UL498B/UL489

Disconnect Switch

NDW3AGZ-2500 series

Product Overview

Table 1 Table of Technical Parameters

Disconnecting switch model			NDW3AGZ-2500
Rated current Ie (A)			1600, 2000, 2500
Rated nominal voltage Ue		(Vdc)	1250
Rated maximum voltage Ue		(Vdc)	1500
Number of poles		(poles)	4P
Closing time		(ms)	＜85
Full break time		(ms)	＜40
Rated short circuit making capacity Icm (peak value) kA		DC1500V	125
Rated short-time withstand current Icw (effective value) 50ms kA		DC1500V	125
Operating performance (Number of times)	Operation frequency of electrical life (60 times/h)	DC1500V	1000
	Operation frequency of mechanical life (60 times/h)	Maintenance-free	10000
Installation type		Fixed type	▲
Wiring method of the main circuit		Fixed type	Horizontal wiring, vertical wiring
Boundary dimension: W×D×H (mm)		Fixed type 4P	463×309.5×394
Enclosure dimension: W×D×H (mm)		Fixed type 4P	583×282×464
Weight (kg)		Fixed type 4P	73.5
Applicable standards			UL489B/UL489
Note: ▲ represents this function is available			

Field of Application

2.1 Working Environment

Ambient temperature

Applicable ambient temperature is -40℃ ~ + 70℃, the average within 24 h shall not be more than +35℃.

In case the temperature is above +50℃, the user shall reduce the capacity according to Table 3.

Table 2 Table of Working Environmental Parameters

Environmental requirements	Description of the specific parameters
Operating ambient temperature	The operating ambient temperature is -40℃~+ 70℃; the average within 24 h shall not be more than +35℃. If the ambient temperature is higher than +50℃, the user needs to reduce the capacity. (For details, see Table 3)
Altitude	The altitude of the installation site doesn't exceed 2,000m. For use with the altitude above 2, 000m, it is necessary to correct the working performance, including power frequency withstand voltage and rated current. (For details, see Table 4)
Pollution degree	Pollution level: Level 3
Wet heat resistance	The relative air humidity at a maximum temperature of +40℃ should not exceed 50%. A higher humidity is allowed at a lower temperature, but special measures should be taken to address occasional condensing due to temperature fluctuation.
Storage conditions	The air temperature is -40℃~+70℃.
Storage period and conditions	The relative air humidity at a maximum temperature of +40℃ should not exceed 50%, and the product can be stored for 1 year without unpacking. The product can be stored for 3 months under the condition of packaging. For continuous use, the surface shall be subjected to dust and moisture removal, and measure the loop resistance less than 45μΩ.
Installation condition	With the vertical gradient no more than 5°, the disconnecting switch shall be installed in places without explosion danger, conductive dust or the possibility of corroding metal and damaging the insulation.

Derating factor

Table 3

Ambient temperature	+40℃	+45℃	+50℃	+60℃	+70℃
Rated current (Ie=2500A vertical short connection)	1.0Ie	1.0Ie	1.0Ie	0.92Ie	0.84Ie
Rated current (Ie=1600A～2000A horizontal short connection)	1.0Ie	1.0Ie	1.0Ie	0.95Ie	0.85Ie

Note: 1. The vertical and horizontal short-connected load sides are connected to the 4m row for simulating the actual installation;

2. Verify the temperature rise according to UL489B/UL489 and refer to Table 3 for the temperature higher than +50℃ and horizontal short-connected derating factor;

Altitude

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

If the altitude of the installation site is between 2,000 m to 5000m, it can be specially customized. For the working performance, refer to the correction value in the following table (Table 4).

Table 4

Altitude (m)	2000	3000	4000	5000
Impulse withstand voltage Uimp (kV)	12	12	12	12
Rated insulation voltage Ui (V/DC)	1500	1500	1500	1500
Rated working voltage (V)	1500	1500	1500	1500
Power frequency withstand voltage (V)	4000	4000	4000	3000
Rated current	1.0Ie	0.93Ie	0.88Ie	0.82Ie

Note: The above data is calculated according to the test and theory. The data represent only guidelines and recommendations.

2.2 Anti-corrosion Level

Salt spray level: GB/T 2423.18 severity class (2)

2.3 Pollution Level

Pollution level: Level 3

The disconnecting switch can be operated in the industrial environment specified in IEC 60664-1. However, we still recommended that it shall be installed in a switchgear with suitable temperature and no excessive dust pollution.

2.4 Shockproof Requirement

The disconnecting switch can ensure resistance to electromagnetic or mechanical shock, and has passed the IEC 60721-3-3 standard test; amplitude: ±1mm (2 -9Hz);

Constant acceleration: 5m/s2 (9-200Hz);

Super strong shock may result in part damage, and impact the reliable action of the disconnecting switch.

2.5 Electromagnetic Interference

The disconnecting switch can resist the following electromagnetic interference

- Overvoltage caused by electromagnetic interference;
- Overvoltage due to aging of the distribution system or environmental interference;
- Radio wave;
- Electrostatic discharge.

The disconnecting switch has passed the electromagnetic compatibility (EMC) test stipulated by following standards

- GB/T 14048.3-2017;

The above tests can ensure that the disconnecting switch won't wrongly occur tripping.

2.6 Installation Category

The installation category of the disconnecting switch's main circuit and power transformer primary coil is IV; the rest auxiliary circuit and control circuit installation category is III.

2.7 Protection Class

IP30.

2.8 Reference Specifications of Disconnecting Switch's Main Circuit Copper Bar (Table5).

Table 5

	Rated current Ie (A) +40℃, +50℃	Copper bar specification	
		Dimensions	Number
Rated current of frame	1600	80mm×6mm	2
		76.2mm×6.4mm（inches：3×1/4）	2
	2000	80mm×5mm	3
		102mm×6.4mm（inches：4×1/4）	2
	2500	80mm×5mm	4
		127mm×6.4mm（inches：5×1/4）	2

Note: 1. The table indicates the copper bar specifications adopted when the disconnecting switch is under the ambient temperature of 50℃ and the open wide installation under the heating condition meets the stipulation in UL489B/UL489. If the temperature is higher than 50℃, the quantity of copper bar should be increased, or the capacity should be reduced according to Table 3.

