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采用生态纸印刷
Printed on ecological paper

CHNAILE®

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AIR CIRCUIT BREAKER

PRODUCTS MANUAL

万能式断路器选型手册

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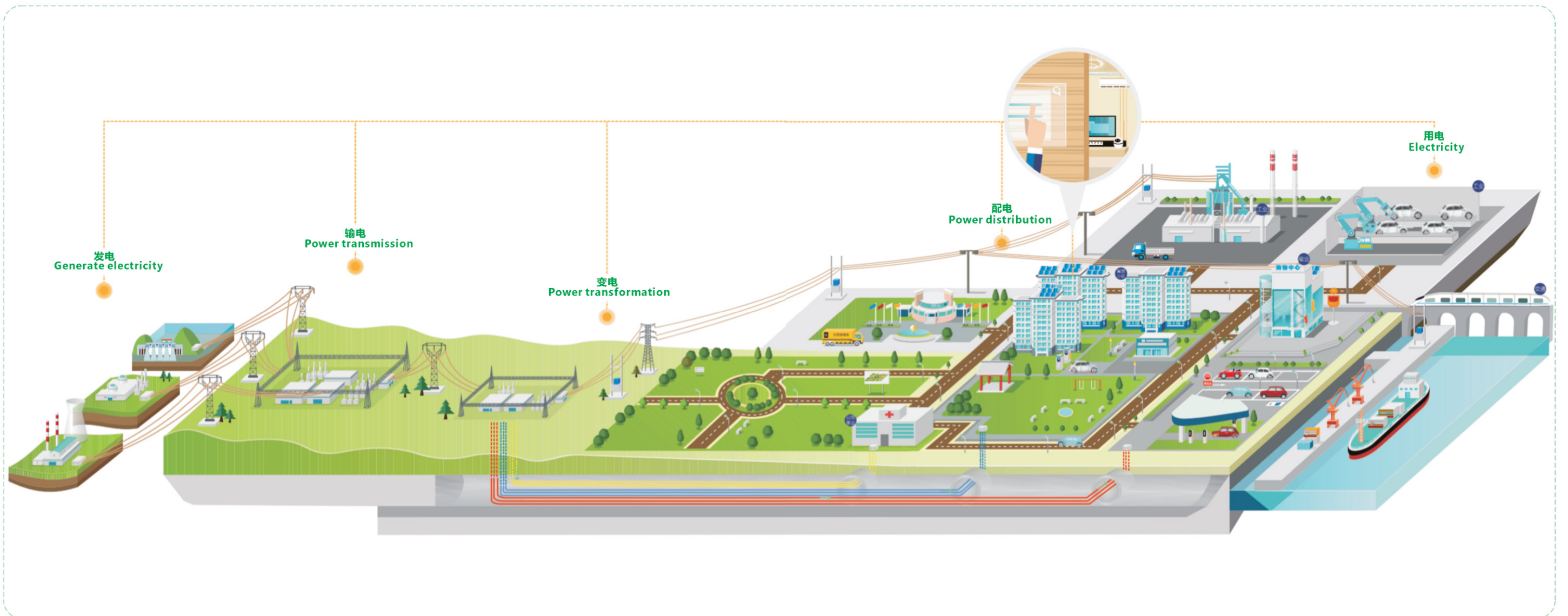
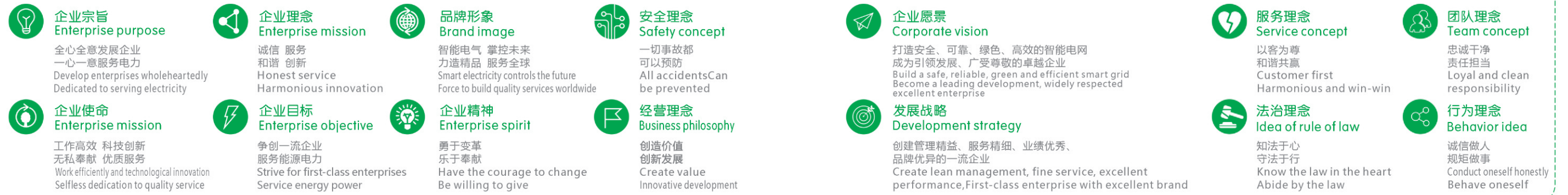
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电力生态示意图

POWER ECOLOGICAL DIAGRAM

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NAILE ELECTRIC CO.,LTD AERIAL VIEW

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耐勒电气有限公司成立于2014年，注册资金1.18亿元。公司总部位于浙江省温州市乐清市。是一家集设计、研发、制造、营销、服务于一体大型综合性高新技术企业。

自成立以来，CHNAILE一直以专业为导向，致力于终端、工控、新能源配电等系列产品的设计与制造，以满足用户需求，提供高品质的解决方案。

公司拥有专业的实验室和检测中心。已获得多项发明和实用新型专利。目前，有多条自动化车间生产线，其中自动装配生产线、半自动装配生产线、自动检测线占70%以上。

目前，公司已荣获国家级高新技术企业、浙江省科技型中小企业等多项荣誉。在生产经营过程中，先后通过ISO9001、ISO14001、ISO45001等国际标准化组织体系认证，并获得SGS认证。产品获得国家CNAS实验室认证。产品质量可靠，远销欧盟、美洲、中东、非洲、东南亚等60多个国家和地区。我们致力于为全球客户提供高品质的产品和服务。

Naile Electric Co., Ltd. was established in 2014 with a registered capital of 118 million yuan. The company's headquarters is located in Yueqing City, Wenzhou City, Zhejiang Province. It is a large-scale comprehensive high-tech enterprise integrating design, research and development, manufacturing, marketing and service.

Since its establishment, CHNAILE has been oriented towards professionalism, dedicated to the design and manufacture of terminal, industrial control, new energy distribution and other series of products to meet the needs of users and provide high-quality solutions.

The company has a professional laboratory and testing center. It has obtained multiple invention and utility model patents. Currently, there are several automated workshop production lines, among which automatic assembly lines, semi-automatic assembly lines, and automatic testing lines account for more than 70%.

At present, the company has been awarded the title of National High-tech Enterprise, Zhejiang Province Science and Technology-based Small and Medium-sized Enterprise, and many other honors. During the production and operation process, it has successively passed ISO9001, ISO14001, ISO45001 and other international standard organization system certifications, and obtained SGS certification. The products have been certified by the National CNAS Laboratory. The product quality is reliable and is exported to more than 60 countries and regions including the European Union, the Americas, the Middle East, Africa, and Southeast Asia. We are committed to providing high-quality products and services to customers worldwide.



车间设备 WORKSHOP EQUIPMENT



实施品牌化管理是我们向前发展的追求目标，是我们竞争于同行的有力保障，而品牌建立的前提是我们产品质量的可靠与稳定性，因此，工欲善其事，必先利其器，精良的设备是提高产量、质量的可靠保证。

我们导入了国际化的质量管理体系，坚持每一细节的一丝不苟与精益求精，实现产品质量的标准化及系统化管理。靠高素质人才、雄厚的技术、精良的设备、齐全的品种，不断推出具有国内领先水平的高低压电气产品，使品牌因质量而更加出类拔萃、更加绽放夺目光彩。

The implementation of brand management is our pursuit of the goal of moving forward, is a strong guarantee for our competition with peers, and the premise of the establishment of the brand is the reliability and stability of the quality of our products, therefore, to do a good job, we must first benefit its tools, sophisticated equipment is a reliable guarantee to improve production and quality.

CHNAILE®



荣誉资质
QUALIFICATION HONOR



品质管理是新时代腾飞的翅膀，通畅的沟通传达，严格的品质监控，尽善尽美的细节操作，愉悦的业务往来，在新时代，总之，务求让每个客户都能获得最完美的服务，这是我们一贯的事业精神。

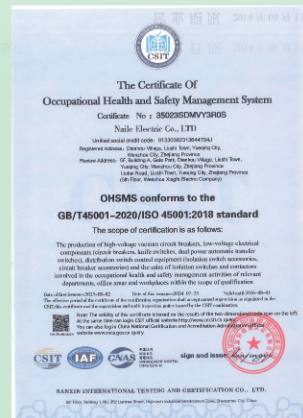
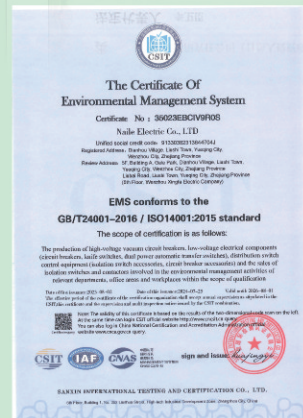
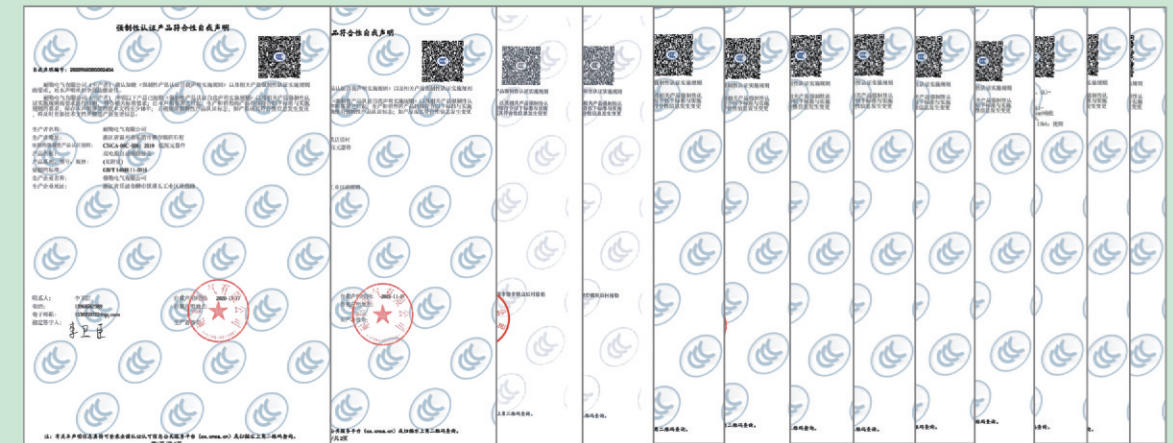
我们一直以自己的专业与专注，赢得了业界的赞誉与支持，也使耐勒电气创造了一系列足堪流传的精品。

Quality management is the wings of the new era, unobstructed communication, strict quality control, perfect detail operation, pleasant business dealings, in the new era, in short, in order to let each customer can get the most perfect service, this is our consistent career spirit.

We have been with their own professional and focus, won the praise and support of the industry, but also make Nalle Electric to create a series of good enough to spread.



CHNAILE®





NLW1
万能式断路器
Air circuit breaker

001-037



NLW3
万能式断路器
Air circuit breaker

038-058



NLW1-1600H
系列塑框一体式断路器
Series Plastic frame
integrated circuit breaker

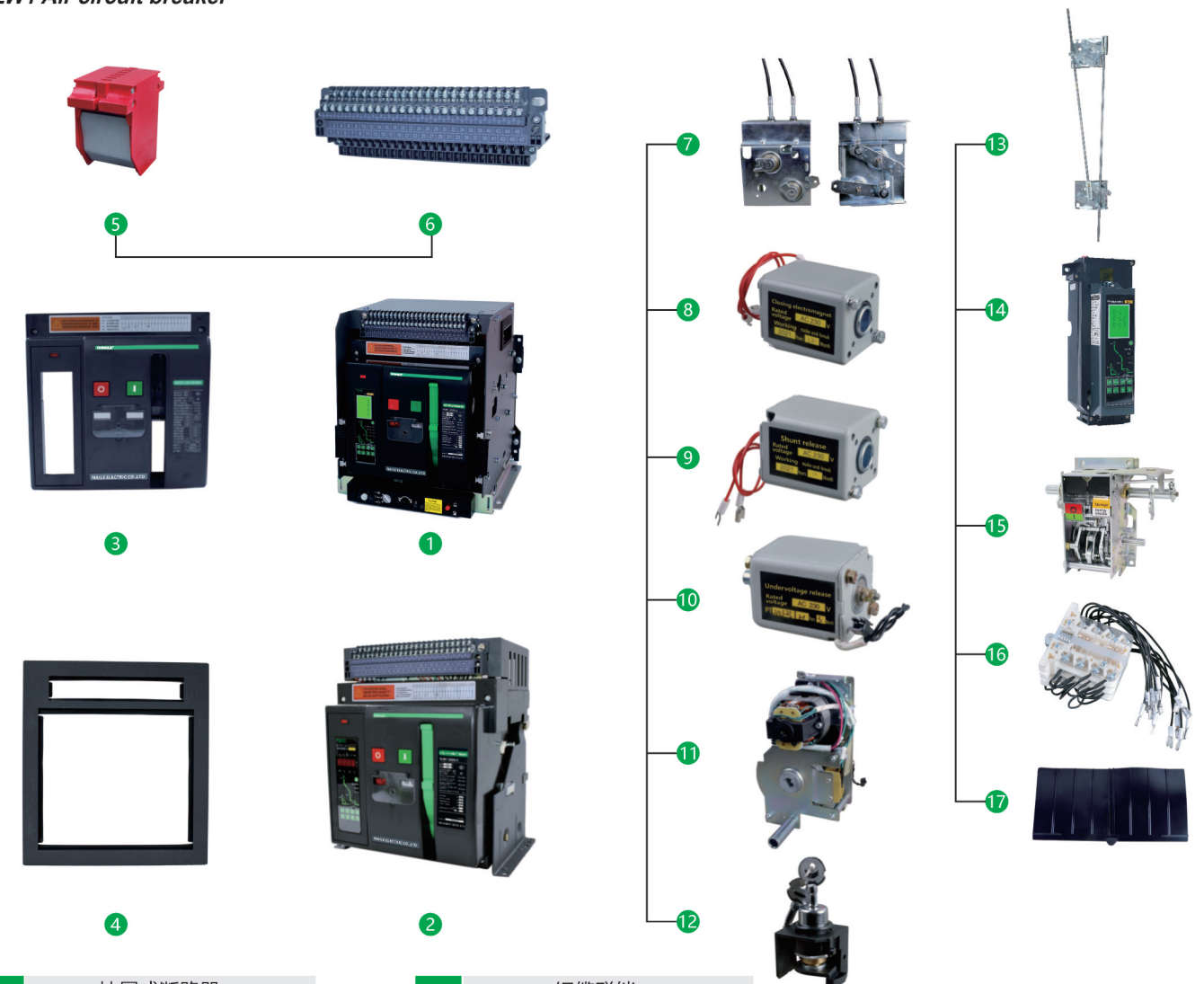
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Warning

本产品必须由专业人员按照手册进行安装、连接、使用和保养。

This product must be installed, connected, used and maintained by aualified personnel in ac cordance with the manual.

NLW1系列智能断路器
NLW1 Air circuit breaker



1	抽屉式断路器 Drawer circuit breaker
2	固定式断路器 Stationary circuit breaker
3	面罩 Front panel
4	门框 Door frame
5	灭弧室 Arc chamber
6	二次回路 Secondary circuit

7	钢缆联锁 Steel cable interlock
8	闭合电磁铁 Closing electromagnet
9	分励脱扣器 Shunt release
10	欠电压脱扣器 Under voltage release
11	电动储能机构 Electro drive energy storage mechanism
12	钥匙锁 Lock

13	杠杆联锁 Lever interlock
14	智能控制器 Intelligent controller
15	操作机构 Operating mechanism
16	辅助开关 Auxiliary switch
17	相间隔板 Phase partition

NLW1

万能式断路器 Air circuit breaker



产品概述 Application

NLW1系列万能式断路器(以下简称断路器)主要适用于交流50Hz、60Hz,额定工作电压为400V、690V,额定电流为200A~6300A的配电网中,用来分配电能和保护线路及电源设备免受过载、欠电压、短路、接地等故障的危害。断路器核心部件采用智能型控制器,具有精确的选择性保护,可避免不必要的停电,提高供电系统可靠性、连续性和安全性。

该断路器能广泛适用于电站、工厂、矿山和现代高层建筑,特别是智能楼宇中的配电系统,在风力发电、太阳能发电等绿色能源领域中也广泛运用。

该断路器符合IEC60947-2和GB/T14048.2标准。

NLW1 series intelligent circuit breaker is mainly suitable for a power distribution network with AC 50/60Hz, rated operating voltages of 400V, 690V, and rated current of 200A to 6300A, to distribute power, protect circuit and power devices against overload, under voltage, short circuit, and ground faults. The core part of the circuit breaker adopts intelligent controller with precise selective protection, which can avoid unnecessary power failure so as to improve the reliability, continuity and safety of the power supply system.

The circuit breaker can be widely used in the power distribution system of power stations, factories, mines and modern commercial buildings, especially in intelligent buildings. It is also often used in wind power generation, solar power generation and other green energy filed. The circuit breaker meets the IEC60947-2.

型式 Type

安装方式: 固定式、抽屉式。

操作方式: 电动操作、手动操作。

使用类别: B类。

极数: 三极、四极。

脱扣器种类: 智能型控制器、欠电压瞬时(或延时)脱扣器和分励脱扣器。

智能型控制器功能

- a) 具有过载长延时反时限、短延时反时限、短延时定时限, 瞬时动作等保护功能, 可由用户自行设定, 组成所需的保护特性;
- b) 接地故障保护功能; c) 过载报警功能; d) 试验功能;
- e) 负载监控功能; g) 自诊断功能; h) MCR功能;
- i) 热模拟功能; j) 触头损耗指示;

Installation mode: stationary type drawer type

Operation mode: electric operation, manual operation

Category use: type B

Pole number: 3, 4

Type of release device: intelligent controller, under voltage rekeage trigger and shunt release trigger.

Intelligent type controller function

- a. With overload long delay reverse time limit, short delay reverse time limit, short delay fixed time limit,

instantaneous action and other protection functions, can be set by the user, composed of the required protection characteristics;

- b. Ground fault protection function; c. Overload alarm function; d. Test function;

- e. Overload alarm function; g. Self-diagnostic function; h. MCR function;

- i. Thermal simulation function; j. Contact loss indication;

正常贮存和运输条件 Storage Environment

温度下限不低于-25℃, 上限不超过+55℃;

相对湿度(+25℃)不超过95%;

产品在运输过程中, 应轻搬轻放, 不应倒放, 应尽量避免剧烈碰撞。

The minimum temperature shall not be lower than -25°C, and the maximum temperature shall not exceed + 55°C;

The relative temperature (+ 25°C) shall not exceed 95%;

Products in the process of transportation, should be handled with special care, should not be inverted, should be tried to avoid violent collision.

正常工作条件和安装条件 Working Environment

周围空气温度为-5℃~+40℃, 且24h的平均值不超过+35℃(特殊订货的除外)。

安装地点的海拔不超过2000m。

安装地点的空气相对湿度在最高温度为+40℃时不超过50%; 在较低温度下可以有较高的相对湿度; 最湿月的平均最低温度不超过+25℃, 该月的平均最大相对湿度不超过90%, 并考虑因温度变化发生在产品表面上的凝露。

污染等级为3级。

断路器主电路及欠电压脱扣器线圈、电源变压器初级线圈的安装类别为IV, 其余辅助电路、控制电路安装类别为III。

安装位置应垂直, 各方向的倾斜度不超过5°。

The ambient air temperature is -5°C ~ + 40°C, and the average value of 24h does not exceed + 35°C (except for special orders).

The altitude of the installation site shall not exceed 2,000 m.

The relative humidity of the air at the installation site shall not exceed 50% when the maximum temperature is +40°C; It can have higher relative humidity at lower temperature. The mean minimum temperature of the wettest month shall not exceed +25°C, and the mean maximum relative humidity of the month shall not exceed 90%, taking into account the condensation occurring on the surface of the product due to temperature changes.

The pollution grade is Grade 3.

The main circuit of circuit breaker, the under voltage tripping coil and the primary coil of power transformer are installed as IV, while the other auxiliary circuit and control circuit are installed as III.

The installation position shall be vertical, and the inclination in each direction shall not exceed 5°.

技术数据及性能 Technical Parameters

断路器技术参数及性能(见表1)

Technical parameter of circuit breaker (see Table 1)

表1 技术参数及性能

Table 1 Technical Parameters

型号及壳架电流Inm Model	NLW1-1600	NLW1-2000	NLW1-3200	NLW1-4000	NLW1-6300	
额定电流In (A) Rated current In (A)	200,400,630 800,1000 1250,1600	400,630,800 1000,1250 1600,2000	2000,2500 2900,3200,4000 (增容量Increase capacity type)	3600,4000	4000,5000 6300	
中性极额定电流In(A) Neutral pole current rating In (A)	100%In	100%In	100%In	50%In	50%In	
额定工作电压Ue(V) Rated operating voltage Ue (V)	AC400/690/800					
极数 Pole number	3P, 4P					
额定冲击耐受电压Uimp(kV) Rated impact withstand voltage Uimp (kV)	AC12					
额定绝缘电压Ui(V) Nominal insulation voltage Ui (V)	AC1000					
工频耐受电压(V) Power frequency withstand voltage (V)	AC3500					
额定极限短路分 断能力Icu(kA) Rated limit short circuit breaking capacity Icu(kA)	AC400V	65	80	100	100	120
	AC690V	50	50	65	65	-
额定运行短路分 断能力Ics(kA) Rated short circuit breaking capacity Ics (kA)	AC400V	55	65	80	80	100
	AC690V	50	50	65	65	-
额定短时耐受 电流Icw(kA) Rated short time withstand current Icw/ 1s (kA)	AC400V	55	50	65	65	100
	AC690V	50	50	65	65	-
使用类别 Category of use	B					
全分断时间(无附加延时) Full break time (no additional delay)	≤30ms					
闭合时间 Closing time	≤70ms					
电气寿命(次) Electrical life (times) ≤3200 1h/20 >3200 1h/10	AC400V	6000	5000	3000	2000	1500
	AC690V	5000	4000	2000	1500	1000
机械寿命(次) Mechanical life (times) ≤2500 1h/20 >2500 1h/10	Maintenance -free	15000	10000	8000	5000	2000
	Have maintenance	20000	12000	10000	6000	2500
抽屉座机械寿命(每1h/20次) Mechanical life of the drawer holder (1h/20times)	1000	1000	1000	600	300	
进线方式 Into the line way	上进线或下进线 Up or down incoming line					
飞弧距离 Arc distance(mm)	0					
安装方式 Installation mode	固定式或抽屉式 Stationary type or Drawer type					
接线方式 Mode of connection	水平接线或垂直接线 Horizontal wiring or vertical wiring		水平接线 Horizontal wiring			

注: 抽屉座机械寿命一次指: 断路器本体在抽屉座内从“分离”摇至“连接”再摇至“分离”位置。
Note: One time of mechanical life of the drawer base refers to when the circuit breaker body is shaken from →→-
"separated" to →→- "connected" and then to the →→- "separated" position in the drawer base.

断路器进出线的最大功率损耗(环境温度+40°C)
Maximum power loss of circuit breaker incoming and outgoing line
(ambient temperature + 40°C)

表2 断路器进出线功率损耗
Table 2 Power loss of incoming and outgoing lines of circuit breaker

产品型号 Model	壳架电流Inm Frame current Inm (A)	功率损耗 Power loss(W)			
		3P抽屉式 3P Drawer type	4P抽屉式 4P Drawer type	3P固定式 3P Stationa type	4P固定式 4P Stationa type
NLW1- 1600	1600	230	306	136	182
NLW1-2000	2000	395	526	262	350
NLW1- 3200	3200	556	742	307	409
NLW1-4000	4000	660	880	332	450
NLW1-6300	6300	1429	1905	-	-

注: 断路器功耗指断路器在常温下, 通以额定电流测得的主电路功耗, 不包括断路器其它带功率损耗附件的功率。此表数据仅供用户选型参考使用, 不能作为断路器实际使用中的功耗。

Note: Power consumption of the circuit breaker refers to the power consumption of the main circuit measured by the circuit breaker with the rated current at room temperature, excluding the power of other power loss accessories of the circuit breaker. This table data is only for reference and cannot be used as power consumption in actual use of the circuit breaker.

环境温度变化工作电流降容查询表
Ambient temperature change Operating current drop capacity query

表3 环境温度变化工作电流降容查询表
Table 3 Ambient temperature change Operating current drop capacity query

产品型号 Model	额定电流(A) Rated Current (A)	40°C	50°C	60°C	70°C
NLW1-1600	200	200	200	200	200
	400	400	400	400	400
	630	630	630	630	630
	800	800	800	800	800
	1000	1000	1000	1000	1000
	1250	1250	1250	1150	1150
NLW1-2000	1600	1600	1500	1300	1300
	400	400	400	400	400
	630	630	630	630	630
	800	800	800	800	800
	1000	1000	1000	1000	1000
	1250	1250	1250	1250	1250
	1600	1600	1600	1500	1300
	2000	2000	1800	1700	1600

产品型号 Model	额定电流(A) Rated Current (A)	40°C	50°C	60°C	70°C
NLW1-3200	2000	2000	2000	2000	2000
	2500	2500	2300	2200	2200
	2900	2900	2900	2800	2600
	3200	3200	3000	2800	2600
NLW1-4000	4000	4000	3800	3600	3200
	3600	3600	3500	3500	3400
NLW1-6300	4000	4000	4000	4000	4000
	5000	5000	5000	4800	4500
	6300	6300	5600	5200	5100

海拔高度降容系数

当海拔超过2000米时，大气中的绝缘性能、冷却性能、压力等都会发生变化，其性能可参照表4修正：

Altitude capacity reduction coefficient When the altitude exceeds 2000 meters, the insulation performance, cooling performance and pressure in the atmosphere will change, and its performance can be corrected by referring to Table 4

表4 海拔高度降容系数
Table4 Coefficient of capacity reduction at altitude

海拔高度 Altitude(m)	2000	3000	4000	5000
工作电流 Working current Ie	1	0.93	0.88	0.82
短路分断能力 Short circuit breaking capacity Icu,Ics	1	0.83	0.71	0.63
短路耐受能力 Short circuit tolerance Icw	1	0.83	0.71	0.63
额定冲击耐受电压 Rated impact withstand voltage Uimp	1	0.9	0.71	0.63
工频耐受电压 Power frequency withstand voltage	1	0.9	0.71	0.63
额定绝缘电压 Rated insulation voltage Ui	1	0.83	0.71	0.63

当环境温度低于40°C时，则Ie=In，如果环境温度高于40°C，必须严格按照说明书要求进行降容使用，此时Ie≠In按电流和温度对应查出。

When the ambient temperature is lower than 40°C, Ie = In. If the ambient temperature is higher than 40°C, the capacity of the circuit breaker must be reduced in strict accordance with the instructions during application. In this case, Ie = In should be settled according to the current and temperature.

用户安装母排推荐见表5

The recommendation for installing of busbar

表5 用户安装母排推荐
Table 5 Recommendation for installing of busbar

额定电流 Rated current (A)	外接铜排规格(宽×厚) External copper busbar (width*thickness) mm	每极根数(根) Required busbar qty per pole	截面积 Cross-sectional area (mm²)
200	20×5	1	100
400	40×5	1	200
630	40×5	2	400
800	50×5	2	500
1000	60×5	2	600
1250	80×5	2	800
1600	100×5	2	1000
2000	100×5	3	1500
2500	100×5	4	2000
2900	100×10	3	3000
3200	100×10	4	4000
3600	100×10	5	5000
4000	100×10	5	5000
5000	100×10	6	6000
6300	100×10	8	8000

注：表中规格为断路器处于周围环境40°C且敞开安装，满足GB/T14048.2中约定发热条件下所采用的铜排规格。

铜排材料为T2裸铜，外接铜排规格根据实际使用情况进行变更，但应该满足表中不同电流对应的截面积要求。

Note: The specification in the table is that the circuit breaker used in ambient environment of 40°C and installed open.

The material of busbar is T2 bare copper. The specification of the external copper busbar can be changed according to the actual use situation, but it should meet the cross-sectional area requirements corresponding to different currents in the table.

a. 智能型控制器的保护性能 Protection performance of the intelligent controller

智能控制器的过电流保护特性曲线见图1 The over current protection characteristic curve of the intelligent controller is shown in Figure 1

a. 智能控制器的整定范围I/In及准确度 a. The setting range I / In and accuracy of the intelligent controller

保护类型 Protection type	长延时 Long time delay		短延时 Short time delay		瞬时 Instantaneous		接地保护 Ground protection	
框架等级 Frame grade	IR	准确度 Accuracy	I _{sd}	准确度 Accuracy	I _i	准确度 Accuracy	I _g	准确度 Accuracy
NLW1- 1600	(0.4~1)In	±10%	(0.4~15)In	±10%	1In~50kA +OFF	±15%	(0.2~1)In	±10%
NLW1-2000					1In~50kA +OFF			
NLW1- 3200/4000					1In~75kA +OFF			
NLW1-6300					1In~100kA +OFF			

b. 长延时过电流保护反时限动作特性

长延时过电流保护反时限动作特性，其反时限曲线符合 $I^2TL = (1.5Ir)^2 tL$ 的特性曲线。式中I为实际动作电流；TL为长延时的实际动作时间；tL为长延时1.5IR的整定时间。

b. Long time delay over current protection reverse time limit action characteristics

For the long time delay over current protection, the reverse time limit curve conforms to the characteristic curve of $I^2TL = (1.5 Ir)^2 tL$. Where I is the actual action current; TL is the actual action time with a long time delay; and tL is the setting time for a long time delay of 1.5 IR.

电流倍数 Current multiple	动作时间 Action time						
1.05IR	2h内不动作 No action within 2 h						
1.3IR	<1h动作 <1h action						
1.5IR	整定时间 Setting time(s)	15	30	60	120	240	480
2.0IR	动作时间 Actuation time(s)	8.4	16.9	33.7	67.5	135	270

c. 短延时过电流保护动作特性
c. Short time delay over current protection action characteristics

电流 Current	动作时间 Action time						
$I \geq I_{sd}, I \leq 8I_R$	反时限 Inverse time limit	$I^2 T_s = (8I_R)^2 t_s$					
$I \geq I_{sd}, I > 8I_R$	定时限 Fixed time limit	Setting time (s)	0.1	0.2	0.3	0.4	
		Action time(s)	0.06	0.14	0.23	0.35	

注: a)动作时间允差±15%。 b)表中I为实际动作电流; ts为短延时设定时间; Ts为实际动作时间。
Note: a) action time tolerance ± 15%. b) I is the actual action current; ts is the set time for short time delay; and Ts is the actual action time.

d. 短路瞬时保护动作特性
瞬时保护功能防止配电系统的负载短路, 此类故障一般为相间故障, 短路电流比较大, 需要快速断开。此保护是基于电流真有效值进行的保护。当 $I \leq 0.85I_i$ 时不动作, $I > 1.15I_i$ 时动作 (I为实际短路电流)。

d. Short circuit instantaneous protection action characteristics
The instantaneous protection function prevents the load from short circuit in the distribution system. This kind of fault usually happens between phases so the short circuit current is relatively big, which needs to be disconnected quickly.
This protection is executed based on the true effective value of the current. When $I \leq 0.85I_i$, $I > 1.15I_i$ (I is actual short circuit current).

e. 接地故障保护动作特性及曲线(图2)
接地故障保护分二种: 一种是检测中性点电流, 当三相电流平衡时, 中性点电流为零, 当三相电流不平衡时, 中性点电流超过整定值时, 智能控制器报警, 经过整定的延时时间后, 按要求发出指令, 使断路器断开或不断开。另一种是检测接地线电流, 当电流超过整定值时, 智能控制器报警, 经过整定的延时时间后, 按要求发出指令, 使断路器断开或不断开, 接地故障保护特性为定时限。

e. The protection characteristics and curve of grounding fault (Figure 2)
There are two kinds of ground fault protection: one is to detect the current of neutral point, when the current of three-phase is in balance, the neutral point current is zero. When the current of three-phase is in imbalance, the current of neutral point exceeds the set value, the intelligent controller alarms, the circuit breaker is disconnected or constantly open according to the instruction after the fixed delay time. The other is to detect the current of the grounding wire, when the current exceeds the set value, the intelligent controller alarms, make the circuit breaker be disconnected or constantly open according to the instruction after the fixed delay time. The grounding fault protection characteristics is fixed time limit.

动作电流设定值 I_g Action current Set I_g	$(0.2 \sim 1)I_n + OFF$
动作特性 Action characteristic	$\leq 0.8I_g$ 不动作 $\leq 0.8I_g$ failure to actuate
	$\geq 1.1I_g$ 延时动作 $\geq 1.1I_g$ deferred action
整定时间 Setting time (s)	$(0.2 \sim 1)I_n + OFF$ (OFF表示只报警不脱扣) $(0.2 \sim 1)I_n + OFF$ (OFF That only the alarm is not removed)

f. 自诊断功能
智能控制器能够对自身出现的故障进行诊断, 当计算机发生故障时能发出错“E”显示或报警, 同时重新启动计算机, 用户需要时, 也可将断路器分断。当局部环境温度达到80°C或者由于触头的发热使机壳内温度超过80°C时, 能发出报警, 并能在较小的电流时(用户需要时)分断断路器。

f. Self-diagnostic function
The intelligent controller can diagnose its own fault when failure happens to the computer. It can display "E" (means error) or alarm, and restart computer at the same time. The circuit breaker can be disconnected when necessary.

When the local ambient temperature reaches 80°C or the temperature in the casing exceeds 80°C due to the heat of the contact, an alarm can be issued, and the circuit breaker can be switched off at a smaller current (when the user needs).

图1 智能控制器的过电流保护特性曲线
Figure 1 Over current protection characteristic curve of the intelligent controller

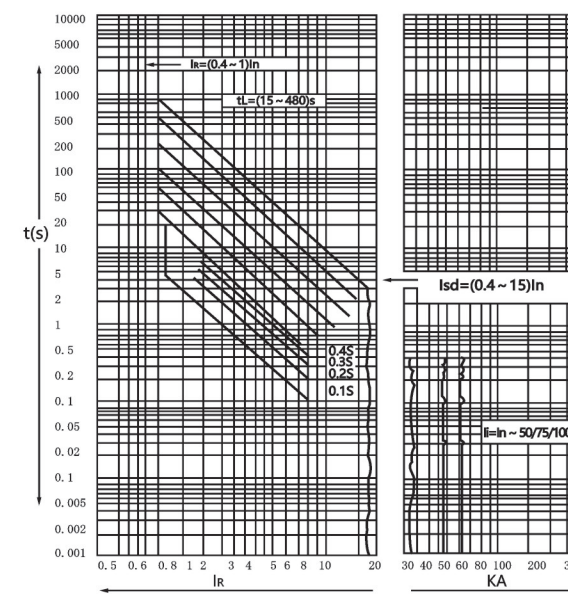
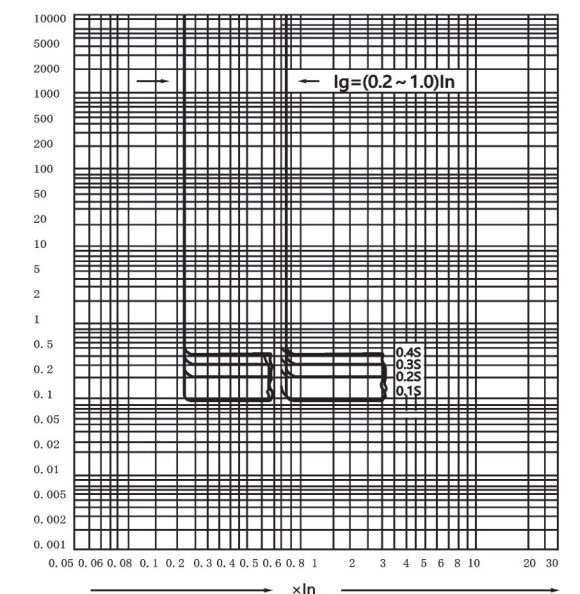
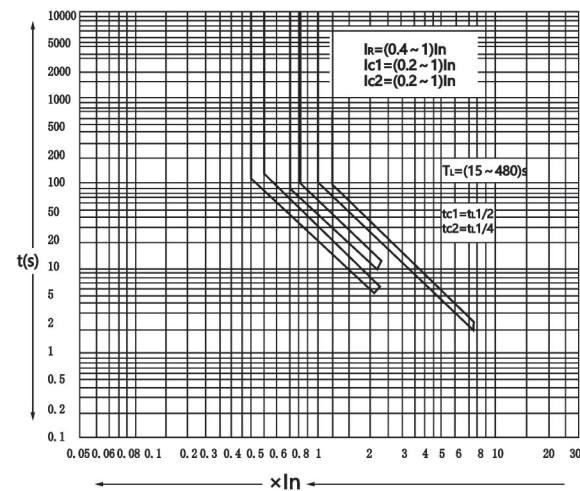
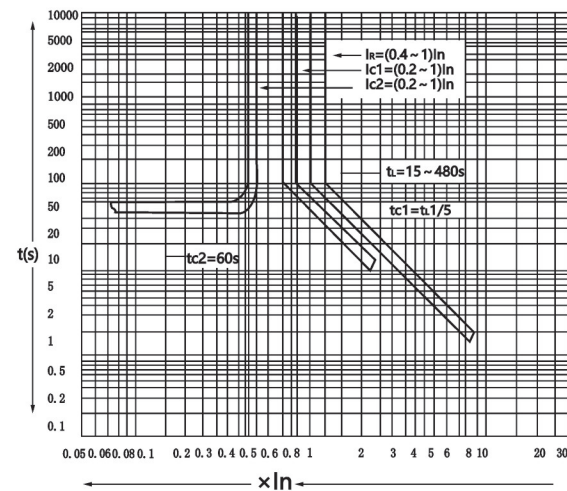


图2 接地故障保护特性曲线
Figure 2 Ground fault protection characteristic curve



g. 负载监控功能
设置二个整定值, I_{c1} 、 I_{c2} 整定范围 $(0.2 \sim 1)I_n$, I_{c1} 延时特性为反时限特性, 其延时整定值为长延时整定值的1/2, I_{c2} 延时特性有二种; 第一种为反时限特性, 其时间整定值为长延时整定值的1/4; 第二种为定时限特性, 其延时时间为60s, 这二种延时功能前者用于当电流接近过载整定值时分断下级最不重要的负载, 后者则用于当电流超过 I_{c1} 值, 使延时分断下级不重要负载后, 电流下降, 使主电路和重要负荷电路保持供电, 当电流下降到 I_{c2} 时经一段延时后发出指令, 再次接通下级已切除过的电路, 恢复整个系统的供电。负载监控特性见下图。

g. Load monitoring function
Set two set values I_{c1} and I_{c2} , setting range of both are $(0.2 \sim 1)I_n$. The delay feature of I_{c1} is the reverse time limit characteristic, its delay setting value is 1/2 of the long delay setting value. There are two kinds of delay characteristics for I_{c2} : one is the reverse time limit characteristics, its value of time setting is 1/4 of the long time delay setting value; The other is the fixed time limit characteristic, its delay time is 60s. The first delay function is used to switch off the lest important load when the current approaches the set overload value. The latter delay function is used to delay switching off unimportant load to decrease the current in order to maintain the power supply for main circuit and important load circuits when the current exceeds the I_{c1} value. When the current drops to I_{c2} , a command is issued after a delay to reconnect the lower circuit that has been cut off restore the power supply to the entire system. The load monitoring features are shown in the following figure.

Ic1负载监测功能
Ic1 Load monitoring functionIc2负载监测功能
Ic2 Load monitoring function

h. 控制器的显示功能

控制器能在运行时显示其运行电流、电压（即电流表、电压表功能），故障发生时显示其保护特性规定的区段并在分断电路后锁存故障显示及故障电流，在整定时显示整定区段的电流、时间及区段类别，如是延时动作，在动作进程中指示灯闪烁、断路器分断后指示灯由闪烁转为恒定发光。试验时显示试验电流，延时时间试验指示及试验动作区段。

i. DO信号报警功能

控制器可输出8路DO输出信号，用于控制器或声光报警指示。对应的功能有：过载预报警信号、短路脱扣信号（短延时和瞬时）、长延时脱扣信号、接地脱扣或报警信号、负载监控1信号、负载监控2信号、自诊断报警信号和故障跳闸信号（OCR）。

j. MCR和越限跳闸保护

MCR和越限跳闸功能为高速瞬时保护，故障电流信号直接通过硬件比较电路发出动作指令，MCR保护只在断路器合闸瞬间（约100ms内）起作用，而越限跳闸保护在运行中一直起作用。MCR保护是对断路器的极限接通能力进行保护，防止在开关闭合前电网已处于短路故障状态，在合闸瞬间产生大于断路器接通能力的电流，控制器以瞬时方式使断路器分断。越限跳闸保护是对断路器极限承载能力进行保护，防止断路器承受超过极限承载能力的电流而损坏。

k. 热记忆功能

控制器因过载或短延时脱扣后具有模拟双金属片特性的热效应，过载热效应能量30min释放结束，短延时能量15min释放结束。在此期间再发生过载、短延时故障，脱扣时间将变短。控制器断电，能量自动清零。

h. Display function of the controller

The controller can display the operating current and voltage (i. e., ammeter and voltmeter function) during operation.

When the fault occurs, it displays the section specified by its protection characteristics, and latch the fault display and fault current after disconnecting the circuit. During setting, it displays current, time and section type of the section. If it is a delay action, the indicator light will flash during the action.

The indicator light will change from flashing to constant lighting after the circuit breaker is disconnected. During the test, the test current, delay time, test indication and test action section are displayed.

i. DO signal and alarm function

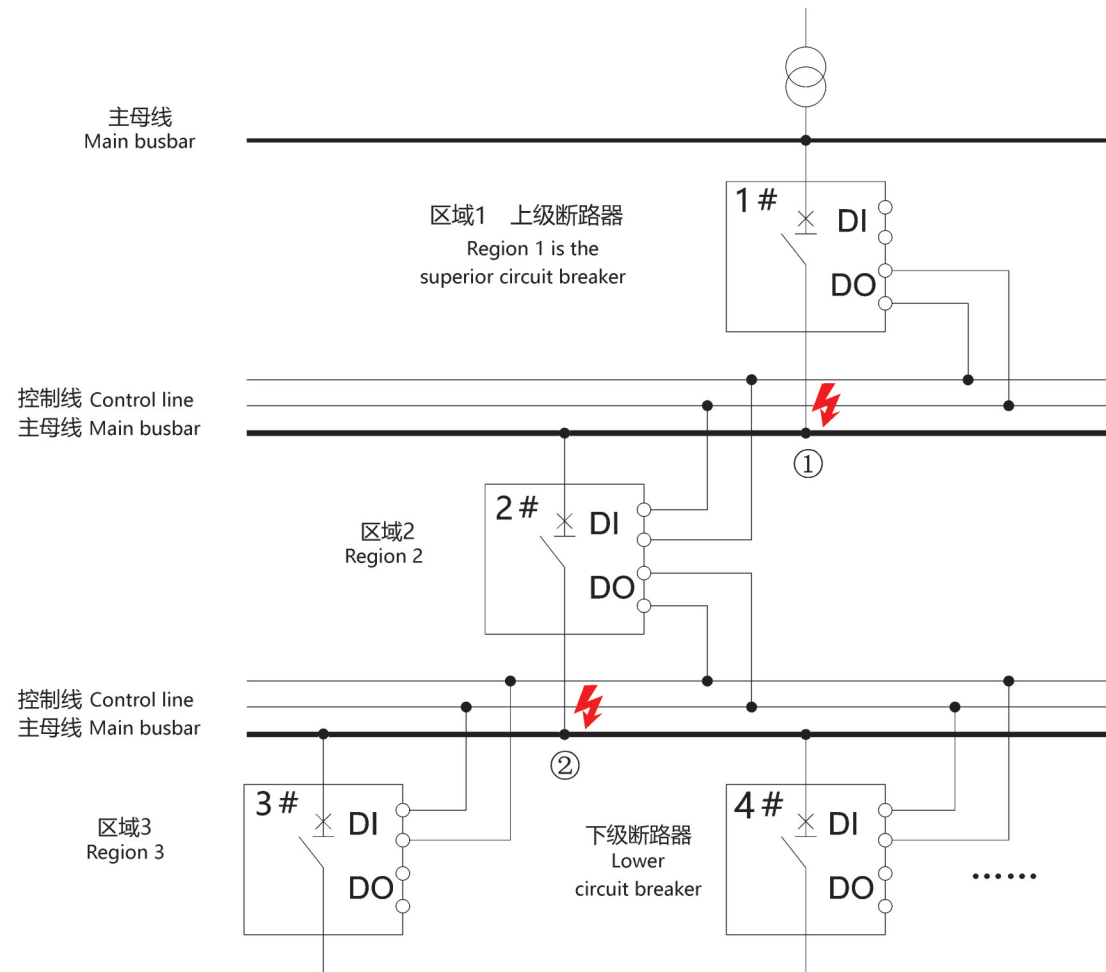
The controller can output 8 DO output signals for the controller or sound and light alarm indication. The corresponding functions include: overload pre-alarm signal, short circuit tripping signal (short delay and instantaneous), long delay tripping signal, ground tripping or alarm signal, load monitoring 1 signal, load monitoring 2 signal, self-diagnosis alarm signal and fault tripping signal (OCR).

j. MCR and over ultimate trip protection

The MCR and over ultimate trip function is high speed instantaneous protection. The fault current signal sends action command directly through the hardware comparison circuit. MCR protection only works at the moment of switch-on of the circuit breaker (about 100ms), while the over ultimate trip protection always plays a role during operation. MCR protection is to protect the ultimate switching capacity of the circuit breaker to prevent the power grid from being in the short circuit fault state before the switch is switched on. While switching on the circuit breaker, the current generated in the moment will be bigger than the switching capacity, the controller switches off the circuit breaker in an instantaneous manner. Over ultimate trip protection is to protect the ultimate load capacity of the circuit breaker, and prevent the circuit breaker from being damaged by the current exceeding the ultimate load capacity.

k. Thermal memory function

Due to overload or short delay tripping, there will be thermal effect which is similar to bimetal in the controller. The overload thermal effect energy is released in 30min while the short delay energy is released in 15min. During this period, if overload or short delay failure occurs again, the disconnection time will become shorter. The controller loses power and eliminates the energy automatically.



