



NA8 Series  
Air Circuit Breaker  
User Instruction

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Air Circuit Breaker

# User Instruction

Standard: IEC 60947-2

## Safety Warnings

- ① This product should not be installed in inflammable, explosive, humid and condensing environment, do not operate the product with wet hand.
- ② No touching of conductive parts during operation.
- ③ Make sure to disconnect the power before installation, maintenance and service.
- ④ Do not let children play with the product or its packaging.
- ⑤ Leave sufficient space and safe distance around the product
- ⑥ Do not install the product at places where gas medium can cause metal corrosion and insulation damage.
- ⑦ During installation, the product must be connected to proper power and load through standard wires.
- ⑧ To avoid dangerous accidents, the product must be installed according to instructions strictly.
- ⑨ After unpacking the product, check for any damage and integrity of items.

## Environmental Protection

In order to protect the environment, when the product or its components are scrapped, please dispose of it as industrial waste; or hand it over to the recycling station for disaggregation, recycling and reuse according to relevant national regulations.

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1 Main use and scope of applications

The NA8 series air circuit breaker (“circuit breaker” in short), with rated current from 200A to 7500A and rated operating voltage of 380V-415V, 690V AC, is suitable for operation under 50Hz/60Hz AC and is mainly used in distribution network for power distribution, and to protect power line and power equipment from various faults such as overload, short circuit, undervoltage and single-phase ground. The circuit breaker is a combination of aesthetic appearance, high breaking capacity, zero flashover and multiple intelligent protection features . It can provide selective protection with accurate operations, to avoid unnecessary black out and guarantee reliable power supply.

The circuit breaker is widely applied in power plants, factories, mines and modern high rises, especially in power distribution system of intelligent buildings. It is also widely used in green projects such as wind power generation or solar power generation.

The product is available for top or bottom cable entries; bus can be rotated horizontally or vertically; withdrawable type is equipped with isolation function.

2 Type specification and definitions

| NA8          | - | 1600               | - | N                      | - | 1600   | - | M  | / | 3                                   | MO  | D                               | 230VAC   |
|--------------|---|--------------------|---|------------------------|---|--|---|--|---|-------------------------------------|---|---------------------------------|--|
| Product code |   | Frame size current |   | Breaking capacity code |   | Rated current  |   | Intelligent controller code  |   | Pole number code                    | Operation method code                           | Installation method code        | Control circuit voltage code   |
|              |   | 1600               |   | N: standard            |   | 200<br>400<br>630<br>800<br>1000<br>1250<br>1600<br>2000<br>2500<br>3200<br>4000<br>5000<br>6300<br>7500 |   | M: basic type (digital display)<br><br>H: communication type (LCD display) |   | 3: three poles<br><br>4: four poles | MO: motor operation<br><br>MN: manual operation | D: withdrawable<br><br>F: fixed | 230VAC: AC 230V<br><br>400VAC: AC 400V<br><br>110VDC: DC 110V<br><br>220VDC: DC 220V |

- Notes: 1. There is no need to mark “N” for the breaking capacity of NA8-7500 N type; if H type is chosen, it should be marked with “H”.  
2. Manual operation: not containing any motor operation mechanism, closing electromagnet and shunt release. Motor operation: including all standard accessories for remote operation.  
3. Code example: NA8-2500H-2000M/3 MO D 230VAC: frame size 2500 with H type breaking capacity, rated current 2000A, M type intelligent controller, 3 poles, motor operation, withdrawable type, control voltage AC230V.

3 Normal use, installation, transportation and storage conditions

- 3.1 Ambient air temperature from -5°C~+40°C, with average temperature within 24h not exceeding +35°C.  
Note: user shall consult with manufacturer for applications under temperature over +40°C or below -5°C.
- 3.2 The product shall not be installed at an altitude higher than 2000m.
- 3.3 Relative humidity shall not exceed 50% when ambient air temperature is at +40°C; higher relative humidity is allowed under lower temperature; if the average minimum relative humidity is 90% in wettest month, and the average minimum temperature in that month is +25°C, condensation due to temperature changes shall be taken into consideration.
- 3.4 The pollution grade is 3.

- 3.5 Circuit breakers with rated operating voltage of AC1140V belongs to installation type III; circuit breakers with undervoltage trip coil in auxiliary circuit, primary coil of power transformer and rated operating voltage not higher than AC380V belong to installation type IV, others are type III.
- 3.6 Circuit breaker should be installed in set or separately indoor according to this instruction, with vertical inclination not bigger than 5°.

4

Main technical parameters and performance

Table 1 Main technical parameters (1)

|   |                                   |            |  |
|---|-----------------------------------|------------|--|
| Number of poles                           | 3/4                               |            |  |
| Rated operational voltage Ue (V)          | 380/400/415/440、690、800、1000/1150 |            |  |
| Rated insulation voltage Ui (V)           | 1000、1150                         |            |  |
| Rated impulse withstand voltage Uimp (kV) | 12                                |            |  |
| Rated frequency (Hz)                      | 50/60                             |            |  |
| Flashover distance (mm)                   | 0                                 |            |  |
| Applicable to isolation                   | IEC/EN 60947-2                    | Applicable |  |
| Pollution grade                           | IEC 60664-1                       | N:3        |  |

Table 2 Main technical parameters (2)

| Frame size  |  |                             | NA8-1600                              |               |  |     |         |             | NA8-2500                          |     |         |      |         |      |         |               | NA8-3200              |               |   |             | NA8-4000        |      |              |                       |      | NA8-7500 |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
|---|--|-----------------------------|---------------------------------------|---------------|--|-----|---------|-------------|-----------------------------------|-----|---------|------|---------|------|---------|---------------|-----------------------|---------------|---|-------------|-----------------|------|--------------|-----------------------|------|----------|------|------|---------|------|---------|------|---------|-----|---------|--|----------|--|-----------------|--|---------|--|---------|--|---------|--|---------|--|---------|--|---------|--|---------|--|---------|--|
| Rated current (A)   |  |                             | 200                                   | 400           | 630  | 800 | 1000    | 1250        | 1600                              | 630 | 800     | 1000 | 1250    | 1600 | 2000    | 2500          |                       |               | 1600  | 2000        | 2500            | 3200 |              | 1600                  | 2000 | 2500     | 3200 | 4000 | 4000    | 5000 | 6300    | 7500 |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Rated current of N pole (A)   |  |                             | 200                                   | 400           | 630  | 800 | 1000    | 1250        | 1600                              | 630 | 800     | 1000 | 1250    | 1600 | 2000    | 2500          |                       |               | 1600  | 2000        | 2500            | 3200 |              | 1600                  | 2000 | 2500     | 3200 | 4000 | 4000    | 5000 | 6300    | 3750 |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Type of the circuit breaker   |  |                             | N(440V)                               |               | N(690V)  |     | H(440V) |             | H(690V)                           |     | N(415V) |      | N(690V) |      | H(415V) |               | H(690V)               |               | HU(800V)  |             | HU(1000V/1150V) |      |              |                       | 415V |          | 690V |      | N(415V) |      | N(690V) |      | H(415V) |     | H(690V) |  | HU(800V) |  | HU(1000V/1150V) |  | N(440V) |  | N(690V) |  | H(440V) |  | H(690V) |  | N(440V) |  | N(690V) |  | H(440V) |  | H(690V) |  |
| Rated ultimate short-circuit breaking capacity (kA rms) VAC 50/60Hz |  | Icu                         | 380/400/415/440V、690V 800V、1000/1150V |               | 55   | 42  | 66      | 50          | 65                                | 55  | 85      | 65   | 65      | 55   |         |               |                       |               | 100   | 75          |                 | 85   | 75           | 100                   | 85   | 75       | 65   | 135  | 100     | 150  | 100     | 135  | 100     | 150 | 100     |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Rated service short-circuit breaking capacity (kA rms) VAC 50/60Hz  |  | Ics                         | 380/400/415/440V、690V 800V、1000/1150V |               | 55   | 42  | 66      | 50          | 65                                | 55  | 85      | 65   | 65      | 55   |         |               |                       |               | 100   | 75          |                 | 85   | 75           | 100                   | 85   | 75       | 65   | 135  | 100     | 135  | 100     | 135  | 100     | 150 | 100     |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Application type  |  |                             | B                                     |               |  |     |         |             | B                                 |     |         |      |         |      |         |               |                       |               | B   |             | B               |      |              |                       |      | B        |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Rated short-time withstand current (kA rms) VAC 50/60Hz             |  | Icw 1s                      | 380/400/415/440V、690V 800V、1000/1150V |               | 42   | 42  | 55      | 50          | 65                                | 55  | 85      | 65   | 65      | 55   |         |               |                       |               | 85  | 65          |                 | 85   | 75           | 100                   | 85   | 75       | 65   | 135  | 100     | 135  | 100     | 135  | 100     | 135 | 100     |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
|   |  | Icw 3s                      | 380/400/415/440V、690V                 |               | 30   |     |         |             | 30                                | 50  |         |      |         | 50   |         |               |                       |               |   |             | 75              |      |              |                       | 75   | 100      | 100  | 100  | 100     | 100  | 100     | 100  | 100     | 100 | 100     |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Rated short-circuit making capacity (kA peak) VAC 50/60Hz           |  | Icm                         | 380/400/415/440V、690V 800V、1000/1150V |               | 121  | 88  | 145     | 105         | 143                               | 121 | 176     | 143  | 143     | 121  |         |               |                       |               | 220   | 165         |                 | 187  | 165          | 220                   | 187  | 165      | 143  | 297  | 220     | 330  | 220     | 297  | 220     | 330 | 220     |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Making current tripping protection (MCR kA rms)                     |  |                             | 16                                    |               |  |     |         |             | 16                                |     |         |      |         |      |         |               |                       |               | 26  |             | 26              |      |              |                       |      | 26       |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Breaking time (ms)  |  |                             | 20~30                                 |               |  |     |         |             | 20~30                             |     |         |      |         |      |         |               |                       |               | 20~30   |             | 20~30           |      |              |                       |      | 20~30    |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Making time (ms)  |  |                             | ≤70                                   |               |  |     |         |             | ≤70                               |     |         |      |         |      |         |               |                       |               | ≤70   |             | ≤70             |      |              |                       |      | ≤70      |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Installation, connection and lifetime                               |  |                             |                                       |               |  |     |         |             |                                   |     |         |      |         |      |         |               |                       |               |   |             |                 |      |              |                       |      |          |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Life C/O cycle  |  | Mechanical                  | Maintenance-free                      |               | 10000  |     |         |             | 15000                             |     |         |      |         |      |         |               |                       |               | 10000   |             | 10000           |      |              |                       |      | 6000     |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
|   |  | Electrical                  | Maintenance-free                      |               | 1600A : 8000(415V) 6000(690V) ≤1250A : 10000(415V) |     |         |             | 8000(415V) 4000(690V) 2000(1150V) |     |         |      |         |      |         |               | 6500(415V) 3000(690V) |               | 6500(415V) 4000A:600(1150V) 3000(690V) ≤4000A:3000(1150V) |             |                 |      |              | 1500(440V) 1000(690V) |      |          |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Connection  |  | Horizontal, vertical, mixed |                                       | ■             |  |     |         | ■           |                                   |     |         |      |         |      |         |               |                       | ■             |   | ■           |                 |      |              |                       | ■    |          |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
| Dimension (H×W×D)   |  | Fixed                       | 3P                                    | 335×257×252.5 |  |     |         | 367×370×357 |                                   |     |         |      |         |      |         |               |                       | 402×422×341   |   | 402×422×341 |                 |      |              |                       |      |          |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
|   |  |                             | 4P                                    | 335×327×252.5 |  |     |         | 367×461×357 |                                   |     |         |      |         |      |         | 402×537×341   |                       | 402×537×341   |   |             |                 |      |              |                       |      |          |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
|   |  | Withdrawable                | 3P                                    | 366×294×353   |  |     |         | 431×375×478 |                                   |     |         |      |         |      |         | 431.5×455×456 |                       | 431.5×455×456 |   |             |                 |      | 472×786×464  |                       |      |          |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |
|   |  |                             | 4P                                    | 366×364×353   |  |     |         | 431×470×478 |                                   |     |         |      |         |      |         | 431.5×550×456 |                       | 431.5×550×456 |   |             |                 |      | 472×1016×464 |                       |      |          |      |      |         |      |         |      |         |     |         |  |          |  |                 |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |         |  |



5 Structural features and operating principles

5.1 NA8-1600 withdrawable circuit breaker structure

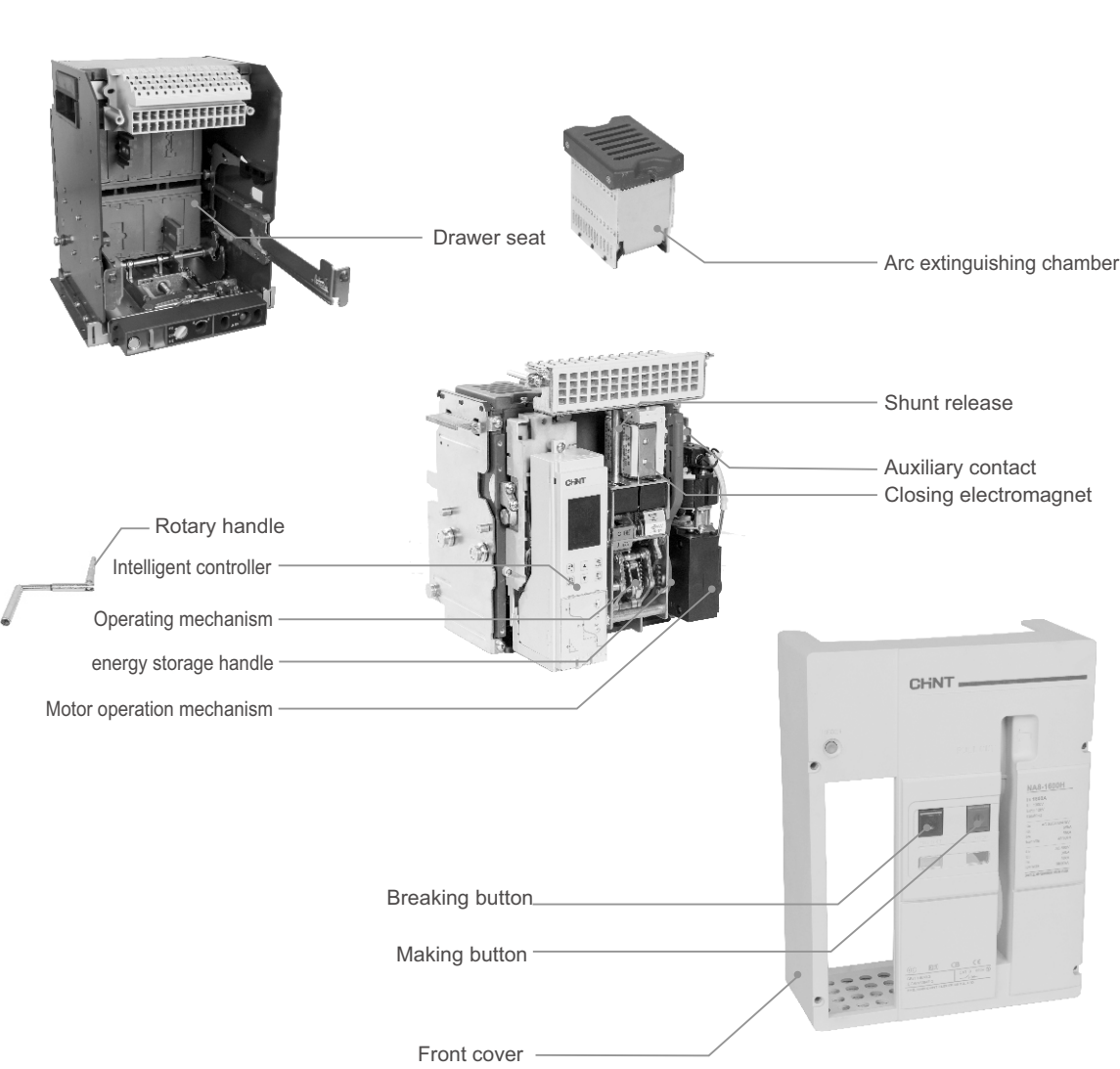


Figure 5.1 NA8-1600 withdrawable circuit breaker structure

5.2 NA8-2500 withdrawable circuit breaker structure

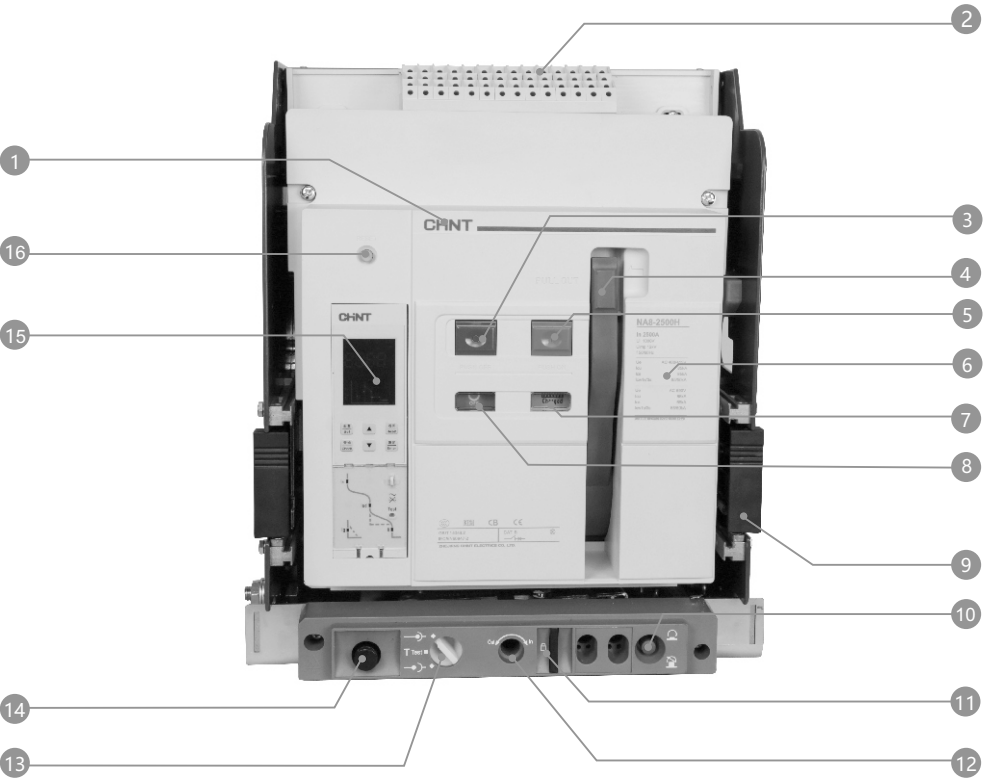


Figure 5.2 NA8-2500 withdrawable circuit breaker structure

- |                                    |  |
|------------------------------------|--|
| 1 Trademark                        | 9 Draw out plate                         |
| 2 Secondary terminal               | 10 Three position locking device         |
| 3 Breaking button                  | 11 Drawer padlock                        |
| 4 Energy storage handle            | 12 Racking-handle entry                  |
| 5 Making button                    | 13 Position indicator                    |
| 6 Name plate                       | 14 Rotate handle storage hole            |
| 7 Energy storage/release indicator | 15 Intelligent controller                |
| 8 Opening/closing indication       | 16 Fault-breaking indicator reset button |

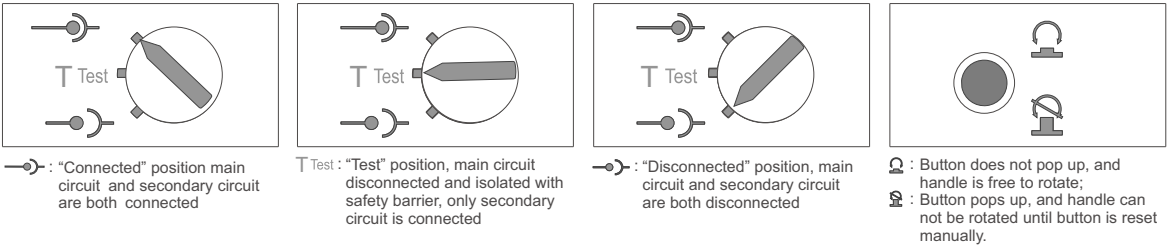


Figure 5.3 NA8 withdrawable circuit breaker positions

6 Installation technical requirements

6.1 Pre-installation check

6.1.1 Check with your order to see whether it is consistent with the parameters on the nameplate of the circuit breaker, check for the following items:

- a. Circuit breaker type, rated current, rated operating voltage;
- b. Installation method, operating method;
- c. Intelligent controller voltage, shunt release voltage, closing electromagnet voltage, energy storage motor voltage, undervoltage release voltage and delay time;
- d. Other special ordering requirements;

6.1.2 Check the packing contents according to the configuration described in this manual;

6.1.3 Before installing, operating, maintaining and repairing the product, read this manual carefully to avoid artificial damage to the circuit breaker and cause unnecessary problems.

6.2 Preparation before installation

6.2.1 Unpack according to the order described on the bottom of the package, do not use brutal force;

6.2.2 Remove the circuit breaker from the base plate of the package. If the circuit breaker is of withdrawable type, you can find fixing bolts inside the drawer seat, rotate the body out and clean up the drawer seat;

6.2.3 Use 500V megameter to test the insulation resistance of the circuit breaker. It shall not be lower than 20 megohm under ambient temperature of 25°C±5°C and relative humidity of 50-70%. Position for testing insulation resistance: between phases and between phase and frame when the circuit breaker is closed; between inlet and outlet cable of each phase when the circuit breaker is open.

6.3 Recommended busbar, power consumption and derated application of circuit breaker

6.3.1 Recommendation busbar

Maximum allowable temperature of busbar: 100°C

Busbar is made of bare copper, with width and thickness in mm.

Table 3 Recommended busbar for circuit breaker

| Frame size<br>current | Rated current<br>(A) | Ambient temperature (-5 ~40)      |           |        |               | Ambient temperature 50            |           |        |               | Ambient temperature 60            |           |        |               |
|-----------------------|----------------------|-----------------------------------|-----------|--------|---------------|-----------------------------------|-----------|--------|---------------|-----------------------------------|-----------|--------|---------------|
|                       |                      | Recommended busbar specifications |           |        |               | Recommended busbar specifications |           |        |               | Recommended busbar specifications |           |        |               |
|                       |                      | Width                             | Thickness | Pieces | Specification | Width                             | Thickness | Pieces | Specification | Width                             | Thickness | Pieces | Specification |
| 1600A                 | 200                  | 30                                | 5         | 1      | 30*5*1        | 30                                | 5         | 1      | 30*5*1        | 40                                | 5         | 1      | 40*5*1        |
|                       | 400                  | 30                                | 5         | 2      | 30*5*2        | 30                                | 5         | 2      | 30*5*2        | 30                                | 10        | 1      | 30*10*1       |
|                       | 630                  | 40                                | 5         | 2      | 40*5*2        | 40                                | 5         | 2      | 40*5*2        | 50                                | 5         | 2      | 50*5*2        |
|                       | 800                  | 50                                | 5         | 2      | 50*5*2        | 50                                | 5         | 2      | 50*5*2        | 50                                | 6         | 2      | 50*6*2        |
|                       | 1000                 | 50                                | 5         | 3      | 50*5*3        | 50                                | 5         | 3      | 50*5*3        | 50                                | 6         | 3      | 50*6*3        |
|                       | 1250                 | 60                                | 8         | 2      | 60*8*2        | 60                                | 8         | 2      | 60*8*2        | 60                                | 10        | 2      | 60*10*2       |
| 2500A                 | 1600                 | 60                                | 10        | 2      | 60*10*2       | 60                                | 10        | 2      | 60*10*2       | 60                                | 10        | 3      | 60*10*3       |
|                       | 630                  | 40                                | 5         | 2      | 40*5*2        | 50                                | 5         | 2      | 50*5*2        | 50                                | 5         | 2      | 50*5*2        |
|                       | 800                  | 50                                | 5         | 2      | 50*5*2        | 50                                | 5         | 2      | 50*5*2        | 60                                | 5         | 2      | 60*5*2        |
|                       | 1000                 | 50                                | 5         | 3      | 50*5*3        | 50                                | 5         | 3      | 50*5*3        | 60                                | 5         | 3      | 60*5*3        |
|                       | 1250                 | 60                                | 8         | 2      | 60*8*2        | 60                                | 8         | 2      | 60*8*2        | 60                                | 8         | 3      | 60*8*3        |
|                       | 1600                 | 60                                | 10        | 2      | 60*10*2       | 60                                | 10        | 2      | 60*10*2       | 60                                | 10        | 3      | 60*10*3       |
| 3200A                 | 2000                 | 100                               | 5         | 3      | 100*5*3       | 100                               | 5         | 3      | 100*5*3       | 100                               | 5         | 4      | 100*5*4       |
|                       | 2500                 | 100                               | 10        | 2      | 100*10*2      | 100                               | 10        | 2      | 100*10*2      | 80                                | 10        | 3      | 80*10*3       |
|                       | 1600                 | 80                                | 6         | 2      | 80*6*2        | 80                                | 5         | 3      | 80*5*3        | 80                                | 6         | 3      | 80*6*3        |
|                       | 2000                 | 80                                | 10        | 2      | 80*10*2       | 80                                | 10        | 2      | 80*10*2       | 100                               | 10        | 2      | 100*10*2      |
|                       | 2500                 | 100                               | 10        | 2      | 100*10*2      | 100                               | 10        | 2      | 100*10*2      | 100                               | 10        | 3      | 100*10*3      |
|                       | 3200                 | 100                               | 10        | 4      | 100*10*4      | 100                               | 10        | 4      | 100*10*4      | 100                               | 10        | 5      | 100*10*5      |
| 4000A                 | 1600                 | 80                                | 6         | 2      | 80*6*2        | 80                                | 5         | 3      | 80*5*3        | 80                                | 6         | 3      | 80*6*3        |
|                       | 2000                 | 80                                | 10        | 2      | 80*10*2       | 80                                | 10        | 2      | 80*10*2       | 100                               | 10        | 2      | 100*10*2      |
|                       | 2500                 | 100                               | 10        | 2      | 100*10*2      | 100                               | 10        | 2      | 100*10*2      | 100                               | 10        | 3      | 100*10*3      |
|                       | 3200                 | 100                               | 10        | 4      | 100*10*4      | 100                               | 10        | 4      | 100*10*4      | 100                               | 10        | 5      | 100*10*5      |
|                       | 4000                 | 100                               | 10        | 5      | 100*10*5      | 100                               | 10        | 5      | 100*10*5      | 120                               | 10        | 5      | 120*10*5      |

Table 3 (continue)

| Frame size<br>current | Rated current<br>(A) | Ambient temperature (-5 ~40)      |           |        |               | Ambient temperature 50            |           |        |               | Ambient temperature 60            |           |        |               |
|-----------------------|----------------------|-----------------------------------|-----------|--------|---------------|-----------------------------------|-----------|--------|---------------|-----------------------------------|-----------|--------|---------------|
|                       |                      | Recommended busbar specifications |           |        |               | Recommended busbar specifications |           |        |               | Recommended busbar specifications |           |        |               |
|                       |                      | Width                             | Thickness | Pieces | Specification | Width                             | Thickness | Pieces | Specification | Width                             | Thickness | Pieces | Specification |
| 7500A                 | 4000                 | 100                               | 10        | 5      | 100*10*5      | 100                               | 10        | 5      | 100*10*5      | 100                               | 10        | 6      | 100*10*5      |
|                       | 5000                 | 100                               | 10        | 7      | 100*10*7      | 100                               | 10        | 7      | 100*10*7      | 120                               | 10        | 7      | 120*10*7      |
|                       | 6300                 | 120                               | 10        | 7      | 120*10*7      | 120                               | 10        | 7      | 120*10*7      | 120                               | 10        | 8      | 120*10*8      |
|                       | 7500                 | 120                               | 10        | 9      | 120*10*9      | 120                               | 10        | 9      | 120*10*9      | 120                               | 10        | 10     | 120*10*10     |

- Notes:
- a. If the busbar selected by user does not match with the terminals of circuit breaker, an extended busbar is needed for adaption. The extended busbar should be provided by user itself, with cross section area not smaller than the requirement in the table above. The clearance of extended busbar should not be smaller than that of circuit breaker terminals.
  - b. After installing the busbar according to the table above, make sure the electric clearance between each phase is not less than 18mm.
  - c. If silicon controlled electrical elements (such as high frequency induction heating furnace (medium frequency furnace for steelmaking), solid state high frequency welder (such as submerged arc welder), vacuum heating melting equipment (such as single crystal silicon growth furnace)) are used for three-phase rectification and high-frequency inversion in loading equipment, impact from ambient temperature and altitude as well as higher harmonic generated by silicon controlled electrical elements should all be considered when selecting circuit breaker. In such cases, the circuit breaker must be derated, the recommend derating factor is 0.5-0.8.
  - d. After the busbar is installed, the electrical clearance between the upper and lower fixing bolts of the busbar should not be smaller than 20mm.
  - e. After the circuit breaker is installed, the safety clearance between live parts of different electrical potentials and the safety clearance between live parts and earth should not be smaller than 18mm.

6.3.2 Power consumption and input/output resistance

Power consumption is measured under In, 50/60Hz for each pole.