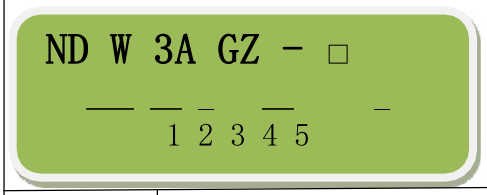
2. The above data is calculated according to the test and theory, and for reference only.

3.The maximum permissible temperature of the copper bar (at the center of the mounting hole) is no more than +115℃.

4. The electrical gap of copper bar is ≥15mm with the altitude more than 5, 000m and relative humidity more than 90%; the electrical gap shall be adjusted according to the relevant standards.

5. When the customer is in horizontal connection, the adapter bar with suitable size shall be added if the width of connected copper bar is greater than 80mm.

Specifications and Models Description



SN	SN name	
1	Enterprise code	ND-Nader 良信电器
2	Product code	W - Universal
3	Design code	3A
4	Derived code	G - Disconnecting switch Z - DC
5	Shell frame level current	2500

Notes: For details of the product ordering models and specifications, see the ordering type selection specification.

Accessories

3.1 Electrical Control Accessories

Fig. 1

●Closed electromagnet, (see Figure 1)

Closed electromagnet is mainly composed of coil, iron core component and electronic parts. In the condition of mechanism energy storage, as long as the closed electromagnet is energized, the disconnecting switch can be closed.

◆ Action features of the closed electromagnet.

1) When the power supply voltage of the closed electromagnet maintains at 85%~120% of the rated control supply voltage Us, operation of the closed electromagnet can make reliable closing of the disconnecting switch;

2) Closed electromagnet is the short-time duty-type. Disconnect the power supply for 1 minute before the next trigger;

3) Each power-on trigger time: 3s>t>200ms;

4) It can be energized for 3s at 1.4Us.

5) Without the overvoltage protection, 1.4Us beyond the limit, long-termenergization will burn.

Instantaneous power is shown in Table 6.

Table 6

Rated insulation voltage (Ui)	Rated control supply voltage (Us)	Instantaneous power
		NDW3AGZ-2500
AC400V	AC230V/DC230V 50/60Hz	500VA/500W

● Shunt release (see Table 2)

Shunt release is mainly composed of coil, iron core component and electronic parts, which can make the disconnecting switch disconnect by remote operation.

Fig. 2

◆ Action features of the shunt release

1) When the power supply voltage of the shunt release maintains at 70%~110% of the rated control supply voltage Us, operation of the shunt release can make the disconnecting switch disconnect;

2) The shunt release can be energized for a long time and maintained under power supply. When the working voltage maintains/locks at 85%~110% of the rated control supply voltage Us, the disconnecting switch maintains in the disconnected position and fails to perform on/off operation.

3) It can be energized for 3s at 1.4Us. Instantaneous power is shown in Table 7.

Table 7

Rated insulation voltage (Ui)	Rated control supply voltage (Us)	Instantaneous power	Off time	Holding current (holding type)	Holding power (holding type)
		NDW3AGZ-2500			
AC400V	AC/DC230V 50/60Hz	＜500VA/W	＜60ms	＜30mA	＜7VA/W

● Motor operating mechanism (see Figure 3)

The disconnecting switch can only be closed after the motor operating mechanism make the disconnecting switch to store energy in advance.

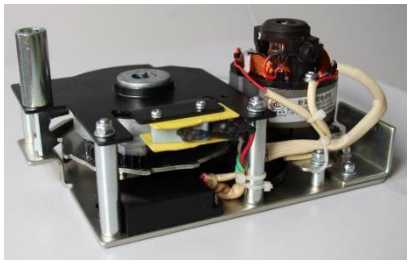


Fig. 3

◆ Operation features

1) If the rated supply voltage of the motor operating mechanism is between 85%~120%, energy storage of the circuit breaker can be made in place.

2) The motor will close the power supply automatically and stop operation after it stores energy in place.

3) The motor operating mechanism can realize the automatic pre-energy storing.

4) Each power-on trigger time: t>7s, long-term energization is allowed for the secondary circuit input terminal.

5) Without the overvoltage protection, 1.4Us beyond the limit, long-term energization will burn. It is allowed to energize for 1s at 1.4Us during operation.

Operating power is shown in Table 8.

Table 8

Rated insulation voltage (Ui)	Energy storage time	Rated control supply voltage (Us)	Operating power consumption	Running current	Starting current maximum peak
			NDW3AGZ-2500		
AC400V	3s~5s	AC230V/DC230V 50/60Hz	165VA/165W	0.75A	6.5A/4.5A

●Undervoltage release (loss of voltage protection), loss of voltage release for short (see Fig. 4)

Fig. 4

◆ Action features of the loss of voltage release

1） When the applied voltage suddenly drops to 0~30% of the rated working voltage, the loss of voltage release will work to disconnect the circuit breaker;

2） When the applied voltage is less than 30% of the rated operational voltage of the loss of voltage release, the loss of voltage release will make the circuit breaker cannot be closed;

3） When the applied voltage is 85%~120% of the rated working voltage of the loss of voltage release, the loss of voltage release

can guarantee reliable closing of the circuit breaker.

4) Without the overvoltage protection, 3.4Us beyond the limit, long-term energization will burn. It is allowed to energize for 1s at 1.4Us during operation.

5) Loss of voltage release is the short-time duty-type, which will not work without the power supply input.

◆ The loss of voltage release can be divided into instantaneous release and delayed release, which is mainly composed of coil, iron core component and electronic parts.

◆ Loss of voltage delayed release

The loss of voltage delayed release sets the delay time of the release action through toggling the toggle switch on the loss of voltage delayed device. The delay time is set as 0s, 1s, 3s and 5s as required and the action time accuracy of the delay time is +10%.

◆ See the table below for the power consumption of loss of voltage release.

