

MAXGE

Switch on to the future

MAXGE ELECTRIC TECHNOLOGY



MGA1

DIRECTION FOR USE



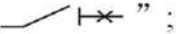
RoHS CE

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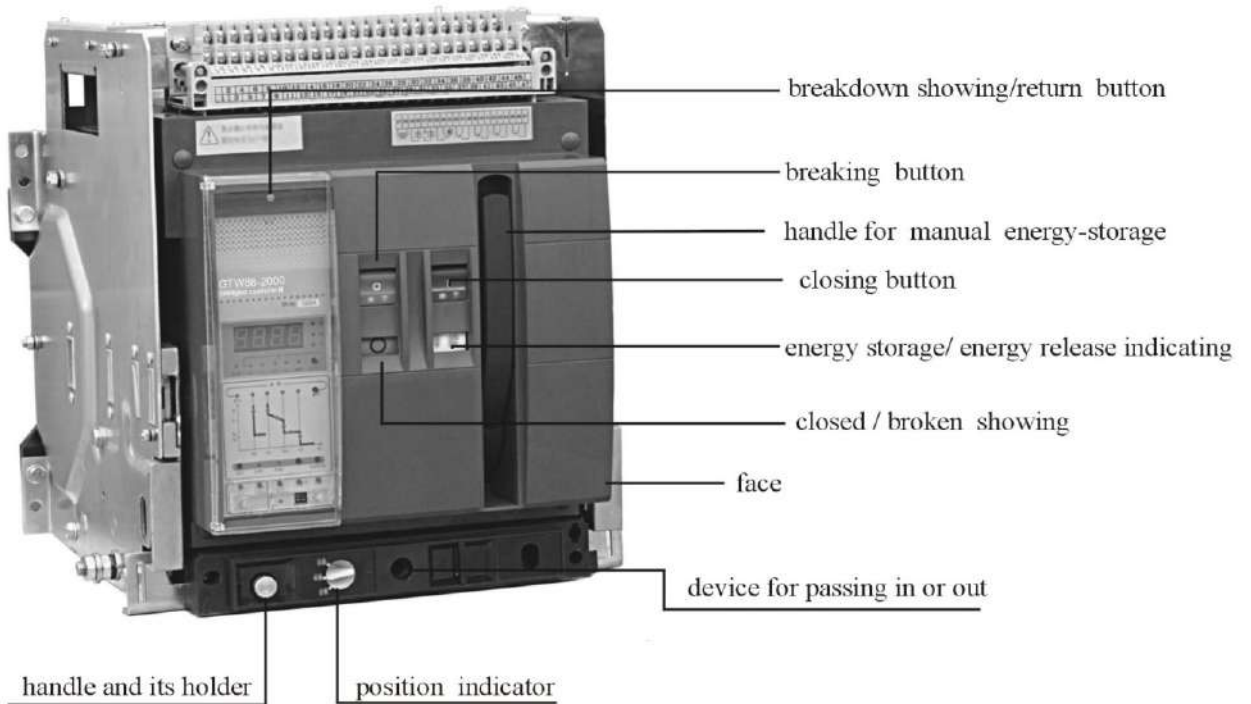
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ESSENTIALS OF MGA1

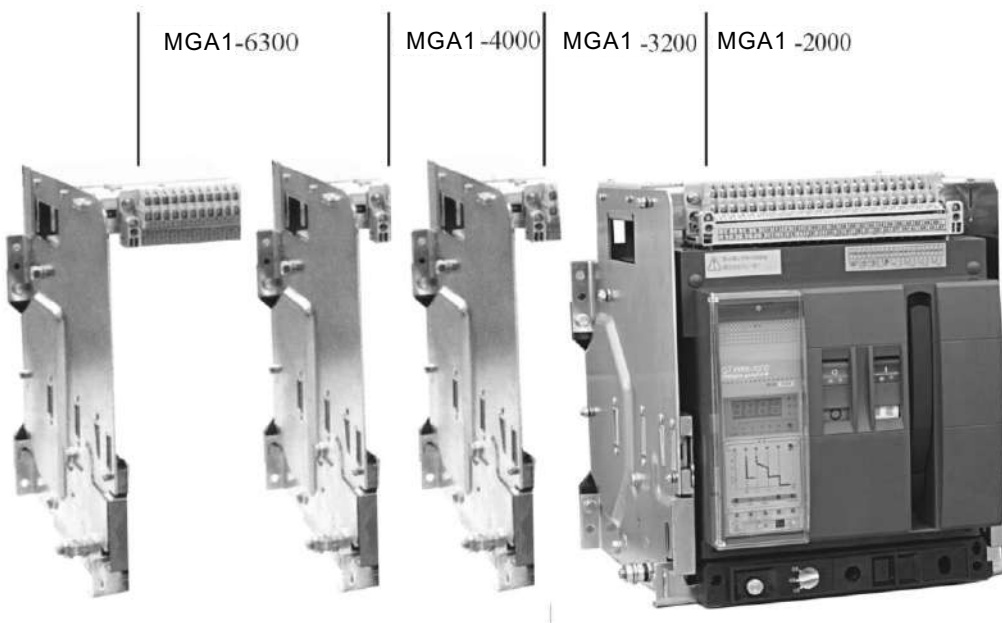
MGA1 series intelligent universal circuit breakers could be used for controlling the low voltage distribution net and keeping it safety. Installing in the low voltage distribution panels, it works as master switch to play general safety role. Its technical nature has reached the international advanced standard of that kind of products in 1990s.

- Rated current 630A~6300AAC;
- Short circuit Breaking Capacity 80kA~120kA(effective value);
- Rated working voltage 690V AC or below;
- Three or four poles;
- Draw-out or Fixed Type;
- Can be in adverse direction;
- Varied Intelligent controller offering various function;
- The breaker has disconnecting function, its corresponding symbol is shown as “  ” ;
- Comply with the demands of the following standards, IEC60947-2;
- Ambient temperature: $-5^{\circ}\text{C} \sim +40^{\circ}\text{C}$, and average temperature in 24 hours below $+35^{\circ}\text{C}$ (except for special orders).
- Elevation of installation site: $\leq 2000\text{m}$.
- Relative humidity: not exceeding 50% at the maximum ambient temperature. higher humidity would be permitted, but the lowest average temperature in a month not exceeding $+25^{\circ}\text{C}$ during the most moist moth, and the maximum monthly average relative humidity not exceeding 90% in that month, and giving consideration the dews on the goods surface, which would appear due to temperature change.
- Pollution protection: 3 grade.
- Installing categories: IV for breaker main circuits, coils of under voltage release and primary circuit of transformers; III for other auxiliary circuits and control circuit.
- The breaker used on ships and in humid tropical area can work normally without influence of humid air. salt fog and mildew.
- The breakers used on ships can operate reliably under normal vibration.
- The breakers should be installed according to stipulations in operation manual. For breakers in common use, the vertical gradient isn't more than 5° ,for that used on ships, the vertical gradient isn't more than 22.5° .
- The breaker should be put in the place where there isn't any explosive medium and conductive dust and no gas which would corrode metal or distroy the insulation.
- The breaker should be installed in compartment of switch- board and door frame should be fixed additionally. Protection grade is up to Ip40.

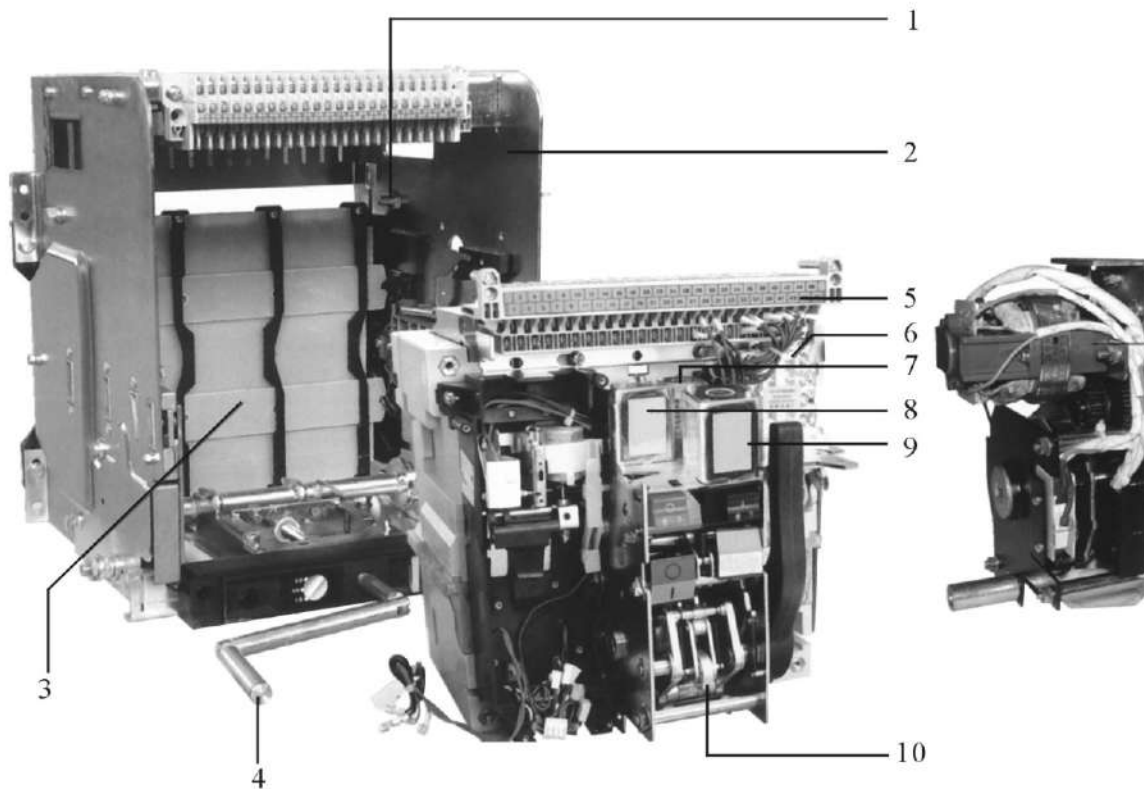
◆ **Front View of the Circuit Breaker**



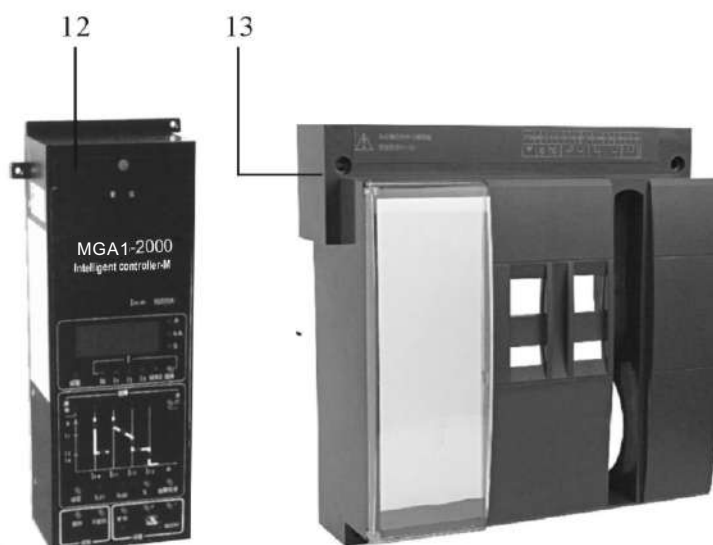
◆ **MGA1 Series Intelligent Universal Circuit Breaker**



SYNOPSIS OF STRUCTURE



- 1. Terminals of secondary circuit (fixed)
- 2. Drawer base
- 3. Safety separator
- 4. Handle
- 5. Terminals of secondary circuit (motional)
- 6. Auxiliary switch
- 7. Under-voltage release
- 8. Shunt release
- 9. Closing electromagnet
- 10. Operation mechanism
- 11. Motor-drive charging device
- 12. Intelligent controller
- 13. Panel



MAIN TECHNICAL PARAMETERS

SYNOPSIS OF STRUCTURE

- The breaker could be classified two types: fixed type and draw-out type. It would become the draw-out type breaker to put the body of a fixed type breaker into the special draw-out socket. The body of breaker consists of contacts system, arc extinguish system, operating device, secondary plug and socket units, undervoltage and shunt release. The draw-out socket is made up of: the rightside plate and leftside plate (with guidway), base and cross member.

- Contacts system

One-gear system. The different part of the same contact is of the different function. The contacts unit is with both main contact function and arc-contact function;

The new-type arc-resistant material is to be chosen for making contacts. After breaking the short-circuit current, the contacts wouldn't be overheat to make the temperature overrising;

The contacts system is made of the multiple way parallel style, to reduce and to rise the electric steady ability.

