

Shanghai Liangxin Electrical Co, Ltd.

# NDQ5W-1600 Product Specification

(IPD-ENG-DEV-T20 A1 2016-09-23)

**Product name: Automatic transfer switching equipment**

**Product model: NDQ5W-1600**

**Date: Dec. 22, 2017**

|                |                |      |            |
|----------------|----------------|------|------------|
| Prepared by    | Zhong Yunpan   | Date | 2017-12-22 |
| Reviewed by    | Wang Mingliang | Date | 2017-12-22 |
| Countersign by | Ren Shanbo     | Date | 2017-12-22 |
| Approved by    | Shi Wei        | Date | 2017-12-22 |

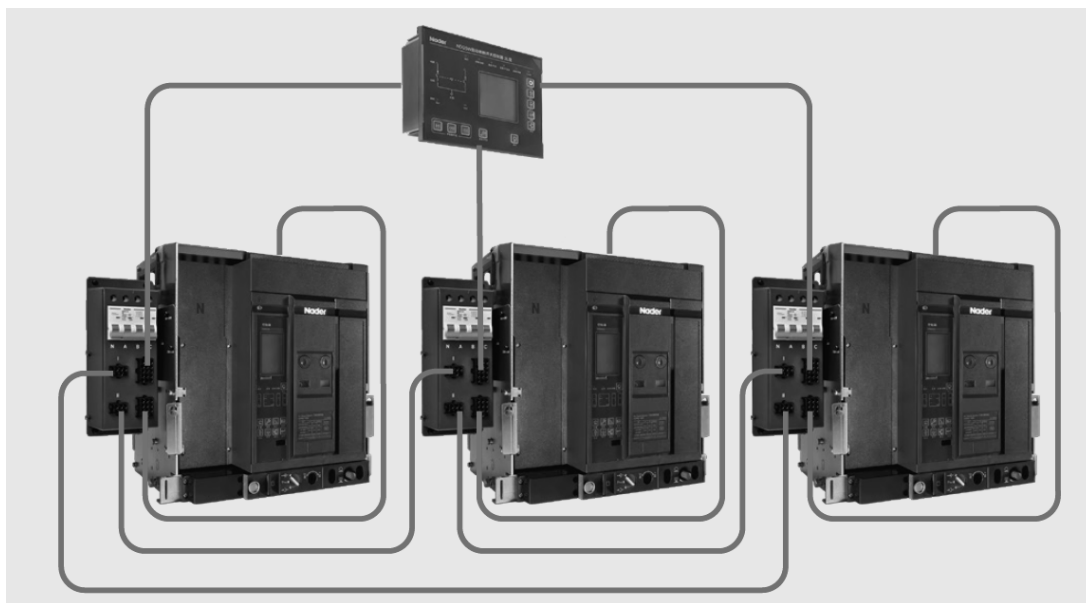
| Revision History |                         |                     |              |                |             |
|------------------|-------------------------|---------------------|--------------|----------------|-------------|
| Version          | Revision Reason/Content | Implementation Date | Prepared by  | Reviewed by    | Approved by |
| 0                | New addition            | 2017-09-11          | Jia Jianping | Wang Mingliang | Shi Wei     |
| 1                | Change pictures         | 2017-12-22          | Zhong Yunpan | Wang Mingliang | Shi Wei     |
|                  |                         |                     |              |                |             |
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|                  |                         |                     |              |                |             |

## 1. Applicable Scope and Purpose

The NDQ5W-1600 automatic transfer switching equipment can be applied to the power distribution system with the AC 50Hz/60Hz, the rated working current of 200A~1600A, the rated insulation voltage of 1000 V, the rated working voltage of AC415V and below for automatically disconnecting from one power supply and connecting to another power supply. The NDQ5W-1600 automatic transfer switching equipment not only provides the dual power transfer system, but also provides the triple power transfer system and incoming power transfer system of “Two lines plus bus connection”. Besides the conventional transfer, it also provides the parallel transfer function, thus comprehensively guaranteeing the uninterrupted power supply at special occasions as well as safety and reliability of the load power supply.

This product complies with GB14048.1-2012, GB14048.2-2008, GB/T14048.11-2016, IEC 60947-1:2011, IEC 60947-2:2006, and IEC 60947-6-1:2013.