NLW1系列智能控制器的出厂整定值见表6
Preset value of the intelligent controller

表6 智能控制器的出厂整定值
Table 6 Preset value of the intelligent controller

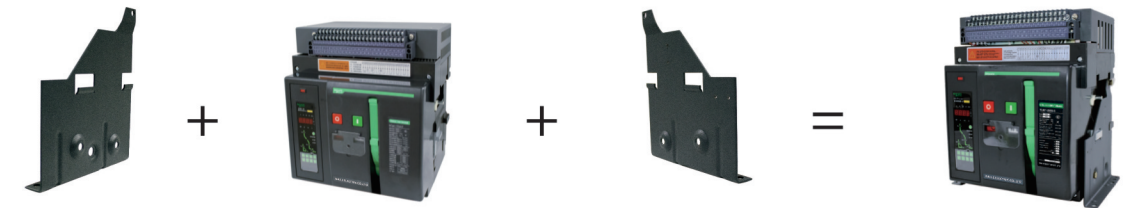
控制器类型 Controller type	长延时 Long delay		短延时 Short delay		瞬时 Instantaneous	接地保护 Ground protection		负载监控 Load monitoring Ic1 Ic2
	IR	tL	I _{sd}	tL		I _g	tG	
NLW1-M	1In	60s	8IR	0.2s	12I _R	0.8I _R	OFF	1In
NLW1-2H/3H	1In	60s	8IR	0.2s	12I _R	0.8I _R	OFF	1In

结构概述 Structure Overview

固定式断路器主要由触头系统、智能控制器、手动操作机构、电动操作机构、固定安装板组成；
 抽屉式断路器主要由触头系统、智能控制器、手动操作机构、电动操作机构、抽屉座组成；
 断路器为立体布置形式，具有结构紧凑、体积小等特点。触头系统封闭在绝缘底板内，每相触头都用绝缘板隔开，形成一个个小室，而智能控制器、手动操作机构，电动操作机构依次排在其前面，形成各自独立的单元，如其中某一单元坏了，可将其整个拆下换上新的（见图3）。

Stationary type circuit breaker is mainly composed of contact system, intelligent controller, manual operation mechanism, electric operation mechanism and fixed installation board; Drawer type circuit breaker is mainly composed of contact system, intelligent controller, manual operation mechanism, electric operation mechanism and drawer holder;

The contact system is closed in the insulating floor and each phase contact is separated by the insulation board to form a small chamber, while the intelligent controller, the manual operation mechanism and the electric operation mechanism are arranged in front of it, forming independent units. If one of the units is broken, the whole unit can be removed and replaced with a new one. The circuit breaker consists of a body and a fixed bracket, and becomes a station



抽屉式断路器由断路器本体与抽屉座组成，抽屉座内的导轨能拉进拉出，通过断路器本体上的母线与抽屉座上的桥式插头的插入连接通主回路。

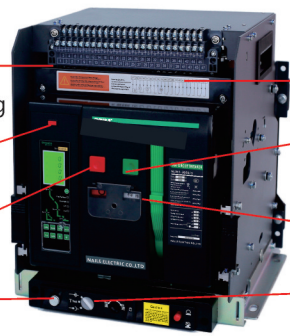
抽屉式断路器有三个工作位置：“连接”位置、“试验”位置、“分离”位置，位置变更通过手柄的旋进或旋出来实现。三个位置的指示通过抽屉座横梁上的指针显示。当处于“连接”位置时，主回路和二次回路均接通，当处于“试验”位置时，主回路断开，并有绝缘隔板隔开，仅二次回路接通，可进行一些必要的动作试验，当处于“分离”位置时，主回路及二次回路全部断开。并且抽屉式断路器具有机械联锁装置，断路器只有在连接位置或试验位置才能使其闭合，而在连接与试验的中间位置断路器不能闭合。

Drawer type circuit breaker is composed of the circuit breaker body and the drawer holder. The guide rail in the drawer holder can be pulled in and out, and the main loop is connected through the bus on the circuit breaker body and the bridge plug on the drawer holder.

Drawer type Circuit breaker has three working positions: "connected" position, "test" position, "separated" position, position change through the rotation in or out of the handle. The indication of the three locations is shown by the pointer on the drawer seat beam. When in the "connected" position, the main loop and the secondary loop are connected. When in the "test" position, the main loop is disconnected and separated by an insulation partition, only the secondary loop is connected, some necessary action tests can be carried out, when in the "separated" position, the main and secondary circuits are all disconnected. And the Drawer type circuit breaker has a mechanical interlocking device, the circuit breaker can only be switched on in the "connected" position or the "test" position, and the circuit breaker cannot be switched on in the middle position between position of "connected" and the "test".

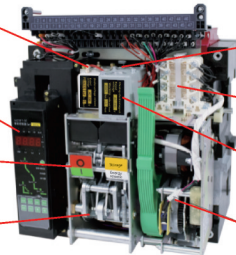
抽屉座 Drawer seat
故障跳闸指示复位按钮 reset button
分闸按钮 Switch button
摇手柄 Shake the handle

Secondary circuit 二次回路
Switch knob 合闸按钮
Storage / release energy indication 储能/释能指示
Position indication 位置指示

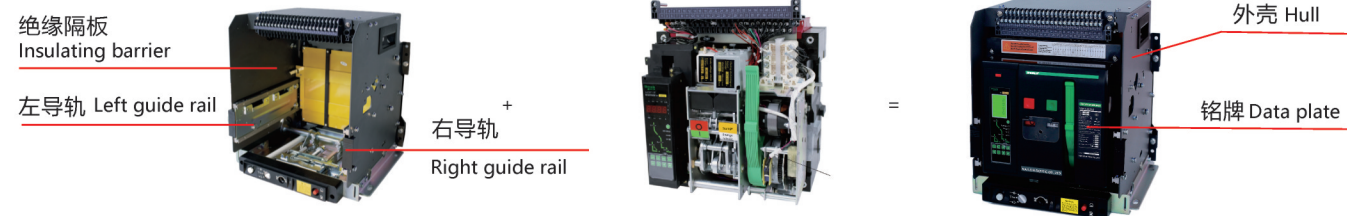


欠压脱扣器 Underpressure debunker
智能控制器 Intelligent controller
分合闸指示 Joint switch instructions
操作机构 Operating mechanism

Shunt release 分励脱扣器
Auxiliary contact 辅助触头
Closing electromagnet 闭合电磁铁
Electric energy storage agency 电动储能机构



断路器有抽屉式和固定式两种类型
There are two types of circuit breakers: drawer type and fixed type



断路器由本体和抽屉座两部分组成，本体插入抽屉座中。
The circuit breaker consists of two parts: the body and the drawer holder, and the body is inserted into the drawer holder.

智能控制器机械复位按钮(Reset)工作状态
Intelligent controller mechanical reset button



智能控制器正常状态
Normal operating state

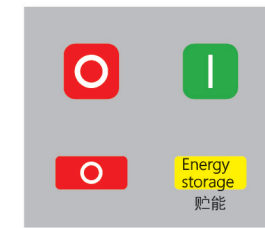


智能控制器处于保护状态，此时断路器断开，清除线路故障后，按下此按钮，断路器才能正常合闸。
When the intelligent controller is in the protected state, the circuit breaker is disconnected and the circuit fault is cleared. Press the button to switch on circuit breaker again

操作机构工作状态
Operating state of the operating mechanism



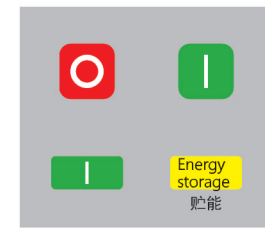
断路器断开且无储能状态
Circuit breaker is disconnected and no energy storage



断路器断开且已储能完毕状态
Circuit breaker is disconnected and the energy storage state has been completed



断路器合闸且无储能状态
Circuit breaker switched on and no energy storage



断路器合闸且已储能完毕状态
Circuit breaker switched on and the energy storage state has been completed

抽屉座工作状态 (仅抽屉式断路器有此功能)
Drawer type circuit breaker (Only the Drawer type circuit breakers have this function)



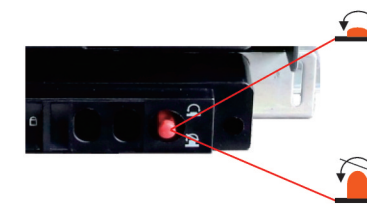
“连接”位置：主电路及二次回路均接通
“Connected” position: Main circuit and second circuit are connected



“试验”位置：主电路断开，二次回路接通
“Test” position: main circuit is disconnected and second circuit is connected



“分离”位置：主电路及二次回路均断开
“Separated” position: Main circuit and second circuit are disconnected



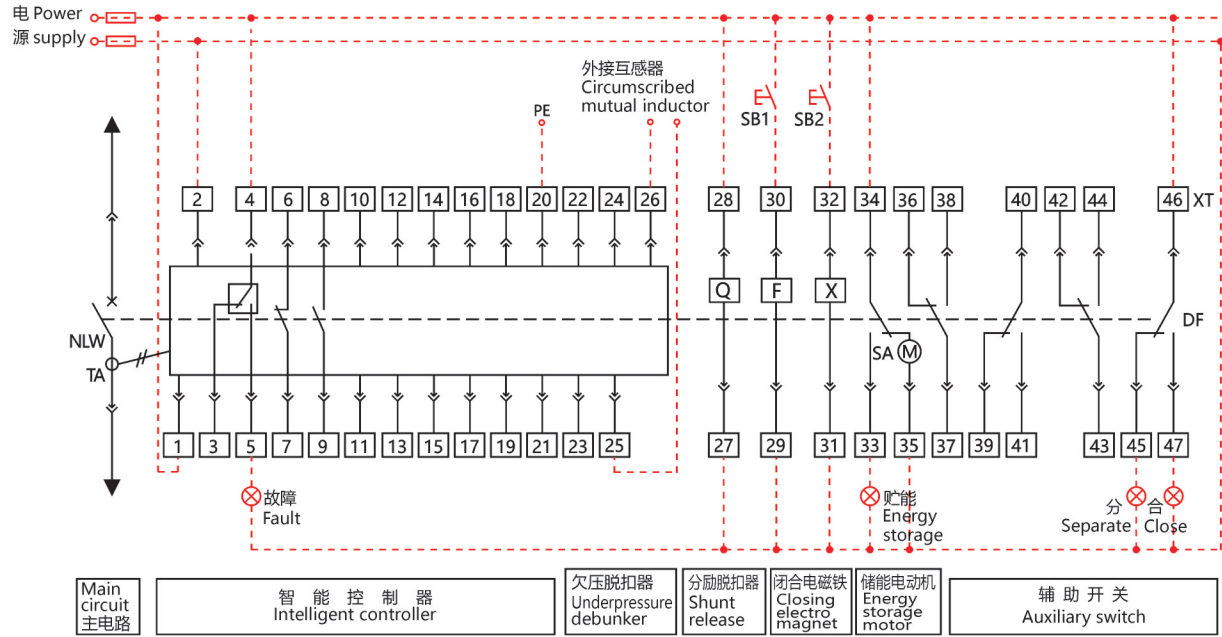
在位置锁锁定后，需要继续操作摇柄时，按下位置锁按钮，解除锁定(解锁状态)
After the position lock is locked, if you need to continue operating the shake handle, press the position lock button to release the lock (unlock state)

在“分离”“试验”“连接”三位置时，位置锁锁定，摇柄无法操作(锁定状态)
In the separated, test, and connected three positions, the position lock is locked, and the shake handle cannot operate (lock state)

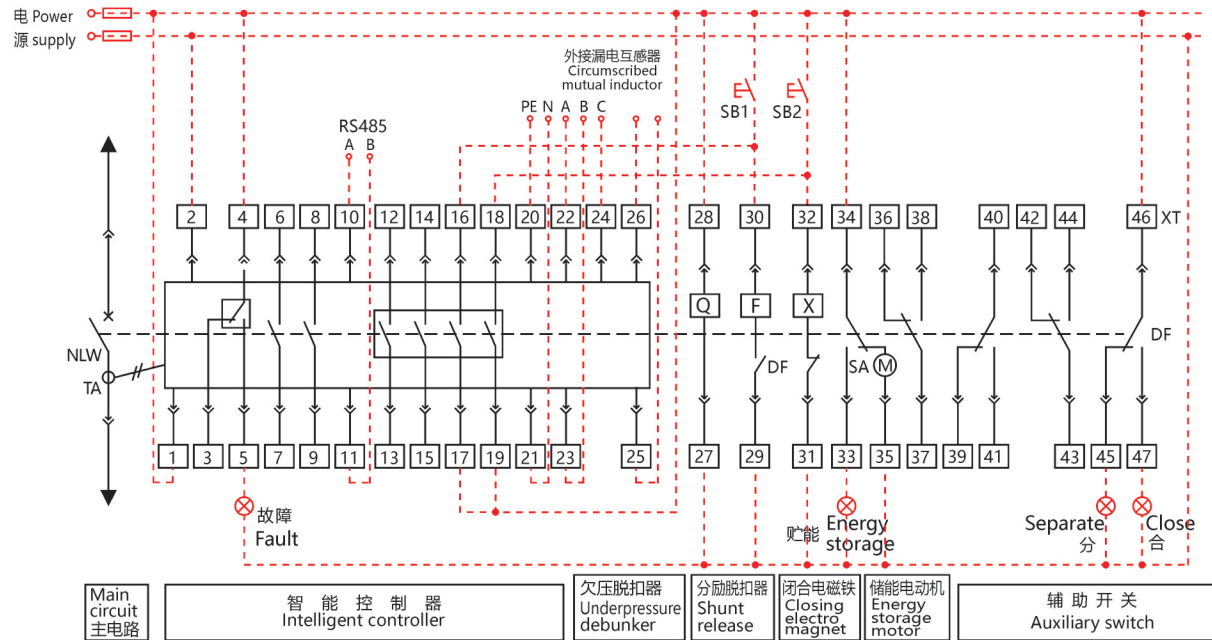
抽屉座三位置锁：对断路器本体在抽屉座“分离”“试验”“连接”三个位置状态进行锁定。
Three position lock of the drawer holder: lock the circuit breaker body in the drawer holder: "separated", "test" and "connected".

控制回路 Control Loop

NLW1-1600~6300配M型智能控制器的二次回路接线图
Secondary loop wiring diagram of NLW1-1600~6300 with M-type intelligent controller



NLW1-1600~6300配H型智能控制器的二次回路接线图
Secondary circuit wiring diagram of NLW1-1600~6300 with H-type intelligent controller



接线图中符号释义与端子功能(红色虚线部分由用户自行接线, 控制回路注意加熔断器保护)

注: 欠电压脱扣器也可串接常闭按钮, 作为紧急情况下的紧急分闸按钮。

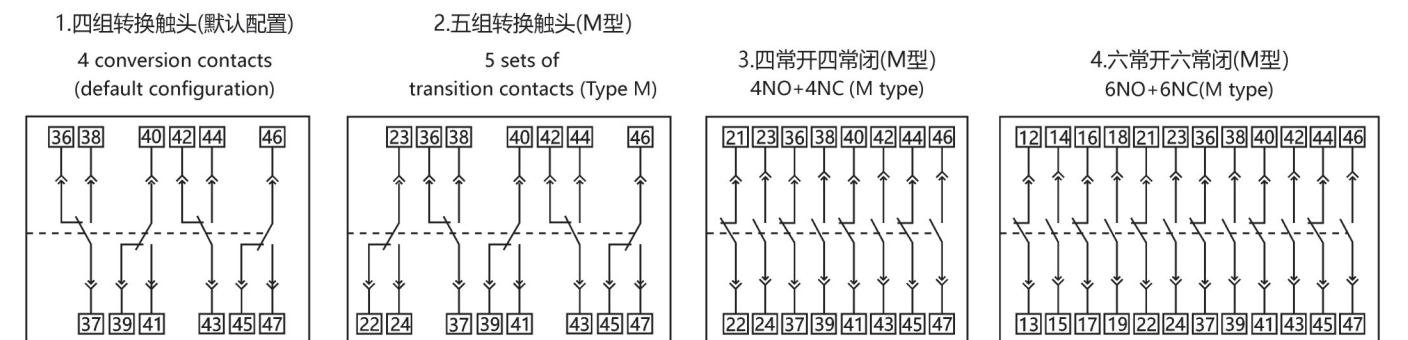
The red dotted line in the wiring diagram is wired by the user himself, and the control circuit should be protected by the fuse.
Note: Under voltage release can also be connected frequently closed butt emergency cases.

符号 Symbol	释义 Paraphrase	备注 Remarks
Q	欠电压脱扣器 Under voltage release	选配附件 Optional attachment
F	分励脱扣器 Shunt release	
X	闭合电磁铁 Closing electromagnet	
DF	辅助开关 Auxiliary switch	
SA	电动机微动开关 Motor micro-dynamic switch	

符号 Symbol	释义 Paraphrase	备注 Remarks
M	电动机 Electric motor	
XT	接线端子 Terminal connector	用户自备 User self-provided
⊗	信号灯 Signal lamp	用户自备 User self-provided
SB1	手动分闸按钮 Manual switch button	用户自备 User self-provided
SB2	手动合闸按钮 Manual closing button	

端子号 Terminal number	端子功能描述 Terminal function description	备注 Remarks
1,2	辅助电源输入: AC230V, AC400V, DC220V, and DC110V	
3,4,5	故障跳闸触点输出 (4#为公共端), 触点容量: AC250V, 3A Fault trip contact output (4# is the public end), contact capacity: AC250V, 3A	M型默认配置 2H/3H通讯型配置
6,7	断路器状态辅助触点输出 (常开), 触点容量: AC250V, 3A Breaker state auxiliary contact output (often open), contact capacity: AC250V, 3A	Type M default configuration
8,9	断路器状态辅助触点输出 (常开), 触点容量: AC250V, 3A Breaker state auxiliary contact output (often open), contact capacity: AC250V, 3A	2H / 3H communication type configuration
20	保护地 (PE) Protection area (PE)	
10,11	RS485通讯接口引出线, 10接A, 11接B (默认Modbus) Rs485 communication interface lead, 10 to A, 11 to B (default Modbus)	
12,19	继电器触点输出: 12, 13为DO1; 14, 15为DO2; 16, 17为遥控分闸触点输出DO3; 18, 19为遥控合闸触点输出DO4 Relay contact output: 12 and 13 are DO 1; 14 and 15 are DO 2; 16,17 D 3 for remote switch DO contacts; 18 and 19 DO 4 for remote switch contacts	2H/3H通讯型配置 2H / 3H communication type configuration
21,22,23,24	电压测量输入: 21接N, 22接A, 23接B, 24接C Voltage measurement input: 21 N, 22 A, 23 B, 24 C	
25,26	a: 3P+N时连接中性线互感器; b: 漏电保护时连接漏电互感器 (二选一) a: Connect neutral wire transformer for 3P + N; b: Connect leakage transformer for leakage protection (alternative)	选配附件 Optional attachment
27,28	欠电压脱扣器 (直接接自主回路电源, 以提高供电的可靠性与安全性) Under voltage release (Direct connected to autonomous loop power supply to improve the reliability and security of power supply)	选配附件 Optional attachment
29,30	分励脱扣器 Shunt release	
31,32	闭合电磁铁 Closing electromagnet	
33,34,35	电动机 (35可直接接电源自动预储能, 也可串接常开按钮后接电源手动预储能) Electric motor (35 can be directly connected to the power supply automatic pre-storage, or can connect the power supply manual pre-storage)	
36~47	辅助开关接线端子 (默认四组转换) Auxiliary switch Terminal terminal (default four ad conversion)	

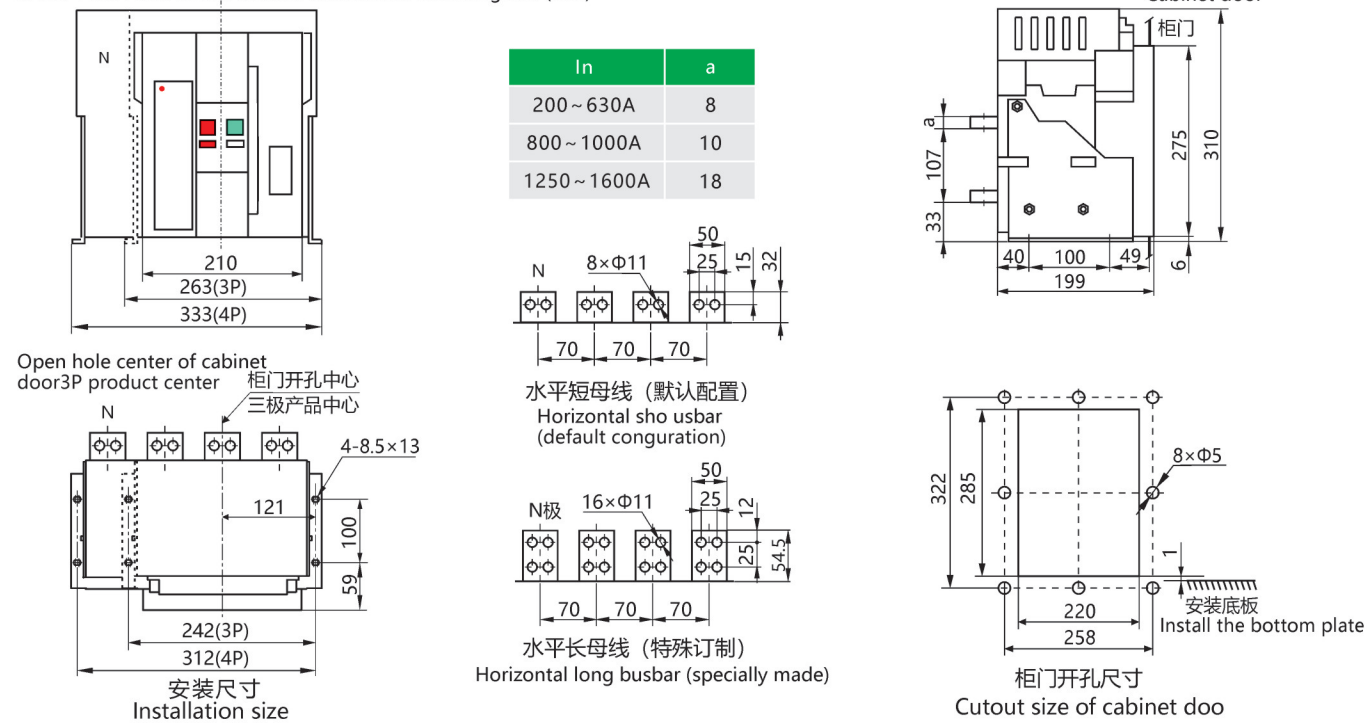
NLW1-2000~6300供用户使用的辅助开关(DF)型式
NLW1-2000~6300 Auxiliary switch (DF) type



外形与安装尺寸 Overall Dimension

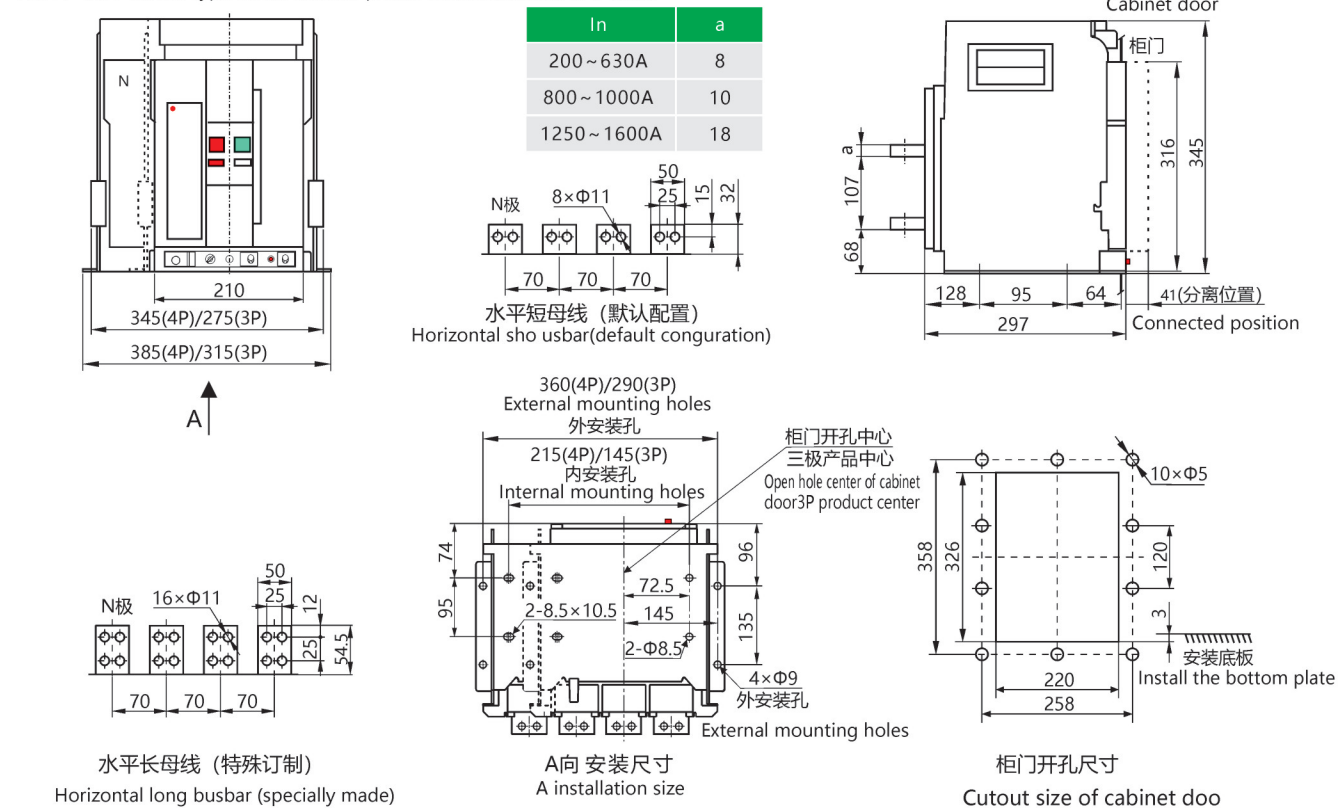
NLW1-1600固定式断路器外形与安装尺寸。(单位:mm)

NLW1-1600 Fixed Circuit breaker Outline and mounting size (mm)



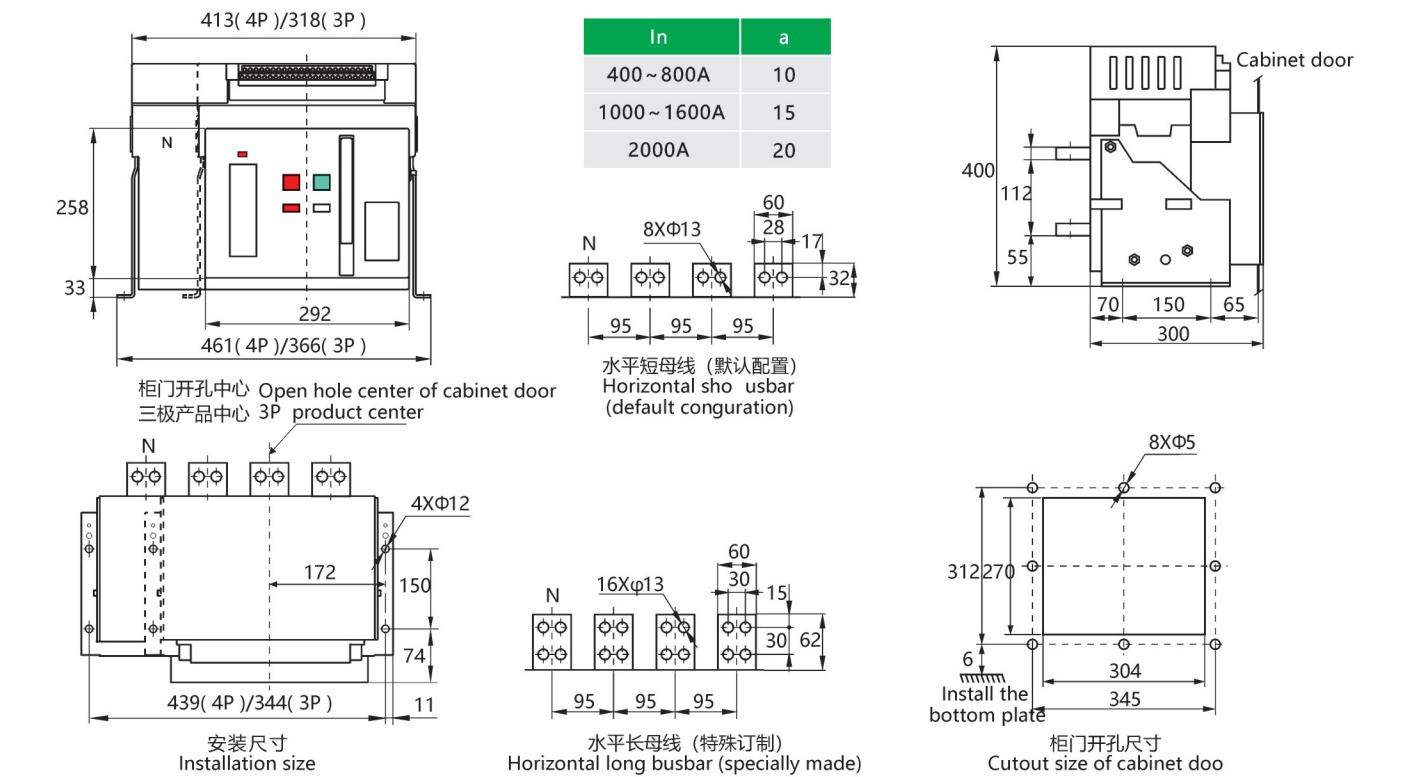
NLW1-1600抽屉式断路器外形与安装尺寸。(单位:mm)

NLW1-1600 drawer type circuit breaker profile with installation size (mm)



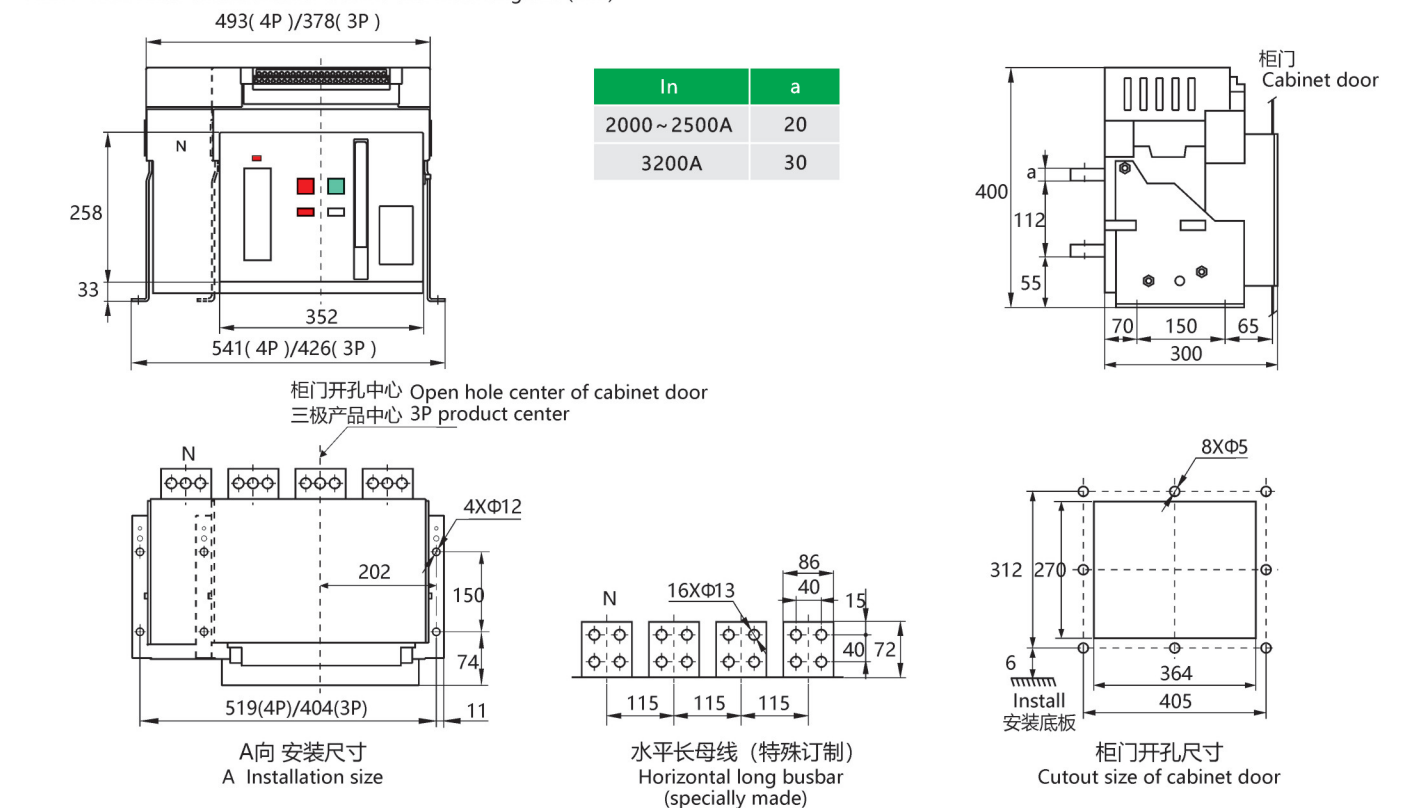
NLW1-2000固定式断路器外形与安装尺寸。(单位:mm)

NLW1-2000 Fixed Circuit breaker Outline and mounting size (mm)

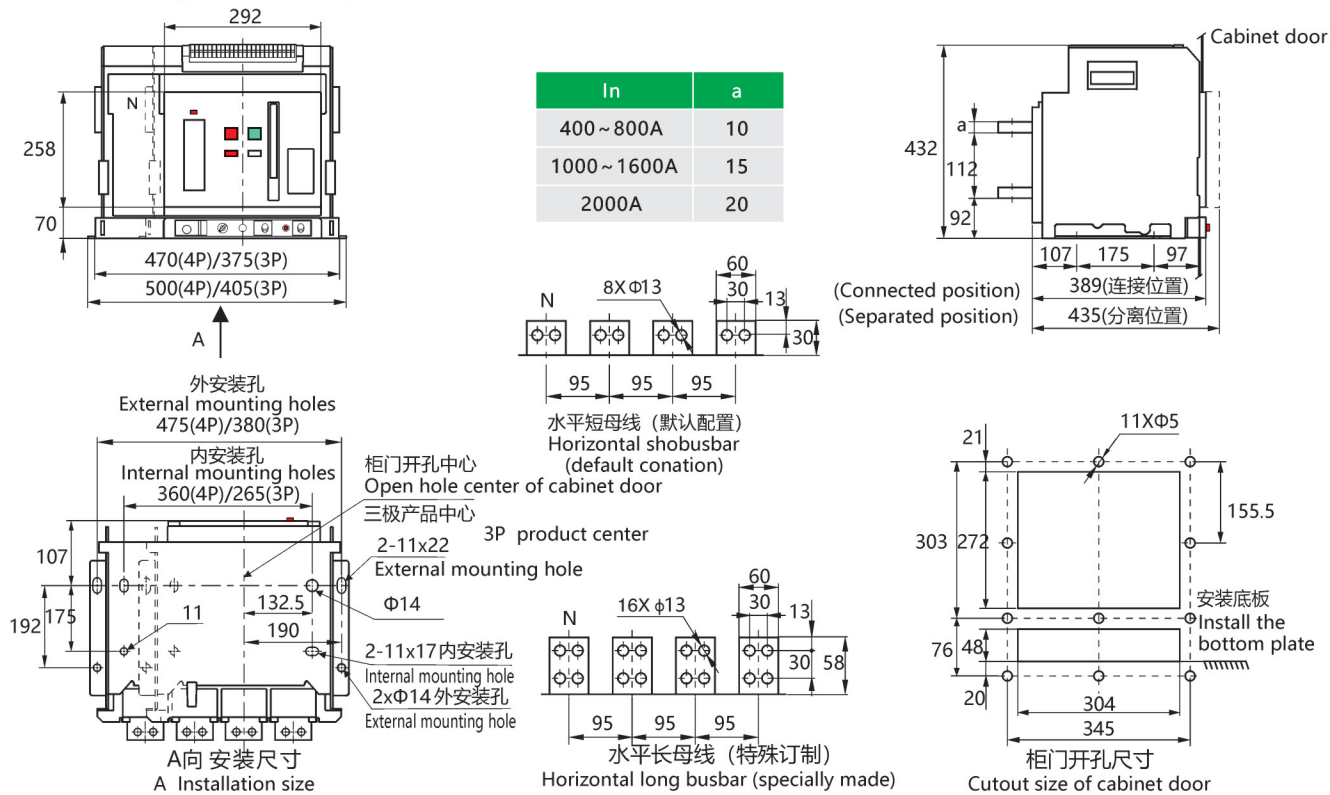


NLW1-3200固定式断路器外形与安装尺寸。(单位:mm)

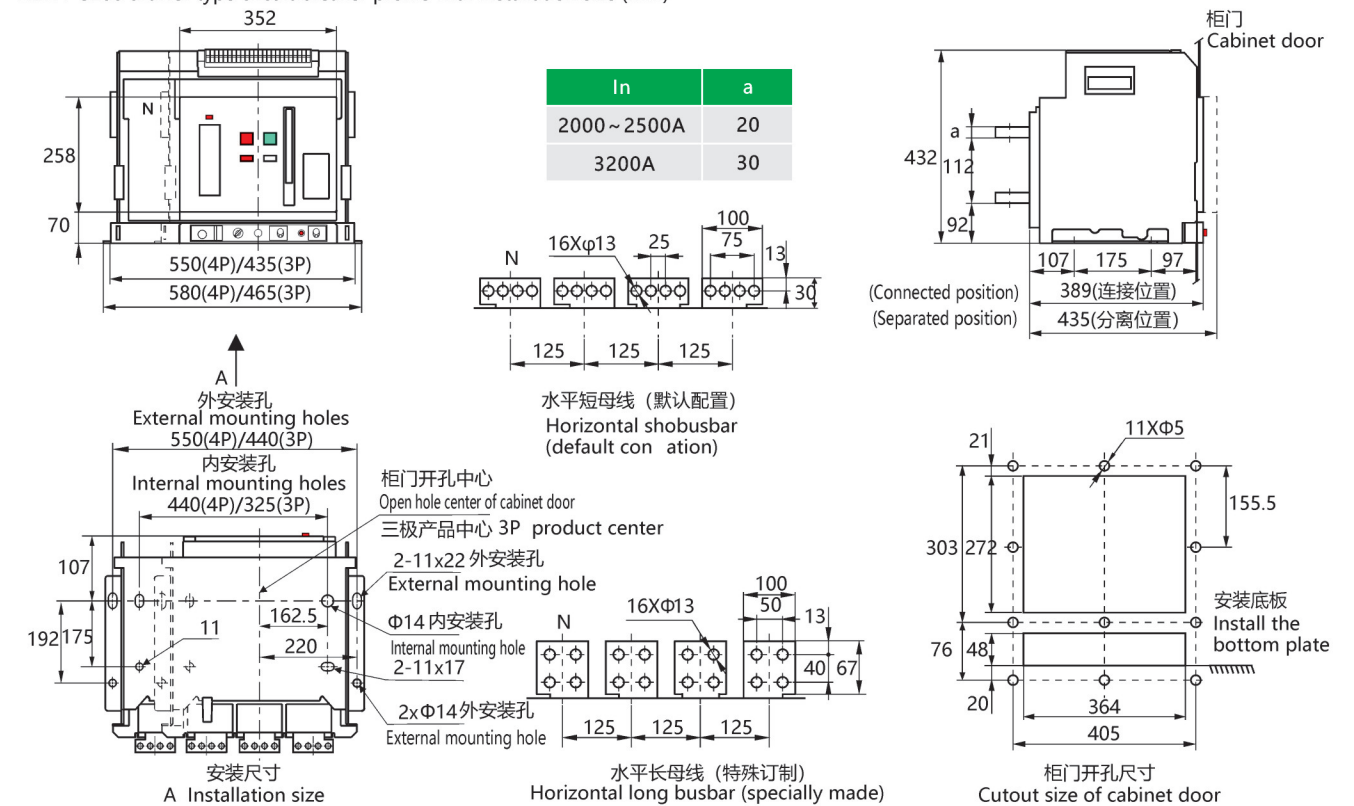
NLW1-3200 Fixed Circuit breaker Outline and mounting size (mm)



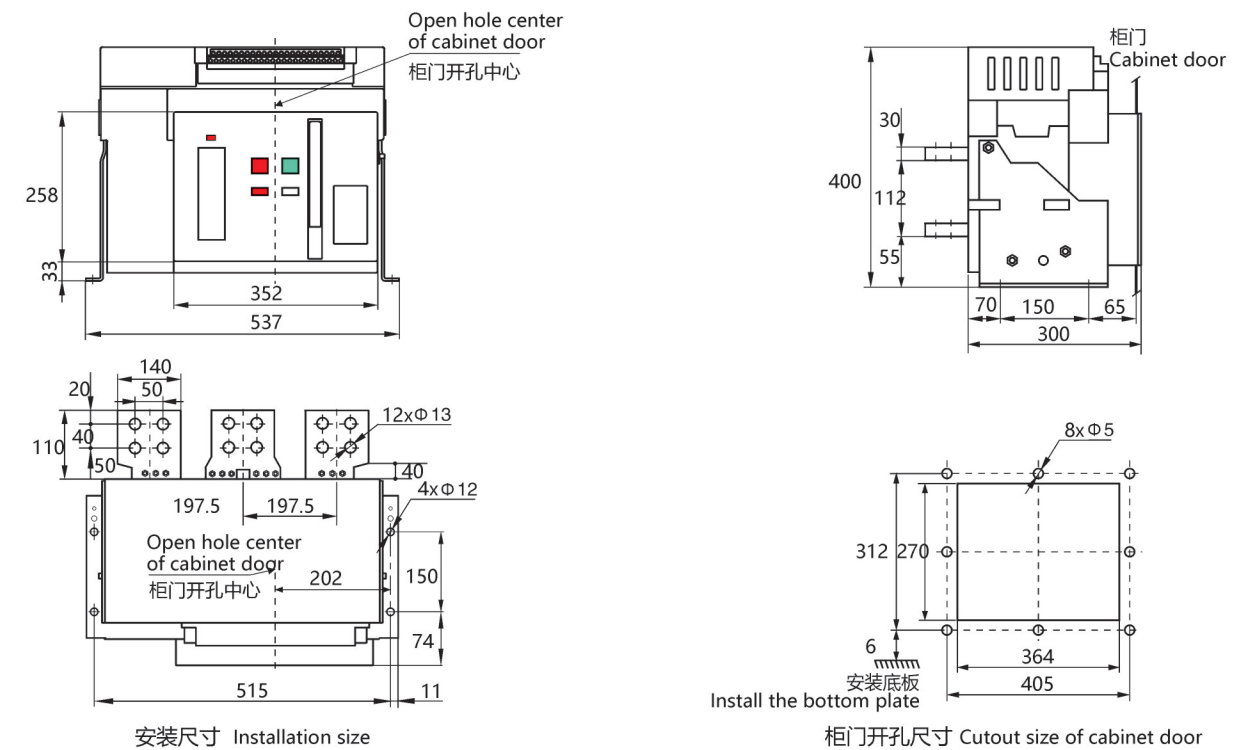
NLW1-2000 抽屉式断路器外形与安装尺寸。(单位:mm)
NLW1-2000 drawer type circuit breaker profile with installation size (mm)