Table 4 Power consumption of circuit breaker

| Frame size | Rated current (A) | Power consumption of withdrawable type (W) | Power consumption of fixed type (W) |
|------------|-------------------|--|-------------------------------------|
| 1600A      | 200               | 115  | 45                                  |
|            | 400               | 140  | 80                                  |
|            | 630               | 161  | 100                                 |
|            | 800               | 215  | 110                                 |
|            | 1000              | 230  | 120                                 |
|            | 1250              | 250  | 130                                 |
| 2500A      | 1600              | 460  | 220                                 |
|            | 630               | 58.6                                       | 26.4                                |
|            | 800               | 73.7                                       | 36.6                                |
|            | 1000              | 172  | 78                                  |
|            | 1250              | 268  | 122                                 |
|            | 1600              | 440  | 200                                 |
| 3200A      | 2000              | 530  | 262                                 |
|            | 2500              | 600  | 312                                 |
|            | 1600              | 390  | 170                                 |
|            | 2000              | 470  | 250                                 |
|            | 2500              | 550  | 280                                 |
|            | 3200              | 670  | 420                                 |
| 4000A      | 1600              | 390  | 170                                 |
|            | 2000              | 470  | 250                                 |
|            | 2500              | 550  | 280                                 |
|            | 3200              | 670  | 420                                 |
| 7500A      | 4000              | 1047                                       | 656                                 |
|            | 4000              | 550  | -                                   |
|            | 5000              | 590  | -                                   |
|            | 6300              | 950  | -                                   |
|            | 7500              | 1500                                       | -                                   |

6.3.3 Circuit breaker derating

a) Circuit breaker derating under different temperature

Table 5 Temperature derating table for NA8-1600

| Ambient temperature | 200A       |          | 400A       |          | 630A       |          | 800A       |          | 1000A      |          | 1250A      |          | 1600A      |          |
|---------------------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|
| Connection method   | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical |
| 40°                 | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        |
| 45°                 | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        |
| 50°                 | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | 1485       | 1540     |
| 55°                 | -          | -        | -          | -        | -          | -        | -          | -        | 950        | 950      | 1150       | 1200     | 1390       | 1450     |
| 60°                 | -          | -        | -          | -        | 550        | 580      | 700        | 700      | 900        | 900      | 1050       | 1100     | 1320       | 1370     |

Table 6 Temperature derating table for NA8-2500

| Ambient temperature | 630A       |          | 800A       |          | 1000A      |          | 1250A      |          | 1600A      |          | 2000A      |          | 2500A      |          |
|---------------------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|
| Connection method   | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical |
| 40°                 | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        |
| 45°                 | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        |
| 50°                 | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        |
| 55°                 | -          | -        | -          | -        | -          | -        | -          | -        | 1500       | 1520     | 1850       | 1850     | 2420       | 2450     |
| 60°                 | -          | -        | -          | -        | -          | -        | -          | -        | 1400       | 1420     | 1720       | 1750     | 2290       | 2320     |

Table 7 Temperature derating table for NA8-3200

| 环境温度 | 1600A      |          | 2000A      |          | 2500A      |          | 3200A      |          |
|------|------------|----------|------------|----------|------------|----------|------------|----------|
| 连接方式 | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical |
| 40°  | -          | -        | -          | -        | -          | -        | -          | -        |
| 45°  | -          | -        | -          | -        | -          | -        | -          | -        |
| 50°  | -          | -        | -          | -        | -          | -        | 3100       | -        |
| 55°  | -          | -        | -          | -        | 2450       | -        | 3000       | 3050     |
| 60°  | -          | -        | -          | -        | 2350       | 2400     | 2900       | 2950     |

Table 8 Temperature derating table for NA8-4000

| Ambient temperature | 1600A      |          | 2000A      |          | 2500A      |          | 3200A      |          | 4000A      |          |
|---------------------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|
| Connection method   | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical |
| 40°                 | -          | -        | -          | -        | -          | -        | -          | -        | -          | -        |
| 45°                 | -          | -        | -          | -        | -          | -        | -          | -        | 3800       | 3850     |
| 50°                 | -          | -        | -          | -        | -          | -        | 3100       | -        | 3600       | 3650     |
| 55°                 | -          | -        | -          | -        | 2450       | -        | 3000       | 3050     | 3400       | 3450     |
| 60°                 | -          | -        | 1900       | 1950     | 2350       | 2400     | 2900       | 2950     | 3200       | 3250     |

Table 9 Temperature derating table for NA8-7500

| Ambient temperature | 4000A      |          | 5000A      |          | 6300A      |          | 7500A      |          |
|---------------------|------------|----------|------------|----------|------------|----------|------------|----------|
| Connection method   | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical | Horizontal | Vertical |
| 40°                 | -          | -        | -          | -        | /          | -        | /          | -        |
| 45°                 | -          | -        | -          | -        | /          | 6100     | /          | 7000     |
| 50°                 | -          | -        | 4700       | 4800     | /          | 6000     | /          | 6550     |
| 55°                 | 3900       | 3900     | 4600       | 4650     | /          | 5500     | /          | 6050     |
| 60°                 | 3800       | 3800     | 4400       | 4500     | /          | 5200     | /          | 5650     |

Note: “-” means no derating; “/” means no horizontal connection.

b) Circuit breaker derating under different altitudes

Table 10 Voltage correction table under different altitudes

| Altitude (m)                          |      | 2000 | 3000 | 4000 | 5000 |
|---------------------------------------|------|------|------|------|------|
| Rate impulse withstand voltage (kV)   | Uimp | 12   | 11   | 10   | 8    |
| Insulation class (V)                  | Ui   | 1000 | 900  | 800  | 700  |
| Power frequency withstand voltage (V) |      | 3500 | 3100 | 2500 | 2200 |
| Maximum operating voltage (V)         | Ue   | 690  | 580  | 520  | 460  |
|                                       |      | 1150 | 900  | 800  | 700  |

Table 11 Current correction table under different altitudes

| Altitude (m) | Rated operating current (Ie)   |
|--------------|--------------------------------|
| 2000         | 1.0Ie                          |
| 2500         | 0.96Ie                         |
| 3000         | 0.93Ie                         |
| 3500         | 0.89Ie                         |
| 4000         | 0.85Ie                         |
| 4500         | 0.82Ie                         |
| 5000         | Must confirm with manufacturer |

Note: If ambient temperature is lower than 40 °C, Ie=In; if ambient temperature is higher than 40 °C, Ie≠In, Ie and In should be referred to according to temperature derating table.

6.4 Circuit breaker installation

a. Fixed type circuit breaker installation

Place the circuit breaker in the cabinet, use 4 M6 (Inm=1600A) or M10 (Inm=2500A and above) bolts and washers to fix the circuit breaker.

The circuit breaker should be secured properly, without additional mechanical force, to avoid damage of circuit breaker or poor contact of main bus.

b. Withdrawable type circuit breaker installation

Draw the circuit breaker body out of the drawer seat, install the drawer seat in the cabinet, use 4 M6 (Inm=1600A) or M10 (Inm=2500A and above) bolts and washers to fix the circuit breaker.

The circuit breaker should be secured properly, without additional mechanical force, to avoid damage of circuit breaker or poor contact of main bus and secondary circuit. Then, install the body back into the drawer seat.

6.5 Interval

Leave sufficient space for ventilation in the cabinet, the spacer for upper and lower connectors of circuit breaker must be made of non-magnetic material.

6.6 Busbar fixation

The busbar must be fixed with proper torque by using bolts and nuts, too big or too small torque is not allowed. Too big torque may cause bolts to slip which makes it difficult to tighten the bolts; too small torque may cause misalignment of bolts and nuts which leads to poor fastening and may cause excessive temperature rise. For circuit breaker connections, the data of torque tightening is applicable to copper busbar and steel bolts and nuts, with grade≥8.8, it is also applicable aluminum busbar.

- 1. Circuit breaker terminal
- 2. Busbar
- 3. Bolt
- 4. Washer
- 5. Nut
- 6. Elastic washer

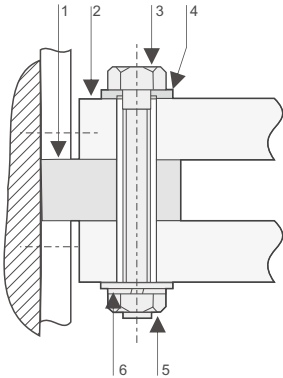


Figure 6.6-1 Diagram of busbar fixing

Recommended installation method

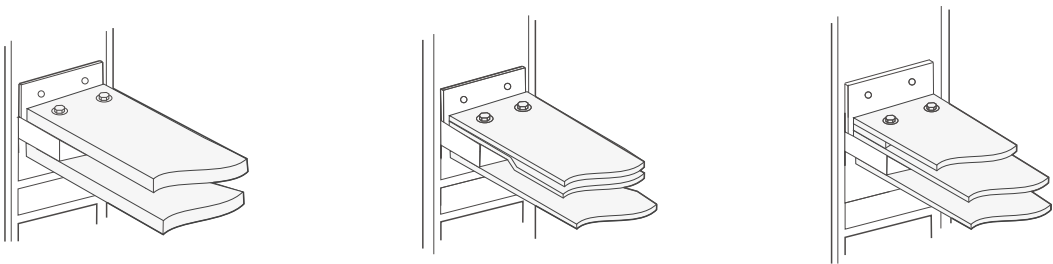


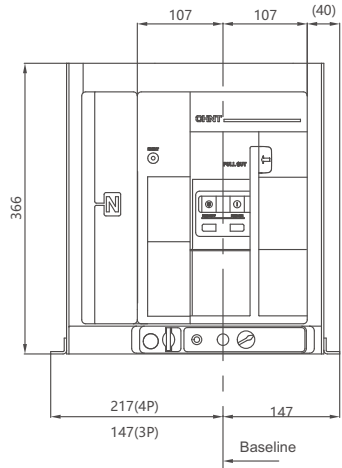
Figure 6.6-2 Recommended installation diagram of busbar

Table 12 Tightening torque for circuit breaker

| Bolt type                   | Application  | Preferred tightening torque |
|-----------------------------|--|-----------------------------|
| M3                          | Secure secondary connection cable                          | (0.5~0.7) N·m               |
| M8 (only with flat washer)  | Secure the product to cabinet (1600A frame size)           | (18~25) N·m                 |
| M10 (only with flat washer) | Secure the product to cabinet (2500A frame size and above) | (25~40) N·m                 |
| M10                         | Secure busbar  | (36~52) N·m                 |

7 Overall and installation dimensions

Front view



Side view

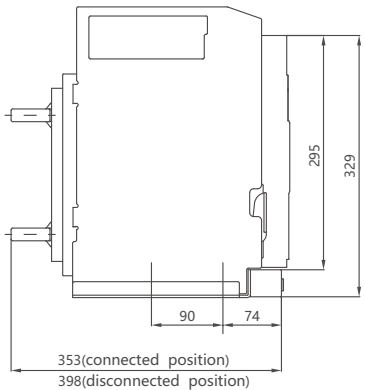
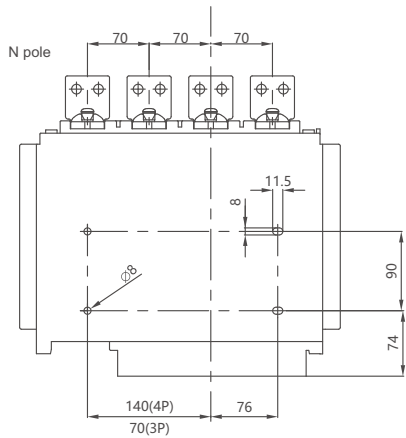


Figure 7.1 Overall dimension of NA8-1600 withdrawable type

Hole size of the base



Hole size of the panel

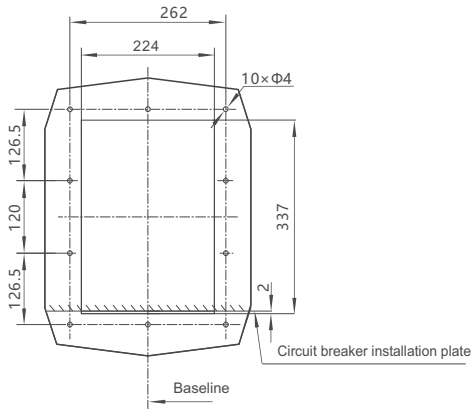
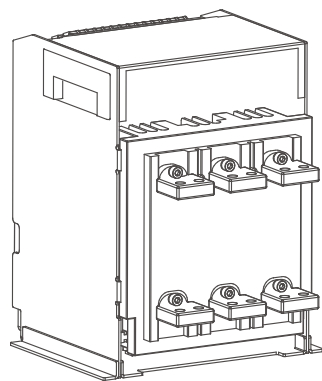


Figure 7.1-1 Perforating size of NA8-1600 withdrawable type

Side view



| In(A)     | D(mm) |
|-----------|-------|
| 200~630   | 5     |
| 800~1000  | 10    |
| 1250~1600 | 16    |

Busbar installation dimensions

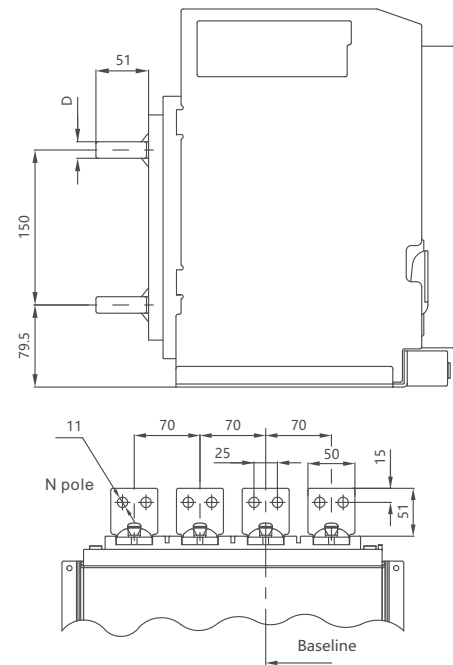
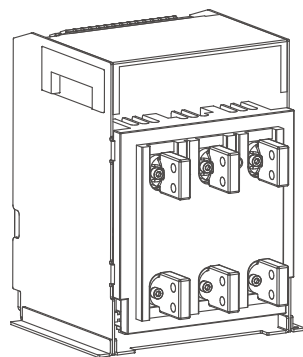


Figure 7.1-2 Horizontal busbar connection of NA8-1600 withdrawable type

Busbar installation dimensions



| In(A)     | D(mm) |
|-----------|-------|
| 200~630   | 5     |
| 800~1000  | 10    |
| 1250~1600 | 16    |

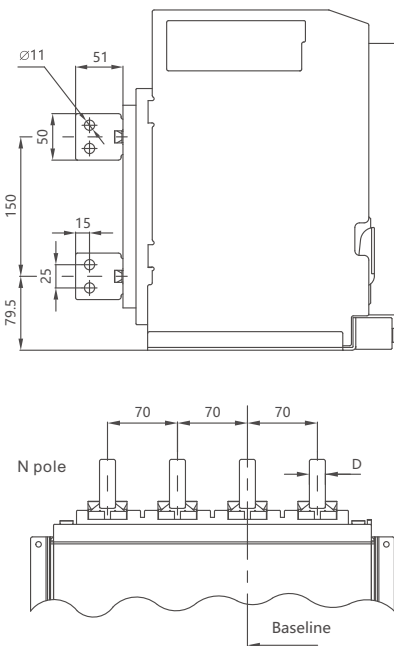
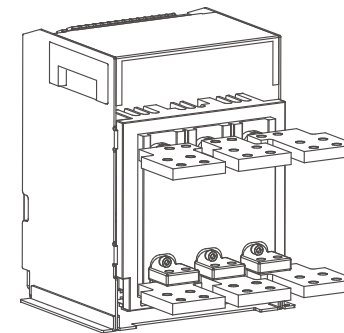


Figure 7.1-3 Vertical busbar connection of NA8-1600 withdrawable type

Side view



| In(A)     | A(mm) | B(mm) | C(mm) | D(mm) |
|-----------|-------|-------|-------|-------|
| 200~630   | 74.5  | 160.5 | 5     | 5     |
| 800~1000  | 68.5  | 170   | 10    | 10    |
| 1250~1600 | 63    | 181   | 15    | 16    |

Note: The extended bus is an optional accessory, which will be charged separately.

Busbar installation dimensions

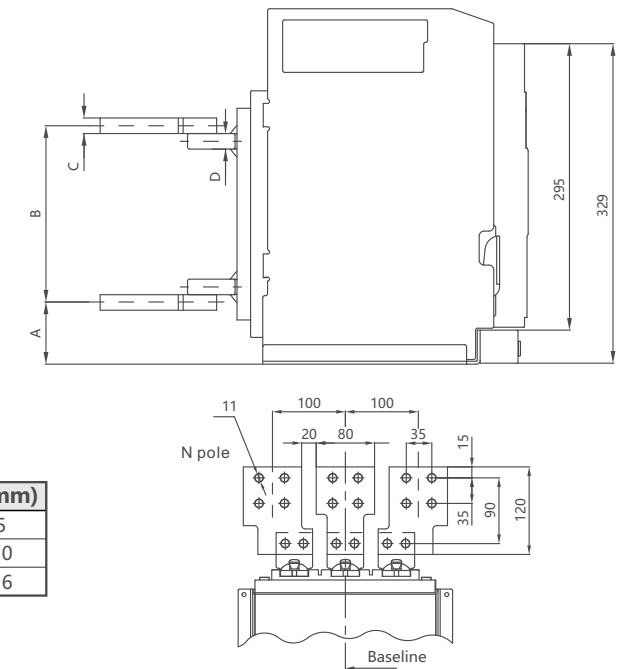
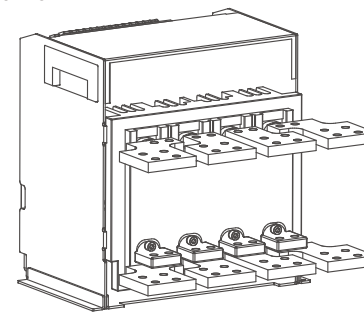


Figure 7.1-4 3 poles extended bus horizontal connection of NA8-1600 withdrawable type

Side view



| In(A)     | A(mm) | B(mm) | C(mm) | D(mm) |
|-----------|-------|-------|-------|-------|
| 200~630   | 74.5  | 160.5 | 5     | 5     |
| 800~1000  | 69.5  | 170.5 | 10    | 10    |
| 1250~1600 | 64    | 181.5 | 15    | 16    |

Note: The extended bus is an optional accessory, which will be charged separately.

Busbar installation dimensions

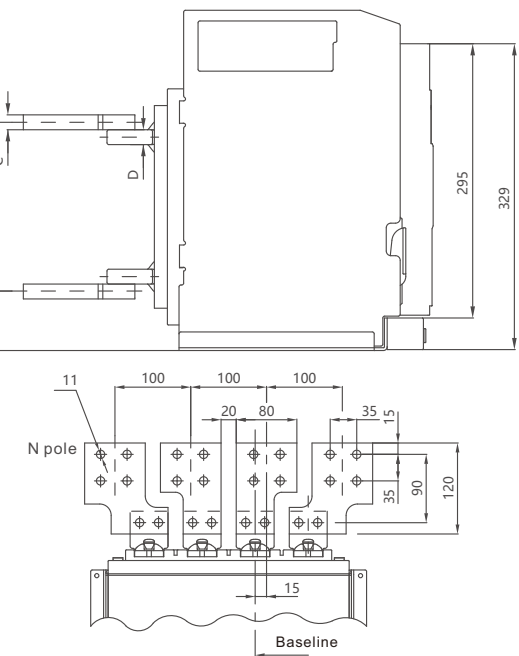
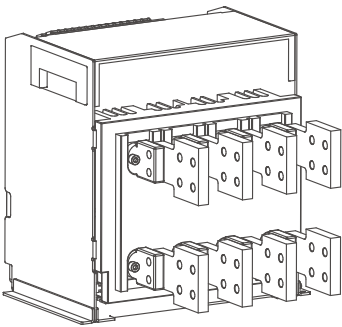
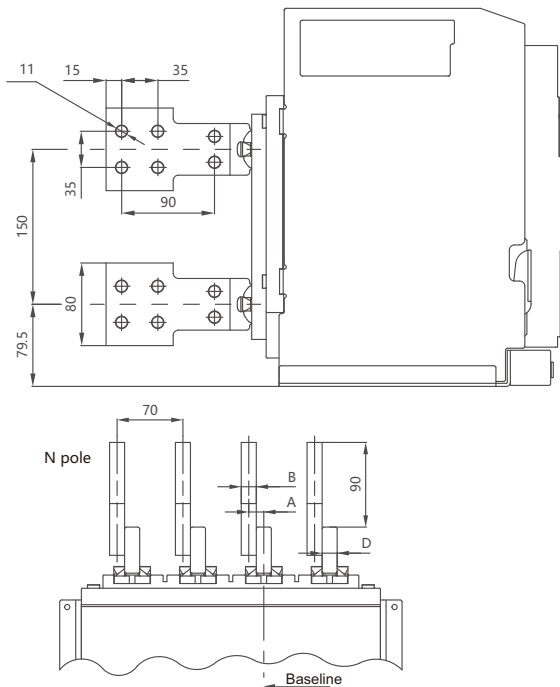


Figure 7.1-5 4 poles horizontal extended bus connection of NA8-1600 withdrawable type

Side view



Busbar installation dimensions

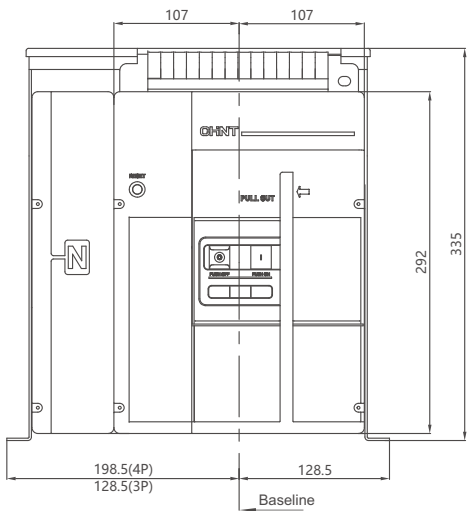


| In (A)    | A(mm) | B(mm) | D(mm) |
|-----------|-------|-------|-------|
| 200~630   | 5     | 5     | 5     |
| 800~1000  | 10    | 10    | 10    |
| 1250~1600 | 15    | 15.5  | 16    |

Note: The extended bus is an optional accessory, which will be charged separately.

Figure 7.1-6 Extended bus vertical connection of NA8-1600 withdrawable type

Front view



Side view

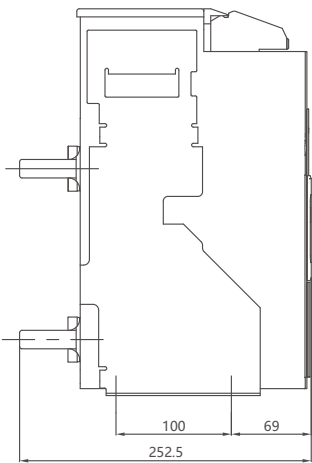
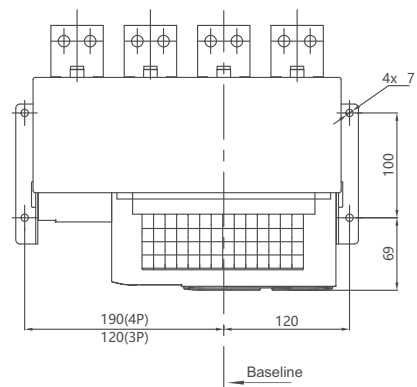


Figure 7.2 Overall dimensions of NA8-1600 fixed type

Hole size of the base



Hole size of the panel

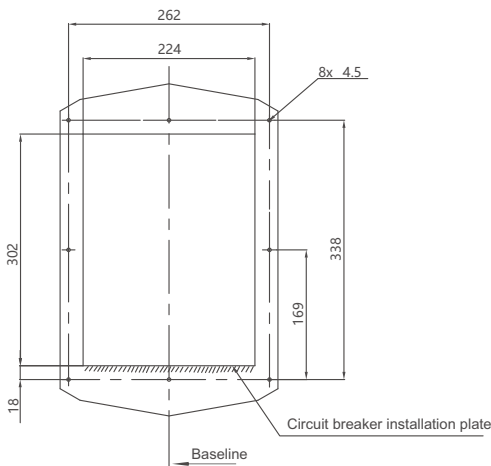
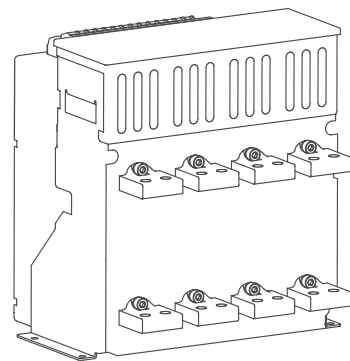


Figure 7.2-1 Perforating size of NA8-1600 fixed type



Side view



| In(A)     | D(mm) |
|-----------|-------|
| 200~630   | 5     |
| 800~1000  | 10    |
| 1250~1600 | 16    |

Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Busbar installation dimensions

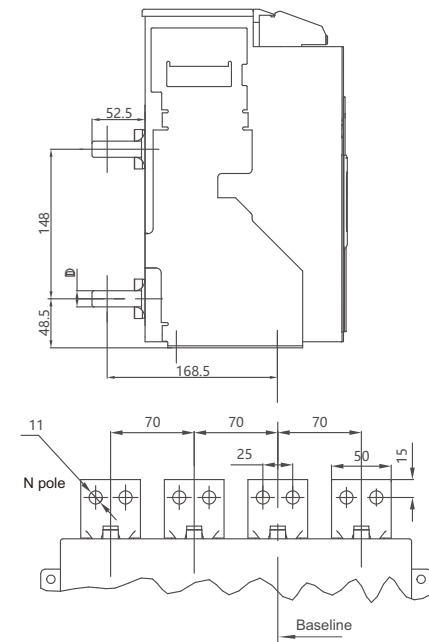
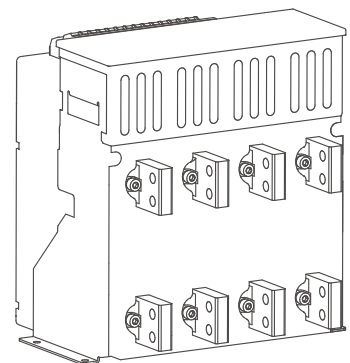


Figure 7.2-2 Busbar horizontal connection of NA8-1600 fixed type

Side view



| In(A)     | D(mm) |
|-----------|-------|
| 200~630   | 5     |
| 800~1000  | 10    |
| 1250~1600 | 16    |

Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Busbar installation dimensions

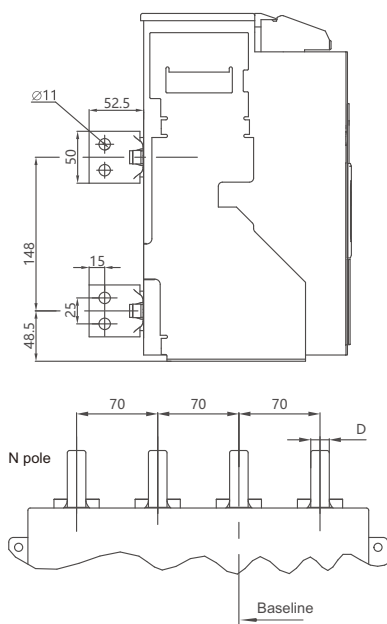
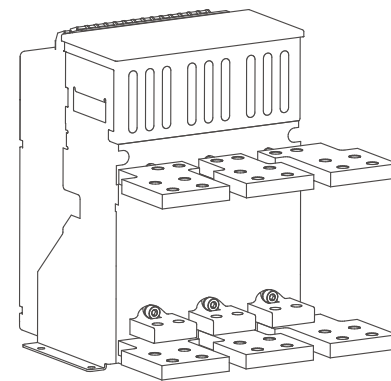


Figure 7.2-3 Vertical busbar connection of NA8-1600 fixed type

Side view



| In(A)     | D(mm) |
|-----------|-------|
| 200~630   | 5     |
| 800~1000  | 10    |
| 1250~1600 | 16    |

Note: The extended bus is an optional accessory, which will be charged separately.

Busbar installation dimensions

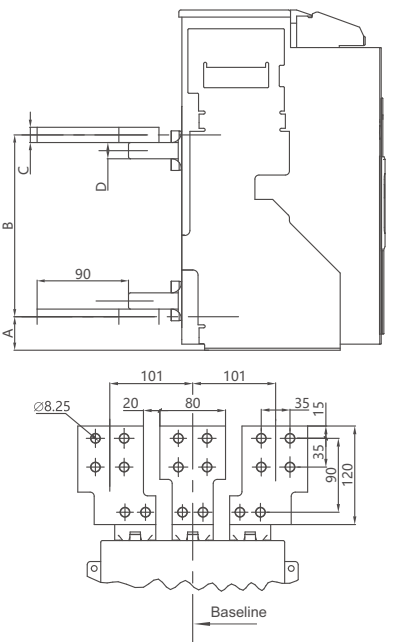
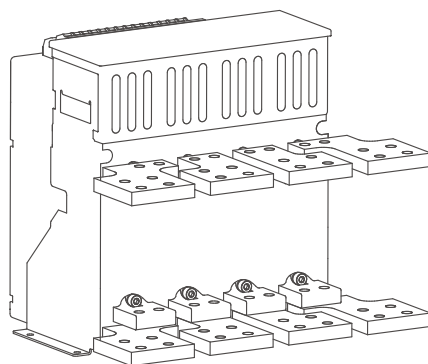


Figure 7.2-4 3 poles horizontal extended busbar connection of NA8-1600 fixed type

Side view



| In(A)     | A(mm) | B(mm) | C(mm) | D(mm) |
|-----------|-------|-------|-------|-------|
| 200~630   | 41    | 163   | 10    | 5     |
| 800~1000  | 38.5  | 168   | 10    | 10    |
| 1250~1600 | 33    | 179   | 15    | 16    |

Note: The extended bus is an optional accessory, which will be charged separately.