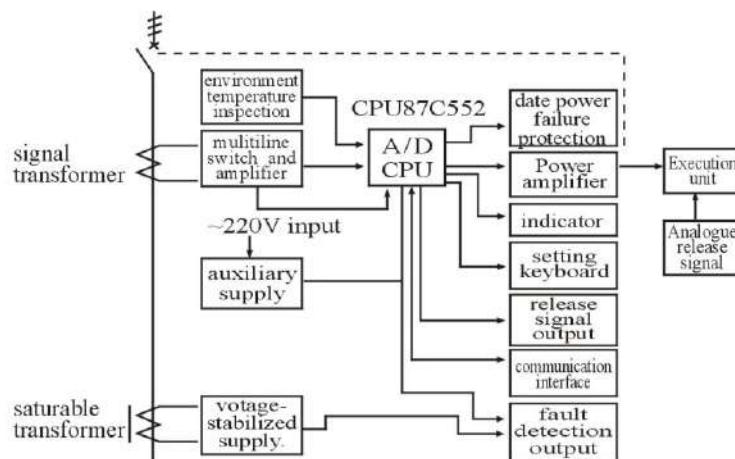
- Arc-extinguish chamber

There is a arc-extinguish chamber for each pole, to play the role of seperating all in the insulation base, to increase the mechanical strenth and ould not to be crashed when breaker big short-circuit current.

- Operation device and manual, motor-driven transmitting device. The device is sited on the front of the breaker. The free-releasw device, with five connecting rods, is used in the operating device, and it is designed energy-storage form. The device is always on energy-storage position, the breaker would be closed instantaneously as soon as the breaker is ordered to be closed . To release the pre-stored energy, it may be by means of pushing the pre-stored energy, it may be by means of pushing the release energy button mauually or using the colsing electro-magnet. The motor-driven transmitting device have the system of its own, linking the energy-storage shaft and main shaft movably with tenon and mortise , easily to assemble or disassemble.

- Intelligent controller

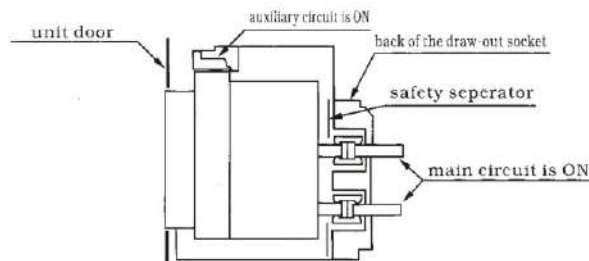
The scheme of intelligent controller



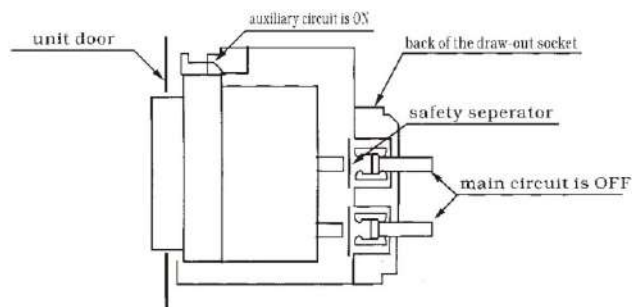
SYNOPSIS OF STRUCTURE

- The draw-out socket is made up of the rightside and leftside plates (with guided way), base and cross member. There are pushing device and position indicator on the base. There are static separated contacts for auxiliary circuit on the top of the base. The safety separator is set on the front of the bridge main contacts.

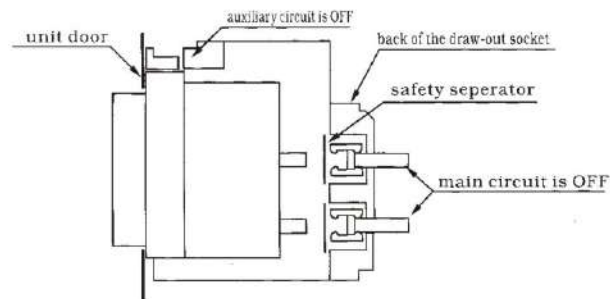
- It has three "position" for breaker body moving in the draw-out socket:
 - "link" position: there are all "ON" for main circuit and auxiliary circuit. The separator is open;



- "test" position: The main circuit is "OFF", safety separator is closed. Only auxiliary circuit is "ON", the necessary action test could be done;



- "seperated" position: The main circuit and auxiliary circuit are all "OFF", safety separator is closed.



SYNOPSIS OF STRUCTURE

It can be divided into two types according to its function:

Type M, normal type (digital indication for current, can be adjusted with push button.)

Type H, communicative type (digital indication for current, can be adjusted with push button and be communicative.)

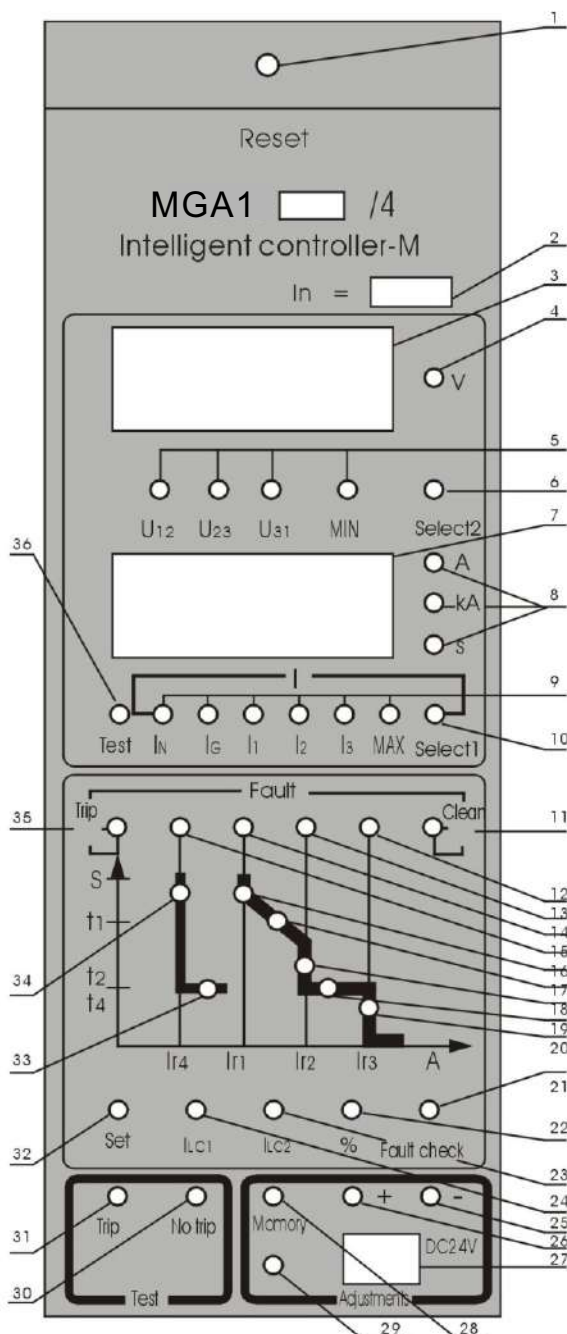
● Type M (Normal)

Panel caption:

1. return button for fault releasing
2. rated current of the breaker
3. unit of voltage
4. voltage indicator
5. voltage of each line and the min. value
6. key for selecting voltage
7. current, time indicator
8. unit of current and time
9. indication of three phase current, neutral phase current, grounding fault-current and the max. value
10. key for selecting current
11. " clean " key
12. fault showing for instantaneous
13. fault showing for over-load short-delay
14. fault showing for over-load long-delay
15. Fault showing for earthed error
16. showing the long-delay current setting (alarm simultaneously)
17. showing the long-delay action time setting
18. showing the short-delay current setting (alarm simultaneously)
19. showing the short-delay action time setting
20. showing the instantaneous current setting (alarm simultaneously)
21. key for inspecting fault
22. key for detecting wearing of contacts
23. load supervision signal 2 (alarm simultaneously)
24. load supervision signal 1 (alarm simultaneously)
25. setting's decrease progressively
26. setting's increase progressively
27. supply socket (DC24V) for test power
28. memory key
29. memory indicator
30. non-release test key
31. release test key
32. setting key for various protection value
33. indication of the earthed fault action time setting
34. indication of the earthed fault current setting (alarm simultaneously)
35. release indicating
36. test indicating

Other function:

1. auto-diagnosis
2. thermo-simulation
3. fault-memory
4. MCR

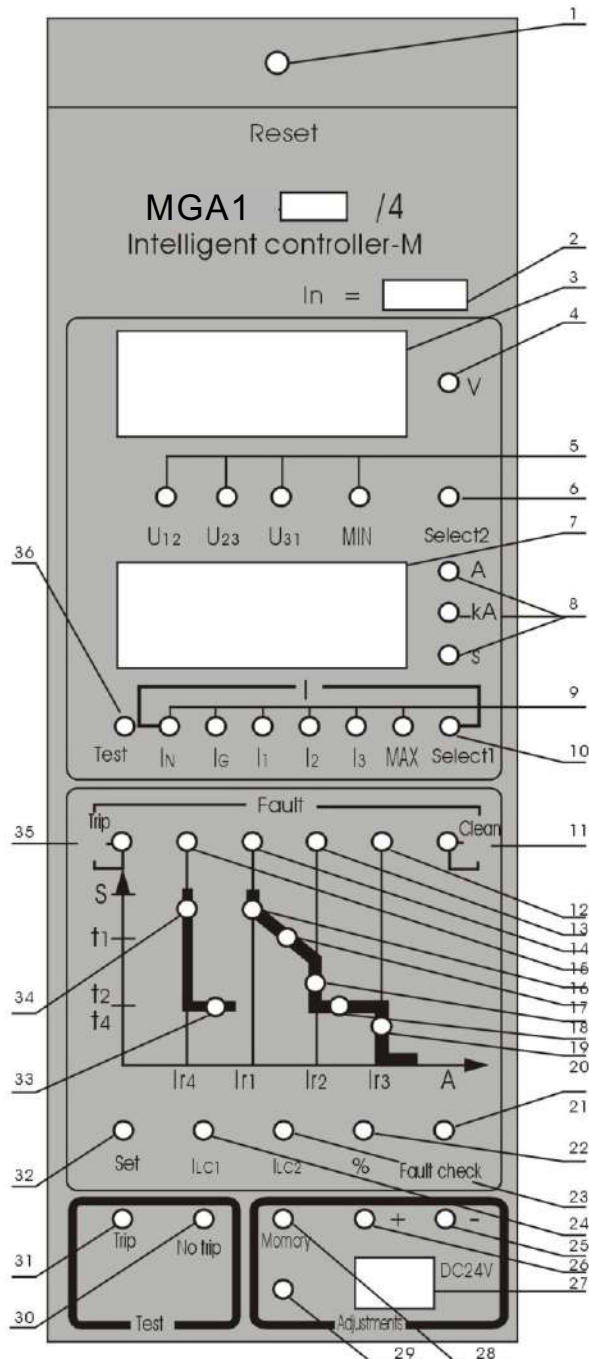


Note: The panel herein belongs to the circuit breaker of four poles, If the breaker is of three poles, the mark "In" in item "9" indicating current of neutral phase will disappear. Other than the type M intelligent controller with voltage indication, the other one without voltage indication is also available (there aren't items "3"、"4"、"5" and "6" on the panel in this case.)

