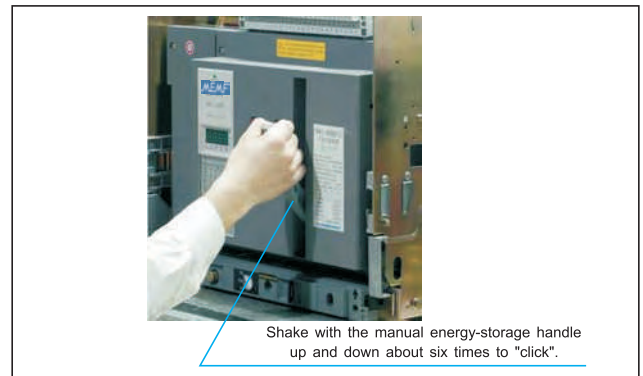
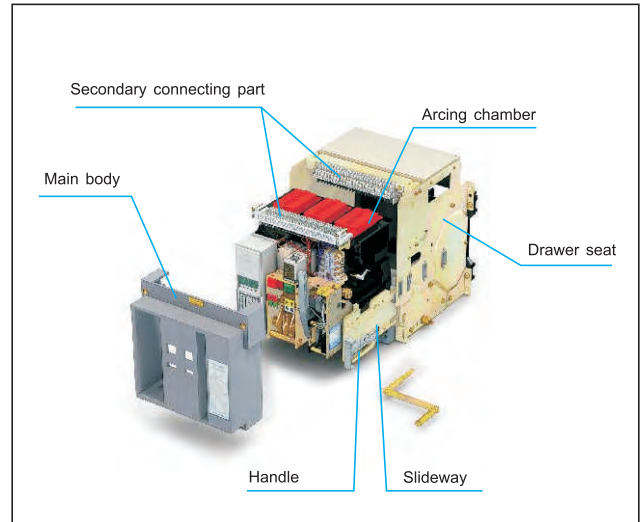
Check the technical parameters in time or add some lubricating oil, etc.

This breaker structure is arranged vertically and modularized composition with each functioncell separated, which make the maintenance easy.

It has compact structure, reliable operation and strong free maintenance capability. Please check the technical parameters on the nameplate in accordance with the requirements of order before installation

Manual energy-storage

Making the secondary circuit power, the motor-driven mechanism can store energy automatically until hearing the click and energy stored" indicating on the panel. Otherwise press the storage handle for 6 times until hearing the click and the indicator display energy stored" And the closing operation can be realized either by closing electromagnet or manual button.



8. Recommendation for user's connecting bus-bar

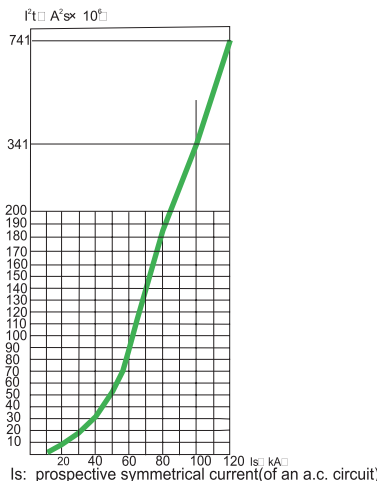
Inm(A)		MF3-2000						MF3-3200				MF3-4000		MF3-6300		
In(A)		630	800	1000	1250	1600	2000	2000	2500	2900	3200	4000/3P	4000/4P	4000	5000	6300
Busbar	Thickness(mm)	5	6	6	8	10	10	8	10	10	10	10	10	10	10	10
	Width(mm)	60	60	80	80	80	80	100	100	100	100	100	100	100	100	100
	Number	2	2	2	2	2	2	2	2	4	4	4	4	4	6	6

Note: the specifications in the table is obtained as the ambient temperature of air circuit breaker is 40 °C, with open installation; this is in compliance with the specification of copper busbars adopted under the heating conditions regulated in IEC/ 60947-2.

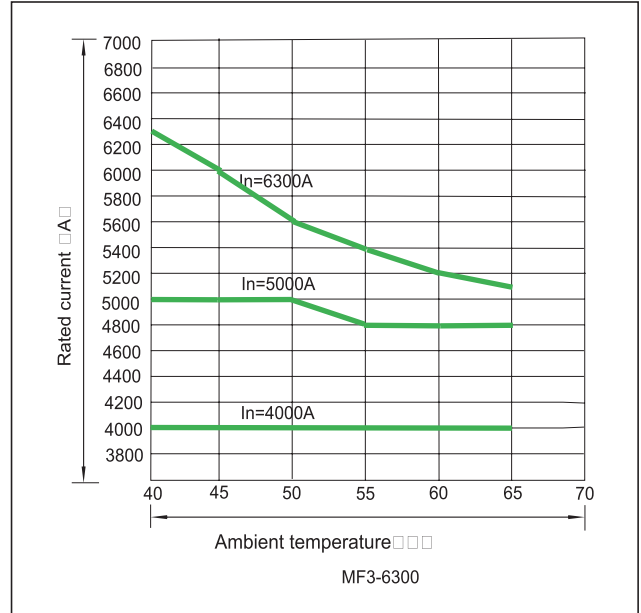
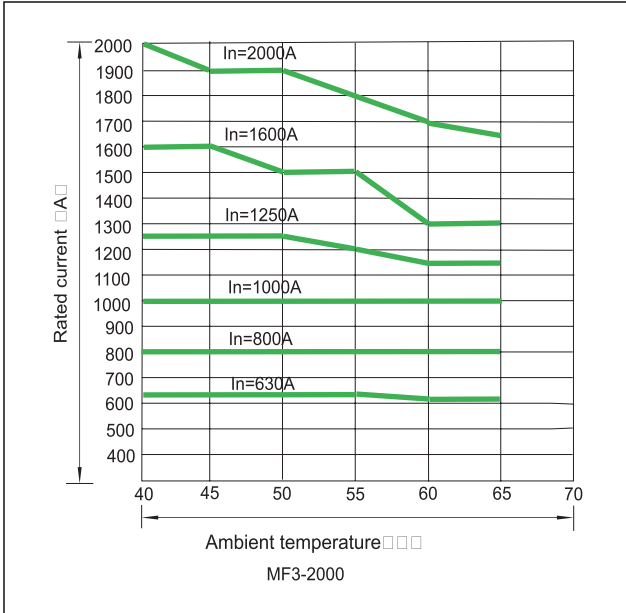
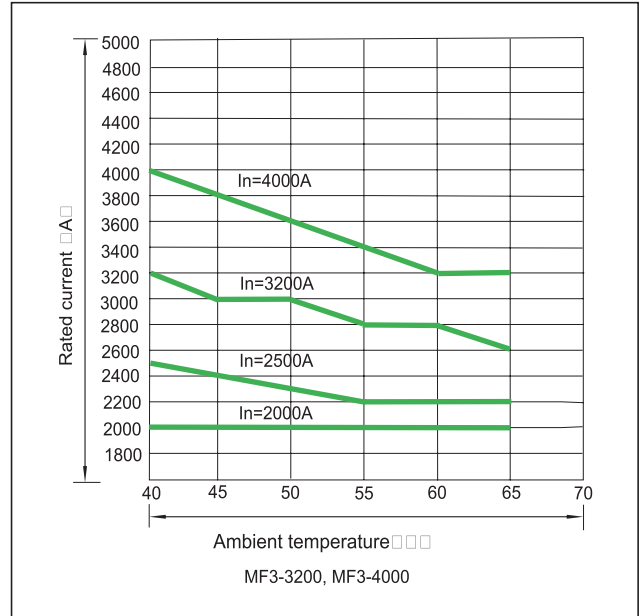
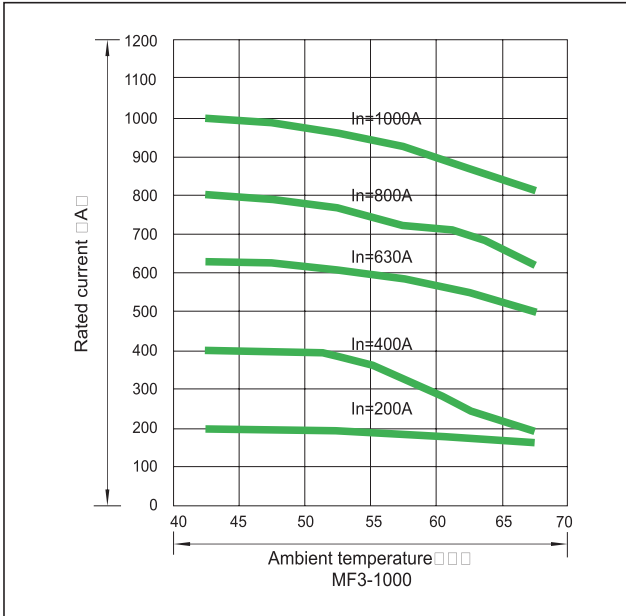
9. Power loss

Inm(A)		MF3-2000						MF3-3200			MF3-4000		MF3-6300		
In(A)		630	800	1000	1250	1600	2000	2000	2500	3200	4000/3P	4000/4P	4000	5000	6300
Power loss (W)	Drawer type	70	110	172	268	440	530	384	600	737	921	900	575	898	1426
	Fixed type	34.4	50	78	122	200	262	200	312	307	-	-	-	-	-

10. A²S curve



Note: The ACB is calibrated at 55°C, special application please refer to the table above and the curve below.