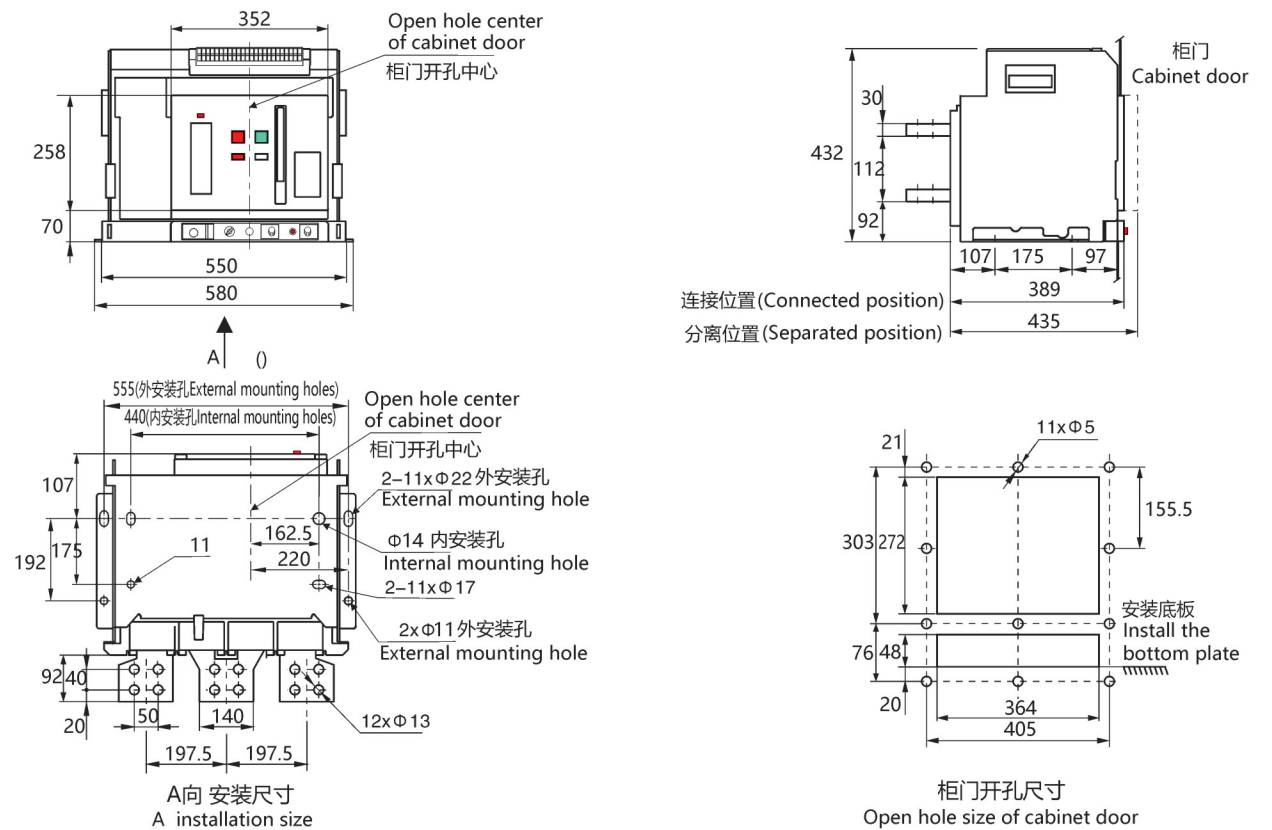
NLW1-3200 抽屉式断路器外形与安装尺寸。(单位:mm)
NLW1-3200 drawer type circuit breaker profile with installation size (mm)



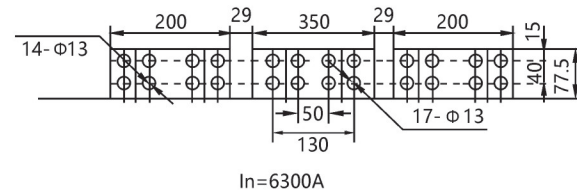
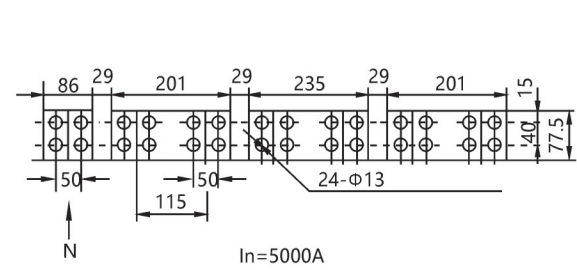
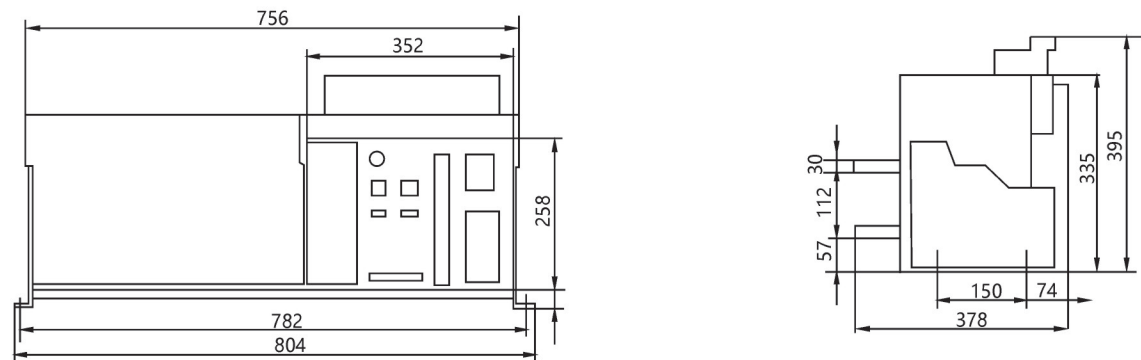
NLW1-4000/3P 固定式断路器外形与安装尺寸。(单位:mm)
NLW1-4000 / 3P Fixed Circuit breaker Outline and mounting size (mm)



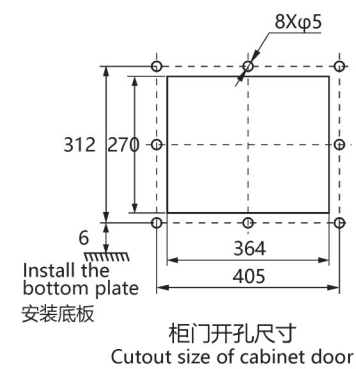
NLW1-4000/3P 增容型抽屉式断路器外形与安装尺寸。(单位:mm)
NLW1-4000 / 3P expansion drawer type circuit breaker profile with installation size (mm)



NLW1-6300/3P固定式断路器外形与安装尺寸。(单位:mm)
NLW1-6300 Fixed Circuit breaker Outline and mounting size (mm)

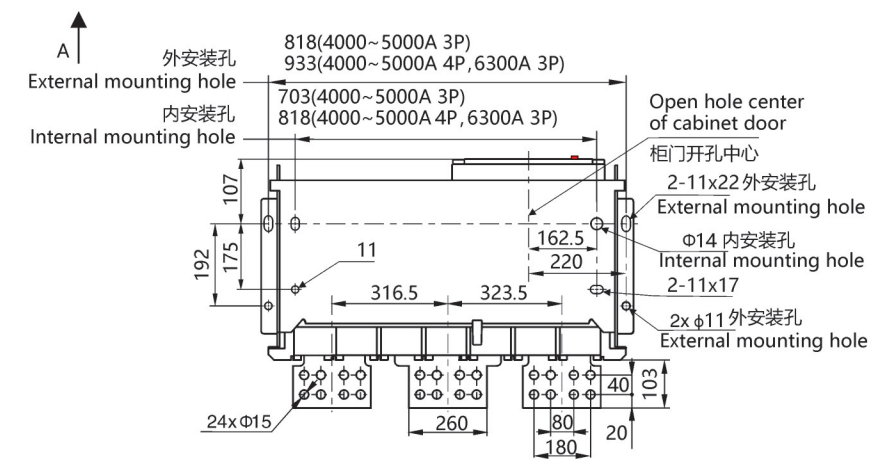
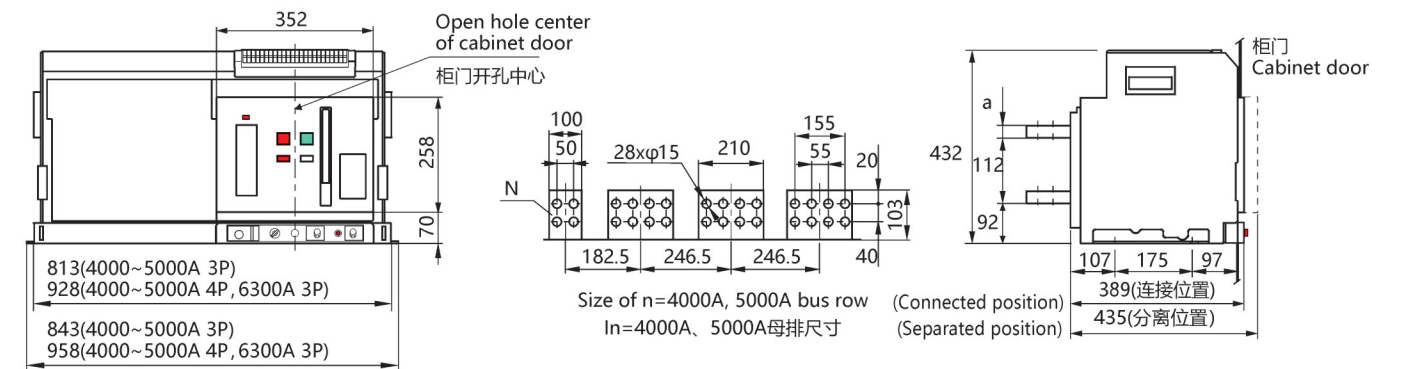


A向 安装尺寸
Horizontal long busbar (specially made)

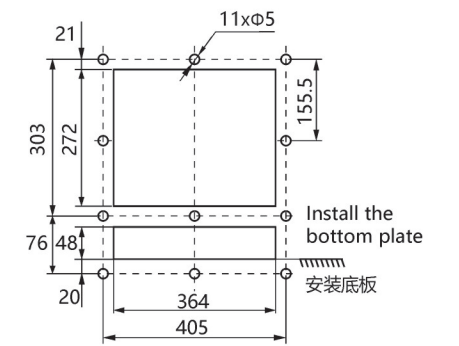


柜门开孔尺寸
Cutout size of cabinet door

NLW1-6300抽屉式断路器外形与安装尺寸。(单位:mm)
NLW1-6300 drawer type circuit breaker profile with installation size (mm)



A向 安装尺寸及6300A/3P母排尺寸
A installation size & 6300A/3P busbar size



柜门开孔尺寸
Open hole size of cabinet door

In	a
4000A	20
5000~6300A	30

母排厚度尺寸
Busbar thickness size

智能控制器 Intelligent Controller

M型控制器的面板显示与功能说明

The description of panel display and function of the controller



面板显示 Information on the panel	功能说明 Function declaration
In	控制器额定电流指示 Rated current of the controller
G	接地电流指示, 闪亮指示N相电流 Current of ground or N phase (constant light refer to ground, ash refer to N phase)
L1	指示A相电流 Current of phase A
L2	指示B相电流 Current of phase B
L3	指示C相电流 Current of phase C
MAX	指示A、B、C相电流三相最大相电流 Maximum phase current
A	指示电流单位 (安培) Unit of current
kA	指示电流单位 (千安培) Unit of current
S	指示时间单位 (秒) Unit of time (s)
试验 test	指示模拟脱扣试验 Simulated tripping test
Ic1	指示负载监控1 Load monitoring No. 1
Ic2	指示负载监控2 Load monitoring No. 2
δ	指示电流不平衡保护 Current imbalance protection
Ig	指示接地保护 Ground protection
IR	指示长延时保护 Long time delay protection
I _{sd}	指示短延时保护 Short time delay protection
li	指示瞬时保护 Instantaneous protection
WARN / ALARM 故障/报警	指示故障报警 Fault alarm
MEMORY 贮存	指示贮存 Save information
RUN 运行	指示正常运行 In normal operation state
按键功能说明 Button Function declaration	
清灯 CLEAN	指示清除故障显示界面返回运行状态 Clear the fault display on screen and return to the run state
设置 SET	进入功能设置, 连续点按可循环显示控制器的所有整定参数 Press the button, then click the button continuously to display all of parameters in sequence
贮存 MEMORY	参数设置时确认保存 Conrm to save when the parameters are set
功能 FUNCTION	辅助功能 (与原来老控制器的无名键相同) Auxiliary function
查询 FAULT CHECK	查询故障记录 Check the fault record
脱扣 TRIP	模拟脱扣试验 Simulate tripping test
不脱扣 NO TRIP	模拟不脱扣试验 Simulated non-tripping test
▲ +	调整设置参数值增加 Adjust the set parameter value to be increased
▼ -	调整设置参数值减少 Adjust the set parameter value to be decreased

M型控制器的参数整定

使用控制器面板上的“设置、▲(+)、▼(-)、贮存”等四个功能键可以整定控制器的各种参数。基本步骤如下:

- ①连续按“设置”键,可循环检查控制器所有的整定参数。当检查到某个参数时,显示屏上显示该参数的原整定值,同时面板上与之对应的指示灯亮。若不需要改变此参数则继续按“设置”键。
- ②若需要改变原整定参数,则连续点按“▲(+)、▼(-)”键,在这过程中电流整定通过按“功能”键切换整定数值的粗调和细调。直到显示屏显示您需要的数值(无级差,任意值)。
- ③按“贮存”键,保存当前设定的新参数。如果不需要设定其它参数项到第④步结束,反之则到第①步继续。
- ④按“清灯”键,退出设定状态。控制器各种保护参数不得交叉设定,要求 $I_{r1} < I_{r2} < I_{r3}$ 。

M型控制器的模拟试验操作

控制器可以进行接地、长延时、短延时、瞬时的模拟特性试验。试验分为“脱扣、不脱扣”两种,前者要分断路器,后者不分断路器。如果在试验过程中,出现过载或短路等故障情况时,系统自动终止试验状态并转入故障处理状态。

How to set the parameters of the intelligent controller

Use those four buttons on the controller panel: SET, ▲, ▼, MEMORY to set all the parameters of the controller.

The basic steps are described as follows:

- ① Click the button of "SET" continuously to check all of parameters in sequence periodically. When a parameter is checked, the original set value of the parameter is displayed on the screen, and the corresponding indicator on the panel will be light on. If you do not need to change this parameter, go on clicking the butt on of "SET".
- ② If you need to change the original set parameter, click the button of "▲" or "▼" continuously. In the process of setting for current, in order to get the required set value quickly, the user can click the button of "function" to converse the mode of adjustment between fast adjustment code and fine adjustment code until the required value is achieved.
- ③ Press button of "MEMORY" to save the new set parameters. If no other parameters are required to be set, follow the step mentioned in ④ to exit the set. Otherwise, continue according to the step mentioned in ①.
- ④ Press the button of "CLEAN" to exit the setting state.

All the protection parameters of the controller should be set according to $I_{r1} < I_{r2} < I_{r3}$ strictly.

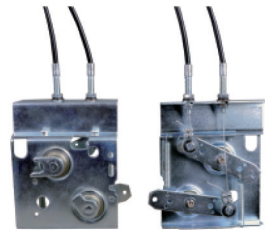
Simulation test operation of the controller

Simulation characteristics test against grounded, long delay, short delay and nstantaneous can be oper ated for the controller. Two kinds of test are available: tripping and non-tripping. The first one needs to break the circuit breaker, the second one does not break the circuit breaker. If faults such as overload or short circuit occurs during the test, the system will automatically terminate the test state and turn to the fault processing state.

断路器附件功能与特性 Function and Characteristics of Accessories

断路器的机械联锁 Mechanical interlock of the circuit breaker

- a. 钢缆绳机械联锁: 可实现2台或3台平放或垂直安装的三极或四极断路器联锁。(固定式或抽屉式)
- b. 杠杆式机械联锁: 可实现2台或3台垂直安装的三极或四极断路器联锁。(固定式或抽屉式)



钢缆绳机械联锁 Steel cable mechanical interlock

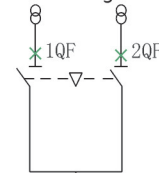


杠杆式机械联锁
Lever type mechanical interlocking

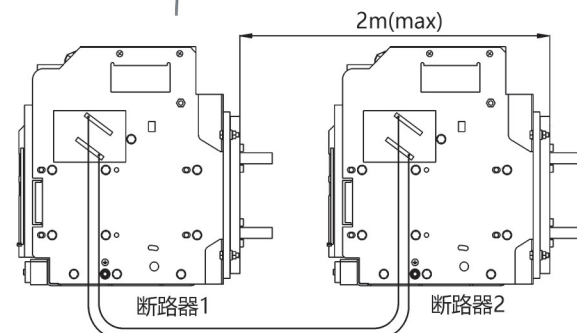
二台断路器的钢缆联锁或杠杆联锁

Two circuit breakers interlocked by the steel cable interlock or lever interlock
Two power sources one load can only be integrated with one circuit breaker

电路图
Circuit diagram



可能的运行方式
Possible operation mode

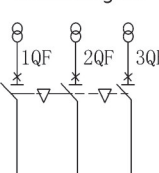


三台断路器的钢缆联锁或杠杆联锁

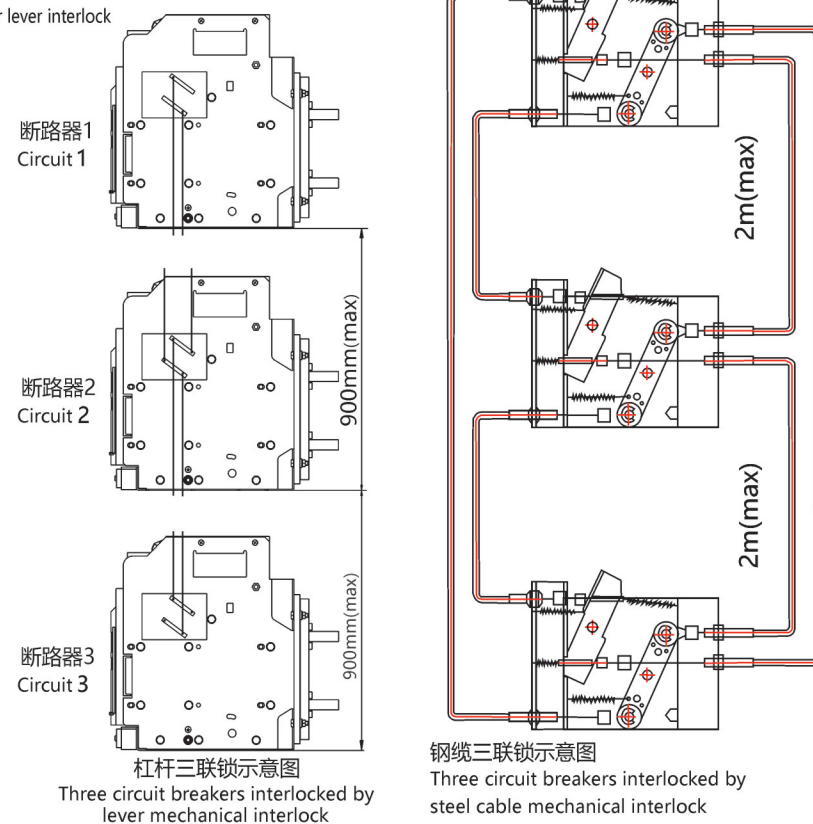
Three circuit breakers interlocked by the steel cable interlock or lever interlock

三路电源一路负载只能合一台断路器
Three power sources one load can only be integrated with one circuit breaker

电路图
Circuit diagram



可能的运行方式
Possible operation mode



杠杆三联锁示意图
Three circuit breakers interlocked by lever mechanical interlock

钢缆三联锁示意图
Three circuit breakers interlocked by steel cable mechanical interlock

QF: 断路器 Circuit breaker

剩余(漏电)电流互感器 Residual current transformer

剩余(漏电)电流保护适用于绝缘损坏导致漏电故障或人体接触外漏的导电部位而导致的漏电故障, 漏电电流 I_n 直接用安培表示, 和断路器的额定电流无关。采用零序取样方式, 需外加一只零序电流互感器; 这种互感器取样精度, 灵敏度高, 适合较小电流的保护。

Residual current protection is suitable for leakage faults caused by insulation damage or leakage faults caused by human contact with leaking conductive parts. The leakage current has nothing to do with the rated current of the circuit breaker. Using the zero-sequence sampling method requires an additional zero-sequence current transformer.

This kind of transformer has sampling accuracy and high sensitivity, and it is suitable for protection of smaller currents.

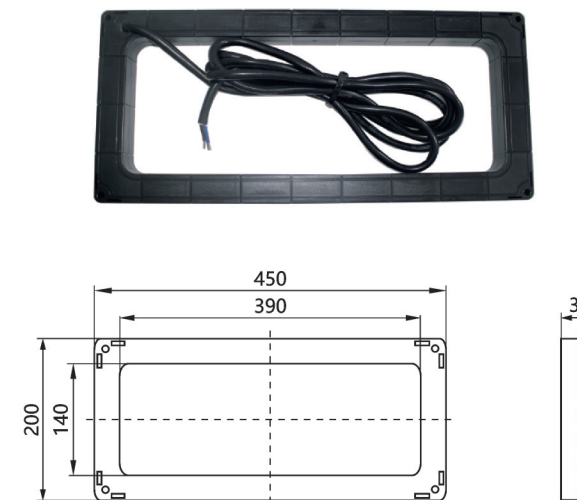
a. 剩余(漏电)电流互感器特性参数

Characteristic parameters of the residual current transformer

整定电流 Setting current (A)	$I_{\Delta n}$ Performance characteristic	0.5~30A+OFF (级差0.1A, OFF表示退出) 0.5~30A+OFF (Grade difference is 0.1A, and OFF refers to exit)						电流允差±10% Current error ±10%					
		在(0.8~1.0) $I_{\Delta n}$ 之间动作 Action between (0.8~1.0) $I_{\Delta n}$						$\leq 0.8I_{\Delta n}$ 不动作; $> I_{\Delta n} 1.0$ 延时动作 $\leq 0.8I_{\Delta n}$ no action; $> I_{\Delta n} 1.0$ Delay action of n1.0					
设定延时时间Tg Delay time set Tg (s)	瞬时 Instantaneous	0.06	0.08	0.17	0.25	0.33	0.42	0.5	0.58	0.67	0.75	0.83	
故障电流最大开断时间 The maximum break time of failure current (s)	$I_{\Delta n}$	0.02	0.36	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	$2I_{\Delta n}$	0.02	0.18	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5
	$5I_{\Delta n}/10I_{\Delta n}$	0.02	0.07	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1

b. 剩余(漏电)电流互感器外形尺寸 (互感器导线长度标配为2m)。(单位:mm)

Profile dimension of residual current transformer (standard length of conductor for transformer is 2m)



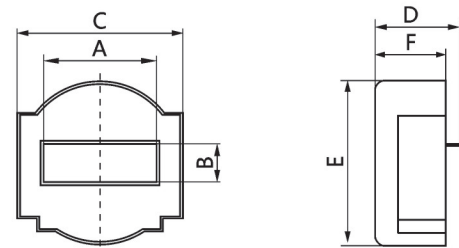
外接中性线互感器 (3P+N)。 (单位:mm)

当控制器为3P+N时, 外接中性线互感器的安装外形尺寸如下图。(外接中性线互感器导线长度标配为1.8m)

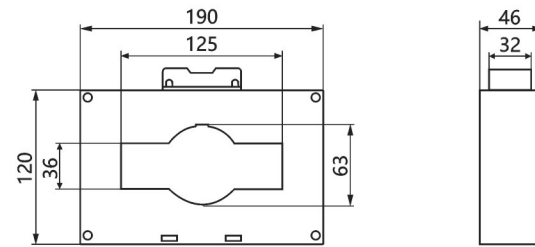
External neutral wire transformer (3P + N).

When the controller is 3P + N, the installation dimension of the external neutral wire transformer is shown as below.

(The length of external neutral wire transformer is 1.8m)



框架等级 Frame grade	A	B	C	D	E	F
框 I 互感器 Frame I Transformer	60	20	90	44	90	37
框 II & III 互感器 Frame II & III transformer	90	30	108	44	105	37



Dimension of customized neutral wire transformer

欠电压脱扣器 Under voltage release

断路器闭合前必须先接通欠电压脱扣器电源, 当供电线路欠压或失压时分断路器来保护受电设备可能受到的损坏, 提供用电可靠性与系统安全性。在1/2延时时间内, 电源电压恢复到85%Ue及以上时, 断路器不会断开。

The power supply of under voltage release must be connected before the circuit breaker is switched on. When the power supply of circuit is under voltage or lost voltage, the circuit breaker is switched off to protect against the possible damage occurs to electrical device, to ensure reliability and security of circuit system. When the voltage of power supply resumes to 85% of Ue or even bigger, the circuit breaker will not be disconnected.



1600型欠电压脱扣器
Under voltage release
for 1600A circuit breaker



2000型及以上欠电压脱扣器
Under voltage release for circuit
breaker not smaller than 2000A

工作电压Ue Working voltage Ue	AC230V	AC400V
动作电压范围 Action voltage range	(35 ~ 70)%Ue	
可靠合闸电压范围 Reliable closing voltage range	(85 ~ 110)%Ue	
不能合闸电压范围 Cannot close the voltage range	≤35% Ue	
功耗 Power dissipation	20VA	
延时脱扣时间 Time-lapse time	瞬时Instant, 0. 5S, 1S, 3S, 5S, 10S, 20S	

分励脱扣器 Shunt release

在断路器合闸后, 能够在规定的电源电压下, 通过远程操作, 使断路器断开。

Using shunt release, the circuit breaker can be disconnected by remote mode at the specified supply voltage after the circuit breaker is switched on.



1600型分励脱扣器
Shunt release for
1600A circuit breaker



2000型及以上分励脱扣器
Shunt release for circuit breaker
not smaller than 2000A

工作电压Ue Working voltage Ue	AC230V	AC230V	AC230V	AC230V
动作电压范围 Action voltage range	(70 ~ 110)%Ue			
启动电流 Start current	1.3A	0.7A	1.3A	2.5A
吸合时间 Response time	≤30ms			
瞬时功耗 Instant Power consumption	300VA		300VA	

合闸电磁铁 Closing electromagnet

在断路器储能后, 能够在规定的电源电压下, 通过远程操作, 使断路器闭合。

After energy is stored in the circuit breaker, the circuit breaker can be switched on by remote mode at the specified supply voltage.



1600型闭合电磁铁
Under voltage release for 1600A circuit breaker



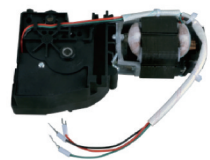
2000型及以上闭合电磁铁
Under voltage release for circuit
breaker not smaller than 2000A

工作电压Ue Working voltage Ue	AC230V	AC400V	DC220V	DC110V
动作电压范围 Action voltage range	(85 ~ 110)%Ue			
启动电流 Start current	1.3A	0.7A	1.3A	2.5A
吸合时间 Response time	≤70ms			
瞬时功耗 Instant Power consumption	300VA		300VA	

储能电动机 Electric motor for energy storage

实现断路器电动储能和在断路器合闸后自动再次储能操作，使断路器分断后立即进行再次合闸操作。

It realizes the electric energy storage of the circuit breaker and re-energy storage operation automatically after the circuit breaker is switched on, so that the circuit breaker can be switched on again immediately once it is disconnected.



1600型储能电动机
Type-1,600 for energy storage



2000型及以上储能电动机
Electric motor for energy storage of
circuit breaker not smaller than 2000A

工作电压Ue Working voltage Ue	AC230V	AC400V	DC220V	DC110V
动作电压范围 Action voltage range	(85 ~ 110)%Ue			
储能时间 Energy storage time	(5 ~ 7)s			
1600型功耗 Type-1,600 power consumption	90VA		90W	
2000型功耗 Type-2000 power consumption	85VA		85W	
3200/4000型功耗 Type 3200/4000 power consumption	110VA		110W	
6300型功耗 Type-6300 power consumption	150VA		150W	

辅助触头 Auxiliary contact

可用于监视断路器状态，如连接断路器位置信号灯和断开指示灯。（默认4组转换触头）

It can be used to monitor the state of breaker, such as connecting position signal light of breaker and disconnecting indicator.
(default 4 groups of conversion contacts)



1600型辅助触头
Auxiliary contact for
1600A circuit breaker



2000型及以上辅助触头
Auxiliary contacts for circuit
breaker not smaller than 2000A

工作电压Ue Working voltage Ue	AC230V	AC400V	DC220V	DC110V
约定发热电流 Agreed heating current	6A			
额定控制容量 Rated control capacity	300VA		60W	

门框 Door Frame

安装在配电柜室的门上，起到密封作用，防护等级达到IP40。分固定式与抽屉式门框。

It is installed on the door of the power distribution cabinet to play a sealing role, and the protection level reaches Ip40. Two kinds of door frames are available: stationary type door frame and drawer type door frame



固定式门框
Stationary type door frame



抽屉式门框
Drawer type door frame

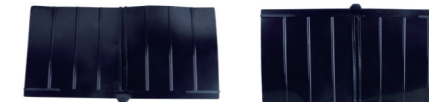
相间隔板 Phase barrier

安装在接线排相间，用于增加断路器相间绝缘能力。

Installed between busbar to increase the insulation performance of the breaker.



固定条
Fixing strip



相间隔板（固定式、抽屉式通用）
phase barrier (suitable for both
stationary type and drawer type)

钥匙锁 Lock

可将断路器的分闸按钮锁定在按下位置上，此时断路器不能进行合闸操作。

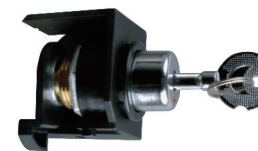
注1：需要拔出钥匙时，必须先按住分闸按钮然后逆时针方向旋转拔出钥匙；

注2：在供电方式中下面列举仅供参考，可根据现场实际供电系统需要进行安装联锁，亦可咨询制造厂进行协商。

When the toggle switch of the breaker is locked in the underneath position, the breaker cannot be switched on.

Note 1: When the key needs to be pulled out, the toggle switch must be hold first, then rotate counterclockwise to pull out the key;

Note 2: The following list of power supply methods is for reference only. Interlocking can be installed according to the actual power supply system on site, or the manufacturer can be consulted for negotiation.

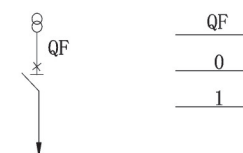


a. 一锁一钥匙：一台断路器配一把锁和一把钥匙
a. One lock and one key:
one circuit breaker with one lock and one key

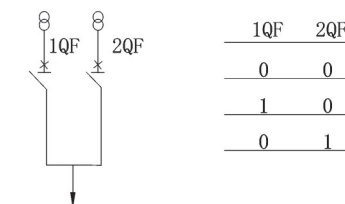


b. 两锁一钥匙：两台断路器配两把相同的锁和一把钥匙，只允许一台断路器合闸
b. Two locks and one key: two circuit breakers are equipped with two identical locks and one key, and only one circuit breaker is allowed to be switched on

两路电源两路负载联锁
One power supply and one load interlock
电路图 可能的运行方式
Circuit diagram Possible operation mode



三路电源一路负载联锁
Two power supplies and one load interlock
电路图 可能的运行方式
Circuit diagram Possible operation mode



c.三锁两钥匙：三台断路器配三把相同的锁和两把钥匙，最多只允许两台断路器合闸

c. Three locks two keys: three circuit breakers with three identical locks and two keys, at most only allow two circuit breakers to be switched on

两路电源两路负载联锁

Two power supply and two load interlock

电路图 Circuit diagram	可能的运行方式 Possible operation mode																					
	<table border="1"> <tr><th>1QF</th><th>2QF</th><th>3QF</th></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td></tr> </table>	1QF	2QF	3QF	0	0	0	1	0	0	0	0	1	1	1	0	1	0	1	0	1	1
	1QF	2QF	3QF																			
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0	1	1																				

d.三锁一钥匙：三台断路器配三把相同的锁和一把钥匙，只允许一台断路器合闸

d. Three locks and one key: three circuit breakers with three identical locks and one key, allowing only one circuit breaker to be switched on

三路电源一路负载联锁

Three power supply one load interlock

电路图 Circuit diagram	可能的运行方式 Possible operation mode															
	<table border="1"> <tr><th>1QF</th><th>2QF</th><th>3QF</th></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td></tr> </table>	1QF	2QF	3QF	0	0	0	1	0	0	0	1	0	0	0	1
	1QF	2QF	3QF													
	0	0	0													
	1	0	0													
0	1	0														
0	0	1														

安装 Installation

安装前先检查断路器的规格是否符合要求。并用500V兆欧表检查断路器绝缘电阻，在周围介质温度20±5°C相对湿度50%~70%应不小于10MΩ，否则应烘干，待绝缘电阻达到要求方可使用。

安装时，其底座应居于水平位置，并用M10螺钉固定。同时对断路器进行可靠的保护接地，接地处有明显的接地标记，固定式断路器应严格遵守安全区。

断路器安装完毕按有关接线图接线后，在主电路通电前（抽屉式断路器抽屉座上的指示指在试验位置）应进行下列操作试验：

- 检查欠电压、分励脱扣器及闭合电磁铁、电动操作电压是否相符(欠电压脱扣器应吸合,断路器才能操作)。
- 上下扳动面罩上的手柄七次后，面板显示“贮能”，并听到“卡嗒”一声，即贮能结束，按动“1”按钮或闭合电磁铁通电，断路器可靠闭合。扳动手柄能再次贮能。
- 电动机通电操作至面板显示“贮能”，并伴随“卡嗒”一声，贮能结束，电动机自动断电，按动“1”按钮或闭合电磁铁通电，断路器可靠闭合。
- 断路器闭合后，无论用欠电压、分励脱扣器或面罩上的“0”按钮、智能型脱扣器的脱扣试验均应能使断路器断开。

Before installation, check whether the specifications of the circuit breaker meet the requirements. Use a 500V megohmmeter to check the insulation resistance of the circuit breaker. When the ambient temperature is 20±5°C and the relative humidity 50%~70%, the insulation resistance of the circuit breaker should not be less than 10MΩ.

Otherwise, it should be dried and used only after the insulation resistance reaches the requirements.

During installation, the base should be in a horizontal position and fixed by M10 screws. At the same time, the circuit breaker should be reliably protected and grounded. There should be an obvious grounding mark on the grounding point. Fixed circuit breakers should be strictly arranged in the safety zone.

After the circuit breaker is installed and connected according to the relevant wiring diagram, a series of operational tests should be carried out before the main circuit is energized (the indicator on the drawer base of the drawer-type circuit breaker is in the test position):

- Check whether the under voltage, shunt release, closing electromagnet, and electric operating voltage are consistent (the circuit breaker can operated only after the under voltage release is on)
- After pulling the handle on the panel up and down seven times, the screen displays "Energy Storage" and a "click" sound is heard, which means the enegy storage is completed. Press the "1" button or connect the electromagnet to reenergize the circuit breaker. Pull the handle to store energy again.
- Power on the motor until the screen displays "Energy Storage", and with a "click" sound, the energy storage is completed, the motor automatically cuts off power, press the "1" button or connect the electromagnet to energize the circuit breaker reliably.
- After the circuit breaker is switched on, the circuit breaker should be able to be disconnected regardless of the tripping test executed by under voltage release, shunt release, the "0" button on the panel or the intelligent release.

维护(每半年至少1次) Maintenance (at least once every six months)

所有摩擦，转动部件按期添加润滑油,应检查断路器与母线连接处螺栓是否被拧紧，接触是否良好。

应检查断路器本体及抽屉座绝缘间的尘埃堆积状态，应定期清扫,应检查断路器二次回路端子连接是否可靠。

应检查断路器智能控制器是否显示正常,应检查智能控制器保护特性整定值是否正确,应检查断路器分合指示是否正确可靠。

All friction and rotating parts should be lubricat ed regularly. Check whether the bolts at the connections between the circuit breaker and the busbar are tightened well and contact is good or not.

The dust accumulation status between the circuit breaker body and the insulation of the drawer base should be checked and cleaned regularly. Also check if the secondary circuit terminal connection of the circuit breaker is reliable.

Check whether the intelligent controller of the circuit breaker displays normally, the protection characteristic setting value of the intelligent controller is correct, and the opening and closing indication of the circuit breaker is correct or not.

检修(每年至少1次) Overhaul (at least once a year)

检查断路器各部分是否完整，整洁，如壳体，底架等绝缘部件,检查断路器基座(与底板连接)是否牢固，在操作时应无振动。

手动分合机构应动作灵活，无卡阻，二次回路辅助开关转换应可靠正确,二次回路通电时，分励脱扣器，闭合电磁铁，欠电压脱扣器动作应符合产品技术规定，电动操作机构应能动作正常。

灭弧室的触头系统，触指应完整，位置准确，镀银层应完好，灭弧室内应清扫干净，(注意在打扫灭弧室时不得合分机构)，断路器与连接母线之间应连接可靠，螺栓应拧紧。

本体与抽屉座连接的接触件表面是否干净，整洁，应予以清扫，去除表面灰尘及氧化物，保证连接可靠。

Check whether all parts of the circuit breaker are complete and clean, such as the shell, chassis and other insulating parts. Check whether the base of the circuit breaker (connected to the base plate) is firm and no vibration during operation.

The manual opening and closing mechanism should be flexible and free of jamming. The secondary circuit auxiliary switch conversion should be reliable and correct. When the secondary circuit is energized, the shunt release, the operation of the magnet and under voltage release should comply with the technical regulations of the products, and the electric operating mechanism should operate normally.

The contact system of the arc extinguishing chamber and the contact fingers should be complete, their position should be accurate. The silver plating layer should be intact, the arc extinguishing chamber should be cleaned (note that the mechanism must not be switched on when cleaning the arc extinguishing chamber). The circuit breaker and the connection busbar should be connected reliably and the bolts should be tightened.

Check whether the surface of the contact piece connecting the main body and the drawer base is clean and tidy. It should be cleaned to remove dust and oxides on the surface to ensure reliable connection.

故障分析与排除 Troubleshooting and Solutions

常见故障 Problems	原因分析 Probable causes	排除方法 Solutions
断路器跳闸 (故障指示灯亮) Circuit breaker tripping (fault indicator on)	过载脱扣 (长延时指示灯亮) Overload tripping (Long delay indicator is on)	检查智能控制器上脱扣电流值及动作时间,找出故障并予以排除。按下复位按钮,将断路器重新合闸。如果是实际运行电流与长延时动作电流整定值不匹配,则请根据实际运行电流修改长延时动作电流整定值,以适当的匹配保护。 Check the tripping current value and operation time set in the intelligent controller, find out fault and eliminate it. Press the reset button to switch on the circuit breaker again. If the actual running current does not match the set long delay action current value, please modify the Long delay action current setting value according to the actual running current to achieve appropriate matching protection.
	短路脱扣(短延时或瞬时指示灯亮) Short circuit tripping(Short delay or the instantaneous indicator is on)	检查智能控制器上脱扣电流值及动作时间,找出故障并予以排除。按下复位按钮,将断路器重新合闸。 Check the tripping current value and operation time set in the intelligent controller, find out and eliminate the fault. Press the reset button to switch on the circuit breaker again.
	接地故障脱扣 (接地故障指示灯亮) Groundfault tripping (Ground fault indicator is on)	检查智能控制器上脱扣电流值及动作时间,找出故障并予以排除。按下复位按钮,将断路器重新合闸。 Check the tripping current value and operation time set in the intelligent controller, find out and eliminate the fault. Press the reset button to switch on the circuit breaker again.

常见故障 Problems	原因分析 Probable causes	排除方法 Solutions
断路器跳闸 (故障指示灯亮) Circuit breaker tripping (fault indicator on)	机械连锁动作 Under voltage release tripping	1) 检查欠电压脱扣器电源电压必须 $\geq 85\%U_e$; 2) 检查欠电压脱扣器及控制单元是否出故障。 1) Check if the power supply voltage of under voltage release must be not smaller than $85\% U_e$; 2) Check whether the under voltage release and the control unit are out of order.
	欠电压脱扣器脱扣 Mechanical interlocked device action	检查两台装有机械连锁的断路器工作状态。 Check the operating state of 2pcs of mechanical interlocked circuit breakers.
断路器不能合闸 Can't be switched on	欠电压脱扣器没有吸合 Under voltage release doesn't actuate	1) 欠电压脱扣器是否已通电; 2) 检查电源电压是否低于 $85\%U_e$; 3) 检查欠电压脱扣器是否烧坏, 如确认烧坏应更换。 1) Whether under voltage release is powered on 2) Check whether the power supply voltage is lower than $85\% U_e$; 3) Check whether the under voltage release is burned out. If it is, replace it.
	复位按钮没有复位 The reset button doesn't reset	按下复位按钮, 将断路器重新合闸。 Press the reset button to restart the circuit breaker.
	抽屉式断路器未摇到位 Drawer type circuit breaker has not been shaken in place	将抽屉式断路器摇到位 (应听到“咔咔”两下声响) Shake the drawer type breaker in place (you should hear two "click" sounds)
	抽屉式断路器二次回路接触不良 Poor contact happens to the secondary loop of drawer type circuit breaker	检查二次回路接触情况, 并予以排除。 Check the secondary loop contact situation and eliminate it.
	断路器未储能 Energy has not been stored in the circuit breaker	1) 检查电动机控制电源是否接通并且必须 $\geq 85\%U_s$; 2) 检查电动机储能机构有无故障。 1) Check whether the Electric motor control power supply is connected and must be $\geq 85\%U_s$; 2) Check if the fault happens to electric motor energy storage mechanism
	机械连锁动作, 断路器被锁住 Mechanical interlock acts while the circuit breaker is locked	检查两台断路器机械连锁工作状态是否正常。 Check whether the mechanical interlocking working state of the two circuit breakers is normal.
	合闸电磁铁有问题 Problem occurs to the closing electromagnet	1) 检查合闸电磁铁电源电压是否接通且 $\geq 85\%U_s$; 2) 如果合闸电磁铁有问题, 不能吸合应更换。 1) Check whether the closing electromagnet is connected to the power supply well and the voltage should be $\geq 85\%U_s$; 2) If the closing electromagnet is fault and can not realize actuation, replace it.
	分励脱扣器接线错误 Wiring error in shunt release	分励脱扣器应按按钮开关常开点。 Shunt release should be connected with NO contact of pushbutton switch.
断路器 合闸后跳闸 Circuit breaker tripping after switched on	1) 立即跳闸 2) 延时跳闸 1) Tripping immediately 2) Tripping with delay	1) 在智能控制器上检查分断电流值及动作时间; 2) 如果是短路的请寻找及排除短路故障; 3) 如果是过载的请寻找及排除过载故障; 4) 检查分励脱扣器按钮是否接错, 再按下复位按钮将断路器重新合闸。 1) Check the breaking current value and action time in the intelligent controller; 2) If it is short circuit, please check and eliminate the hitch; 3) If it is overload, please check and eliminate the hitch; 4) Check whether the shunt release is connected with pushbutton switch wrongly or not, then press the reset button to switch on the circuit breaker again.

常见故障 Problems	原因分析 Probable causes	排除方法 Solutions
断路器不能分闸 Circuit breaker can't be disconnected	1) 不能电动分闸 2) 不能手动分闸 1) Can't be switched off by electric drive 2) Can't be switched off manually	1) 检查分励脱扣器电路连接是否可靠及分励脱扣器有无故障, 如确认有故障应更换分励脱扣器; 2) 检查操作机构, 有无机械故障。 1) Check whether the shunt release circuit is well connected. Check if failure happen to shunt release. If fault is confirmed, replace it; 2) Check the operating mechanism, whether there is mechanical failure.
断路器不能储能 Circuit breaker can't store energy	1) 不能手动储能 2) 不能电动储能 1) Can't store energy manually 2) Energy storage can not fulfilled by electric drive	1) 检查操作机构, 有无机械故障; 2) 检查操作手柄是否卡死; 3) 查电动储能装置控制电源电压 $\geq 85\%U_s$; 电路连接有无问题; 4) 检查电动机有无问题。 1) Check the operating mechanism, whether there is mechanical failure; 2) Check whether the operation handle is stuck; 3) Check whether the control power supply voltage of the electric energy storage device is $\geq 85\%U_s$; whether there is any problem with the circuit connection; 4) Check if something wrong with electric motor
抽屉式断路器在 “分离”位置不能 抽出断路器 Drawer type circuit breaker cannot withdraw in the position of  (separated)	1) 手柄未拔出 2) 断路器没有完全到达 “分离”位置。 1) The handle is not pulled out 2) The circuit breaker has not been reached to the position of "separated" fully.	1) 拔出手柄; 2) 把断路器完全摇到“分离”位置; 3) 检查抽屉内有无异物卡住。 1) Pull out the handle; 2) Shake the circuit breaker completely to the position of  (separated); 3) Check whether any foreign object is stuck in the drawer.
抽屉式断路器不能 摇到“连接”位置 Drawer type circuit breaker cannot be rolled to the Connection position	有异物落入抽屉座内卡 死摇进机构或推进机构 齿轮有损坏 A foreign object falls into the drawer base and jam the advance mechanism or the pushing mechanism. Damage might occur to the gear.	1) 检查有无异物和齿条及齿轮卡死的情况; 2) 检查抽屉隔板是否掉落; 3) 断路器本体与抽屉座的壳架等级额定电流不相配。 1) Check whether rack or gear are stuck by foreign object or not; 2) Check whether the drawer partition plate falls off; 3) The rated current of the frame level of the circuit breaker does not correspond to that of the drawer base.
智能控制器 屏幕无显示 No display on the screen of intelligent controller	1) 智能控制器没有接通电源 2) 辅助电源输入端与电压 不正常 3) 智能控制器有故障。 1) The intelligent controller has not been connected to the power supply. 2) Input terminal and voltage of auxiliary power supply is not in order 3) Fault happens to the intelligent controller	1) 检查智能控制器电源连接是否良好; 2) 切除智能控制器电源, 然后再接通电源, 如故障仍然存在, 可能控制器有问题需更换。 1) Check whether the intelligent controller is well connected with control power. 2) Disconnect the control power of the intelligent controller, and connect the power again. If failure still exists, the controller needs to be replaced.