## 2. Picture of the Product



## 3. Specification and Model Description

|  |                 |   |   |   |   |   |   |   |   |    |
|--|-----------------|---|---|---|---|---|---|---|---|----|
| ND   Q   5   W   -   □   □   /   □□□   /   □   /   □   /   □ |                 |   |   |   |   |   |   |   |   |    |
| —  | 1               | 2 | 3 | 4 | 5 | 6   | 7 | 8 | 9 | 10 |
| SN   | SN name         |   |   |   |   | NDQ5W   |   |   |   |    |
| 1  | Enterprise code |   |   |   |   | ND: <b>Nader</b> brand low-voltage electrical appliance |   |   |   |    |
| 2  | Product code    |   |   |   |   | Q: ATSE   |   |   |   |    |
| 3  | Design SN       |   |   |   |   | 5   |   |   |   |    |

|  |  |   |
|--|--|---|
| 4  | Actuating circuit breaker                            | W: NDW3 series air circuit breaker  |
| 5  | Rated current of frame                               | 1600A   |
| 6  | Installation mode of the actuating circuit breaker   | C: Drawout type   |
| 7  | Rated working current                                | 02:200A, 04:400A, 06:630A, 08:800A,<br>10:1000A, 12:1250A, 16:1600A   |
| 8  | Number of poles                                      | 3: 3P; 4: 4P  |
| 9  | Rated working voltage                                | K1: AC380/400/415V (TT/TN),<br>K2: AC380/400/415V (IT),   |
| 10   | Controller type<br>(Related to the No. 7 selection,) | 2L: Dual power transfer<br>3L: Triple power transfer<br>QL: Two lines plus bus connection transfer<br>2LB: Dual power transfer with the manual parallel operation function<br>3LB: Triple power transfer with the manual parallel operation function<br>QLB: Two lines plus bus connection transfer with the manual parallel operation function |
| <p>Example and description: Choose the same or different rated current in the same frame; consult the after-sales engineer.</p> <p>1. NDQ5W-1600 C/40 /4/K1/2L (one type is possible for the same rated current)</p> <p>2. NDQ5W-1600 C/25 32 40/4/K1/3L (different types shall be indicated separately for the different rated current)</p> |  |   |

#### 4. Main Technical Parameters

Rated working voltage  $U_e$ : AC380/400/415V;

Rated control supply voltage of controller  $U_s$ : TT/TN system: AC230V; IT system: AC380V;

Rated frequency: 50/60Hz

Rated insulation voltage  $U_i$ : AC1000V

Rated impulse withstand voltage  $U_{imp}$ : 12kV

Utilization category: AC-33iB

Electrical equipment level: Level CB

Rated short-circuit breaking capacity  $I_{cn}$ : 55kA

Rated short circuit making capacity  $I_{cm}$  (peak value): 121kA

Rated short time withstand current  $I_{cw}$  (effective value): 50kA, 1s

Contact switching time: 200ms

Electrical life: 6,500 times

Mechanical life: 15,000 times (free maintenance)      30,000 times (with maintenance)