12. Coordination recommendations

Capacity of transformer (kVA) & parallelly connected number	Rated current of transformer In(A)	Short circuit current of main circuit (kA)	Breaking capacity of air circuit breaker for main circuit (kA)
1× 800	1154	19.3	19.3
2× 800	1154	19.3	19.3
3× 800	1154	19.3	38.5
1× 1000	1444	24	24
2× 1000	1444	24	24
3× 1000	1444	24	48.1
1× 1250	1805	30	30
2× 1250	1805	30	30
3× 1250	1805	30	60.1
1× 1600	2310	36.5	36.5
2× 1600	2310	36.5	36.5
3× 1600	2310	36.5	73
1× 2000	2887	48.2	48.2
2× 2000	2887	48.2	48.2
3× 2000	2887	48.2	96.3
1× 2500	3608	60	60
2× 2500	3608	60	60
1× 3150	4550	75.8	75.8
2× 3150	4550	75.8	75.8

13.2 Selective protection in MF3

			Circuit breaker	MF3-2000					
			Rated current (A)	400	630	800	1000	1250	
			Default setting ratings of short time-delay 8In (kA)	3.2	5.04	6.4	8	10	
Downstream			Upstream	Setting range (kA)	0.4~6	0.63~9.45	0.8~12	1~15	1.25~18.75
			Delayed tripping time (s)	0.1, 0.2, 0.3, 0.4					
			Returnable time	0.06, 0.14, 0.23, 0.35					
Frame size	Rated current (A)	Default instantaneous setting ratings 12In (kA)							
MF3-2000	400	4.8			6.348~9.45	6.348~12	6.348~15	6.348~18.75	
	630	7.56				9.998~12	9.998~15	9.998~18.75	
	800	9.6					12.696~15	12.696~18.75	
	1000	12						15.87~18.75	
	1250	15							
MF3-3200	1600	19.2							
	2000	24							
	2000	24							
MF3-4000	2500	30							
	3200	38.4							
MF3-6300	3200	38.4							
	4000	48							
MF3-6300	4000	48							
	5000	60							
	6300	75							

Note: It can satisfy the selective protection if only the short time-delay setting value of the superior breaker 1.32 times more than the subordinate breaker, when the instantaneous setting value is adjustable.

Type of air circuit breaker for main circuit	Number and area of the busbar for main circuit (n× W× T)	Breaking capacity of air circuit breaker for branch circuit (kA)	Air circuit breaker for branch circuit
MF3-2000-1250	3× 50× 5	19.3	MF3
MF3-2000-1250		38.5	
MF3-2000-1250		57.8	
MF3-2000-1600	2× 60× 10	24	MF3
MF3-2000-1600		48.1	
MF3-2000-1600		72.1	
MF3-2000-2000	2× 80× 10	30	MF3
MF3-2000-2000		60.1	
MF3-2000-2000		90.1	
MF3-3200-2500	2× 100× 10	36.5	MF3
MF3-3200-2500		73	
MF3-3200-2500		109.5	
MF3-3200-3200	2× 120× 10	48.2	MF3
MF3-3200-3200		96.3	
MF3-3200-3200		144.5	
MF3-4000-4000	2× (2× 80× 10)	60	MF3
MF3-4000-4000		120	
MF3-6300-5000	2× (2× 120× 10)	75.8	MF3
MF3-6300-5000		151.6	

		MF3-3200			MF3-4000		MF3-6300		
1600	2000	2000	2500	3200	3200	4000	4000	5000	6300
	16	16	20	25.6	25.6	32	32	40	50.4
	2~30	2~30	2.5~37.7	3.2~48	3.2~48	4~60	4~60	5~75	6.3~94.5
0.1, 0.2, 0.3, 0.4									

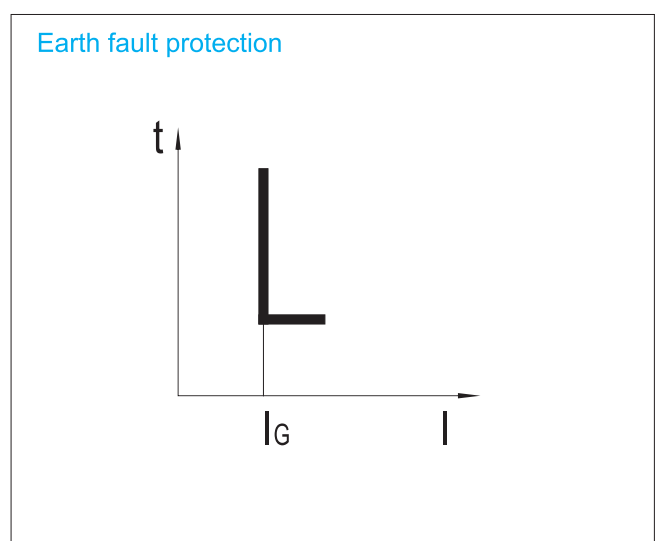
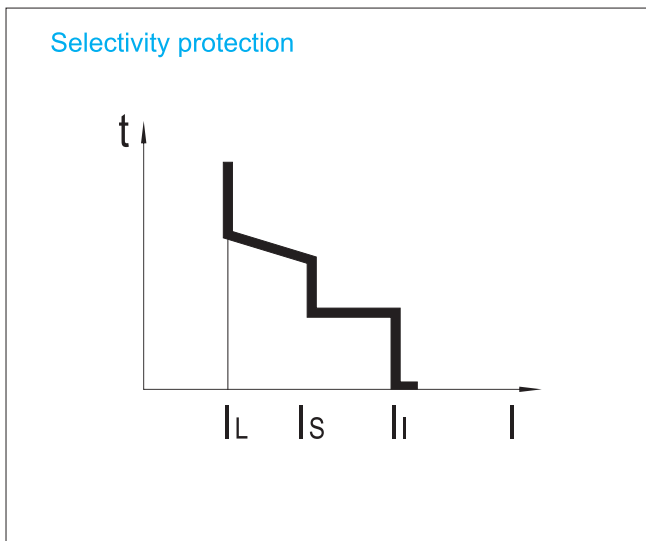
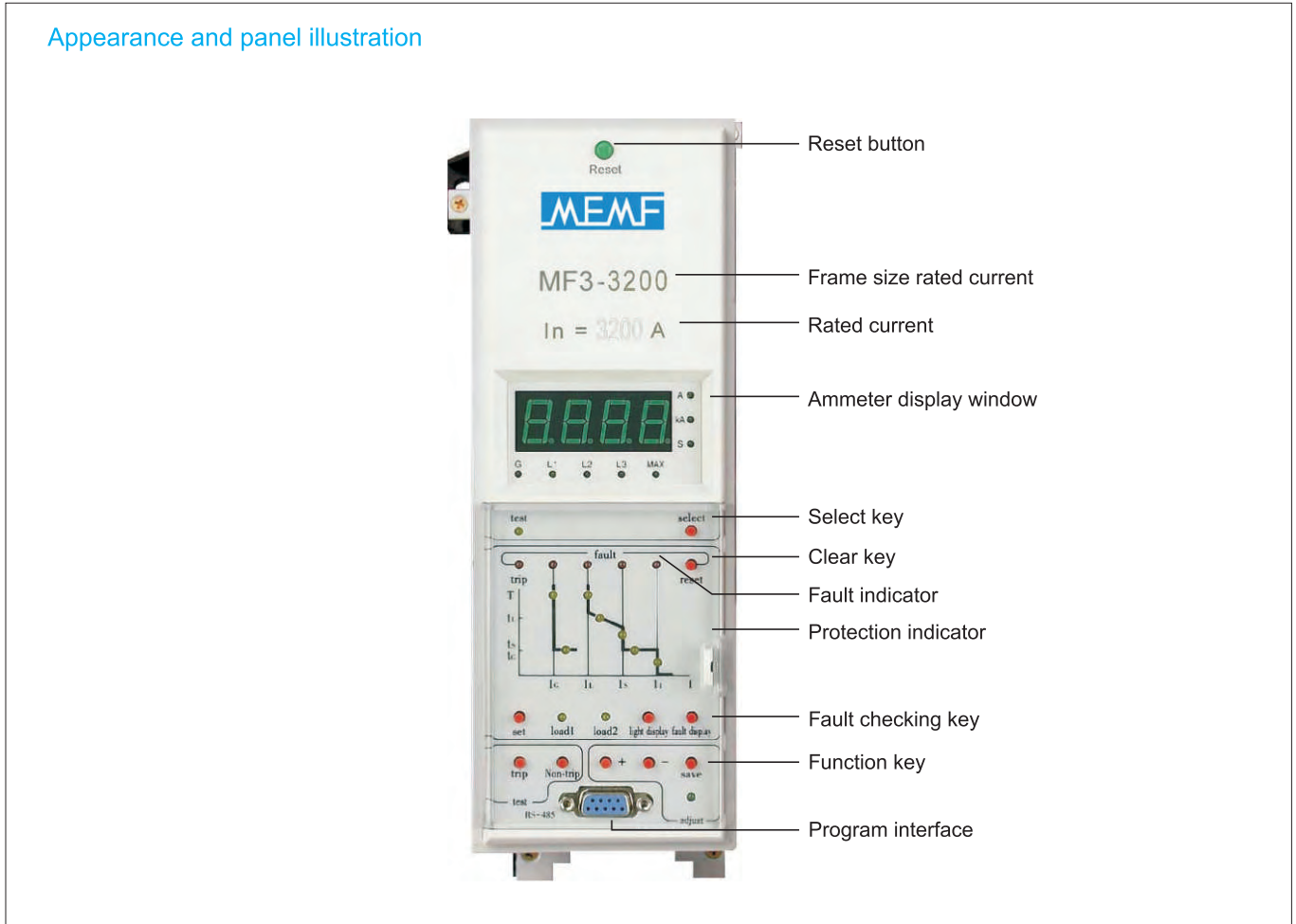
0.06, 0.14, 0.23, 0.35