Power Consumption Table of Loss of Voltage Release

Rated insulation voltage (Ui)	Frequency (f)	Rated operational voltage (Ue)	Operating power
400V	50Hz/60Hz	AC /DC230V	14W

3.2 Signal Output Accessories

● Auxiliary switch (Figure 5)

Fig. 5

◆ The conventional thermal current of the auxiliary switch is 5A;

◆ Auxiliary contact form: Four normally opened and four normally closed, six normally opened and six normally closed;

◆ See Table 9 for technical parameters of auxiliary contact.

Table 9

Applicable shell frame		NDW3AGZ-2500
Auxiliary contact form		Four normally opened and four normally closed, six normally opened and six normally closed
Agreed thermal current Ith		5A
Minimum load		2mA/DC15V (terminal numbers: 59, 60, 61, 62)
Breaking capacity	DC-12	5A/250V
	AC-12	5A/230V

● Secondary wiring terminal (Fig. 6);

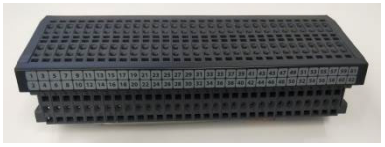


Fig. 6

◆ For the number of secondary wiring terminal, there is a total of 62 groups;

◆ See Table 10 below for parameters of the secondary wiring terminal.

Table 10

Item	Parameter
Connection mode	Clamping
Flame retardant rating, according to UL 94	V0
Pollution level	3
Voltage category	III
Material group	IIIa
Applicable connection standards	UL1059
Maximum load current	5A
Rated current	5A~
Rated voltage	500V
Minimum cross section area of the rigid (flexible) conductor	20AWG

Maximum cross section area of the rigid (flexible) conductor	16AWG
Recommended striping length	10mm±1mm

3.3 Mechanical accessories

●Button lock (see Fig. 7)

To be used with a padlock, it is used to prevent non-staff from illegally operating the opening/closing button (padlock should be prepared by users).

Fig. 7

●Safety lock (see Fig. 8)

To be used with a padlock, it is used to prevent non-staff from illegally operating the opening/closing button (padlock should be prepared by users). After padlock is installed for the safety lock, the product may be locked at the closing state, in which case, the product cannot be switched on. 1-3 padlocks with a diameter of 5mm or 1-2 padlocks with a diameter of 6mm may be installed. The product can only be switched on when all the padlocks have been taken down.

Fig. 8

● Door frame (see Fig. 9)

It is mainly placed on the door of the cubicle for sealing effect, and can make the protection level of the disconnecting switch reaches IP40. It is beautiful and practical.

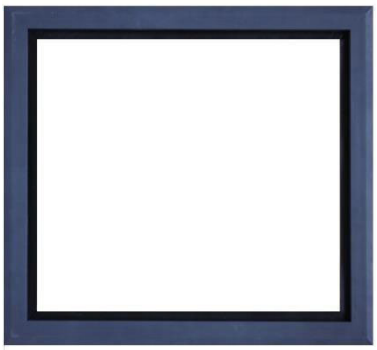


Fig. 9

● Dust cover (see Fig. 10)

Installed on the beam of the wiring terminal, it can prevent dust and other debris falling into the terminal of the wiring terminal, leading to poor contact. It is an optional accessory.

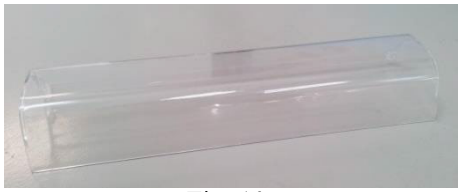
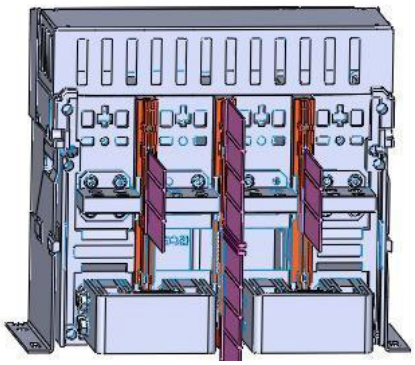
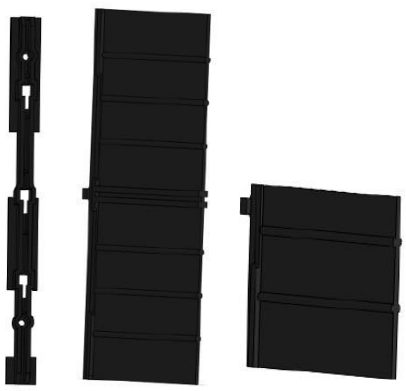


Fig. 10

● Phase partition (see Fig. 11)

It is installed in the groove between the phase bus bars, used to increase the insulation strength between phase to phase of the main circuit and improve the insulation performance. The partition has two types, i.e. conventional and extended. For the location of installation, see Fig. 11 and Fig. 12.





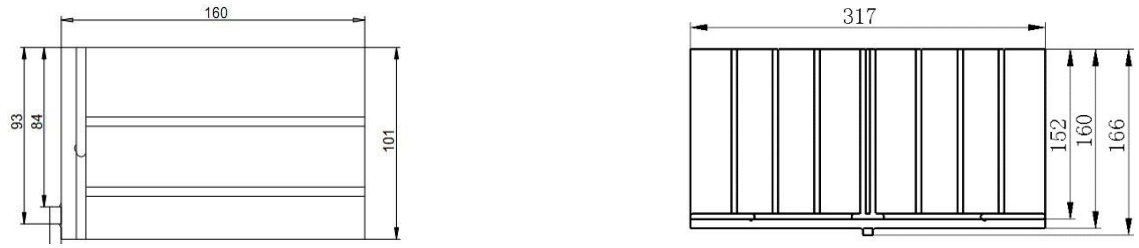


Fig. 11 (conventional partition)