SYNOPSIS OF STRUCTURE

◆ Selecting the intelligent controller

● Type H (Normal)

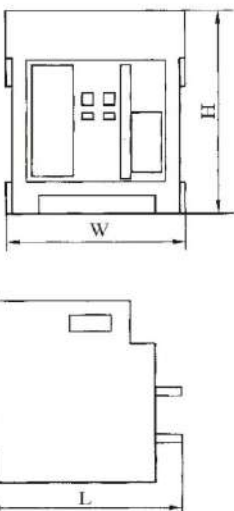


Panel caption:

1. return button for fault releasing
 2. rated current of the breaker
 3. unit of voltage
 4. voltage indicator
 5. voltage of each line and the min. value
 6. key for selecting voltage
 7. current, time indicator
 8. unit of current and time
 9. indication of three phase current, neutral phase current, grounding fault-current and the max. value
 10. key for selecting current
 11. " clean " key
 12. fault showing for instantaneous
 13. fault showing for over-load short-delay
 14. fault showing for over-load long-delay
 15. Fault showing for earthed error
 16. showing the long-delay current setting (alarm simultaneously)
 17. showing the long-delay action time setting
 18. showing the short-delay current setting (alarm simultaneously)
 19. showing the short-delay action time setting
 20. showing the instantaneous current setting (alarm simultaneously)
 21. key for inspecting fault
 22. key for detecting wearing of contacts
 23. load supervision signal 2 (alarm simultaneously)
 24. load supervision signal 1 (alarm simultaneously)
 25. setting's decrease progressively
 26. setting's increase progressively
 27. supply socket (DC24V) for test power
 28. memory key
 29. memory indicator
 30. non-release test key
 31. release test key
 32. setting key for various protection value
 33. indication of the earthed fault action time setting
 34. indication of the earthed fault current setting (alarm simultaneously)
 35. release indicating
 36. test indicating
- Other function:
1. auto-diagnosis
 2. thermo-simulation
 3. fault-memory
 4. MCR

Note: The panel herein belongs to the circuit breaker of four poles, If the breaker is of three poles, the mark "IN" in item "9" indicating current of neutral phase will disappear. Other than the type M intelligent controller with voltage indication, the other one without voltage indication is also available (there aren't items "3"、"4"、"5" and "6" on the panel in this case.)

MAIN TECHNICAL PARAMETERS

Type		MGA1															
Frame Rated Current I_{nm} (A)		2000															
Rated Current I_n (A)		630	800	1000	1250												
Rated Working Voltage U_e (V)		AC400,690 50Hz															
Rated Insulation Voltage U_i (V)		AC1000 50Hz															
Rated Impulse Withstand able voltage U_{imp} (V)		1200															
Working Frequency Withstandable Voltage U		AC3500V I_{min} 50Hz															
Quantity of poles		3、4	3、4	3、4	3、4												
Rated Current of N-pole I_N (A)		50% I_n 、100% I_n															
Limited Short-circuit Breaking Capacity I_{cu} (kA) (effective value)	AC400V	80	80	80	80												
	AC690V	50	50	50	50												
Operation Short-circuit Breaking Capacity I_{co} (kA) (effective value)	AC400V	50	50	50	50												
	AC690V	50	50	50	50												
Rated Marking capacity of Short-circuit I_{cu} (kA) (peak)	AC400V	176	176	176	176												
	AC690V	105	105	105	105												
Rated Stand Current For Short-time (1s) I_{cw} (kA) (effective value)	AC400V	50	50	50	50												
	AC690V	40	40	40	40												
Applicable category		B															
Full Disconnection Time (without) additional time-delay (ms)		25~30															
Closing Time (ms)		max. 70															
Intelligent Controller	Electronic Type	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>												
	Normal Type	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>												
	Communicative Type	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>												
Operation performance	Electronic Life	AC400V	1500	1500	1500	1500											
		AC690V	500	500	500	500											
	Mechanical Life	Non-maintainance	5000	5000	5000	5000											
		Maintanance	10000	10000	10000	10000											
Installation 		Connection Pattern		horizontal Vertical	horizontal Vertical	horizontal Vertical	horizontal Vertical										
		Pattern		Draw-out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>									
				Fixed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>									
		H×W×L		H	W	L	H	W	L	H	W	L	H	W	L		
		Draw-out	horizontal	3P	front set												
					back set	438	375	451	438	375	451	438	375	451			
				4P	front set												
			back set		438	470	451	438	470	451	438	470	451				
			Vertical	3P	front set	494	375	425	494	375	425	494	375	425	494	375	425
					back set	438	375	446	438	375	446	438	375	446	438	375	446
4P	front set	494		470	425	494	470	425	494	470	425	494	470	425			
	back set	438	470	446	438	470	446	438	470	446	438	470	446				
Fixed	horizontal	3P	front set														
			back set	395	362	351	395	362	351	395	362	351					
	4P	front set															
		back set	395	457	351	395	457	351	395	457	351						
	Vertical	3P	front set	482	362	325	482	362	325	482	362	325	482	362	325		
			back set	395	362	375	395	362	375	395	362	375	395	362	375		
4P		front set	482	457	325	482	457	325	482	457	325	482	457	325			
		back set	395	457	375	395	457	375	395	457	375	395	457	375			

Note: Mortor protection type will be available for the breakers whose rated current (I_n) is 630A, 800A or 1000A and rated working voltage (U_e) is 400V.

MAIN TECHNICAL PARAMETERS

MGA1 -2000		MGA1 -3200				MGA1-4000			MGA1-6300	
2000		3200				4000			6300	
1600	2000	2000	2500	2900	3200	3200	3200	3200	5000	6300
AC400,690 50Hz										
AC1000 50Hz										
1200										
AC3500V 1min 50Hz										
3、4	3、4	3、4	3、4	3、4	3、4	3、4	3、4	3、4	3、4	3、4
50%In, 100%In										
80	80	100	100	100	100	100	100	100	80	80
50	50	65	65	65	65	75	75	75	50	50
50	50	80	80	80	80	80	80	80	50	50
50	50	65	65	65	65	65	65	65	50	50
176	176	220	220	220	220	220	220	220	176	176
105	105	143	143	143	143	165	165	165	105	105
50	50	80	80	80	80	80	80	80	50	50
40	40	50	50	50	50	65	65	65	40	40
B										
25-30										
max. 70										
○	○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○	○
1500	1500	500	500	500	500	500	500	500	1500	1500
500	500	500	500	500	500	500	500	500	500	500
5000	5000	2500	2500	2500	2500	2000	2000	2000	5000	5000
10000	10000	10000	10000	10000	10000	8000	8000	8000	10000	10000
horizontal Vertical	horizontal Vertical	horizontal	horizontal	horizontal	horizontal	horizontal	horizontal	horizontal	horizontal	horizontal Vertical
○	○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○	○
H W L	H W L	H W L	H W L	H W L	H W L	H W L	H W L	H W L	H W L	H W L
438 375 451	438 375 451	438 429 492	438 429 492	438 429 492	438 429 492	438 429 492	438 544 492	438 799 492	438 799 492	438 799 492
438 470 451	438 470 451	438 544 492	438 544 492	438 544 492	438 544 492	438 544 492	438 799 492	438 799 492	438 799 492	438 799 492
494 375 425	494 375 425									
438 375 446	438 375 446									
494 470 425	494 470 425									
438 470 446	438 470 446									
395 362 351	395 362 351	395 414 371	395 414 371	395 414 371	395 414 371	395 414 371	395 527 424	395 782 424	395 782 424	395 782 424
395 457 351	395 457 351	395 527 371	395 527 371	395 527 371	395 527 371	395 527 371	395 782 424	395 782 424	395 782 424	395 782 424
482 362 325	482 362 325									
395 362 375	395 362 375									
482 457 325	482 457 325									
395 457 375	395 457 375									

POWER CONSUMPTION AND CAPACITY LOWER COEFFICIENT

◆ Power consumption (Ambient temp+40°C)

MGA1-2000 (3-poles)

MGA1-2000 (4-poles)

MGA1-3200 (3-poles)

MGA1-3200 (4-poles)

MGA1-4000 (3-poles)

MGA1-4000 (4-poles)

MGA1-6300 (3-poles)

◆ Capacity Lower Coefficient

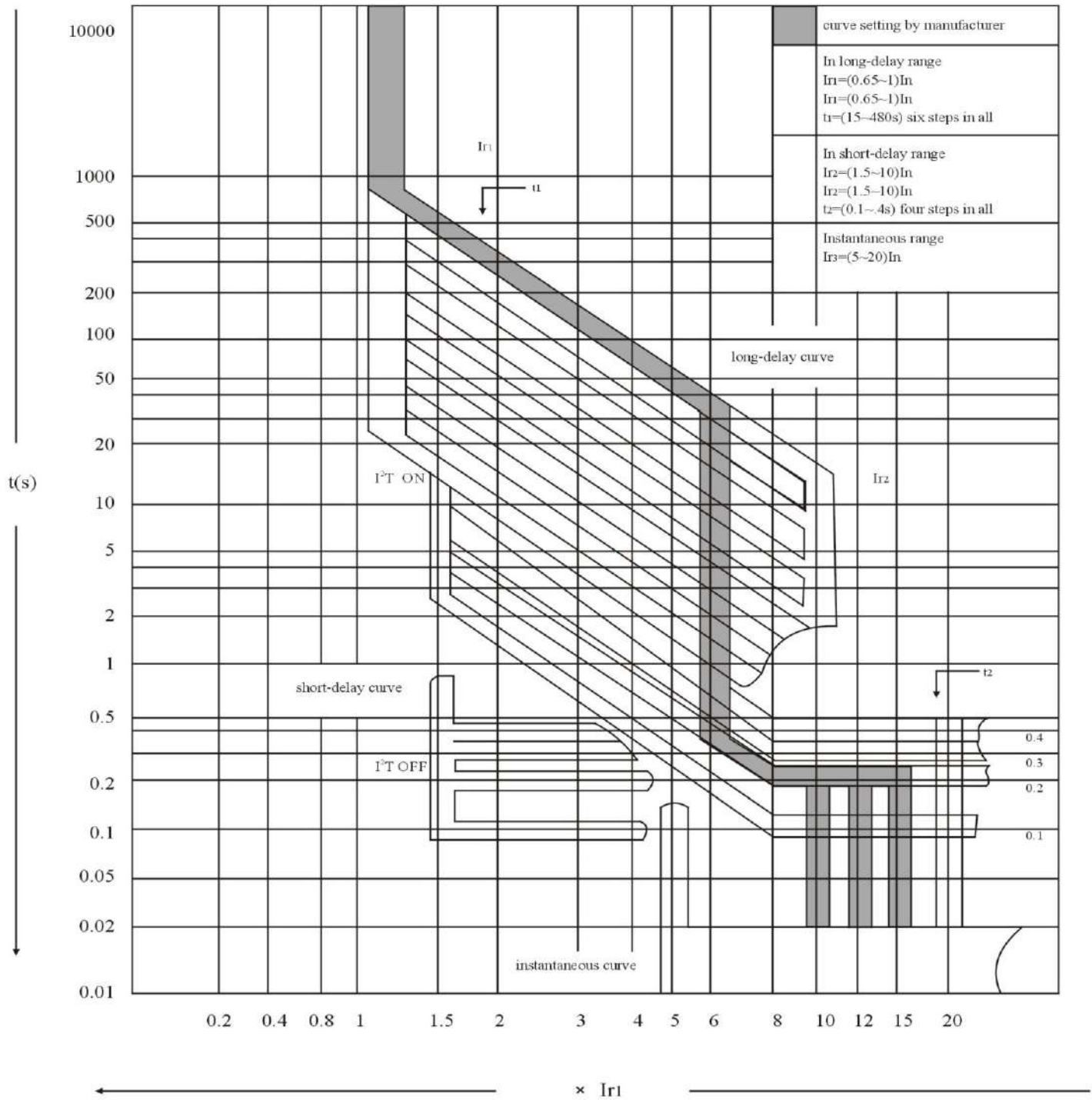
The circuit breaker capacity lower coefficient

Environment temperature		+40°C	+45°C	+50°C	+55°C	+60°C
Permission continual working current	2000A	1In	0.95In	0.9In	0.85In	0.8In
	3200A	1In	0.92In	0.86In	0.80In	0.74In
	4000A	1In	0.93In	0.87In	0.81In	0.75In
	6300A	1In	0.94In	0.88In	0.82In	0.76In