6.348~24	6.348~30	6.348~30	6.348~37.7	6.348~48	6.348~48	6.348~60	6.348~60	6.348~75	6.348~94.5
9.998~24	9.998~30	9.998~30	9.998~37.7	9.998~48	9.998~48	9.998~60	9.998~60	9.998~75	9.998~94.5
12.696~24	12.696~30	12.696~30	12.696~37.7	12.696~48	12.696~48	12.696~60	12.696~60	12.696~75	12.696~94.5
15.87~24	15.87~30	15.87~30	15.87~37.7	15.87~48	15.87~48	15.87~60	15.87~60	15.87~75	15.87~94.5
19.837~24	19.837~30	19.837~30	19.837~37.7	19.837~48	19.837~48	19.837~60	19.837~60	19.837~75	19.837~94.5
	25.392~30	25.392~30	25.392~37.7	25.392~48	25.392~48	25.392~60	25.392~60	25.392~75	25.392~94.5
			31.74~37.7	31.74~48	31.74~48	31.74~60	31.74~60	31.74~75	31.74~94.5
			31.74~37.7	31.74~48	31.74~48	31.74~60	31.74~60	31.74~75	31.74~94.5
				39.675~48	39.675~48	39.675~60	39.675~60	39.675~75	39.675~94.5
						50.784~60	50.784~60	50.784~75	50.784~94.5
						50.784~60	50.784~60	50.784~75	50.784~94.5
								63.48~75	63.48~94.5
								63.48~75	63.48~94.5
									79.35~94.5

14.2 The intelligent controller of MF3-2000, 3200, 4000, 6300

14.2.1 The standard M type intelligent controller (MF3-2000, 3200, 4000, 6300)

The M type intelligent controller is the core part of the MF3 Air Circuit Breaker to protect the electric circuit and the power supply against the dangers such as overload, short circuit and single-phase earthing fault. The controller adopts highly-integrated and high-performance digital signal processor that featuring power functions and reliable performance to perform real-time processing to the signal so as to achieve various protection function and numerous auxiliary functions.



a.Symbol designation table

Number	Symbol	Designation
1	Inm	Frame size rated current of breaker
2	In	Rated current
3	I _L (I _{r1}),I _S (I _{r2}),I _I (I _{r3})	Action current of long time-delay, short time-delay and instantaneous
4	I _e (I _{r4})	Action current of earth fault or phase N
5	t _L ,t _S ,t _e	Action time of long time-delay, short time-delay and grounding
6	L1,L2,L3,G	Phase A, B, C and N (or earth)
7	I _{c1} ,I _{c2}	Action current of load monitor 1 and load monitor 2
8	T,I	Time, current
9	A,kA,s	Unit Indicator: Ampere, kilo-Ampere, second

b.Operating power supply

The operating power supply input to the intelligent controller:
AC 400V/380V, 230V/220V, AC 110V, 50Hz; DC220V, 110V, 24V.

c. Basic functions of intelligent controller

- Main protection function
- Query function
- Parameter setting function
- Test function
- Load monitor function (optional)
- Making current release (MCR) and override tripping function (Optional)
- Signal alarm function (optional)

d. Operation instructions

Parameter setting operation

Step 1: Setting right confirmation. The key must be switched to "setting" position for type H.

This step is no necessary for type M.

Step 2: Make sure the controller is under reset status. If the controller isn't under reset status, press "reset" key till the ammeter displays operation current.

Note: When the controller is under malfunction alarm status, then the setup function is locked and the setup operation can't be conducted.

Step 3: Press "set" key till the ammeter display window displays required action current or time setting.

Step 4: Press "+" and "-" to set the items to be changed.

Step 5: Press "save" key. At that time, the "save" indicator will flash once to indicate that the parameters are saved.

If not desiring to save, then directly press "reset" key.

Then the parameters won't be changed and will remain the original values.

Step 6: Repeat step 3 ~ step 5 in case requiring changing other parameters. If not, press "reset" key till the characteristic curve indicator is off.

Note: In case of occurrence of malfunction under setup status, it will automatically exit the setup status and enter into malfunction status.

During the adjustment of the parameters, the longer the time of pressing or holding the "+" or "-" key is, the faster the up or down speed is.

Failure inquiry operation

Query operation method

Step 1: Make sure the controller is under reset status.

Step 2: Press "fault display" key till the ammeter display window indicates the failure action value and the action time alternately. Press "select" to inquiry relevant parameters.

Step 3: Press "reset" key to exit the inquiry status.

Test operation method

Step 1: Make sure the controller is under reset status.

Step 2: Press "set" key till the indicator of the short time-delay characteristic curve current is on. Press "+" "-" to adjust the required current.

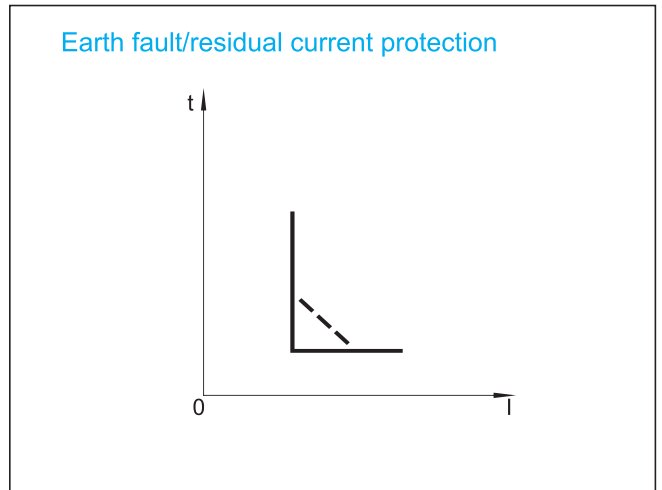
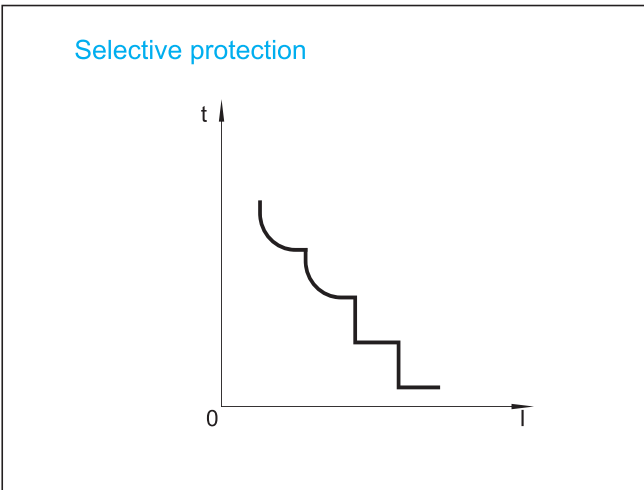
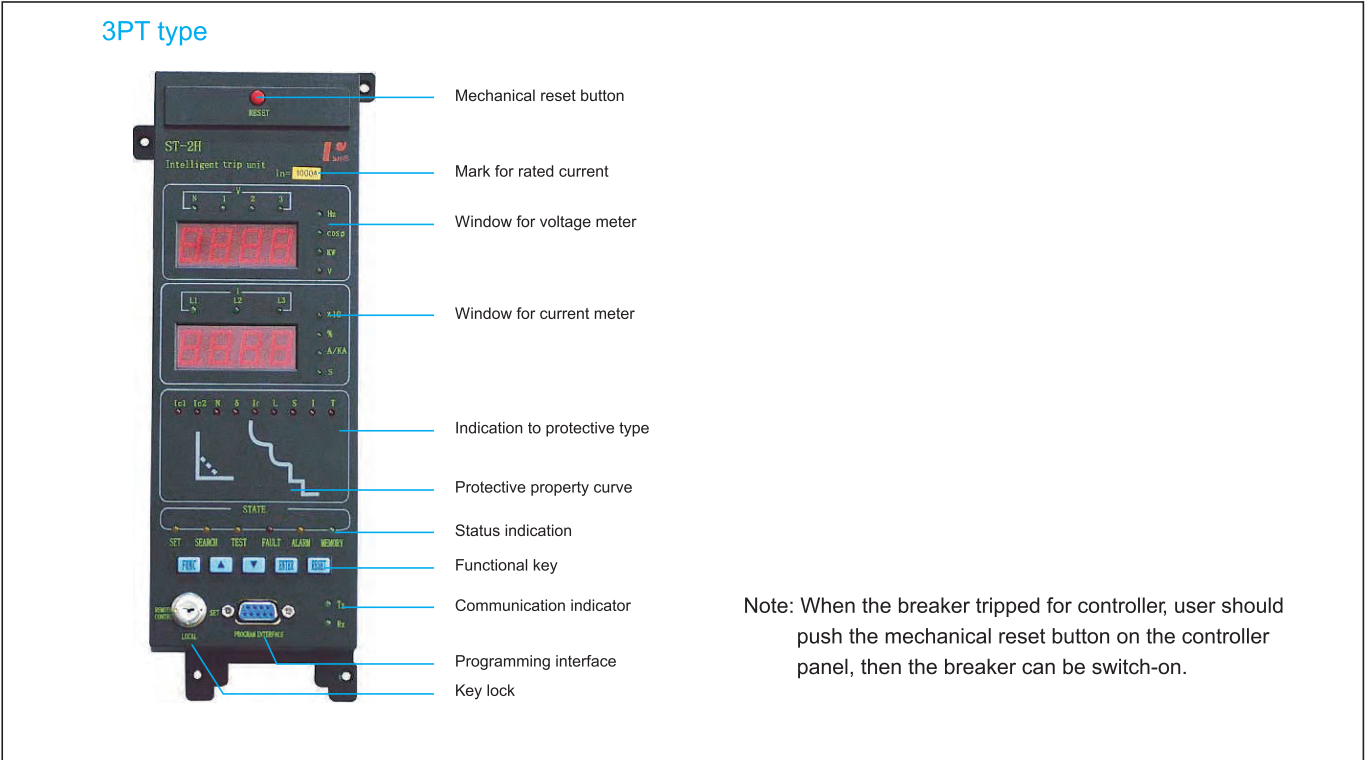
Press "trip" key, then the breaker will trip. The ammeter display window will display the action current and action time in turn.