Busbar installation dimensions

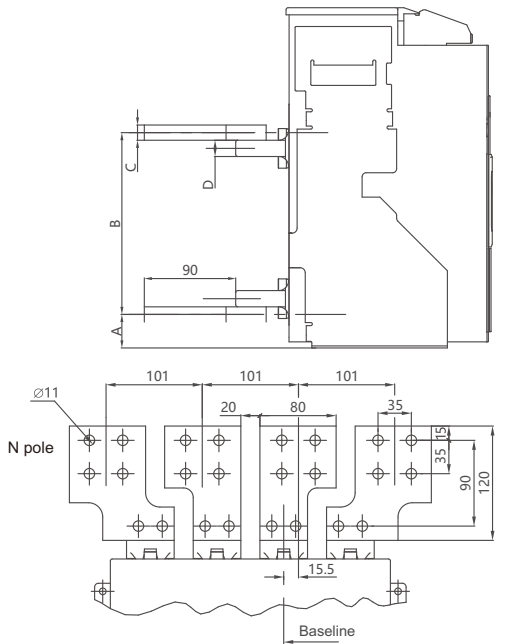
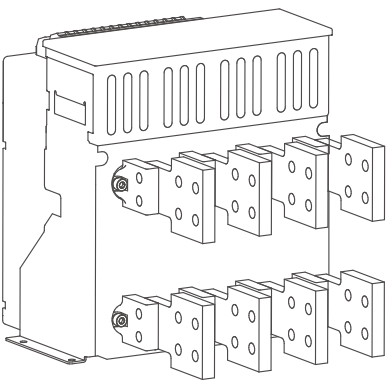


Figure 7.2-5 4poles horizontal extended busbar connection of NA8-1600 fixed type

Side view



| In(A)     | A(mm) | B(mm) | D(mm) |
|-----------|-------|-------|-------|
| 200~630   | 10    | 7.5   | 5     |
| 800~1000  | 10    | 10    | 10    |
| 1250~1600 | 15    | 15.5  | 16    |

Note: The extended bus is an optional accessory, which will be charged separately.

Busbar installation dimensions

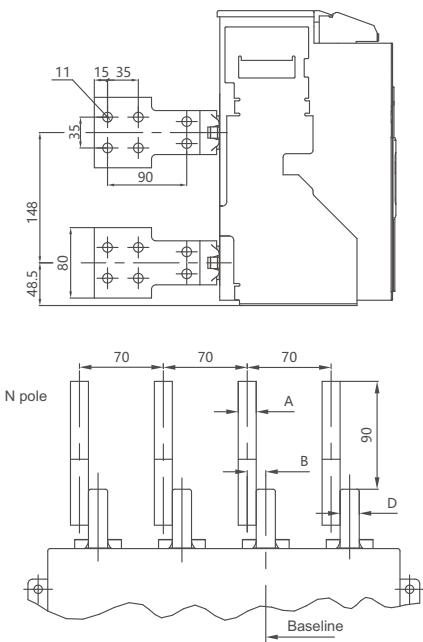
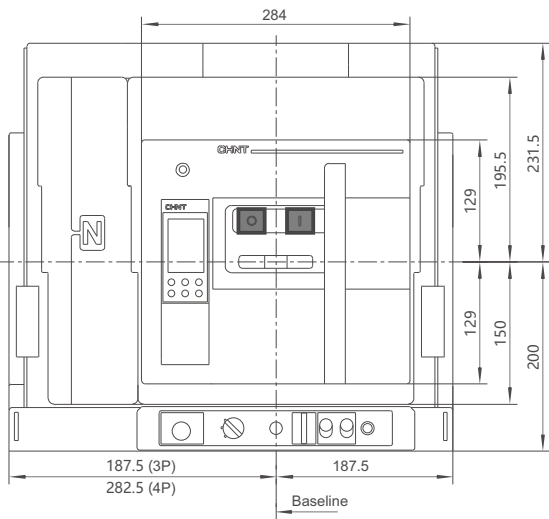


Figure 7.2-6 Vertical extended busbar connection of NA8-1600 fixed type

Front view



Side view

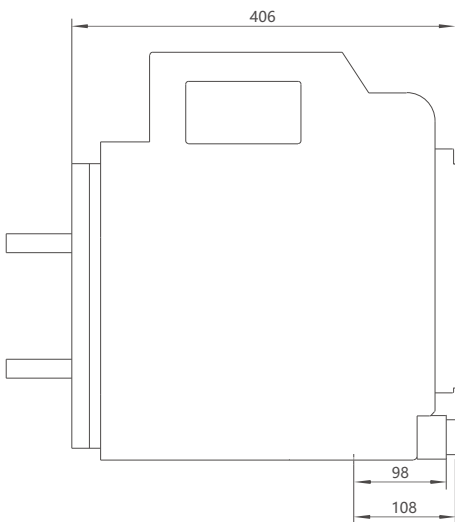
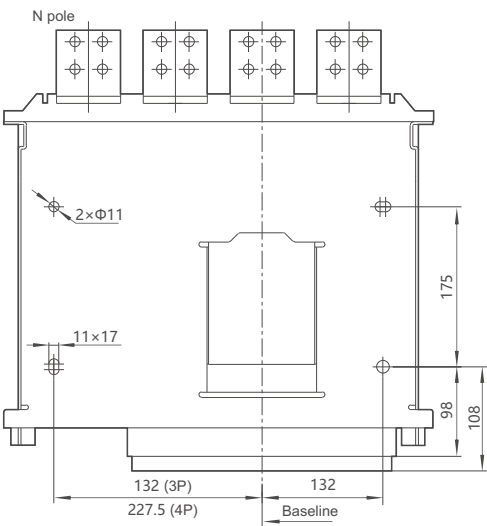


Figure 7.3 Overall dimensions of NA8-2500 withdrawable type

Hole size of the base



Hole size of the panel

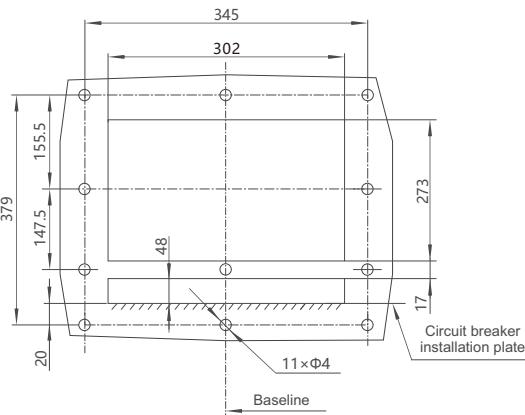
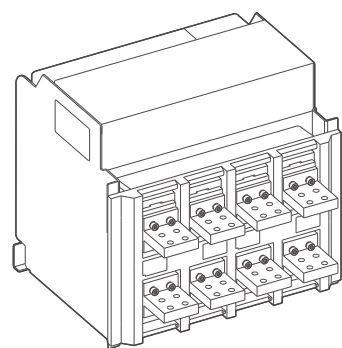


Figure 7.3-1 Perforating size of NA8-2500 withdrawable type



Side view



Unit: mm

| In(A)     | D  | L  |
|-----------|----|----|
| 630~1600  | 15 | 60 |
| 2000~2500 | 20 | 70 |

Note: User only needs to rotate the bus 90°to change horizontal connection to vertical connection.

Busbar installation dimensions

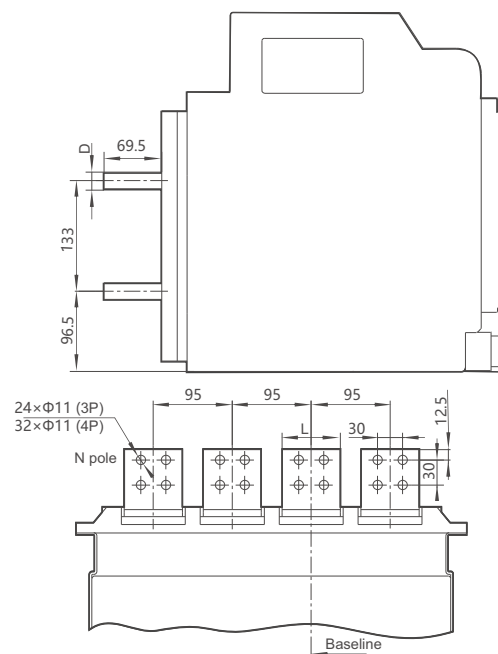
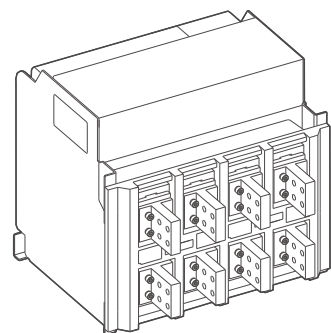


Figure 7.3-2 Horizontal busbar connection of NA8-2500 withdrawable type

Side view



Unit: mm

| In(A)     | D  | L  |
|-----------|----|----|
| 630~1600  | 15 | 60 |
| 2000~2500 | 20 | 70 |

Note: User only needs to rotate the bus 90°to change horizontal connection to vertical connection.

Busbar installation dimensions

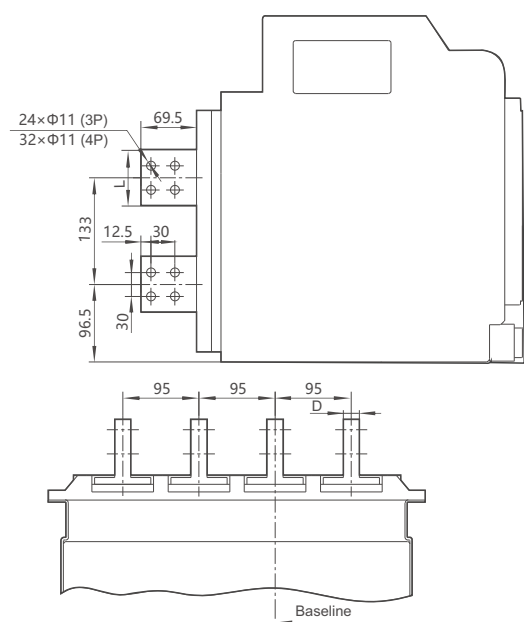
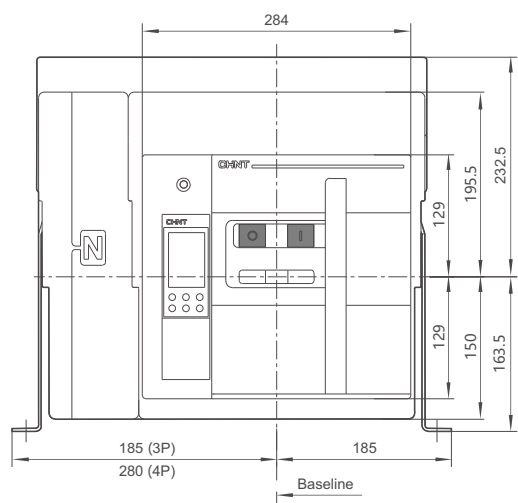


Figure 7.3-3 Vertical busbar connection of NA8-2500 withdrawable type

Front view



Side view

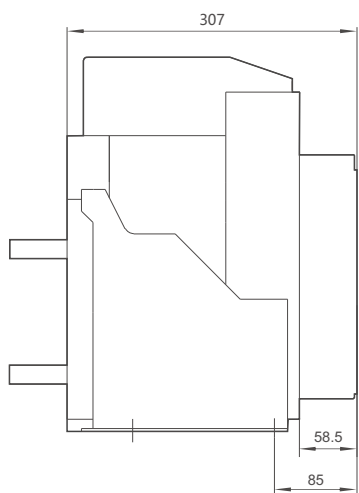
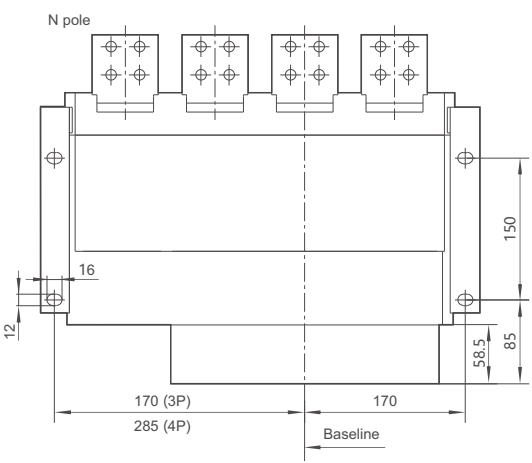


Figure 7.4 Overall dimensions of NA8-2500 fixed type

Hole size of the base



Hole size of the panel

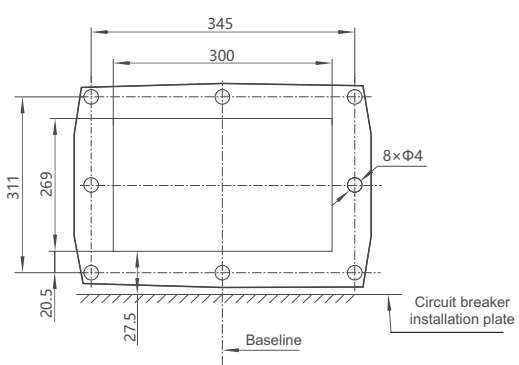
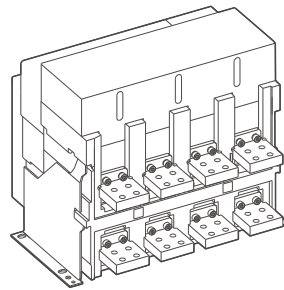


Figure 7.4-1 Perforating size of NA8-2500 fixed type

Side view

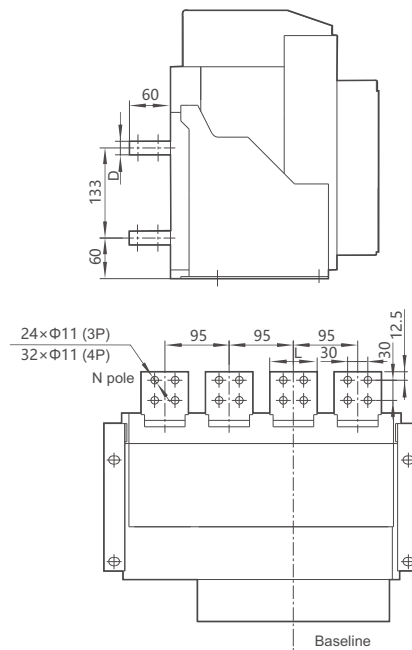


Unit: mm

| In(A)     | D  | L  |
|-----------|----|----|
| 630~1600  | 15 | 60 |
| 2000~2500 | 20 | 70 |

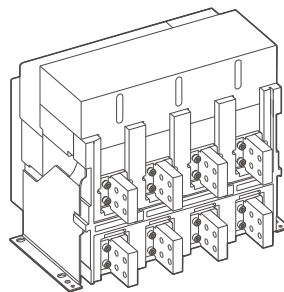
Note: User only needs to rotate the bus 90° to change horizontal connection to vertical connection.

## Busbar installation dimensions



**Figure 7.4-2 Horizontal busbar connection of NA8-2500 fixed type**

Side view

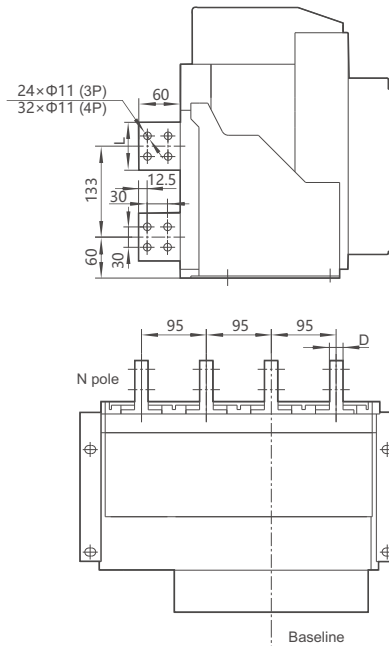


Unit: mm

| In(A)     | D  | L  |
|-----------|----|----|
| 630~1600  | 15 | 60 |
| 2000~2500 | 20 | 70 |

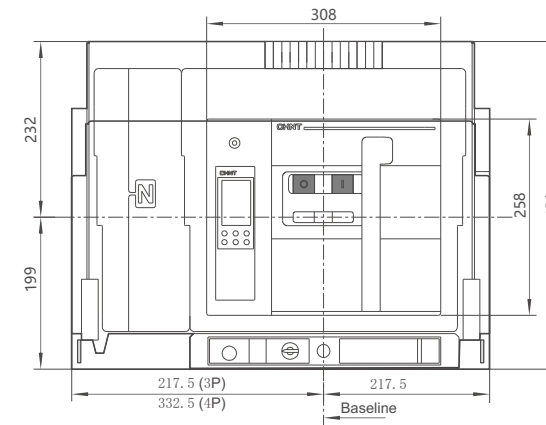
Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

### Busbar installation dimensions

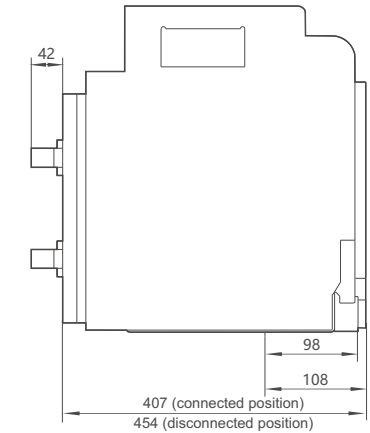


**Figure 7.4-3 Vertical busbar connection of NA8-2500 fixed type**

Front view

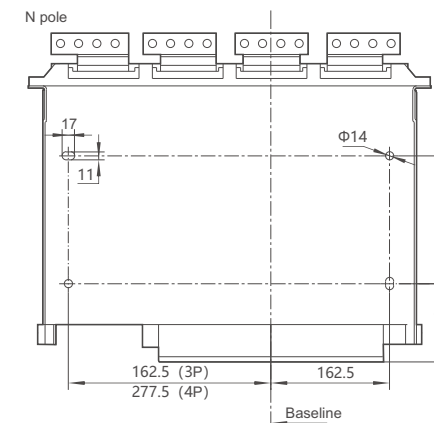


Side view

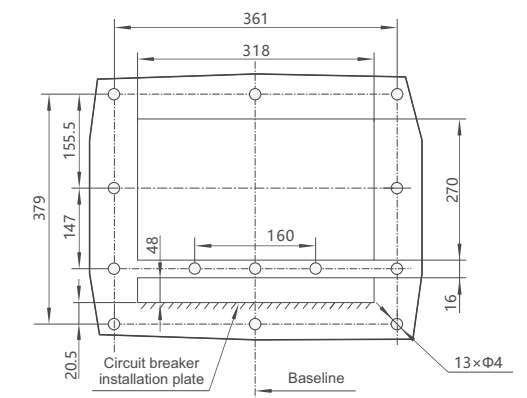


**Figure 7.5 Overall dimensions of NA8-3200 withdrawable type**

Hole size of the base

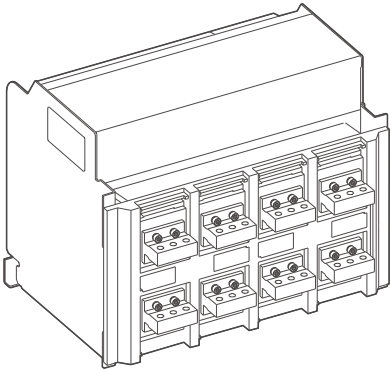


Hole size of the base



**Figure 7.5-1 Perforating size of NA8-3200 withdrawable type**

Side view



Note: User only needs to rotate the bus 90°to change horizontal connection to vertical connection.

Busbar installation dimensions

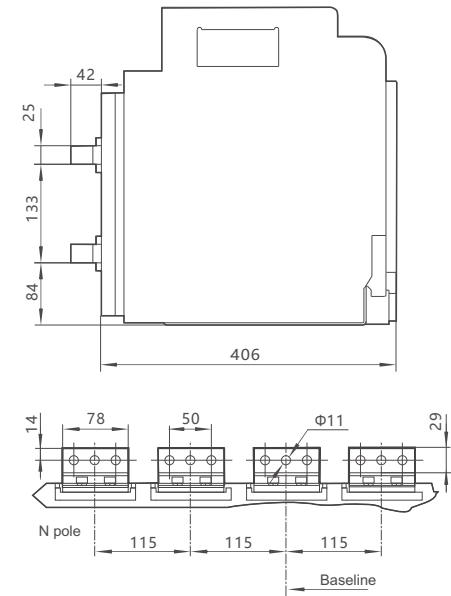
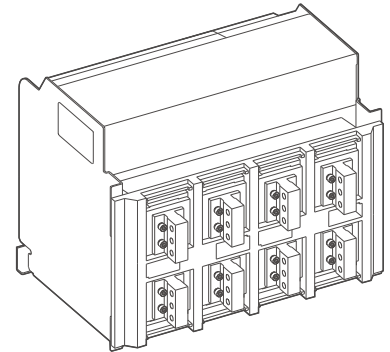


Figure 7.5-2 Horizontal busbar connection of NA8-3200 withdrawable type(In=1600A~2500A)

Side view



Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Busbar installation dimensions

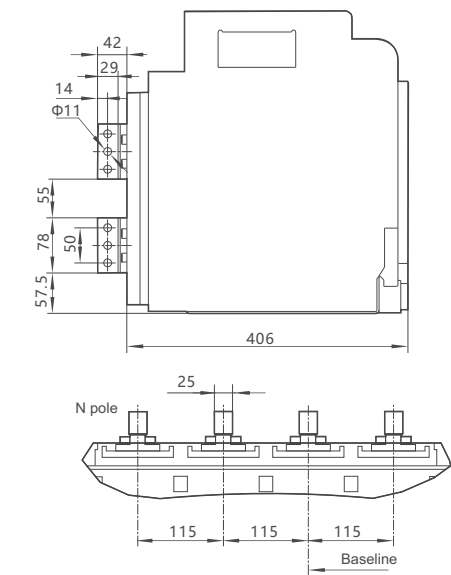
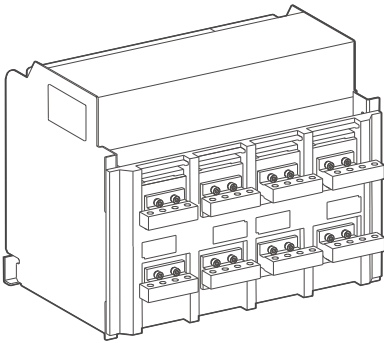


Figure 7.5-3 Vertical busbar connection of NA8-3200 withdrawable type(In=1600A~2500A)

Side view



Note: To change horizontal connection to vertical connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

Busbar installation dimensions

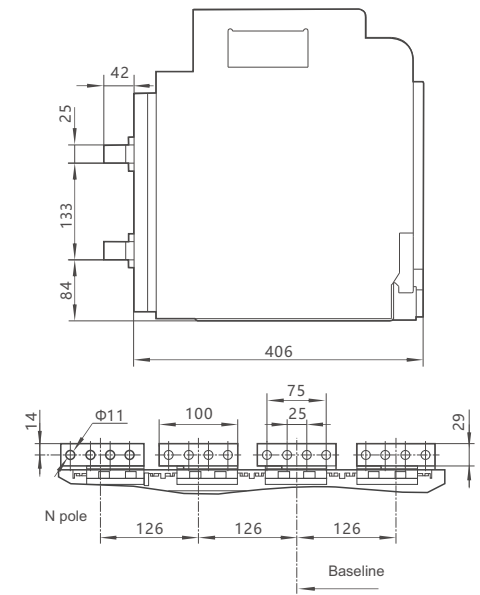
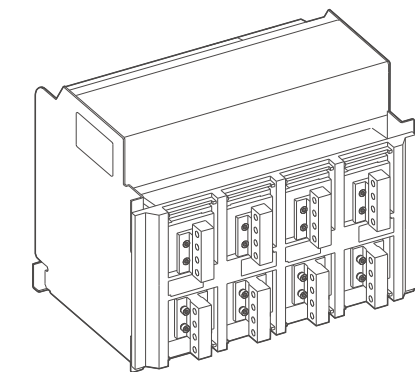


Figure 7.5-4 Horizontal busbar connection of NA8-3200 withdrawable type(In=3200A)

Side view



Note: To change vertical connection to horizontal connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

Busbar installation dimensions

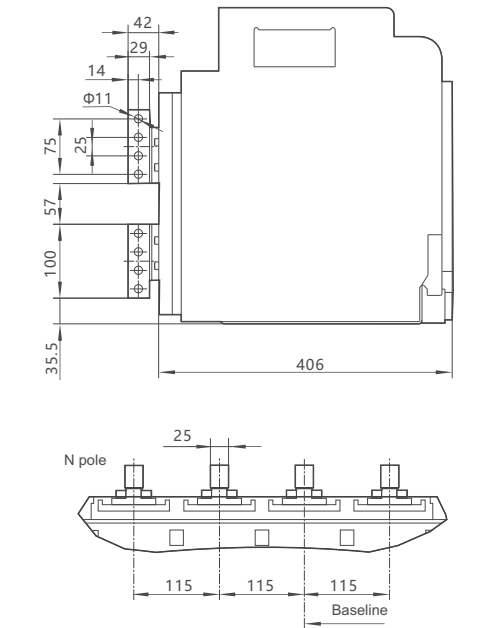
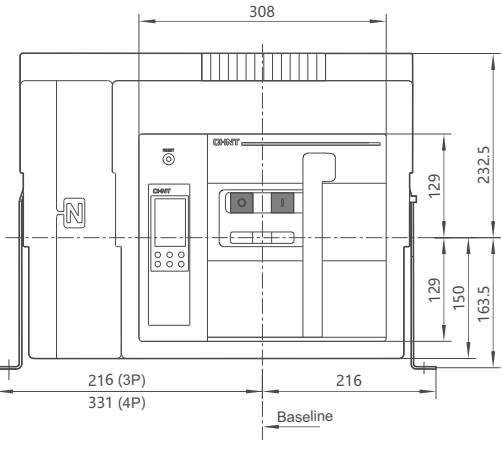


Figure 7.5-5 Vertical busbar connection of NA8-3200 withdrawable type(In=3200A)

Front view



Side view

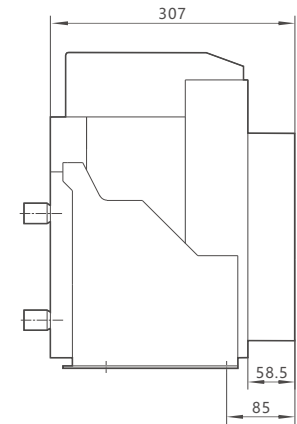
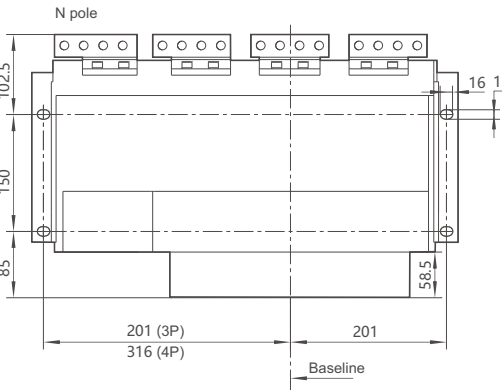


Figure 7.6 Overall dimensions of NA8-3200 fixed type

Hole size of the base



Hole size of the base

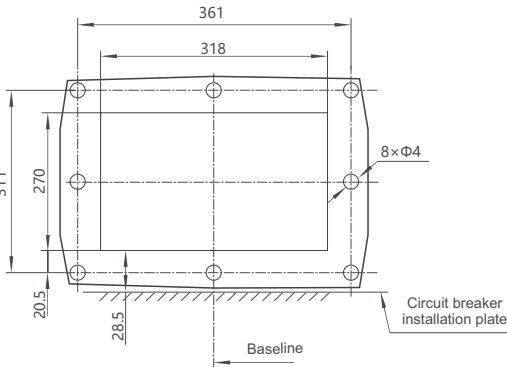
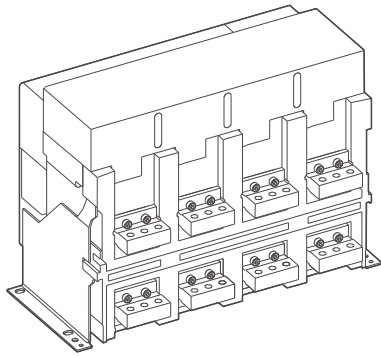
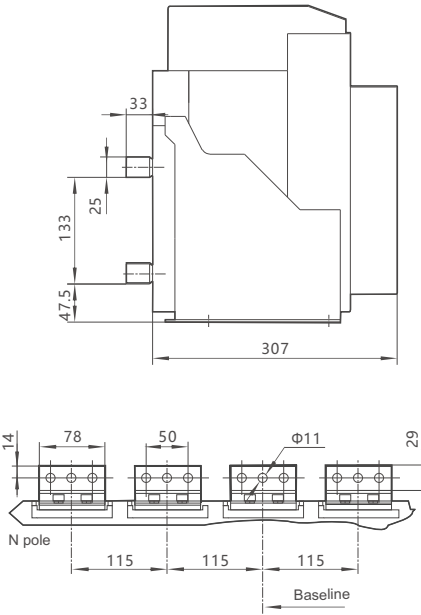


Figure 7.6-1 Perforating size of NA8-3200 fixed type

Side view



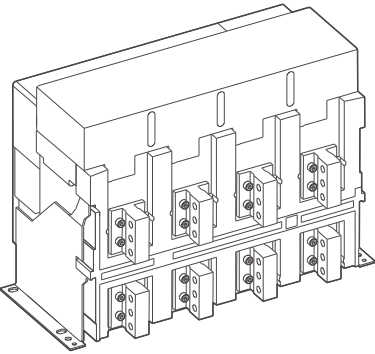
Busbar installation dimensions



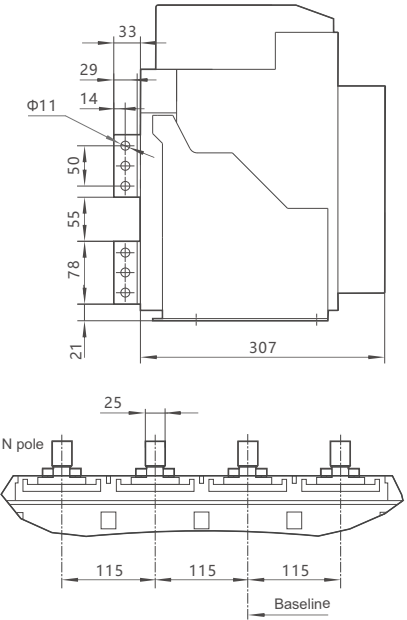
Note: User only needs to rotate the bus 90° to change horizontal connection to vertical connection.