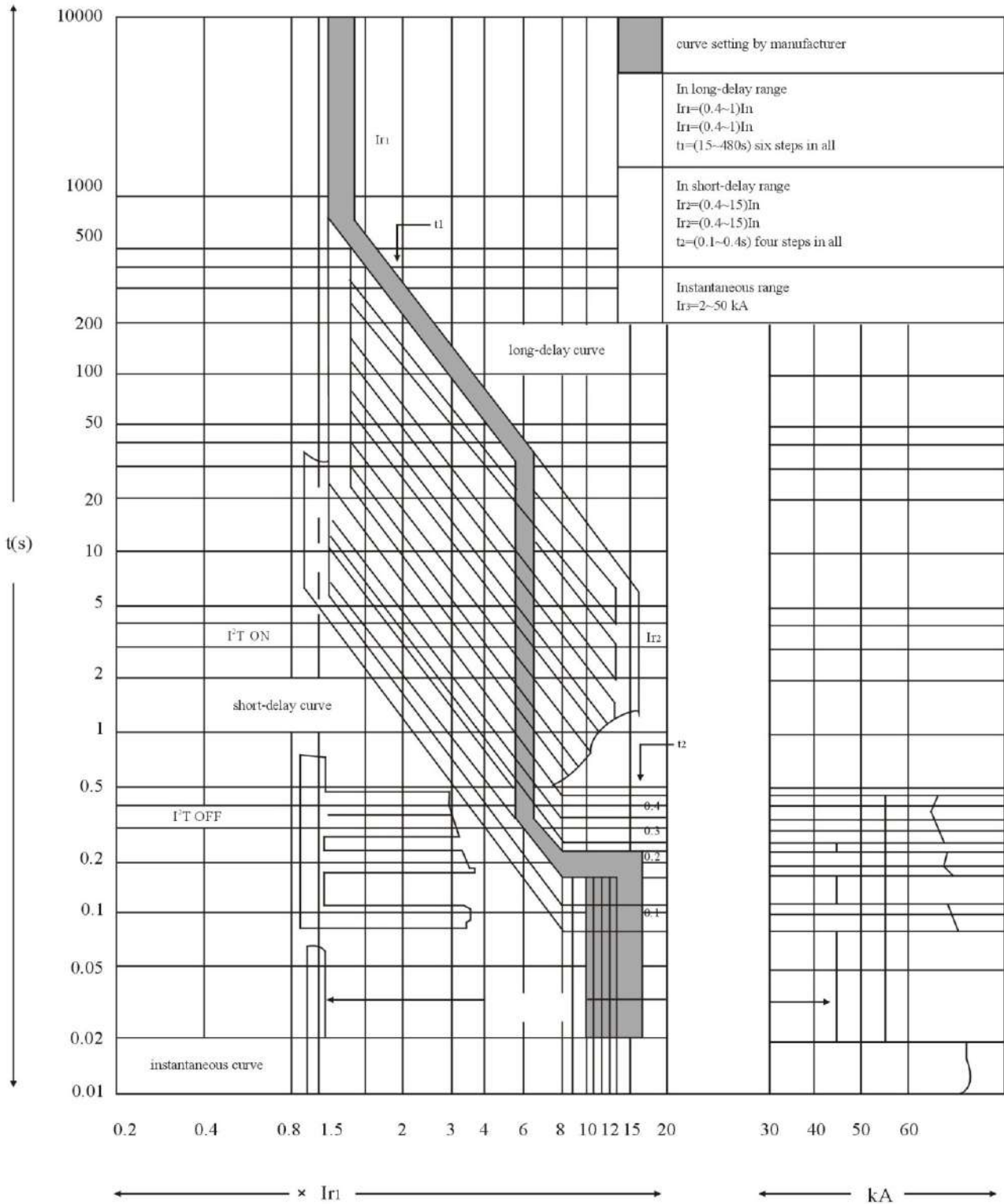
Note: Relationship between ambient temperature and permission continual working current (Under each ambient temperature condition, basing on the circuit breaker inlet and outlet's acting temperature reaching 110°C)

CHARACTERISTIC OF THE INTELLIGENT CONTROLLER

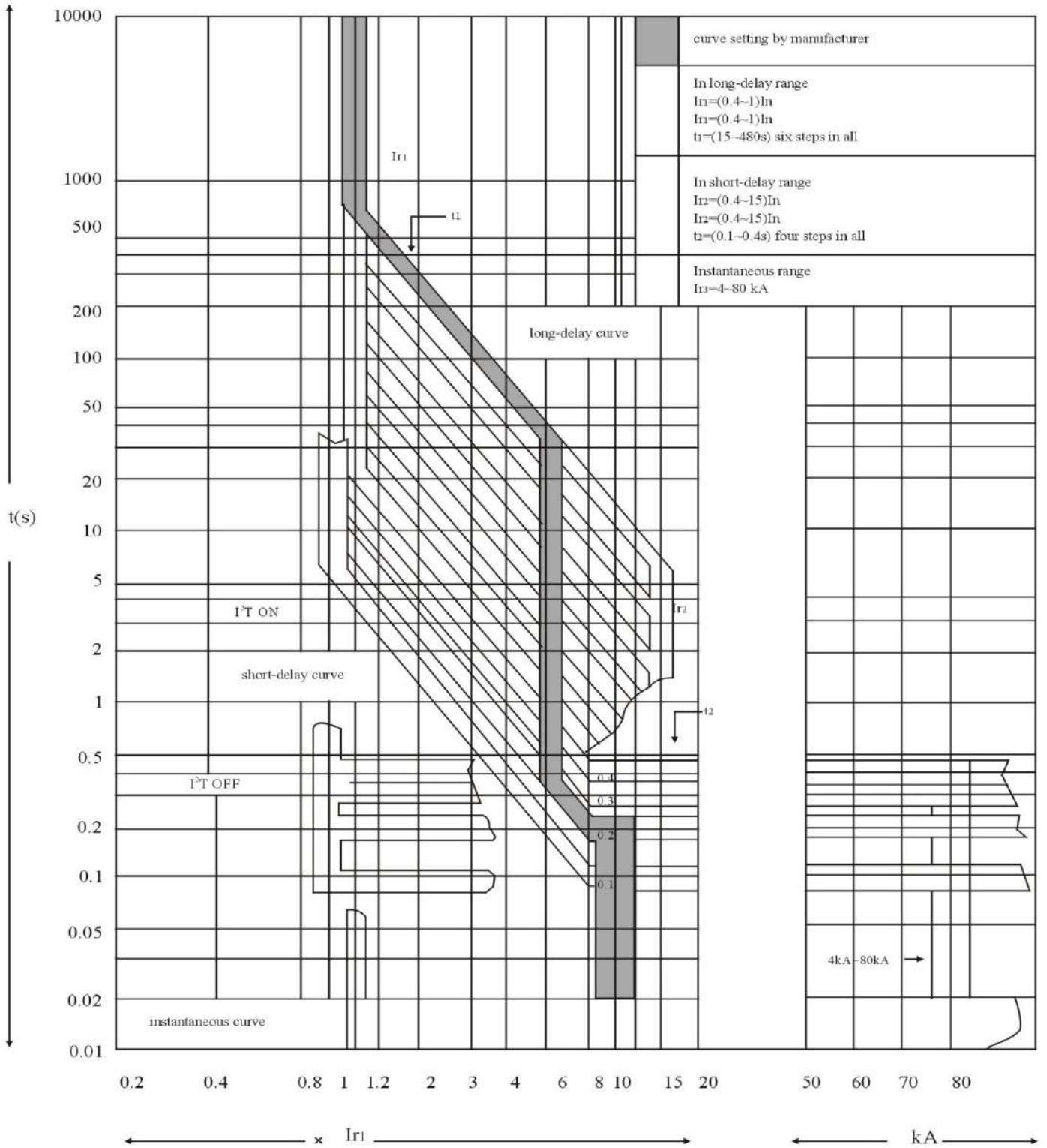
T/I (time/current) curve of type L intelligent controller (MGA1 series)



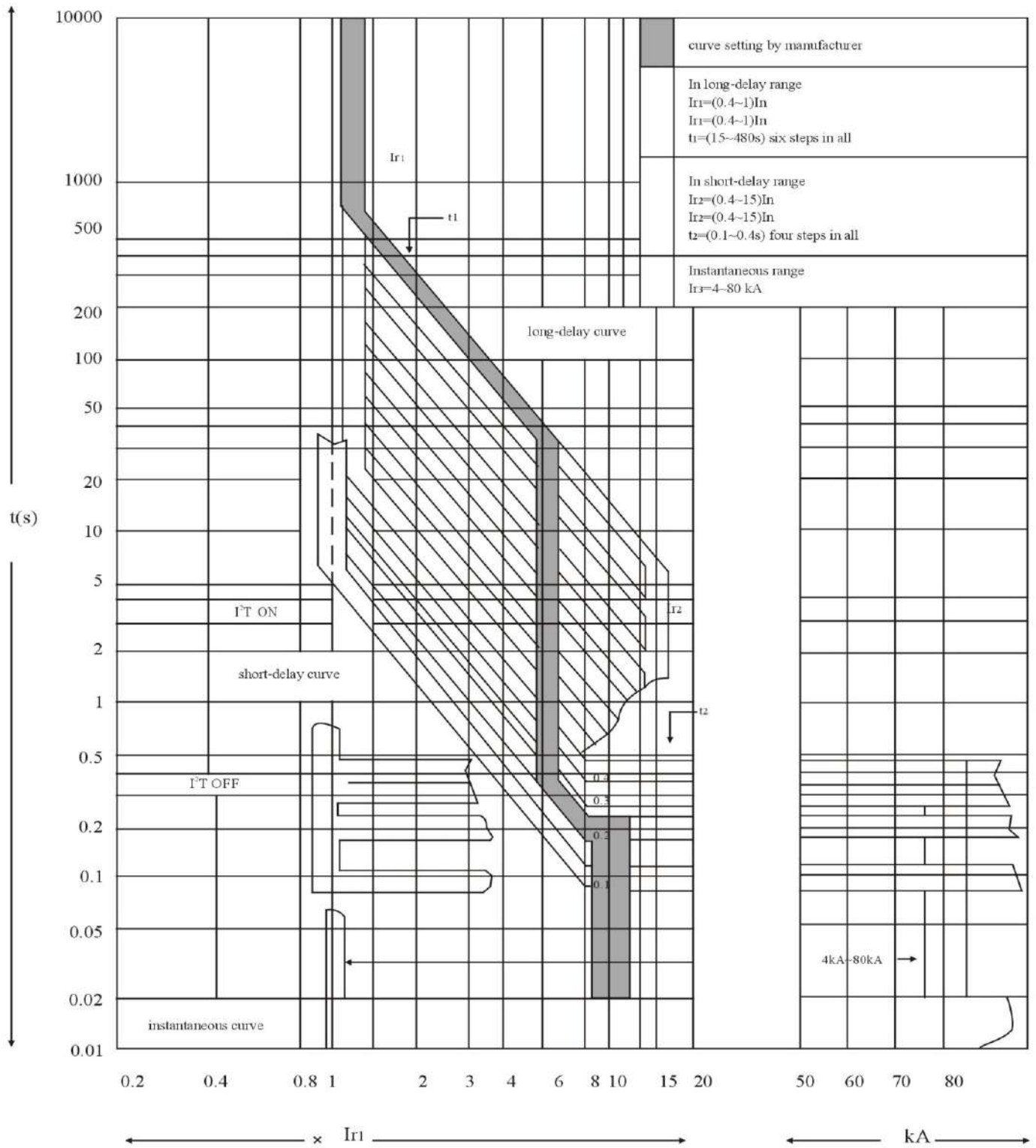
T/I (time/current) curve of the intelligent controller M、H type (2000A)



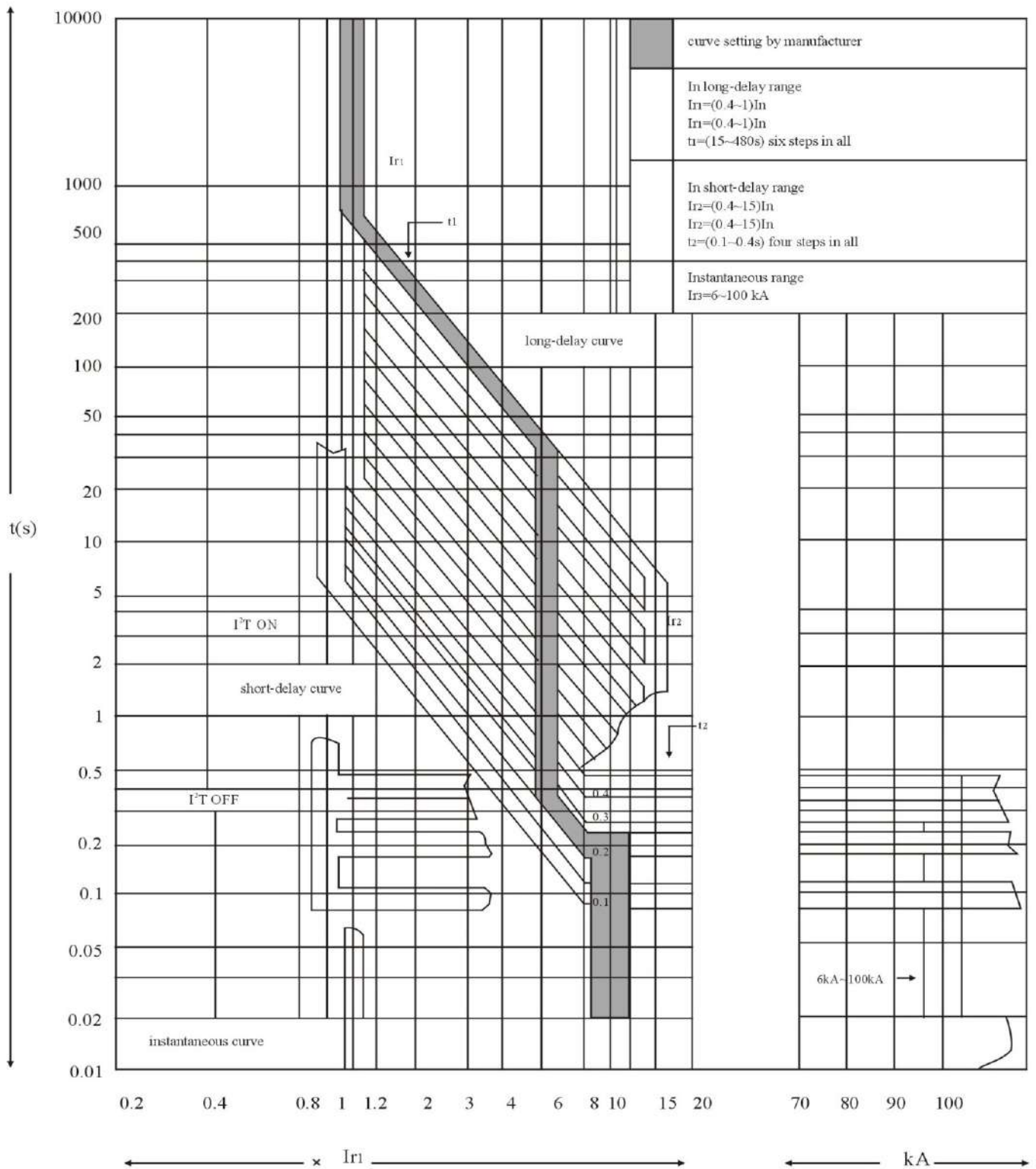
T/I (time/current) curve of the intelligent controller M、H type (3200A)