Isolating function: Available

#### 5. Controller Functions

| Controller model                |  |                                | 2L  | 2LB | 3L                   | 3LB | QL                | QLB |
|---------------------------------|--|--------------------------------|---|-----|----------------------|-----|-------------------|-----|
| Rated control supply voltage Us |  |                                | AC230V [Ue= AC380V/400V/415V (TT/TN)],<br>AC380V [Ue= AC380V/400V/415V (IT)]                  |     |                      |     |                   |     |
| Auxiliary power supply          |  |                                | DC24V   |     |                      |     |                   |     |
| Applicable application mode     |  | Grid-grid                      | ■   | ■   |                      |     | ■                 | ■   |
|                                 |  | Grid-oil engine                | ■   | ■   |                      |     | ■                 | ■   |
|                                 |  | Grid-grid-oil engine           |   |     | ■                    | ■   |                   |     |
|                                 |  | Grid-oil engine-oil engine     |   |     | ■                    | ■   |                   |     |
| Applicable type                 | Dual power transfer                    |                                | ■   | ■   |                      |     |                   |     |
|                                 | Triple power transfer                  |                                |   |     | ■                    | ■   |                   |     |
|                                 | Two lines plus bus connection transfer |                                |   |     |                      |     | ■                 | ■   |
| Automatic transfer              | Under-voltage protection               | Power supply detected          | S1/S2 three-phase   |     | S1/S2/S3 three-phase |     | S1/S2 three-phase |     |
|                                 |  | Under-voltage start value      | OFF+ Us * (75~95%)  |     |                      |     |                   |     |
|                                 |  | Under-voltage return value     | AC380V: Under-voltage start value + (6V~45V),<br>AC230V: Under-voltage start value + (4V~30V) |     |                      |     |                   |     |
|                                 | Overvoltage protection                 | Power supply detected          | S1/S2 three-phase   |     | S1/S2/S3 three-phase |     | S1/S2 three-phase |     |
|                                 |  | Overvoltage start value        | Us *(105%~125%)+ OFF  |     |                      |     |                   |     |
|                                 |  | Overvoltage return value       | AC380V: Overvoltage start value - (6V~45V),<br>AC230V: Overvoltage start value - (4V~30V)     |     |                      |     |                   |     |
|                                 | Open-phase protection                  | Power supply detected          | S1/S2 three-phase   |     | S1/S2/S3 three-phase |     | S1/S2 three-phase |     |
|                                 |  | Open-phase value               | Us *25%   |     |                      |     |                   |     |
|                                 | Underfrequency protection              | Underfrequency start value     | OFF+rated frequency * (90%~98%)   |     |                      |     |                   |     |
|                                 |  | Underfrequency return value    | Rated frequency * (95%~99%)   |     |                      |     |                   |     |
|                                 | Overfrequency protection               | Overfrequency start value      | Rated frequency * (102%~110%) + OFF   |     |                      |     |                   |     |
|                                 |  | Overfrequency return value     | Rated frequency * (101%~105%)   |     |                      |     |                   |     |
|                                 | Voltage unbalance protection           | Voltage unbalance Start value  | (3%~30%) + OFF  |     |                      |     |                   |     |
|                                 |  | Voltage unbalance Return value | (2%-10%)  |     |                      |     |                   |     |
|                                 | Phase order                            | Phase order mode               | A-B-C (A-B-C, A-C-B, OFF)   |     |                      |     |                   |     |

|                        |   |                          |  |       |               |       |                               |       |
|------------------------|---|--------------------------|--|-------|---------------|-------|-------------------------------|-------|
|                        | protection  |                          |  |       |               |       |                               |       |
| Power priority         |   | Mode selection           | Qs1, Qs2   |       | Qs1, Qs2, Qs3 |       | Qs1+Qs2<br>Qs1+Qql<br>Qs2+Qql |       |
| Energy storage setting |   |                          | Energy storage before closing, energy storage after closing    |       |               |       |                               |       |
| Operation mode         |   |                          | Auto switch and auto recover, auto switch and non-auto recover |       |               |       |                               |       |
| Manual transfer key    |   | Manual transfer          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        |   | Manual parallel transfer |  | ■     |               | ■     |                               | ■     |
| Display                | Supply voltage/frequency/unbalance parameter display                |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Power open phase/abnormal/normal display                            |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Making, breaking and tripping status display of the circuit breaker |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Communication status display  |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Power failure display   |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Parameter setting display   |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
| Transfer delay         |   |                          | T1-T4  | T1-T4 | T1-T6         | T1-T6 | T1-T6                         | T1-T6 |
| Communication function |   | Communication function   | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        |   | Modbus protocol          | ■  | ■     | ■             | ■     | ■                             | ■     |
| Auxiliary functions    | RTC real time   |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Key locking function  |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Generator starting/stopping control                                 |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Load removal (optional)   |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Fault locking   |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Event recording   |                          | ■  | ■     | ■             | ■     | ■                             | ■     |
|                        | Alarm function  |                          | ■  | ■     | ■             | ■     | ■                             | ■     |

Note: ■ Standard configuration

## 6. Normal Working Environment and Installation Conditions

### ➤ Ambient temperature

- Applicable ambient temperature is -25℃ ~ + 70℃, the average within 24 hours shall not be more than +35℃;
- The circuit breaker with the ambient temperature of -25℃~45℃ can be specially customized. If the ambient temperature is higher than +40℃, the user needs to reduce the capacity; for the reduced capacity coefficient, refer to the derating factor table in the product's actuator-air circuit breaker manual of the specific model.

### ➤ Atmospheric environment condition

When the ambient air temperature is  $+40^{\circ}\text{C}$ , the relative humidity of atmosphere shall not be more than 50%. At low temperature, a higher relative humidity is allowed, for example, in case of  $+25^{\circ}\text{C}$ , the relative humidity of atmosphere can reach 90%. For condensation due to temperature change, dehumidification or corresponding measures should be taken.