订货须知 Attention While Odering

规格型号	NLW1-1600	NLW1-2000	NLW1-3200	NLW1-4000	NLW1-6300
额定电压	<input type="checkbox"/> AC400V <input type="checkbox"/> AC690V				
型号规格	<input type="checkbox"/> 抽屉式 <input type="checkbox"/> 固定式				
额定电流In(A)	<input type="checkbox"/> 200 <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"/> 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"/> 2900 <input type="checkbox"/> 3200 <input type="checkbox"/> 4000(expansion)	<input type="checkbox"/> 3600 <input type="checkbox"/> 4000	<input type="checkbox"/> 4000 <input type="checkbox"/> 5000 <input type="checkbox"/> 6300
极数	<input type="checkbox"/> 3极 <input type="checkbox"/> 4极				
智能控制器	控制电压	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
	基本功能	辅助功能	增选功能		
	过载长延时保护、短路短延时保护、短路瞬时保护、接地保护	1.电流表功能 2.自诊断功能 3.整定功能 4.试验功能 5.显示功能	<input type="checkbox"/> 频率显示 <input type="checkbox"/> 功率因素显示 <input type="checkbox"/> 有功功率显示 <input type="checkbox"/> 负载监控 <input type="checkbox"/> MCR功能 注: 增选功能费用另计		
电气附件	欠压脱扣器(选配附件)	控制电压 <input type="checkbox"/> AC230V <input type="checkbox"/> AC400V			
		<input type="checkbox"/> 欠压瞬时脱扣器 <input type="checkbox"/> 欠压延时脱扣器 <input type="checkbox"/> 零压延时 <input type="checkbox"/> 0.5s <input type="checkbox"/> 1s <input type="checkbox"/> 3s <input type="checkbox"/> 5s <input type="checkbox"/> 10s <input type="checkbox"/> 20s			
	分励脱扣器	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
	闭合电磁铁	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
	储能电动机	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
特殊附件	辅助触头	<input type="checkbox"/> 四组转换(默认) <input type="checkbox"/> 五组转换 <input type="checkbox"/> 4NO+4NC <input type="checkbox"/> 6NO+6NC			
	机械联锁	两台断路器		<input type="checkbox"/> 钢缆联锁 <input type="checkbox"/> 杠杆联锁(上下联锁)	
		三台断路器		<input type="checkbox"/> 钢缆联锁 <input type="checkbox"/> 杠杆联锁(上下联锁)	
	钥匙锁	<input type="checkbox"/> 一锁一钥匙 <input type="checkbox"/> 二锁一钥匙 <input type="checkbox"/> 三锁一钥匙 <input type="checkbox"/> 三锁二钥匙 <input type="checkbox"/> 特殊			
	其他功能	<input type="checkbox"/> 外接漏电互感器		<input type="checkbox"/> 外接中性线互感器(3P+N)	
双电源控制器	<input type="checkbox"/> 双路自备投控制器		<input type="checkbox"/> 母联自备投控制器		
控制电压	<input type="checkbox"/> 垂直布线(带L型垂直母线)		注: 常规产品为水平布线		

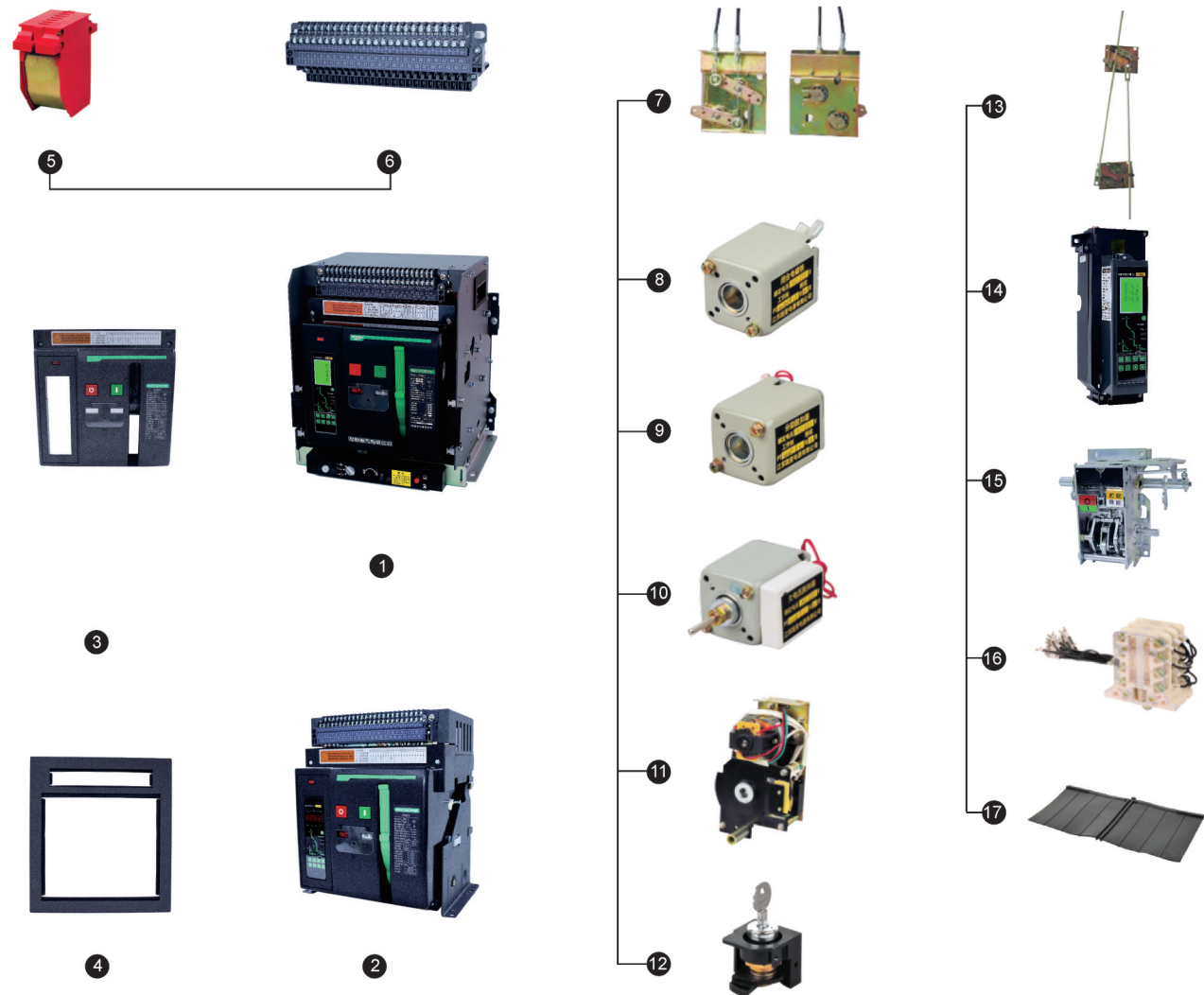
订货须知 Attention While Odering

Model	NLW1-1600	NLW1-2000	NLW1-3200	NLW1-4000	NLW1-6300
Rated voltage	<input type="checkbox"/> AC400V <input type="checkbox"/> AC690V				
Type	<input type="checkbox"/> Drawer type <input type="checkbox"/> Stationary type				
Rated Current In (A)	<input type="checkbox"/> 200 <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"/> 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"/> 2900 <input type="checkbox"/> 3200 <input type="checkbox"/> 4000(expansion)	<input type="checkbox"/> 3600 <input type="checkbox"/> 4000	<input type="checkbox"/> 4000 <input type="checkbox"/> 5000 <input type="checkbox"/> 6300
Number of pole	<input type="checkbox"/> 3 poles <input type="checkbox"/> 4 poles				
Intelligent controller	Control voltage	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
	Basic function	Auxiliary function	Optional function		
	Overload Long delay, protection, short circuit Short d elay protection, short circuit Instant, protection, grounding protection	1. Ammeter function 2. Self-diagnosis function 3. Complete the function 4. Test function 5. Display function	<input type="checkbox"/> Frequency display <input type="checkbox"/> Power factor display <input type="checkbox"/> Active power display <input type="checkbox"/> Load monitoring <input type="checkbox"/> MCR function Note: The cost of the optional function is offered additionally		
Electrical accessories	Under voltage release (Optional)	Control voltage <input type="checkbox"/> AC230V <input type="checkbox"/> AC400V			
		<input type="checkbox"/> Under voltage Instant tripping device <input type="checkbox"/> Under voltage delay tripping device <input type="checkbox"/> Delay under voltage value at zero <input type="checkbox"/> 0.5s <input type="checkbox"/> 1s <input type="checkbox"/> 3s <input type="checkbox"/> 5s <input type="checkbox"/> 10s <input type="checkbox"/> 20s			
	Shunt release	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
	Closing electromagnet	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
	Electric motor for energy storage	<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V			
Special accessories	Auxilia contact	<input type="checkbox"/> 4 groups conversion (default) <input type="checkbox"/> 5 groups conversion <input type="checkbox"/> 4NO+4NC <input type="checkbox"/> 6NO+6NC			
	Mechanical interlock	Two circuit breakers		<input type="checkbox"/> Steel cable Inter lock <input type="checkbox"/> Lever Interlock (Upper and Lower Interlock)	
		Three circuit breakers		<input type="checkbox"/> Steel cable Inter lock <input type="checkbox"/> Lever Interlock (Upper and Lower Interlock) Note: There are two in one or one in two	
	Lock	<input type="checkbox"/> One lock, one key <input type="checkbox"/> Two locks one key <input type="checkbox"/> Three locks one key <input type="checkbox"/> Three locks and two keys <input type="checkbox"/> special			
	Other functions	<input type="checkbox"/> External residual current transformer		<input type="checkbox"/> External neutral wire transformer (3P + N)	
Dual power controller	<input type="checkbox"/> Double standby self-cast controller		<input type="checkbox"/> Parent joint standby self-cast controller		
Mode of connection	<input type="checkbox"/> Vertical eiring (with L-type vertical busbar)		Note:conventional products are horizontal wiring		

Warning

本产品必须由专业人员按照手册进行安装、连接、使用和保养。
This product must be installed, connected, used and maintained by aualified personnel in ac cordance with the manual.

NLW3系列智能断路器
NLW3 Intelligent Circuit Breaker



1	抽屉式断路器 Drawer circuit breaker
2	固定式断路器 Stationary circuit breaker
3	面罩 Front panel
4	门框 Door frame
5	灭弧室 Arc chamber
6	二次回路 Secondary circuit

7	钢缆联锁 Steel cable interlock
8	闭合电磁铁 Closing electromagnet
9	分励脱扣器 Shunt release
10	欠电压脱扣器 Under voltage release
11	电动储能机构 Electro drive energy storage mechanism
12	钥匙锁 Lock

13	杠杆联锁 Lever interlock
14	智能控制器 Intelligent controller
15	操作机构 Operating mechanism
16	辅助开关 Auxiliary switch
17	相间隔板 Phase parition

NLW3
万能式断路器
Air circuit breaker



产品概述 Application

NLW3系列万能式断路器(以下简称断路器)主要适用于交流50HZ、60Hz，额定工作电压至1140V，额定电流为400A~8000A的配电网中，用来分配电能和保护线路及电源设备免受过载、欠电压、短路、接地等故障的危害。断路器核心部件采用智能型控制器，具有精确的选择性保护，可避免不必要的停电，提高供电系统可靠性、连续性和安全性。

该断路器能广泛适用于电站、工厂、矿山和现代高层建筑，特别是智能楼宇中的配电系统，在风力发电、太阳能发电等绿色能源领域中也广泛运用。该断路器符合IEC60947-2和GB/T14048.2标准。

NLW3 series intelligent circuit breaker is mainly suitable for a power distribution network with AC 50/60Hz, rated operating voltages of 1140V, and rated current of 200A to 8000A, to distribute power, protect circuit and power devices against overload, under voltage, short circuit, and ground faults. The core part of the circuit breaker adopts intelligent controller with precise selective protection, which can avoid unnecessary power failure so as to improve the reliability, continuity and safety of the power supply system.

The circuit breaker can be widely used in the power distribution system of power stations, factories, mines and modern commercial buildings, especially in intelligent buildings. It is also often used in wind power generation, solar power generation and other green energy filed.

The circuit breaker meets the IEC60947-2.

型式 Type

安装方式：抽屉式。
操作方式：电动操作、手动操作。
使用类别：B类。
极数：三极、四级。
脱扣器种类：智能型控制器、欠电压瞬时（或延时）脱扣器和分励脱扣器。

智能型控制器功能：

- a) 具有过载长延时反时限、短延时反时限、短延时定时限，瞬时动作等保护功能，可由用户自行设定，组成所需的保护特性；
- b) 接地故障保护功能； c) 过载报警功能； d) 试验功能；
- e) 负载监控功能； g) 自诊断功能； h) MCR功能；
- i) 热模拟功能； j) 触头损耗指示；

Installation mode: stationary type drawer type

Operation mode: electric operation, manual operation

Category use: type B

Pole number: 3, 4

Type of release device: intelligent controller, under voltage rekeage trigger and shunt release trigger.

Intelligent type controller function:

- a. With overload long delay reverse time limit, short delay reverse time limit, short delay fixed time limit, instantaneous action and other protection functions, can be set by the user, composed of the required protection characteristics;
- b. Ground fault protection function; c. Overload alarm function; d. Test function;
- e. Overload alarm function; g. Self-diagnostic function; h. MCR function;
- i. Thermal simulation function; j. Contact loss indication;

正常工作条件和安装条件 Working Environment

周围空气温度为-5℃~+40℃，且24h的平均值不超过+35℃(特殊订货的除外)。

安装地点的海拔不超过2000m。

安装地点的空气相对湿度在最高温度为+40℃时不超过50%；在较低温度下可以有较高的相对湿度；最湿月的平均最低温度不超过+25℃，该月的平均最大相对湿度不超过90%，并考虑因温度变化发生在产品表面上的凝露。

污染等级为3级。

断路器主电路及欠电压脱扣器线圈、电源变压器初级线圈的安装类别为IV，其余辅助电路、控制电路安装类别为III。

安装位置应垂直，各方向的倾斜度不超过5°。

The minimum temperature shall not be lower than -25℃, and the maximum temperature shall not exceed + 55℃;

The relative temperature (+ 25℃) shall not exceed 95%;

Products in the process of transportation, should be handled with special care, should not be inverted, should be tried to avoid violent collision.

The ambient air temperature is -5℃ ~ + 40℃, and the average value of 24h does not exceed + 35℃ (except for special orders).

The altitude of the installation site shall not exceed 2,000 m.

The relative humidity of the air at the installation site shall not exceed 50% when the maximum temperature is +40℃; It can have higher relative humidity at lower temperature. The mean minimum temperature of the wettest month shall not exceed +25℃, and the mean maximum relative humidity of the month shall not exceed 90%, taking into account the condensation occurring on the surface of the product due to temperature changes.

The pollution grade is Grade 3.

The main circuit of circuit breaker, the under voltage tripping coil and the primary coil of power transformer are installed as IV, while the other auxiliary circuit and control circuit are installed as III.

The installation position shall be vertical, and the inclination in each direction shall not exceed 5°.

技术数据及性能 Technical Parameters

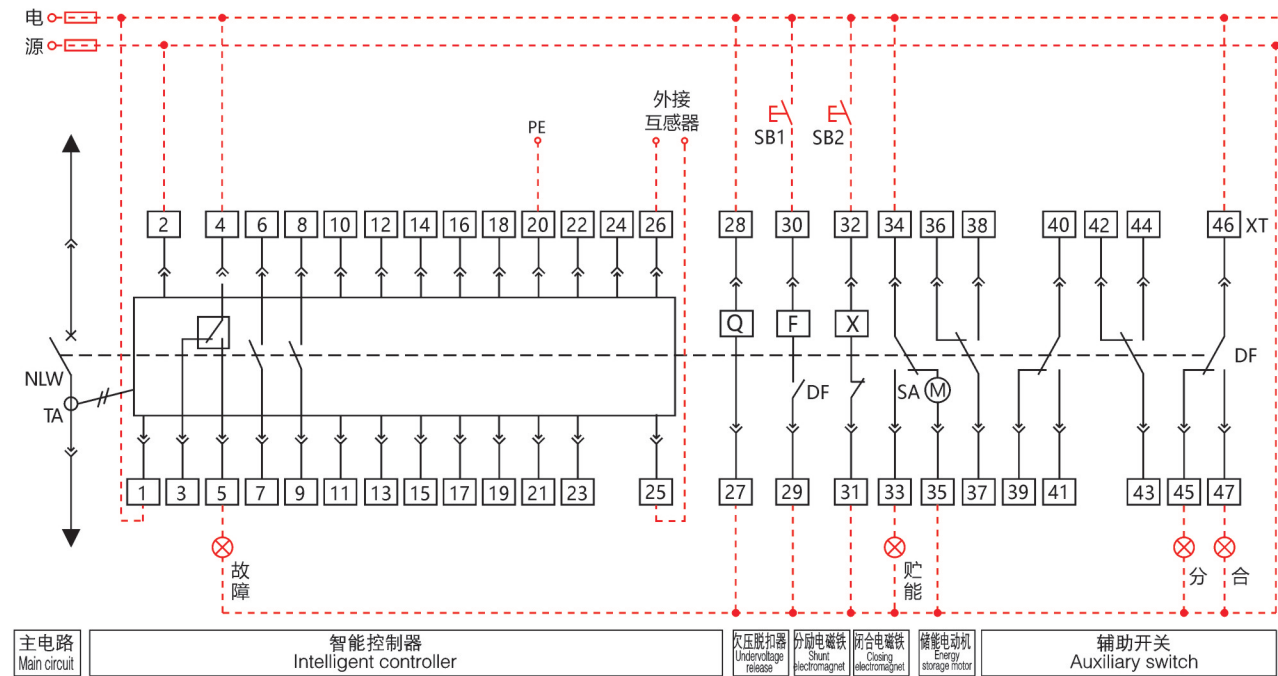
断路器技术参数及性能(见表1) Technical parameter of circuit breaker (see Table 1)

表1 技术参数及性能 Table 1 Technical Parameters

型号及壳架电流Inm Model	NLW3-2500	NLW3-4000	NLW3-8000
额定电流In (A) Rated current In (A)	400、630、800、1000 1250、1600、2000、2500	2000、2500、2900 3200、3600、4000	6300、7500、8000
中性极额定电流 Neutral pole current rating In (A)	100%In	100%In	100%In
额定工作电压 Rated operating voltage Ue (V)	AC400/440/690/800/1000/1140		
频率 Frequency	50/60Hz		
极数 Pole number	3P、4P		
额定冲击耐受电压 Rated impact withstand voltage Uimp(kV)	AC12		
额定绝缘电压 Nominal insulation voltage Ui (V)	AC1500		
工频耐受电压 Power frequency withstand voltage (V)	AC3500		
额定极限短路分断能力 Rated limit short circuit breaking capacity Icu(kA)	AC400/440V	85	100
	AC690/800V	65	80
	AC1000/1140V	50	65
额定运行短路分断能力 Rated short circuit breaking capacity Ics (kA)	AC400/440V	85	100
	AC690/800V	65	80
	AC1000/1140V	50	65
额定短时耐受电流 Rated short time withstand current Icw/ 1s (kA)	AC400/440V	85	100
	AC690/800V	65	80
	AC1000/1140V	50	65
使用类别 Category of use	B		
全分断时间 (无附加延时) Full break time (no additional delay)	≤30ms		
闭合时间 Closing time	≤70ms		
电气寿命(次) Electrical life (times) ≤3200 1h/20 > 3200 1h/10	AC400/440V	8000	6000
	AC690/800V	6000	4000
	AC1000/1140V	3000	2000
机械寿命(次) ≤2500 每1h/20 > 2500 每1h/10	免维护 Maintenance-free	12000	8000
	有维护 Have maintenance	15000	10000
抽屉座机械寿命(每1h/20次) Mechanical life of the drawer holder (1h/20times)	1200	1000	600
进线方式 Into the line way	上进线或下进线 Up or down incoming line		
飞弧距离 Arc distance(mm)	0		
安装方式 Installation mode	固定式或抽屉式 Stationary type or Drawer type		
接线方式 Mode of connection	水平接线或垂直接线 Horizontal wiring or vertical wiring		

控制回路 Control Loop

NLW3配M型智能控制器的二次回路接线图



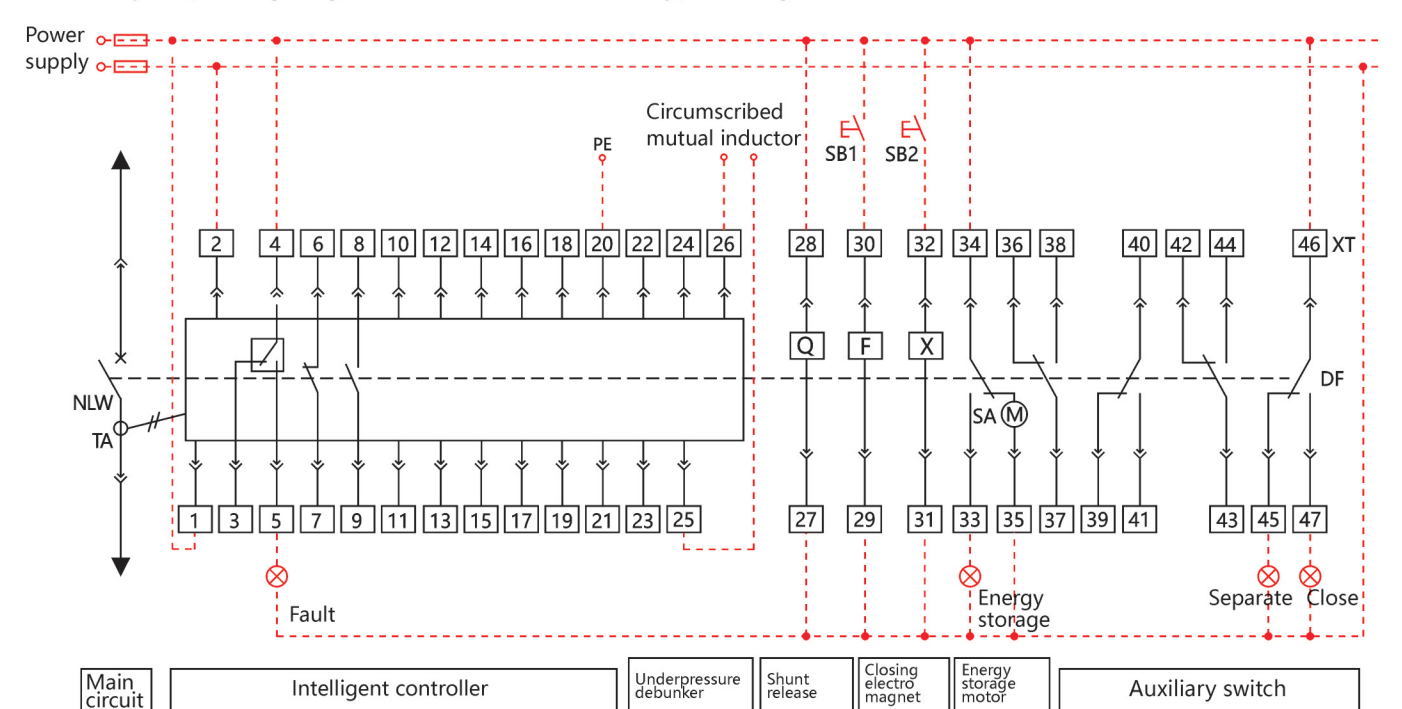
接线图中符号释义与端子功能(红色虚线部分由用户自行接线, 控制回路注意加熔断器保护)
注:欠电压脱扣器也可串接常闭按钮, 作为紧急情况下的紧急分闸按钮。

符号	释义	备注	符号	释义	备注
Q	欠电压脱扣器	选配附件	M	电动机	
F	分励脱扣器		XT	接线端子	
X	闭合电磁铁		⊗	信号灯	用户自备
DF	辅助开关		SB1	手动分闸按钮	用户自备
SA	电动机微动开关		SB2	手动合闸按钮	用户自备

端子号	端子功能描述	备注
1, 2	辅助电源输入: AC230V、AC400V、DC220V、DC110V	M型默认配置 2H/3H通讯型配置
3, 4, 5	故障跳闸触点输出 (4#为公共端), 触点容量: AC250V、3A	
6, 7	断路器状态辅助触点输出 (常开), 触点容量: AC250V、3A	
8, 9	断路器状态辅助触点输出 (常开), 触点容量: AC250V、3A	
20	保护地 (PE)	
10, 11	RS485通讯接口引出线, 10接A, 11接B(默认Modbus)	2H/3H通讯型配置
12~19	继电器触点输出: 12、13为DO1; 14、15为DO2; 16、17为遥控分闸触点输出DO3; 18、19为遥控合闸触点输出DO4	
21, 22, 23, 24	电压测量输入: 21接N、22接A、23接B、24接C	
25, 26	a: 3P+N时连接中性线互感器; b: 漏电保护时连接漏电互感器 (二选一)	
27, 28	欠电压脱扣器 (直接接自主回路电源, 以提高供电的可靠性与安全性)	选配附件
29, 30	分励脱扣器	
31, 32	闭合电磁铁	
33, 34, 35	电动机(35可直接接电源自动预储能, 也可串接常开按钮后接电源手动预储能)	
36~47……	辅助开关接线端子 (默认四组转换)	

控制回路 Control Loop

Secondary loop wiring diagram of NLW3-1600 with M-type intelligent controller



Symbol definition and terminal function in the wiring diagram (the red dotted line is wired by the user himself, and the control loop is protected by a fuse)

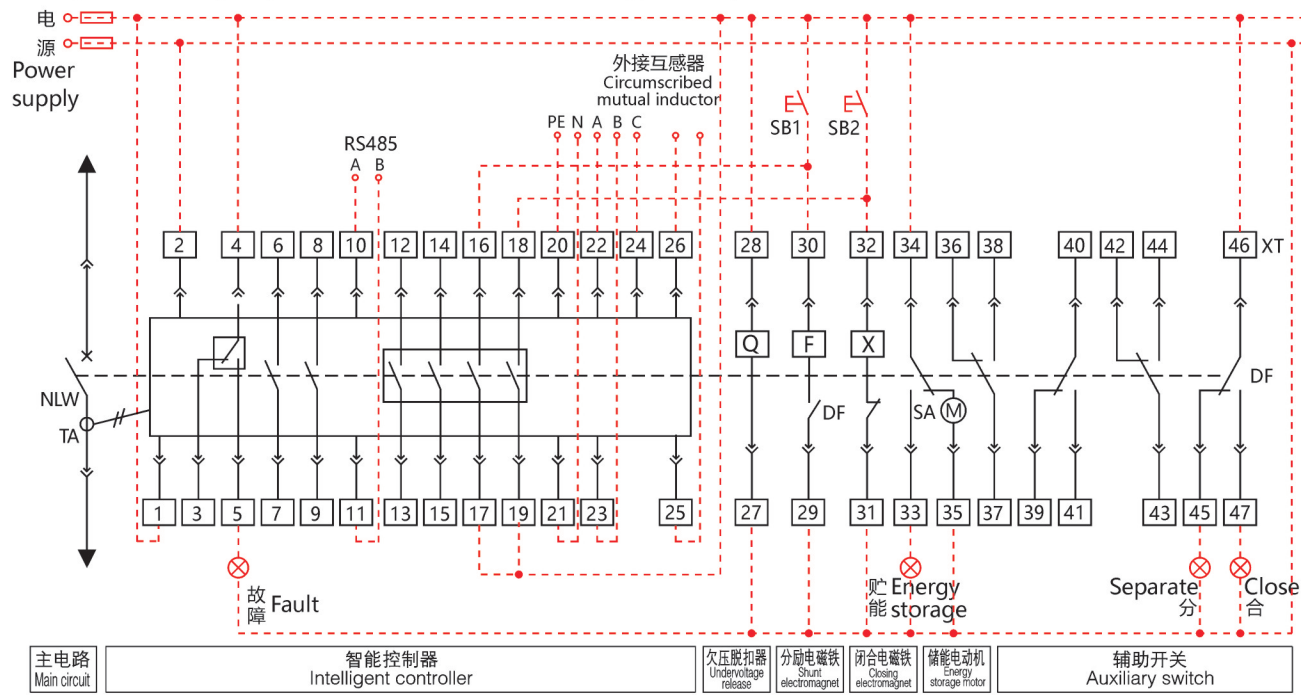
Note: The under voltage tripping button can also be connected to the normally closed button as an emergency switch button in emergency cases.

Symbol	Paraphrase	Remarks	Symbol	Paraphrase	Remarks
Q	Under voltage release	Optional attachment	M	Electric motor	
F	Shunt release		XT	Terminal connector	
X	Closing electromagnet		⊗	Signal lamp	User self-provided
DF	Auxiliary switch		SB1	Manual switch button	User self-provided
SA	Motor micro-dynamic switch		SB2	Manual closing button	User self-provided

Terminal number	Terminal function description	Remarks
1,2	Auxiliapower supply input: AC230V, AC400V, DC220V, and DC110V	Type M default configuration
3,4,5	Fault trip contact output (4 # is the public end), contact capacity: AC250V, 3A	
6,7	Breaker state auxiliary contact output (normally closed), contact capacity: AC250V, 3A	
8,9	Breaker state auxiliary contact output (often open), contact capacity: AC250V, 3A	
20	Dependency (PE)	
25,26	a: Connect neutral wire transformer for 3P + N; b: Connect leakage transformer during leakage protection (alternative)	Optional attachment
27,28	Unde oltagte tripping device (directly connected to the autonomous circuit power supply to improve the reliability and security of power supply)	Optional attachment
29,30	Shunt release	
31,32	Closing electromagnet	
33,34,35	Motor (35 can be directly connected to the power supply automatic pre-storage, or the power supply manual pre-storage)	
36~47	Auxiliary switch Terminal terminal (default four ad conversion)	

NLW3-2500~8000配H型智能控制器的二次回路接线图

Secondary-circuit wiring diagram of NLW3-2500~8000 with H-type intelligent controller



接线图中符号释义与端子功能(红色虚线部分由用户自行接线, 控制回路注意加熔断器保护)

注:欠电压脱扣器也可串接常闭按钮, 作为紧急情况下的紧急分闸按钮。

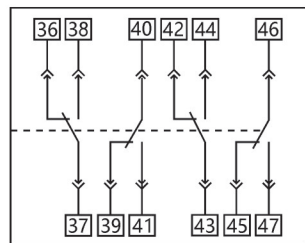
The red dotted line in the wiring diagram is wired by the user himself, and the control circuit should be protected by the fuse.
Note: Under voltage release can also be connected frequently closed butt on, as an emergency switch button in emergency cases.

NLW3供用户使用的辅助开关(DF)型式

NLW3 Auxiliary switch (DF) type

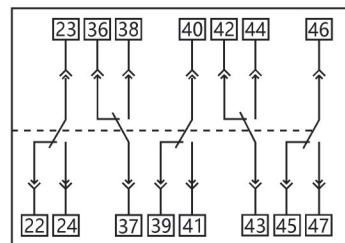
1.四组转换触头(默认配置)

1. 4 conversion contacts (default configuration)



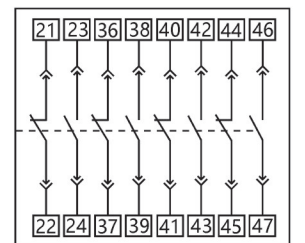
2.五组转换触头(M型)

2. 5 sets of transition contacts (Type M)



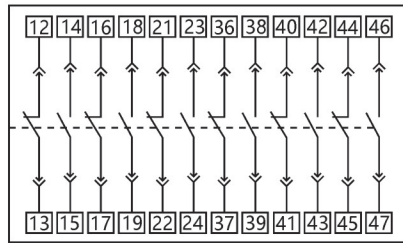
3.四常开四常闭(M型)

3. 4NO+4NC (M type)



4.六常开六常闭(M型)

4. 6NO+6NC (M type)

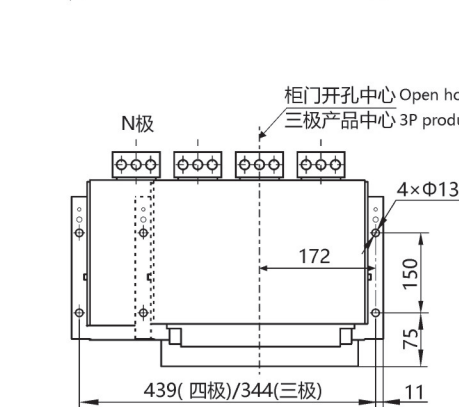
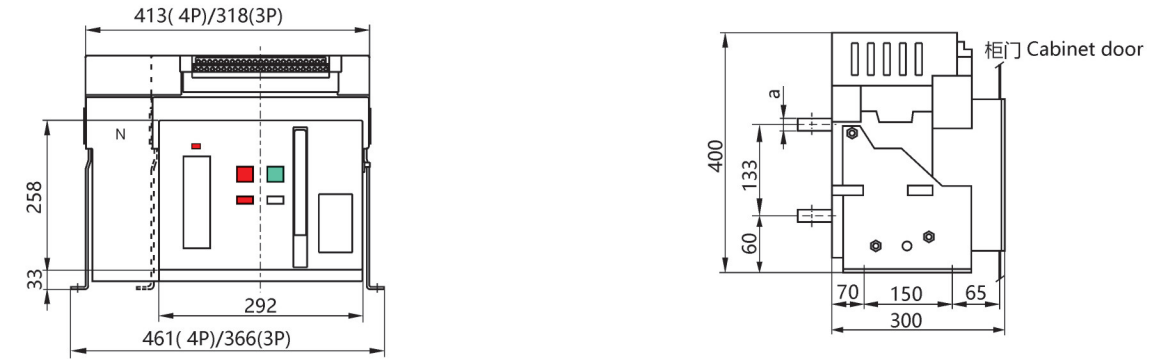


外形与安装尺寸 Overall Dimension

NLW3-2500固定式断路器外形与安装尺寸。(单位:mm)

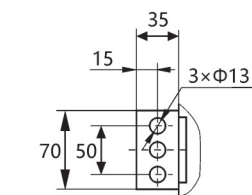
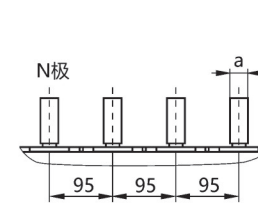
NLW3-2500 Fixed Circuit breaker Outline and mounting size (mm)

水平接线 Horizontal connection

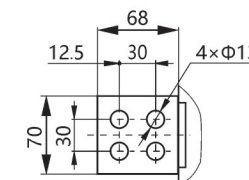
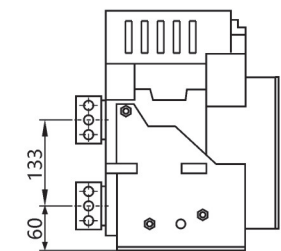


安装尺寸
Installation size

垂直接线 Vertical connection

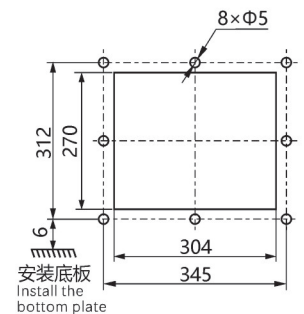


垂直短母线 (常规)
short busbar
(default configuration)



垂直长母线 (特殊订制)
long busbar(specially made)

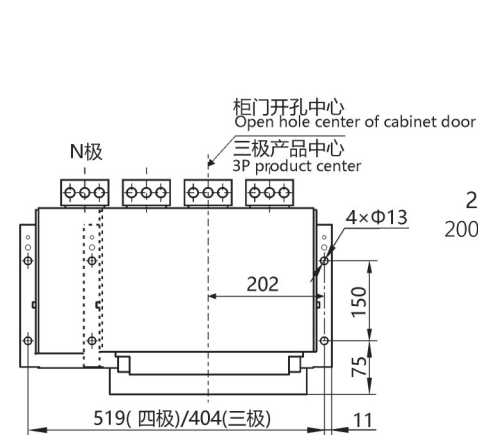
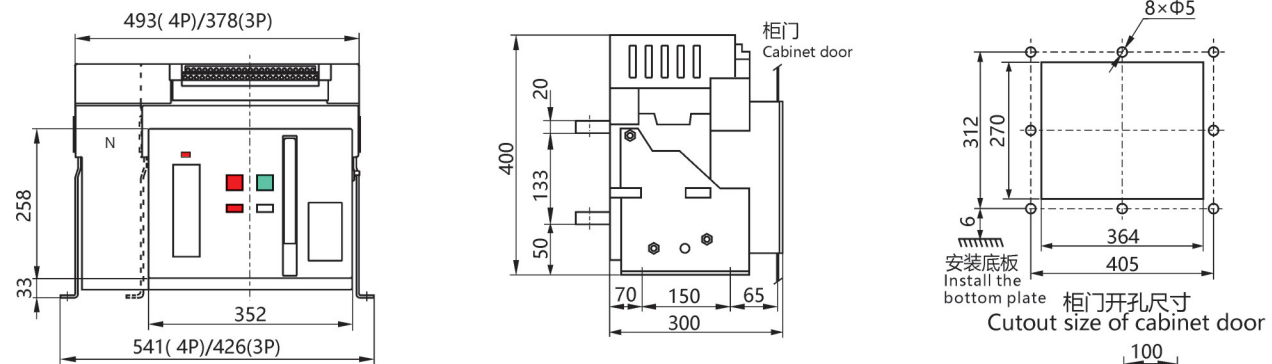
In	a
400~1600A	15
2000~2500A	20



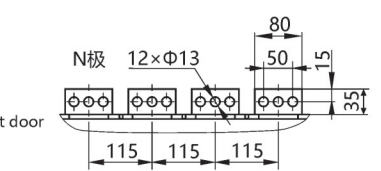
柜门开孔尺寸
Cutout size of cabinet door

NLW3-4000固定式断路器外形与安装尺寸。(单位:mm)
NLW3-4000 Fixed Circuit breaker Outline and mounting size (mm)

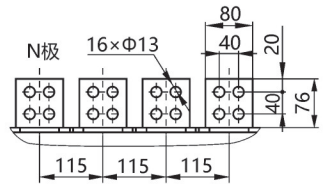
水平接线 Horizontal connection



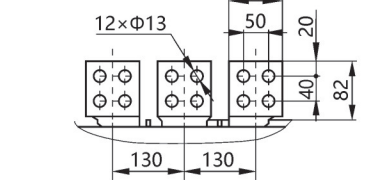
安装尺寸
Installation size



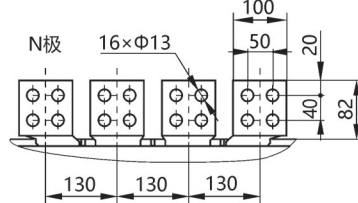
2000A-2900A/水平短母线 (常规)
2000A-2900A/Horizontal short busbar



2000A-2900A/水平长母线 (特殊订制)
2000A-2900A/Horizontal long busbar

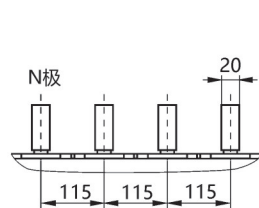


3200A-4000A/3P水平母线
3200A-4000A/3PHorizontal busbar

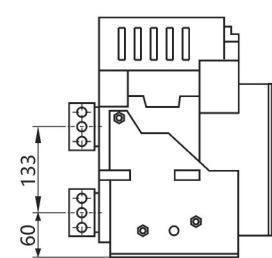


3200A-4000A/4P水平母线
3200A-4000A/4PHorizontal busbar

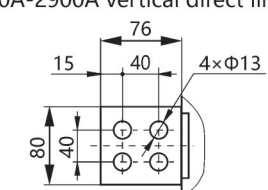
垂直接线 Vertical connection



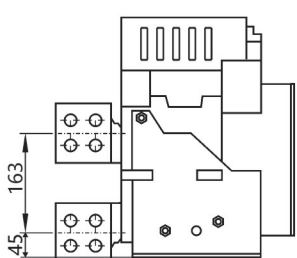
2000A-2900A垂直短母线 (常规)
2000A-2900A short busbar (default configuration)



2000A-2900A垂直接线
2000A-2900A vertical direct line



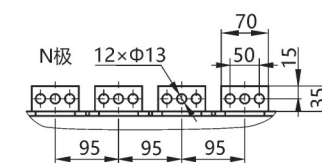
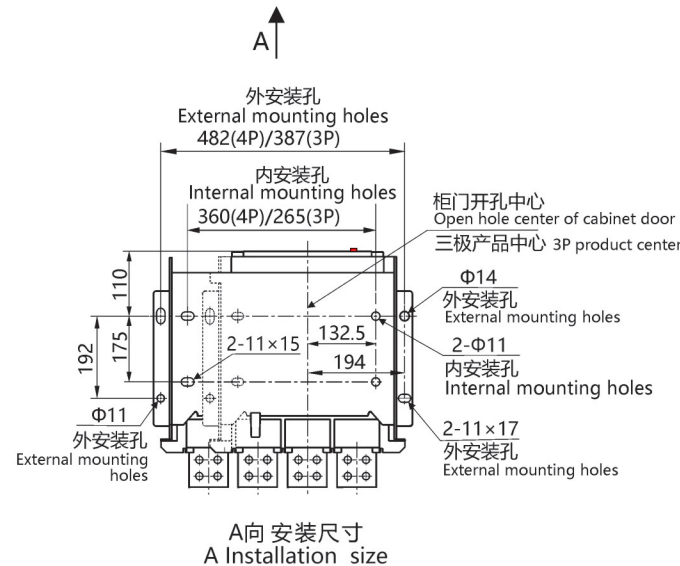
2000A-2900A垂直长母线 (特殊订制)
2000A-2900A/Horizontal long busbar



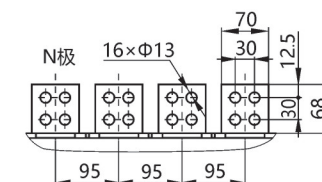
3200A-4000A垂直母线
3200A-4000A vertical connection

NLW3-2500抽屉式断路器外形与安装尺寸。(单位:mm)
NLW3-2500 drawer type circuit breaker profile with installation size.(mm)

水平接线 Horizontal connection

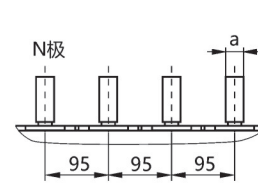


水平短母线 (常规)
Horizontal short busbar

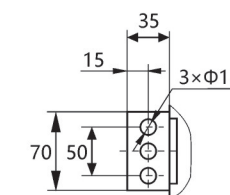


水平长母线 (特殊订制)
Horizontal longt busbar

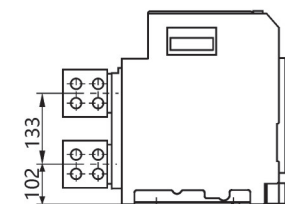
垂直接线 Vertical connection



水平长母线 (常规)