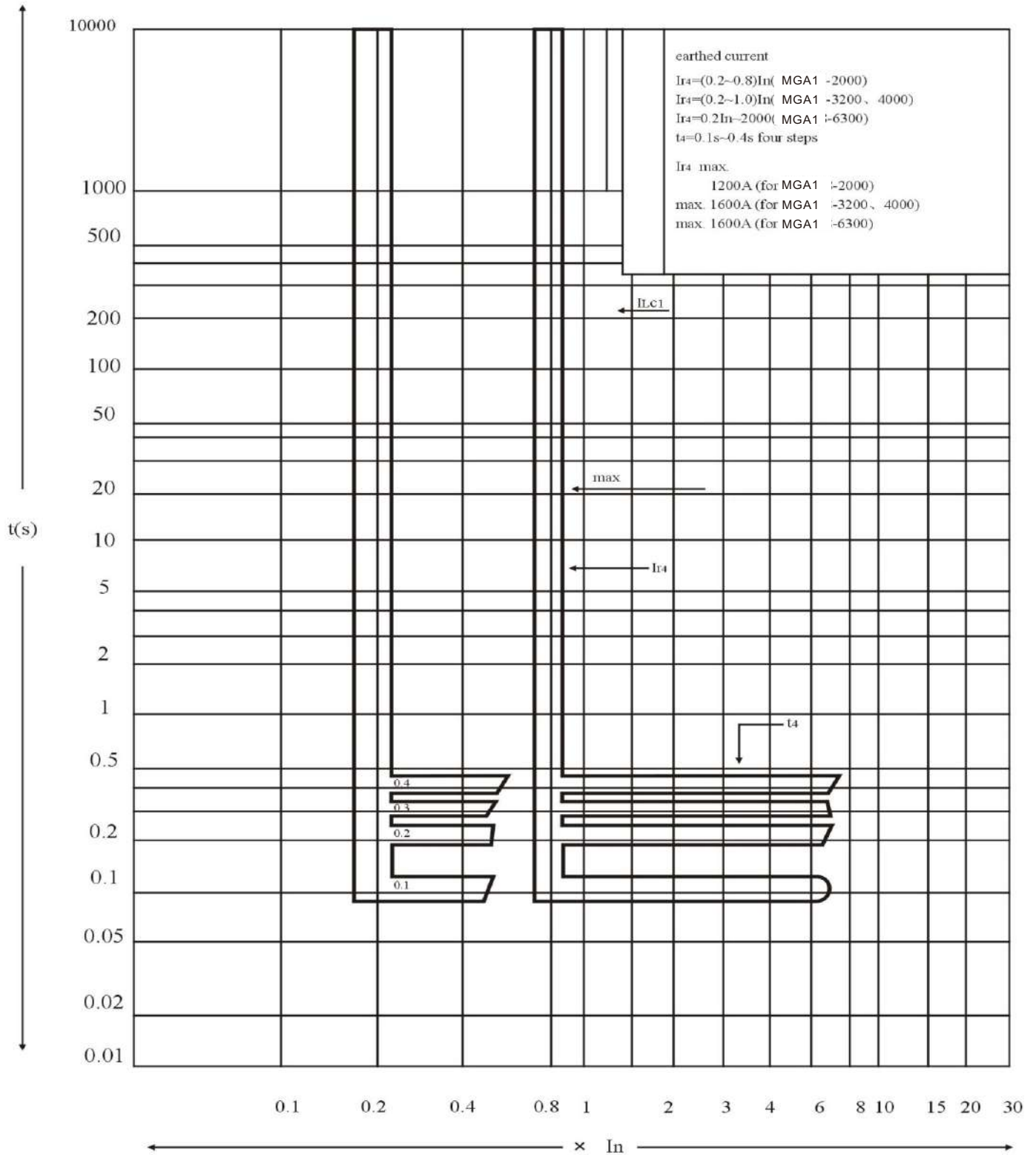
T/I (time/current) curve of the intelligent controller M、H type (4000A)



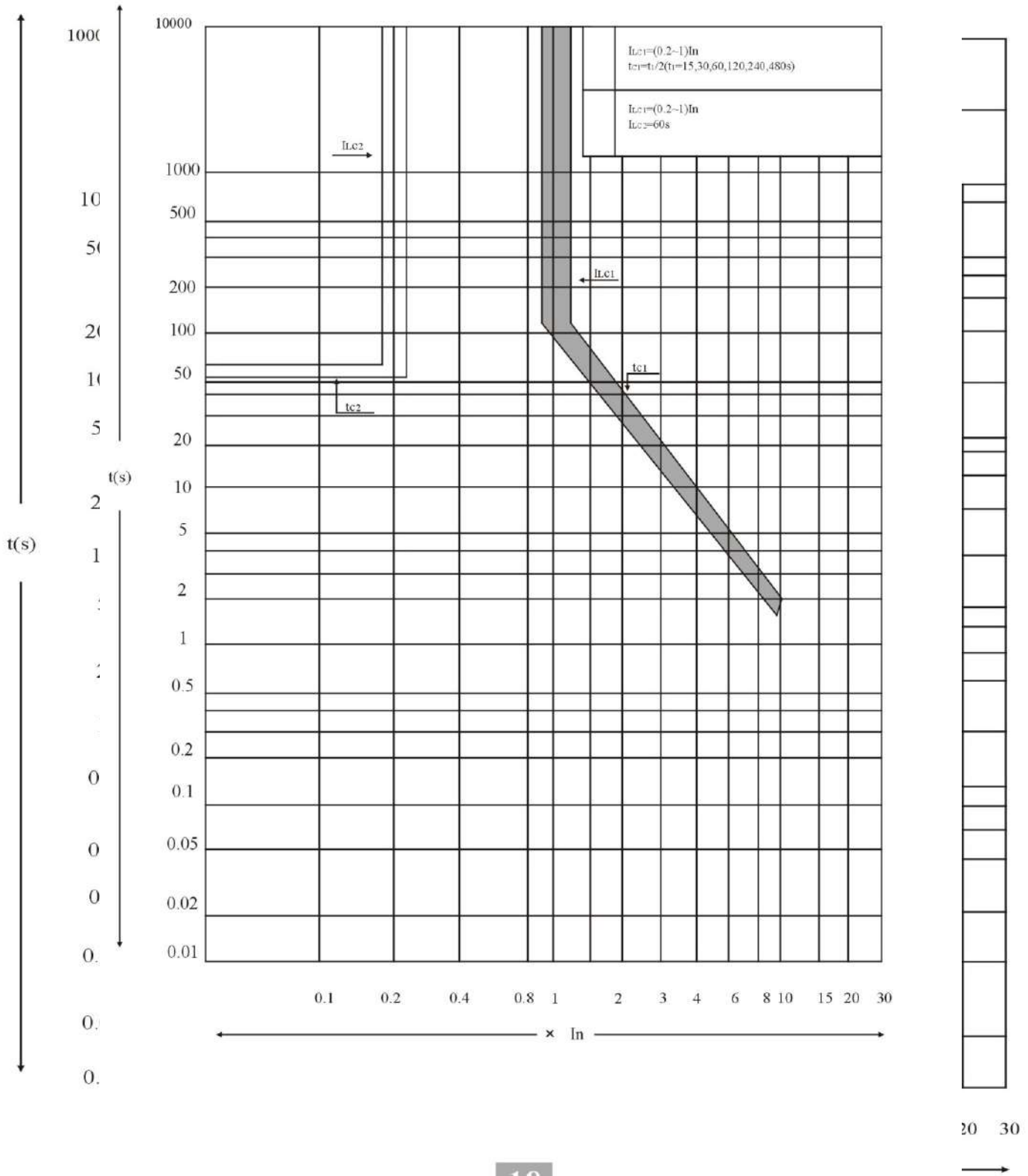
T/I (time/current) curve of the intelligent controller M、H type (5000A)



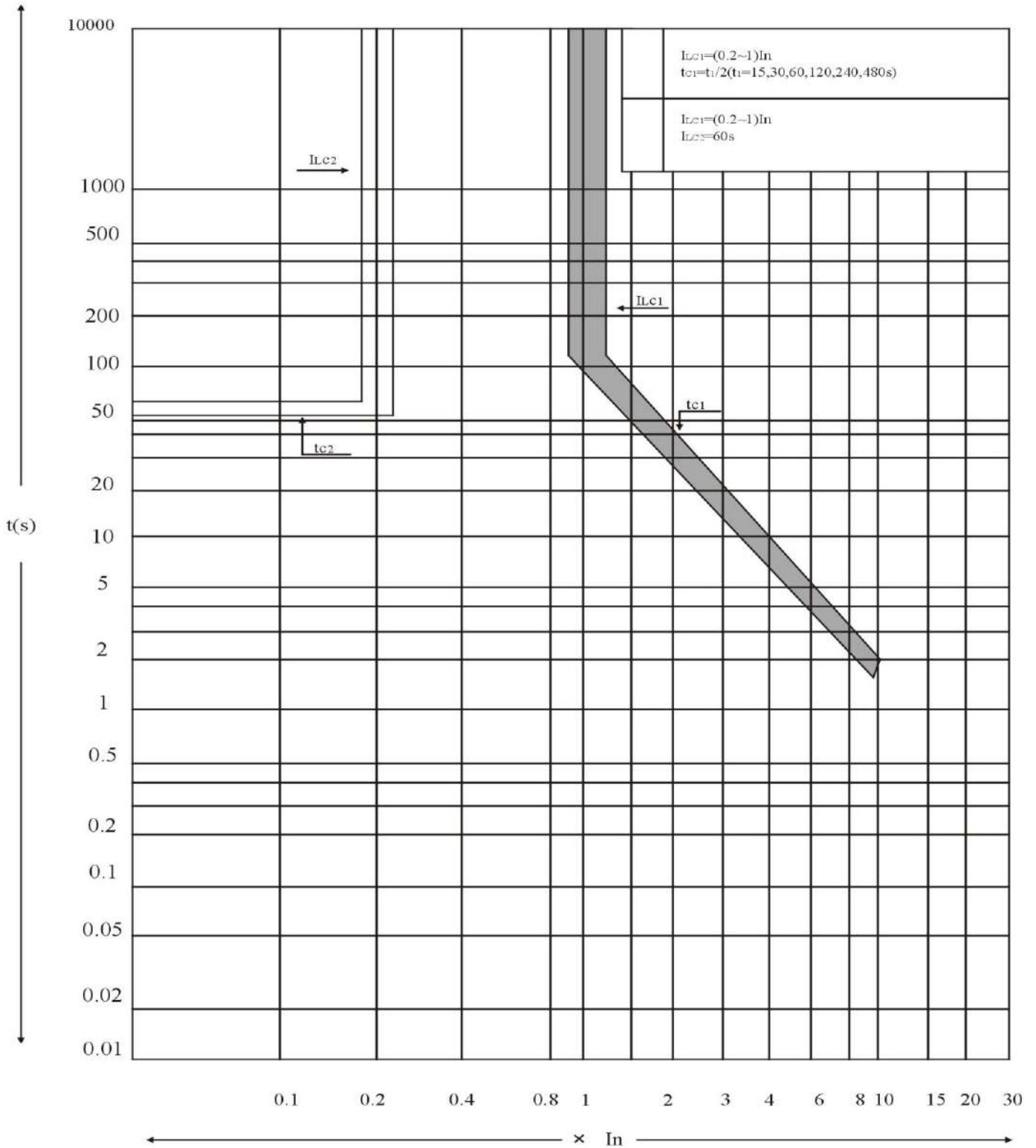
T/I (time/current) curve of the intelligent controller M、H type errors protection



T/I (ti T/I (time/current) curve of the intelligent controller M、H type for load-monitor pattern 2 pattern 1



T/I (time/current) curve of the intelligent controller M、H type for load-monitor pattern 2



OUTER AND MOUNT DIMENSIONS

◆ Fixed Circuit Breaker Mount & Outer Dimensions refer to chart 8, 9.