Step 3: Press "reset" key to exit the test status.

14.2.2 The communication H type intelligent controller (MF3-200, 3200, 4000, 6300)

As the core part of the MF3 Air Circuit Breaker, the H type intelligent controller could protect the electric circuit from overload, short circuit, single-phase earthing fault and residual current, etc. With the highly-integrated and highly-performance digital signal processor, the H type intelligent controller could have real time processing on signals and realize various protective functions and multiple auxiliary functions, especially the function of communicating with PC.

Appearance and panel illustration



a. Comparison of signal and meaning

Serial Number	Signal	Meaning
1	Inm	The maximal rated current of the frame size of circuit breaker
2	In	Rated current of circuit breaker
3	Io	Rated current of externally connected current transformer for residual current protection
4	Ir1, Ir2, Ir3	They stand for long time-delay, short time-delay and instantaneous setting acting current value separately.
5	It	Setting current value for earth fault or residual current
6	tL, ts, t0	They stand for long time-delay, short time-delay and instantaneous setting acting current value separately.
7	K	Coefficient, applied to stand for overload or earth fault inverse-time property
8	N (Various meanings)	Described in overload formula: I/I_r 4-poles product, stand for: N-phase For voltage display, it could indicate phase voltage.
9	$\delta_1, \delta_2, \delta_3$	They stand for unbalanced ratio of current at phase A, B and C separately.
10	L1, L2, L3, N	They stand for phase A, B, C and phase N.
11	Ic1, Ic2	They stand for rectified current value of load monitor 1, and load monitor 2 separately.
12	Er01~Er13	Stand for self-diagnosis fault code
13	T	Indicator for self-diagnosis fault status
14	U	Voltage, it could indicate phase voltage and line voltage separately.
15	F	Frequency
16	cosφ	Power factor
17	P	Effective power
18	A, kA, s %, × 10, V, kW, Hz Ic1, Ic2, δ If, L, S, I	Unit: Ampere, kA, s Percentage, operating times, V, kW, Hz Protective property type: Load1, load2, unbalanced ratio Earth fault or residual current, long time-delay, short time-delay, instantaneous

b. Operational power supply

Operational power supply of intelligent controller:
AC 400V/380V, 230V/220V, 50Hz/60Hz;
DC 220V, 110V and 24V.

c. Major protective functions

- Measurement & operation monitoring
- Inquiry function
- Parameter setting function
- Function of programming interface
- Test function
- Self-diagnosis function
- Fault clock function (optional)
- Historical data recording function (optional)
- Load monitoring function (optional)
- Making current release(MCR) & override tripping function (Optional)
- Setting function of remote control, local control and setting position (this function only for H-type intelligent controller)

d. Operation instruction of H type intelligent controller

- Parameters setting operation
- Step 1: Confirm setting authority, and the key lock of H-type must point to " SET " position.
- Step 2: Confirm that controller is under reset status.
If the controller is in non-reset status, press "RETURN" key till current meter display is in circulating status.
Note: If controller is in fault alarm status, setting function is locked and setting cannot be operated.
- Step 3: Press "FUNCTION" button till setting lamp flashes.
- Step 4: Press "ENTER" button to make acting current setting of load monitor 1 be displayed in current meter display window, and setting lamp flashes at that time.
- Step 5: Press "▲" and "▼" buttons to selected items to be modified.

Step 6: Press "ENTER" button, and "SET" lamp will in constantly lit status. Press "▲" and "▼" buttons to make required values with adjustment. Press "ENTER" button again, and "MEMORY" lamp flashes once indicating parameters have been stored. If you don't want to store this data, press "RETURN" button directly, and parameters haven't been modified and will keep the original value.

Step 7: Press "RETURN" button once, "SET" lamp will flash.

If you need to modify other parameters, just repeat step 5 and step 6. Otherwise, press "RETURN" button till "SET" lamp is turned off.

Note: If there is any failure while it's in setting status, it will exit from setting status and enter fault status automatically. While adjusting parameters, the longer you press "▲" and "▼" buttons, the higher the gradual accelerating or decelerating speed will be.

Display contents of current meters and protective type indicators with different parameters are as follows.
owed as 4.20S in the right diagram.

Fault inquiry operation

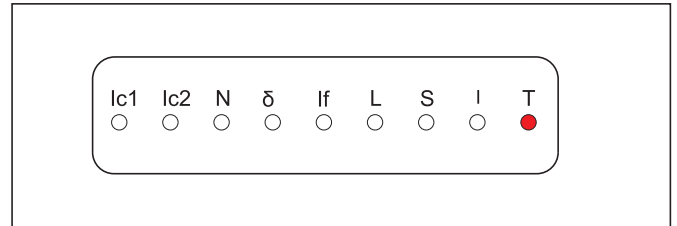
- Step 1: Confirm controller is in reset status.
- Step 2: Press FUNCTION button till inquiry flashes. Press " ENTER " button, and " SEARCH " lamp will be lit constantly and display window of current meter displays fault acting value and delay time alternately. Press "▲" or "▼" button to inquiry relevant parameters.
- Step 3: Press "RETURN" button, it will enter the status of displaying fault acting value and delay time alternately again.
- Step 4: Press "RETURN" button till "SEARCH" lamp is turned off, it will exit from inquiry status.

Test operation:

- Step1: Confirm controller is in reset status.
For H-type controller, it's necessary to confirm that key lock is at "SET" position.
- Step2: Press "FUNCTION" button till "TEST" lamp flashes.
Press "ENTER" button, and "TEST" lamp will be lit constantly. Press "ENTER" button again, and circuit breaker will be switch-off, and display window of current meter displays acting time.
- Step3: Press "RETURN" button till "TEST" lamp is turned off, it will exit from test status.

Inquiry method

- Step 1: Confirm "T" lamp is turned on
(It means there is some self-diagnosis information.)
And controller is under reset status.