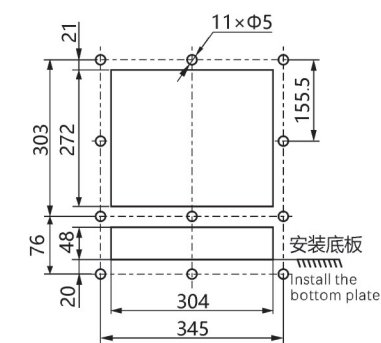


垂直短母线 (常规)
Horizontal short busbar



垂直长母线 (特殊订制)
Horizontal long busbar

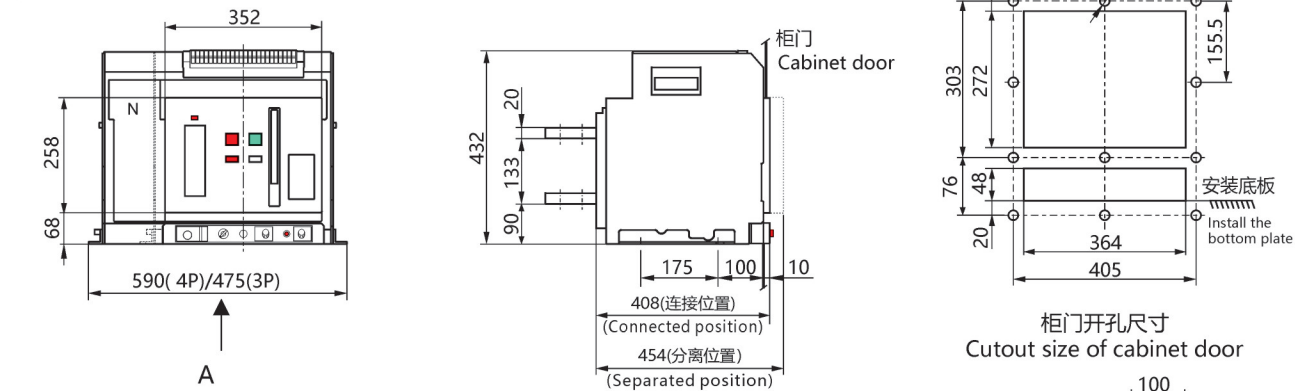
I_n	a
400~1600A	15
2000~2500A	20



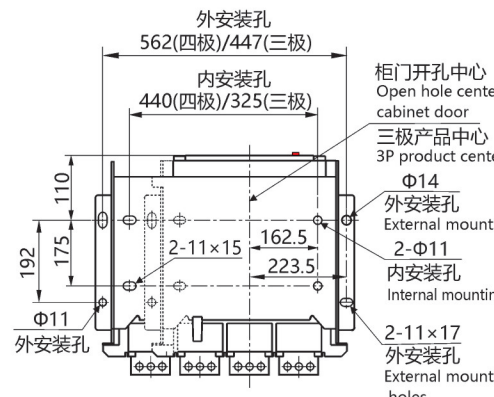
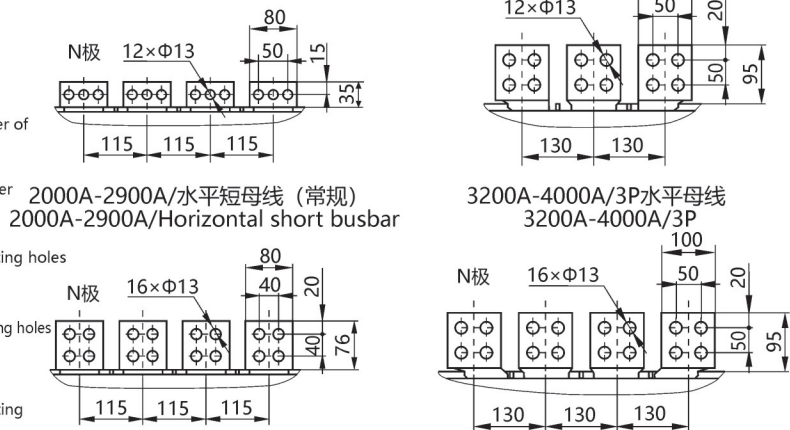
柜门开孔尺寸
Cutout size of cabinet door

NLW3-4000抽屉式断路器外形与安装尺寸。(单位:mm)
NLW3-4000 drawer type circuit breaker profile with installation size.(mm)

水平接线 Horizontal connection

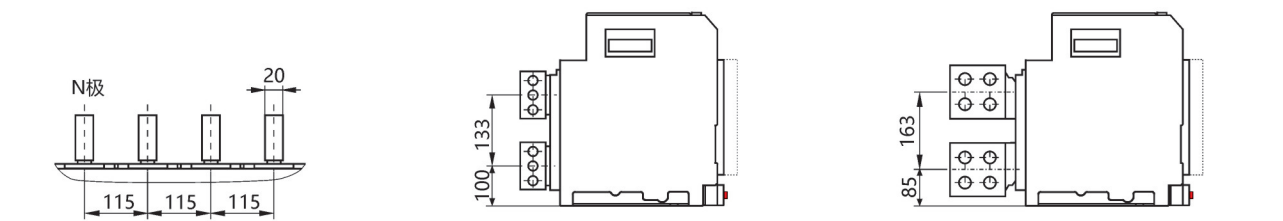


柜门开孔尺寸
Cutout size of cabinet door

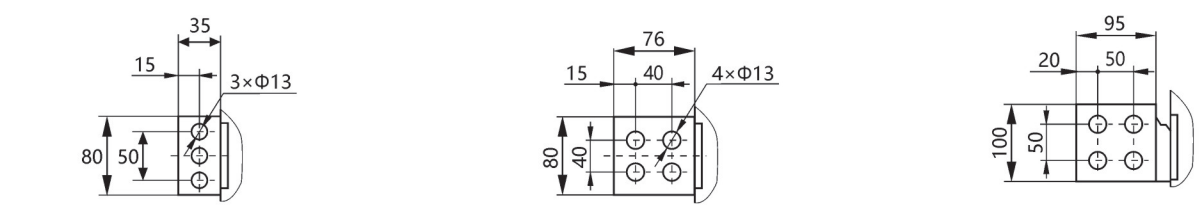


A向 安装尺寸
A Installation size

垂直接线 Vertical connection



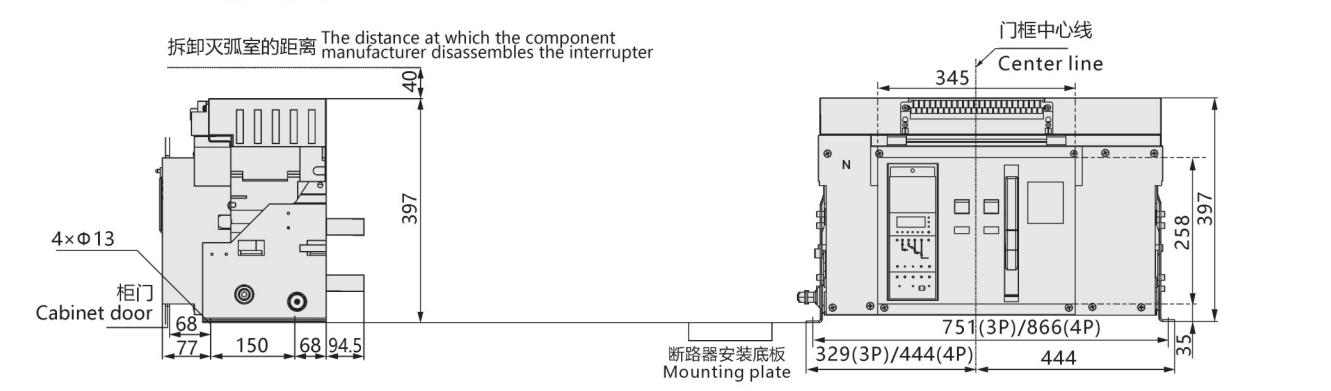
2000A-2900A垂直接线
2000A-2900A Vertical connection
3200A-4000A垂直接线
3200A-4000A Vertical connection



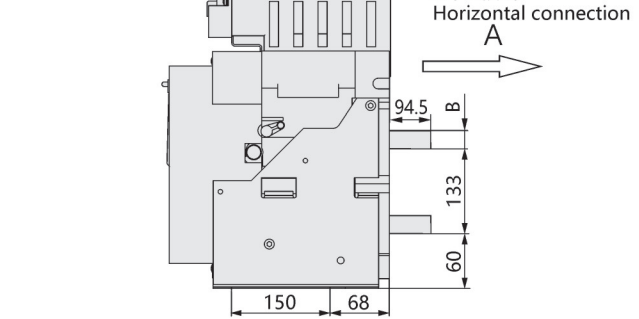
2000A-2900A垂直短母线 (常规)
2000A-2900A Horizontal short busbar
2000A-2900A垂直长母线 (特殊订制)
2000A-2900A Horizontal long busbar
3200A-4000A垂直母线
3200A-4000A Vertical busbar

NLW3-7500固定式断路器外形与安装尺寸。(单位:mm)
NLW3-7500 Fixed Circuit breaker Outline and mounting size (mm)

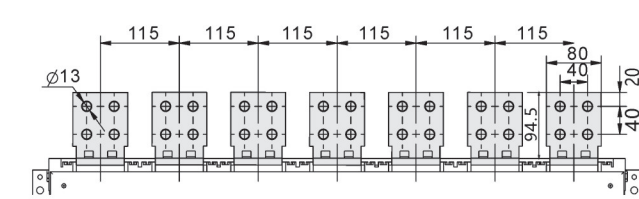
4000A.5000A三级和四级尺寸



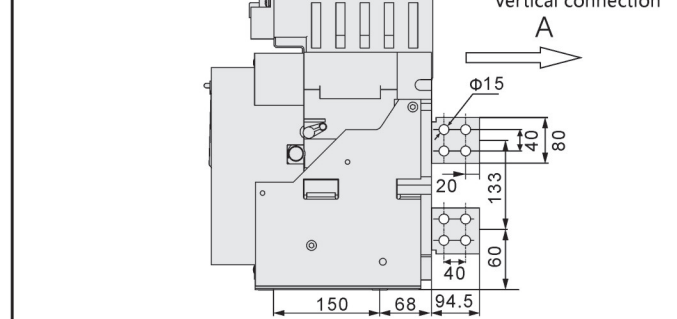
水平型接线
Horizontal connection



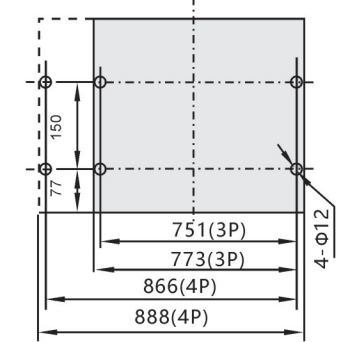
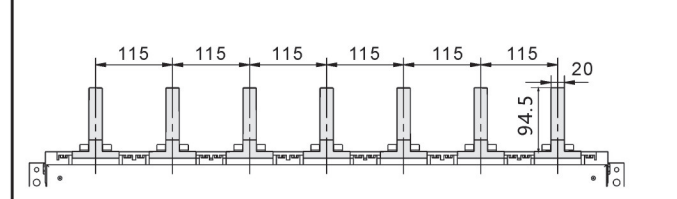
水平接线 Horizontal connection



垂直接线
Vertical connection



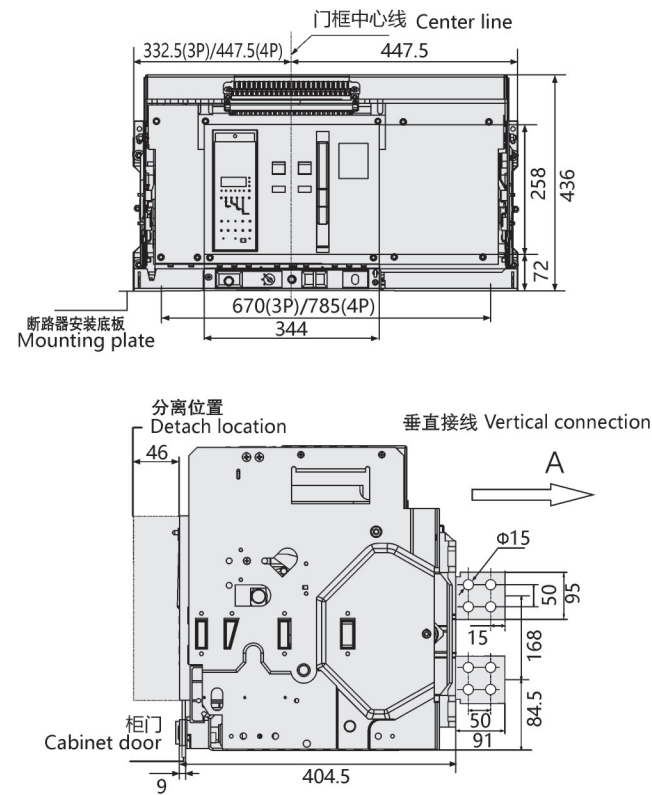
垂直接线 Vertical connection



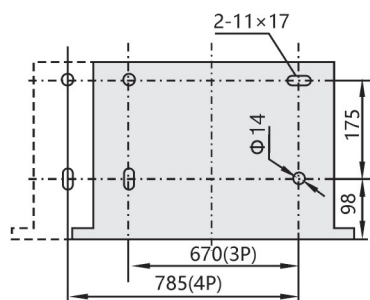
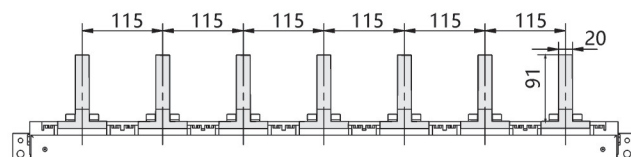
尺寸size	
4000A	20mm
5000A	20mm

NLW3-7500断路器外形与安装尺寸。(单位:mm)
NLW3-7500 drawer type circuit breaker profile with

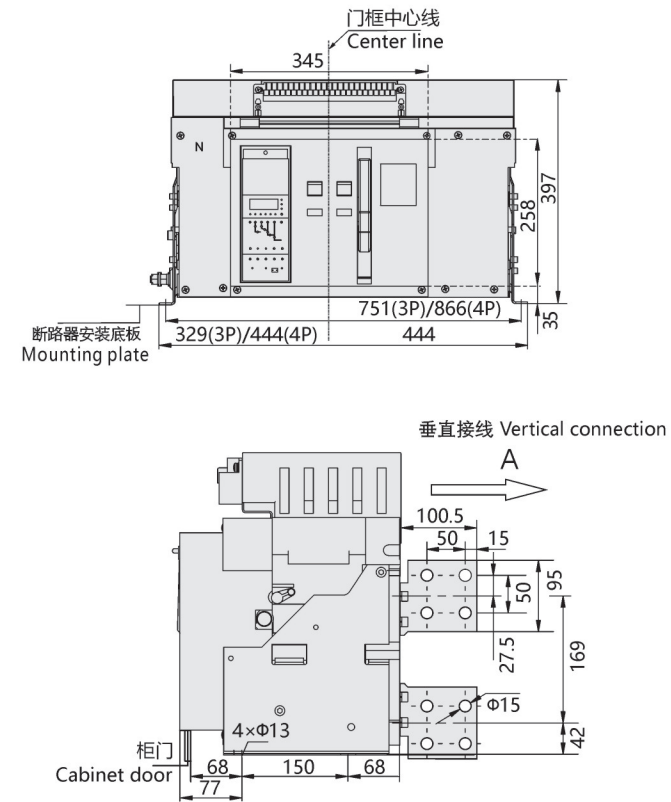
6300A三级和四级抽屉式尺寸
installation size 6300A (mm)



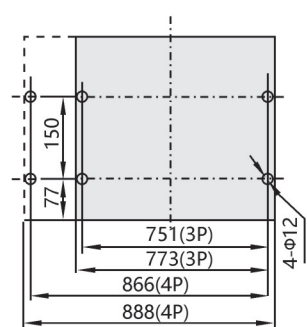
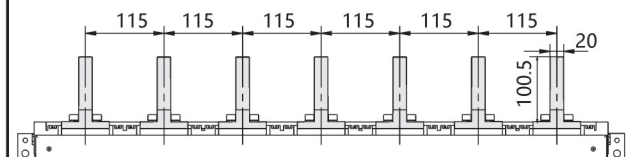
垂直接线 Vertical connection



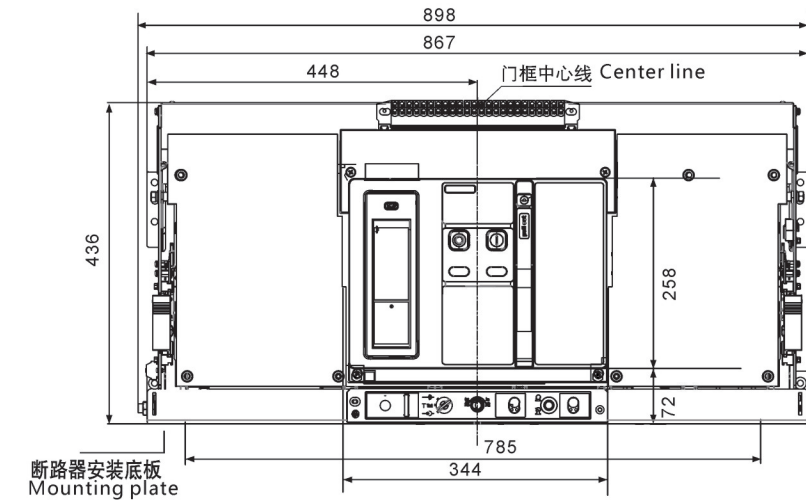
6300A三级和四级固定式尺寸
installation dimensions 6300A(mm)



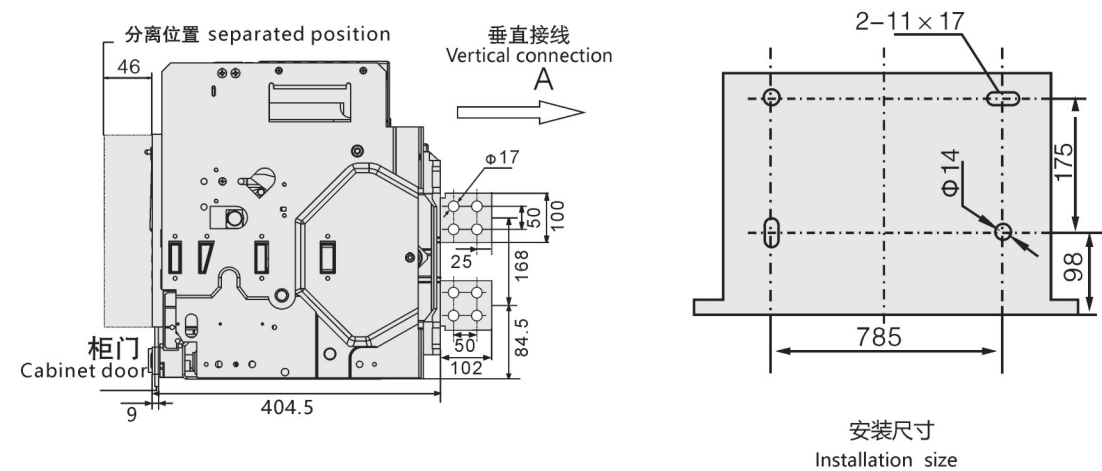
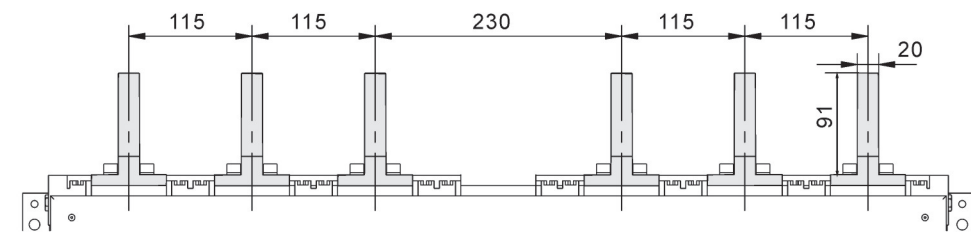
垂直接线 Vertical connection



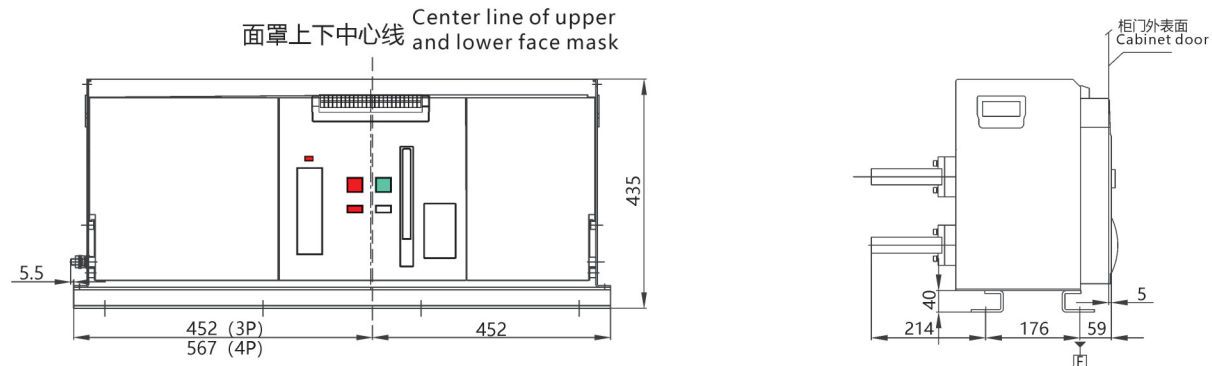
NLW3-7500抽屉式断路器外形与安装尺寸。(7500A 单位:mm)
NLW3-7500 drawer type circuit breaker profile with installation size 7500A (mm)



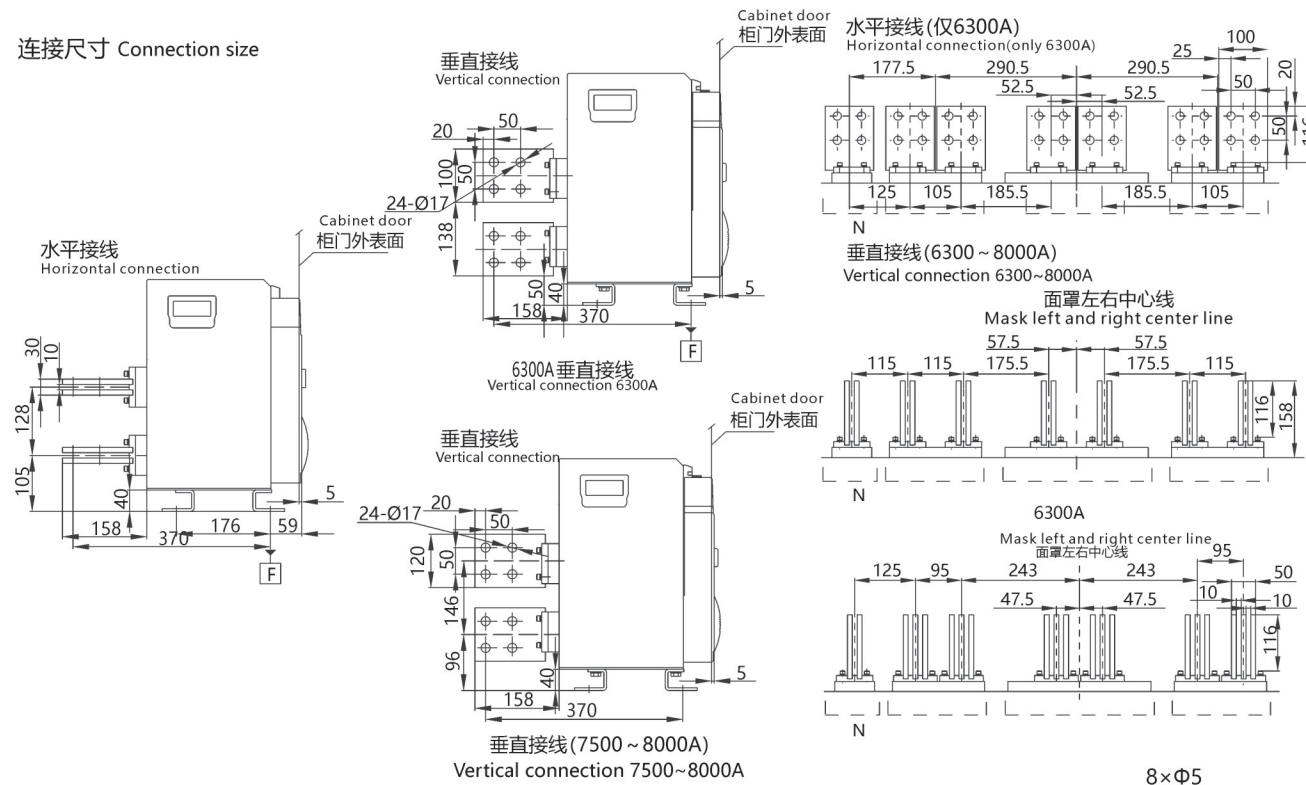
垂直接线 Vertical connection



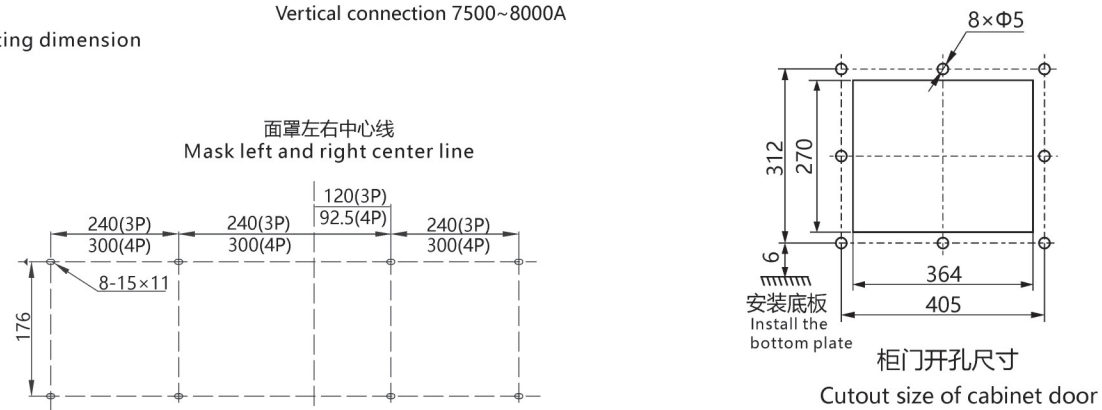
NLW3-8000固定式断路器外形与安装尺寸。(单位:mm)
NLW3-8000 station type circuit breaker profile and installation dimensions (mm)



连接尺寸 Connection size

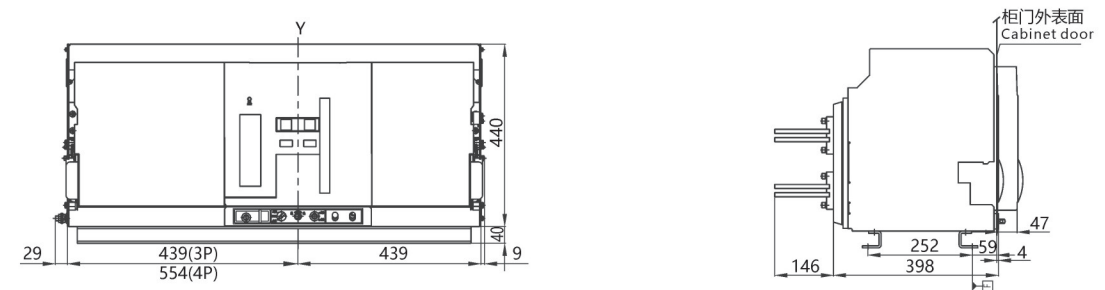


安装尺寸 Mounting dimension

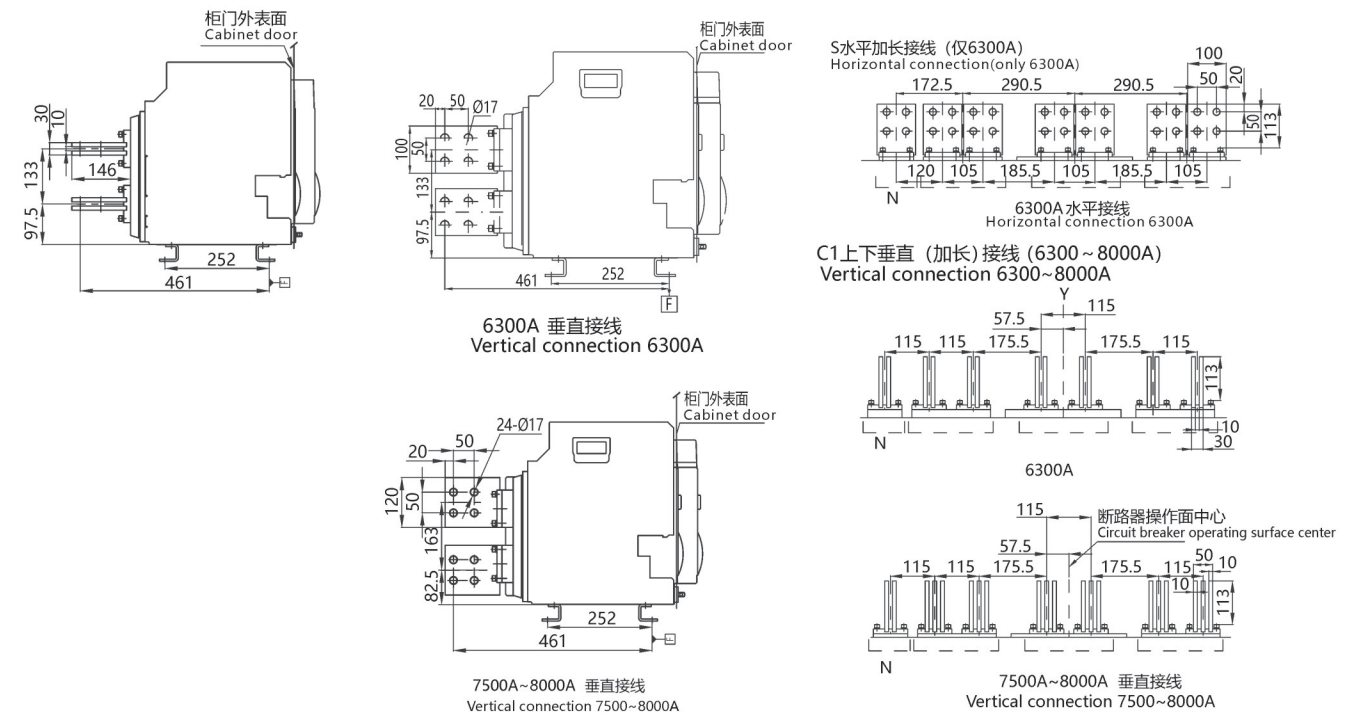


NLW3-8000抽屉式断路器外形与安装尺寸。(单位:mm)
NLW3-8000 drawer type circuit breaker profile with installation size (mm)

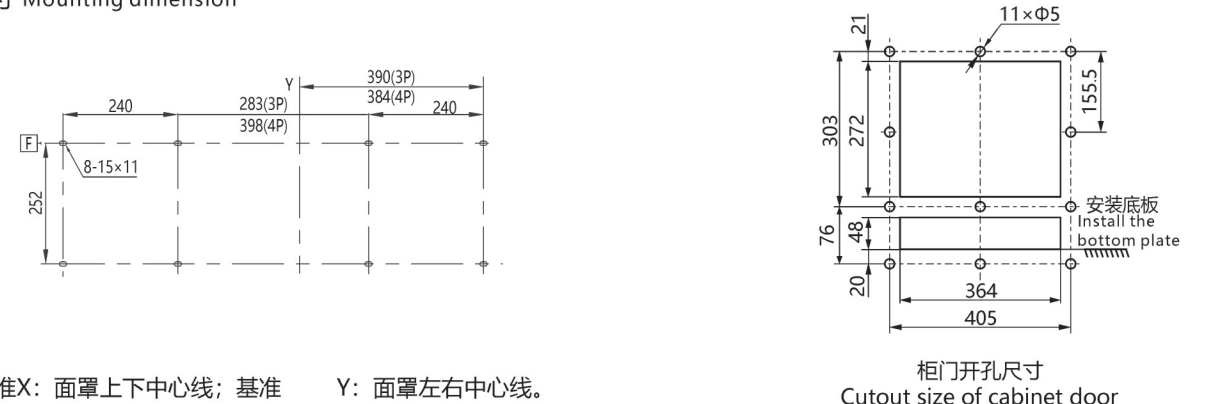
外形尺寸 Overall dimension



连接尺寸 Connection size



安装尺寸 Mounting dimension



注: 基准X: 面罩上下中心线; 基准 Y: 面罩左右中心线。
Note : X is the upper and lower center line of the mask; Y is the left and right center line of the mask,

智能控制器的参数整定与使用 The description of panel display and function of the controller

智能控制器的参数整定与使用 The description of panel display and function of the controller



面板显示	功能说明
In	控制器额定电流指示
G	接地电流指示, 闪亮指示N相电流
L1	指示A相电流
L2	指示B相电流
L3	指示C相电流
MAX	指示A、B、C相电流三相最大相电流
A	指示电流单位 (安培)
kA	指示电流单位 (千安培)
S	指示时间单位 (秒)
试验	指示模拟脱扣试验
Ic1	指示负载监控1
Ic2	指示负载监控2
δ	指示电流不平衡保护
Ig	指示接地保护
I _r	指示长延时保护
I _s d	指示短延时保护
I _i	指示瞬时保护
故障/报警	指示故障报警
贮存	指示贮存
运行	指示正常运行
按键功能说明	
清灯	指示清除故障显示界面返回运行状态
设置	进入功能设置, 连续点按可循环显示控制器的所有整定参数
贮存	参数设置时确认保存
功能	辅助功能 (与原来老控制器的无名键相同)
查询	查询故障记录
脱扣	模拟脱扣试验
不脱扣	模拟不脱扣试验
向上(+)	调整设置参数值增加
向下(-)	调整设置参数值减少
铅封盖	
铅封盖	锁定整定按键防止参数误修改



Information on the panel	Function declaration
In	Rated current of the controller
G	Current of ground or N phase (constant light refer to ground,ash refer to N phase)
L1	Current of phase A
L2	Current of phase B
L3	Current of phase C
MAX	Maximum phase current
A	Unit of current
kA	Unit of current
S	Unit of time (s)
test	Simulated tripping test
Ic1	Load monitoring No. 1
Ic2	Load monitoring No. 2
δ	Current imbalance protection
Ig	Ground protection
I _r	Long time delay protection
I _s d	Short time delay protection
I _i	Instantaneous protection
WARN / ALARM	Fault alarm
MEMORY	Save information
RUN	In normal operation state
Button Function declaration	
CLEAN	Clear the fault display on screen and return to the run state
SET	Press the button, then click the button continuously to display all of parameters in sequence
MEMORY	Conrm to save when the parameters are set
FUNCTION	Auxiliary function
FAULT CHECK	Check the fault record
TRIP	Simulate tripping test
NO TRIP	Simulated non-tripping test
+	Adjust the set parameter value to be increased
-	Adjust the set parameter value to be decreased

M型控制器的参数整定

使用控制器面板上的“设置、▲(+)、▼(-)、贮存”等四个功能键可以整定控制器的各种参数。基本步骤如下

①连续按“设置”键，可循环检查控制器所有的整定参数。当检测到某个参数时，显示屏上显示该参数的原整定值，同时面板上与之对应的指示灯亮。若不需要改变此参数则继续按“设置”键。

②若需要改变原整定参数，则连续点按“▲(+)、▼(-)”键，在这过程中电流整定通过按“功能”键切换整定数值的粗调和细调。直到显示屏显示您需要的数值(无级差，任意值)。

③按“贮存”键，保存当前设定的新参数。如果不需要设定其它参数项到第④步结束，反之则到第①步继续。

④按“清灯”键，退出设定状态。控制器各种保护参数不得交叉设定，要求 $I_{r1} < I_{r2} < I_{r3}$ 。

M型控制器的模拟试验操作

控制器可以进行接地、长延时、短延时、瞬时的模拟特性试验。试验分为“脱扣、不脱扣”两种，前者要分断路器，后者不分断路器。如果在试验过程中，出现过载或短路等故障情况时，系统自动终止试验状态并转入故障处理状态。

How to set the parameters of the intelligent controller

Use those four buttons on the controller panel: **SET**, **▲**, **▼**, **MEMORY** to set all the parameters of the controller.

The basic steps are described as follows:

① Click the button of " **SET** " continuously to check all of parameters in sequence periodically. When a parameter is checked, the original set value of the parameter is displayed on the screen, and the corresponding indicator on the panel will be light on. If you do not need to change this parameter, go on clicking the butt on of " **SET** ".

② If you need to change the original set parameter, click the button of " **▲** " or " **▼** " continuously. In the process of setting for current, in order to get the required set value quickly, the user can click the button of "function" to converse the mode of adjustment between fast adjustment code and fine adjustment code until the required value is achieved.

③ Press button of " **MEMORY** " to save the new set parameters. If no other parameters are required to be set, follow the step mentioned in ④ to exit the set. Otherwise, continue according to the step mentioned in ① .

④ Press the button of " **CLEAN** " to exit the setting state.

All the protection parameters of the controller should be set according to $I_{r1} < I_{r2} < I_{r3}$ strictly.

Simulation test operation of the controller

Simulation characteristics test against grounded, long delay, short delay and nstantaneous can be operated for the controller. Two kinds of test are available: tripping and non-tripping. The first one needs to break the circuit breaker, the second one does not break the circuit breaker. If faults such as overload or short circuit occurs during the test, the system will automatically terminate the test state and turn to the fault processing state.

订货须知 Attention While Odering

规格型号		NLW3-2500		NLW3-4000		NLW3-8000		
额定电压		<input type="checkbox"/> AC400/440V		<input type="checkbox"/> AC690/800V		<input type="checkbox"/> AC1000/1140V		
型号规格		<input type="checkbox"/> 抽屉式		<input type="checkbox"/> 固定式				
额定电流In(A)		<input type="checkbox"/> 400	<input type="checkbox"/> 630	<input type="checkbox"/> 2500	<input type="checkbox"/> 2900	<input type="checkbox"/> 7500	<input type="checkbox"/> 6300	
		<input type="checkbox"/> 800	<input type="checkbox"/> 1000	<input type="checkbox"/> 3200	<input type="checkbox"/> 3600		<input type="checkbox"/> 8000	
		<input type="checkbox"/> 1250	<input type="checkbox"/> 1600					
		<input type="checkbox"/> 2000	<input type="checkbox"/> 2500	<input type="checkbox"/> 4000				
极数		<input type="checkbox"/> 3极		<input type="checkbox"/> 4极				
智能控制器		控制电压		<input type="checkbox"/> AC230V	<input type="checkbox"/> AC400V	<input type="checkbox"/> DC220V	<input type="checkbox"/> DC110V	
		基本功能			辅助功能		增选功能	
		过载长延时保护、短路短延时保护、 短路瞬时保护、接地保护			1.电流表功能 2.自诊断功能 3.整定功能 4.试验功能 5.显示功能		<input type="checkbox"/> 频率显示 <input type="checkbox"/> 功率因素显示 <input type="checkbox"/> 有功功率显示 <input type="checkbox"/> 负载监控 <input type="checkbox"/> MCR功能 注：增选功能费用另计	
电气附件	欠压脱扣器 (选配附件)	控制电压		<input type="checkbox"/> AC230V	<input type="checkbox"/> AC400V			
		<input type="checkbox"/> 欠压瞬时脱扣器						
		<input type="checkbox"/> 欠压延时脱扣器	<input type="checkbox"/> 零压延时	<input type="checkbox"/> 0.5s	<input type="checkbox"/> 1s	<input type="checkbox"/> 3s	<input type="checkbox"/> 5s	
		<input type="checkbox"/> AC230V	<input type="checkbox"/> AC400V	<input type="checkbox"/> DC220V	<input type="checkbox"/> DC110V			
		<input type="checkbox"/> AC230V	<input type="checkbox"/> AC400V	<input type="checkbox"/> DC220V	<input type="checkbox"/> DC110V			
特殊附件	储能电动机	<input type="checkbox"/> AC230V		<input type="checkbox"/> AC400V		<input type="checkbox"/> DC220V		
	辅助触头	<input type="checkbox"/> 四组转换(默认)		<input type="checkbox"/> 五组转换		<input type="checkbox"/> 4NO+4NC		
	机械联锁	两台断路器		<input type="checkbox"/> 钢缆联锁		<input type="checkbox"/> 杠杆联锁(上下联锁)		
		三台断路器		<input type="checkbox"/> 钢缆联锁		<input type="checkbox"/> 杠杆联锁(上下联锁)		
特殊附件	钥匙锁	<input type="checkbox"/> 一锁一钥匙		<input type="checkbox"/> 二锁一钥匙		<input type="checkbox"/> 三锁一钥匙		
		<input type="checkbox"/> 三锁二钥匙		<input type="checkbox"/> 特殊				
	其他功能	<input type="checkbox"/> 外接漏电互感器				<input type="checkbox"/> 外接中性线互感器(3P+N)		
	双电源控制器	<input type="checkbox"/> 双路自备投控制器				<input type="checkbox"/> 母联自备投控制器		
控制电压		<input type="checkbox"/> 垂直布线(带L型垂直母线)				注：常规产品为水平布线		

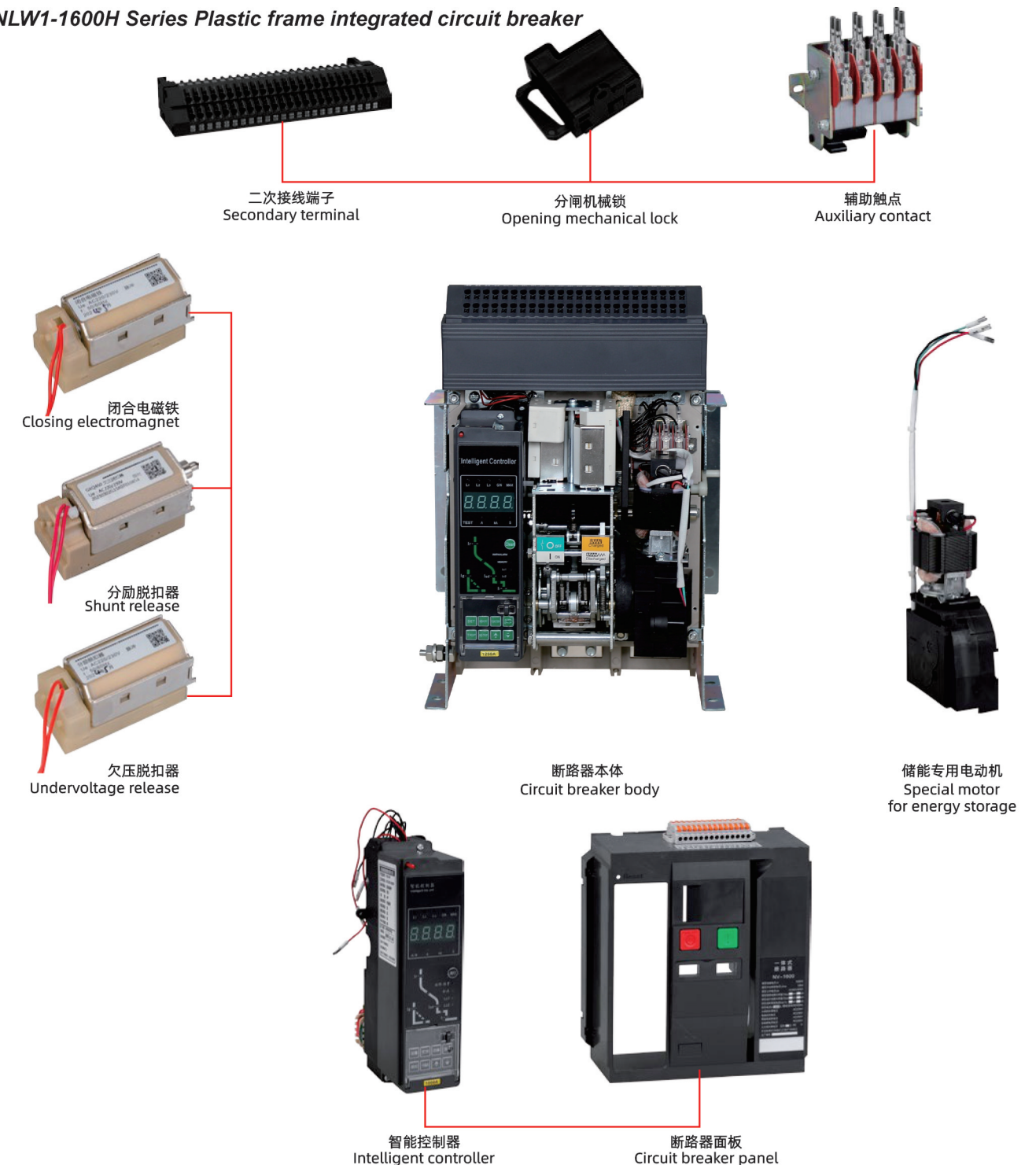
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Model		NLW3-2500	NLW3-4000	NLW3-8000
Rated voltage		<input type="checkbox"/> AC400/440V	<input type="checkbox"/> AC690/800V	<input type="checkbox"/> AC1000/1140V
Type		<input type="checkbox"/> Drawer type	<input type="checkbox"/> Stationary type	
Rated Current In (A)		<input type="checkbox"/> 400 <input type="checkbox"/> 800 <input type="checkbox"/> 1250 <input type="checkbox"/> 2000	<input type="checkbox"/> 630 <input type="checkbox"/> 1000 <input type="checkbox"/> 1600 <input type="checkbox"/> 2500	<input type="checkbox"/> 2500 <input type="checkbox"/> 2900 <input type="checkbox"/> 3200 <input type="checkbox"/> 3600 <input type="checkbox"/> 4000
Number of pole		<input type="checkbox"/> 3 poles		<input type="checkbox"/> 4 poles
Intelligent controller		Control voltage <input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V		
		Basic function	Auxiliary function	Optional function
		Overload Long delay, protection, short circuit Short delay protection, short circuit Instant, protection, grounding protection	1. Ammeter function 2. Self-diagnosis function 3. Complete the function 4. Test function 5. Display function	<input type="checkbox"/> Voltage display <input type="checkbox"/> Frequency display <input type="checkbox"/> Power factor display <input type="checkbox"/> Active power display <input type="checkbox"/> Load monitoring <input type="checkbox"/> MCR function Note: The cost of the optional function is offered additionally
Electrical accessories		Control voltage <input type="checkbox"/> AC230V <input type="checkbox"/> AC400V		
Under voltage release (Optional)		<input type="checkbox"/> Under voltage Instant tripping device <input type="checkbox"/> Under voltage delay tripping device		
		Delay under voltage value at zero <input type="checkbox"/> 0.5s <input type="checkbox"/> 1s <input type="checkbox"/> 3s <input type="checkbox"/> 5s <input type="checkbox"/> 10s <input type="checkbox"/> 20s		
Shunt release		<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V		
Closing electromagnet		<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V		
Electric motor for energy storage		<input type="checkbox"/> AC230V <input type="checkbox"/> AC400V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V		
Auxilia contact		<input type="checkbox"/> 4 groups conversion (default) <input type="checkbox"/> 5 groups conversion <input type="checkbox"/> 4NO+4NC <input type="checkbox"/> 6NO+6NC		
Special accessories		Mechanical interlock		
		Two circuit breakers	<input type="checkbox"/> Steel cable Inter lock <input type="checkbox"/> Lever Interlock (Upper and Lower Interlock)	Three circuit breakers
		<input type="checkbox"/> Steel cable Inter lock <input type="checkbox"/> Lever Interlock (Upper and Lower Interlock)	Note: There are two in one or one in two	
Lock		<input type="checkbox"/> One lock, one key <input type="checkbox"/> Two locks one key <input type="checkbox"/> Three locks one key <input type="checkbox"/> Three locks and two keys <input type="checkbox"/> special		
Other functions		<input type="checkbox"/> External residual current transformer <input type="checkbox"/> External neutral wire transformer (3P + N)		
Dual power controller		<input type="checkbox"/> Double standby self-cast controller <input type="checkbox"/> Parent joint standby self-cast controller		
Mode of connection		<input type="checkbox"/> Vertical eiring (with L-type vertical busbar)	Note:conventional products are horizontal wiring	

Warning

本产品必须由专业人员按照手册进行安装、连接、使用和保养。
This product must be installed, connected, used and maintained by aualified personnel in ac cordance with the manual.