Figure 7.6-2 Horizontal busbar connection of NA8-3200 fixed type (In=1600A~2500A)

Side view



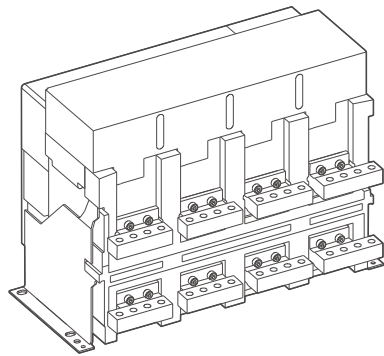
Busbar installation dimensions



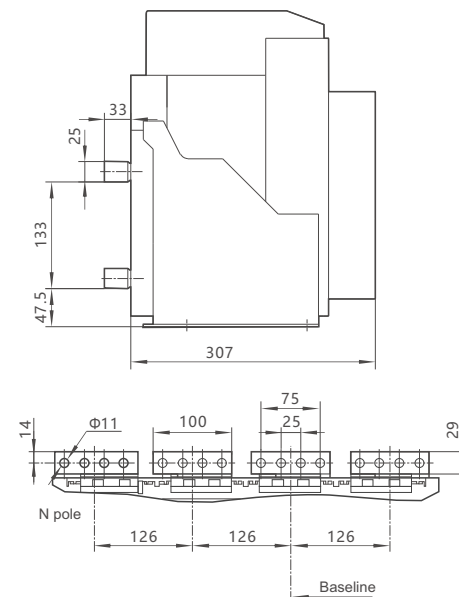
Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Figure 7.6-3 Vertical busbar connection of NA8-3200 fixed type (In=1600A~2500A)

Side view



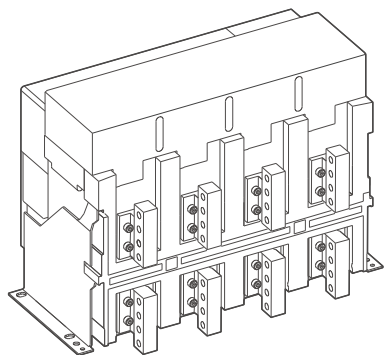
### Busbar installation dimensions



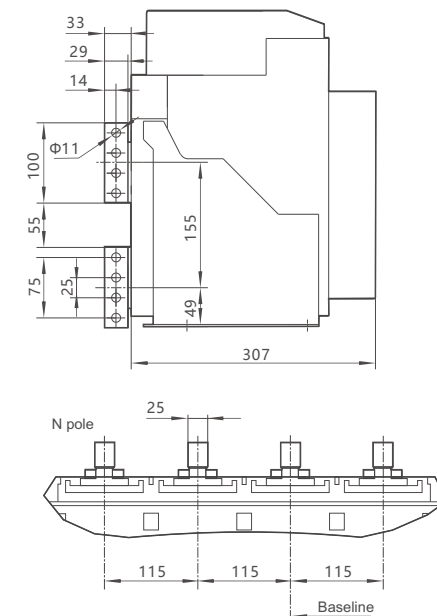
Note: To change horizontal connection to vertical connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

**Figure 7.6-4 Horizontal busbar connection of NA8-3200 fixed type (In=3200A)**

Side view



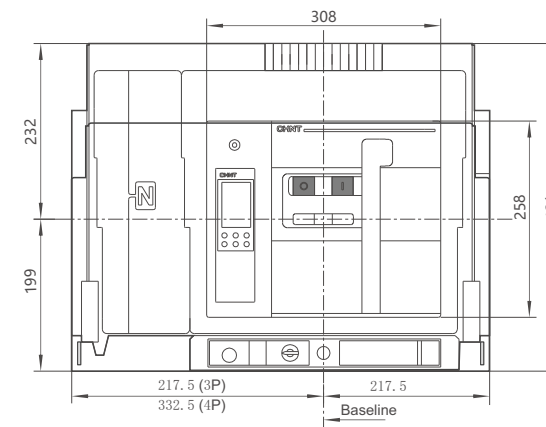
### Busbar installation dimensions



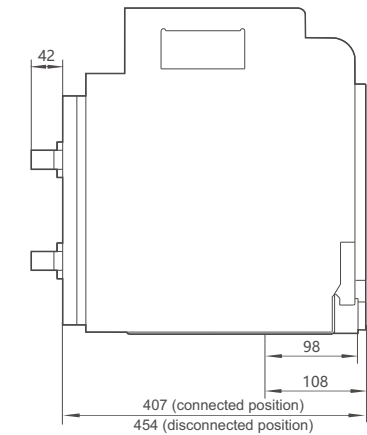
Note: To change vertical connection to horizontal connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

**Figure 7.6-5 Vertical busbar connection of NA8-3200 fixed type (In=3200A)**

Front view

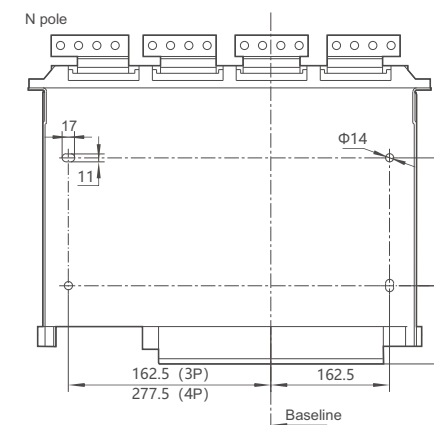


Side view

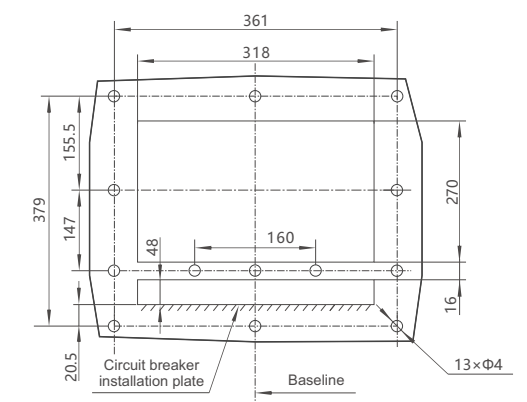


**Figure 7.7 Overall dimensions of NA8-4000 withdrawable type**

Hole size of the base

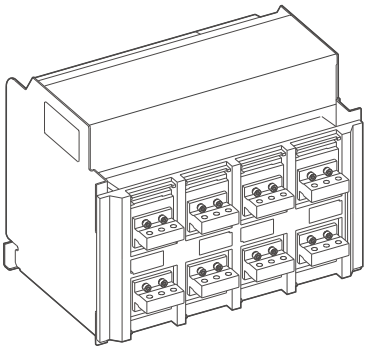


Hole size of the base



**Figure 7.7-1 Perforating size of NA8-4000 withdrawable type**

Side view



Note: User only needs to rotate the bus 90° to change horizontal connection to vertical connection.

Busbar installation dimensions

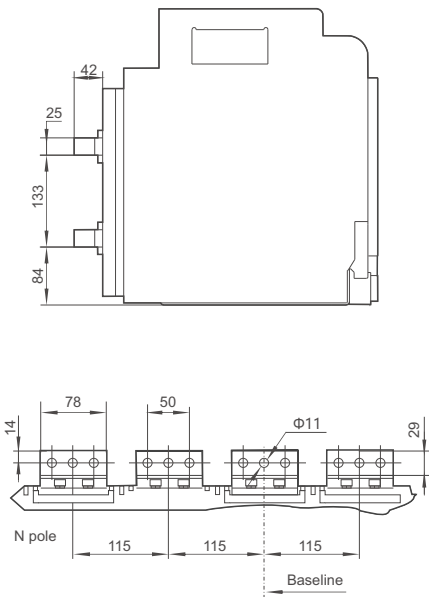
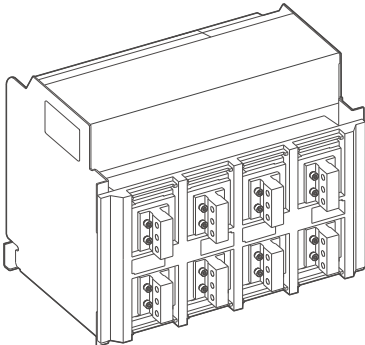


Figure 7.7-2 Horizontal busbar connection of NA8-4000 withdrawable type(In=1600A~2500A)

Side view



Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Busbar installation dimensions

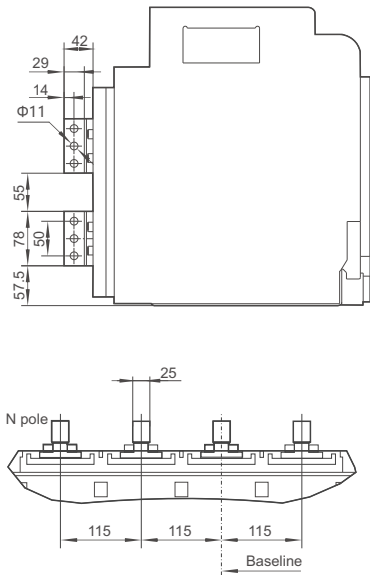
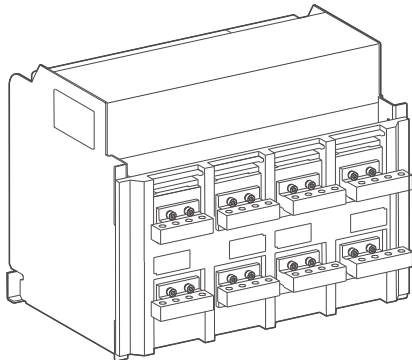


Figure 7.7-3 Vertical busbar connection of NA8-4000 withdrawable type(In=1600A~2500A)

Side view



Note: To change horizontal connection to vertical connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

Busbar installation dimensions

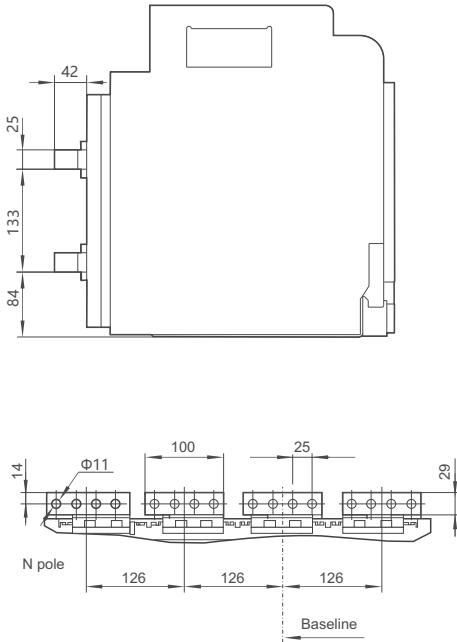
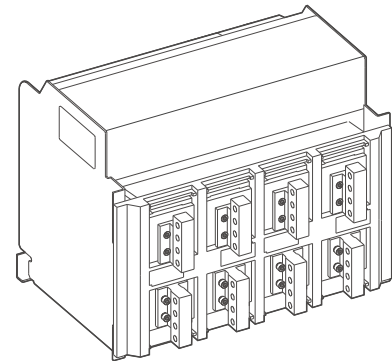


Figure 7.7-4 Horizontal busbar connection of NA8-4000 withdrawable type (In=3200A~4000A)

Side view



Note: To change vertical connection to horizontal connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

Busbar installation dimensions

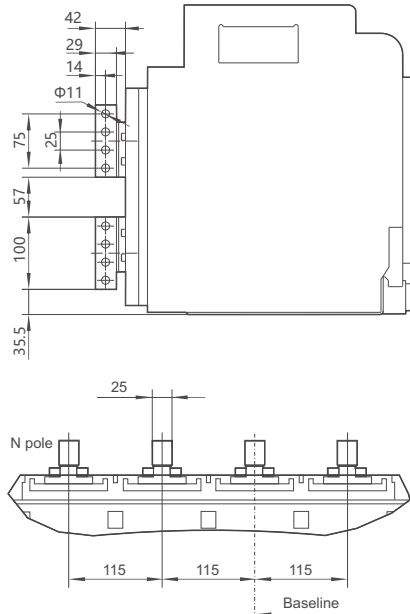


Figure 7.7-5 Vertical busbar connection of NA8-4800 withdrawable type (In=3200A~4000A)

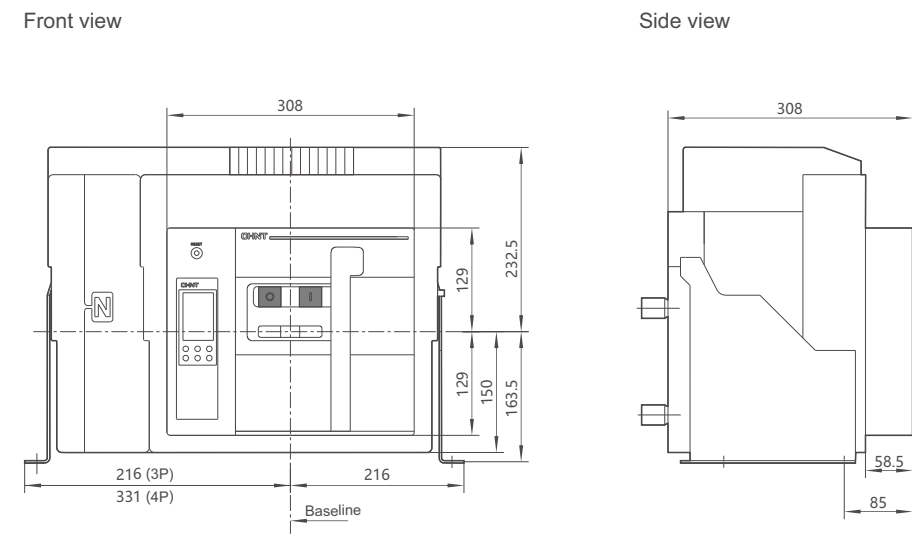


Figure 7.8 Overall dimensions of NA8-4000 fixed type

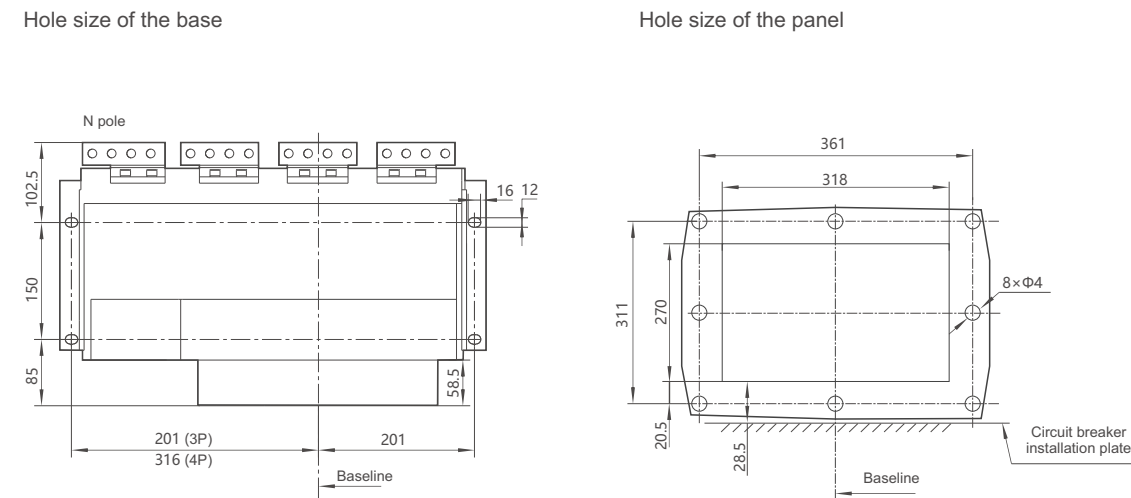
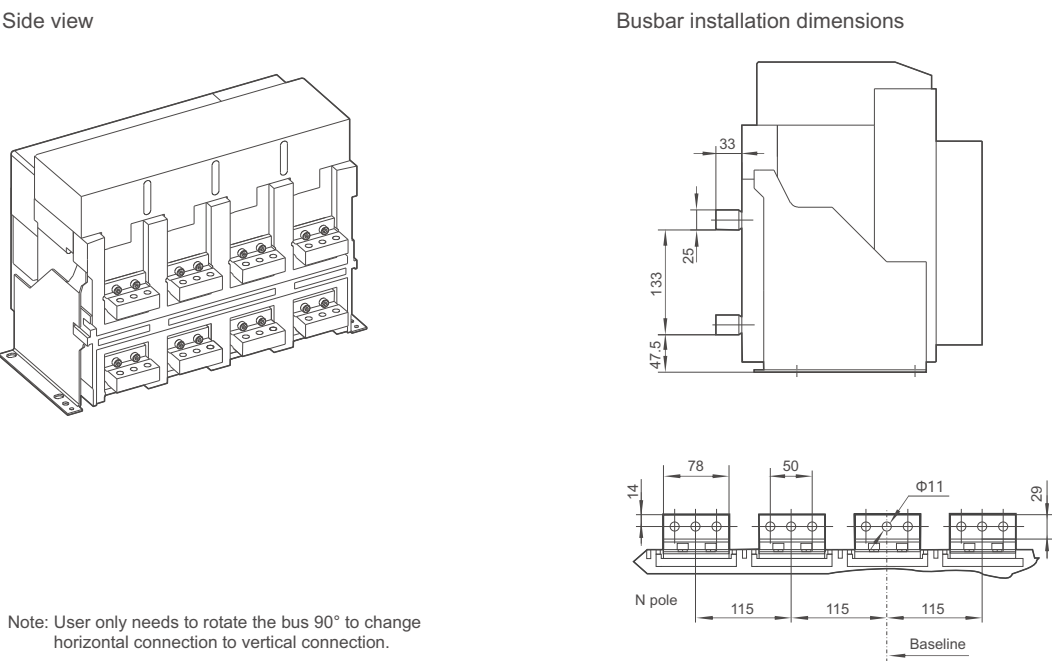
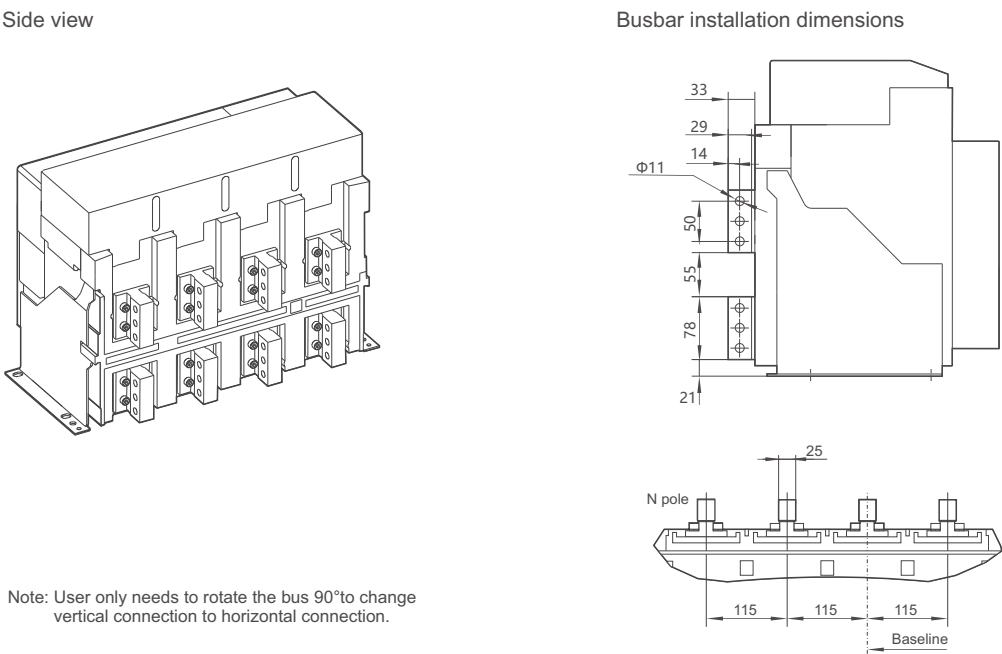


Figure 7.8-1 Perforating size of NA8-4000 fixed type



Note: User only needs to rotate the bus 90° to change horizontal connection to vertical connection.

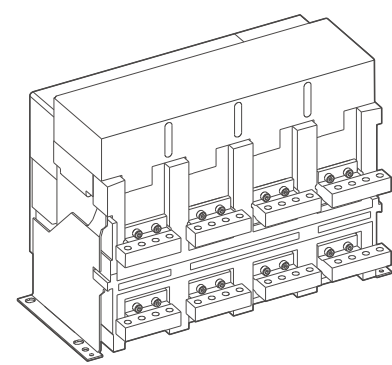
Figure 7.8-2 Horizontal busbar connection of NA8-4000 fixed type (In=1600A~2500A)



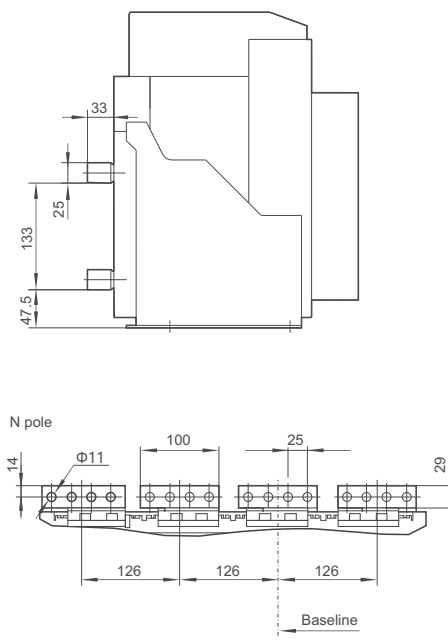
Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Figure 7.8-3 Vertical busbar connection of NA8-4000 fixed type (In=1600A~2500A)

Side view



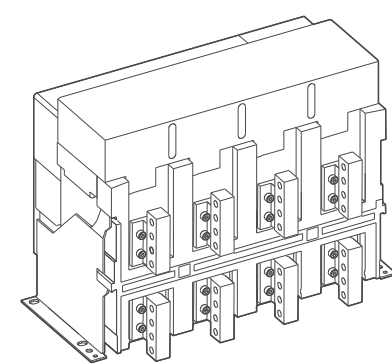
Busbar installation dimensions



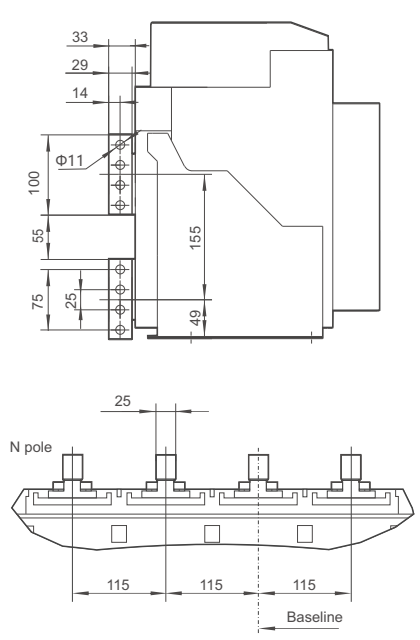
Note: To change horizontal connection to vertical connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

Figure 7.8-4 Horizontal busbar connection of NA8-4000 fixed type (In=3200A~4000A)

Side view



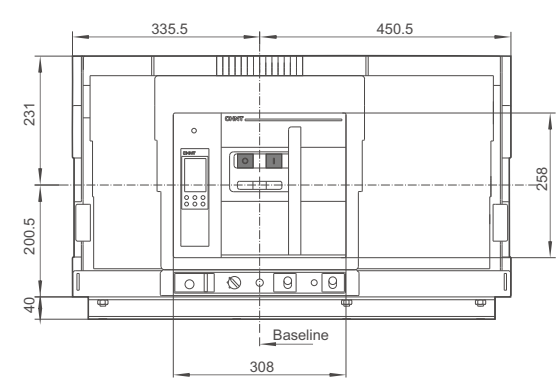
Busbar installation dimensions



Note: To change vertical connection to horizontal connection, user needs to change the upper and lower buses of phase N and phase B to the same as those of phase A and phase C.

Figure 7.8-5 Vertical busbar connection of NA8-4000 fixed type (In=3200A~4000A)

Front view



Side view

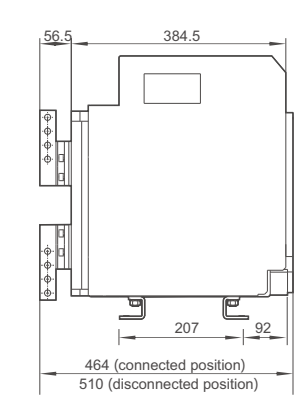
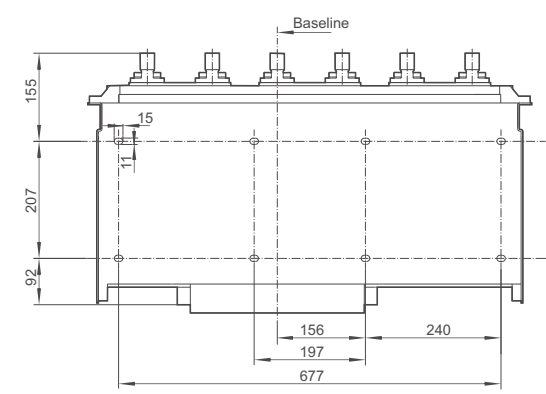


Figure 7.9 Overall dimensions of NA8-7500 3-pole withdrawable type (In=4000A~6300A)

Hole size of the base



Hole size of the panel

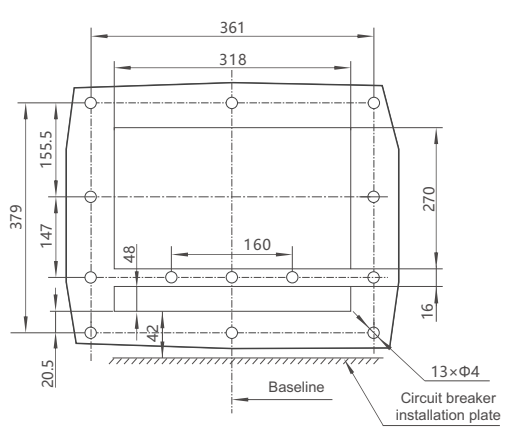
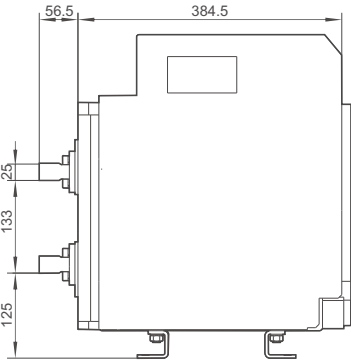


Figure 7.9-1 Perforating size of NA8-7500 3-pole withdrawable type (In=4000A~6300A)



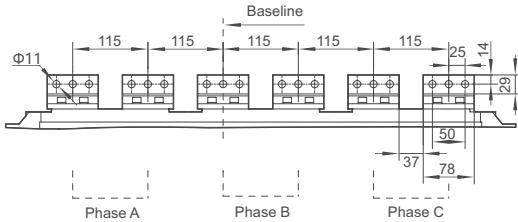
Side view



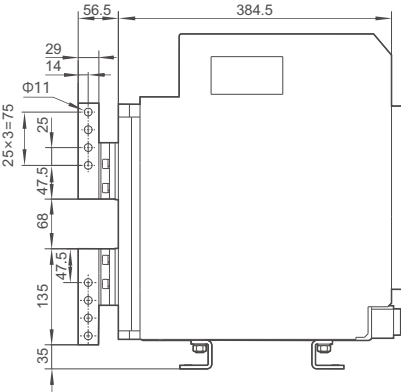
Note: User only needs to rotate the bus 90° to change horizontal connection to vertical connection.

Figure 7.9-2 Horizontal busbar connection of NA8-7500 3-pole withdrawable type (In=4000A~5000A)

Busbar installation dimensions



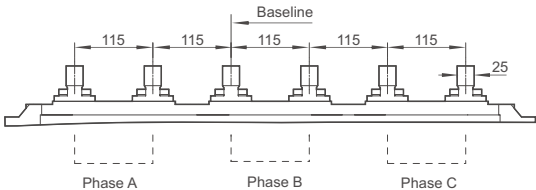
Side view



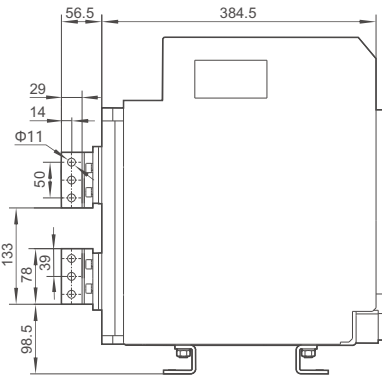
Note: In=6300A is only available with vertical connection, horizontal connection is not available.

Figure 7.9-4 Vertical busbar connection of NA8-7500 3-pole withdrawable type (In=6300A)

Busbar installation dimensions



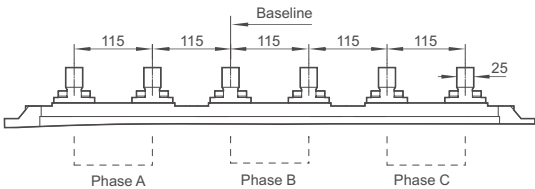
Side view



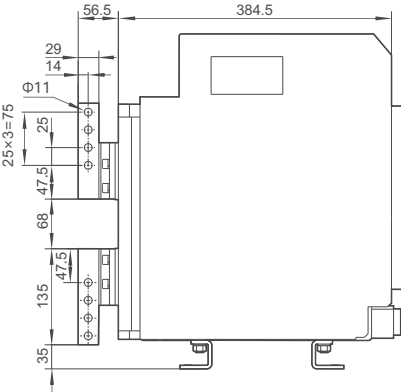
Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Figure 7.9-3 Vertical busbar connection of NA8-7500 3-pole withdrawable type (In=4000A~5000A)

Busbar installation dimensions



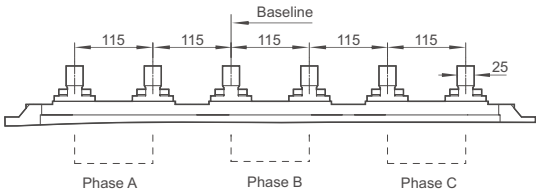
Side view



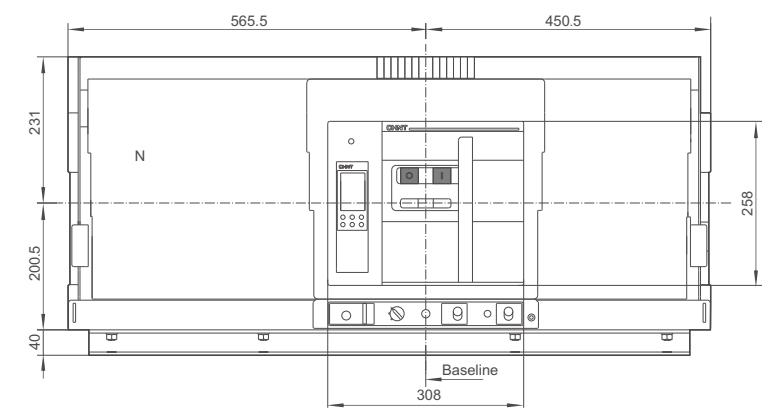
Note: In=6300A is only available with vertical connection, horizontal connection is not available.