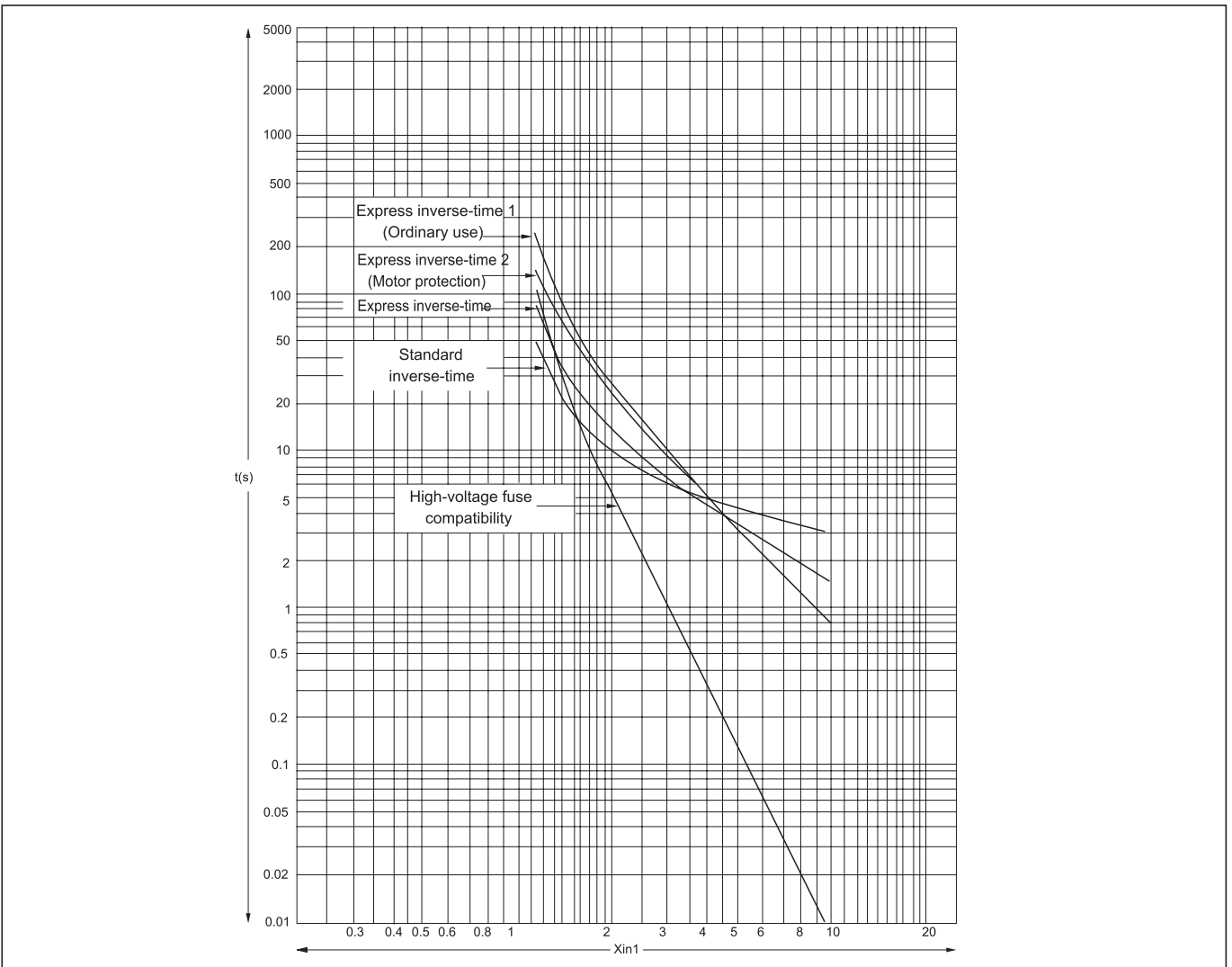
6. Instruction to technical property

- Step 2: Press "CONFIRM" button, and display window of current meter displays error code.
- Step 3: Press "CONFIRM" button again to confirm that self-diagnosis information has been reviewed (It will be eliminated automatically after exiting for partial self-diagnosis information such as rejection to actions, and E2PROM error, etc).
Press "▲" and "★" button to check different codes one by one in circulation.
- Step 4: Press "Return" button to exit from self-diagnosis inquiry status.

- Step 4: Press "Return" button to exit from self-diagnosis inquiry status.

Communication:

When controller is at data receipt status, "Rx" lamp is turned on when controller is at data sending status, "Tx" lamp is turned on.



f. Overload long time-delay protection

■Power distribution or motor protection

Setting current	I _{r1} =	(0.4~1.0)I _n + OFF (Exit position)
	Acting property	$I \leq 1.05I_{r1}$ without actions in 2h $I \square 1.20I_{r1}$ with actions while it's less than 1h
Inverse-time (s) (Corresponding 2I _{r1})	Property curve	Curve 1~curve 5, could be rectified, rectified as curve 3 for ex-factory
	Curve speed	IEC255 standard, 80 level points totally, could be rectified
	Precision	$\pm 10\%$ (intrinsic 40ms)

■Electrical machine protection

Setting current	I _{r1} =	(0.4~1.25)I _n + OFF (Exit position)
	Acting property	$I \leq 1.05I_{r1}$ without actions in 2h $I \square 1.20I_{r1}$ with actions while it's less than 1h
Inverse-time (s) (Corresponding 2I _{r1})	Property curve	Curve 1~curve 5, could be rectified, rectified as curve 3 for ex-factory
	Curve speed	IEC255 standard, 80 level points totally, could be rectified
	Precision	$\pm 10\%$ (intrinsic 40ms)
Thermal memory (30min, could be eliminated while power-off)		Standard + OFF
N-phase overload and over-current property		100% or 50% (Applicable to 3P+N or 4P products)

Note: When N-phase is 50%, protective settings are treated as 5 0% for N-phase. If long delay setting is 2000A, long delay setting for phase A, B and C is 2000A, and 1000A for phase N.

g. Instruction to short time-delay property

Setting current	I _{r2} =	(1.5~15) I _{r1} + OFF (exit position)
	Acting property	$I \leq 0.9I_{r2}$ without actions $I \square 1.1I_{r2}$ delay action
Inverse-time delay (s) (Corresponding 2I _{r1})	T _s =	(0.1~1)s (0.1s level error)
	Precision	$\pm 10\%$ (intrinsic 40ms)
Inverse-time property		Curve is the same as overload long delay, but curve speed is 10times faster.
Short delay inverse-time thermal memory (15min)		Standard + OFF

h. Instruction to short circuit instantaneous property

Setting current	I _{r3} =	1.01n~50kA/75kA/100kA+OFF (Exit position)
	Acting property	$I \leq 0.85I_{r3}$ without actions $I \square 1.15I_{r3}$ with actions

Note: When controller is frame I (I_{nm}=2000A), rectified value of instantaneous protection is 1.0I_n~50kA+OFF;
 when controller is frame II (I_{nm}=3200A), rectified value of instantaneous protection is 1.0I_n~75kA+OFF;
 When controller is frame III (I_{nm}=6300A), rectified value of instantaneous protection is 1.01n~100kA+OFF.

i. Earth fault or residual current protective property: $t=TG \times KG \times I_f / I$

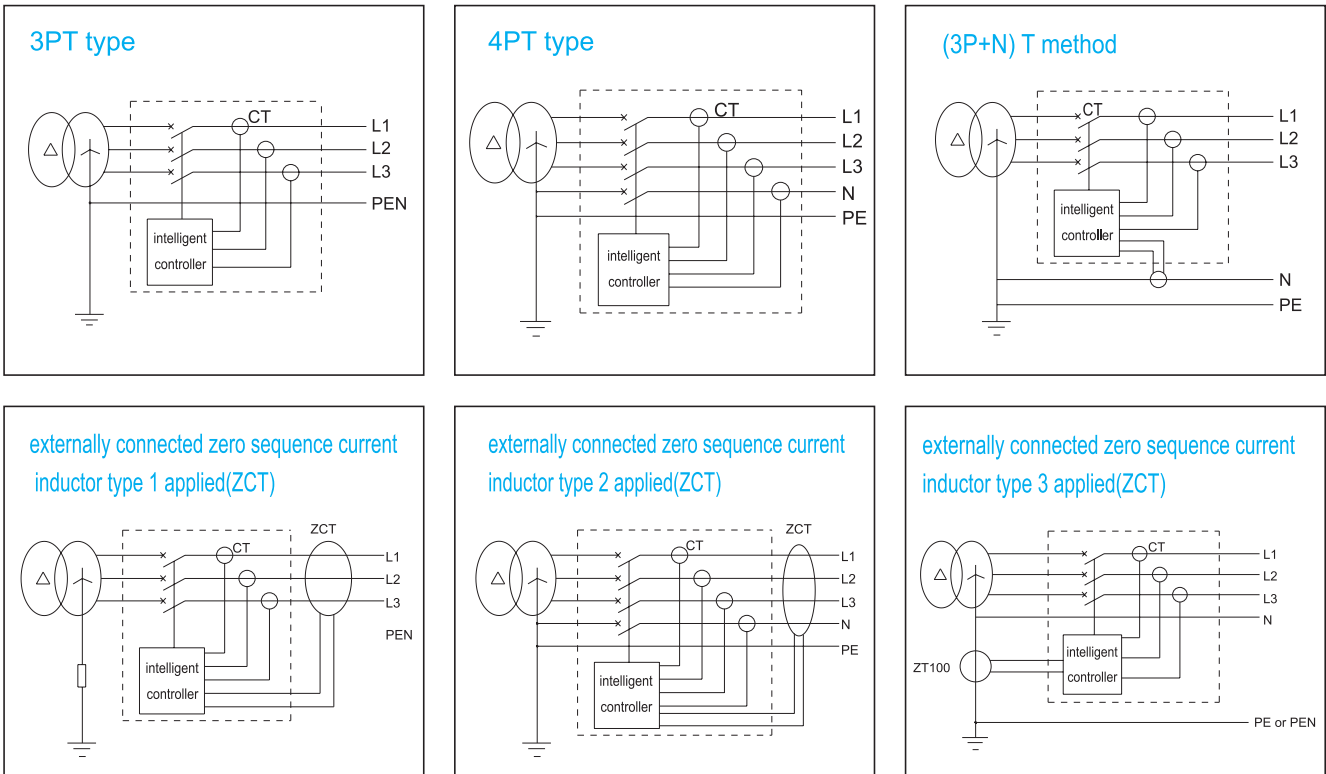
■Earth fault protection

Setting current	I _f =	(0.2~1.0)I _n + OFF (with 160A as the minimum and 1200A as the maximum. OFF means it only alarms without tripping)
	Acting property	$I \square 0.8I_f$ without actions $I \geq 1.0 I_f$ delayed action