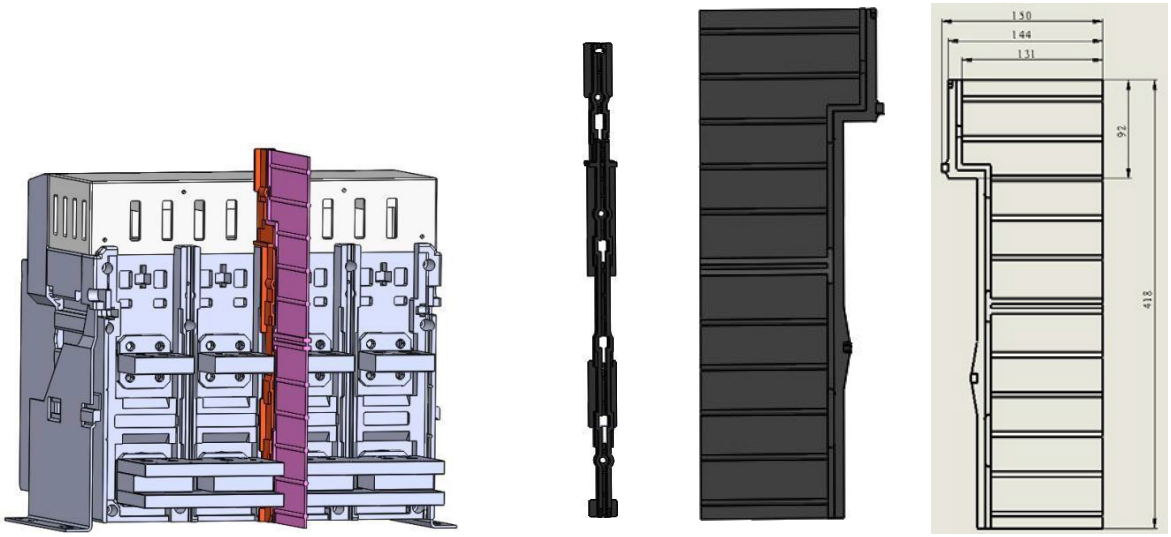


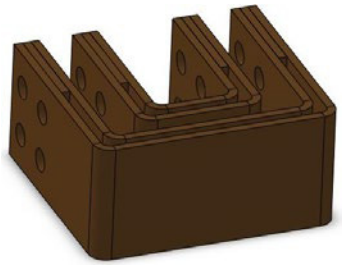
Fig. 12 (extended partition)

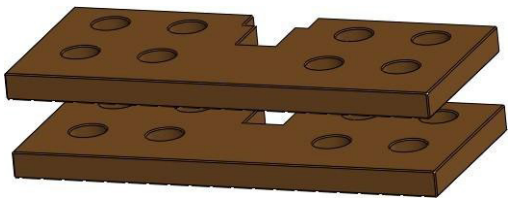
Note: Extension support and partition shall be installed by customers.

3.4 Short-connected bus

The short-connected busbar is optional. See Table 12 below for the configuration of the busbar in series.

Table 12

Rated current	Busbar in series
2500A	

1600A, 2000A	

Note: 1. Both vertical and horizontal short bus bars are available. They will leave the factory after installation if no special requirement has been specified by the customer.

2. The short bus bar provided by the customer itself should have the same size as that designed by our company. For the size of the horizontal short bus bar, see Fig. 13:

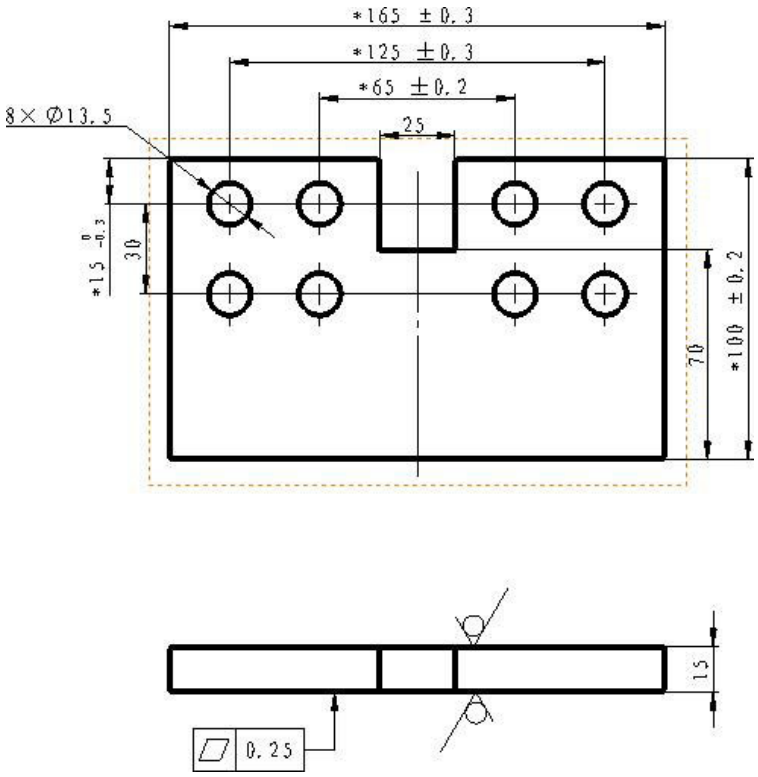
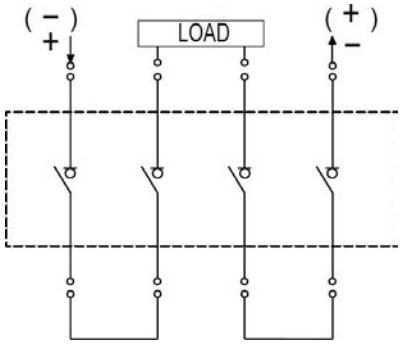


Fig. 13

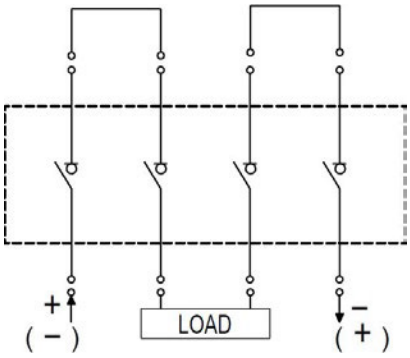
Wiring Mode, Outline and Installation Dimensions

4.1 Wiring mode

NDW3AGZ-2500 disconnecting switch's wiring mode of 4P in series is shown as follows:



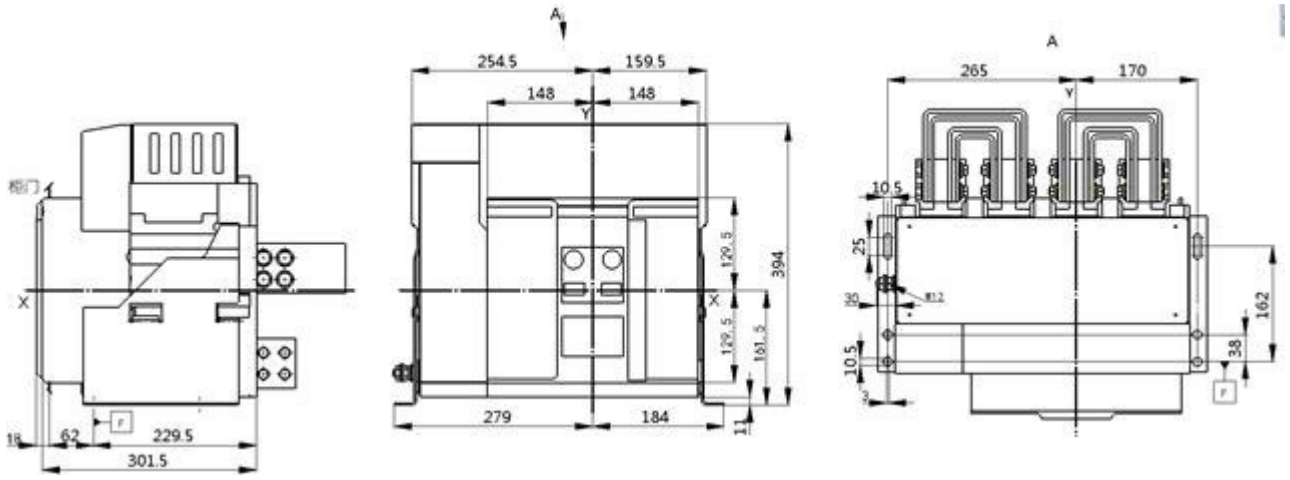
Upper wiring of 4P in series



Lower wiring of 4P in series

4.2 External dimensions

Fixed Details

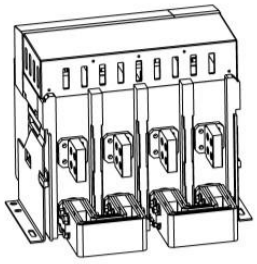


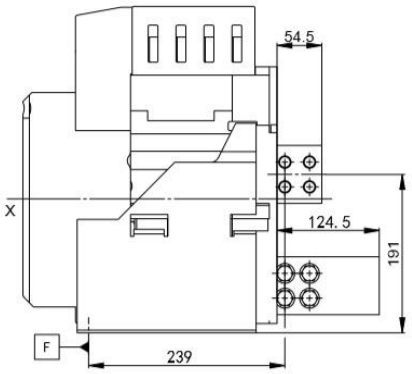
Note: For the disconnecting switch, X and Y are the symmetric axes of the front cover;