Figure 7.9-4 Vertical busbar connection of NA8-7500 3-pole withdrawable type (In=6300A)

Busbar installation dimensions



Front view



Side view

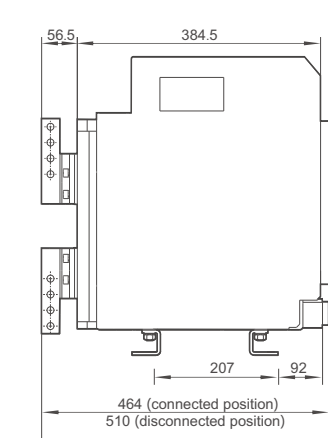
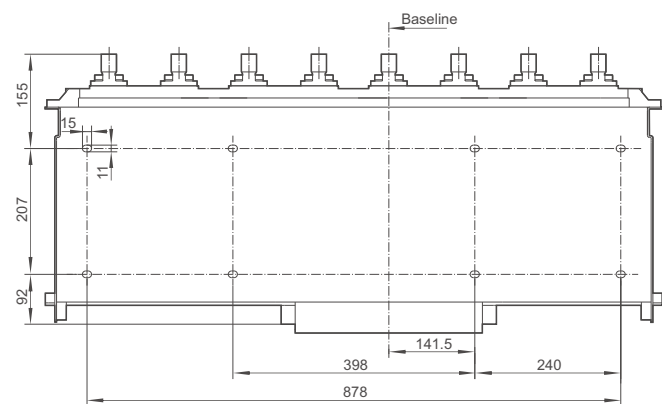


Figure 7.10 Overall dimensions of NA8-7500 withdrawable type 4 poles (In=4000A~6300A) /3&4 poles (In=7500A)

Hole size of the base



Panel perforating size

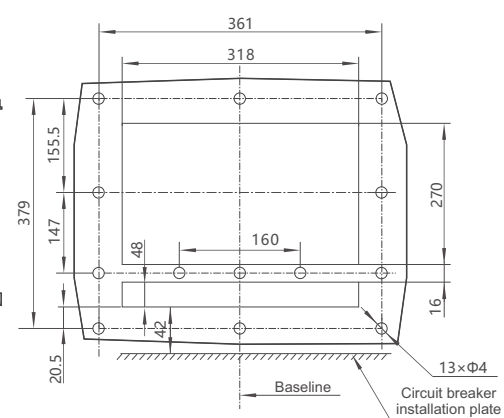
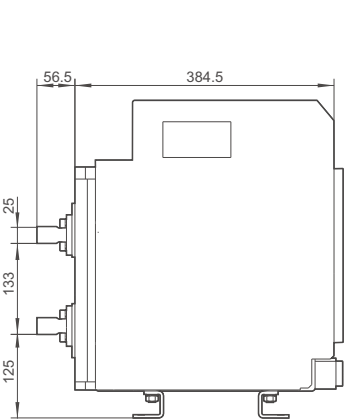
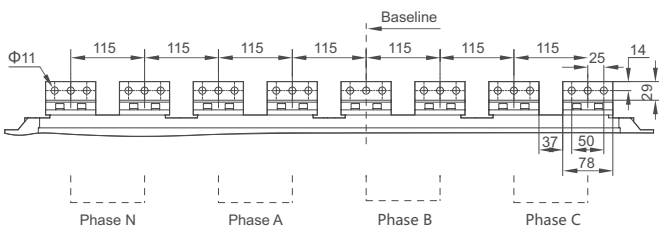


Figure 7.10-1 Perforating size of NA8-7500 withdrawable type 4 poles (In=4000A~6300A) /3&4 poles (In=7500A)

Side view



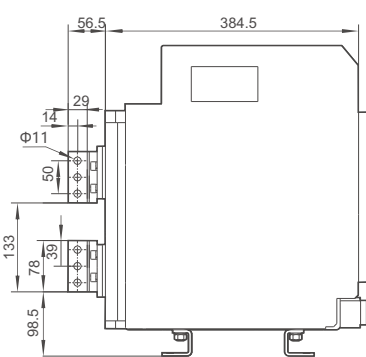
Busbar installation dimensions



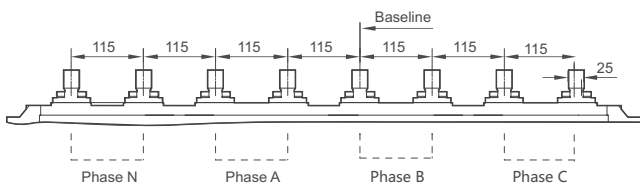
Note: User only needs to rotate the bus 90° to change horizontal connection to vertical connection.

Figure 7.10-2 Horizontal busbar connection of NA8-7500 4-pole withdrawable type (In=4000A~5000A)

Side view



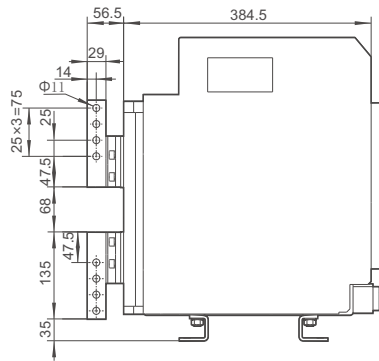
Hole size of the panel



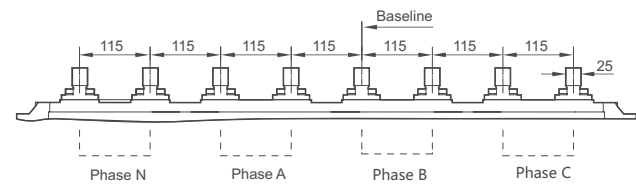
Note: User only needs to rotate the bus 90° to change vertical connection to horizontal connection.

Figure 7.10-3 Vertical busbar connection of NA8-7500 4-pole withdrawable type (In=4000A~5000A)

Side view



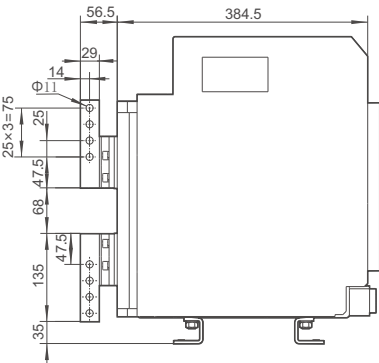
Busbar installation dimensions



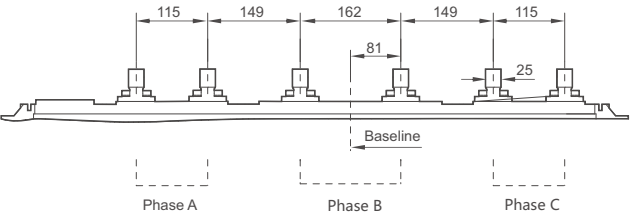
Note: In=6300A is only available with vertical connection, horizontal connection is not available.

Figure 7.10-4 Vertical busbar connection of NA8-7500 4-pole withdrawable type (In=6300A)

Side view



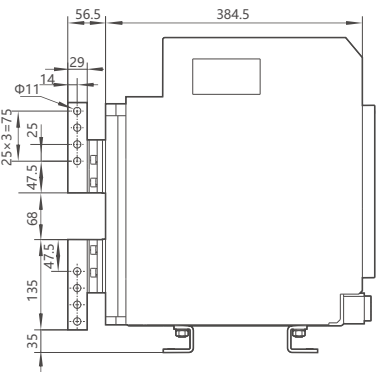
Busbar installation dimensions



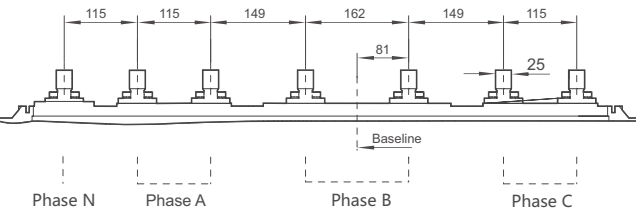
Note: In=7500A is only available with vertical connection, horizontal connection is not available.

Figure 7.10-5 Vertical busbar connection of NA8-7500 3-pole withdrawable type (In=7500A)

Side view

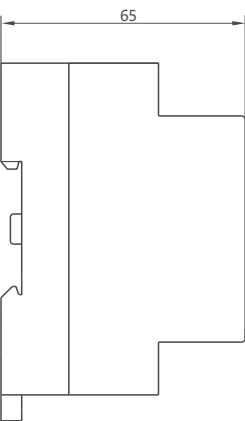
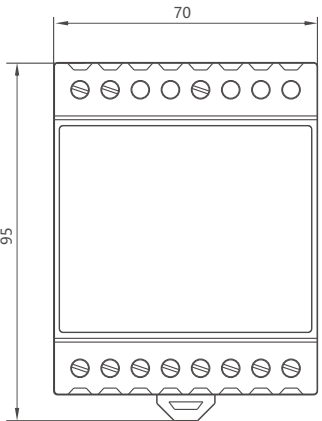


Busbar installation dimensions



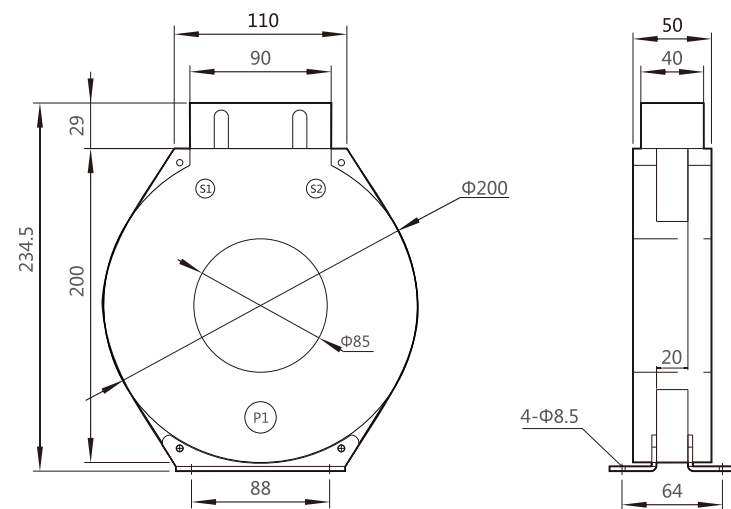
Note: In=7500A is only available with vertical connection, horizontal connection is not available.

Figure 7.10-6 Vertical busbar connection of NA8-7500 4-pole withdrawable type (In=7500A)

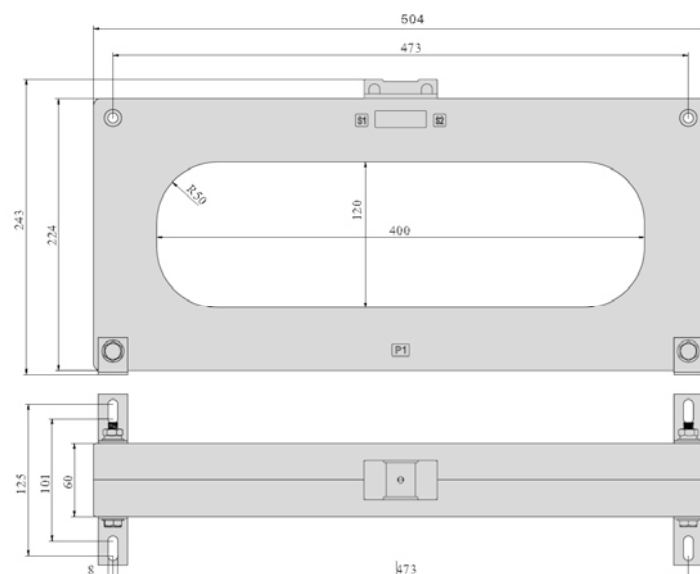


Note: Undervoltage delay control module(UVTZ-1), power module(PSU-1) and relay signal module(RU-1) are of same outline dimension, 35mm standard guide rail installation can also be used for installation.

Figure 7.11 Overall dimensions of undervoltage delay control module, power module, RU-1 relay signal module

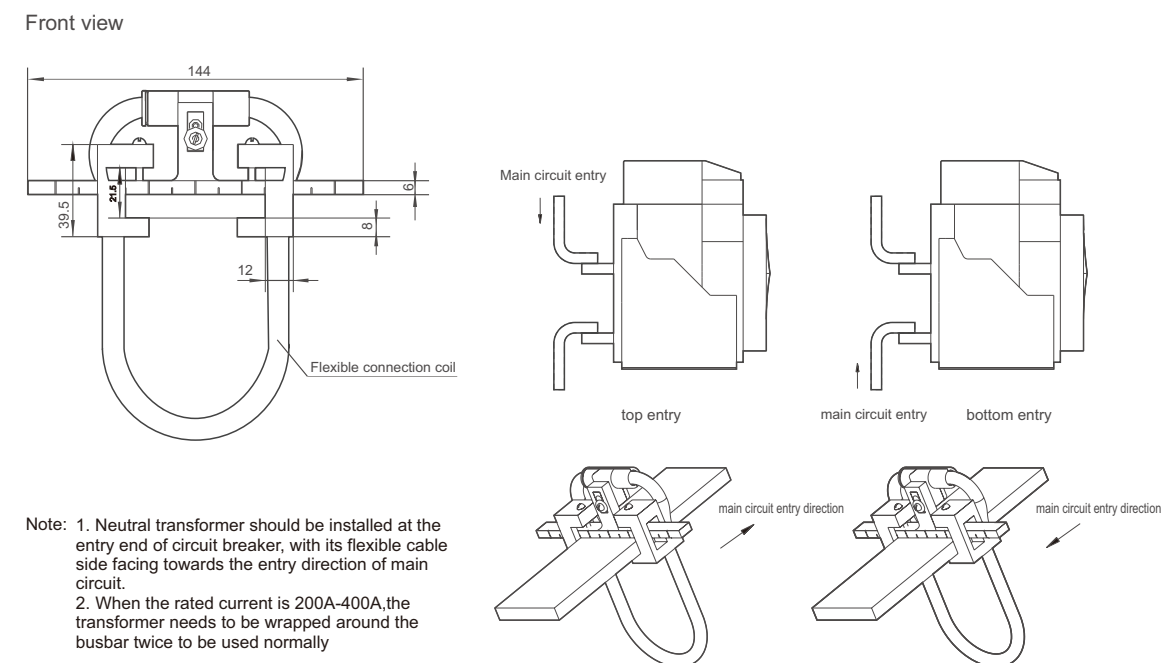


**Figure 7.12 Overall dimensions of earth current transformer**



Note: 1. The circuit breaker selected for the configuration of leakage current transformer can only be selected if the rated current is  $\leq 3200A$ .  
2. 1600 frame can be horizontally or vertically outgoing, 2500 and 3200 frames use vertical outgoing.

**Figure 7.13 Overall dimensions of leakage protection transformer**



**Figure 7.14 Overall dimensions of neutral pole current transformer**

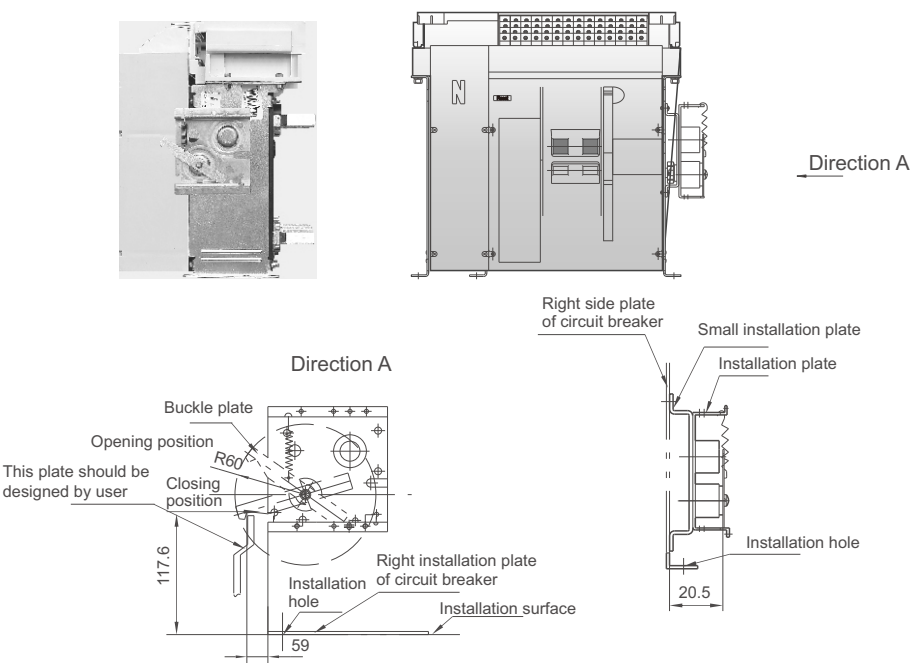


Figure 7.15 NA8-1600 fixed type circuit breaker status door interlock installation dimensions

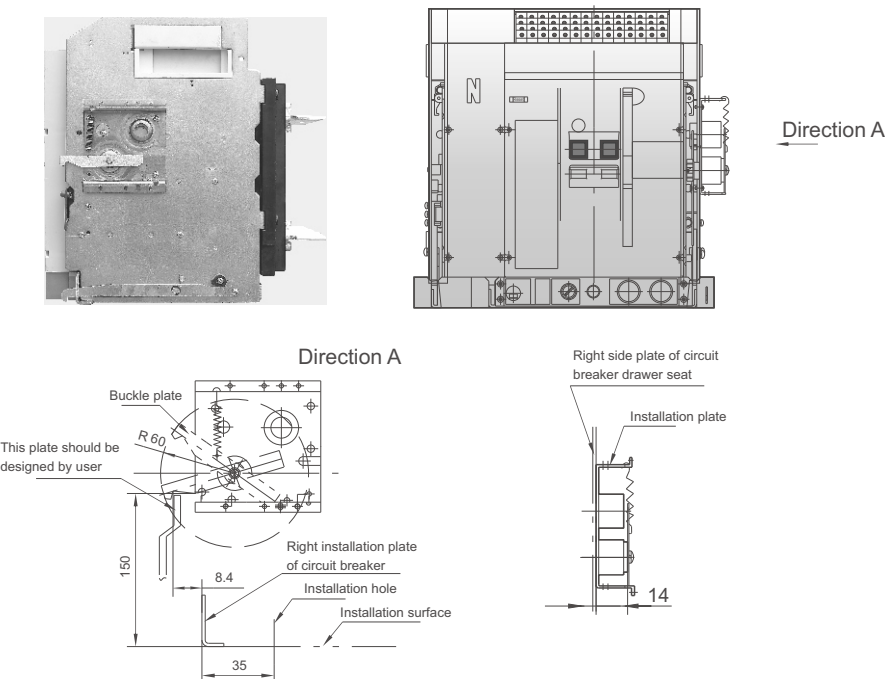


Figure 7.16 NA8-1600 withdrawable type circuit breaker status door interlock installation dimensions

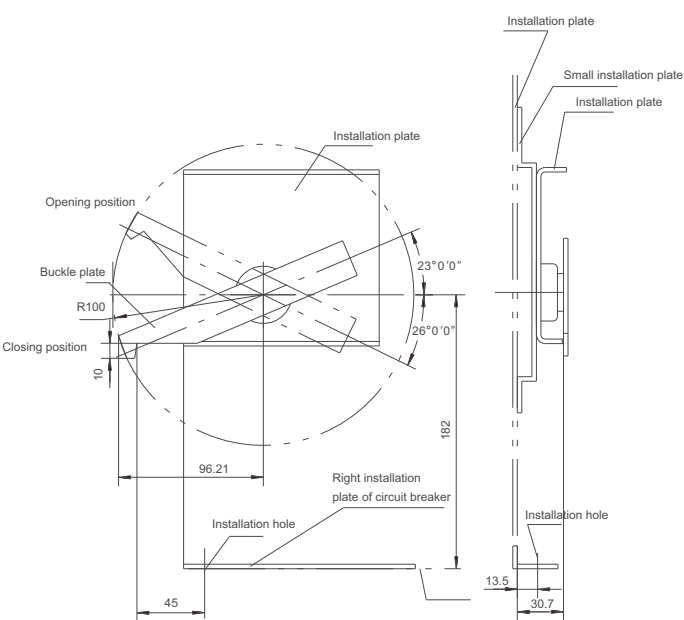


Figure 7.17 NA8-2500~4000 fixed type circuit breaker status door interlock installation dimensions

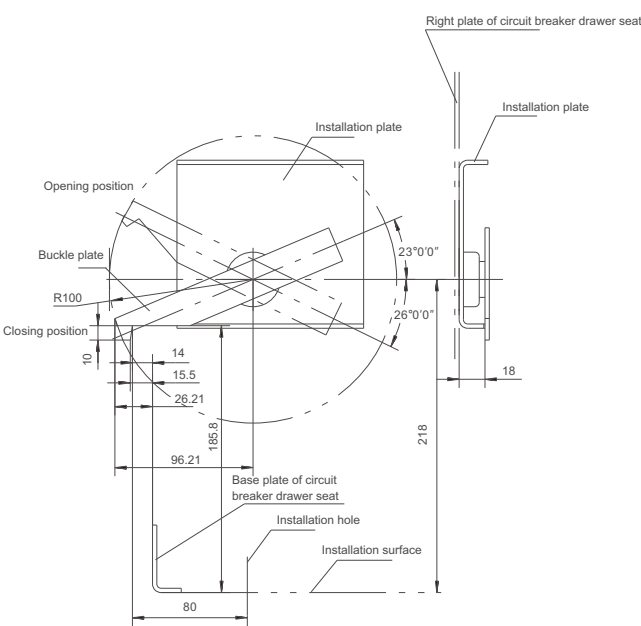


Figure 7.18 NA8-2500~7500 withdrawable type circuit breaker status door interlock installation dimensions

8 Control circuit electrical wiring diagram

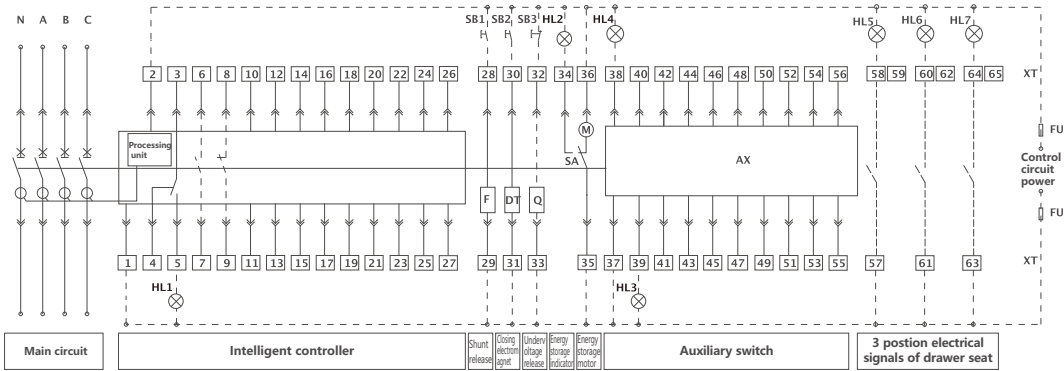
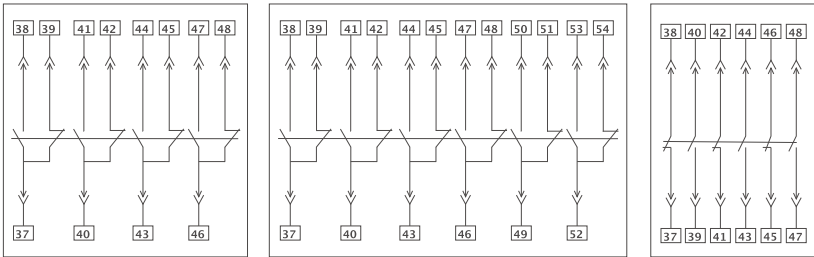


Figure 8.1 Control circuit wiring diagram of NA8-1600 M controller

C04 4 group conversion contact (default) C06 6 group conversion contact (optional) N3 3NO, 3NC contact (optional)



F-shunt release DT-closing electromagnet Q-undervoltage release  
M-motor operating mechanism  
SA-position switch XT-terminal AX-auxiliary terminal SB1-Breaking button  
SB2-Making button SB3-emergency stop button HL1-fault indicator  
HL2-energy storage indicator  
HL3-Breaking indicator HL4-Making indicator HL5~7-position indicator  
FU-fuse (6A)  
1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#; If voltage is DC220/110V, a 24V output from power module is required before being connected to 1#, 2#  
3#~ 5#: trip alarm contact (3 is the common contact)  
6#~ 9#: auxiliary contact (1 NO and 1 NC contact), optional  
10#, 11#: empty  
12#~ 19#: empty

20#: empty  
21#~ 24#: empty  
24#, 25#: signal input contact for external N phase transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.  
27#: protectively earthed, connected to exterior panel of circuit breaker.  
28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release  
34#~36#: motor operating mechanism  
37#~ 56#: auxiliary contact. Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 3NO/3NC contacts are available if specially ordered by user. 6-group conversion auxiliary contacts are only applicable to AC current.  
57#~65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.  
Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.1-1 AX auxiliary contact wiring diagram of NA8-1600 M controller

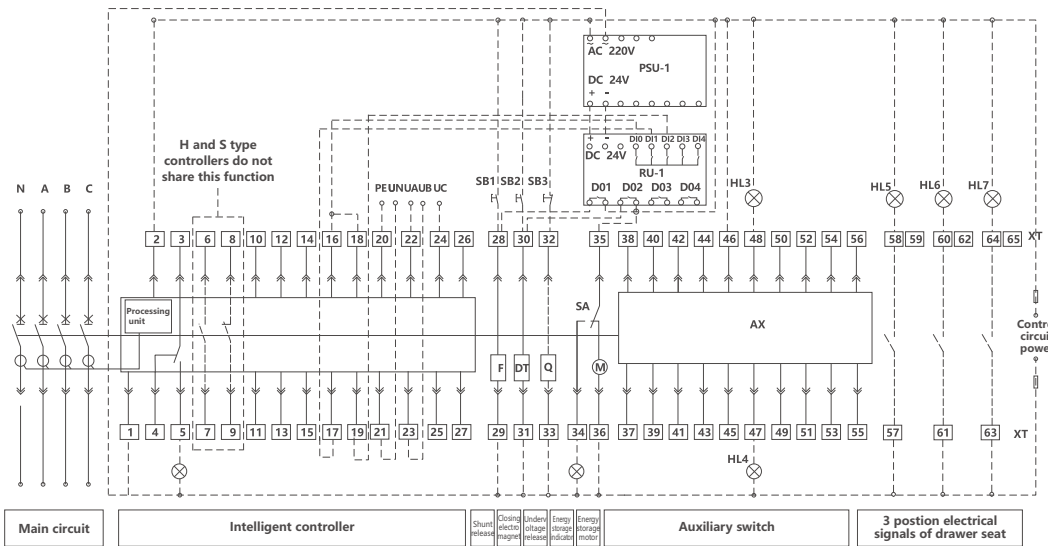
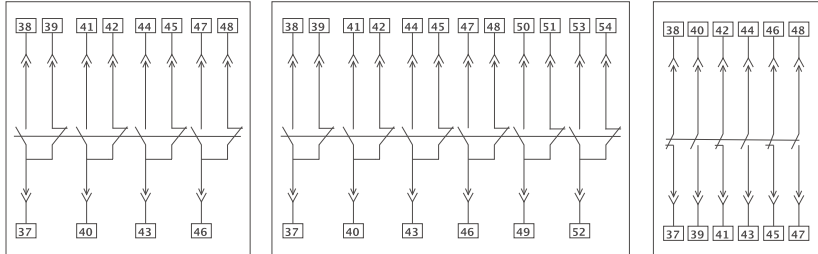


Figure 8.2 Control circuit wiring diagram of NA8-1600 H/S controller

C04 4 group conversion contact (default) C06 6 group conversion contact (optional) N3 3NO, 3NC contact (optional)



F-shunt release DT-closing electromagnet Q-under voltage release M-motor operating mechanism SA-position switch XT-terminal AX-auxiliary terminal  
SB1-Breaking button  
SB2-Making button SB3-emergency stop button HL1-fault indicator  
HL2-energy storage indicator HL3-Breaking indicator HL4-Makeing indicator  
HL5~7-position indicator  
FU-fuse (6A)  
1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#; If voltage is DC220/110V, a 24V output from power module is required before being connected to 1#, 2#  
3#~ 5#: trip alarm contact (3 is the common contact)  
6#~ 9#: H-type controller,6#, 7#:normally open contact:  
8#, 9#:normally closed contact;optional  
S-type controller,6#, 7#:Internal communication interface (used for AMU and PMU detection modules)  
8#, 9#:internal switch state detection  
10#, 11#: H and S type intelligent controller default communication output terminal  
12#~ 19#: 4 groups of programmable output signals, must be connected with external RU-1 relay module. Prohibit access to high voltage signal  
12#, 13#:load 1 alarm;14#, 15#:load 2 alarm;16#, 17#:open signal output; 18#, 19#:closing signal output;