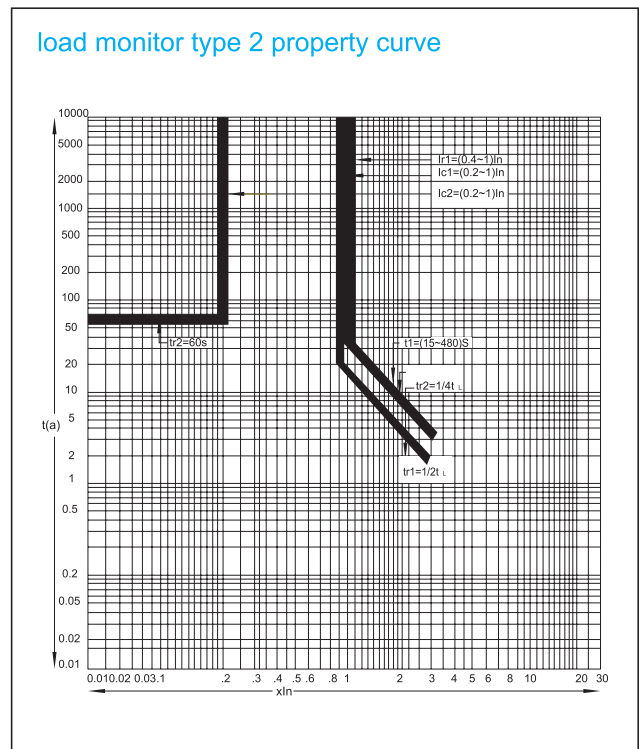
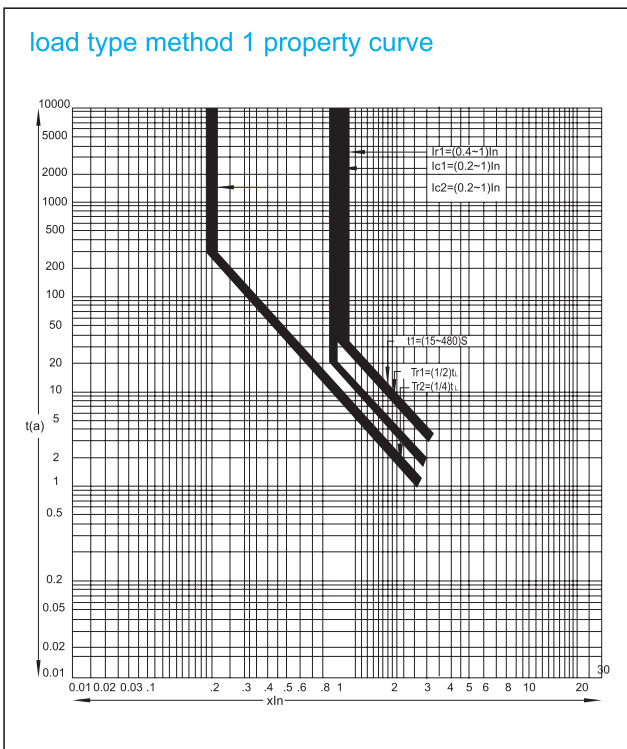
■ Earth fault protection

Inverse-time (s) (Corresponding 2I _{r1})	TG =	(0.1~1.0)s + OFF (Level difference 0.1s, OFF means it only alarms without tripping.)
	Inverse-time cutting coefficient KG	1.5~6 + OFF (Level difference 0.5, OFF means earth fault is definite-time)
	Precision	$\pm 10\%$ (intrinsic 40ms)
Setting current	I _f =	(0.1~1.0)I _o + OFF (Level different 0.01A, OFF means exit position)
	Acting property	$I \square 0.8I_f$ without actions $I \geq 1.0 I_f$ delayed action
Delay (s)	Property curve	Curve 1~curve 5, could be rectified, rectified as curve 3 for ex-factory
	TG =	(1.5~6)s + OFF (Level difference 0.5s, OFF means is definite-time)
	Precision	$\pm 15\%$

Wiring diagram of earth fault protection



j. Load monitor protection property



Technical parameter:

■Load monitor type 1

Rectified current	IC1=	(0.2~1.0)In + OFF (OFF means exit position)
	Acting property	$\leq 1.05I_{c1}$ without action <input type="checkbox"/> 1.21c1 delay relay action
Inverse-time (s)	Property curve	The same as overload long delay
	Curve speed	Could be set separately (Setting content is the same as that of overload long delay)
Rectified current	Ic2=	(0.2~1.0)In + OFF (OFF means exit position)
	Acting property	$\leq 1.05I_{c2}$ without action <input type="checkbox"/> 1.21c2 delayed relay
Maximal inverse-time delay (s)	Property curve	The same as overload long delay
	Curve speed	Could be set separately (Setting content is the same as that of overload long delay)

■Load monitor type 2

Rectified current	Ic1=	(0.2~1.0)In + OFF (OFF means exit position)
	Acting property	$\leq 1.05I_{c1}$ without action <input type="checkbox"/> 1.21c1 delay relay action
Inverse-time (s)	Property curve	The same as overload long delay
	Curve speed	Could be set separately (Setting content is the same as that of overload long delay)
Rectified current	Ic2=	(0.2~1.0)In + OFF (OFF means exit position)
	Acting property	$\leq 0.9I_{c2}$ without action Fixed as 60s
Fixed delay (s)		
Precision		$\pm 10\%$ (Intrinsic 40ms)
Thermal memory (30min, could be eliminated while power-off)		Standard + OFF

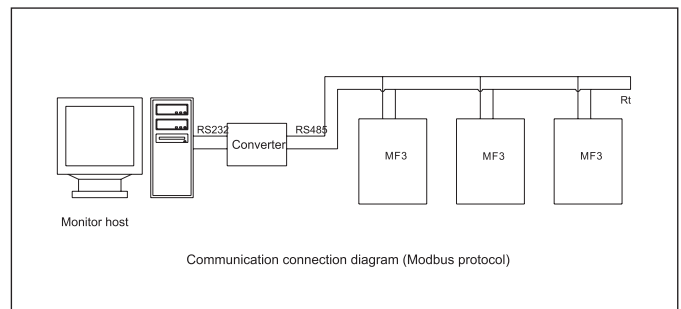
k. Protective property on unbalance current

Rectified current	$\delta =$	40%~100% + OFF (Level difference 0.1, OFF means exit)
	Action or alarm property	$\leq 0.9\delta$ without actions <input type="checkbox"/> 1.1 δ delay action
Delay time (s)	T $\delta =$	(0.1~1.0)s (Level difference 0.1, OFF means exit)
Precision		$\pm 10\%$ (Intrinsic 40ms)

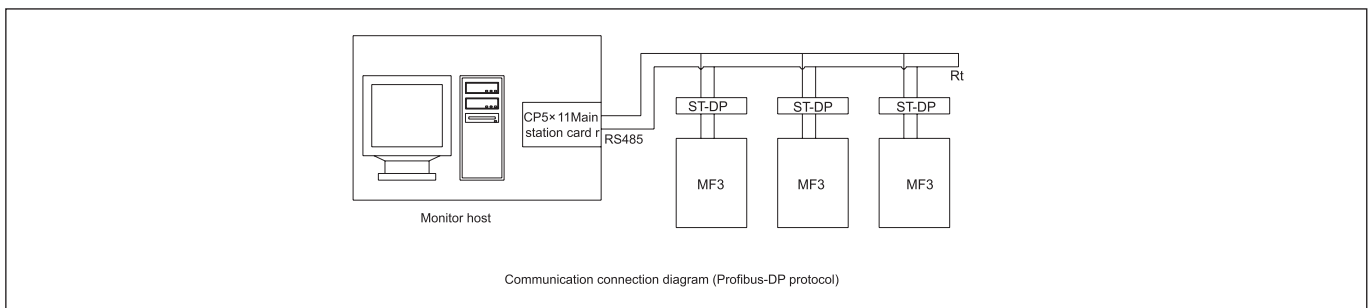
l. Communication networking

Make key-lock at "communication" position, connect to secondary terminals "10#" and "11#" through cable to achieve the communication function.

Modbus protocol networking



Profibus-DP protocol networking



15. Accessories

15.1 Under-voltage release

- a. Without power supply, under-voltage release can't close
- B. Delay time 0, 1s, 2s, 3s, 4s, 5s, 6s, 7s are fixed for MF3-1000, 1s, 3s, 5s, 7s are fixed for MF3-2000, 3200, 4000, 6300.
- C. Within 1/2 time-delay range, circuit breaker does not trip when power voltage recovers and exceeds 85%Ue.
- D. Characteristic



Type	MF3-2000, 3200, 4000, 6300	
Rated control power voltage Us(V)	AC400, 230, 127	DC220, 110
Action voltage(V)	(0.35-0.7)Us	
Reliable making voltage(V)	(0.85-1.1)Us	
Reliable non-making voltage(V)	≤ 0.35Us	
Power loss(W)	48VA	

Close the circuit breaker before operation the circuit breaker.