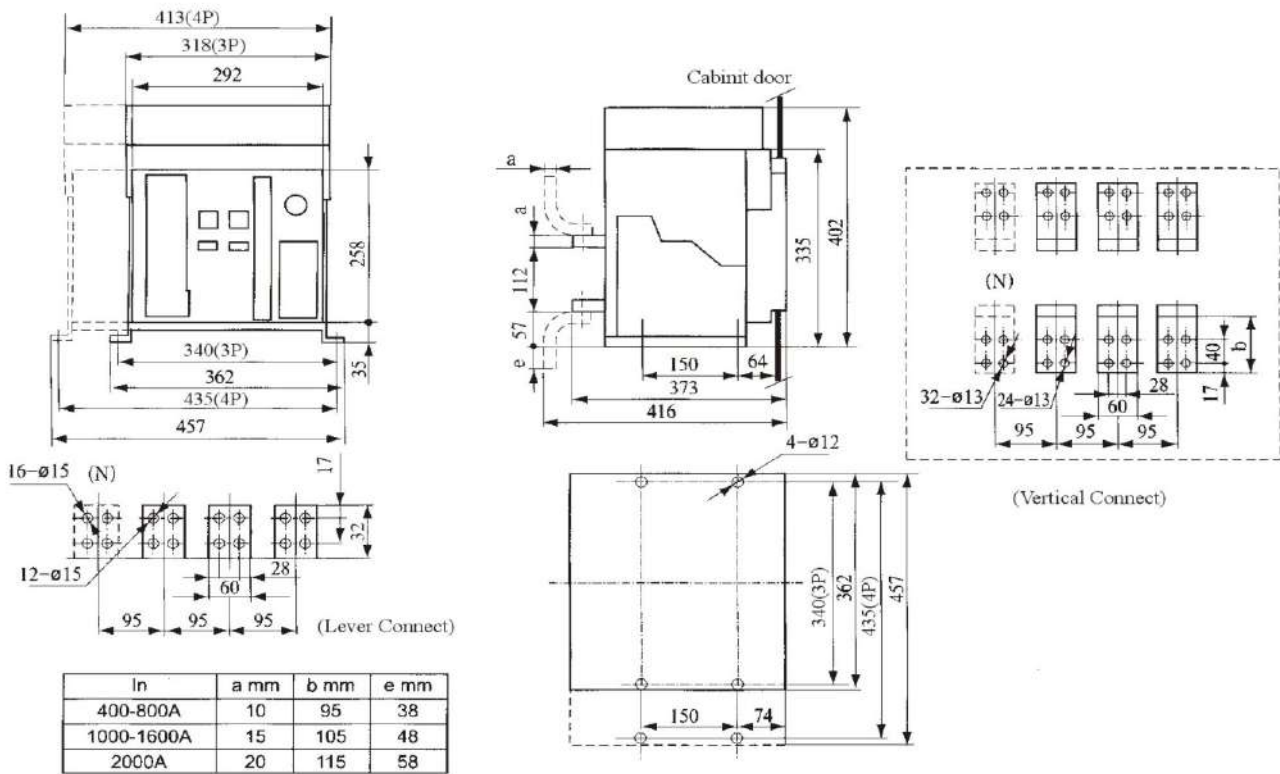


Chart 8 Fixed CB mount & Outer Dimensions (MGA1-2000、2000/4)

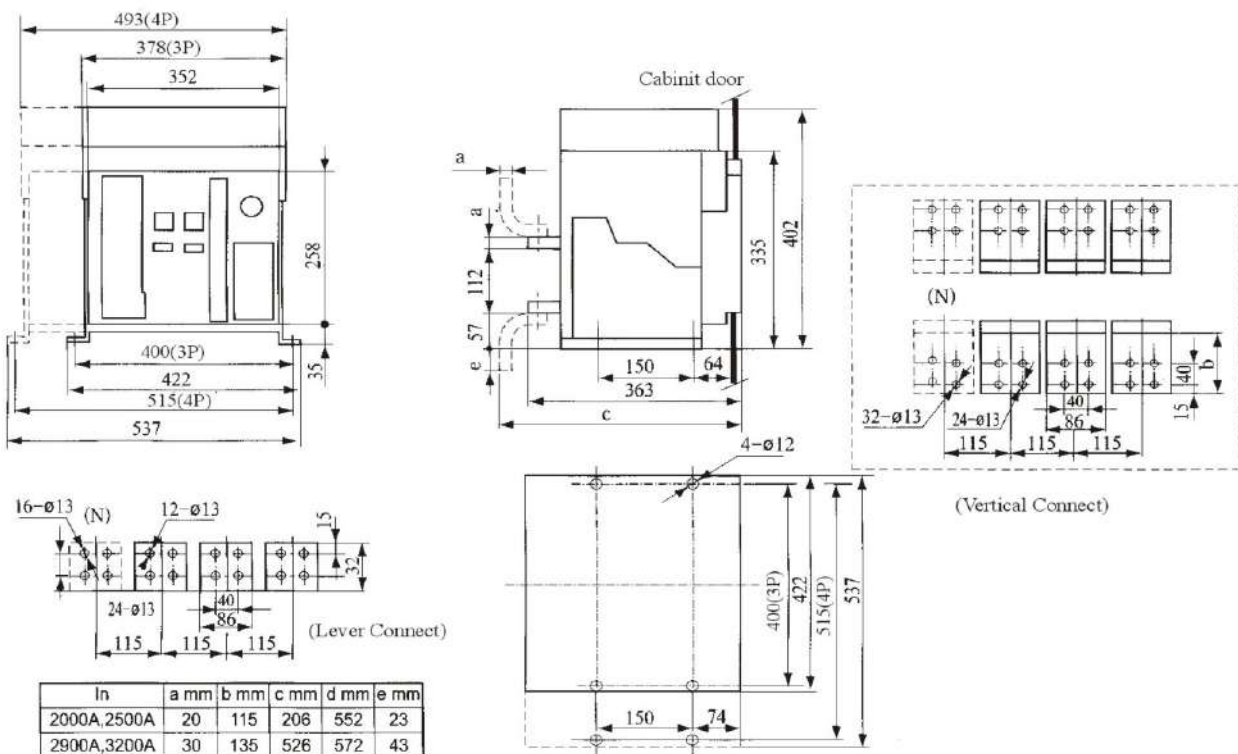


Chart 9 Fixed CB mount & Outer Dimensions (MGA1-3200、3200/4)

◆ Drawer Type CB Mount & Outer Dimensions refer to chart 10, 11, 12, 13, 14, 15, 16.

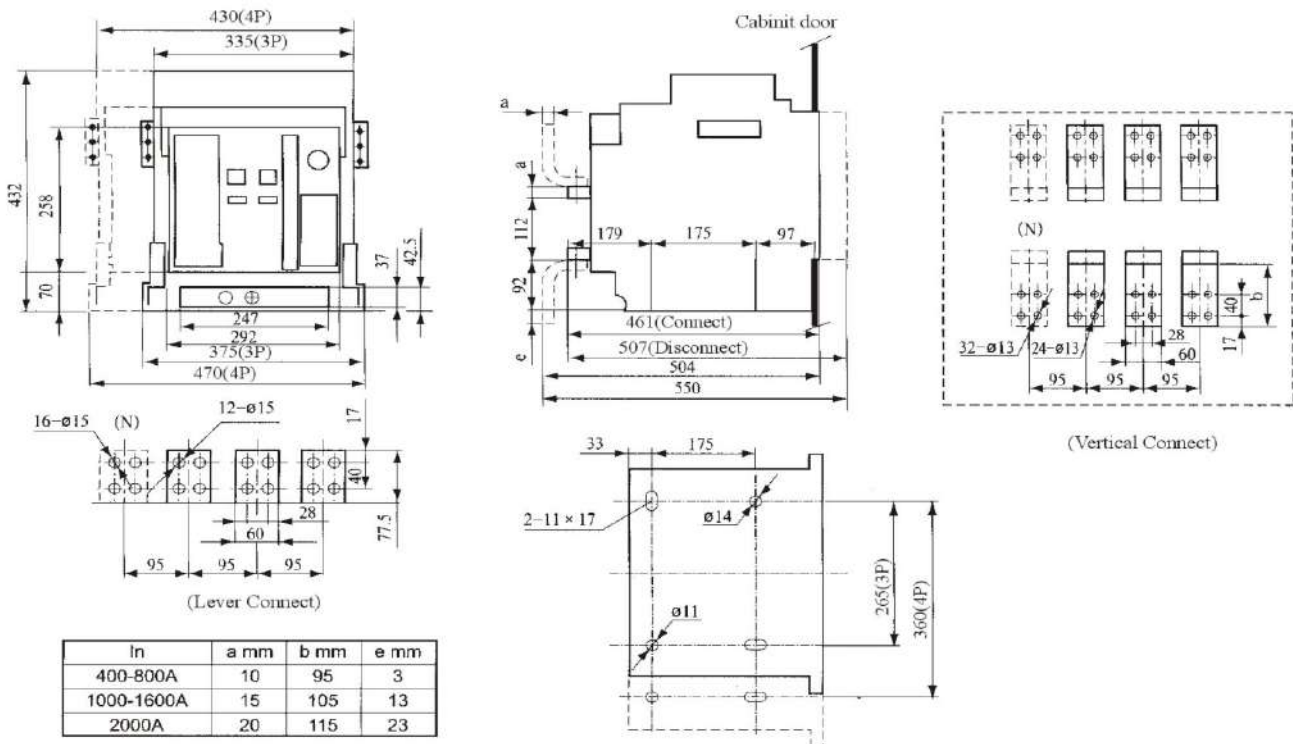


Chart 10 Drawer Type CB mount & Outer Dimensions (MGA1-2000、2000/4)