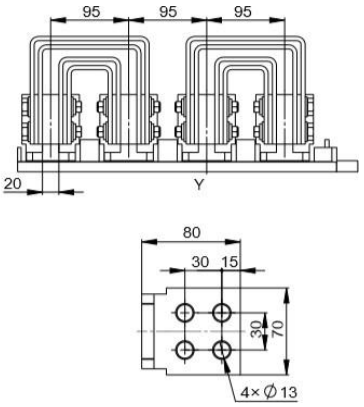
4.3 Installation dimensions

Vertical upper wiring of 4P in series

Ie=2500A **Details**

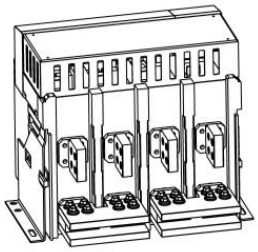


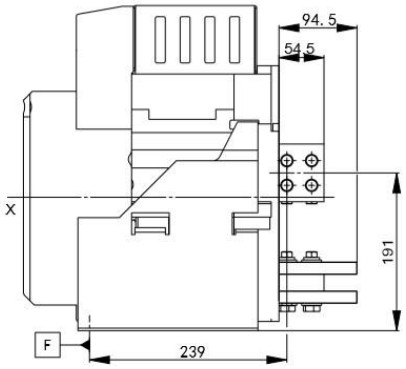


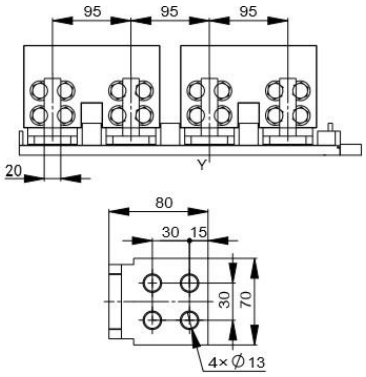


Vertical upper wiring of 4P in series

Ie=1600A~2000A **Details**

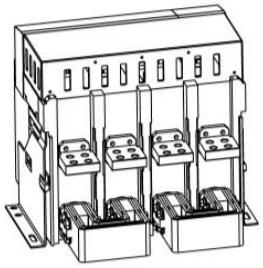


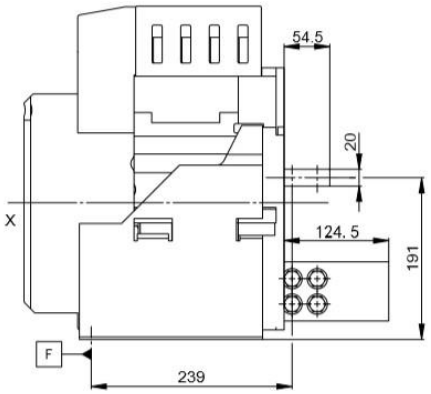


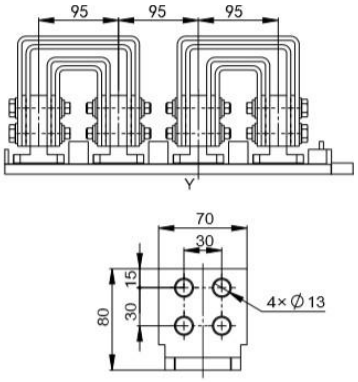


Horizontal upper wiring of 4P in series

Ie=2500A **Details**

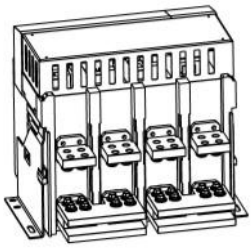


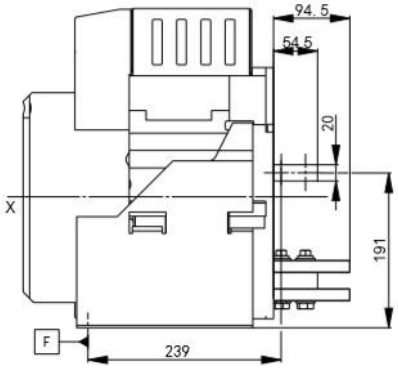


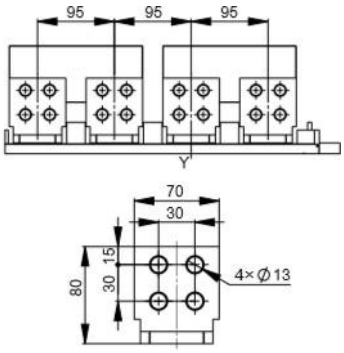


Horizontal upper wiring of 4P in series

Ie=1600A~2000A **Details**

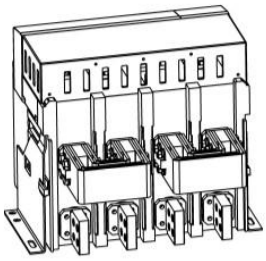


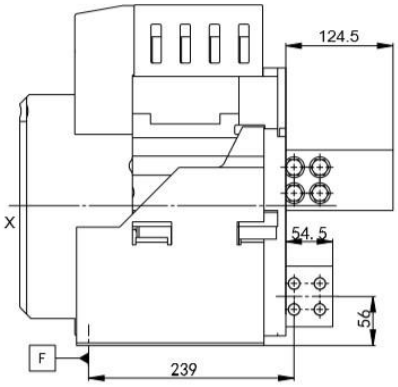


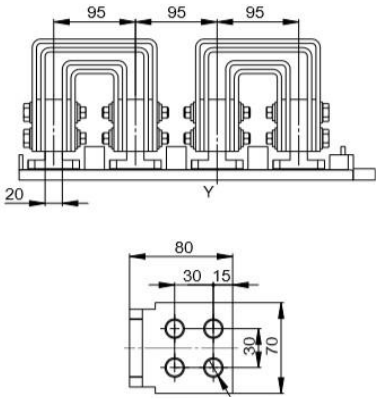


Vertical lower wiring of 4P in series

Ie=2500A **Details**

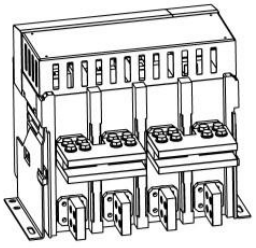


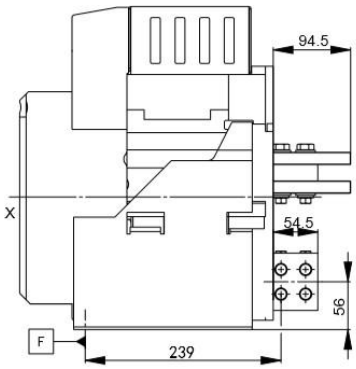


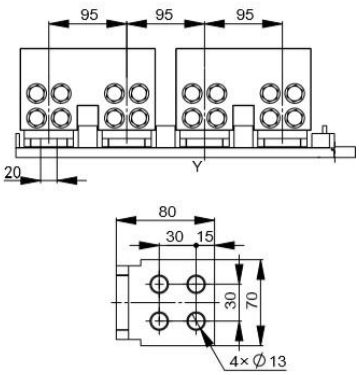


Vertical lower wiring of 4P in series

Ie=1600A~2000A **Details**



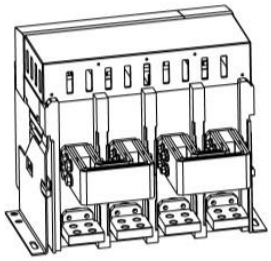


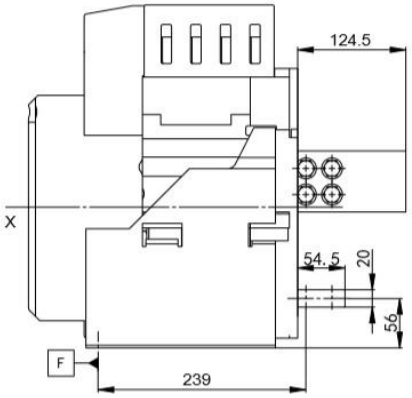


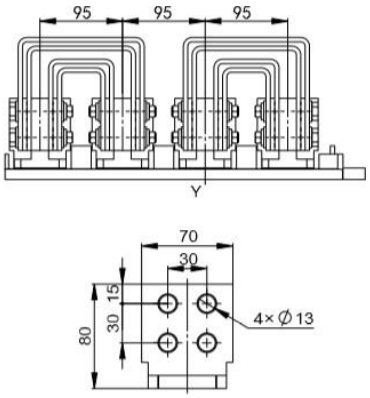
Note: For the disconnecting switch, X and Y are the symmetric axes of the front cover;