15.2 Shunt release

Shunt release can realize the remote control to break the circuit breaker.
Characteristic



Type	MF3-2000, 3200, 4000, 6300	
Rated control power voltage Us(V)	AC400, 230, 127	DC220, 110
Work voltage	(0.7-1.1)Us	
Power loss	300VA	40W
Breaking time	30~50ms	

Forbid making the power for long time to avoid the shunt release being damaged.

15.3 Closing release

After the motor finishing the energy storage, closing release can instantly close the circuit breaker.
Characteristic



Type	MF3-2000, 3200, 4000, 6300	
Rated control power voltage Us(V)	AC400, 230, 127	DC220, 110
Work voltage (V)	(0.85-1.1)Us	
Power loss (W)	300VA	40W
Closing time	≤ 70ms	

Forbid making the power for long time to avoid the closing release being damaged.

15.4 Motor-driven energy-storage mechanism

With the function of motor-driven energy storing and auto restoring energy after closing the circuit breaker, the mechanism can ensure closing the circuit breaker instantly after breaking the circuit breaker.

Manual energy-store is available.

Characteristic



Type	MF3-2000, 3200, 4000, 6300	
Rated control power voltage Us(V)	AC400, 230, 127	DC220, 110
Work voltage (V)	(0.85-1.1)Us	
Power loss (W)	85/110/150W	192W
Energy-storage time	<5s	
Operation frequency	No more than 3 times per minute	

15.5 Auxiliary contact

Standard model: 6N/O(normal open) and 6N/C(normal close).

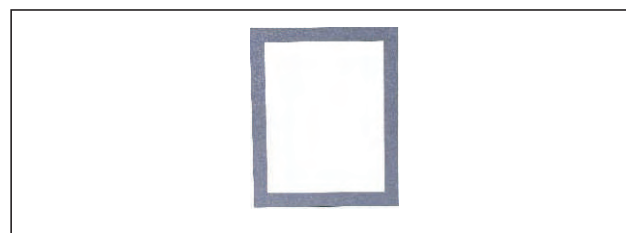
Characteristic



Type	MF3-2000~6300		
Rated voltage (V)	AC230	AC400	DC220
conventional free-air thermal current Ith (A)	6	6	6
Rated control capacity	300VA	300VA	60W

15.6 Doorcase

Installed on the door of the distribution cubicle, for sealing the distribution cubicle and making the protection class to IP40(fixed type and drawout type).



15.7 Phases barrier

Installed between the busbars to increase the creepage distance.



15.8 Off position locking mechanism

When the circuit breaker is disconnected, padlock can be used to lock it after pulling out the lock lever, then the circuit breaker can't be "Test" or "connected" position. (Padlock is prepared by users)

15.9 Key lock

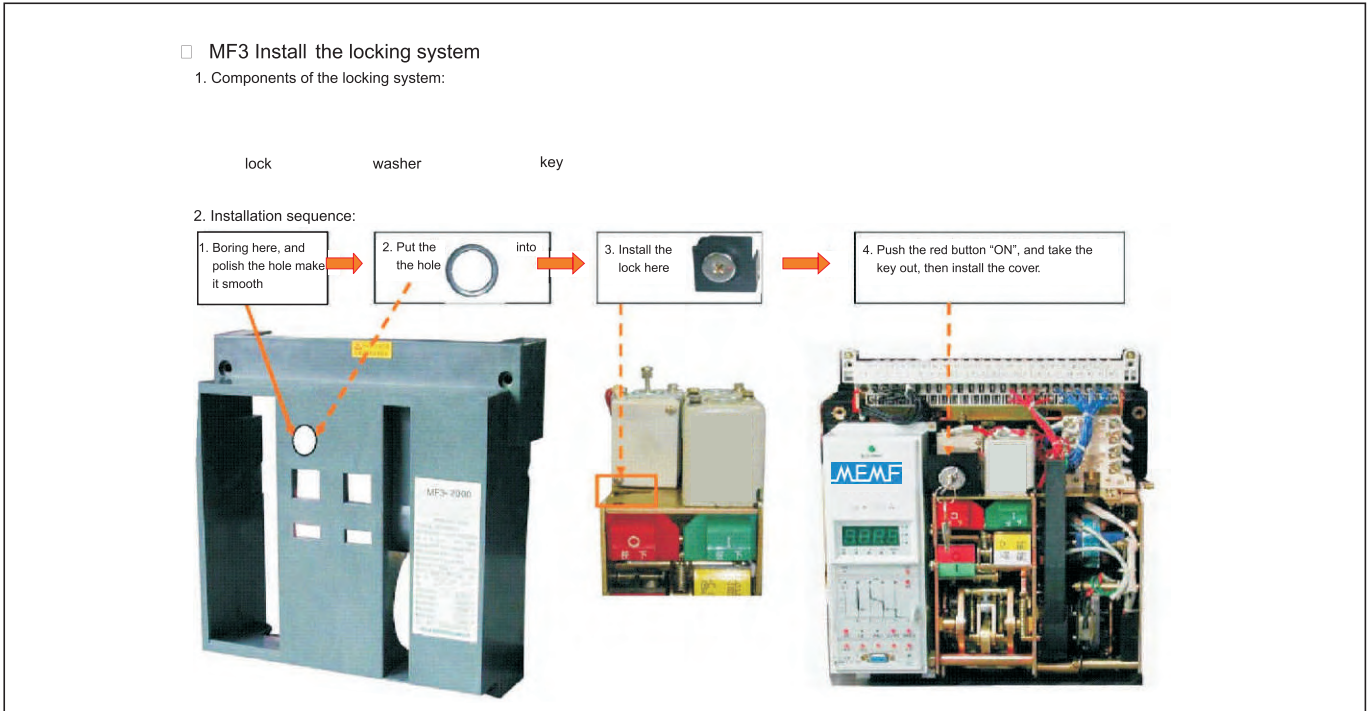
Lock the circuit breaker on the OFF position, then the circuit breaker can't be closed.

Locks and keys will be provided by us.

Separate lock and key is matched with one set of the circuit breaker.

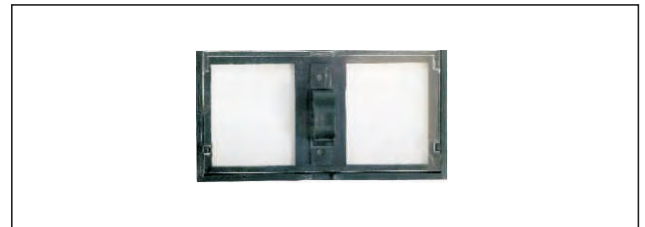
Three same locks and two same keys are matched with three circuit breaker.

Note: Before pulling out the key, the break pushbutton should be pressed first, rotate the key anticlockwise, then pull it out



15.10 Operation pushbutton lock

Used for locking the break pushbutton and the close pushbutton. (Padlock is prepared by users)



15.11 Transparent shield (MF3-2000)

Installed on the doorcase of the cubicle's small door, make the protection class to IP54. It is suitable for the fixed, drawout type circuit breaker and the load switch.



15.12 Cable mechanical interlock

It can realize the interlock of two horizontal or vertical-installed, three poles or four poles ,drawout type or fixed type circuit breaker.

- a. If need bend the cable, make sure the radian is more than 120°.
- b. Check and make sure enough lubricating oil of the cable.
- c. The maximal distance between two interlock circuit breaker is 2m.

Circuit diagram		Available running manner	
		1QF	2QF
○	○	0	0
○	⊗	0	1
⊗	○	1	0

Notes: a. when the steel cable needs to be bent, enough transition arc should be reserved to guarantee flexible movement of steel cable;
b. check the steel cable and make sure there is enough lubricant in the steel cable to guarantee flexible movement of steel cable.

15.13 Connecting-rod type mechanical interlock

Three vertical-installed three-poles or four-poles, drawout- type or fixed type circuit breakers realize the interlock between one breaker with another two different-state breakers.

Circuit diagram		Available running manner		
Manner 1: three power supplies are provided for one circuit breaker only				
		1QF	2QF	3QF
○	○	0	0	0
○	⊗	0	0	1
⊗	○	0	1	0
⊗	⊗	1	0	0

Circuit diagram		Available running manner		
Manner 2: two normal power supplies (1QF, 3QF)+ one replacement power supply (2QF)				
		1QF	2QF	3QF
○	○	0	0	0
○	⊗	0	0	1
⊗	○	0	1	0
⊗	⊗	1	0	1
○	○	1	0	0

16. Regular malfunction and solutions

Fault description	Reasons analysis	Maintenance method
Tripping of circuit breaker	Over load tripping (IL indicator flashing)	<ol style="list-style-type: none"> 1. Check the breaking current value and operation time of intelligent release. 2. Analyze the load and electric network, exclude the overload if it happens. 3. Match the actual operating current with long time-delay current setting value. 4. Press the reset button to reclose the breaker
	Short circuit tripping (" Is" or " li" indicator flashing)	<ol style="list-style-type: none"> 1. Check the breaking current value and operation time of intelligent release. 2. Exclude the short circuit fault if it happens 3. Check the setting value of intelligent release 4. Check the normal state of breaker 5. Press the reset button to reclose the breaker
	Earthing fault tripping (IG indicator flashing)	<ol style="list-style-type: none"> 1. Check the breaking current value and acting time of intelligent release. 2. Exclude the earthing fault if that happens. 3. Match the fault current setting value with the actual protection. 4. Press the reset button to reclose the breaker.
	Under-voltage release fault: 1. Rated working voltage is less than 70%Ue 2. Fault of control unit	<ol style="list-style-type: none"> 1. Check the power is on or not 2. Check the power voltage of under-voltage release, it should be less than 85%Ue. 3. Replace the control unit of under-voltage release
The breaker can't be closed	Mechanical interlock acting	Check the working state of two circuit breakers fixed with mechanical interlock
	Intelligent release don't reset (panel is raised)	Press the reset button to reclose the breaker
	Secondary circuit of drawerout-type breaker isn't connected	Make the breaker to "making" position ("click" sound will be heard)
The breaker can't be closed	Breaker hasn't stored energy	Check the secondary circuit: <ol style="list-style-type: none"> 1. Power voltage of motor shouldn't less than 85%Ue. 2. Check the storage mechanism, replace it if necessary.
	Mechanical interlock acting leads to locking of breaker	Check the working state of two circuit breakers fixed with mechanical interlock
The breaker can't be closed	Closing electromagnet: 1. Rated control voltage is less than 85%Us; 2. Closing electromagnet is damaged	<ol style="list-style-type: none"> 1. Power voltage of closing electromagnet shouldn't less than 85%Us. 2. Replace the electromagnet.