20#: PE line  
21#~ 24#: voltage display input signal terminal, 21#: Phase N voltage signal, 22#: phase A voltage signal, 23#: phase B voltage signal, 24#: phase C voltage signal.  
25#, 26#: signal input contact for external N phase transformer or external earth current transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.  
27#: empty.  
28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release  
34#~36#: motor operating mechanism  
37#~ 56#: auxiliary contact. 6-group conversion auxiliary contacts are only applicable to AC current.  
Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 3NO/3NC contacts are available if specially ordered by user.  
57#~65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.  
RU-1: relay module. Upstream machine opens and closes circuit breaker through remote control, used for opening and closing signal energy amplification, which will be charged separately.  
Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.2-1 AX auxiliary contact wiring diagram of NA8-1600 H/S controller

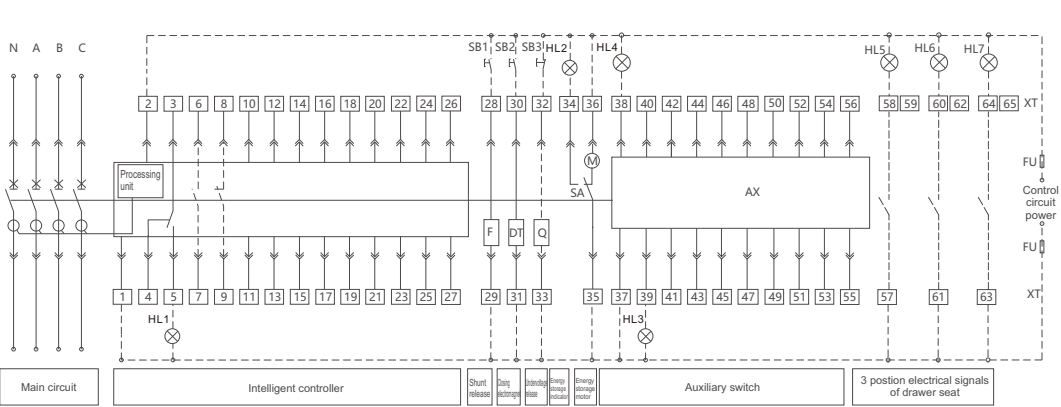


Figure 8.3 Control circuit wiring diagram of NA8-2500~7500 M controller

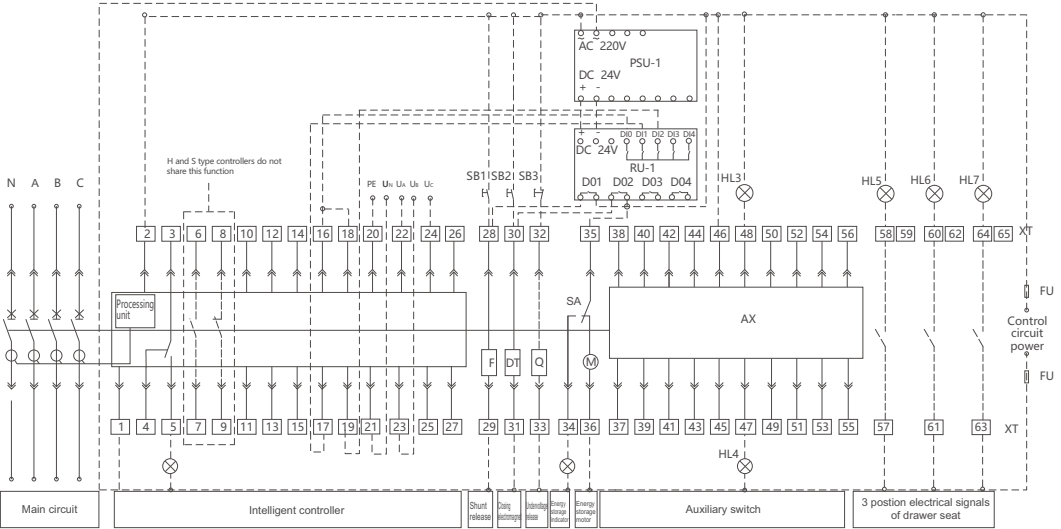
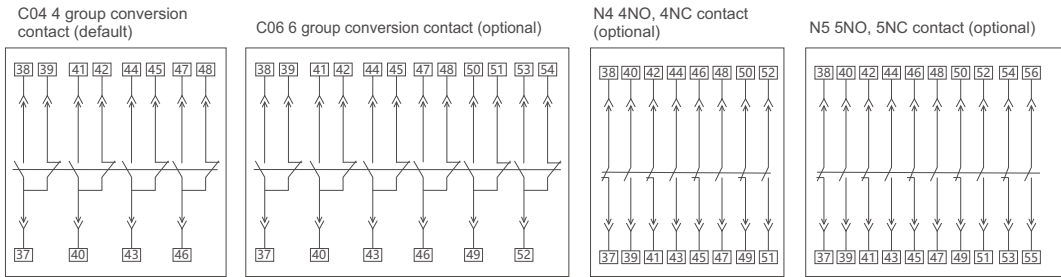


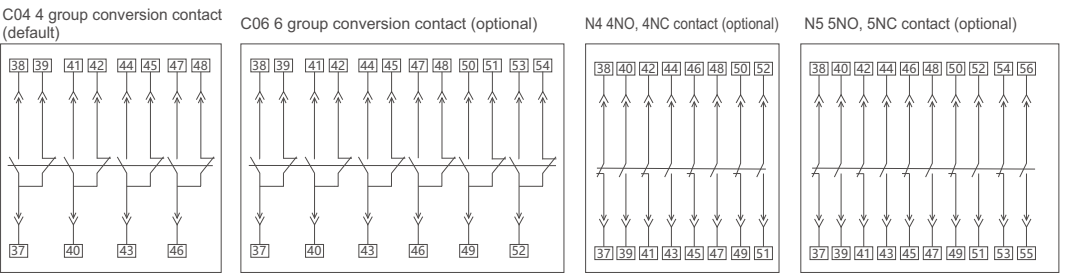
Figure 8.4 Control circuit wiring diagram of NA8-2500~7500 H/S controller



F—shunt release DT—closing electromagnet Q—under voltage release M—motor operating mechanism  
SA—position switch XT—terminal AX—auxiliary terminal SB1—Breaking button SB2—Makeing button SB3—emergency stop button HL1—fault indicator HL2—energy storage indicator HL3—Breaking indicator HL4—Makeing indicator HL5~7—position indicator FU—fuse (6A)  
1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#; If voltage is DC220/110V, a 24V output from power module will be required before being connected to 1#, 2#  
3#~ 5#: trip alarm contact (3 is common contact)  
6#~ 9#: auxiliary contact (1 NO and 1 NC contact), optional  
10#, 11#: empty  
12#~ 19#: empty  
20#: empty  
21#~ 24#: empty

24#, 25#: signal input contact for external N phase transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.  
27#: protectively earthed, connected to exterior panel of circuit breaker.  
28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release  
34#~36#: motor operating mechanism  
37#~ 56#: auxiliary contact. 6-group conversion auxiliary contacts are only applicable to AC current.  
Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 4NO/4NC contacts and 5NO/5NC contacts are available if specially ordered by user.  
57#~65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.  
Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.3-1 AX auxiliary contact wiring diagram of NA8-2500~7500 M controller



F—shunt release DT—closing electromagnet Q—under voltage release M—motor operating mechanism SA—position switch XT—terminal AX—auxiliary terminal SB1—Breaking button SB2—Makeing button SB3—emergency stop button HL1—fault indicator HL2—energy storage indicator HL3—Breaking indicator HL4—Makeing indicator HL5~7—position indicator FU—fuse (6A)  
1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#; If voltage is DC220/110V, a 24V output from power module is required before being connected to 1#, 2#  
3#~ 5#: trip alarm contact (3 is the common contact)  
6#~ 9#: H-type controller; 6#, 7#: normally open contact; 8#, 9#: normally closed contact; optional  
S-type controller; 6#, 7#: Internal communication interface (used for AMU and PMU detection modules)  
8#, 9#: internal switch state detection  
10#, 11#: H and S type intelligent controller default communication output terminal  
12#~ 19#: 4 groups of programmable output signals, must be connected with external RU-1 relay module. Prohibit access to high voltage signal  
12#, 13#: load 1 alarm; 14#, 15#: load 2 alarm; 16#, 17#: open signal output; 18#, 19#: closing signal output;  
20#: PE line  
21#~ 24#: voltage display input signal terminal, 21#: Phase N voltage signal, 22#: phase A voltage signal, 23#: phase B voltage signal, 24#: phase C voltage signal.

25#, 26#: signal input contact for external N phase transformer or external earth current transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.  
27#: empty.  
28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release  
34#~36#: motor operating mechanism  
37#~ 56#: auxiliary contact. 6-group conversion auxiliary contacts are only applicable to AC current.  
Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 4NO/4NC contacts and 5NO/5NC contacts are available if specially ordered by user.  
57#~65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.  
ST-DP: DP protocol module, no need for ST-DP protocol module if upstream communication protocol is Modbus-RTU; use ST-DP protocol module to transfer Modbus-RTU protocol into Profibus-DP protocol if upstream communication protocol is Profibus-DP, which will be charged separately.  
RU-1: relay module. Upstream machine opens and closes circuit breaker through remote control, used for opening and closing signal energy amplification, which will be charged separately.  
Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.4-1 AX auxiliary contact wiring diagram of NA8-2500~7500 H/S controller

9 Intelligent controller usage

9.1 Intelligent controller functional configuration

Table 13 Intelligent controller functional configuration

| Controller functions |                          |  | M   | H             | S         |
|----------------------|--------------------------|--|---|---------------|-----------|
|                      |                          |  | Standard type                             | Harmonic type | IoT type  |
| Display mode         |                          |  | LED digitron                              | LCD screen    | Color LCD |
| Protection           | Current protections      | Overload long delay                              | ■   | ■             | ■         |
|                      |                          | Short circuit short delay                        | ■   | ■             | ■         |
|                      |                          | Short circuit instantaneous                      | ■   | ■             | ■         |
|                      |                          | Earth protections (1 of 2)                       | Vector sum earth protection               |               | ■         |
|                      |                          |  | Transformer center point earth protection |               | □         |
|                      |                          | Electric leakage protection                      | -   | □             | □         |
|                      |                          | Neutral pole protection (4P.3P + N)              | □   | □             | □         |
|                      |                          | Overload early alarm                             | ■   | ■             | ■         |
|                      |                          | Current open phase protection                    | -   | □             | ■         |
|                      |                          | Current unbalance protection                     | ■   | ■             | ■         |
|                      |                          | MCR (making control routine)                     | ■   | ■             | ■         |
|                      |                          | HSISC (overreach tripping)                       | ■   | ■             | ■         |
|                      |                          | Required current protection                      | -   | □             | ■         |
|                      | Voltage protections      | Over/under-voltage/phase sequence protection     |   | ■             | ■         |
|                      |                          | Voltage unbalance protection                     |   | ■             | ■         |
|                      |                          | Voltage open-phase protection                    |   | □             | ■         |
|                      | Frequency protections    | Over/under-frequency protection                  |   | ■             | ■         |
|                      |                          | Frequency change rate protection                 |   | -             | ■         |
|                      | Power protections        | Inverse power protection                         |   | ■             | ■         |
|                      |                          | Under/over-power protection                      |   | -             | ■         |
|                      | Other                    | Thermal memory                                   |   | ■             | ■         |
|                      |                          | Load monitoring                                  |   | □             | □         |
|                      |                          | Region selective interlock                       |   | □             | □         |
| Meas.                | Current                  | Phase current/neutral line current/earth current |   | ■             | ■         |
|                      |                          | Residual current                                 |   | □             | □         |
|                      |                          | Average current                                  |   | ■             | ■         |
|                      |                          | Current unbalance rate                           |   | ■             | ■         |
|                      | Voltage                  | Phase voltage/line voltage                       |   | ■             | ■         |
|                      |                          | Voltage unbalance rate                           |   | ■             | ■         |
|                      |                          | Phase sequence                                   |   | ■             | ■         |
|                      | Power                    | Active/reactor/apparent power                    |   | ■             | ■         |
|                      | Electric energy          | Active/reactive/apparent electric energy         |   | ■             | ■         |
|                      | Power factor             |  | ■   | ■             | ■         |
|                      | Frequency                |  | ■   | ■             | ■         |
|                      | Waveform display         |  | ■   | ■             | ■         |
|                      | Measurement of harmonics |  | ■   | ■             | ■         |
|                      | Required value           | Required current/required power                  |   | □             | ■         |

Table13(continue)

| Controller functions   |   |   |                        | M             | H             | S         |
|--|---|---|------------------------|---------------|---------------|-----------|
|  |   |   |                        | Standard type | Harmonic type | IoT type  |
| Display mode   |   |   |                        | LED digitron  | LCD screen    | Color LCD |
| Health diagnosis   | Health test                             | Fault tripping test   |                        | ■             | ■             | ■         |
|  | Health prompts                          | Controller functional monitoring                                |                        | ■             | ■             | ■         |
|  |   | CB accessories monitoring                                       |                        | -             | -             |           |
|  |   | CB temp. monitoring   | Controller temperature | -             | -             | ■         |
|  |   |   | Busbar temperature     | -             | -             |           |
|  | Health forecast                         | Contact wear equivalent   |                        | -             | ■             | ■         |
|  |   | Remaining service life  |                        | ■             | ■             | ■         |
|  | Maintenance prompts                     | Prompt for trip/close functions                                 |                        | -             | -             | ■         |
|  |   | Prompt for controller accessory module                          |                        | -             | -             |           |
|  |   | Prompt for circuit breaker (CB) (service life/temperature etc.) |                        | -             | -             | ■         |
| Event records  | Tripping/alarm records (10 times)       |   |                        | ■             | ■             | ■         |
|  | Displacement records (10 times)         |   |                        | -             | ■             | ■         |
|  | Operation times record                  |   |                        | ■             | ■             | ■         |
|  | Internal clock function                 |   |                        | -             | ■             | ■         |
|  | Max./min. history current               |   |                        | -             | -             | ■         |
|  | Max./min. history voltage               |   |                        | -             | -             | ■         |
|  | Max./min. frequency                     |   |                        | -             | -             | ■         |
|  | Peak required power                     |   |                        | -             | -             | ■         |
|  | Max. required current                   |   |                        | -             | -             | ■         |
|  | Electric energy quality analysis record |   |                        | -             | -             | ■         |
| Smart inter-connect  | Blue-tooth                              |   |                        | -             | ■             | ■         |
|  | USB                                     |   |                        | -             | ■             | ■         |
|  | NFC                                     |   |                        | -             | ■             | ■         |
|  | Modbus RTU                              |   |                        | -             | ■             | ■         |
|  | DL/T645                                 |   |                        | -             | -             | □         |
|  | DL/T698                                 |   |                        | -             | -             | □         |
|  | HPLC                                    |   |                        | -             | -             | □         |
|  | Ethernet                                |   |                        | -             | □             | □         |
| Expanded functions   | Programmable signal output              |   |                        | -             | ■             | ■         |
|  | Closing by voltage check                |   |                        | -             | □             | □         |
|  | Dual parameter settings                 |   |                        | -             | -             | □         |
|  | Maintenance mode protection             |   |                        | -             | -             | □         |
|  | Program upgrade                         |   |                        | -             | -             | ■         |
|  | Remote reset                            |   |                        | -             | □             | □         |
|  | Authorities setup                       |   |                        | -             | -             | ■         |
|  | Harmonic alarm                          |   |                        | -             | -             | ■         |
| Notes: ■ Basic function; □ Optional function; - No such function |   |   |                        |               |               |           |



9.2 Intelligent controller protection characteristics and curves

The following is for type M functions and characteristics only. For types H/S, refer to special manuals.

9.2.1 Protection characteristics

Table 14 Protection characteristics

| Protection type  |      | Protection characteristics               | Action value   | Delay  | Graded difference (step length)   | Action tolerance (accuracy) | Can be closed |
|--|------|--|--|--|---|-----------------------------|---------------|
| Long delay protection  |      | Inverse time-limit I <sup>2</sup> T      | I <sub>r</sub> =0.4I <sub>n</sub> ~1I <sub>n</sub>   | Refer to Table 12  | 1A (1600, 2500)<br>2A(3200,4000,7500)   | ±10%                        | Yes           |
| Short circuit short delay protection   |      | Constant time-limit                      | I <sub>sd</sub> =1.5I <sub>r</sub> ~15I <sub>r</sub> (I <sub>n</sub> <3600A)   | 0.1s, 0.2s, 0.3s, 0.4s   | I<10kA 1A (1600, 2500) 2A (3200 , 4000,7500) I ≥ 10kA 10A (1600, 2500) 20A (3200, 4000,7500)    | ±10%                        | Yes           |
|  |      | Constant time-limit + inverse time-limit | I <sub>sd</sub> =1.5I <sub>r</sub> ~50kA (I <sub>n</sub> ≥3600A)   | 0.1s, 0.2s, 0.3s, 0.4s (I <sub>sd</sub> >8I <sub>r</sub> )<br>(8I <sub>r</sub> /I) <sup>2</sup> ×t <sub>sd</sub> (I <sub>sd</sub> ≤8I <sub>r</sub> ) |   |                             |               |
| Instantaneous protection   |      | /  | I <sub>i</sub> =1.5I <sub>n</sub> ~15I <sub>n</sub> (I <sub>n</sub> <5000A)<br>I <sub>i</sub> =1.5I <sub>n</sub> ~75kA (I <sub>n</sub> >6300A)   | /  | I <10kA 1A (1600 , 2500) 2A (3200, 4000,7500)<br>I ≥10kA 10A (1600, 2500) 20A (3200, 4000,7500) | ±10%                        | Yes           |
| Earth protection (vector sum)  |      | Constant time-limit protection           | I <sub>g</sub> =100A~1I <sub>n</sub> (I <sub>n</sub> ≤400) I <sub>g</sub> =0.2I <sub>n</sub> ~1I <sub>n</sub> (630A≤I <sub>n</sub> < 3200A)<br>I <sub>g</sub> =0.2I <sub>n</sub> ~3200A (I <sub>n</sub> >3200) | 0.1s, 0.2s, 0.3s, 0.4s   | 1A (1600,2500)<br>2A (3200, 4000, 7500)   | ±10%                        | Yes           |
| Current unbalance protection   |      | Constant time-limit                      | 20%-60%  | 1s~40s   | 1%  | ±10%                        | Yes           |
| Current open phase protection  |      | Constant time-limit                      | 90%~99%  | 0.1s~3s  | 1%  | ± 10%                       | Yes           |
| Neutral pole prot.   | 50%  | Constant time-limit + inverse time-limit | I <sub>r</sub> N=50%I <sub>r</sub> , I <sub>sd</sub> N=50%I <sub>sd</sub> , M <sub>N</sub> =50%I <sub>i</sub> , I <sub>g</sub> N=100%I <sub>g</sub>  | /  | /   | /                           | Yes           |
|  | 100% | Constant time-limit + inverse time-limit | I <sub>r</sub> N=100%I <sub>r</sub> , I <sub>sd</sub> N=100%I <sub>sd</sub> , I <sub>i</sub> N=100%I <sub>i</sub> , I <sub>g</sub> N=100%I <sub>g</sub>  | /  | /   | /                           | Yes           |
| Default settings: I <sub>r</sub> =1.0I <sub>n</sub> , t <sub>r</sub> =15s (@1.5I <sub>r</sub> )<br>I <sub>sd</sub> =8I <sub>r</sub> (I <sub>r</sub> <6250A), I <sub>sd</sub> =50kA (I <sub>r</sub> >6250A) t <sub>sd</sub> =0.4s<br>I <sub>i</sub> =12I <sub>n</sub> (I <sub>n</sub> =200A~5000A) I <sub>i</sub> =75kA (I <sub>n</sub> >6300A)<br>I <sub>g</sub> =OFF, t <sub>g</sub> =0.4s<br>Note: Controller overcurrent protection parameters must be set according to actual demands. |      |  |  |  |   |                             |               |

Table 15 Long delay protection action delays

| Curve type       | Fault current       | Action time t <sub>r</sub> |        |        |       |       |        |
|------------------|---------------------|----------------------------|--------|--------|-------|-------|--------|
|                  |                     | 15s                        | 30s    | 60s    | 120s  | 240s  | 480s   |
| I <sup>2</sup> t | 1.05XI <sub>r</sub> | >2h: no action             |        |        |       |       |        |
|                  | 1.3XI <sub>r</sub>  | <1h: action                |        |        |       |       |        |
|                  | 1.5xI <sub>r</sub>  | 15s                        | 30s    | 60s    | 120s  | 240s  | 480s   |
|                  | 2XI <sub>r</sub>    | 8.44s                      | 16.87s | 33.75s | 67.5s | 135s  | 270s   |
|                  | 6XI <sub>r</sub>    | 0.94s                      | 1.87s  | 3.75s  | 7.5s  | 15s   | 30s    |
|                  | 7.2XI <sub>r</sub>  | 0.8s                       | 1.3s   | 2.6s   | 5.2s  | 10.4s | 20.83s |

9.2.2 Characteristic curves

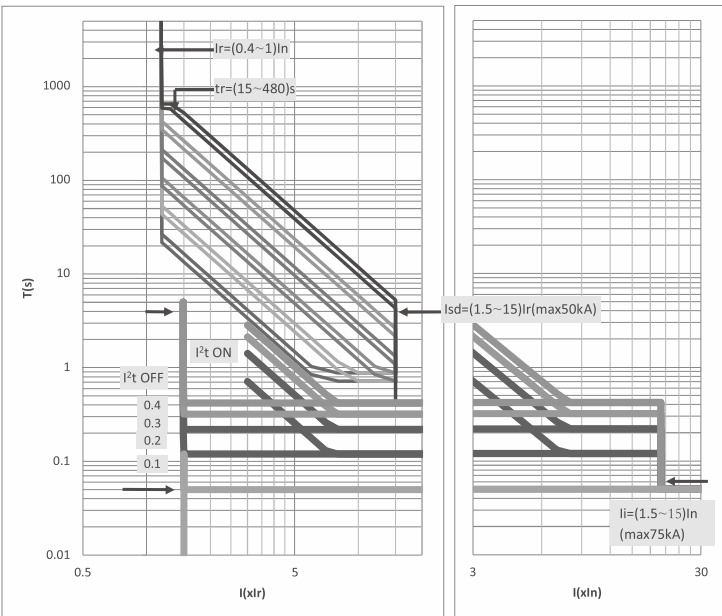


Fig.9.1 Overcurrent protection characteristic curve I2T

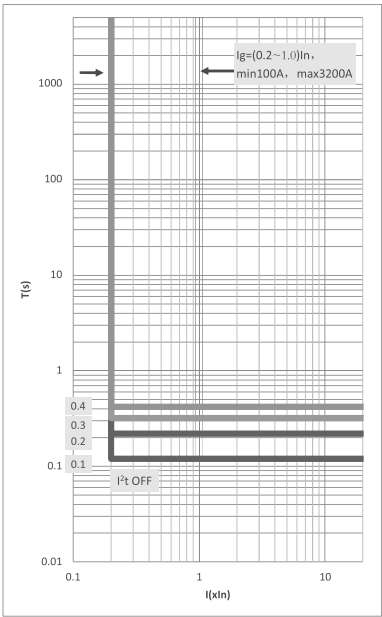


Fig.9.2 Earthing protection characteristic curve (vector sum)

9.3 Operations of the intelligent controller

9.3.1 Type M controller

9.3.1.1 Description of appearance

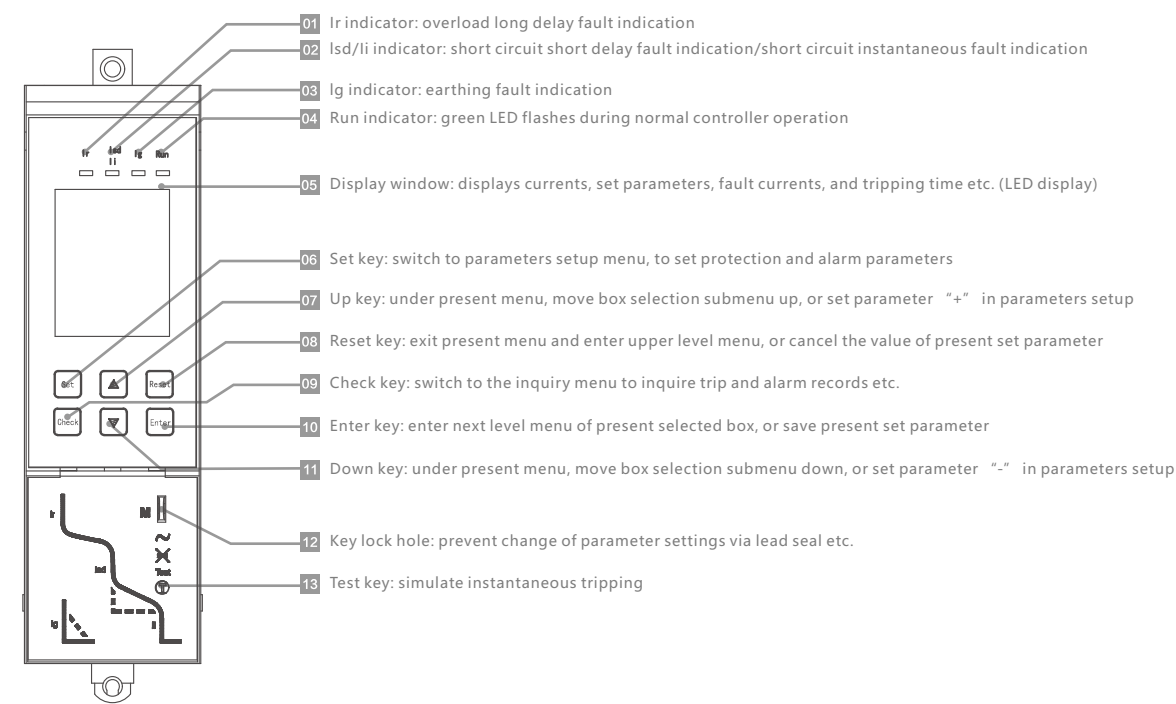


Fig.9.3 Description of appearance of M type controller

9.3.1.2 Display symbols on the interface and their description

Table 16 Display symbols on the interface of M type controller and their description

| S/N | Symbol    | Description  |
|-----|-----------|--|
| 1   | Ir= tr=   | Long delay current setting, long delay time setting respectively   |
| 2   | Isd= tsd= | Short delay current setting, short delay time setting respectively |
| 3   | Ig= tg=   | Earthing current setting and earthing time setting respectively    |
| 4   | Ii=       | Instantaneous current setting                                      |
| 5   | N=        | Neutral pole protection parameter setting                          |
| 6   | TM        | Software simulated trip state                                      |
| 7   | TRIP      | Trip state   |
| 8   | SET       | Glow to enable setting and flashes to allow change of data         |
| 9   | LIN       | Data storage state   |
| 10  | Pt-0      | 4-zone current protection setup interface                          |
| 11  | fES       | Software simulated tripping test setup interface                   |
| 12  | RLR       | Alarm setup or inquiry interface                                   |
| 13  | SYS       | System setup interface (calibrate current; set system frequency)   |
| 14  | DBS       | Communication setup interface (type H)                             |
| 15  | DOS       | DO setup interface (type H + DO functions)                         |
| 16  | FRU       | Fault records inquiry interface                                    |
| 17  | COU       | Interface to inquire operation times and service life              |
| 18  | m0r       | Heat capacity inquiry interface                                    |
| 19  | DOC       | DO status inquiry interface  |
| 20  | H         | Heat capacity data   |
| 21  | cLoo      | Zero point calibration   |
| 22  | F--       | Fault record No.   |

| S/N | Symbol         | Description   |
|-----|----------------|---|
| 23  | F--            | Alarm record No.  |
| 24  | Lg L1 L2 L3 LN | Earth and phases A, B, C, and N respectively  |
| 25  | L              | 4-zone current curve; normal if fully displayed; with corresponding zone flashing after fault tripping (this zone in fault record also flashes) |
| 26  | ALM            | Alarm indication status   |
| 27  | F              | System frequency  |
| 28  | U              | Auxiliary power supply overvoltage alarm setting  |
| 29  | JS             | Number of poles   |
| 30  | P              | Current open phase setting; time setting  |
| 31  | U              | Current unbalance setting; time setting; present unbalance rate   |
| 32  | C              | Controller communication address  |
| 33  | b              | Communication baud rate   |

9.3.1.3 Default interface

The default interface is the measurement state, in which all fault indicators are off, there is no key operation on the controller, and maximum current is displayed.

On the default interface, press key "▲" or "▼" to cyclically display currents L1, L2, L3, LN, and Lg.

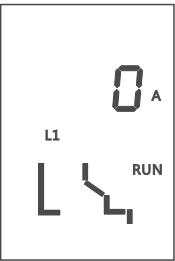


Fig.9.4 Default interface

9.3.1.4 Setup interface

On the default interface, press key "Set" to enter the setup state, in which current protection parameters can be checked and modified, software simulated tripping test can be performed, and thresholds and delays of overload early alarm and earthing alarm can be checked and set. The "SET" indicator will glow or flash. With this indicator flashing, key "▲" or "▼" can be pressed to increase or decrease the data. Press key "Enter" to store the data.