NLW1-1600H 系列塑框一体式断路器
NLW1-1600H Series Plastic frame integrated circuit breaker



NLW1-1600H

塑框一体式断路器
Plastic frame integrated
circuit breaker



概述 Application

一体式断路器采用先进的技术研发的新型断路器，该产品适用于一般配电系统、新能源配电系统、多能源配电网、逆变器及分布式电源旋转电机类电源的并网操作与保护等场合，它具有隔离功能且尺寸小，分断能力高、等多功能特点。

额定工作电压：AC400V/800V

额定频率：50/60Hz

极数：3P、4P

选择性类别：B类

执行标准：GB/T 14048.2

符合标准：IEC60947-1 及 GB14048.1 低压开关设备和控制设备总则
IEC60947-2 及 GB 14048.2 低压开关设备和控制设备断路器

The integrated circuit breaker adopts advanced technology to develop a new type of circuit breaker, the product is suitable for general power distribution system, new energy distribution system, multi-energy distribution network, inverter and distributed power supply rotating electrical power supply grid-connected operation and protection and other occasions, it has isolation function and small size, high breaking capacity, and other multi-functional characteristics.

Rated operating voltage: AC400V/800V

Rated frequency: 50/60Hz

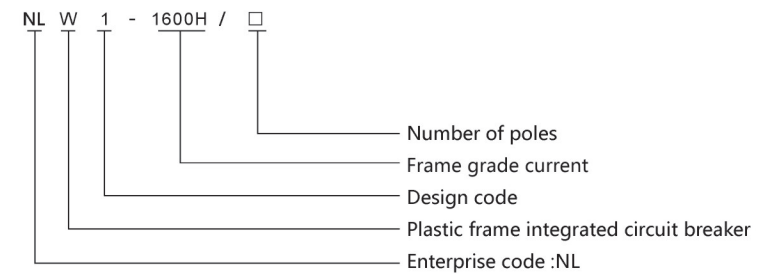
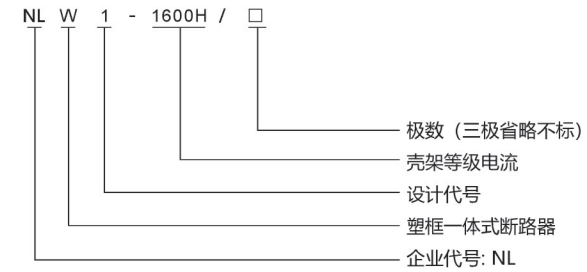
Number of poles: 3P, 4P

Optional category: Class B

Execution standard: GB/T 14048.2

Compliance with standards: IEC60947-1 and GB14048.1 low-voltage switchgear and control equipment General
IEC60947-2 and GB 14048.2 Circuit breakers for low-voltage switchgear and control equipment

型号及含义 Model and meaning



正常工作条件和安装条件 Working Environment

周围空气温度为 -5°C ~ +40°C (超出范围可降容使用), 且 24h 的平均值不超过 +35°C ;

安装地点的海拔不超过 2000m, 超过 2000m 降容使用;

安装地点的空气相对湿度在最高温度为 +40°C 时不超过 50%, 在较低温度下可以有较高的相对湿度, 例如 20°C 时达 90%, 对由于温度变化偶尔产生的凝露应采取特殊措施;

污染等级为 3 级;

断路器主电路安装类别为 IV, 其余辅助电路和控制电路安装类别为 III;

断路器应安装在无爆炸危险、无导电尘埃、无雨雪侵袭、无足以腐蚀金属和破坏绝缘的地方。

The ambient air temperature is -5 °C ~ +40 °C (beyond the range can be reduced capacity use), and the average value of 24h does not exceed +35°C ;

The elevation of the installation site does not exceed 2000m, more than 2000m capacity reduction use;

The relative humidity of the air at the installation site does not exceed 50% when the maximum temperature is +40°C , and can have a higher relative humidity at lower temperatures, such as 90% at 20°C . Special measures should be taken for condensation occasionally caused by temperature changes;

Pollution level is level 3;

Circuit breaker main circuit installation category IV, the rest of the auxiliary circuit and control circuit installation category III;

The circuit breaker should be installed in a place where there is no explosion risk, no conductive dust, no rain and snow attack, and no enough to corrode metal and destroy insulation.

技术数据及性能 Technical Parameters

壳架等级额定电流 Bracket rating Current Inm(A)	1600	
额定电流 Rated current In(A)	200、400、630、800、1000、1250、1600	
额定工作电压 Rated operating voltage Ue(V)	AC400V、AC800V	
额定绝缘电压 Rated insulation voltage Ui(V)	1000	
额定冲击耐受电压 Rated impulse withstand voltage Uimp(kV)	12	
工频耐受电压 Power frequency withstand voltage U(V)1min	3500	
极数 Number of poles	3、4	
N 极额定电流 N-pole rated current In(A)	100%In	
壳架等级电流 Frame grade current	GB/T14048.2	B
	GB/T14048.4	AC-3
额定极限短路分断能力 Icu(kA)(有效值) Rated limit short-circuit breaking capacity Icu(kA)(valid value)	AC400V	60
	AC800V	32
额定运行短路分断能力 Ics(kA)(有效值) Rated operating short-circuit breaking capacity Ics(kA)(valid value)	AC400V	50
	AC800V	20
额定短路接通能力 Icm(kA)(峰值) Rated short-circuit ability Icm(kA)(Peak)	AC400V	143
	AC800V	105
额定短时耐受电流 Icw(kA)/1s(有效值) Rated short-time withstand current Icw(kA)/1s(valid value)	AC400V	50
	AC800V	20
全分断时间(无附加延时)(ms) Total breaking time (no additional delay)(ms)	25	
闭合时间 Closing time(ms)	最大 70 Max 70	
电气寿命(次) Electrical life (s)	AC400V	免维护 1500 maintenance-free 1500
		免维护 4500 maintenance-free 4500
	AC800V	免维护 1200 maintenance-free 1200
		有维护 3500 Be maintained 3500
机械寿命(次) Mechanical life (second)	免维护	4500
	有维护	8500

保护功能 Protection function

过载长延时保护
Overload long delay protection

过载长延时保护功能一般对电缆过负荷进行保护。
The overload and long delay protection function generally protects the cable from overload.

过载长延时保护参数设定
Overload long delay protection parameter setting

过载保护参数整定表
Overload protection parameter setting table

动作电流设定值 Ir Action current set value	= $(0.2 \sim 1.0)I_n + OFF$, 调整步长 =1A。 = $(0.2 \sim 1.0)I_n + OFF$, Adjust the step =1A.	配电保护是 Ir 的上限为 1.0In, 发电机保护时 Ir 的上限为 1.25In, "OFF" 表示功能退出; For distribution protection, the upper limit of Ir is 1.0In. For generator protection, the upper limit of Ir is 1.25In. "OFF" indicates that the function is out.
保护曲线类型 Protection curve type	曲线 1: 标准反时限 曲线 2: 快速反时限 曲线 3: 特快反时限 (一般配电保护用) 曲线 4: 特快反时限 (电机保护用) 曲线 5: 高压熔丝兼容 曲线 6: 通用型反时限 (I^2t) Curve 1: Standard inverse time Curve 2: Fast inverse time Curve 3: Express inverse time (general distribution protection) Curve 4: Express inverse time limit (for motor protection) Curve 5: High voltage fuse compatibility Curve 6: Universal inverse time (I^2t)	
延时时间设定 Tr Delay time set Tr	C01~C16	
冷却时间设定 Cooling time setting	瞬时、10min、20min、30min、45min、1h、2h Instantaneous、10min、20min、30min、45min、1h、2h	

不动作特性 Inactive characteristic	$n \leq 1.05$	>2h 不动作 >2h No action	
动作特性 Action characteristic	$n > 1.2$	< 1h 动作 < 1h action	
延时特性 Delay characteristic	$n > 1.2$	特性曲线, 出厂默认为特性曲线 3 EI(G) Characteristic curve, factory default characteristic curve 3 EI(G)	±10%

不动作特性 Inactive characteristic	$n \leq 0.95$	>2h 不动作 >2h No action	
动作特性 Action characteristic	$n > 1.05$	< 1h 动作 < 1h action	
动作延时 Action delay	$n > 1.05$	特性曲线 6, 发电机保护特性曲线: $t = t_r \cdot (\frac{1.2}{n})^2$ Characteristic curve 6, generator protection characteristic curve: $t = t_r \cdot (\frac{1.2}{n})^2$	±10%

过载特性曲线选择 Overload characteristic curve selection

控制器提供 6 种过载保护特性曲线，其表达方式如下：

曲线 1、标准反时限 (SI): $t = \frac{K}{n^{0.02-1}}$

曲线 2、快速反时限 (VI): $t = \frac{K}{n-1}$

曲线 3、特快反时限 (一般用途)EI(G): $t = \frac{K}{n^2-1}$

曲线 4、特快反时限 (马达用途)EI(M): $t = \frac{K}{1.15} \cdot \ln(\frac{N^2}{N^2-1.15})$

曲线 5、高压熔丝兼容 (HV): $t = \frac{K}{n^4-1}$

曲线 6、通用型反时限 (I²t): $t = \frac{K}{n^2}$

以上 6 式中: t: 反时限延时动作时间 [秒, s]

K: 曲线速率;

n: 实际故障电流相对于长延时保护整定值的倍数, 即 $n = \frac{I_f}{I_r}$

tr: 当 n 等于某特征值时的延时时间 [秒, s]

The controller provides 6 overload protection characteristic curves, which are expressed as follows:

Curve 1, Standard inverse time (SI): $t = \frac{K}{n^{0.02-1}}$

Curve 2, Fast inverse time (VI): $t = \frac{K}{n-1}$

Curve 3, Express inverse time (general purpose)EI(G): $t = \frac{K}{n^2-1}$

Curve 4, Express inverse time (motor use)EI(M): $t = \frac{K}{1.15} \cdot \ln(\frac{N^2}{N^2-1.15})$

Curve 5, High Voltage fuse Compatibility (HV): $t = \frac{K}{n^4-1}$

Curve 6, universal inverse time (I²t): $t = \frac{K}{n^2}$

In the above 6 formulas: t: inverse time delay action time [seconds, s]

K: curve rate;

n: The multiple of the actual fault current relative to the long delay protection setting, that is, $n = \frac{1}{I_r}$

tr: The delay time when n is equal to some eigenvalue [seconds, s]

保护功能 Protection function

过载长延时动作延时间及K值
Overload Long delay action
Delay time and K value

曲线类型 Curve type	故障电流 Fault current	延时间 (s) 及 K 值							
		C1	C2	C3	C4	C5	C6	C7	C8
曲线 1 curve 1 SI	K	0.005	0.008	0.012	0.02	0.03	0.04	0.05	0.075
	1.5Ir	0.61	0.98	1.47	2.46	3.68	4.91	6.14	9.21
	6.0Ir	0.14	0.22	0.33	0.55	0.82	1.1	1.37	2.06
	7.2Ir	0.12	0.2	0.3	0.5	0.74	0.99	1.24	1.86
曲线 2 curve 2 VI	K	1	1.6	2.4	4	6	8	10	13.5
	1.5Ir	2	3.2	4.8	8	12	16	20	27
	6.0Ir	0.2	0.32	0.48	0.8	1.2	1.6	2	2.7
	7.2Ir	0.16	0.26	0.39	0.65	0.97	1.29	1.61	2.18
曲线 3 curve 3 EI(G)	K	10	16	24	40	60	80	100	135
	1.5Ir	8	12.8	19.2	32	48	64	80	108
	6.0Ir	0.29	0.46	0.69	1.14	1.71	2.29	2.86	3.86
	7.2Ir	0.2	0.31	0.47	0.79	1.18	1.57	1.97	2.66
曲线 4 curve 4 EI(M)	K	10	16	24	40	60	80	100	135
	1.5Ir	6.22	9.96	14.9	24.9	37.3	49.8	62.2	84
	6.0Ir	0.28	0.45	0.68	1.13	1.69	2.26	2.82	3.81
	7.2Ir	0.2	0.31	0.47	0.78	1.17	1.56	1.95	2.63
曲线 5 curve 5 HV	K	10	16	24	40	60	80	100	135
	1.5Ir	2.46	3.94	5.91	9.85	14.8	19.7	24.6	33.2
	6.0Ir	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.1
	7.2Ir	0	0.01	0.01	0.01	0.02	0.03	0.04	0.05
曲线 6 curve 6 I²t	K	33.75	45	56.25	67.5	90	112.5	135	180
	1.5Ir	15	20	25	30	40	50	60	80
	6.0Ir	0.94	1.25	1.56	1.88	2.5	3.13	3.75	5
	7.2Ir	0.65	0.87	1.09	1.3	1.74	2.17	2.6	3.47

保护功能 Protection function

过载长延时动作延时时间及K值
Overload Long delay action
Delay time and K value

曲线类型 Curve type	故障电流 Fault current	延时时间 (s) 及 K 值							
		C9	C10	C11	C12	C13	C14	C15	C16
曲线 1 curve 1 SI	K	0.09	0.14	0.2	0.3	0.4	0.5	0.6	0.7
	1.5Ir	11.1	17.2	24.6	36.8	49.1	61.4	73.7	86
	6.0Ir	2.47	3.84	5.48	8.22	11	13.7	16.4	19.2
	7.2Ir	2.23	3.48	4.97	7.45	9.93	12.4	14.9	17.4
曲线 2 curve 2 VI	K	18	28	40	60	80	100	120	140
	1.5Ir	36	56	80	120	160	200	240	280
	6.0Ir	3.6	5.6	8	12	16	20	24	28
	7.2Ir	2.9	4.52	6.45	9.68	12.9	16.1	19.4	22.6
曲线 3 curve 3 EI(G)	K	180	280	400	600	800	1000	1200	1400
	1.5Ir	144	224	320	480	640	800	960	1120
	6.0Ir	5.14	8	11.4	17.1	22.9	28.6	34.3	40
	7.2Ir	3.54	5.51	7.87	11.8	15.7	19.7	23.6	27.5
曲线 4 curve 4 EI(M)	K	180	280	400	600	800	1000	1200	1400
	1.5Ir	112	174	249	373	498	622	747	871
	6.0Ir	5.08	7.9	11.3	16.9	22.6	28.2	33.9	39.5
	7.2Ir	3.51	5.46	7.8	11.7	15.6	19.5	23.4	27.3
曲线 5 curve 5 HV	K	180	280	400	600	800	1000	1200	1400
	1.5Ir	44.3	68.9	98.5	148	197	246	295	345
	6.0Ir	0.14	0.22	0.31	0.46	0.62	0.77	0.93	1.08
	7.2Ir	0.07	0.1	0.15	0.22	0.3	0.37	0.45	0.52
曲线 6 curve 6 12t	K	225	270	360	450	540	720	900	1080
	1.5Ir	100	120	160	200	240	320	400	480
	6.0Ir	6.25	7.5	10	12.5	15	20	25	30
	7.2Ir	4.34	5.21	6.94	8.68	10.4	13.9	17.4	20.8

保护功能 Protection function

热记忆功能 Thermal memory function

为了防止反复或周期性过载，控制器跟踪并记录负载电流的热效应，当过载积累的热效应达到预定水平，将引起脱扣。热容变化方式由所选择的曲线决定。

热容在电流测量值大于 1.1Ir 时增加，当断路器因过载长延时故障或反时限短路故障跳闸后，从过载状态返回非过载状态，热容量按指数规律衰减。用户可设定热容冷却时间为：瞬时、10 分钟、20 分钟、30 分钟、45 分钟、1 小时、2 小时。控制器未使用辅助电源时，断路器分断后，热容都被清零，其热容累加如图 2(A) 所示。

控制器使用辅助电源时，在断路器分断后热容按散热规律减少，重合闸后热容在原来的基础上，按照此时电流继续变化。热容变化如图 2(B) 所示。

In order to prevent repeated or periodic overload, the controller tracks and records the thermal effect of the load current. When the thermal effect of the overload accumulates to a predetermined level, the trip will be caused. The way the heat capacity changes is determined by the curve chosen.

The heat capacity increases when the measured current value is greater than 1.1Ir. When the circuit breaker returns from overload state to non-overload state after tripping due to overload long delay fault or inverse time short circuit fault, the heat capacity decreases exponentially. Users can set the heat capacity cooling time: instantaneous, 10 minutes, 20 minutes, 30 minutes, 45 minutes, 1 hour, 2 hours. When the controller does not use the auxiliary power supply, the heat capacity is cleared to zero after the circuit breaker is broken, and the heat capacity accumulation is shown in Figure 2(A).

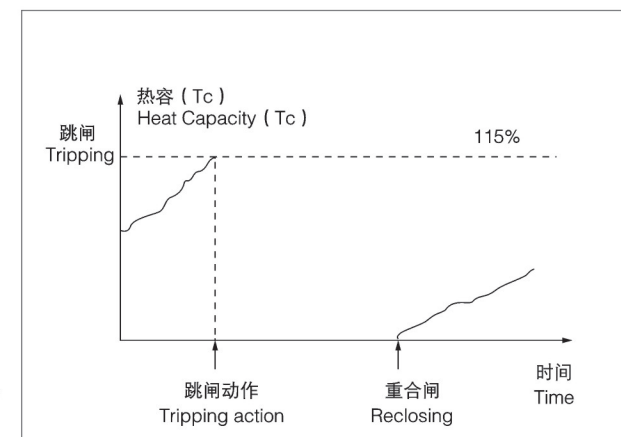
When the controller uses auxiliary power supply, the heat capacity decreases according to the heat dissipation law after the breaker is broken, and the heat capacity continues to change according to the current at this time on the basis of the original after re-closing. The change of heat capacity is shown in Figure 2(B).

短路短延时保护 Short circuit delay protection

短路短延时保护是针对 B 类断路器实现选择性保护而设置的，针对中等强度的短路故障。用户可以根据需要选择定时限模式或反时限模式。3H 型控制器短延时保护可以选配区域联锁功能，当短路故障发生在本级断路器出线侧时，短路短延时将瞬时跳开断路器；当短路故障发生在本级断路器的下一级断路器的出线侧时，则短路短延时经约定的延时时间后跳闸。此功能的实现需配合使用可编程 IO 口 (DI 和 DO), DI 用于检测下一级断路器的区域联锁信号，DO 用于向上一级断路器发出联锁信号。

Short circuit delay protection is set for Class B circuit breaker to achieve selective protection, for medium strength short circuit fault. Users can choose either fixed time mode or inverse time mode according to their needs.

3H type controller short delay protection can be optional area interlock function, when the short circuit fault occurs in the circuit breaker outlet side, short circuit delay will jump the circuit breaker instantaneously; When the short-circuit fault occurs on the outgoing side of the next level circuit breaker, the short-circuit delay is tripped after the agreed delay time. The implementation of this function needs to be combined with the use of programmable IO ports (DI and DO), DI is used to detect the area interlock signal of the next level circuit breaker, and DO is used to send the interlock signal of the upper level circuit breaker.



控制器失去电源 Tc 从零开始增加

图 2(A) 无辅助工作电源时的热容变化图

The controller loses power. The Tc increases from zero
Figure 2(A) Heat capacity variation diagram without auxiliary power supply

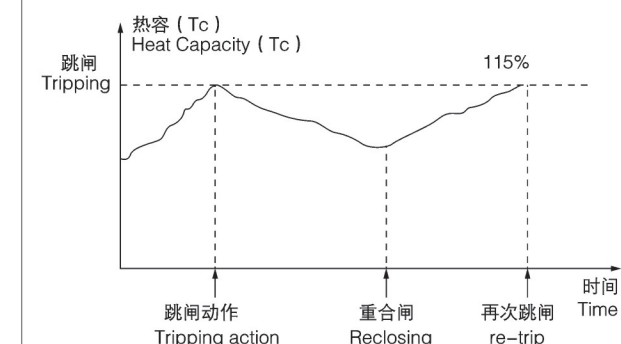


图 2(B) 有辅助工作电源时的热容变化图

Figure 2(B) Heat capacity variation diagram with auxiliary power supply

短路短延时保护参数
Short circuit delay protection parameter

整定电流: Isd		Isd=1.25~15IR+OFF,OFF 表示关闭短延时保护
定时限	整定时间 tsd	tsd=d0.1s~d1.0s+OFF, 时间前面带 d 表示定时限;
	动作时间 [s]	T=tsd;
反时限	整定时间 tsd	tsd=0.1s~1.0s+OFF,OFF 表示只报警不跳闸
	动作特性	0.9~1.1Isd 之间动作
	$T=\max \left\{ Tsd, \left(\frac{s \cdot IR}{I} \right)^2 \times Tsd \right\}$;	≤ 0.9: 不动作 >1.1: 延时动作
精度	精度 ±10% (固有误差 ±40ms);	
热记忆功能	15min+OFF (出厂默认 OFF, 仅对反时限有效)	

Setting current: Isd		Isd=1.25~15IR+OFF,OFF Indicates that the short delay protection is disabled
Constant time-lag	Setting time tsd	tsd=d0.1s~d1.0s+OFF, A d before the time indicates a definite time limit;
	Action time [s]	T=tsd;
Inverse time lag	Setting time tsd	tsd=0.1s~1.0s+OFF,OFF Indicates alarm only without tripping
	Action characteristic	Actions between 0.9 and 1.1 Isd
	$T=\max \left\{ Tsd, \left(\frac{s \cdot IR}{I} \right)^2 \times Tsd \right\}$;	≤ 0.9: No action >1.1: Delay action
precision	Accuracy ±10% (inherent error ±40ms);	
Thermal memory function	15min+OFF (Factory default OFF, only valid for inverse time limit)	

注: Ir=OFF 时, Isd=1.25~15In+OFF;

2 型、3 型短延时反时限延时特性曲线 1~6, 同过载长延时, 但曲线速度快 10 倍;

Note: Ir=OFF when Isd=1.25~15In+OFF;

Type 2, type 3 short delay inverse time delay characteristic curve 1~6, with overload long delay, but the curve speed is 10 times faster;

保护功能 Protection function

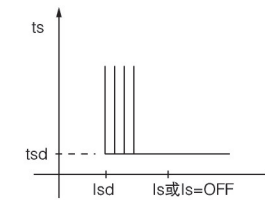


图3(A)短路短延时定时限图
FIG. 3(A) Short-circuit short-delay fixed time diagram

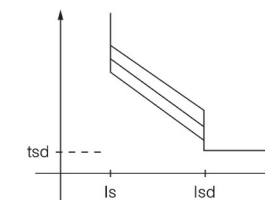


图3(B)短路短延时反时限图
Figure 3(B) Inverse time diagram of short circuit delay

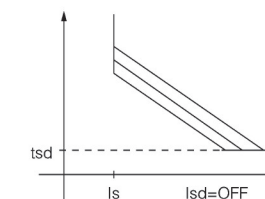


图3(C) Isd=OFF时短路短延时反时限图
FIG. 3(C) Inverse time diagram of short circuit delay when Isd=OFF

【使用提示】

- [1]、2 型和 3 型短延时反时限延时特性同过载长延时特性, 只是动作延时时间是长延时的 1/10。
- [2]、当故障产生时保护处于冷态 (即热容量 =0), 无论是长延时动作还是短延时动作, 动作延时时间不小于短延时定时限时间设定值。此时短延时保护延时特性与 Isd 和 Is 整定值有关:
 - 1)、当 Isd<1s 或 Is=OFF 时, 控制器只有定时限功能; 参见图 3(A)。
 - 2)、当 Isd>1s 时, 控制器同时具有反时限和定时限保护功能; 参见图 3(B)。
 - 3)、当 Is ≠ OFF, Isd=OFF 时, 控制器只有反时限保护功能, 这时的反时限特性曲线称为 IDMT(Inverse Definite Minimum Time) 反时限特性。参见图 3(C)。关于 IDMT 反时限特性参考 GB14048.1-2006 的 2.4.27 款的注释。
 - 4)、当 Isd=Is=OFF 时, 短延时保护功能关闭。
- [3]、当故障产生时保护处于热态 (即热容量 ≠ 0), 则动作延时时间不受短延时定时限时间设定值的限制。

【 Use tips 】

- [1], type 2 and type 3 short delay inverse time delay characteristics are the same as overload long delay delay characteristics, only the action delay time is 1/10 of the long delay.
- [2] When the fault occurs, the protection is in a cold state (that is, the heat capacity =0), whether it is a long delay action or a short delay action, the action delay time is not less than the short delay time set value. In this case, the delay characteristic of short delay protection is related to the Isd and Is setting values:
 - 1) When Isd<1s or Is=OFF, the controller only has a time-limit function; See Figure 3(A).
 - 2) When Isd>1s, the controller has both inverse time limit and fixed time limit protection functions; See Figure 3(B).
 - 3) When Is ≠ OFF, Isd=OFF, the controller only has the inverse Time protection function, then the inverse time characteristic curve is called IDMT(Inverse Definite Minimum Time) inverse time characteristic. See Figure 3(C). For IDMT inverse time feature, refer to GB14048.1-2006 for the note 2.4.27.
 - 4) When Isd=Is=OFF, the short delay protection function is disabled.
- [3] When the fault occurs, the protection is in a hot state (that is, the heat capacity ≠ 0), then the action delay time is not limited by the set value of the short delay time limit time.

短路瞬时保护 Short circuit instantaneous protection

瞬时保护功能是为了防止配电系统的固体短路, 此类故障一般为相间故障, 短路电流比较大, 需要快速断开。

The instantaneous protection function is to prevent the solid short circuit of the distribution system, such faults are generally phase faults, short circuit current is relatively large, need to be quickly disconnected.

短路瞬动保护的参数

Characteristic parameters of short circuit instantaneous protection

整定电流 Setting current Ii[A]	框 I box I	=1.0In~50kA+OFF
	框 II box II	=1.0In~75kA+OFF
	框 III box III	=1.0In~100kA+OFF
动作特性 Action characteristic	0.85~1.15Ii 之间动作	≤ 0.85 不动作
	0.85~1.15Ii In-between action	> 1.15 瞬动动作 (固有动作时间 ≤ 50ms) > 1.15 Instantaneous action (natural action time ≤ 50ms)

保护功能 Protection function

MCR和HSISC保护 MCR and HSISC Protection

接通分断 (MCR) 和越限跳闸 (HSISC) 功能均为瞬时保护功能。MCR 保护对断路器的接通能力进行保护,防止断路器接通时超过接通极限电流而导致的开关损坏,保护在分闸及断路器合闸瞬间(100ms内)起作用;HSISC 保护对断路器的极限承载能力进行保护,防止开关承载超过极限分断电流,在合闸 100ms 后起作用。

The on-off/off (MCR) and off-limit trip (HSISC) functions are instantaneous protection functions. MCR protection protects the switching ability of the circuit breaker to prevent the switch damage caused by exceeding the switching limit current when the circuit breaker is switched on. The protection works in the moment of opening and closing of the circuit breaker (within 100ms). HSISC protection protects the limit carrying capacity of the circuit breaker, prevents the switch from carrying more than the limit breaking current, and takes effect after closing 100ms.

MCR 和 HSISC 保护参数设定表 MCR and HSISC Protection parameter setting table

参数名称 Parameter name	整定范围 Setting range	整定步长 Set the step size
MCR 动作电流设定值 MCR Operation current set value	30~100kA+OFF	1kA
HSISC 动作电流设定值 HSISC Operation current set value	30~100kA+OFF	1kA

【使用提示】

[1]、MCR 和 HSISC 设定值一般在断路器出厂时,根据断路器的分断能力进行设定,最终用户不可调。

[2]、M 型控制器出厂默认 MCR=OFF,HSISC=OFF;H 型出厂默认 MCR=30kA,HSISC=50KA。

【 Use tips 】

[1]、MCR and HSISC setting values are generally set when the circuit breaker is delivered, according to the breaking capacity of the circuit breaker, and are not adjustable by the end user.

[2] M-type controller factory default MCR=OFF,HSISC=OFF; H type factory default MCR=30kA,HSISC=50KA.

中性线保护 Neutral line protection

中性线保护是为了适应配电系统日趋复杂,中性线故障日益增多的情况设计的。它适用于3P+N或4P的断路器配置。控制器提供了50%N、100%N、160%N、200%N和 OFF 等 5 种中性线保护方式。当中性线较细时,可采用 50%N的方法保护;当中性线和其它相线一样时可采用 100%N 的方式保护;当电网中谐波比较严重时可采用 160%N 或200%N 的方式进行保护。中性线保护特性同过载长延时动作特性。

Neutral line protection is designed to adapt to the increasingly complex distribution system and the increasing number of neutral line faults. It is suitable for 3P+N or 4P circuit breaker configurations. The controller provides five neutral line protection modes: 50%N, 100%N, 160%N, 200%N and OFF. When the neutral line is thin, it can be protected by 50%N method; When the neutral line is the same as other phase lines, it can be protected by 100%N. When the harmonics in the power grid are relatively serious, 160%N or 200%N can be used for protection. The neutral line protection characteristic is the same as the overload long delay action characteristic.

保护功能 Protection function

中性线保护参数设定表 Neutral line protection parameter setting table

保护方式 Protection mode	长延时 Long delay	短延时 Short time delay	瞬动 Instantaneous movement	接地 Ground connection	适用范围 Scope of application
50%N	Ir/2	I _{sd} /2	I _i	I _g	中性线截面积等于相线截面积 1/2 的配电系统 Distribution system where the cross-sectional area of the neutral line is equal to 1/2 of the cross-sectional area of the phase line
100%N	Ir	I _{sd}	I _i	I _g	中性线截面积等于相线截面积的配电系统 Distribution system in which the cross-sectional area of the neutral line is equal to the cross-sectional area of the phase line
160%N	1.6Ir	1.6I _{sd}	I _i	I _g	中性线截面积等于相线截面积 1.6 倍的配电系统 Distribution system where the cross-sectional area of the neutral line is 1.6 times that of the phase line
200%N	2Ir	2I _{sd}	I _i	I _g	中性线截面积等于相线截面积 2 倍的配电系统 Distribution system where the cross-sectional area of the neutral line is twice the cross-sectional area of the phase line
OFF	/	/	/	/	中性线保护功能关闭 The neutral protection function is disabled

【使用提示】

[1]、以1/2N模式举例说明中性线保护的实际情况:如果某断路器整Ir=2000A,I_{sd}=8000A,I_i=24000A,I_g=600A,则中性线的Ir=1000A,I_{sd}=4000A,I_i=24000A,I_g=600A。当中性线的电流 >1200A(1.2Ir) 时,启动中性线长延时保护。

[2]、三相负荷平衡回路的中性线中基波(50Hz)的电流互相抵消,但 3、9、15.....等次的奇数倍三次谐波电流则不被抵消而是叠加,这就是中性线常常过载的原因 [1]。所以,中性线保护对于中性线存在的 3n 次谐波导致的电缆发热老化起到有效的保护作用。IEC60364 对此情况要求使用中性线保护。

[3]、在 3P+N 结构使用中性线保护应注意配电系统的设计要求。如果配电系统的设计要求不能分断中性线但任然对中性线过流保护提出具体要求,则可以启动该保护功能。

[4]、在 IEC60364 标准中还规定,对于 TT、TN-S、IT 系统中,如果中性线截面积小于相线,应当使用中性线过流保护;在 TN-C 系统中不宜使用中性线保护。

【 Use tips 】

[1] The 1/2N mode is used as an example to illustrate the actual situation of neutral line protection: If a circuit breaker sets Ir=2000A, I_{sd}=8000A, I_i=24000A, I_g=600A, the neutral line Ir=1000A, I_{sd}=4000A, I_i=24000A, I_g=600A. When the current of the neutral line is greater than 1200A(1.2Ir), the neutral line long delay protection is enabled.

[2] The fundamental (50Hz) currents in the neutral line of the three-phase load balancing circuit cancel each other, but 3, 9, 15... Odd times of equal order third harmonic currents are not cancelled but superimposed, which is why neutral lines are often overloaded [1]. Therefore, the neutral line protection plays an effective role in protecting the cable heating aging caused by the 3n harmonics of the neutral line. IEC60364 Neutral line protection is required in this case.

[3] The use of neutral line protection in 3P+N structure should pay attention to the design requirements of the distribution system. If the design requirements of the distribution system cannot break the neutral line but still have specific requirements for the neutral line overcurrent protection, the protection function can be activated.

[4] In the IEC60364 standard also stipulates that for TT, TN-S, IT systems, if the neutral line cross-sectional area is smaller than the phase line, neutral line overcurrent protection should be used; Neutral line protection should not be used in TN-C systems.

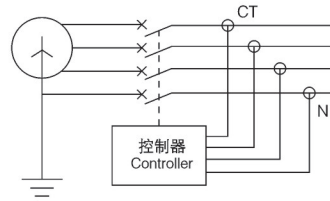
保护功能 Protection function

接地故障保护 Earth fault protection

IEC60364 对接地故障的定义是：相线和大地、接地的金属管道结构以及设备外壳间的短路故障。接地故障保护适用于 TN 系统，即电源中性点接地、设备外壳连接到中性线的配电系统。接地故障电流可达 kA 级强度。

根据 TN 系统的具体细节和断路器配置方式不同而不同。接地故障保护主要有三种模式：

- 其一、NFPA/EGFP 模式；
- 其二、限制性 (REF)/ 非限制性 (UEF) 接地保护；
- 其三、备用接地保护 (SEF)。

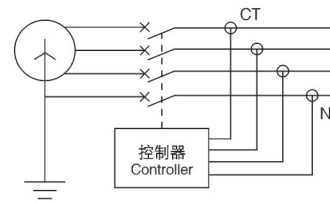


4(A)、4P 断路器的接地保护
4(A), 4P circuit breaker ground protection

The IEC60364 grounding fault is defined as a short circuit fault between the phase line and the ground or grounded metal pipe structure or device shell. Ground fault protection applies to the TN system, that is, the power distribution system where the neutral point of the power supply is grounded and the device enclosure is connected to the neutral line. The ground fault current can reach kA level strength.

It varies according to the specific details of the TN system and the circuit breaker configuration. There are three main modes of ground fault protection:

- First, NFPA/EGFP mode;
- Second, limited (REF)/ unrestricted (UEF) grounding protection;
- Third, standby ground protection (SEF).



4(B)、3P+N 断路器的接地保护
4(B) Grounding protection for 3P+N circuit breakers

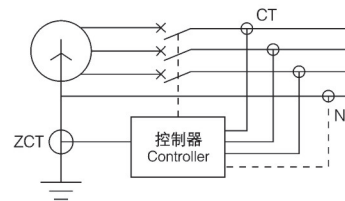
NFPA/EGFP 接地保护模式 NFPA/EGFP Ground protection mode

该保护模式美国国家防火协会在 NFPA70 标准中针对 TB 系统中制定的保护策略，称为设备接地故障保护 (EGFP: Ground-Fault Protection of Equipment)。它有以下要点：

- (1)、配电系统的中性点必须直接接地 (Solidly Grounded)，接地回路不能串入任何电阻或电抗。
- (2)、保护的电流整定值最大不能超过 1200A；且当故障电流大于 1200A 时，无论反时限、定时限延时不得超过 1s。

NFPA/EGFP 接地故障保护有两种结构形式：

- 其一、矢量和方式 (亦称剩余电流方式, T 型)，即接地故障电流等于相线和中性线电流的矢量和，图 4(A)、4(B) 分别示意了 4P 和 3P+N 的接地电流矢量和方式。
- 其二、地电流方式 (W 型)，即用一个独立电流互感器检测电源接地回路 (Ground Return) 的电流，其它相线互感器检测的电流不参与保护。如图 4(C) 所示。



4(C)、地电流型接地保护
4(C) Ground current type grounding protection

This Protection mode is a protection policy developed by the National Fire Protection Association for TB systems in the NFPA70 standard, called Ground Fault Protection of Equipment (EGFP). It has the following points:

- (1) The neutral point of the distribution system must be directly Grounded (Solidly Grounded), and the grounding circuit cannot be strung into any resistance or reactance.
- (2) The maximum current setting value of the protection cannot exceed 1200A; When the fault current is greater than 1200A, neither the inverse time limit nor the fixed time limit delay shall exceed 1s.

There are two types of NFPA/EGFP ground fault protection:

- First, the vector sum mode (also known as residual current mode, type T), that is, the ground fault current is equal to the vector sum of the phase line and neutral line current. Figure 4(A) and 4(B) show the vector sum mode of the ground current of 4P and 3P+N respectively.
- Second, the Ground current mode (W type), that is, an independent current transformer detects the current of the Ground Return circuit of the power supply, and the current detected by other phase line transformers does not participate in the protection. As shown in Figure 4(C).

【使用提示】

- [1]、地电流方式的 ZCT 配置的位置对于保护的有效性非常重要。它必须安装在电源 (变压器) 的接地回路 (Ground Return) 接地回路是指变压器中性点接地导线上，中性线分出点到大地之间的回路。
- [2]、如果 3P 断路器配置于 TN 系统且要求使用接地故障保护，必须采用 3P+N 方式 (图 4(B) 所示) 或地电流方式 (图 4(C) 所示)。否则，必须关闭接地故障保护功能，以免控制器误动作。
- [3]、图 4(B)、4(C) 的情况，中性线 CT 或 ZCT 与断路器之间最大距离 ≤ 10 米。过长信号传输带来的干扰可能导致误动作。

图4、NFPA/EGFP 接地故障保护系统示意
Figure 4, NFPA/EGFP ground fault protection system schematic

保护功能 Protection function

【 Use tips 】

[1] The location of the ZCT configuration in the ground current mode is very important for the effectiveness of protection. It must be installed in the Ground Return circuit of the power supply (transformer). The ground return circuit refers to the neutral point of the transformer grounding wire, and the neutral line is the circuit between the point and the earth.

[2] If the 3P circuit breaker is configured in a TN system and requires ground fault protection, it must be used in 3P+N mode (as shown in Figure 4(B)) or ground current mode (as shown in Figure 4(C)). Otherwise, disable the grounding fault protection function to prevent the controller from misoperating.

[3] In the case of FIG. 4(B) and 4(C), the maximum distance between the neutral line CT or ZCT and the circuit breaker is less than 10 meters. Interference caused by excessively long signal transmission may lead to misoperation.

NFPA 接地保护模式特性参数 NFPA Ground protection mode characteristic parameters

整定电流 (I _g) Setting current (I _g)	I _n ≤ 1200A I _n > 1200A	I _g = (0.2~1)I _n + OFF; I _g = 240~1200A + OFF;	调整步长: 1A, OFF 表示功能关闭 Step: 1A, OFF indicates that the function is disabled
动作特性 Action characteristic	0.8~1.0I _g 之间动作 In-between action	≤ 0.8 I _g 不动作 Inaction ≥ 1.0 I _g 延时动作 Delay action	
整定时间 Setting time (t _g)	0.1~1.0s		
动作时间 Action time	反时限 Inverse time lag	T = max { (1/n) ² T _g , T _g }; n = 1/I _{gm} ; I _{gm} = { =I _n , I _n < 1200A =1200A, I _n ≥ 1200A 误差 Error: ±15% (固有 inherent ±40ms);	
	定时限 Constant time-lag	T = T _g ; 误差 Error: ±40ms	
接地区域 联锁 (ZSI) Ground area interlock (ZSI)	控制器须配备 ZSI 功能，才有此项； 一路开关量输出 (DO) 设置为 ZSI 输出；一路开关量输入 (DI) 设置为 ZSI 输入； The controller must be equipped with ZSI function to have this; One switch output (DO) is set to ZSI output; One switch input (DI) is set to ZSI input;		

【使用提示】

- [1]、控制器出厂默认为 NFPA 保护方式。电流 (I_g) 整定为 OFF 时，功能关闭；
- [2]、为了便于在反时限、定时限模式间切换，在整定 T_g 参数时，如果显示 0.10~1.00，表示当前整定值为反时限时间；如果显示 “d0.10~d1.00”，表示当前整定值为定时限时间。
- [3]、对于矢量和形式，互感器断线会直接导致电流矢量和出现严重偏差，从而导致误动作。所以，一旦控制器自诊断功能监测到互感器断线故障，自动将保护模式屏蔽，同时启动自诊断报警。

【 Use tips 】

- [1] The factory default protection mode of the controller is NFPA. When current (I_g) is set to OFF, the function is turned off;
- [2] In order to facilitate switching between inverse time limit and fixed time limit mode, when setting T_g parameters, if 0.10~1.00 is displayed, it means that the current setting value is inverse time limit; If the value d0.10 to d1.00 is displayed, the current value is a specified time limit.
- [3] For vector and form, transformer breakage will directly lead to serious deviation of current vector and sum, resulting in misoperation. Therefore, once the controller self-diagnosis function detects the fault of the transformer broken line, the protection mode will be automatically shielded and the self-diagnosis alarm will be started.

保护功能 Protection function

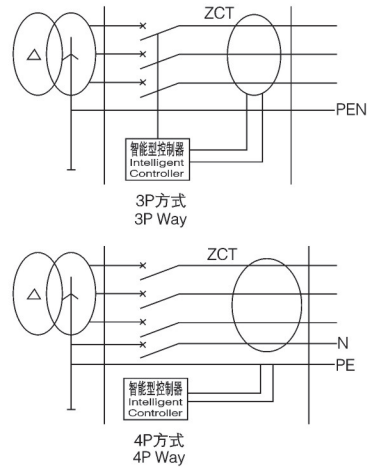


图5、漏电保护结构示意图
(注: ZCT为漏电互感器)
Figure 5. Schematic of leakage protection structure
(Note: ZCT is leakage transformer)

接地报警 Earth alarm

3型控制器的接地报警功能和接地保护功能是相互独立,同时存在,有各自不同的设置参数。
The ground alarm function and the ground protection function of the Type 3 controller are independent of each other, and exist at the same time, with different setting parameters.