➤ Anti-corrosion level

Salt mist: Severe Level 2

➤ Pollution level

Pollution level: 3

➤ Altitude

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

If the altitude of the installation site is between 2,000 m to 4,000 m, it can be specially customized. For the working performance, refer to the correction value in the product's actuator-air circuit breaker manual of the specific model.

➤ Shockproof requirement

The automatic transfer switching equipment can ensure resistance to electromagnetic or mechanical shock, and has passed the IEC 60721-3-3 standard test.

■ Amplitude:  $\pm 1\text{Mm}$  (2~9Hz)

■ Constant acceleration:  $5\text{M/s}^2$  (9~200Hz)

➤ Installation condition

With the vertical gradient no more than  $5^{\circ}$ , the actuator-air circuit breaker shall be installed under the environment condition without explosion danger, conductive dust or the possibility of corroding metal and damaging the insulation.

➤ Installation category

The actuator-air circuit breaker's main circuit installation category is IV; the rest auxiliary circuit and control circuit installation category is III.

➤ Protection class

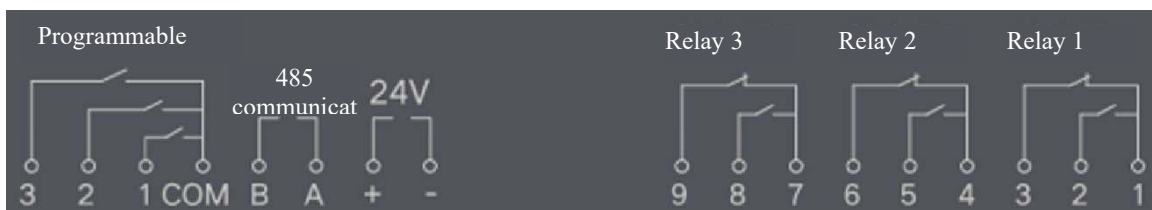
IP30 and IP40 (the circuit breaker is installed in a cubicle and equipped with a protective door frame);

IP65 (the controller is installed in a cubicle and equipped with a waterproof rubber gasket).

## 7. Definition of External Interfaces



Two groups of yellow wiring card slots underneath in the figure above are secondary wiring terminals provided to customers with the wiring terminal functions shown as below:



B A terminals --- 485 communication interfaces;

+ - terminals --- External DC24V power supply, with the power supply capacity of DC24V, 1A;

Programmable input ports: There are three groups of input ports with each port as the NO contact. For the input status of each group of ports, customers can select three types of the required status inputs and dry contact inputs according to the port programming input table;

Relay output ports: There are three groups of relay output ports with each port consisting of two pairs of the corresponding NO and NC contacts. For the output status of each group of ports, customers can select three types of the required status outputs and dry contact outputs according to the port programming output table;

Port Programming Input Table

| Port Programming Input Settings   |
|-----------------------------------|
| Either:                           |
| Fire control function (fully off) |
| Forced Qs1 closing                |
| Forced Qs2 closing                |
| One-out-three:                    |
| Fire control function (fully off) |
| Forced Qs1 closing                |
| Forced Qs2 closing                |
| Forced Qs3 closing                |
| Either+bus connection:            |
| Fire control function (fully off) |
| Forced Qs1+Qs2 closing            |
| Forced Qs1+Qq1 closing            |
| Forced Qs2+Qq1 closing            |

Port Programming Output Table

| Port Programming Output Settings              |
|---|
| Fault alarm                                   |
| Transfer action fault                         |
| Tripping fault                                |
| Grid alarm                                    |
| Qs1 power alarm                               |
| Qs2 power alarm                               |
| Qs3 power alarm                               |
| #1 oil engine startup                         |
| #2 oil engine startup                         |
| Bus connection removal                        |
| Fully off event                               |
| Parallel transfer failure (parallel validity) |

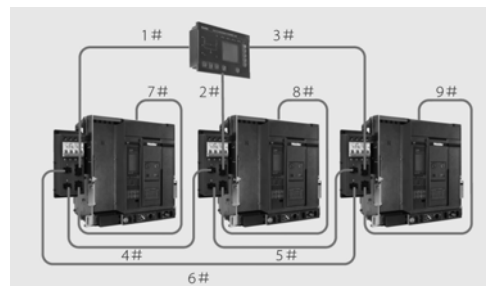


## 8. Product Outline and Installation Dimensions

The NDQ5W-1600 automatic transfer switching equipment consists of controller, adapter, electric interlocking harness and actuating circuit breaker. The controller is installed separately on the instrument door of the power distribution cabinet; the adapter can be installed on the left side of the actuating circuit breaker, which can be installed freely by the user; the electric interlocking harness is wired according to the blue wire in the figure below while the actuating circuit breaker is installed in the power distribution cabinet. For external dimensions of the above product parts, see the following table (see the subsequent figure for the detailed dimensions).