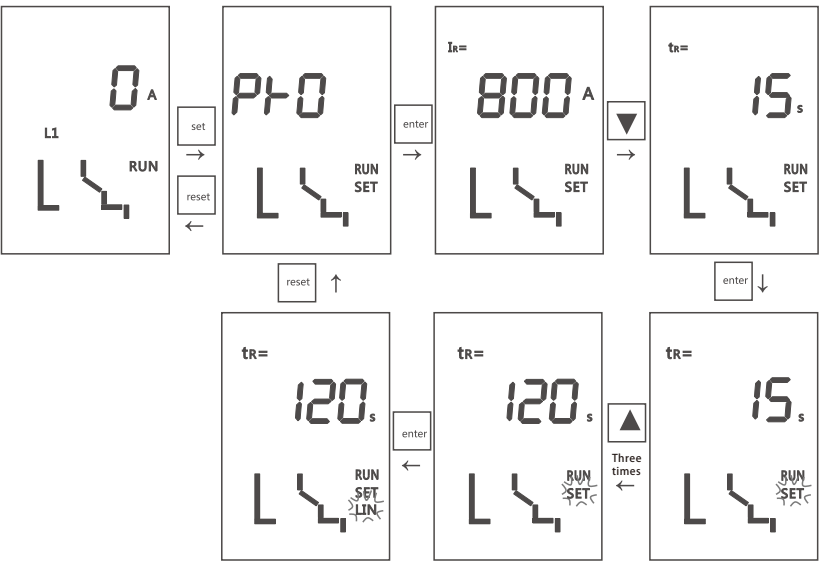


Fig.9.5 Modify long delay time setting

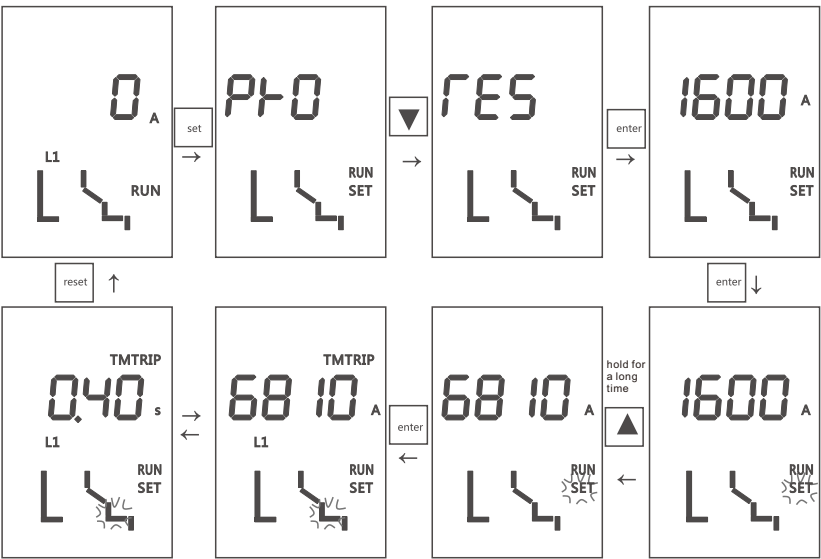


Fig.9.6 Software simulated short delay tripping test

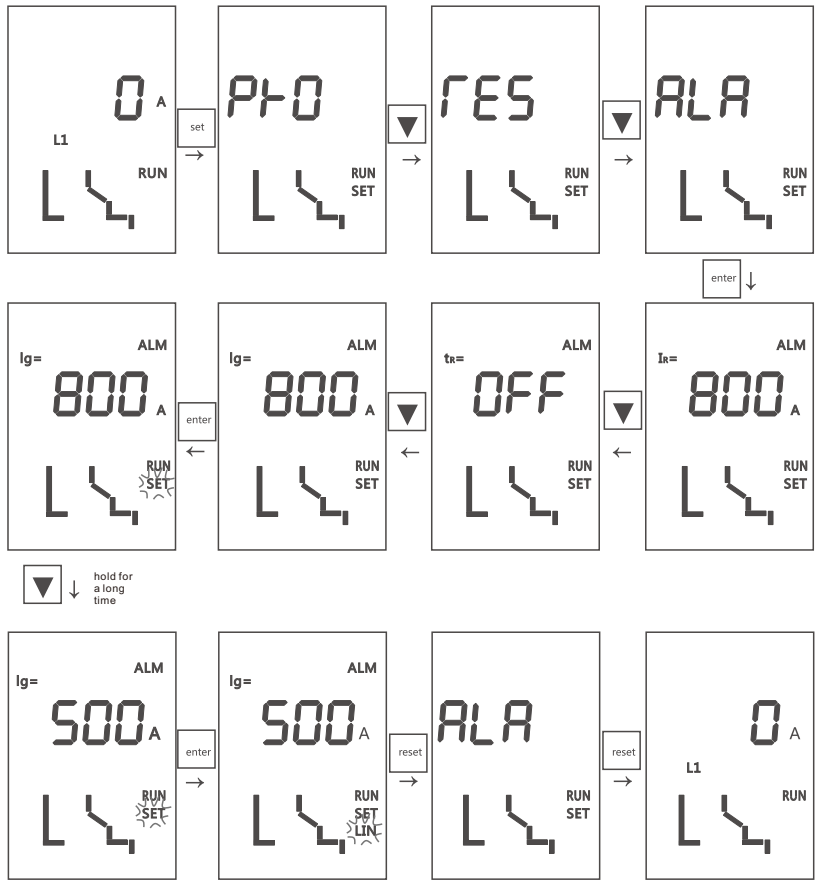


Fig.9.7 Setup of earthing alarm current threshold

9.3.1.5 Inquiry interface

On the default interface, press key "Check" to enter the inquiry state, in which latest 10 fault records, 8 latest alarm records, CB operation times, service life records, and heat capacity message can be checked.

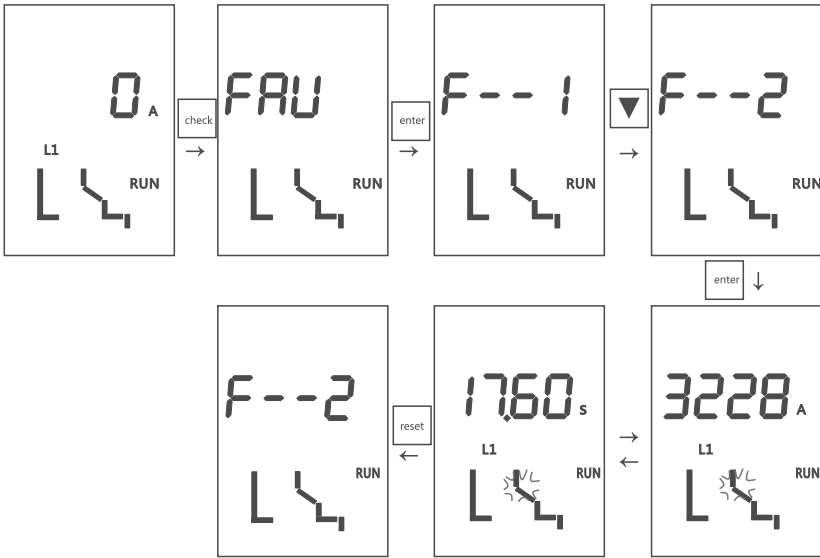


Fig.9.8 Inquiry of second fault record

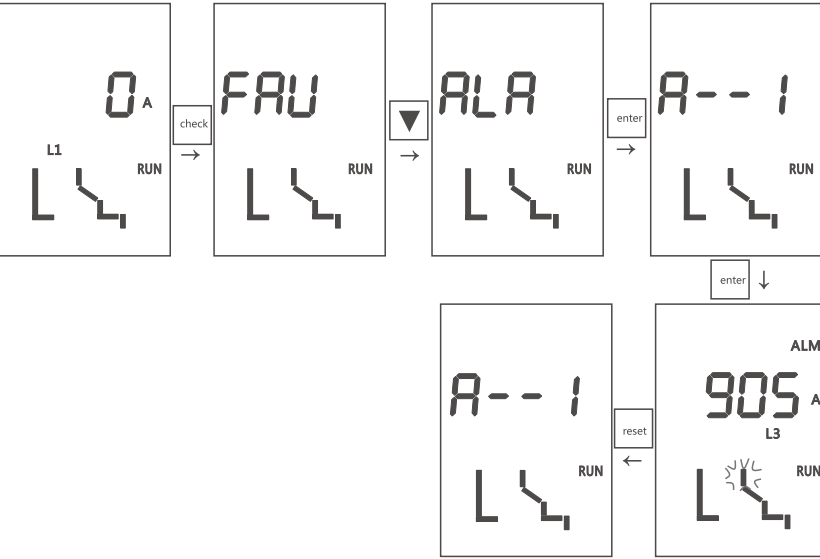


Fig.9.9 Inquiry of first alarm record



Fig.9.10 Inquiry of CB operation times and service life record

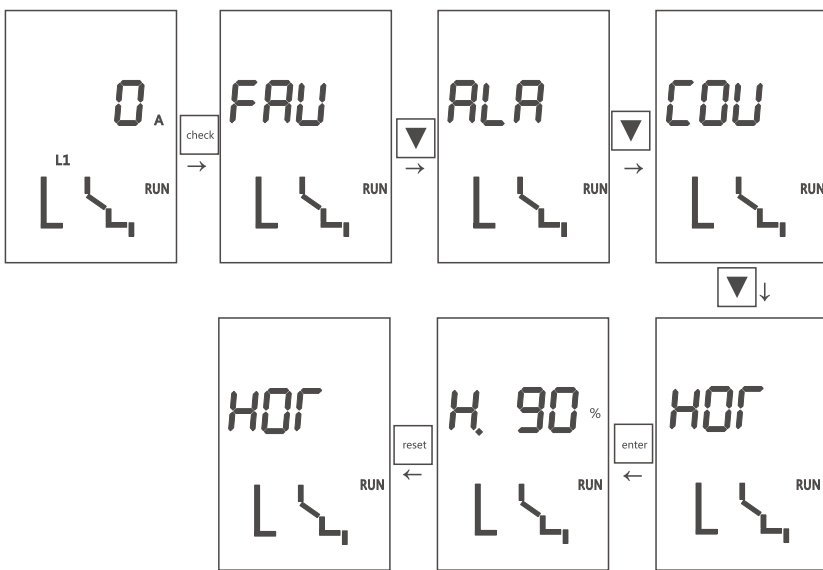


Fig.9.11 Inquiry of heat capacity message after fault tripping

9.3.1.6 Tripping interface

After fault and tripping of circuit breaker, the controller will be in the tripping interface, on which tripping current and tripping time will be displayed alternatively. At this time, key “Reset” needs to be pressed to clear the fault.

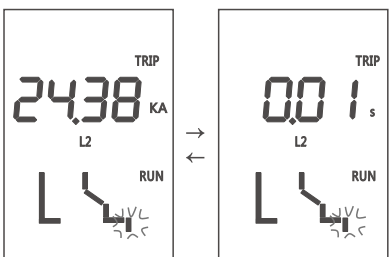


Fig.9.12 Instantaneous fault tripping state

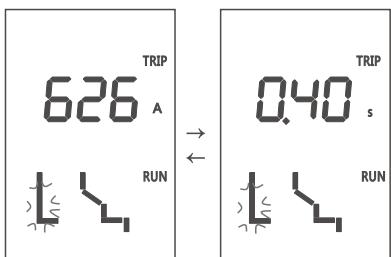


Fig.9.13 Earthing fault tripping state

9.3.1.7 Current fine tuning operation

Assume phase A actual current of 2000A and controller displayed current of 1978A; fine tuning operation can be performed to adjust the current to 2000A, using the following steps:

- (1) Calculate the adjustment percentage:  $(2000-1978) \times 100 / 1978 \approx 1.1\%$ ;
- (2) According to the illustrated operation, enter menu SYS and then press key Enter to enter phase A current calibration;
- (3) After pressing key Enter (so that SET flashes) to enter the percentage adjustment mode. Press key "▲" or "▼" to adjust the percentage to 1.1% (adjustable in -5.0%~+5.0%; at step of 0.1%);
- (4) After pressing key Enter (SET changes from flashing to glowing) to return to the main interface, where the current can be seen calibrated to 2000A.

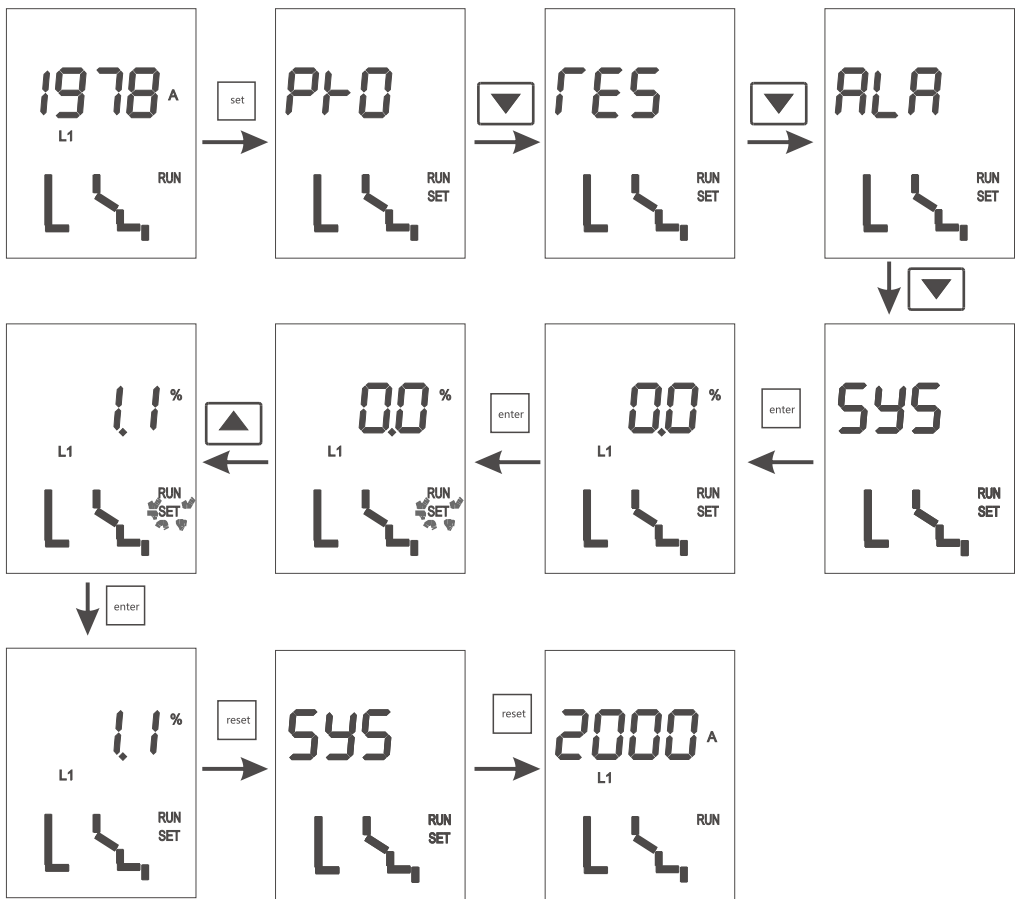


Fig.9.14 Fine tuning of current

9.3.1.8 Zero point calibration operation

This function calibrates sampling zero point of the controller when it has neither load nor signal input. With the circuit breaker at trip state and small current displayed on the controller less than 300A, press key "Enter" and after 1s, press it again. Indicator "LIN" will light up and then go off. At this point, the zero calibration operation is completed.



Fig.9.15 Zero point calibration

9.3.1.9 Controller minimum displayed current

Table 17 Controller minimum displayed current

| Frame size | Rated current (A) | Min. displayed current (A) |
|------------|-------------------|----------------------------|
| 1600       | 200~400           | 40                         |
|            | 630~1600          | 80                         |
| 2500       | 400~2500          | 80                         |
| ≥3200      | 630~6300          | 160                        |

9.3.2 For description of type H/S controller detailed interface display and operations, refer to dedicated manual.

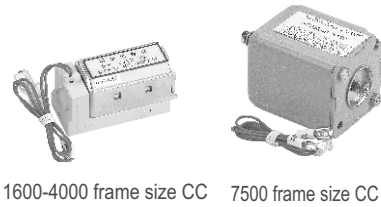
10 Circuit breaker accessories

10.1 Closing electromagnet (CC)

After the operation mechanism finishes energy storage, CC is energized and ready for remote closing.

Table 24 Operation feature of Closing electromagnet

| Feature                                 |             | CC                             |
|---|-------------|--------------------------------|
| Power Supply                            | VAC 50/60Hz | 220/230/240                    |
|   | VDC         | 380/400/415                    |
| Operation voltage                       |             | 220,110                        |
| Frame size: power consumption (VA or W) | AC          | 0.85-1.1Us                     |
|   | DC          | 400VA                          |
| Circuit breaker response time           |             | 1600A~4000A: 380W; 7500A: 130W |
|   |             | 30ms-45ms                      |



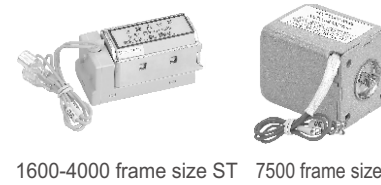
1600-4000 frame size CC 7500 frame size CC

10.2 Shunt release (ST)

After being energized, ST will instantaneously disconnect the circuit breaker, to realize remote opening.

Table 25 Operation feature of Shunt release

| Feature                                 |             | ST                             |
|---|-------------|--------------------------------|
| Power Supply                            | VAC 50/60Hz | 220/230/240                    |
|   | VDC         | 380/400/415                    |
| Operation voltage                       |             | 220,110                        |
| Frame size: power consumption (VA or W) | AC          | 0.85-1.1Us                     |
|   | DC          | 400VA                          |
| Circuit breaker response time           |             | 1600A~4000A: 380W; 7500A: 130W |
|   |             | 25ms-35ms                      |



1600-4000 frame size ST 7500 frame size ST

10.3 Undervoltage release (UVT)

If the supply voltage drops to any point between 35%-70% of rated voltage, the release coil will disconnect the circuit breaker instantaneously. If the UVT release coil is not energized, the circuit breaker cannot be closed manually (closing button) or electrically (closing electromagnet). The circuit breaker can only be closed when the supply voltage of UVT release coil reaches 85% of rated voltage.

Table 26 Operation feature of undervoltage release

| Feature                           |             |  |
|-----------------------------------|-------------|--|
| Power Supply                      | VAC 50/60Hz | 220/230/240                            |
|                                   | VDC         | 380/400/415                            |
| Operation threshold               | Open        | 0.35-0.7Ue                             |
|                                   | Close       | 0.85-1.1Ue                             |
| Frame size: power consumption (W) |             | 1600A~4000A: 220W/15W; 7500A: 220W/13W |

Note: closing/maintain.

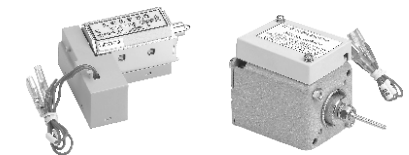
Delayed undervoltage release (UVTD)

To prevent unintended release due to voltage drop in short time, we add an operation delay to UVT by adding a delay unit.

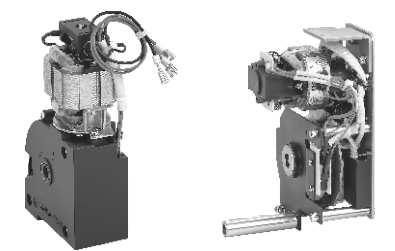
Table 27 Operation feature of delayed undervoltage release

| Power Supply                       |   |            |
|------------------------------------|---|------------|
| Power Supply                       | VAC 50/60Hz   |            |
| Operation threshold                | Open  | 0.35-0.7Ue |
|                                    | Close   | 0.85Ue     |
| Frame size: power consumption (VA) | 1600A: 20VA; 2500A~7500A: 48VA  |            |
| Adjustable time                    | 1600A-4000A: 1s-10s, delay time adjustable (UVTZ-1)<br>7500A : 1s-5s, delay time adjustable |            |

Note: NA8-1600~4000 uses external undervoltage delay module, delay unit is integrated into the undervoltage delay release for NA8-7500 products.



1600 frame size UVT 2500-7500 frame size UVT



1600 frame size MO    2500-7500 frame size MO

10.4 Motor operation mechanism (MO)

Storage energy by motor and automatically after circuit breaker closing, to ensure the circuit breaker can close immediately after opening. Energy storage handle used as standby measure if there is no auxiliary power supply.

Table 28 Feature of motor operation mechanism

| Feature                                 |                        |                          |
|---|------------------------|--------------------------|
| Power Supply                            | VAC 50/60Hz            | 220/230/240, 380/400/415 |
|   | VDC                    | 110, 220                 |
| Operation threshold                     |                        | 0.85-1.1Us               |
| Frame size: power consumption (VA or W) | 1600A:75W; 2500A:85W   |                          |
|   | 4000A:150W; 7500A:150W |                          |
| Motor overcurrent time                  |                        | ≤1min                    |
| Energy storage time                     |                        | ≤7s                      |
| Operation frequency                     |                        | ≤2 times/min             |

After the motor operation mechanism (MO) finishes energy storing, the internal indication contact will switch to output, user may connect the energy storage indicator, see the table below for feature of indication contact.

Table 29 Indication contact technical parameters

| Spring energy storage indication contact |             |                         |
|--|-------------|-------------------------|
| Standard supply                          |             | 1NO                     |
| Breaking capacity                        |             | Current (A)/Voltage (V) |
| Application type                         | VAC (AC-15) | 1.3/240, 0.75/415       |
|  | VDC (DC-13) | 0.55/220, 0.27/110      |

10.5 Auxiliary contacts (OF)

Standard configuration: 4 groups of changeover contacts (4CO)

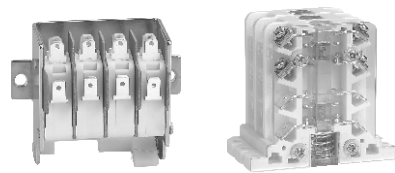
Optional configuration: 6 groups of changeover contacts (6CO)

Optional for NA8 full series

3NO, 3NC (N3)      Optional for NA8-1600

4NO, 4NC (N4)      Optional for NA8-2500-7500

5NO, 5NC (N5)      Optional for NA8-2500-7500



1600 frame size OF    2500-7500 frame size OF

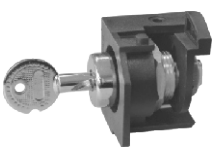
Table 30 Auxiliary contact technical parameters (1)

| Features          |                    |             |             |
|-------------------|--------------------|-------------|-------------|
| Auxiliary model   |                    | 4CO/N4/N5   | 6CO(1600)   |
| Breaking capacity |                    | Current (A) | Current (A) |
| Application type  | 230/240VAC (AC-15) | 1.3         | 1.3         |
|                   | 400/415VAC (AC-15) | 0.75        | 0.75        |
|                   | 110VDC (DC-13)     | 0.55        | -           |
|                   | 220VDC (DC-13)     | 0.27        | -           |

Table 31 Auxiliary contact technical parameters (2)

| Features          |                    |                      |
|-------------------|--------------------|----------------------|
| Auxiliary model   |                    | 6CO (2500 and above) |
| Breaking capacity |                    | Current (A)          |
| Application type  | 230/240VAC (AC-15) | 1.3                  |
|                   | 400/415VAC (AC-15) | 0.75                 |
|                   | 110VDC (DC-13)     | 0.55                 |
|                   | 220VDC (DC-13)     | 0.27                 |

Note: 6 groups of changeover contacts of NA8-1600 is not applicable to DC operation voltage.



10.6 Key lock (KL)

Key lock is used to lockout the opening button of circuit breaker. After pulling out the key, you will not be able to close the circuit breaker manually or electrically, and the circuit breaker will maintain opening status; user may choose this option, and we will provide lock and key; there are 3 types of key locks:

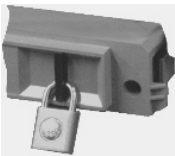
- 1 lock and 1 key (1S1S): 1 circuit breaker with an independent lock and a key
- 2 locks and 1 key (2S1S): 2 circuit breakers with two identical locks and a key
- 3 locks and 2 keys (3S2S): 3 circuit breaker with 3 identical locks and 2 keys

Notes: 1. Before you pull out the key, you must press the opening button first, then rotate the key counterclockwise  
2. If user purchase key lock separately, then you must use hole opener to open a hole on the panel before installation, there are two diameters available: Φ21mm (NA8-1600)and φ 24mm (NA8-2500~7500), hole opener should be provided by user itself.



10.7 Button lock (PL)

A padlock is used to lock the mechanical breaking and closing buttons on the panel. After lockout, user will not be able to open or close the circuit breaker manually (padlock should be provided by user itself).



10.8 Padlock for drawer seat disconnect position

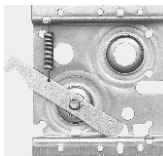
Use the padlock to lock the drawer seat and body at disconnect position, at this position, user cannot insert the drawer seat rotation handle into the hole to rotate and change the position of withdrawable circuit breaker body.

Padlock should be provided by user itself.

10.9 Padlock for drawer seat baffle

If a padlock is used, user ensure the body contact will not be connected with external live circuit when the circuit breaker body is at disconnect or test position.

Padlock should be provided by user itself.

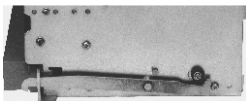


10.10 Circuit breaker status door interlock

This interlock can prevent the cabinet from being opened when the circuit breaker is under closing status; the cabinet can only be opened when the circuit breaker is under opening status.

10.11 Circuit breaker position door interlock

This interlock can prevent the cabinet from being opened when the circuit breaker is at connect or test position; the cabinet can only be opened when the circuit breaker is at disconnect position. This device is only applicable to withdrawable products.

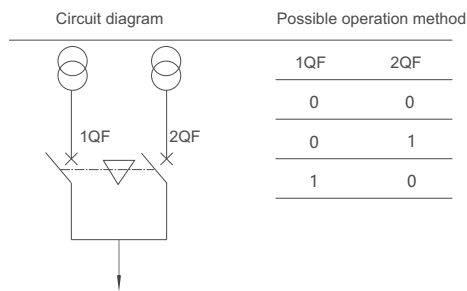
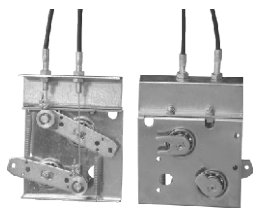


10.12 Drawer seat position locking device

After using the rotate handle to rotate the circuit breaker body to disconnect, test or connect position, the device will automatically lockout the rotation mechanism of the drawer seat. User need to press the unlock button before rotating the circuit breaker body to next position.



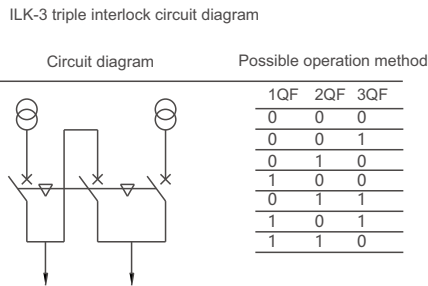
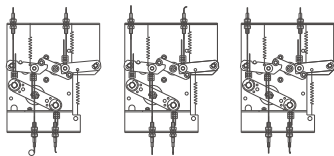
10.13 Mechanical interlock ILK2 (steel cable double interlock)  
For interlock of two horizontally or vertically installed 3 pole or 4 pole circuit breakers.



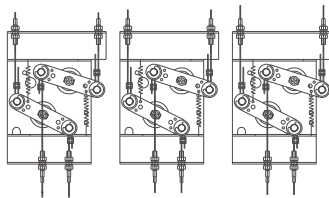
Notes: a. If user needs to bend the steel cable, the transition arc at the bend must be larger than R120mm, to ensure the flexible movement of the cable.  
b. Check the cable and make sure there is sufficient lubricant to guarantee the flexible movement of the cable.

10.14 Mechanical interlock ILK3/4  
For interlock of three horizontally or vertically installed 3 pole or 4 pole circuit breakers.

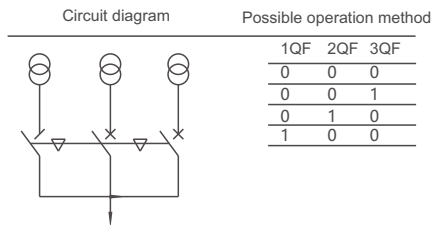
ILK-3 triple interlock diagram



ILK-4 interlock diagram

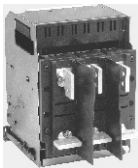


ILK-4 triple interlock circuit diagram



Notes: a. If user needs to bend the steel cable, the transition arc at the bend must be larger than R120mm, to ensure the flexible movement of the cable.  
b. Check the cable and make sure there is sufficient lubricant to guarantee the flexible movement of the cable.

10.15 Barrier  
Installed between the phases of connector bar, to enhance the phase to phase insulation of circuit breaker.



10.16 Door frame and gasket  
Installed on the cabinet door for sealing, with protection class of IP40.

11 Circuit breaker maintenance and repair

11.1 Notes for circuit breaker maintenance and repair

- Complete the following procedures before maintaining and repairing circuit breaker:
- open the circuit breaker, make sure the circuit breaker is under opening status;
  - disconnect the upstream disconnector (if any), make sure the main circuit and secondary circuit are de-energized.
  - release energy and opening circuit breaker, make sure the circuit breaker is free of energy and under opening status;
  - all components and parts that may be touched by operator must be de-energized.



Caution

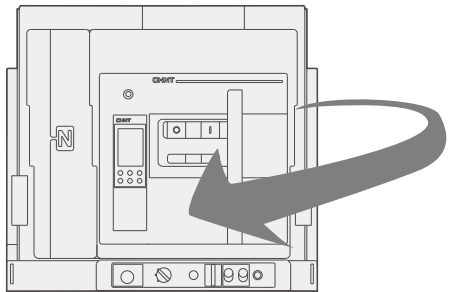
11.2 Maintenance and repair interval

Table 32 Circuit breaker maintenance and repair interval

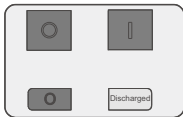
| Conditions        | Environment  | Maintenance interval | Repair interval   | Remarks   |
|-------------------|--|----------------------|---|---|
| Normal conditions | Clean and dry air, no corrosive gas, with temperature between -5°C~+40°C, humidity comply with the requirements in 1.3 Operation condition c. extreme atmospheric conditions | Once half a year     | Once a year (Once half a year after 3 years of installation )         | Comply with IEC/EN 60947-2 General environmental condition requirements |
| Harsh conditions  | Low temperature (-5°C~-40°C) or high temperature (40°C~65°C) or humidity≥90%   | Once every 3 months  | Once half a year (Once every 3 months after 3 years of installation ) |   |
|                   | With high content of dust and corrosive gas  | Once a month         | Once every 3 months   |   |

11.3 Circuit breaker maintenance

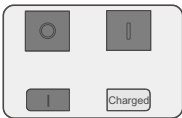
- Clean the foreign matters (such as tools, wire head or debris, metal objects etc.) in the cabinet regularly
- Remove the dust on the circuit breaker regularly, ensure good insulation
- Check whether the connecting bolts, grounding bolts and washers of main circuit flat and secure
- Check if the opening and closing indicator is correct and reliable



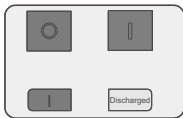
Open and release energy



Open and store energy



Close and release energy



Close and store energy

11.4 Circuit breaker repair

Circuit breaker repair contents (note: take NA8-4000 as example)

1. Connection check

The recommended torques for main circuit and secondary circuit are listed as follows:

Table 33 Circuit breaker tightening torque

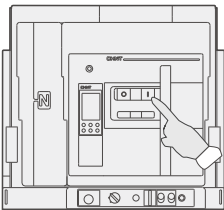
| Fastener specification | Torque requirement N•m |
|------------------------|------------------------|
| M3                     | 1.5 2.5                |
| M4                     | 2.5 3.6                |
| M8                     | 20 33                  |
| M10                    | 38 55                  |
| M12                    | 61 94                  |

2. Insulation test

The insulation resistance between phases and between phase and earth should be  $\geq 20M\Omega$ ; An insulation resistance test must be conducted before repairing and recovering power after long period ( $\geq 7$  days) of power-off.