漏电保护 Leakage protection

漏电保护适用于绝缘损坏导致漏电故障或人体接触外漏的导电部位而导致的漏电故障,漏电电流 $I_{\Delta n}$ 直接用安培表示,和断路器的额定电流无关。采用零序取样方式,需外加一只零序电流互感器;这种互感器取样精度,灵敏度高,适合较小电流的保护。

Leakage protection is applicable to the leakage fault caused by insulation damage or the leakage fault caused by human contact with the conductive part of the leakage. The leakage current $I_{\Delta n}$ is directly expressed in amperes and has nothing to do with the rated current of the circuit breaker. The zero-sequence sampling method is adopted, and a zero-sequence current transformer is required. This kind of transformer has high sampling accuracy, high sensitivity and is suitable for small current protection.

漏电保护特性参数 Leakage protection characteristic parameters

整定电流 [A] Setting current	$I_{\Delta n}$	0.5~30A+OFF(级差 0.1A,OFF 表示退出 Level difference 0.1A,OFF indicates exit)
动作特性 Action characteristic	在 $(0.8\sim 1.0)I_{\Delta n}$ 之间动作 in $(0.8\sim 1.0)I_{\Delta n}$ In-between action	$\leq 0.8I_{\Delta n}$ 不动作 n inaction $> 1.0I_{\Delta n}$ 延时动作 n Delay action
延时 [s] Delay	Tg(s)	0.06, 0.08, 0.17, 0.25, 0.33, 0.42, 0.5, 0.58, 0.67, 0.75, 0.83、瞬时 instantaneous
精度 precision		$\pm 10\%$ (固有 Inherent 40ms)

漏电保护延时时间整定值 Setting value of leakage protection delay time

整定时间 Setting time	0.06	0.08	0.17	0.25	0.33	0.42	0.5	0.58	0.67	0.75	0.83	
故障电流倍数 Multiple of fault current	最大断开时间 Max disconnect time [s]											
$I_{\Delta n}$	0.36	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	0.02
$2I_{\Delta n}$	0.18	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	0.02
$5I_{\Delta n}/10I_{\Delta n}$	0.072	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.02

漏电保护也可以分为两段,反时限和定时限;当 $I/I_{\Delta n} < 5$ 时为反时限,当 $I/I_{\Delta n} \geq 5$ 时为定时限;漏电保护特性曲线及保护条件如下:

$$T = \begin{cases} \left(\frac{I_{\Delta n}}{I}\right) \times 6 \times Tg & (I/I_{\Delta n} < 5) \\ (6 \times Tg)/5 & (I/I_{\Delta n} \geq 5) \end{cases}$$

例如:假设漏电延时时间整定为 $Tg=0.06s$,当 $I=I_{\Delta n}$ 时, $t=0.36s$; $I=2I_{\Delta n}$ 时, $t=0.18s$; $I \geq 5I_{\Delta n}$ 时, $t=0.072s$;

Leakage protection can also be divided into two sections, inverse time limit and fixed time limit; When $I/I_{\Delta n} < 5$ is the inverse time limit, when $I/I_{\Delta n} \geq 5$ is the fixed time limit; Leakage protection characteristic curve and protection conditions are as follows:

$$T = \begin{cases} \left(\frac{I_{\Delta n}}{I}\right) \times 6 \times Tg & (I/I_{\Delta n} < 5) \\ (6 \times Tg)/5 & (I/I_{\Delta n} \geq 5) \end{cases}$$

For example, if the leakage delay time is set to $Tg=0.06s$, when $I=I_{\Delta n}$, $t=0.36s$; When $I=2I_{\Delta n}$, $t=0.18s$; When $I \geq 5I_{\Delta n}$, $t=0.072s$;

保护功能 Protection function

负载监控 Load monitoring

负载监控可用于预报警,也可用于控制支路负荷。动作依据可根据功率或电流进行动作,有两种动作方式:
方式一:可独立控制两路负荷,当运行参数超过整定值时,相应负载监控 DO 延时动作(需设定相应的 DO 功能),控制分断两路支路负荷,保证主系统供电。
方式二:一般用于控制同一支路负荷,当运行参数超过启动值,"负载一"DO 延时动作(动作形式可为脉冲方式或电平方式)分断支路负荷;若分断后运行参数值低于返回,并经延时设定时间后,"负载一"DO 返回,"负载二"DO 动作(动作形式可为脉冲方式或电平方式),接通已分断的负荷,恢复系统供电。

Load monitoring can be used to forecast alarms and control branch loads. Action basis can be based on power or current action, there are two modes of action:

Mode 1: Two loads can be independently controlled. When the operating parameters exceed the setting value, the corresponding load monitors the DO delay action (the corresponding DO function needs to be set), and controls the load splitting of two branches to ensure power supply for the main system.

Mode 2: Generally used to control the load of the same branch, when the operating parameter exceeds the starting value, "load one" DO delay action (the action form can be pulse mode or level mode) to break the branch load; If the running parameter value is lower than the return value after breaking, and after the delay setting time, "load 1" DO return, "load 2" DO action (the action form can be pulse mode or level mode), switch on the broken load, and restore the system power supply

测量功能 Measuring function

电流测量 Current measurement

控制器能实时测量三个线电流 (Ia、Ib、Ic)、中性线电流 (IN)、接地电流 (I_g) 或漏电电流 ($I_{\Delta n}$),适用于 50Hz/60Hz 电网。

测量方式:真有效值或基波有效值;

测量范围: Ia、Ib、Ic、IN 不小于 25 倍 In(断路器额定电流)。

测量精度: 2In 范围内,测量误差为 $\pm 1.5\%$; 2In 以上为 $\pm 5\%$;

【使用提示】: 当测量值小于范围的下限时,显示为 0。

The controller can measure three line currents (Ia, Ib, Ic), neutral line current (IN), ground current (I_g) or leakage current ($I_{\Delta n}$) in real time, suitable for 50Hz/60Hz power grids.

Measurement method: true RMS value or fundamental RMS value;

Measuring range: Ia, Ib, Ic, IN not less than 25 times In(circuit breaker rated current).

Measurement accuracy: within the range of 2In, the measurement error is $\pm 1.5\%$; $\pm 5\%$ above 2In;

[Use tip]: When the measured value is less than the lower limit of the range, 0 is displayed.

电压测量 Voltage measurement

实时测量线电压 (Uab、Ubc、Uca、UMAx) 和相电压 (Uan、Ubn、Ucn),适用于 50/60Hz 电网。电压测量取决于电网结构和断路器配置。

测量方式:真有效值;

测量范围: 30V ~ 1200V(电压低于下限时,显示为 0V);

测量精度: $\pm 1.5\%$ 。

Real-time measurement of line voltages (Uab, Ubc, Uca, UMax) and phase voltages (Uan, Ubn, Ucn) for 50/60Hz power grids. Voltage measurement depends on the grid structure and circuit breaker configuration.

Measurement method: true effective value;

Measuring range: 30V ~ 1200V(when the voltage is lower than the lower limit, it is displayed as 0V);

Measurement accuracy: $\pm 1.5\%$.

自诊断信息记录 Self-diagnostic information recording

控制器的自诊断功能主要用于对自身运行状况的检查和维修，能对互感器断线、磁通断线、断路器拒动、触头维护、AD 故障、XT 时钟故障、E2ROM 故障等自身故障进行实时检测，当自诊断故障发生时，在“当前报警”菜单中能查询到当前自诊断故障信息，同时可以发出 DO 报警信号，自诊断信息被记录在报警记录中。

The self-diagnosis function of the controller is mainly used for the inspection and maintenance of its own operating status. It can detect the transformer broken line, magnetic flux broken line, circuit breaker rejection, contact maintenance, AD fault, XT clock fault, E2ROM fault and other own faults in real time. When the self-diagnosis fault occurs, the current self-diagnosis fault information can be found in the "Current alarm" menu option A DO alarm signal can be sent, and the self-diagnostic information is recorded in the alarm record.

自诊断故障信息表 Self-diagnostic fault information table

自诊断故障显示内容 Self-diagnosis fault Display content	自诊断故障说明 Self-diagnostic fault description	故障排除方法 Troubleshooting method
E-L1 E-L2 E-L3 E-LN	分别表示电流互感器 L1、L2、L3、Ln 断线 Indicates that the current transformer L1, L2, L3, and Ln are disconnected	检查电流互感器二次端 L1、L2、L3、Ln 线是否有断线、破皮的情况或 L1、L2、L3、Ln 和线路板的连接是否有松动现象； Check whether L1, L2, L3, Ln wires of the secondary end of the current transformer are broken or broken, or whether the connection between L1, L2, L3, Ln and the circuit board is loose.
E-CT E-11	控制器脱扣线圈断线 The controller trip coil is disconnected	检查脱扣磁通和线路板的连接线是否连接良好； Check whether the tripping magnetic flux and the circuit board are properly connected;
E-JD E-12	控制器未检测到断路器分闸成功 The controller does not detect that the circuit breaker is successfully opened	检查分合闸检测小机构是否工作正常； Check whether the small switch detection mechanism works normally;
E-13	触头磨损值 >100% Contact wear value > 100%	需对主触头进行维护，维护完毕，需手动复位，使触头磨损值恢复为 0 The main contact needs to be maintained. After the maintenance is complete, manually reset the contact Contact wear value is restored to 0
E-02	系统 A/D 采样电路出错。 The system A/D sampling circuit is faulty.	控制器无法使用，请联系厂家处理 The controller cannot be used. Contact the manufacturer
E-01	外部存储芯片故障 The external memory chip is faulty	可掉电重启看故障是否消失，如故障仍然存在则需要更换外部 E2ROM 存储芯片 Power off and restart to see whether the fault disappears. If the fault still exists, it is required To replace the external E2ROM memory chip

DO 功能 DO Feature

控制器拥有四组相互独立可编程 I/O 口，可根据客户的需要设置，内部为继电器触点输出（触点容量为 250VAC/5A,30VDC/5A）。

The controller has four sets of independent programmable I/O ports, which can be set according to the needs of the customer, and the internal relay contact output (contact capacity of 250VAC/5A,30VDC/5A).

继电器可定义的功能状态：

Relay definable functional states:

F 型、M 控制器输出 DO 参数设定 F and M controllers output DO parameter Settings				
功能设置 Function setting	短路瞬时故障跳闸 Short circuit instantaneous fault trip	接地或漏电故障跳闸 Ground or leakage fault trip	接地或漏电故障跳闸 Ground or leakage fault trip	短路短延时故障跳闸 Short circuit delay fault trip
	过载长延时故障跳闸 Overload long delay fault trip	故障跳闸 Fault trip	负载监控 1 卸载输出 Load monitoring 1 Unload the output	负载监控 2 卸载输出 Load monitoring 2 Unload output
	系统自诊断故障 The system self-diagnoses faults	电网故障状态报警 Power grid fault state alarm	遥控分闸 Remote switching	遥控合闸 Remote closing
执行方式 Execution mode	故障跳闸开关信号、故障消失后按清灯键返回 The fault trip switch signal, after the fault disappears, press the light clearing key to return		其它为 100ms 脉冲信号输出 Others are 100ms pulse signal output	

3H 型控制器输出 DO 参数设定 3H controller output DO parameter setting				
功能设置 Function setting	通用 Be common	报警 Give an alarm	故障跳闸 Fault trip	自诊断报警 Self-diagnostic alarm
	负载 I 卸载 Load I unloading	负载 II 卸载 Load II unloading	N 相故障 N-phase fault	长延时跳闸 Long delay trip
	短延时跳闸 Short delay trip	瞬时跳闸 Instantaneous trip	MCR 跳闸 MCR trip	HSISC 跳闸 HSISC trip
	接地跳闸 Ground trip	漏电跳闸 Leakage trip	lunbal 跳闸 The lunbal trip	需用 A 跳闸 A trip is required
	需用 B 跳闸 B trip is required	需用 C 跳闸 A C trip is required	需用 N 跳闸 N trip is required	欠压跳闸 Undervoltage trip
	过压跳闸 Overvoltage trip	Uunbal 跳闸 The Uunbal trips	欠频跳闸 Underfrequency trip	过频跳闸 Overfrequency tripping
	相序跳闸 Phase sequence trip	逆功率跳闸 Reverse power trip	过载预警 Overload warning	接地报警 Earth alarm
	漏电报警 Leakage alarm	lunbal 报警 lunbal call the police	需用 A 报警 Call the police with "A"	需用 B 报警 Call the "B" alarm
	需用 C 报警 Need to use C alarm	需用 N 报警 Need N alarm	欠压报警 Undervoltage alarm	过压报警 Overvoltage alarm
	Uunbal 报警 Uunbal, call the police	欠频报警 Underfrequency alarm	过频报警 Overfrequency alarm	逆功率报警 Reverse power alarm
	相序报警 Phase sequence alarm	通信失败 Communication failure	ZS1 输出 ZS1 Output	远程分闸 Remote switching
	远程合闸 Remote closing			
	执行方式 Execution mode	常开电平 Normally open level	常闭电平 Normally closed level	常开脉冲 Normally open pulse

DI 输入功能 区域选择性联锁 (ZSI) DI Input function Area Selective Interlocking (ZSI)

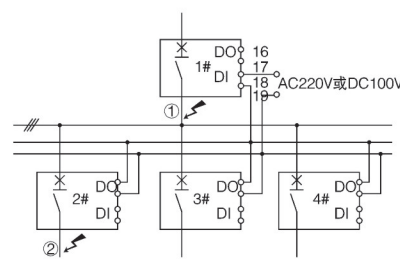


Figure 6 Schematic diagram of regional interlocking

区域选择性联锁 (ZSI) 其设计目的是降低电气配电设备在短路或接地故障期间遭受的故障应力。ZSI 系统与一个预先协同 (配电设备之间工作参数的协调协同关系) 的配电系统一起工作，它通过缩短故障清除时间来减小故障给系统造成的应力 (破坏)，并维持系统中短路或接地故障保护设备之间的协同关系。

区域选择性联锁 (ZSI) 包括短路联锁和接地联锁，在两台或多台断路器相连如图 15 所示：

(1)、当短路或接地故障发生的位置在下级断路器 (2# ~ #4 断路器) 的出线侧 (如位置②) 时，下级断路器瞬时跳闸，并向上级断路器 (#1 断路器) 发出区域联锁跳闸信号；上级断路器收到区域联锁跳闸信号，按短路或接地保护设定的参数进行延时。若上级断路器延时的过程中故障电流被取消，则保护返回，上级断路器不动作；若下级断路器跳闸后故障电流仍未取消，则上级断路器按短路或接地保护设定参数动作，切除故障线路。

(2)、当短路或接地故障发生的位置在上级断路器 (#1 断路器) 和下级断路器 (2# ~ #4 断路器) 之间 (如位置①) 时，上级断路器未收到区域联锁信号，因而瞬时跳闸，快速切除故障线路。

Zonal selective interlocking (ZSI) is designed to reduce the fault stress that electrical distribution equipment suffers during short circuits or ground faults. The ZSI system works with a pre-collaborative (coordination of operating parameters between distribution devices) distribution system, which reduces the stress (damage) caused by faults by reducing fault clearance time, and maintains coordination between short-circuit or ground fault protection devices in the system.

Zone selective interlocking (ZSI) includes short circuit interlocking and ground interlocking, where two or more circuit breakers are connected as shown in Figure 15:

(1), when the short circuit or ground fault occurs in the position of the lower circuit breaker (2# ~ #4 circuit breaker) outlet side (such as position 2), the lower circuit breaker instantaneously trips, and sends a regional interlock trip signal to the upper circuit breaker (#1 circuit breaker); The upper circuit breaker receives the regional interlock trip signal and delays according to the parameters by the short circuit or ground protection. If the fault current is cancelled during the delay of the upper circuit breaker, the protection returns and the upper circuit breaker does not operate. If the fault current does not cancel after the lower circuit breaker trips, the upper circuit breaker acts according to the set parameters of short circuit or ground protection to cut out the fault line.

(2) When the short circuit or ground fault occurs between the upper circuit breaker (#1 circuit breaker) and the lower circuit breaker (2# ~ #4 circuit breaker) (such as position ①), the upper circuit breaker does not receive the regional interlock signal, and therefore the instantaneous trip, quickly cut the fault line.

【使用提示】 【 Use tips 】

ZSI 功能必须配备一组 DO (ZSI 输出为电平方式) 和一组 DI (ZSI 输入) 做为上下级断路器的电气联接；订货时需向厂家说明。

区域联锁只配置于 3H 型产品上。

The ZSI function must be equipped with a set of DO (ZSI output in level mode) and a set of DI (ZSI input) as the electrical connection of the upper and lower circuit breakers; Please inform the manufacturer when ordering. Zone interlock is only available on 3H products.

试验功能 Test function

控制器可以模拟瞬时脱扣动作，用于在现场调试、定期检查或检修时的跳闸试验，以检查控制器和断路器的配合情况。

试验完成后，显示机构动作时间或试验状态。

【使用提示】

- (1)、本功能只可以在断路器现场调试或检修时使用，正常运行期间请勿随意使用；
- (2)、每次合闸前必须按下控制面板上的红色复位按钮，方可再次闭合断路器投入运行；

The controller can simulate the instantaneous trip action for the trip test during field debugging, regular inspection or overhaul to check the cooperation between the controller and the circuit breaker.

After the completion of the test, display the mechanism action time or test state.

【 Use tips 】

- (1) This function can only be used during field debugging or maintenance of the circuit breaker, do not use it at will during normal operation;
- (2) Before each closing, the red reset button on the control panel must be pressed to close the circuit breaker again and put into operation;

故障记录及查询功能 Fault record and query function

当发生故障跳闸时，控制器自动记录故障时刻电流及动作时间，用户可以按“查询”键查询故障记录。

When a fault trip occurs, the controller automatically records the fault current and operation time. You can press "Search" to query the fault record.

自诊断功能 Self-diagnostic function

控制器的自诊断功能主要用于对自身运行状况的检查和维修，能对互感器信号断线、磁通断线、断路器拒动、自身故障等进行实时检测。

The self-diagnosis function of the controller is mainly used for the inspection and maintenance of its own operating status, and can detect the transformer signal breakage, magnetic flux breakage, circuit breaker rejection, and self-fault in real time.

指示灯全显功能 Indicator full display function

控制器可以点亮所有数码管及指示灯，此功能用于检查所有发光器件是否正常。

The controller can light up all the nixie tubes and indicators, this function is used to check whether all the light emitting devices are normal.

实时时钟(RTC)功能(选配) Real-time Clock (RTC) function (optional)

控制器可以提供实时时钟功能，用于显示当前日期及时间，当故障发生时记录故障时间。

The controller provides the real-time clock function to display the current date and time and record the fault time when a fault occurs.

电压表功能(选配) Voltmeter function (optional)

控制器可以选配电压表，电压表可以实时显示当前三相线电压 Uab、Ubc、Uca，相电压 Uan、Ubn、Ucn，电压频率 F；

The controller can be equipped with voltmeter, voltmeter can display the current three-phase line voltage Uab, Ubc, Uca, phase voltage Uan, Ubn, Ucn, voltage frequency F in real time;

温度保护功能(F型选配) Temperature protection function (optional F)

控制可选配断路器母排温度保护功能，通过外接本公司配套的温度采集模块实现，每极母排上安装 1 只温度传感器，模块可采集 3 极或 4 极断路器；控制器与温度采集模块采用 RS485 链接，采集的温度显示在控制器上；当检测到温度达到设定值时启动延时并脱扣动作。

温度启动值 =25~160°C +OFF,OFF 表示温度保护功能关闭，回差 5°C；

保护启动延时 =1~1800s+OFF,OFF 表示只报警不动作；

Control can be optional circuit breaker bus temperature protection function, through the external temperature acquisition module of the company, each pole bus is installed with a temperature sensor, the module can collect 3 or 4 pole circuit breakers; The controller and the temperature acquisition module are connected by RS485, and the collected temperature is displayed on the controller. When the temperature is detected to reach the setting Value initiates delay and trip action.

Temperature Start value =25 to 160 ° C +OFF. OFF indicates that the temperature protection function is disabled and the return difference is 5 ° C.

Protection start delay =1~1800s+OFF,OFF indicates only alarm but no action.

【使用说明】：温度只报警不跳闸时，报警启动值 = 设定的温度启动值，启动延时 1s，回差为 5°C；报警时 Lcd 背光黄色，自诊断显示 E-03；如果需要继电器输出，可以将继电器设为 11.09 系统自诊断故障；

[Usage instructions]: When the temperature alarm only does not trip, the alarm starting value = the set temperature starting value, the starting delay of 1s, the return difference is 5 ° C ; Alarm Lcd backlight yellow, self-diagnosis display E-03; If the relay output is required, the relay can be set to 11.09 system selfdiagnosis fault;

有压重合功能(F型选配) Pressure recloser function (F type optional)

根据《国家电网公司关于印发分布式电源并网相关意见和规范的通知》中规定:专用开关应具备失压分闸及检有压合闸功能，失压分闸定值宜整定为 20%UN、10 秒，检有压定值宜整定为大于 85%UN。根据该规范要求，智能控制器增加“失压分闸及检有压合闸”功能。加“失压分闸及检有压合闸”功能。路负荷，当运行参数超过启动值，“负载—”DO 延时动作（动作形式可为脉冲方式或电平方式）分断支路负荷；若分断后运行参数值低于返回值，并经延时设定时间后，“负载—”DO 返回，“负载二”DO 动作（动作形式可为脉冲方式或电平方式），接通已分断的负荷，恢复系统供电。

According to the Notice of the State Grid Corporation on the issuance of distributed power grid-connected opinions and Specifications, the special switch should have the function of losing voltage opening and checking voltage closing, and the setting value of losing voltage opening should be adjusted to 20%UN, 10 seconds, and the setting value of detecting voltage should be adjusted to greater than 85%UN. According to the requirements of the code, the intelligent controller adds the function of "loss of pressure opening and detection of pressure closing".

失压分闸功能 Loss of pressure opening function

检测线电压有效值，当三个线电压的最小值小于失压启动设定值时，经整定的延时时间后，分闸控制无源触点动作，输出方式为 100ms 脉冲，窗口显示“U-F”。

如分闸过程中控制回路异常导致分闸失败，则在自检测信息中显示“E-09”，此时不再输出分闸脉冲信号，检查并排除分闸回路故障后，按复位键恢复。

When the minimum value of the three line voltages is less than the set value of the no-voltage start, after the set delay time, the switch control passive contact action, the output mode is 100ms pulse, and the window displays "U-F".

If the failure of opening is caused by the abnormal control loop in the process of opening, "E-09" will be displayed in the self-detection information, and the opening pulse signal will not be output at this time. After checking and eliminating the fault of the opening loop, press the reset key to recover

失压分闸功能参数表 Pressure loss switching function parameter table

参数名称 Parameter name	调整范围 Adjustment range	调整步长 Adjust step size	出厂默认值 Factory default	备注 Remark
保护启动设定值 Protect startup Settings	60V~1200V	1V	80V	80V=(20%×UN)=(20%×400V)
延时时间设定值 Delay time set value	0.2~60s	0.1s	3.0s	
执行方式 Execution mode	关闭 / 分闸 Switch off/switch off		关闭 Off	
输出方式 Output mode	分闸继电器 100ms 脉冲输出 Switching relay 100ms pulse output			

有压合闸功能 Pressure closing function

检测线电压有效值，当三个线电压的最小值小于失压启动设定值时，经整定的延时时间后，合闸控制无源触点动作，输出方式为 100ms 脉冲，窗口显示“U-H”。

如合闸过程中控制回路异常导致合闸失败，则在自检测信息中显示“E-09”，此时不再输出合闸脉冲信号，检查并排除合闸回路故障后，按复位键恢复。

When the minimum value of the three line voltages is less than the set value of the no-voltage start, after the setting delay time, the closing control passive contact action, the output mode is 100ms pulse, and the window displays "U-H".

If the closing failure is caused by the abnormal control loop during the closing process, "E-09" will be displayed in the self-detection information, and the closing pulse signal will not be output at this time.

After checking and eliminating the fault of the closing loop, press the reset key to recover.

失压分闸功能参数表 Pressure loss switching function parameter table

参数名称 Parameter name	调整范围 Adjustment range	调整步长 Adjust step size	出厂默认值 Factory default	备注 Remark
保护启动设定值 Protect startup Settings	60V~1200V	1V	80V	80V=(20%×UN)=(20%×400V)
延时时间设定值 Delay time set value	0.2~60s	0.1s	3.0s	
执行方式 Execution mode	关闭 / 分闸 Switch off/switch off		关闭 Off	
输出方式 Output mode	分闸继电器 100ms 脉冲输出 Switching relay 100ms pulse output			

通讯功能 Communication function

H 型控制器通过通信口按 MODBUS 协议可以实现遥测、遥控、遥调、通讯等功能。通信口的输出采用了光电隔离器件，适用于强电器干扰环境。关于通讯的详细内容见《H 型通讯协议》。

H-type controller can realize telemetry, remote control, remote adjustment, remote communication and other functions by MODBUS protocol through communication port. The output of communication port adopts photoelectric isolation device, which is suitable for strong electrical interference environment. For details of the communication, see Type H Communication Protocol.

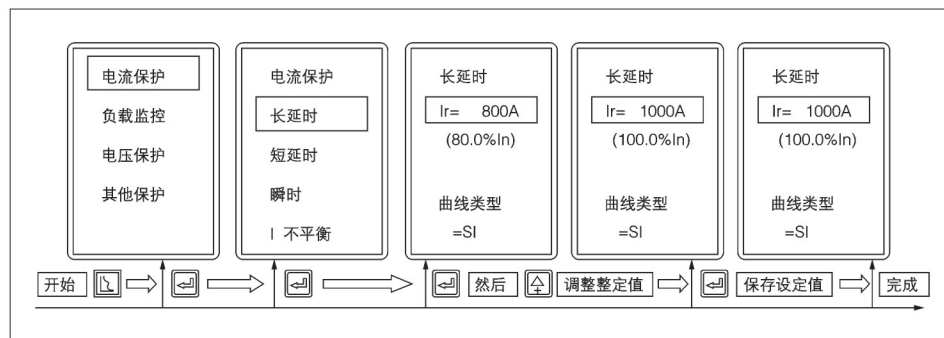
3M,H 型控制器面板示意图 3M,H Type controller panel diagram



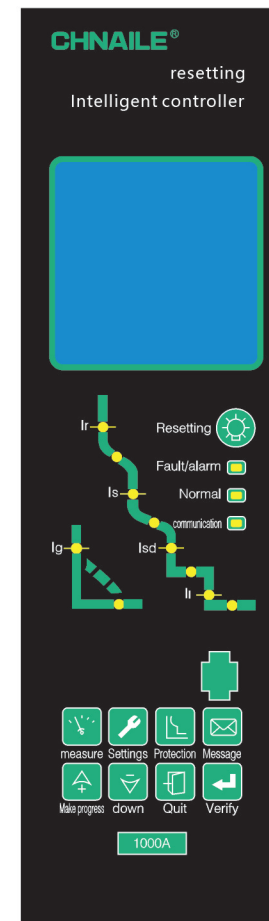
控制器面板示意图

显示界面说明		
面板显示	类型	功能
In	电流标签	指示控制器的额定电流
LCM	液晶显示屏	显示控制器各项参数,主界面为电流显示界面
Ig	灯 / 红色	接地或漏电保护指
IR	灯 / 红色	长延时指示
Is	灯 / 红色	短延时反时限指示
Isd	灯 / 红色	短延时定时限指示
li	灯 / 红色	瞬时指示
故障报警	灯 / 红色	保护启动或自诊断报警常亮,脱扣快闪
正常	灯 / 绿色	系统正常运行时慢闪
通讯	灯 / 黄色	正常通讯时慢闪
按键功能说明		
复位	故障动作后清除故障显示界面	
测量	进入测量菜单,控制器当前运行中各项测量数据;密码输入时左移	
设置	进入设置功能,设置控制器工作参数;密码输入时右移	
保护	进入保护设置,设置控制器各项保护参数	
信息	查询控制器历史记录及系统维护	
向上	设置参数时数值增加	
向下	设置参数时数值减小	
返回	退出或返回上级菜单,或取消当前参数选定状态	
确认	确认进入当前参数选定;参数设置时保存修改参数	
铅封盖		
铅封盖	锁住整定按键防止参数误修改	

示例: 过载长延时保护设定, 当前 Ir=800A, 设置成 1000A 并保存, 设置方法如下:



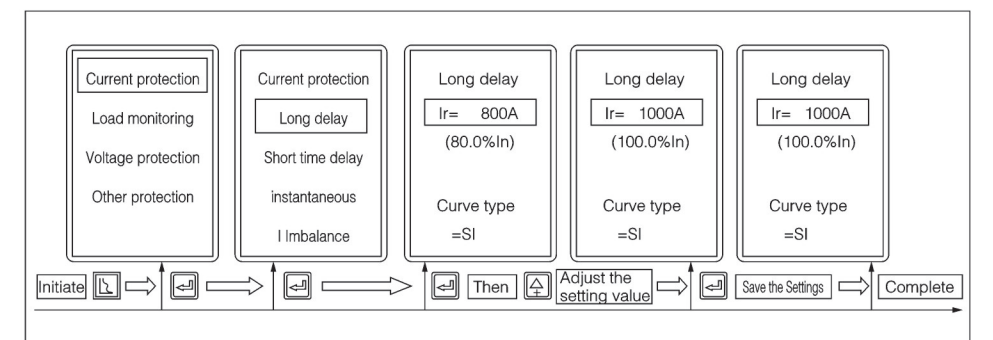
3M,H 型控制器面板示意图 3M,H Type controller panel diagram



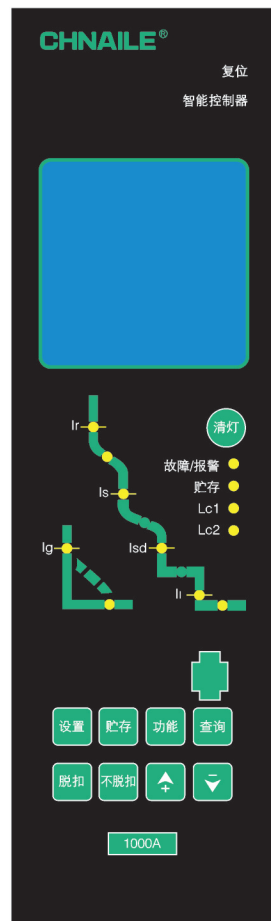
Controller panel diagram

Display interface description		
Panel display	type	Feature
In	Current label	Indicates the rated current of the controller
LCM	Liquid crystal display screen	Displays the parameters of the controller. The main screen is the current display screen
Ig	Light/Red	Grounding or leakage protection refers
IR	Light/Red	Long delay indication
Is	Light/Red	Short delay inverse time indication
Isd	Light/Red	Short delay set time indication
li	Light/Red	Instantaneous indication
Fault alarm	Light/Red	The protection startup or self-diagnosis alarm is steady on, and the trip blinks quickly
normal	Light/Green	Blinking slowly when the system is running normally
communication	Light/Yellow	Blink slowly during normal communication
Key function description		
resetting	The fault is cleared after the fault action	
measure	Enter the measurement menu, the current operation of the controller measurement data; Move left when entering the password	
Settings	Enter the setting function, set the controller working parameters; Move to the right when entering the password	
Protection	Enter Protection Settings and set the protection parameters of the controller	
Message	Example Query controller history and system maintenance	
Make progress	The value increases when the parameter is set	
down	The value decreases during parameter setting	
Back	Exit or return to the upper-level menu, or unselect the current parameter	
verify	Confirm to enter the current parameter selection; The modified parameter is saved during parameter setting	
Lead seal cover		
Lead seal cover	Lock the setting key to prevent incorrect parameter modification	

Example: Overload long delay protection Settings, the current Ir=800A, set to 1000A and save, the setting method is as follows:

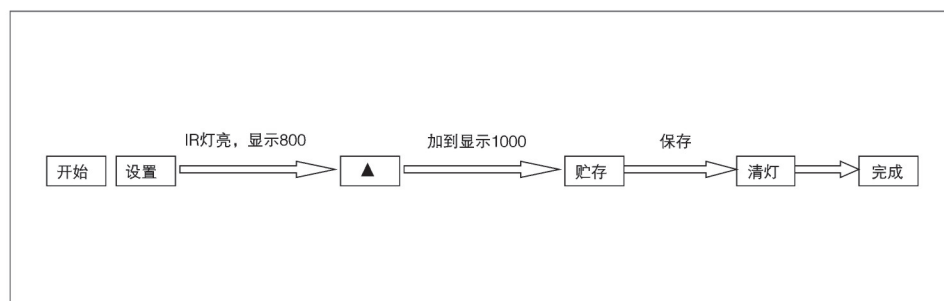


F 型控制器面板示意图 F-type controller panel diagram

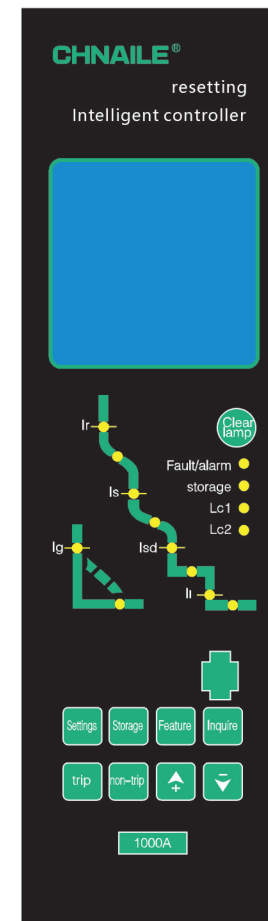


显示界面说明		
面板显示	类型	功能
In	电流标签	指示控制器的额定电流
LCM	液晶显示屏	显示控制器各项参数,主界面为电流显示界面三色可变液晶,运行绿色、报警黄色、故障红色
Ig	灯 / 红色	接地或漏电保护指
IR	灯 / 红色	长延时指示
Is	灯 / 红色	短延时反时限指示
Isd	灯 / 红色	短延时定时限指示
li	灯 / 红色	瞬时指示
故障 / 报警	灯 / 红色	保护启动或自诊断报警常亮,脱扣快闪
贮存	灯 / 黄色	保存参数时闪亮
Ic1	灯 / 黄色	负载监控 1 指示
Ic2	灯 / 黄色	负载监控 2 指示
按键功能说明		
清灯		故障动作后清除故障显示界面,参数设置时退出设置状态
设定		进入保护参数设置
贮存		保存修改参数
功能		长按显示器件检查;正常运行或故障查询时浏览各相电流
查询		故障记录查询,查询脱扣最大相电流和时间
脱扣		模拟试验脱扣动作
不脱扣		模拟试验不脱扣动作
向上		调整设置参数时数值增加,自诊断报警时查询报警状态
向下		调整设置参数时数值减小,自诊断报警时查询报警状态
铅封盖		
铅封盖		锁住整定按键防止参数误修改

示例: 过载长延时保护设定, 当前 Ir=800A, 设置成 1000A 并保存, 设置方法如下



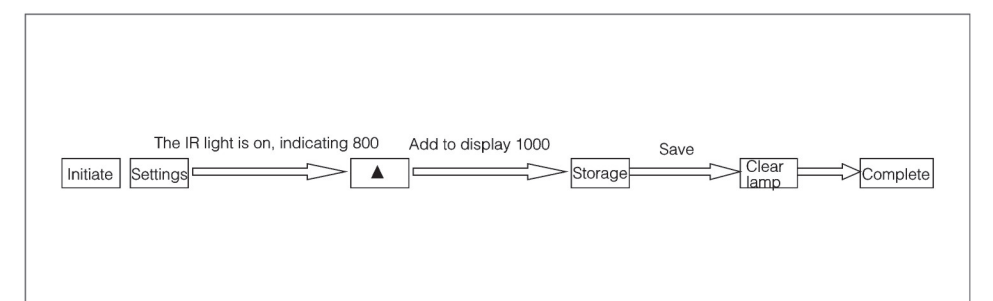
F 型控制器面板示意图 F-type controller panel diagram



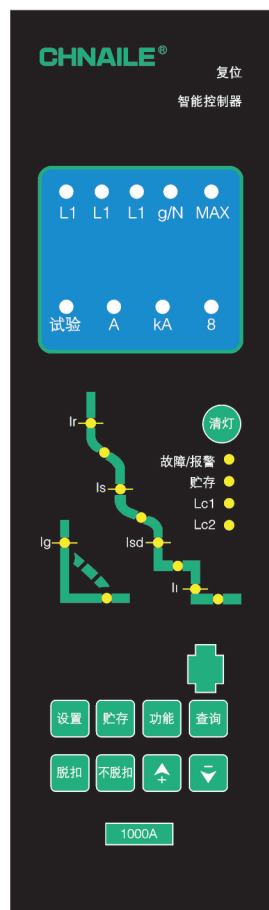
Controller panel diagram

Display interface description		
Panel display	type	Feature
In	Current label	Indicates the rated current of the controller
LCM	Liquid crystal display screen	Display controller parameters, the main interface for the current display interface three-color variable LCD, running green, alarm yellow, fault red
Ig	Light/Red	Grounding or leakage protection refers
IR	Light/Red	Long delay indication
Is	Light/Red	Short delay inverse time indication
Isd	Light/Red	Short delay set time indication
li	Light/Red	Instantaneous indication
Fault/alarm	Light/Red	The protection startup or self-diagnosis alarm is steady on, and the trip blinks quickly
storage	Light/Yellow	Shine when saving parameters
Ic1	Light/Yellow	Load monitoring 1 indicates
Ic2	Light/Yellow	Load monitoring 2 indicates
Key function description		
Clear lamp		The fault is cleared after the fault action is performed. The setting state exits during parameter setting
Settings		Enter protection parameter Settings
storage		Save modified parameters
Feature		Long press the display device to check; View the current of each phase during normal running or fault query
inquire		To query fault records, query the maximum trip phase current and time
trip		Simulated test trip action
non-trip		Simulated test without tripping action
Make progress		The value is increased when adjusting the setting parameter, and the alarm status is queried when self-diagnosing the alarm
down		The value decreases when adjusting the setting parameter, and the alarm status is queried when self-diagnosing the alarm
Lead seal cover		
Lead seal cover		Lock the setting key to prevent incorrect parameter modification

For example: Overload long delay protection setting, the current Ir=800A, set it to 1000A and save the Settings



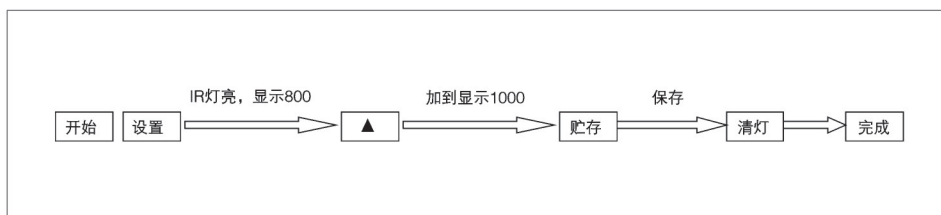
M 控制器面板示意图 M Controller panel diagram



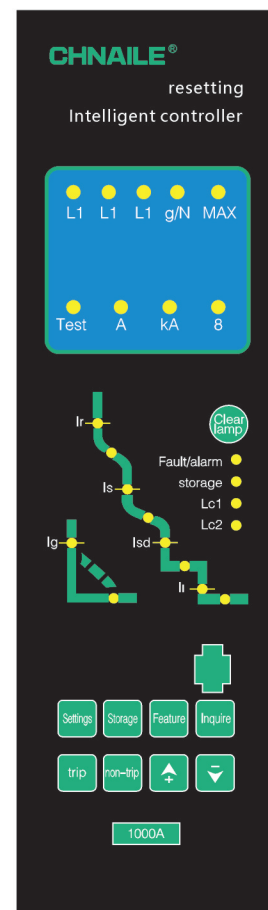
控制器面板示意图

显示界面说明		
面板显示	类型	功能
In	电流标签	指示控制器的额定电流
LCM	液晶显示屏	显示控制器各项参数,主界面为电流显示界面三色可变液晶,运行绿色、报警黄色、故障红色
Ig	灯 / 红色	接地或漏电保护指
IR	灯 / 红色	长延时指示
Is	灯 / 红色	短延时反时限指示
Isd	灯 / 红色	短延时定时限指示
Ii	灯 / 红色	瞬时指示
故障 / 报警	灯 / 红色	保护启动或自诊断报警常亮,脱扣快闪
贮存	灯 / 黄色	保存参数时闪亮
Ic1	灯 / 黄色	负载监控 1 指示
Lc2	灯 / 黄色	负载监控 2 指示
按键功能说明		
清灯		故障动作后清除故障显示界面,参数设置时退出设置状态
设定		进入保护参数设置
贮存		保存修改参数
功能		长按显示器件检查;正常运行或故障查询时浏览各相电流
查询		故障记录查询,查询脱扣最大相电流和时间
脱扣		模拟试验脱扣动作
不脱扣		模拟试验不脱扣动作
向上		调整设置参数时数值增加,自诊断报警时查询报警状态
向下		调整设置参数时数值减小,自诊断报警时查询报警状态
铅封盖		
铅封盖		锁住整定按键防止参数误修改

示例：过载长延时保护设定,当前 Ir=800A, 设置成 1000A 并保存, 设置方法如下



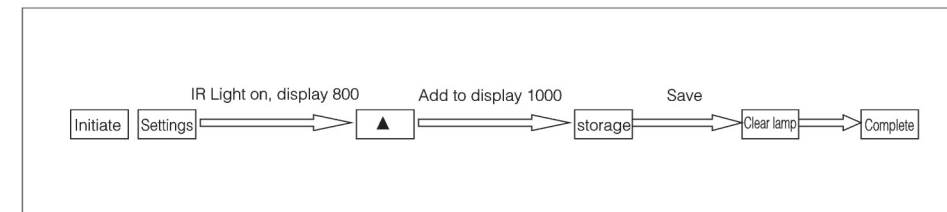
M 控制器面板示意图 M Controller panel diagram



Controller panel diagram

Display interface description		
Panel display	type	Feature
In	Current label	Indicates the rated current of the controller
LCM	Liquid crystal display screen	Display controller parameters, the main interface for the current display interface three-color variable LCD, running green, alarm yellow, fault red
Ig	Light/Red	Grounding or leakage protection refers
IR	Light/Red	Long delay indication
Is	Light/Red	Short delay inverse time indication
Isd	Light/Red	Short delay set time indication
Ii	Light/Red	Instantaneous indication
Fault/alarm	Light/Red	The protection startup or self-diagnosis alarm is steady on, and the trip blinks quickly
storage	Light/Yellow	Shine when saving parameters
Ic1	Light/Yellow	Load monitoring 1 indicates
Lc2	Light/Yellow	Load monitoring 2 indicates
Key function description		
Clear lamp		The fault is cleared after the fault action is performed. The setting state exits during parameter setting
Settings		Enter protection parameter Settings
storage		Save modified parameters
Feature		Long press the display device to check; View the current of each phase during normal running or fault query
inquire		To query fault records, query the maximum trip phase current and time
trip		Simulated test trip action
non-trip		Simulated test without tripping action
Make progress		The value is increased when adjusting the setting parameter, and the alarm status is queried when self-diagnosing the alarm
down		The value decreases when adjusting the setting parameter, and the alarm status is queried when self-diagnosing the alarm
Lead seal cover		
Lead seal cover		Lock the setting key to prevent incorrect parameter modification

For example: Overload long delay protection setting, the current Ir=800A, set it to 1000A and save the Settings





控制器选型功能表 Controller selection function list

型号规格	M 型	F 型	3M 型	3H 型	温度控制器
面板特征	数码管 +LED + 按键	液晶显示 +LED + 按键	液晶显示 +LED + 按键	液晶显示 +LED + 按键	数码管 +LED + 按键
基本保护 (四段保护)	LSIG	LSIG	LSIG	LSIG	
长延时保护曲线选择	●	●	●	●	
中性线过流保护	●	●	●	●	
负载监控	○	○	○	●	
可编程继电器输出	○	○	○	●	
MCR/HSIOC 保护	○	○	○	○	
电流不平衡保护			●	●	
漏电保护	○	○	○	○	
需用电流测量			●	●	
最大需用电流保护			●	●	
电压测量		○	○	●	可以和本公司 F 系列智能控制器配合使用或独立使用, 实现温度采集, 超温保护或报警输出, 数据远程等功能。
电压保护 (过压 / 欠压)			○	●	
电压不平衡保护			○	●	
功率 / 功率因数测量			○	●	
逆功率保护			○	●	
需用功率保护			○	●	
系统频率测量或保护		○	○	●	
谐波、波形测量			●	●	
检有压重合功能		○			
温度保护		○			
485 通信功能		○		●	
断路器触头磨损			●	●	
互感器断线自诊断	●	●	●	●	
磁通断线自诊断	●	●	●	●	