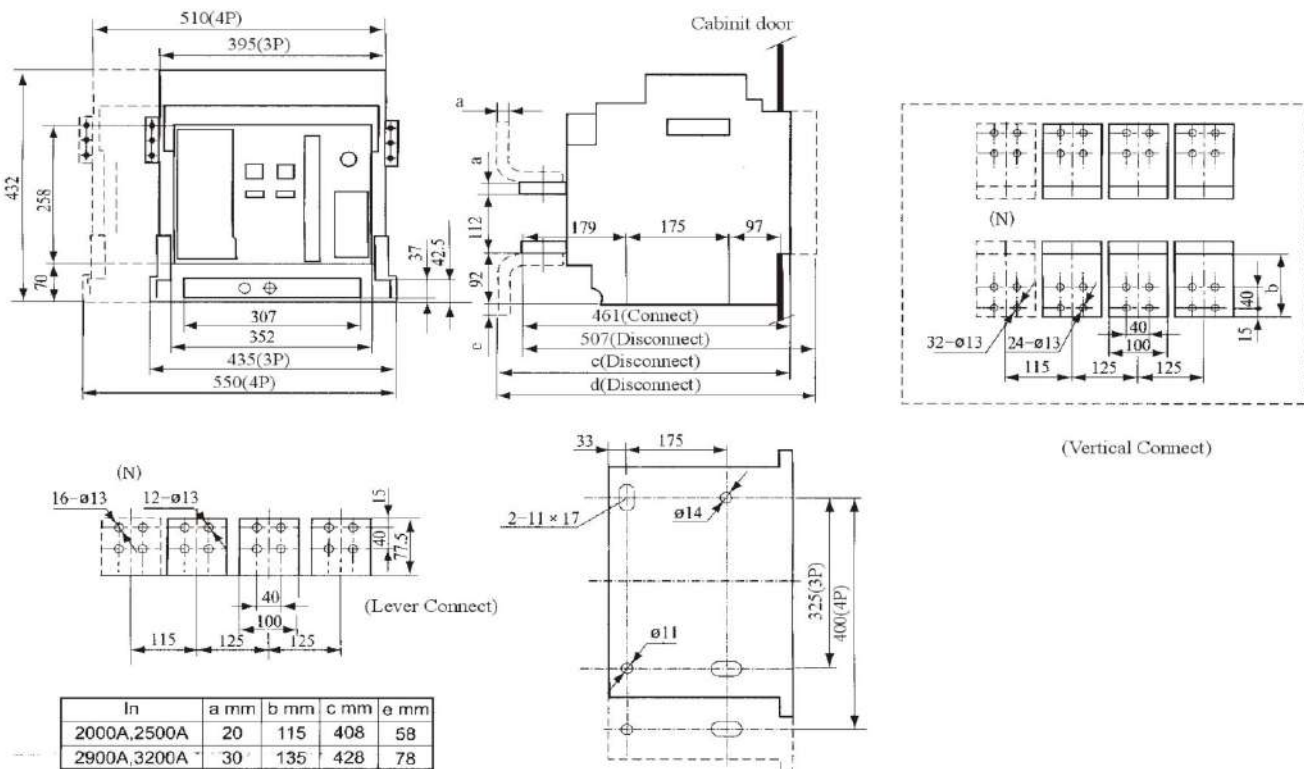


Chart 11 Drawer Type CB mount & Outer Dimensions (MGA1-3200、3200/4)

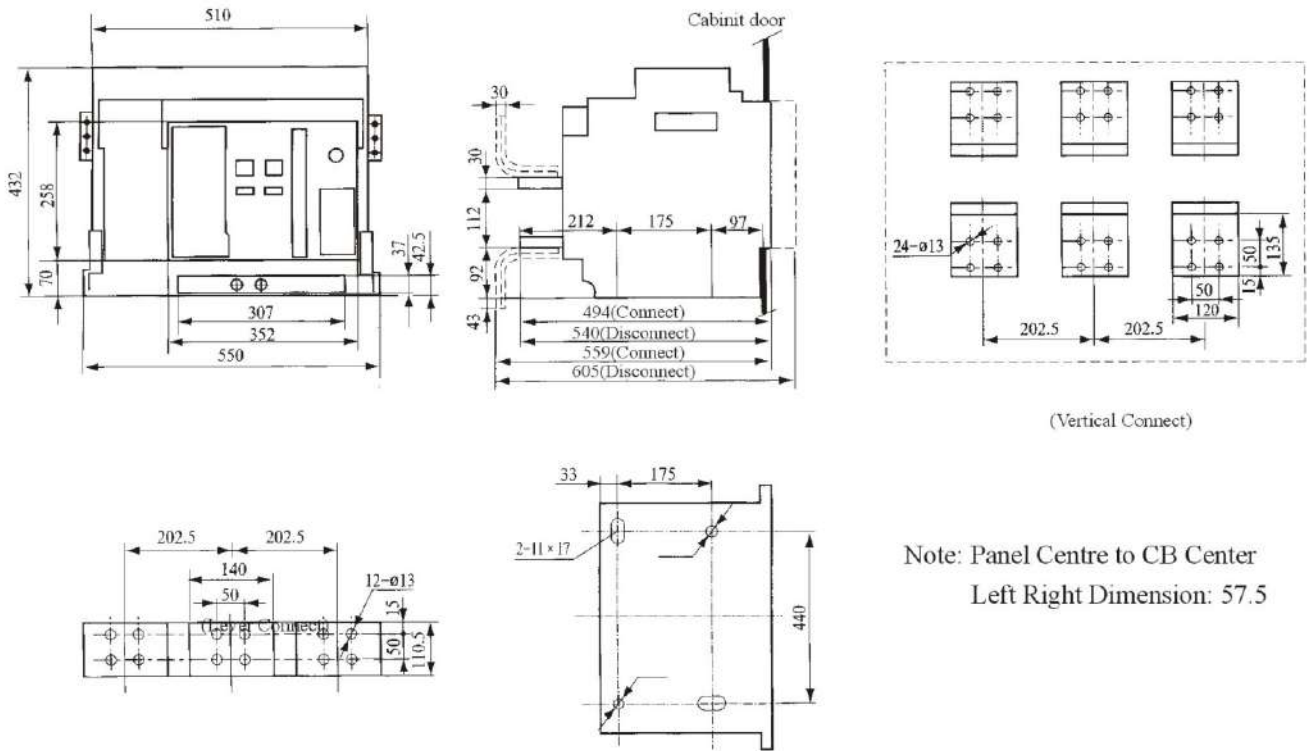


Chart 12 Drawer Type CB mount & Outer Dimensions (MGA1 -4000)

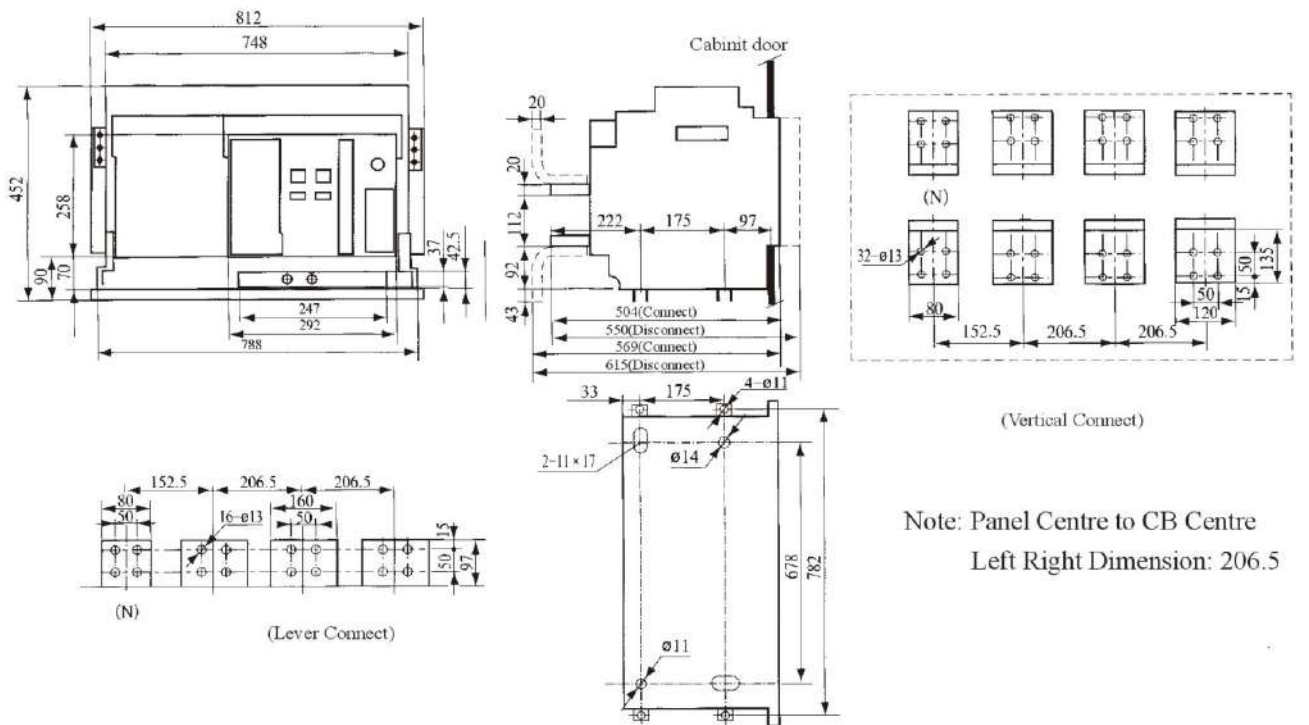


Chart 13 Drawer Type CB mount & Outer Dimensions (MGA1 -4000/4)

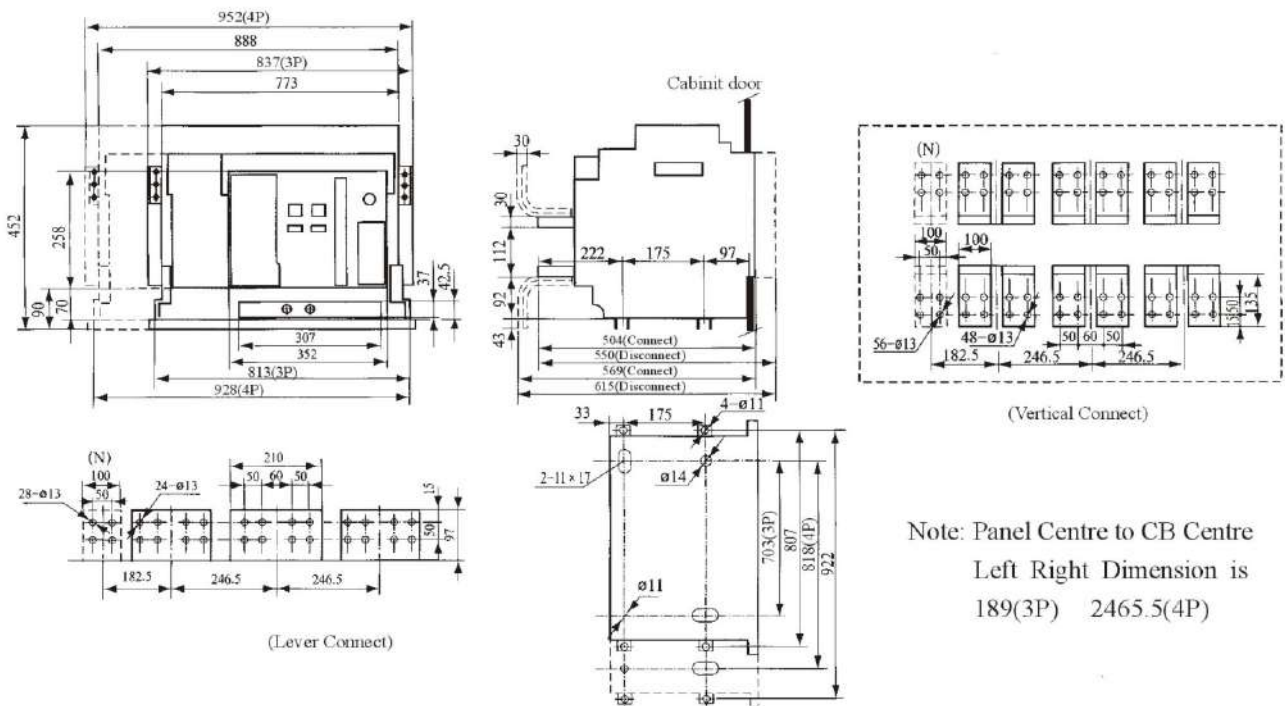


Chart 14 Drawer Type CB mount & Outer Dimensions (MGA1 -6300、6300/4 In=4000、5000)