Horizontal lower wiring of 4P in series

Ie=2500A **Details**

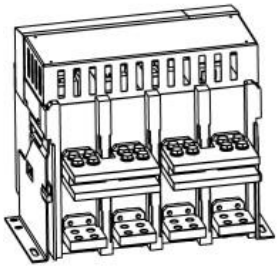


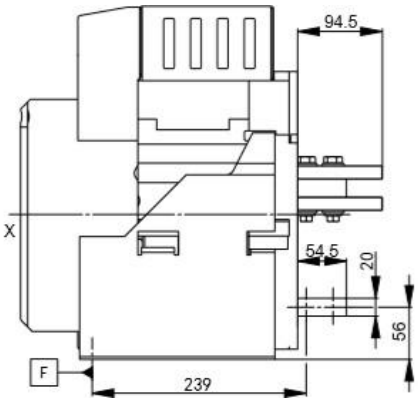


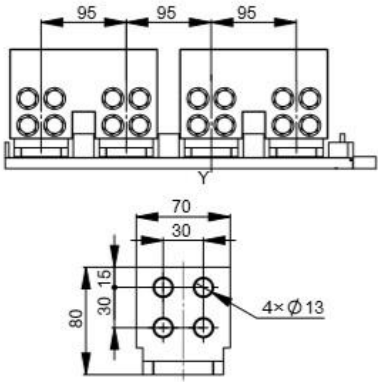


Horizontal lower wiring of 4P in series

Ie=1600A~2000A **Details**





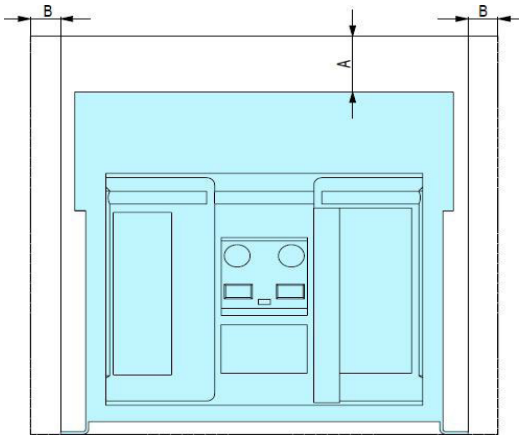


Note: For the disconnecting switch, X and Y are the symmetric axes of the front cover.

Safe Distance and Flashover Distance

The disconnecting switch is installed in the cabinet, the safe distance between the disconnecting switch and the cabinet

When users install the disconnecting switch into the cabinet, the safe distance between the disconnecting switch and the cabinet is as shown in the figure below, and the installation dimensions are shown in Table 13.



Schematic diagram for safety distance

Table 13 Unit: mm

Installation type of the disconnecting switch	To the insulator		To the metallic body grounded safely		To the live part	
	A	B	A	B	A	B
Fixed type	0	0	70	60	70	60

Note: 1. 150 mm space needed for removing the arc-extinguishing chamber should be considered for the safe spacing of the fixed type disconnecting switch;

2. If dust cover is added, height space of 70 mm for installation and rotating of the dust cover should be considered;

3. The flashover distance is consistent with the safe distance.

Electrical Wiring Diagram

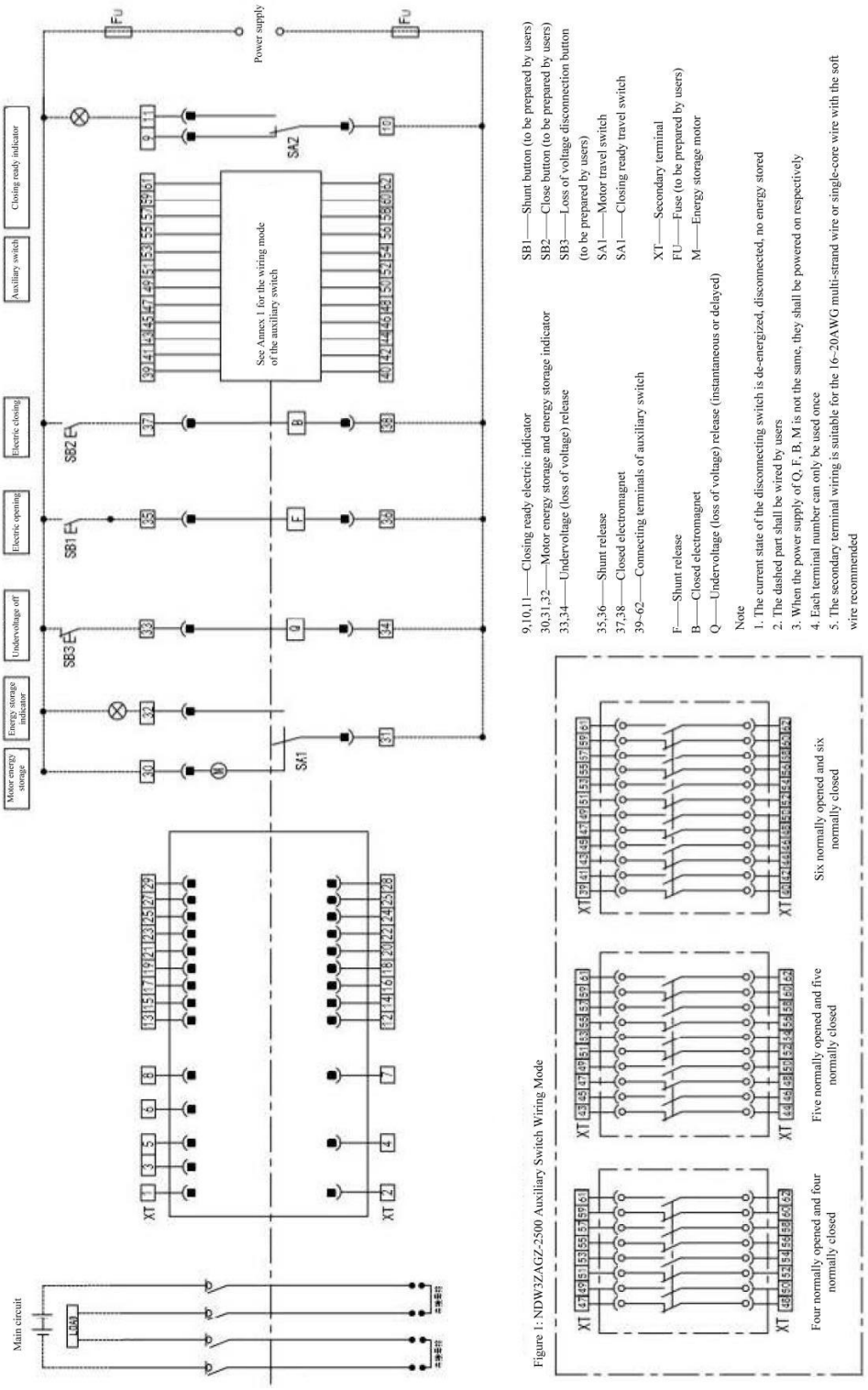


Figure 1: NDW3ZAGZ-2500 Auxiliary Switch Wiring Mode

Installation Notes on Disconnecting Switch

To ensure the safety of you and the electric equipment, before put the disconnecting switch into operation, users must:

- Carefully read this instruction before installation;
- Check whether the specification of the disconnecting switch is in line with the requirements before installation;
- Install the disconnecting switch in the well-ventilated environment without explosion danger, conductive dust or the possibility of corroding metal and damaging the insulation.
- Measure the insulation resistance value of the main circuit of the disconnecting switch with a 1000V megohmmeter before installation. When the ambient air temperature is 20±5 ℃ and the relative humidity is 50%-70%, the resistance value shall not be less than 20 mge; otherwise it shall be dried, which can be used until the insulation resistance meets the requirements;
- During installation, the disconnecting switch shall be reliably grounded with an obvious grounding mark at the grounding place;
- Prevent foreign matters from falling into the disconnecting switch when installing it;
- Ensure the circuit breaker is flat without additional mechanical stress when installing the conductive busbar, and both the terminal connection and fixed bolt shall be fastened.
- Carry out wiring of the control circuit according to the wiring diagram when installing it, check whether the working voltage of the undervoltage, shunt, closing electromagnet, motor and related parts conforms to the actual voltage, and then carry out the secondary circuit energizing;
- Press (or power on) the closing button after the energy storage of the motor, the disconnecting switch will close; press (or power on) the separating button, the disconnecting switch will separate;
- For manual storage of energy, pull the handle on the front panel up and down, a “click” sound can be heard after seven times, and the panel shows “storage of energy”, the storage of energy ends. At this moment, if undervoltage release happens, power on (otherwise, do not do so), and then switch on;
- The panel indicator of the disconnecting switch shall be correct;
- After the installation, clean the site and do not leave conductors, conductive parts, tools or dirts on (or around) the disconnecting switch and switchgear.

Ordering Type Selection Specification

Disconnecting Switch Model Explanation and Encoding Rules

ND W 3A GZ - □ □ □/□/□ □ □ □ □ □/□/□/□/□/□/□

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

No.	Name	Specification, type code	Description
1	Enterprise code	ND-"Nader" brand low-voltage electrical appliance	
2	Product code	W - Universal	
3	Design code	3A	
4	Derived code	G - Disconnecting switch Z - DC	
5	Shell frame level current	25-2500	
6	Installation structure	Not-marked - Fixed type	
7	Rated current	16-1600A 20-2000A 25-2500A	
8	Number of poles	4-4P	
9	Electric energy storage mechanism	DE-AC230V/DC230V D4- DC110V	This shall be omitted if without this accessory
10	Shunt release	FE-AC230V/DC230V F4- DC110V F6-AC230V/DC230V (holding type)	This shall be omitted if without this accessory
11	Closed electromagnet	BE-AC230V/DC230V B4- DC110V	This shall be omitted if without this accessory
12	Voltage of no-voltage release	Voltage of no-voltage release: SE-AC230V/DC230V	Optional
13	Delay time of no-voltage release	□ 0 (Instantaneous) □ 1 (1s delay) □ 3 (3s delay) □ 5 (5s delay)	Optional
14	Auxiliary contact	Not-marked - four normally opened and four normally closed (standard), A66 - six normally opened and six normally closed	
15	External Accessories	M - Door frame	Carry out the sequence arrangement according to the table, with "/" for separation.
		Not-marked - Phase partition (conventional) G - Phase partition (extended)	
		F - Dust cover	
		S - Button lock A - Safety lock (either)	
		JS - Counter	
		U - Short bus bar	
16	Wiring mode	Not-marked - installed by the customer (horizontal wiring) CS - vertical upper wiring, SS - horizontal upper wiring, CX - vertical lower wiring, SX - horizontal lower wiring	Wiring means the wiring of the customer
17	Product usage type	Not-marked - Conventional TH - Thermal-humidity type	
18	Rated working voltage	KV3-DC1500V	
19	Special notes	Customer's special requirements, such as abbreviation of YG - Sungrow Power Supply	
20	UL compliance	UL - With UL certification	

Disconnecting Switch Ordering Notes

(Please fill in numbers in_____, and check √ in □. Related contents can be found in the Manual)

User unit			Number of units ordered:	Date of ordering:
Shell frame level			□NDW3AGZ-2500	
Rated current (A)			□1600 □2000 □2500	
Number of poles			□4-4P	
Installation structure			□Fixed type	
Required accessories	Electric operating mechanism		□DE-AC230V/DC230V □D4-DC110V	
	Shunt release		□FE-AC230V/DC230V □F4-DC110V F6-AC230V/DC230V (holding type)	
	Closed electromagnet		□BE-AC230V/DC230V □B4-DC110V	
	Auxiliary contact		□ Not-marked - four normally opened and four normally closed (standard) □ A66 - six normally opened and six normally closed	
Required accessories	Loss of voltage release	voltage specification	□SE-AC230V/DC230V	
		Delay time	□ 0 (Instantaneous) □ 1 (1s delay) □ 3 (3s delay) □ 5 (5s delay)	
	Door frame		□ M - Door frame	
	Phase partition		□ Not-marked - Phase partition (conventional) □ G - Phase partition (extended)	
	Dust cover		□ F-Dust cover	
	Button lock		□S - Button lock □ A - Safety lock (either)	
	Counter		□ JS - Counter	
	Short bus bar		□ U - Short bus bar	
Wiring mode			□ Not-marked - installed by the customer (horizontal wiring) □ SS - horizontal upper wiring, □ SX - horizontal lower wiring, □ CS - vertical upper wiring □ CX - vertical lower wiring	
Product usage type			□ Conventional, □TH - Thermal-humidity type	
Rated working voltage			KV3-DC1500V	
Special requirements			Customer's special requirements, such as abbreviation of YG - Sungrow Power Supply	
UL compliance			UL - With UL certification	
Note: If you have special requirements, please indicate in the special requirements column.				