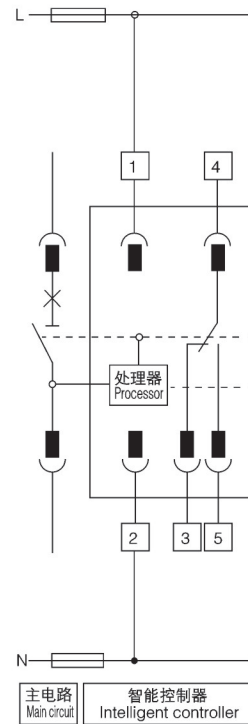
注: ● - 基本功能; ○ - 增选功能;

控制器选型功能表 Controller selection function list

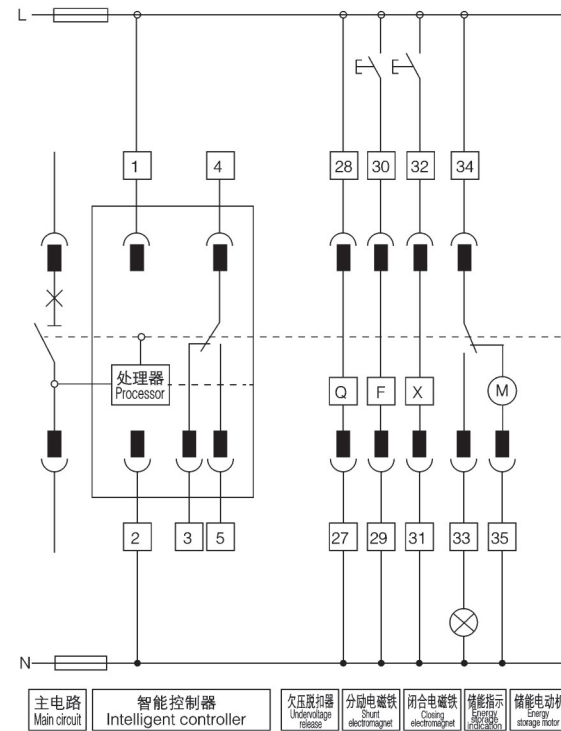
Type specification	M Type	F Type	3M Type	3H Type	Temperature controller
Panel feature	Nixie tube +LED + button	Liquid crystal display +LED + button	Liquid crystal display +LED + button	Liquid crystal display +LED + button	Nixie tube +LED + button
Basic protection (four-stage protection)	LSIG	LSIG	LSIG	LSIG	
Long delay protection curve selection	●	●	●	●	
Neutral line overcurrent protection	●	●	●	●	
Load monitoring	○	○	○	●	
Programmable relay output	○	○	○	●	
Protection for MCR/HSIOC	○	○	○	○	
Current imbalance protection			●	●	
Leakage protection	○	○	○	○	
It needs to be measured by electric current			●	●	
The maximum current protection is required			●	●	
Voltage measurement		○	○	●	Can cooperate with our company F Series intelligent controller Used in combination or independently Use to achieve temperature mining Set, overtemperature protection or alarm Alarm output, data remote And other functions.
Voltage protection (over/under voltage)			○	●	
Voltage unbalance protection			○	●	
Power/power factor measurement			○	●	
Reverse power protection			○	●	
Power protection is required			○	●	
System frequency measurement or protection		○	○	●	
Harmonics, waveform measurement			●	●	
The detection has the function of pressure coincidence		○			
Temperature protection		○			
485 Communication function		○		●	
Breaker contacts are worn			●	●	
Transformer broken line self-diagnosis	●	●	●	●	
Magnetic rupture self-diagnosis	●	●	●	●	

Note: ● - Basic function; ○ - co-option function;

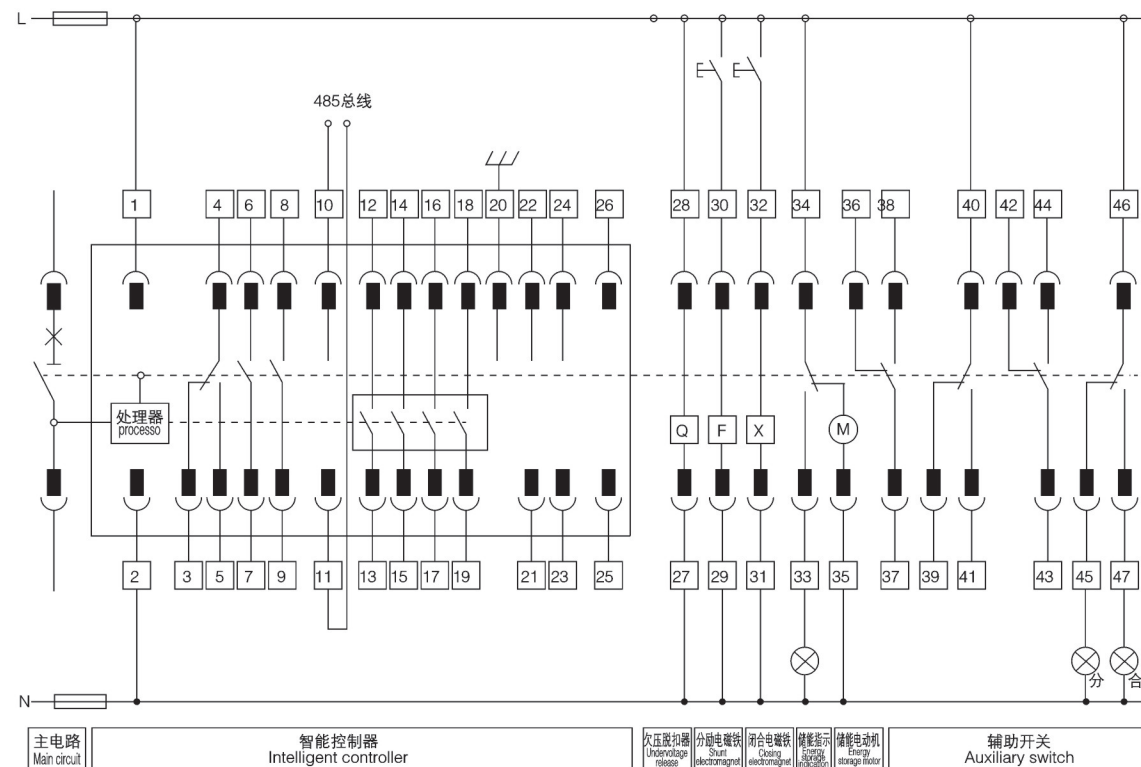
手动二次接线图 Manual secondary wiring diagram



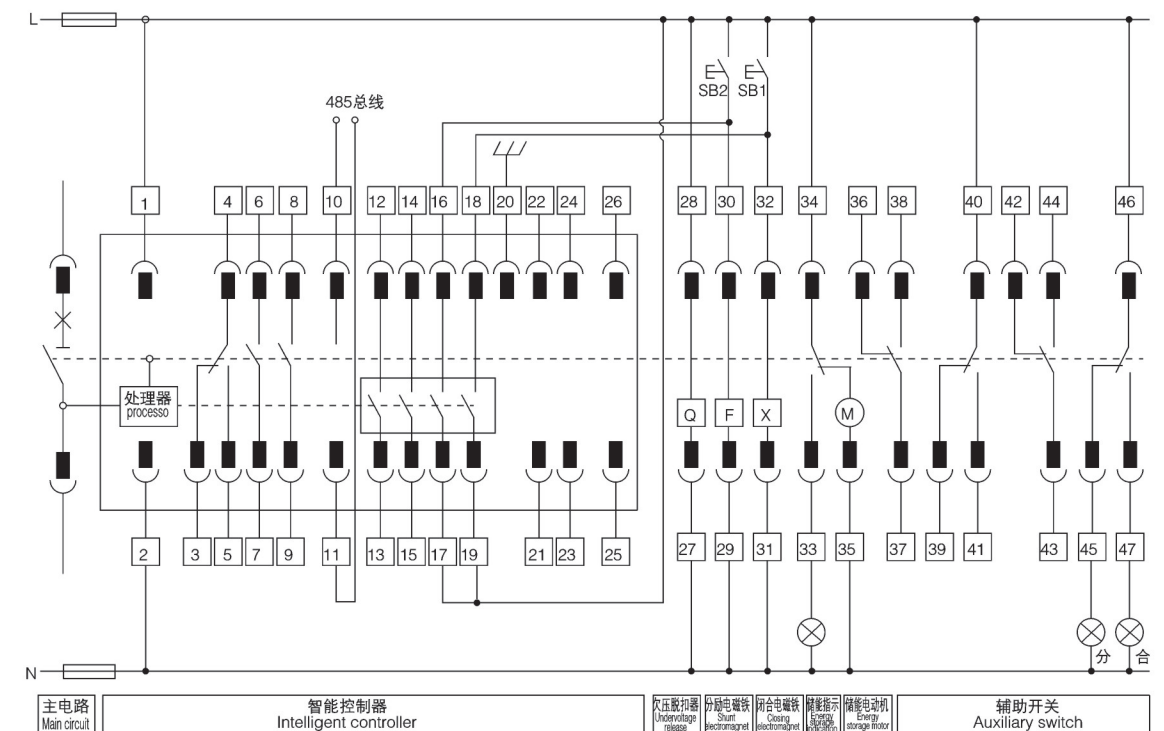
电动二次接线图 Electric secondary wiring diagram



全功能型二次接线图 Full-featured secondary wiring diagram



检有压重合闸二次接线图 Check voltage reclosing secondary wiring diagram



控制器端子定义说明 Controller terminal definition

序号 Serial number	线号 Wire number	功能说明 Function description	备注 Remark
1	1、2	辅助电源输入 Auxiliary power input	
2	3、4、5	故障跳闸触点输出 (4# 为公共端) Fault trip contact output (4# is the common end)	
3	6、7	断路器状态辅助触点 1 输出 Circuit breaker status auxiliary contact 1 Output	
4	8、9	断路器状态辅助触点 2 输出 Circuit breaker status auxiliary contact 2 output	
5	20	保护地 Protected area (PE)	M 型出厂默认 (序号 1-5) H 型出厂默认 (序号 1-11)
6	10、11	RS485 通讯接口引出线 A、B 端 RS485 communication port leads terminals A and B	M type factory default (serial number 1-5) H type factory default (serial number 1-11)
7	12、13	继电器 (D01) 触点输出 Relay (D01) contact output	
8	14、15	继电器 (D02) 触点输出 Relay (D02) contact output	
9	16、17	遥控分闸继电器触点输出 Remote control tripping relay contact Output (D03)	
10	18、19	遥控合闸继电器触点输出 Remote closing relay contact output (D04)	
11	21、22、23、24	电压测量输入: N、A、B、C Voltage measurement input: N, A, B, C	
12	25、26	3P+N 结构时连接中性线互感器; 漏电保护时连接漏电互感器 ZCT1 3P+N structure is connected to the neutral line transformer; Connect the leakage transformer ZCT1 for leakage protection	订货说明 Order specification

【使用提示】

Q- 欠压脱扣器 (使用时可串接“急停”按钮);
X- 闭合电磁铁 (使用时可串接常闭辅助触点);
SB2- 手动分闸按钮;
F- 分励脱扣器 (使用时可串接常开辅助触点);
M- 电动机;
SB1- 手动合闸按钮;

【 Use tips 】

Q- undervoltage release device (can be connected to the "emergency stop" button when in use);
X-closed electromagnet (normally closed auxiliary contact can be connected in series when in use);
SB2- manual switch button;
F-shunt trip device (normally open auxiliary contact can be connected in series when in use);
M- motor;
SB1- Manual closing button;

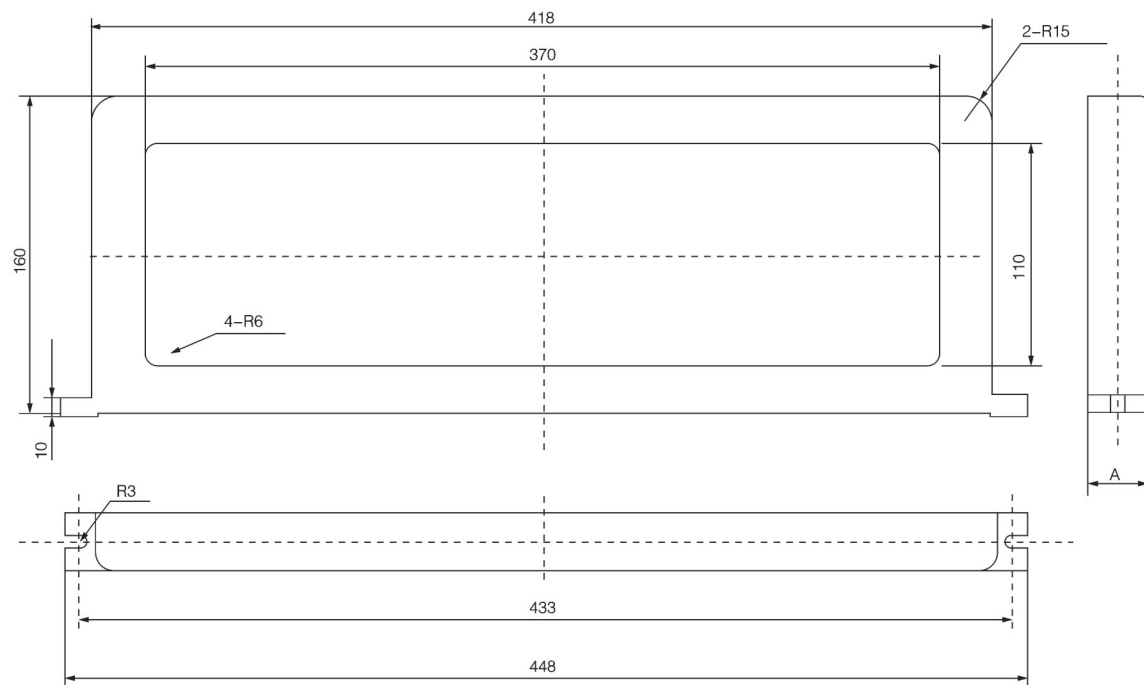
控制器的运行维护及注意事项如下： Precautions for operation and maintenance of the controller are as follows:

- 1、控制器应按本《使用说明书》的要求细心操作。
 - 2、与断路器装配后，正常运行中应封好防护罩，以防面板损坏。
 - 3、正常运行中应经常查看控制器的系统自诊断信息或报警信息，发现问题应及时分析处理。
 - 4、应定期检查各连接部位的紧固状况，如有松动应及时紧固。
 - 5、故障跳闸后，应仔细分析故障原因，故障排除后按下面板上的红色机械复位按钮方能再次投入使用。
1. The controller shall be operated carefully according to the requirements of this Manual.
 2. After assembling with the circuit breaker, the protective cover should be sealed during normal operation to prevent panel damage.
 - 3, the normal operation should often check the controller system self-diagnosis information or alarm information, found problems should be analyzed and processed in time.
 - 4, should regularly check the fastening of the connection parts, if loose should be tightened in time.
 5. After the fault trip, the cause of the fault should be carefully analyzed, and the red mechanical reset button on the panel can be put into use again after the fault is removed.

附件 Attachments

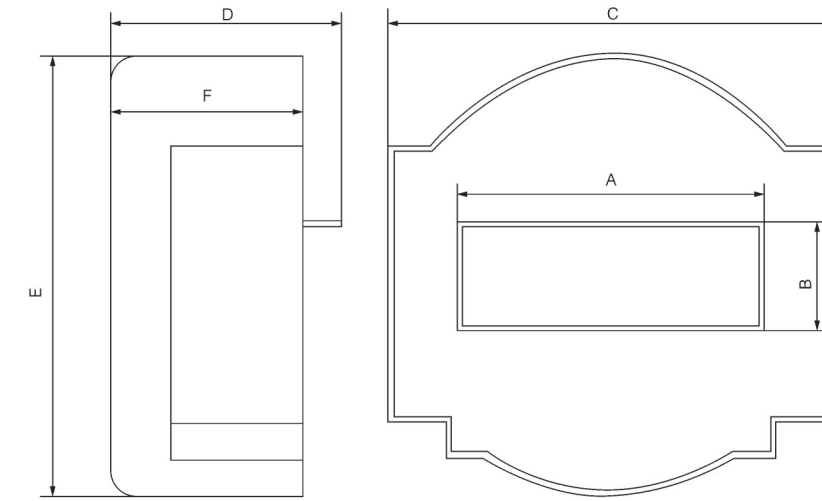
漏电互感器 Leakage transformer

当接地保护选择漏电型时，需外加漏电互感器（ZCT），其安装尺寸如图所示：
When the earth protection selects the leakage type, it is necessary to add the leakage transformer (ZCT), and its installation size is shown in the figure:



3P+N 配置的中性线互感器 3P+N Configured neutral line transformer

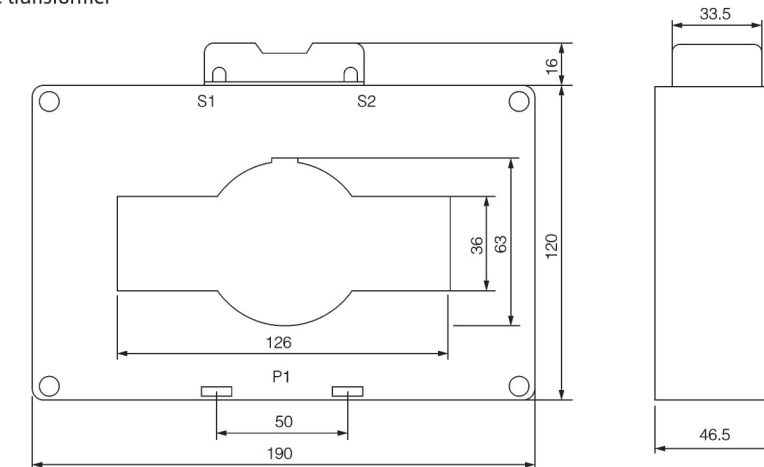
当控制器为 3P+N 时，外接中性线互感器安装外形尺寸见下图。
When the controller is 3P+N, the external neutral transformer installation dimensions are shown in the following figure.



标准型3P+N极互感器外形图
Standard 3P+N pole transformer appearance diagram

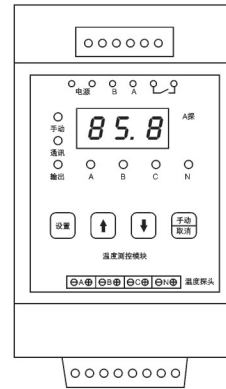
3P+N 时外接中性线互感器安装尺寸表 (尺寸单位 mm)	3P+N External neutral wire transformer installation size table (size unit mm)					
	A	B	C	D	E	F
框 I 互感器 Box I transformer	60	20	90	44	90	37
框 II & III 互感器 Box II & III transformer	90	30	108	44	105	37

特殊定制外置 N 极互感器
Special custom external N-pole transformer

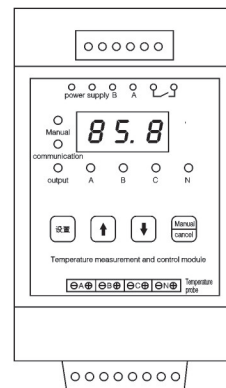


- 【提示】
- [1]、N 极互感器只有空心互感器，没有速饱和互感器；其与控制器间的接线长度 <10m。
 - [2]、如有其它尺寸需求，请与我公司联系。
- 【 Hint]
- [1] N pole transformer only hollow transformer, no speed saturation transformer; The cable length between the controller and the controller is less than 10m.
 - [2] If you have any other size requirements, please contact us.

温度保护模块 Temperature protection module



WK-200 产品外观图



WK-200
Product appearance
drawing

WK-200 型温度采集模块,是我公司新研发用于断路器温度测量控制的模块,其特点如下:

- 1、可以和本公司系列智能控制器配合使用或独立使用,实现温度采集,超温保护或报警输出,数据远程等功能。
- 2、配合温度传感器最多采集 4 路母排温度(配套 3 极或 4 极开关)。
- 3、配备 1 路 RS485(采用 MODBUS 协议) 接口,可以与本公司控制器或和其它设备实现数据通信功能。
- 4、本模块可独立设置温度保护参数,配备 1 路继电器输出触点;根据用户需求可用于过温报警 / 启动降温 / 超温分闸等功能。

【提示】

- [1]、N 极互感器只有空心互感器,没有速饱和互感器;其与控制器间的接线长度 <10m。
- [2]、如有其它尺寸需求,请与我公司联系。

WK-200 temperature acquisition module is a newly developed module for circuit breaker temperature measurement and control. Its characteristics are as follows:

- 1, can be used with the company's series of intelligent controller or independent use, to achieve temperature collection, overtemperature protection or alarm output, data remote and other functions.
2. With the temperature sensor, the temperature of up to 4 busbars can be collected (with 3-pole or 4-pole switch).
- 3, equipped with one RS485(using MODBUS protocol) interface, you can achieve data communication with the company's controller or other equipment.
- 4, this module can set temperature protection parameters independently, equipped with 1 relay output contact; According to user requirements can be used for over-temperature alarm/start cooling/over-temperature switch and other functions.

【 Hint 】

- [1] N pole transformer only hollow transformer, no speed saturation transformer; The cable length between the controller and the controller is less than 10m.
- [2] If you have any other size requirements, please contact us.

产品参数 Product parameter

- 1、工作电源 :AC220V 或 DC24V, ≤ 2W, 误差 ±20%(订货时说明)
- 2、输入规格 :1~4 个温度探头 (订货时说明)
- 3、继电器容量 :AC250V/10A 或 DC30V/10A
- 4、测量范围 :0~200°C, 误差 ±1%
- 5、通信 :一路 RS485 通信 (支持 Modbus 通信协议)
- 6、外形尺寸 :L102xW55xH45mm

- 1, working power supply :AC220V or DC24V, ≤ 2W, error ±20%(instructions when ordering)
- 2, input specifications :1~4 temperature probes (instructions when ordering)
- 3, relay capacity :AC250V/10A or DC30V/10A
- 4, measuring range :0~200°C , error ±1%
- 5, communication: one RS485 communication (support Modbus communication protocol)
- 6, overall size :L102xW55xH45mm

设置参数 Set parameters

序号 Serial number	项目 item	设置范围 Set range	初值 Initial value	备注说明 remarks
1	温度保护启动值 Temperature protection start value	10°C ~160°C	150°C	当前温度大于启动值,控制输出 If the current temperature is higher than the start value, control the output
2	温度保护返回值 Temperature protection Returned value	9C~159C	145°C	当前温度小于返回值,输出停止 If the current temperature is lower than the returned value, the output stops
3	通信地址 Correspondence address	1~255	1	
4	通信波特率 Communication baud rate	/	9.6 k	1.2k,2.4k,4.8k,9.6k,19.2k

温度保护模块 Temperature protection module

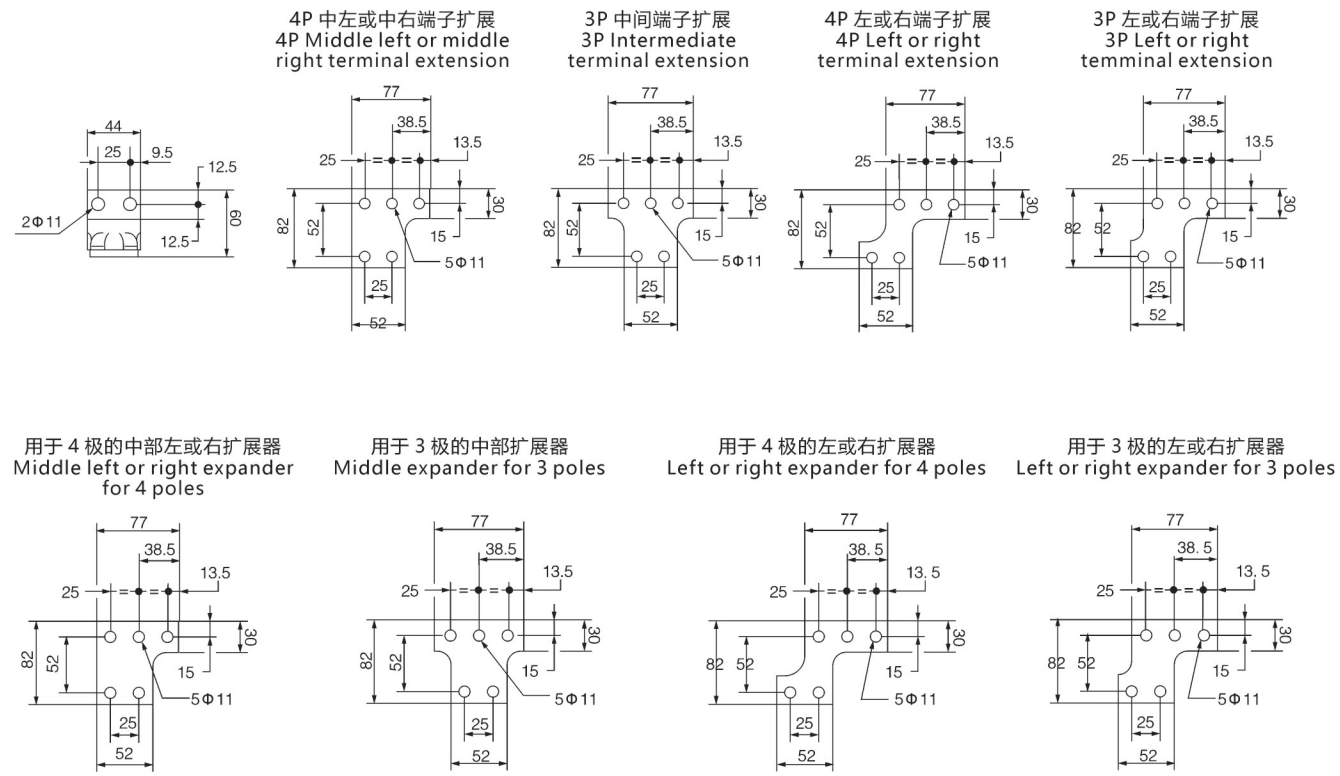
操作说明 Operation instruction

- 1、温度查询:开机后主界面显示当前 TA,TB,TC,TN 最大温度值,按【上】或【下】键循环切换显示 TA,TB,TC,TN 温度值。
- 2、参数修改:点按【设置】键,进入参数设置;数码管闪亮,A 常亮,表示此时处于参数设置状态。按【上】或【下】键修改当前参数,点按【设置】键保存当前参数并切换到下一个参数。
提示:点按【设置】时 A,B,C,N 循环点亮,A 表示启动值,B 表示返回值,C 表示通信地址,N 表示通信波特率);点按【手动/取消】键,取消当前设置值,并退出设置状态。
- 3、继电器手动输出:在主界面,点按【手动/取消】键,切换手动/自动继电器输出;【手动】、【输出】灯点亮为手动输出模式;【手动】灯熄灭,为自动工作模式,根据模块设定温度参数自动控制输出,有【输出】时该灯点亮。
- 4、温度传感器断线检测:当某相温度传感器断线或未接时,查询该相温度时显示【---】,请及时排除异常。

1. Temperature query: The main screen displays the current maximum temperature of TA,TB,TC,TN. Press [up] or [Down] to switch the temperature of TA,TB,TC,TN.
2. Parameter modification: click [Setting] to enter parameter setting; If the digital tube is blinking and A is steady on, it indicates that the parameters are being set. Press [Up] or [Down] to modify the current parameter. Click [Settings] to save the current parameter and switch to the next parameter.
Tip: Click [Settings] when A,B,C,N cycle light,A represents the start value,B represents the return value,C represents the communication address,N represents the communication baud rate); Click the [Manual/Cancel] key to cancel the current setting and exit the setting state.
- 3, relay manual output: in the main interface, click [manual/cancel] key to switch manual/automatic relay output; [Manual] , [Output] light is lit to manual output mode; [Manual] When the lamp is off, it is in automatic working mode, and the output is automatically controlled according to the temperature parameter set by the module. When there is [output], the lamp is on.
4. Temperature sensor disconnected detection: When a phase temperature sensor is disconnected or not connected, [-] is displayed when querying the phase temperature, please remove the exception in time.

转接排尺寸 (选配) Adapter bar Size (optional)

单位 size: mm



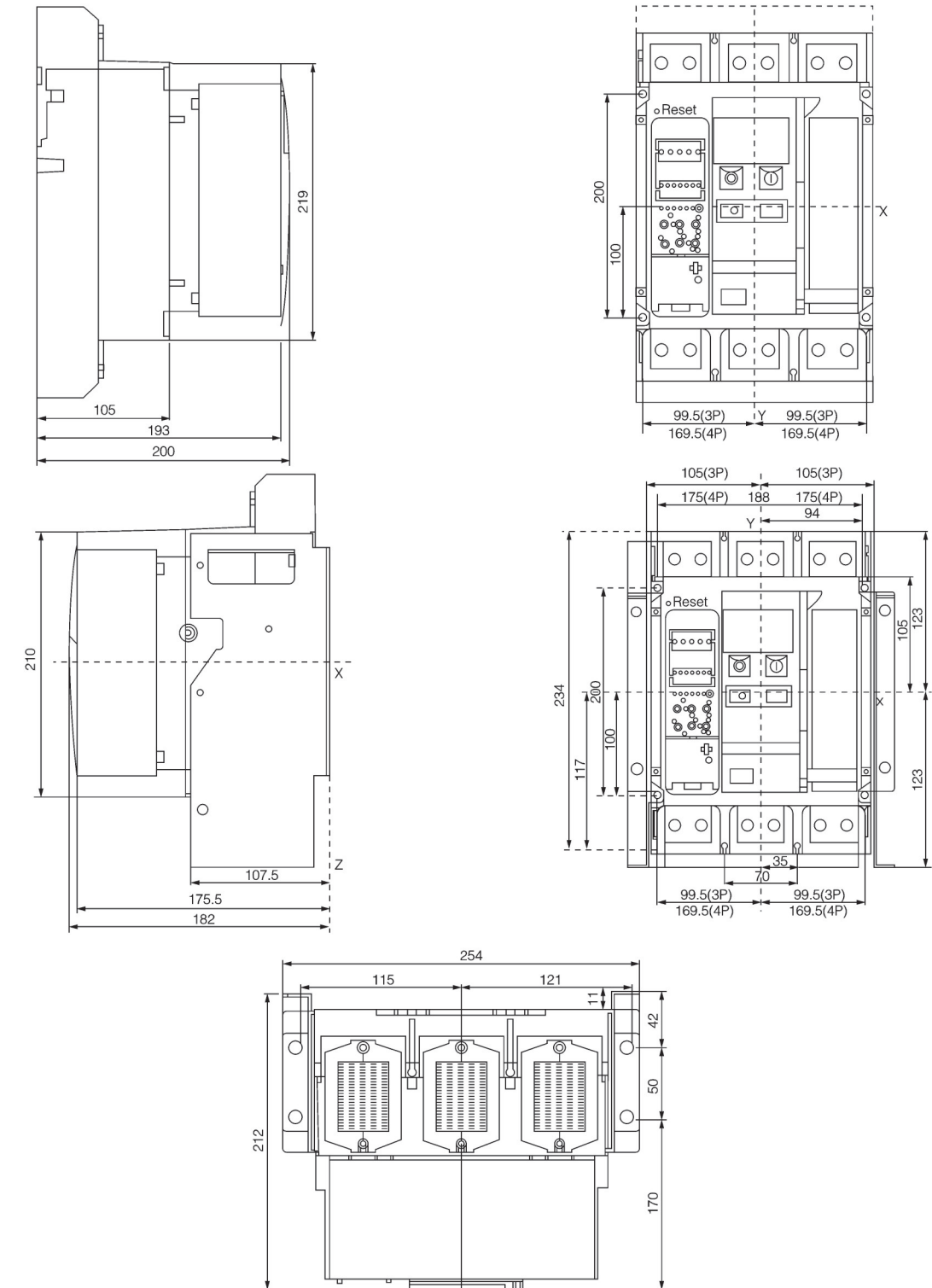
A 74A

外接铜牌建议尺寸及数量 Recommended size and quantity of external bronze plate

型号 Model number	最大工作电流 Maximum working current	T:40°C母排片数 Number of busbars		T:50°C母排片数 Number of busbars		T:60°C母排片数 Number of busbars	
		5mm 厚度 thickness	10mm 厚度 thickness	5mm 厚度 thickness	10mm 厚度 thickness	5mm 厚度 thickness	10mm 厚度 thickness
NLW1-800A	800	2b.50×5	1b.50×10	2b.50×5	1b.50×10	2b.50×5	1b.50×10
NLW1-1000~1250A	1000~1250	3b.50×5	1b.50×10	3b.50×5	2b.50×10	3b.50×5	2b.50×10
NLW1-1600A	1600	3b.50×5	2b.40×10	3b.50×5	2b.50×10	4b.50×5	2b.50×10

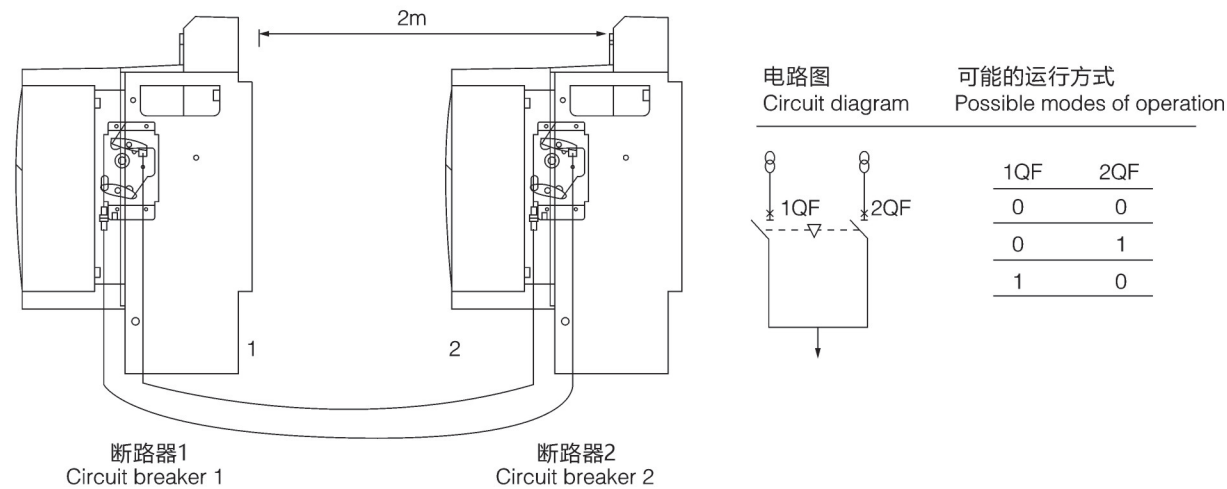
框塑一体断路器安装尺寸 Installation dimensions of the frame-plastic integrated circuit breaker

单位 size: mm



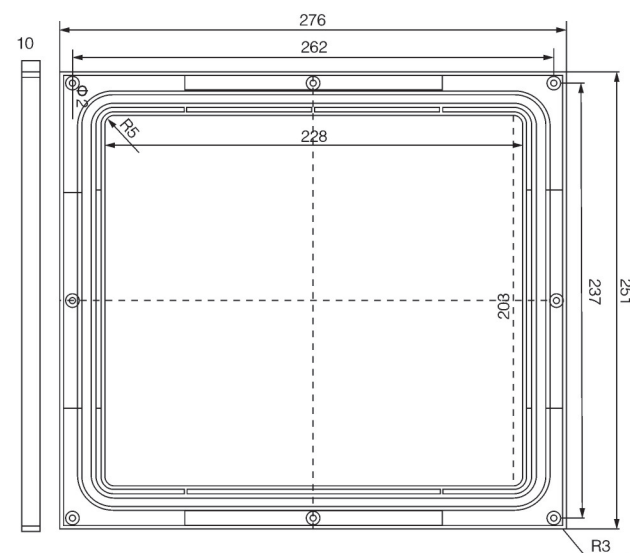
框塑一体断路器安装尺寸 Installation dimensions of the frame-plastic integrated circuit breaker

两台平放或叠装断路器的钢缆联锁 Interlocking of two flat or stacked circuit breakers



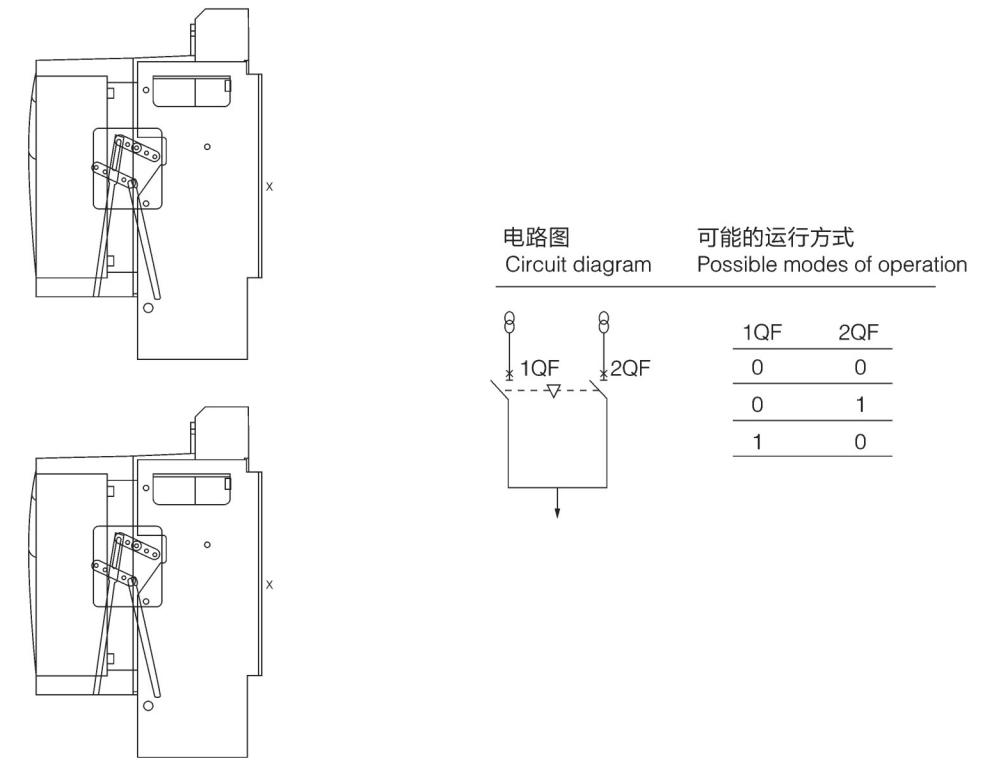
注：钢缆联锁的钢缆长度常规为 2.5m，也可提供 1.5m 钢缆，但用户订货时需注明。
Note: The cable length of interlocking steel cable is generally 2.5m, and 1.5m steel cable can also be provided, but the user needs to indicate when ordering.

门框尺寸 Door frame size



框塑一体断路器安装尺寸 Installation dimensions of the frame-plastic integrated circuit breaker

两台叠装断路器的联杆联锁 Two bar interlocks for stacked circuit breakers



“分闸”锁定装置 "Break" locking device

“分闸”锁定装置可将断路器的断开按钮锁定在按下位置上，此时断路器将不能闭合。
用户选装后，工厂提供锁和钥匙；三台断路器配三把相同的锁和二把钥匙
The "off" lock device locks the off button of the circuit breaker in the pressed position, at which time the circuit breaker will not close.
After the user chooses the installation, the factory provides the lock and key; Three circuit breakers with three identical locks and two keys



选装时，厂家会安装断路器上。
When optional, the manufacturer will install the circuit breaker.

选装时（锁要用户自备）锁损坏时，用户可自行更换。
Optional (lock should be brought by the user)
When the lock is damaged, the user can replace it by himself.



订货规范				(请用户根据需要在口内打√)	
用户单位		订货台数		订货日期 /	
型号规格	NLW1-1600H	极数	<input type="checkbox"/> 3P <input type="checkbox"/> 4P	安装方式	<input type="checkbox"/> 固定式 <input type="checkbox"/> 固定式 (带安装支架)
额定工作电压		<input type="checkbox"/> AC400V <input type="checkbox"/> AC800V	额定电流 In= A		
智能型 控制器	类型	<input type="checkbox"/> M <input type="checkbox"/> 3M <input type="checkbox"/> 3H <input type="checkbox"/> F(检有压重合闸)			
	基本功能	<input type="checkbox"/> 过载长延时保护 <input type="checkbox"/> 短路延时保护 <input type="checkbox"/> 短路瞬时保护 <input type="checkbox"/> 接地或漏电保护 <input type="checkbox"/> 故障记忆功能 <input type="checkbox"/> 试验功能			
	增选功能	<input type="checkbox"/> 电流表功能 <input type="checkbox"/> 热模拟功能 <input type="checkbox"/> 通讯功能 <input type="checkbox"/> 负载监控功能 <input type="checkbox"/> MCR 功能 <input type="checkbox"/> 区域锁功能 <input type="checkbox"/> 自诊断功能			
	接地方式	<input type="checkbox"/> 3PT <input type="checkbox"/> 4PT <input type="checkbox"/> (3P+N)T 需外接互感器★			
	控制器电源	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
标准 附件	分励脱扣器	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
	合闸电磁铁	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
	电动操作机构	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
	辅助开关	<input type="checkbox"/> 标准型			
可 增 选 附 件	欠电压脱扣器	<input type="checkbox"/> AC400V <input type="checkbox"/> 欠电压瞬时脱扣器			
		<input type="checkbox"/> AC230V <input type="checkbox"/> 欠电压延时脱扣器 <input type="checkbox"/> 1s <input type="checkbox"/> 2s <input type="checkbox"/> 3s			
	断开位置锁定	<input type="checkbox"/> 一锁一钥匙 (厂家安装好) <input type="checkbox"/> 二锁一钥匙 (厂家安装好) <input type="checkbox"/> 三锁二钥匙 (厂家安装好) <input type="checkbox"/> 一锁一钥匙 (自备) <input type="checkbox"/> 二锁一钥匙 (自备) <input type="checkbox"/> 三锁二钥匙 (自备)			
	机械联锁	<input type="checkbox"/> 钢缆绳联锁 (二台) <input type="checkbox"/> 杠杆联锁二台开关			
其他附件	<input type="checkbox"/> 扩展排		<input type="checkbox"/> 其他		

备注：如用户订货还有其它特殊要求，请与厂家协商。

Order specification				(Please make a √ in your mouth if necessary)	
User unit		Number of units ordered		Order date /	
Type specification	NLW1-1600H	Number of poles	<input type="checkbox"/> 3P <input type="checkbox"/> 4P	Installation mode	<input type="checkbox"/> Fixed <input type="checkbox"/> Fixed (with mounting bracket)
Rated operating voltage		<input type="checkbox"/> AC400V <input type="checkbox"/> AC800V	Rated current In= A		
Intelligent controller	Type	<input type="checkbox"/> M <input type="checkbox"/> 3M <input type="checkbox"/> 3H <input type="checkbox"/> F(pressure reclosing)			
	Basic function	<input type="checkbox"/> Overload long delay protection <input type="checkbox"/> Short circuit delay protection <input type="checkbox"/> Short circuit instantaneous protection <input type="checkbox"/> Grounding or leakage protection <input type="checkbox"/> Fault memory function <input type="checkbox"/> Test function			
	Co-option function	<input type="checkbox"/> Ammeter function <input type="checkbox"/> Thermal simulation function <input type="checkbox"/> Communication function <input type="checkbox"/> Load monitoring <input type="checkbox"/> MCR function <input type="checkbox"/> Area lock function <input type="checkbox"/> Self-diagnosis function			
	Grounding mode	<input type="checkbox"/> 3PT <input type="checkbox"/> 4PT <input type="checkbox"/> (3P+N)T Need external transformer ★			
	Controller power supply	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
Standard accessories	Shunt release	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
	Closing electromagnet	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
	Electric operating mechanism	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V			
	Auxiliary switch	<input type="checkbox"/> Normal form			
Accessories can be co- opted	Undervoltage release	<input type="checkbox"/> AC400V <input type="checkbox"/> Undervoltage transient trip device			
		<input type="checkbox"/> AC230V <input type="checkbox"/> Undervoltage delay release <input type="checkbox"/> 1s <input type="checkbox"/> 2s <input type="checkbox"/> 3s			
	Break position lock	<input type="checkbox"/> One lock one key (manufacturer installed) <input type="checkbox"/> One lock and one key (own)		<input type="checkbox"/> Two locks and one key (manufacturer installed) <input type="checkbox"/> Two locks and one key (brought by oneself)	
	Mechanical interlocking	<input type="checkbox"/> Steel cable interlock (two sets) <input type="checkbox"/> Lever interlock two switches			
Other accessories	<input type="checkbox"/> Expansion row		<input type="checkbox"/> Other		

Note: If the customer has other special requirements, please negotiate with the manufacturer.