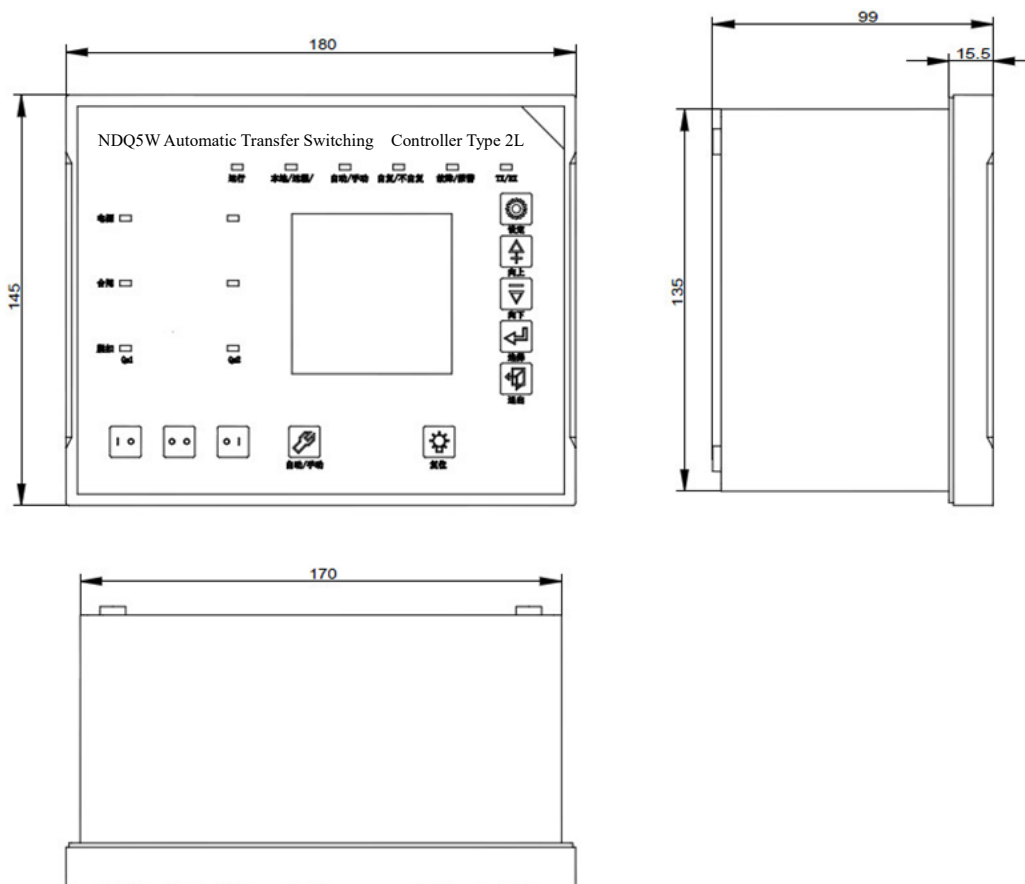
| Name                      | Model                | External dimensions |
|---------------------------|----------------------|---------------------|
| Controller                | 2L/3L/QL/2LB/3LB/QLB | 180mm×99mm×145mm    |
| Adapter                   | -                    | 83mm×80mm×219mm     |
| Actuating circuit breaker | NDW3-1600/3P drawout | 363mm×356mm×351.5mm |
|                           | NDW3-1600/4P drawout | 433mm×356mm×351.5mm |

Note: The controller dimension doesn't include the wiring terminal dimension.