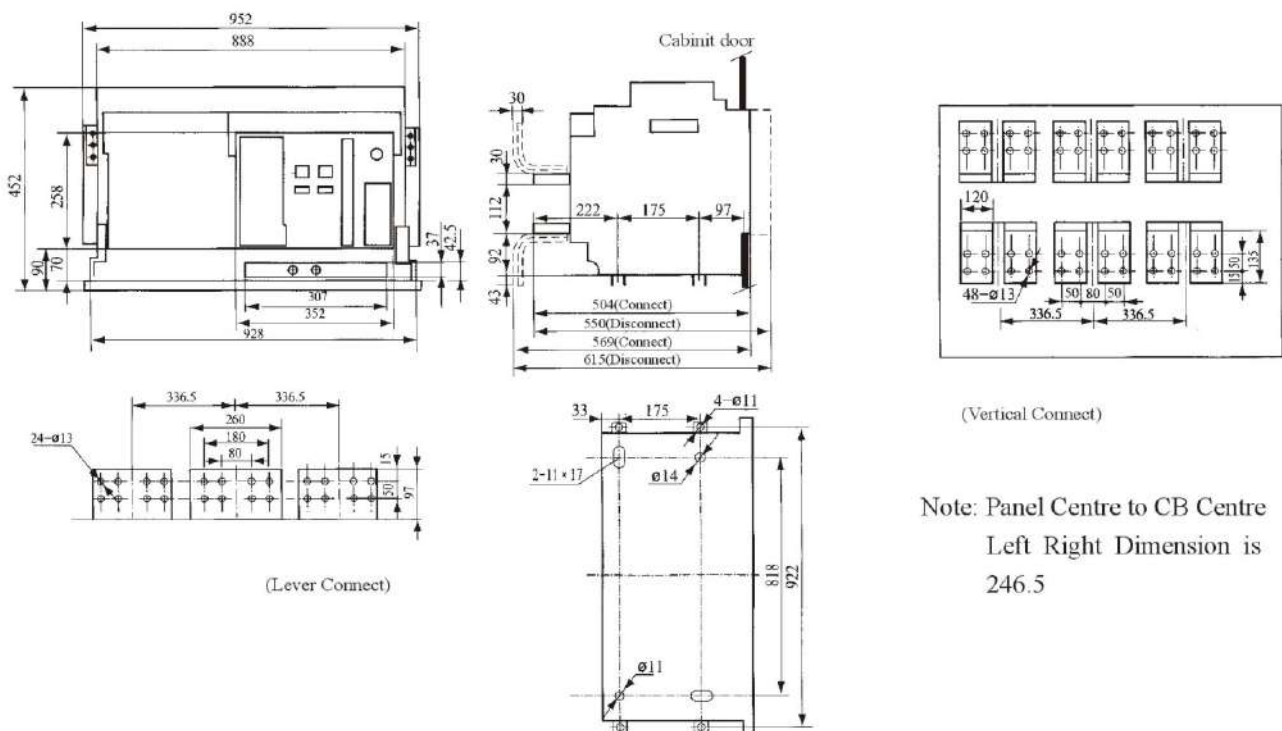
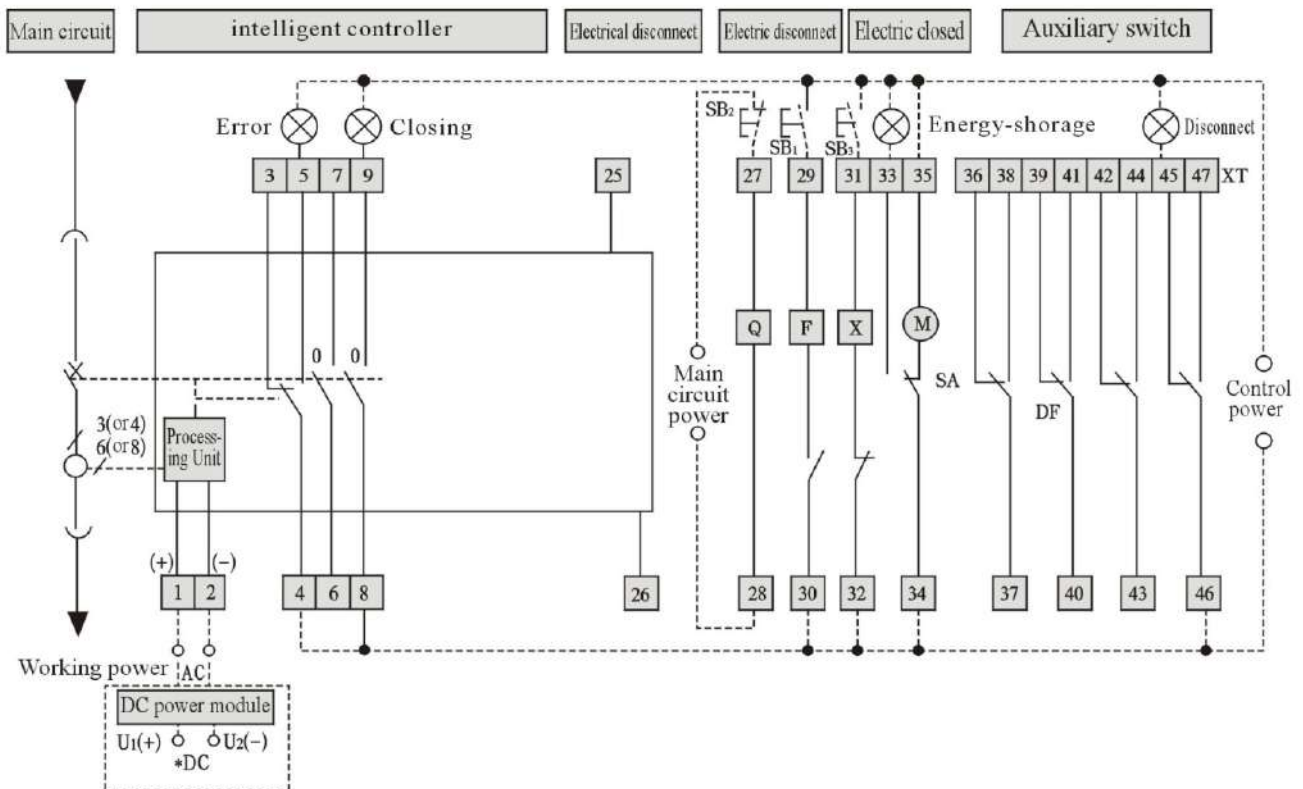


Chart 15 Drawer Type CB mount & Outer Dimensions (MGA1-6300、In=6300A)

BREAKER SECONDARY CIRCUIT WIRING DIAGRAM

Controller for the M or L-type basic functions

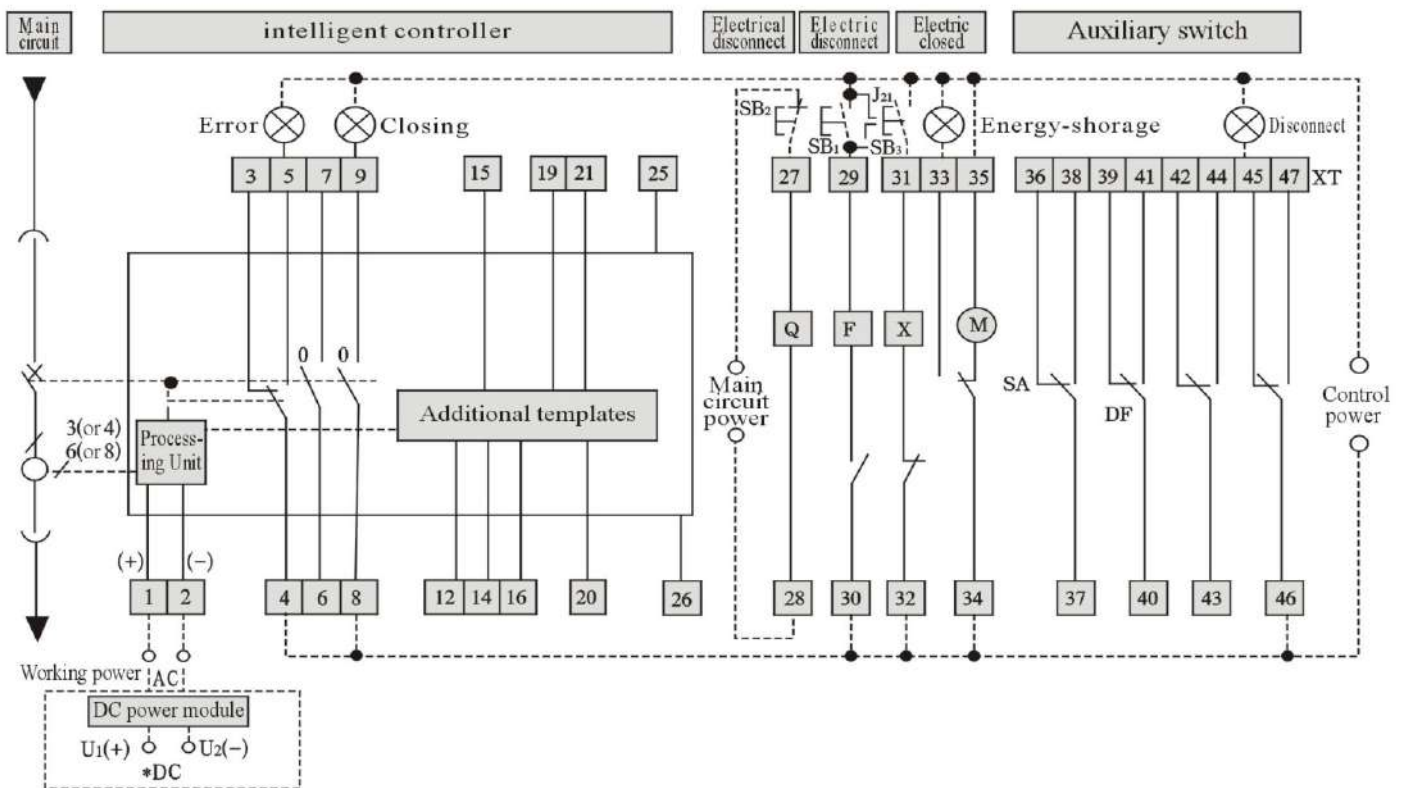
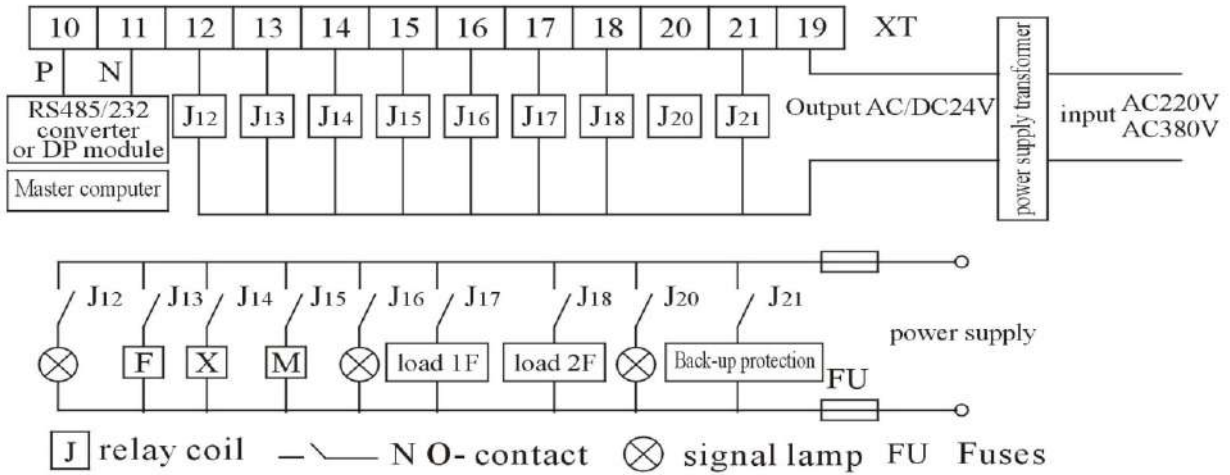


Note:

- (1) If the control power voltage of F、X、M is different ,it should be connect into different power .
- (2) Terminal #35 to power supply directly (auto energy prestore) or follow with a N O button then connect to the power supply (manual advance energy storage).
- (3) If user put forward , terminal # 6 - # 7 can output often close contact
- (4) Impressed accessories is done by users themselves .
- (5) When the intelligence work of controllers for the DC power supply, it need to increase the DC module(At this point # 1, # 2 terminal can not directly access AC power)
Secondary wiring is showed by the chart 【DC110V or 220V U1 (+) \U2(-)input, the two fan-out of DC power module should be respectively connect to the Second Block wiring terminal 1 (+), 2 (-)】

SB1 Shunt button(User-owned) X closing electromagnet DF Auxiliary contact
 Q Under-voltage release or under-voltage delay-time release SB2 under-voltage button(User-owned) M charging motor F shunt release O NO- contact (3A/AC380V) SB3 switch-on button XT Terminal SA Micro-motor switch ⊕ signal lamp (User-owned)

For the M-type controller with additional functions, or H-RS485/232



SETTING VALUE BEFORE LEAVING FACTORY

The intelligent controller would be configured as follows, If no special demands was put forward when ordering:

Overload long-delay	Current setting I_{r1}	I_n		
	Delay time setting t_1	15S		
Short-circuit hort-delay	Current setting I_{r2}	$8I_{r1}$		
	Delay time setting t_1	0.4S		
Short-circuit instantaneous current setting I_{r3}		$12I_n$		
Earthed errors	Current setting I_{r4}	MGA1 - 2000	MGA1 - 3200、4000	MGA1 - 6300
		$0.8I_n$ or 1200A (choose smaller value)	$0.6I_n$ or 1600A (choose smaller value)	2000A
	Delay time setting t_4	OFF		
Load monitoring	Monitoring setting I_{LC1}	I_n		
	Monitoring setting I_{LC2}	I_n		