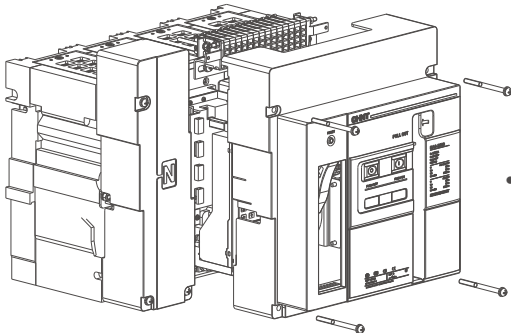
3. Operation check

Supply all the accessories with corresponding rated voltage according the nameplate and conduct the following operations:  
Motor energy storage, opening and closing operations, conduct 5 cycles;  
Manual energy storage, opening and closing operations, conduct 3 cycles;  
The energy storage as well as opening and closing operations of circuit breaker should be normal. Note: main circuit must be de-energized, if an undervoltage release is used, you must supply with rated voltage first.



4. Circuit breaker component check

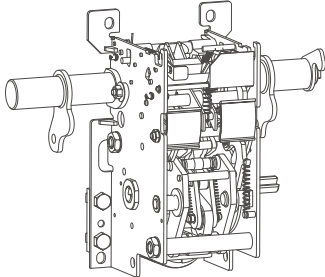
4.1 Remove Front cover



Remove the four fixing bolts on circuit breaker panel, and take off the Front cover

4.2 Operation mechanism check

All the parts should be free of fracture or damage, secure and clean all the fasteners, evenly grease all the rotating parts



Evenly apply 7012 low temperature grease or similar solid grease to lubricate all the rotating parts

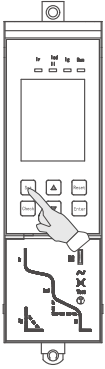
4.3 Intelligent controller

Check display function



Press " " / " " key, check whether the display and indicators can function normally

Parameter setup complies with on-site requirements



Press "Setup" key, then press " " / " " key to select the parameter needs to be checked, check whether the parameter meets on-site test requirement  
Requirement: the displayed parameter should comply with on-site requirements

Analog test release function

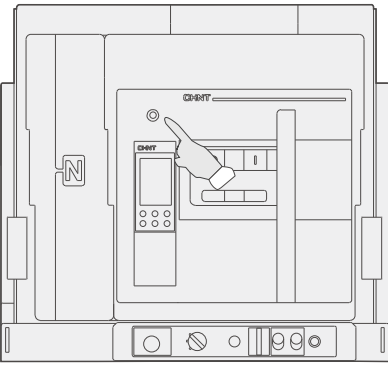


Use a small slot type screwdriver or other tools to poke the position given in the figure, the circuit breaker will release



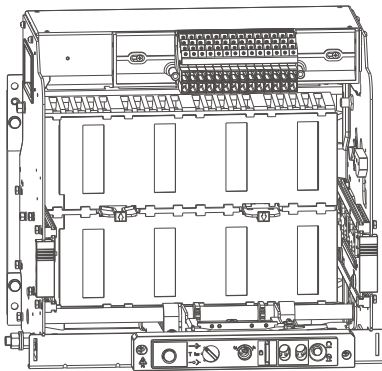
Press "Return" key to exit the test





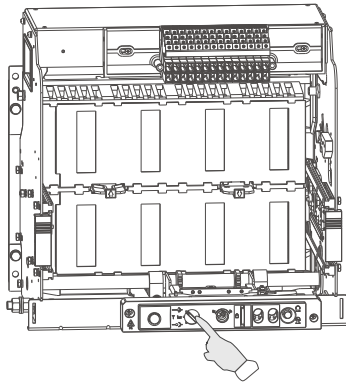
●Press the “Reset” key on the face shield to recover normal status

4.4 Drawer seat check (test after pulling out the body)  
No foreign objects inside

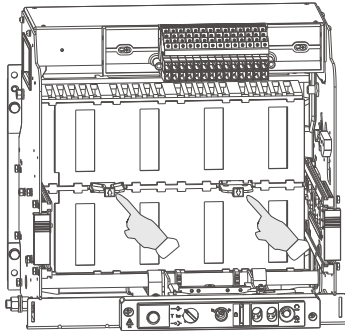


●Check whether there are foreign objects inside the drawer seat, such as screws, wire heads, iron scraps, etc. Remove any foreign objects found.

Flash barrier can open and close normally, isolation contacts are free of deformation and oxidation

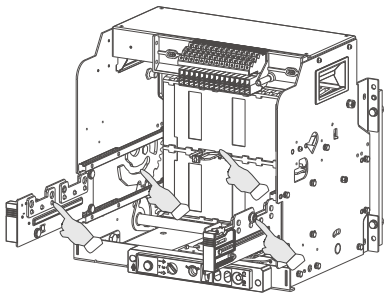


●Rotate to Disconnected position, the flash barrier should be able to open and close freely, as shown in figure on the left

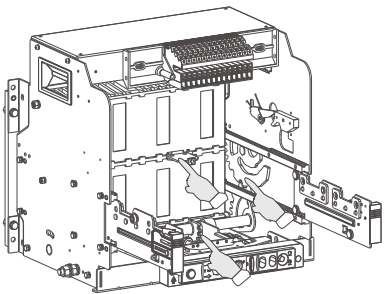


●Manually push the ejector rod in, the barrier should be able to open freely, as shown in figure on the left. After you release the ejector rod, the barrier should be able to close freely, check the bridge contacts of each phase are free of deformation, misalignment and oxidation. Replace the contact if any of these status is found.

Rotate the friction parts and apply grease evenly



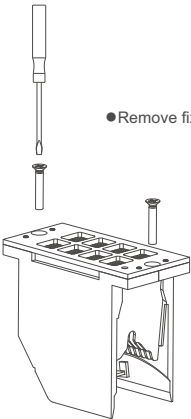
●Evenly apply 7012 low temperature grease or similar solid grease to lubricate the positions pointed out in the figure



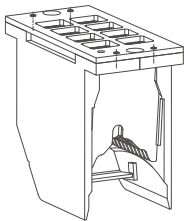
4.5 Arc extinguishing cover

All the grids and arc initiating pieces should be intact, the arc extinguishing cover should be free of damage, if there is any damage found, please replace the arc extinguishing cover and clean the dust, corrosion layer and arc discharge point timely, if there is serious corrosion, please replace in time.

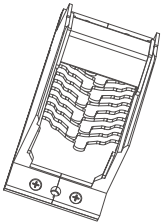
Note: must check after short circuit breaking



●Remove fixing bolts

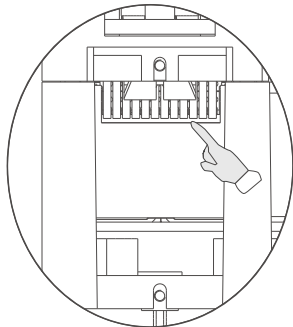


●Take out arc extinguishing cover



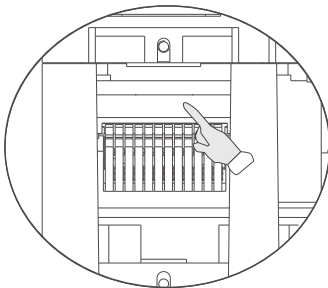
●Check the status inside

4.6 Main contact check  
Over travel should be≥2mm



●Close the circuit breaker manually, observe the over travel of main contact  
Note: replace the contact if it reaches the position pointed out in the figure

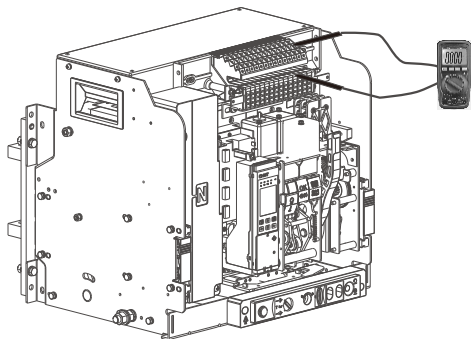
Clean dust, corrosion layer and burnt particles



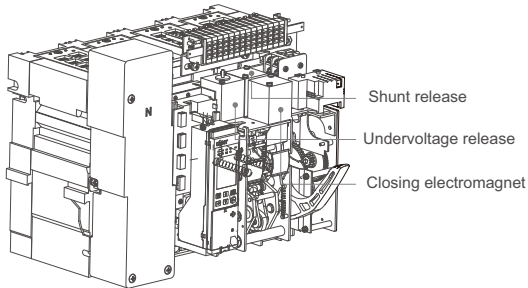
●Open the circuit breaker, the main contact should be at the position point out in the figure, check if there is dust, burnt particles and oxidation layer on static and dynamic contacts. If any, please clean up in time.

Note: must check after short circuit breaking

4.7 Second circuit check  
Enclosure is free of damage  
Use multimeter to check whether the contacts of secondary circuits of withdrawable body and drawer seat can function normally at “test” position and “connect” position.  
Check whether the connection screws are secured and the conductor insulation is intact.

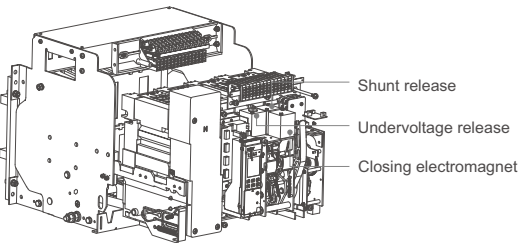


11.5 Circuit breaker accessory replacement  
11.5.1 Replace undervoltage release, shunt release and closing electromagnet.  
Conduct the following operations before replacing the any accessory.  
Disconnect all power supplies, make sure none of the circuit breakers in main circuit and secondary circuit is under energy release and opening status.



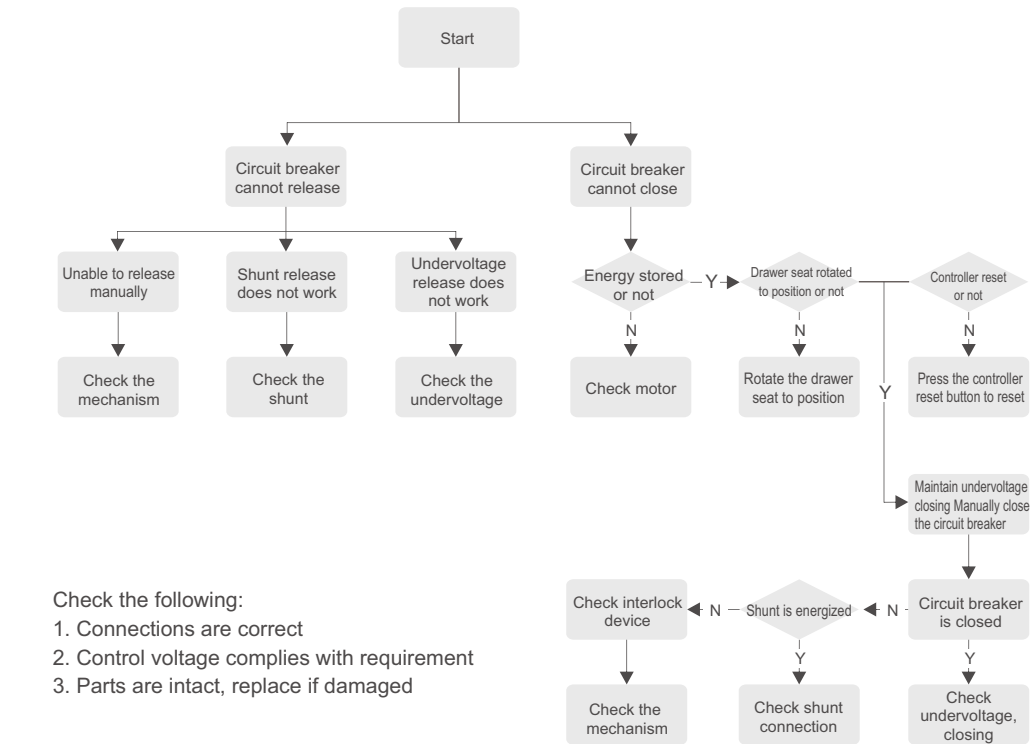
11.5.2 Accessory replacement of fixed type circuit breaker  
Remove the fixing bolts on the panel, take off the panel  
Loosen the ties, remove the connection conductor  
Remove the installation screws used to secure the accessories  
Remove the accessories and replace them

11.5.3 Accessory replacement for withdrawable type circuit breaker  
Rotate the body to disconnect position, take out the body  
Remove the fixing bolts on the panel, take off the panel  
Loosen the ties, remove the connection conductor  
Remove the installation screws used to secure the accessories  
Remove the accessories and replace them



12 Fault diagnosis and troubleshooting

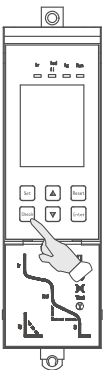
12.1 Troubleshooting logic



Check the following:  
1. Connections are correct  
2. Control voltage complies with requirement  
3. Parts are intact, replace if damaged

12.2 Identify fault cause

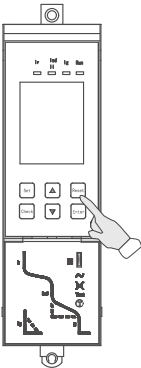
Identify faults by intelligent controller instructions



●Press “Check” key to enter main menu



●Press “” key to identify fault



●Press “Reset” key to exit

Note: do not close circuit breaker with power on before trouble shooting

12.3 Common fault causes and solutions

The table below provides the possible problems that may occur during circuit breaker installation, commissioning and operation, as well as the causes and solutions to these problems.

Table 34 Common fault causes and solutions

| No. | Technical problem                             | Possible cause   |   |
|-----|---|--|---|
| 1   | Circuit breaker tripping (fault indicator on) | Overload fault release (long time delay indicator on)                        | Inspection and troubleshooting<br>1 Check breaking current value and operation time of intelligent controller<br>2 Analyze load and grid operation<br>3 If overload is confirmed, conduct inspection and troubleshooting immediately<br>4 If the actual operation current does not match with long time delay operation current, please alter the set value of long time delay operation current based on the actual operation current to provide proper protection;<br>5 Press reset button to reclose the circuit breaker |
|     |   | Short circuit fault release (short time delay or instantaneous indicator on) | 1 Check breaking current value and operation time of intelligent controller<br>2 If short circuit is confirmed, conduct inspection and troubleshooting immediately<br>3 Check the set value of intelligent controller<br>4 Check whether the circuit breaker is intact, and confirm whether it can be closed;<br>5 Press reset button to reclose the circuit breaker  |

Table 34 (continue)

| No. | Technical problem  | Possible cause   |  |
|-----|--|--|--|
| 1   | Circuit breaker tripping (fault indicator on)                                | Ground fault release (ground fault indicator on)   | 1 Check breaking current value and operation time of intelligent controller<br>2 If ground fault is confirmed, conduct inspection and troubleshooting immediately<br>3 If ground fault does not exist, check if the set value of ground fault current is correct and matches with actual phase to be protected; if the set value is incorrect, change it;<br>4 Press reset button to reclose the circuit breaker |
| 2   | Circuit breaker does not close   | Undervoltage release tripping  | 1 Check if the supply voltage is under 70%Ue;<br>2 Check if there is fault on undervoltage release and control unit  |
|     |  | Mechanical interlock operation   | Check the status of the two circuit breakers installed with mechanical interlock   |
|     |  | Undervoltage release does not close  | 1 Check if the undervoltage release is energized;<br>2 Check if the supply voltage is under 85%Ue;<br>3 Check if there is fault on undervoltage release and control unit<br>Replace the undervoltage release if fault is identified.   |
|     |  | Reset button did not reset   | Press the reset button to reclose the circuit breaker  |
|     |  | Withdrawable circuit breaker was not rotated to position   | Rotate the withdrawablecircuit breaker to position (lockout at connect position)   |
|     |  | Bad contact of circuit breaker secondary circuit   | Check the contact of secondary circuit and solve the problem   |
|     |  | Circuit breaker does not store energy  | 1 Check if the motor control power is connec ted and≥85%Us;<br>2 Check if there is fault on the energy storage mechanism   |
|     |  | Closing electromagnet problem  | 1 Check if the supply voltage of the closing electromagnet is ≥85%Us;<br>2 If the closing electromagnet cannot close, replace it.  |
| 3   | Circuit breaker trips after closing  | Immediate tripping<br>Delayed tripping   | 1 A short circuit current may exist during closing, check and solve the problem;<br>2 Check whether there is overload current and solve the problem;<br>3 Check whether the circuit breaker mechanism is intact;<br>4 Check whether the set value of intelligent controller is correct, reset the value if necessary;<br>5 Press the reset button to reclose the circuit breaker                                 |
| 4   | Circuit breaker does not open  | Does not open electrically<br>Does not open manually   | 1 Check the connection of shunt release and whether there is a fault on shunt release, if a fault is identified, replace the shunt release;<br>2 Check the operation mechanism for any mechanical fault  |
| 5   | Circuit breaker does not store energy  | Does not store energy electrically   | 1 Check whether the supply voltage of the control power of motor energy storage device is ≥85%Us, check the circuit;<br>2 Check the motor;   |
|     |  | Does not store energy manually   | Energy storage mechanism fault.  |
| 6   | Withdrawable circuit bebreaker can not pulled out at “Disconnected” position | The rotation handle is not pulled out;<br>Circuit breaker did not fully reach “disconnect” position  | Pull out the rotation handle<br>Fully rotate the circuit breaker to “disconnect” position  |
| 7   | Withdrawable circuit breaker cannot be rotated to “connected” position       | The drawer is jammed by foreign object; the rotation mechanism or the gear of rotation mechanism is damaged; the position locking device is not unlocked   | Check for foreign object and the status of gear.<br>Turn the key  on the drawer and unlock the device.  |
| 8   | No display on intelligent controller   | Intelligent controller is not energized;<br>Incorrect voltage at input end of auxiliary power;<br>Incorrect secondary output voltage of transformer;<br>Poor connection between secondary ouput end of transformer and the controller; | 1 Check the power connection of intelligent controller;<br>2 Disconnect the control power of intelligent controller, reconnect the power, if the fault still exists, it may be necessary to replace the intelligent controller.  |

13 Warranty

The warranty for this product is 12 months from the date of production if the normal storage and transportation conditions are observed and the package or the product itself is in good condition. The following circumstances are not covered by the warranty:

- 1. Damage due to user's improper use, storage and maintenance of the product.
- 2. Damage due to unauthorized disassembly, assembly and maintenance.
- 3. Warranty expires.
- 4. Damage due to force majeure

14 Model selection and ordering information

14.1 Circuit breaker configuration

Table 35 Circuit breaker standard configuration

| Standard accessories                 | NA8-1600 |              | NA8-2500 |              | NA8-3200 |              | NA8-4000 |              | NA8-7500     |
|--------------------------------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|--------------|
|                                      | Fixed    | Withdrawable | Fixed    | Withdrawable | Fixed    | Withdrawable | Fixed    | Withdrawable | Withdrawable |
| Circuit breaker body                 | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Drawer seat                          |          | ■            |          | ■            |          | ■            |          | ■            | ■            |
| Intelligent controller               | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Top and bottom horizontal connection | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Auxiliary contacts 4CO               | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Fault release indication contact     | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Motor operation mechanism            | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Closing electromagnet                | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Shunt release                        | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Door frame                           | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |

Table 36 Circuit breaker optional accessories

| Standard accessories                      | NA8-1600 |              | NA8-2500 |              | NA8-3200 |              | NA8-4000 |              | NA8-7500     |
|---|----------|--------------|----------|--------------|----------|--------------|----------|--------------|--------------|
|   | Fixed    | Withdrawable | Fixed    | Withdrawable | Fixed    | Withdrawable | Fixed    | Withdrawable | Withdrawable |
| Undervoltage instantaneous release        | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Relayed undervoltage release              | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Opening and closing button                | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Drawer position padlock                   |          | ■            |          | ■            |          | ■            |          | ■            | ■            |
| Drawer safety baffle padlock              |          | ■            |          | ■            |          | ■            |          | ■            | ■            |
| Body key lock                             | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Position door interlock                   |          | ■            |          | ■            |          | ■            |          | ■            | ■            |
| Status door interlock                     |          | ■            |          | ■            |          | ■            |          | ■            | ■            |
| Auxiliary contacts 6CO                    | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Auxiliary contacts 3NO+3NC                | ■        | ■            |          |              |          |              |          |              |              |
| Auxiliary contacts 4NO+4NC                |          |              | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Auxiliary contacts 5NO+5NC                |          |              | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Drawer position indication contact        |          | ■            |          | ■            |          | ■            |          | ■            | ■            |
| Mechanical interlock (2 sets)             | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| External neutral line transformer         | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Earth current transformer and accessories | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Interphase barrier                        | ■        | ■            | ■        | ■            | ■        | ■            | ■        | ■            | ■            |
| Mechanical interlock (3 sets)             |          |              | ■        | ■            | ■        | ■            | ■        | ■            | ■            |

14.2 Circuit breaker selection table

Table 37 Circuit breaker selection table

| Frame size current                              | NA8-1600   |                                | NA8-2500   |                                 | NA8-3200  | NA8-4000                        |                                 | NA8-7500                       |  |
|---|--|--------------------------------|--|---------------------------------|---|---------------------------------|---------------------------------|--------------------------------|--|
| Circuit breaker                                 | N <input type="checkbox"/> H <input type="checkbox"/>  | N <input type="checkbox"/>     | H <input type="checkbox"/>                                 |                                 | N <input type="checkbox"/>                        | H <input type="checkbox"/>      | N <input type="checkbox"/>      | H <input type="checkbox"/>     |  |
| Rate current                                    | 200A <input type="checkbox"/>  | 630A <input type="checkbox"/>  | 630A <input type="checkbox"/>                              | 1600A <input type="checkbox"/>  | 1600A <input type="checkbox"/>                    | 1600A <input type="checkbox"/>  | 4000A <input type="checkbox"/>  | 4000A <input type="checkbox"/> |  |
|   | 400A <input type="checkbox"/>  | 800A <input type="checkbox"/>  | 800A <input type="checkbox"/>                              | 2000A <input type="checkbox"/>  | 2000A <input type="checkbox"/>                    | 2000A <input type="checkbox"/>  | 5000A <input type="checkbox"/>  | 5000A <input type="checkbox"/> |  |
|   | 630A <input type="checkbox"/>  | 1000A <input type="checkbox"/> | 1000A <input type="checkbox"/>                             | 2500A <input type="checkbox"/>  | 2500A <input type="checkbox"/>                    | 2500A <input type="checkbox"/>  | 6300A <input type="checkbox"/>  | 6300A <input type="checkbox"/> |  |
|   | 800A <input type="checkbox"/>  | 1250A <input type="checkbox"/> | 1250A <input type="checkbox"/>                             | 3200 A <input type="checkbox"/> | 3200 A <input type="checkbox"/>                   | 3200 A <input type="checkbox"/> | 7500A <input type="checkbox"/>  | 7500A <input type="checkbox"/> |  |
|   | 1000A <input type="checkbox"/>   | 1600A <input type="checkbox"/> | 1600A <input type="checkbox"/>                             |                                 | 4000 A <input type="checkbox"/>                   | 4000 A <input type="checkbox"/> |                                 |                                |  |
|   | 1250A <input type="checkbox"/>   | 2000A <input type="checkbox"/> | 2000A <input type="checkbox"/>                             |                                 |   |                                 |                                 |                                |  |
|   | 1600A <input type="checkbox"/>   | 2500A <input type="checkbox"/> | 2500A <input type="checkbox"/>                             |                                 |   |                                 |                                 |                                |  |
| Number of poles                                 | 3p <input type="checkbox"/> 4p <input type="checkbox"/>  |                                |  |                                 |   |                                 |                                 |                                |  |
| Installation method                             | Withdrawable <input type="checkbox"/> Fixed <input type="checkbox"/> (not available for NA8-7500)  |                                |  |                                 |   |                                 |                                 |                                |  |
| Bus connection                                  | Horizontal <input type="checkbox"/> Vertical <input type="checkbox"/> Mixed <input type="checkbox"/> (specify)   |                                |  |                                 |   |                                 |                                 |                                |  |
| Intelligent controller                          | M type <input type="checkbox"/> (basic) H type <input type="checkbox"/> (communication) S type <input type="checkbox"/> (LOT)  |                                |  |                                 |   |                                 |                                 |                                |  |
| Shunt, close, motor                             | Closing electromagnet <input type="checkbox"/> Shunt release <input type="checkbox"/> Energy storage motor <input type="checkbox"/>  |                                |  |                                 |   |                                 |                                 |                                |  |
|   | AC220/230V <input type="checkbox"/>  |                                | AC380/400 V <input type="checkbox"/>                       |                                 | DC220V <input type="checkbox"/>                   |                                 | DC110V <input type="checkbox"/> |                                |  |
| Undervoltage release                            | UVT <input type="checkbox"/> UVTD <input type="checkbox"/> UVTZ-1 <input type="checkbox"/> (only for NA8-1600)   |                                |  |                                 |   |                                 |                                 |                                |  |
|   | AC220/230V <input type="checkbox"/>  |                                | AC380/400V <input type="checkbox"/>                        |                                 |   |                                 |                                 |                                |  |
| Auxiliary contact                               | NA8-1600 C04 (standard)  |                                | C06 <input type="checkbox"/> (only for AC)                 |                                 | N3 <input type="checkbox"/> (only for AC)         |                                 |                                 |                                |  |
|   | NA8-2500~7500 C04 (standard)   |                                | C06 <input type="checkbox"/> N4 <input type="checkbox"/>   |                                 | N5 <input type="checkbox"/>                       |                                 |                                 |                                |  |
| Auxiliary contact indicator(optional)           | 3 position signal device for drawer seat <input type="checkbox"/>  |                                |  |                                 |   |                                 |                                 |                                |  |
| Connection accessories (optional)               | Interphase barrier <input type="checkbox"/> NA8-1600 extended bus <input type="checkbox"/>   |                                |  |                                 |   |                                 |                                 |                                |  |
| Controller functions and accessories (optional) | External transformer: N phase external transformer <input type="checkbox"/> External LEC leakage transformer <input type="checkbox"/>  |                                |  |                                 |   |                                 |                                 |                                |  |
|   | Earth current protection transformer <input type="checkbox"/>  |                                |  |                                 |   |                                 |                                 |                                |  |
|   | Controller function: 3P+N protection <input type="checkbox"/>  |                                | Leakage protection <input type="checkbox"/>                |                                 | Earth current protection <input type="checkbox"/> |                                 |                                 |                                |  |
|   | Voltage measurement and protection <input type="checkbox"/>  |                                | Energy measurement and protection <input type="checkbox"/> |                                 | Signal contact output <input type="checkbox"/>    |                                 |                                 |                                |  |
|   | ZSI zone selective interlock protection <input type="checkbox"/>   |                                | Load monitoring <input type="checkbox"/>                   |                                 |   |                                 |                                 |                                |  |
|   | Notes: 1) 3P+N protection requires N phase external transformer;<br>2) Leakage protection requires external LEC leakage transformer, and rated current of ACB with leakage transformer should <= 3200A;<br>3) Earth current protection requires earth current protection transformer |                                |  |                                 |   |                                 |                                 |                                |  |
| Locking mechanism (Optional)                    | Breaking and making button lock <input type="checkbox"/> 1 lock 1 key <input type="checkbox"/> 2 locks 1 key <input type="checkbox"/> 3 locks 2 keys <input type="checkbox"/>  |                                |  |                                 |   |                                 |                                 |                                |  |
| Mechanical interlock (Optional)                 | Steel cable interlock (dual interlock) <input type="checkbox"/> Steel cable interlock (MIT-3) <input type="checkbox"/> (only for NA8-2500~7500)  |                                |  |                                 |   |                                 |                                 |                                |  |
| Module (Optional)                               | PSU-1 <input type="checkbox"/> RU-1 <input type="checkbox"/> ST-DP protocol conversion module <input type="checkbox"/>   |                                |  |                                 |   |                                 |                                 |                                |  |

Notes:1) specify frame size current, rated current and auxiliary control voltage when ordering

2) Please mark “□” or “√” in the “—” to select the option you need; if not marked, we will delivery with factory settings.

3) Extra charges are required for additional functions and special requirements. Telephone:

Fax: 0577-62877777-706288

Configuration

1. NA8-1600-7500 regular configuration

Shunt release, closing electromagnet, 4 groups of auxiliary changeover contacts, motor, M type intelligent controller, main circuit horizontal connection, door frame, main circuit installation bolts, circuit breaker manual, package box, drawer seat (withdrawable circuit breaker)

2. Optional configuration (extra charges)

NA8-1600 optional configuration: undervoltage instantaneous release, undervoltage delayed release, steel cable interlock, keylock, external transformer ground protection, 6 groups of auxiliary changeover contacts, 3 NO 3 NC contacts, H type intelligent controller, optional H type functions, interphase barrier, position signal.

NA8-2500-7500 optional configuration: undervoltage delayed release (1s-5s adjustable), steel cable interlock, button lock, keylock, door interlock, external transformer ground protection, vertical connection, 6 groups of auxiliary changeover contacts, 4 NO 4 NC contacts, 5 NO 5 NC contacts, H type intelligent controller, optional H type functions, position signal.