Fault description	Reasons analysis	Maintenance method
Tripping after closing the circuit breaker (Fault indicator flashing)	Tripping immediately: 1. Short circuit current is closed 2. Delay tripping because of transient current is high when closing; 3. Overload current is closed	1. Check the breaking current value and operation time of intelligent release; 2. Exclude the short circuit fault if it happens; 3. Exclude overload fault 4. Check the normal state of breaker 5. Modify the current setting value of intelligent release 6. Press the reset button to reclose the breaker
Circuit breaker can't be opened	The breaker can't be opened manually 1. There is fault with mechanical operating mechanism	1. Check the mechanism, if there is fault happened.
	The breaker can't be opened by motor remotely 1. There is fault with mechanical operating mechanism 2. Power voltage of shunt release is less than 70%Us; 3. Shunt release is damaged	1. Check the mechanism, if there is fault happened. 2. Check the Power voltage of shunt release is less than 70%Us or not 3. Replace shunt release
Circuit breaker can't store energy	Manual storage can't be realized	Mechanical fault with the energy-storage device
	Motor storage can't be realized 1. Power voltage of motor energy-stored device is less than 85%Us; 2. There is mechanical fault with energy-storage device	1. Power voltage of motor energy-stored device shouldn't less than 85%Us 2. Mechanical fault with the energy-storage device
Handle of drawerout-type circuit breaker can't be drawn in or out	1. There is padlock at the "opening" position 2. Slideway or breaker body isn't pulled into its position	1. Take away the padlock 2. Pull the slideway or breaker body into its position
Drawerout-type breaker can't be drawn out at the "opening" position	1. Handle isn't pulled out 2. Breaker is not totally at the "opening" position	1. Pull out the handle 2. Keep the circuit breaker totally at "opening" position
Drawerout-type breaker can't reach the "making" position	1. Something drop into the drawer base, and lock the mechanism or mechanism fault happens. 2. Breaker body not match with the frame-size rated current of drawer base	1. Check and clean the drawer base, or contact with manufacture 2. Match the body with relevant drawer base
No display on intelligent release panel	1. Release isn't connected with power 2. There is fault with release	1. Check the power is connected or not 2. Cut off the power, then connect again. Otherwise contact with manufacturer
	Closing electromagnet: 1. Rated control voltage is less than 85%Us; 2. Electromagnet is damaged	1. Check the electromagnet power voltage shouldn't be less than 85%Us. 2. Replace the closing electromagnet.
Fault indicator still flashing after pressing the clear button	Fault happened with intelligent release	Cut off the power, then connect again. Otherwise contact with manufacturer

17. Order Sheet

Model	MF3-2000	MF3-3200	MF3-4000	MF3-6300
Rated current (In)A	<input type="checkbox"/> 400 <input type="checkbox"/> 630 <input type="checkbox"/> 800 <input type="checkbox"/> 1000 <input type="checkbox"/> 1250 <input type="checkbox"/> 1600 <input type="checkbox"/> 2000	<input type="checkbox"/> 2000 <input type="checkbox"/> 2500 <input type="checkbox"/> 3200	<input type="checkbox"/> 4000	<input type="checkbox"/> 4000 <input type="checkbox"/> 5000 <input type="checkbox"/> 6300 (only 3 poles)
Installation mode	<input type="checkbox"/> Drawerout type	<input type="checkbox"/> Fixed type (note: In≥4000A fixed type is not available)		
Number of poles	<input type="checkbox"/> Three poles	<input type="checkbox"/> Four poles		
Connection	<input type="checkbox"/> Horizontal	<input type="checkbox"/> Vertical		

Model	MF3-2000	MF3-3200	MF3-4000	MF3-6300
	Protection function			
□ M-type standard type (default configuration)	1. □Ir1 protection for overload long time-delay, Ir2 inverse-time protection + definite time-delay protection for short-circuit short time-delay, Ir3 instantaneous protection for short-circuit, Ir4 4-section protection for single-phase earthing. 2. □Ir1 protection for overload long time-delay, Ir2 definite time-delay protection for short-circuit short time-delay, Ir3 instantaneous protection for short-circuit, Ir4 4-section protection for single-phase earthing.			1. Function of current meter 2. Function of self-diagnosis 3. Function of setting 4. Function of test 5. Function of display
MF3-2000, Communication-type (optional), 3200, 4000, 6300	1. Ir1 protection for overload long time-delay, Ir2 definite time-delay protection for short-circuit short-delay, Ir3 instantaneous protection for short-circuit, 4-section protection for single-phase earthing. 2. Ir1 protection for overload long time-delay, Ir2 inverse-time protection + definite time-delay protection for short-circuit short time-delay, Ir3 instantaneous protection for short-circuit, 4-section protection for single-phase earthing.			
Intelligent controller	Explanation: Available set range of protection function and conventional setting before delivery Available set range of Ir1 long-delay current: 0.4~1 □ In □ Conventional setting before delivery: overload long time-delay: 1.0In Available set range of operating time with overload 1.5In: 15, 30, 60.....480s □ Conventional setting before delivery: overload 1.5In, operating 15s ! Conventional setting before delivery: short time-delay current 8Ir1 Available set range of current of Ir2 short-delay: Operating time of short-delay: 0.1~0.4s ! Conventional setting before delivery: operating time of short time-delay: 0.4s 0.1~0.4s Available set range of Ir3 instantaneous current : 1.0 In ~50kA/75kA/100kA ! Conventional setting before delivery: 12In Available set scope of Ir4 earthing protection current: 0.2~0.8In; Available set scope of operating time of earthing protection: 0.1~0.4s ! Conventional setting before ex-factory: 0.5 In; OFF			
Power supply of controller	□AC400 □AC230 □DC220 □DC110 □DC24			
Intelligent controller	Optional function	<input type="checkbox"/> Modbus communication <input type="checkbox"/> Profibus-DP communication <input type="checkbox"/> Display of voltage <input type="checkbox"/> Display of frequency <input type="checkbox"/> Display of power factor <input type="checkbox"/> Display of power <input type="checkbox"/> Overvoltage/undervoltage protection <input type="checkbox"/> Phases protection	Display of voltage <input type="checkbox"/> Display of frequency <input type="checkbox"/> Display of power factor <input type="checkbox"/> Display of power <input type="checkbox"/> Function of monitoring load ! Not items to be selected necessarily, cost of the increased will be calculated additionally	
Electrical accessories	Under-voltage release (default configuration)	AC380V, □AC220V, □DC220V, □customize _____V (Optional)		
	Shunt release (default configuration)	□AC380V, □AC220V, □DC220V, □DC110V (Optional)		
	Motor (default configuration)	□AC380V, □AC220V, □DC220V, □DC110V (Optional)		
Special requirements	Interlocking device (cost will be calculated additionally)	<input type="checkbox"/> Connecting-rod interlocking (only provided for drawer-type) <input type="checkbox"/> Steel cable interlocking :(for MF3-2000 both types of drawer-type and fixed-type) □ Button lock (Optional) <input type="checkbox"/> Key lock: (for both types of drawer-type and fixed-type) □ Door interlock (for MF3-2000 open or closed position) <input type="checkbox"/> Door interlock □ status of ON/OFF □		
	Others functions (cost will be calculated additionally)	□ Function of earthing protection with external mutual-inductor (Mutual-inductor is prepared by the user)		
	Connection of main circuit □ Explanation of vertical connection (prepared with vertical bus-bar): conventional supply is horizontal connection <input type="checkbox"/> Revolving bus-bar (Drawerout type In≤3200) (cost of the increased will be burden by the user)			
Remark: Current of frame size, rated current, and auxiliary control voltage must be indicated when ordering				

Note: 1) Please mark “√” or fill figure in the relative “□” if no mark, we will provide according to conventional factory settings.
 2) For ordering products with optional function □ or special requirements, please contact with us.



MF3-2000



MF3-3200



MF3-4000



MF3-6300

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