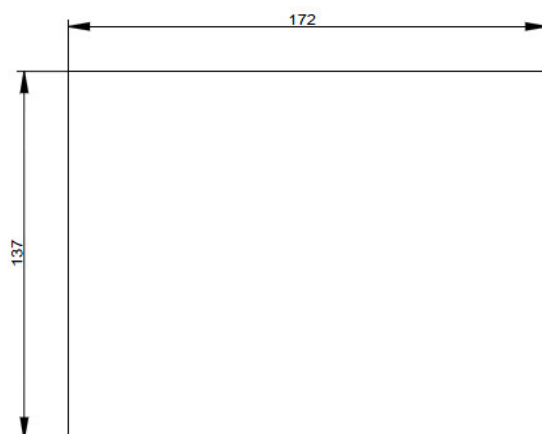
Note: 1 #, 2 #, 3 # harness is the control line; 4 #, 5 #, 6 # harness is the interlocking line; 7 #, 8 #, 9 # harness is the actuating line.

### External dimensions of controller (in mm)



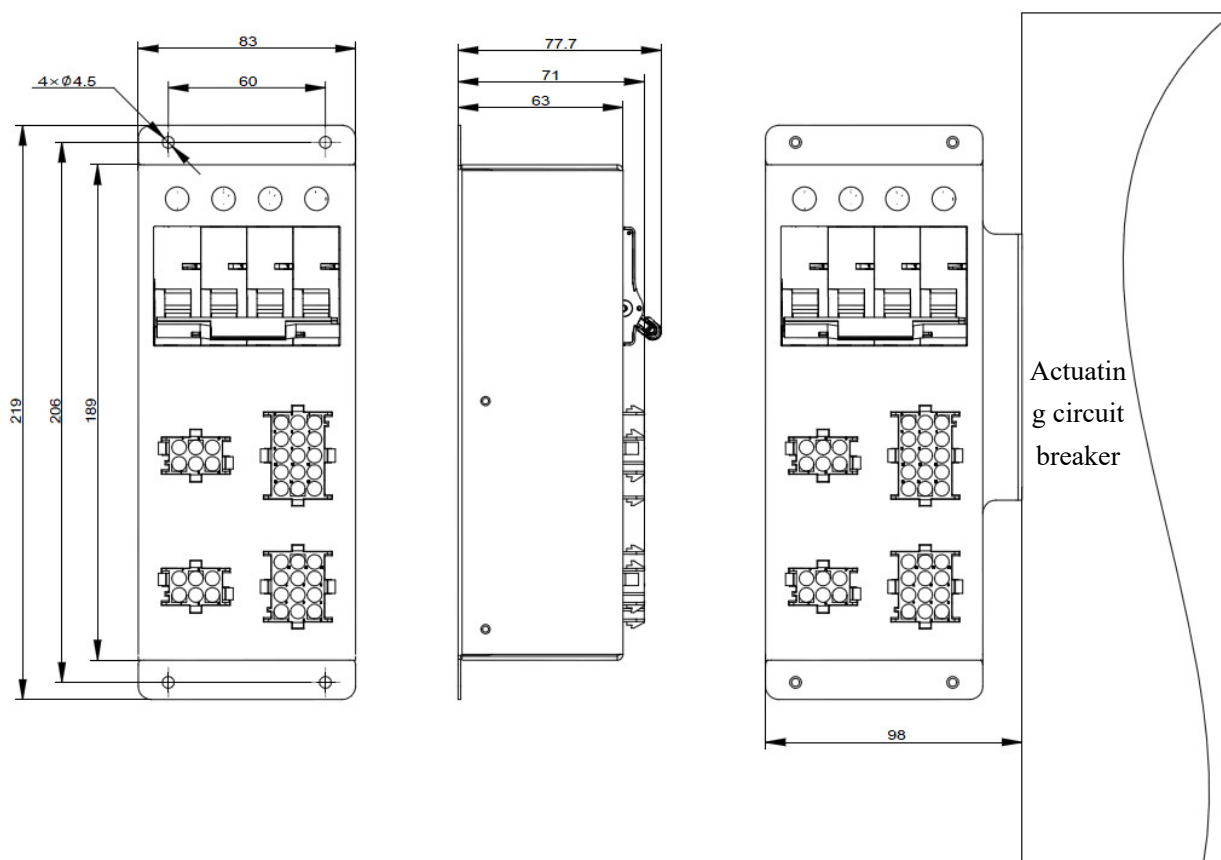
Note: External and installation dimensions of all controller models (2L, 3L, QL, 2LB, 3LB, QLB) are all the same.

## Cabinet door opening dimensions of controller (in mm)



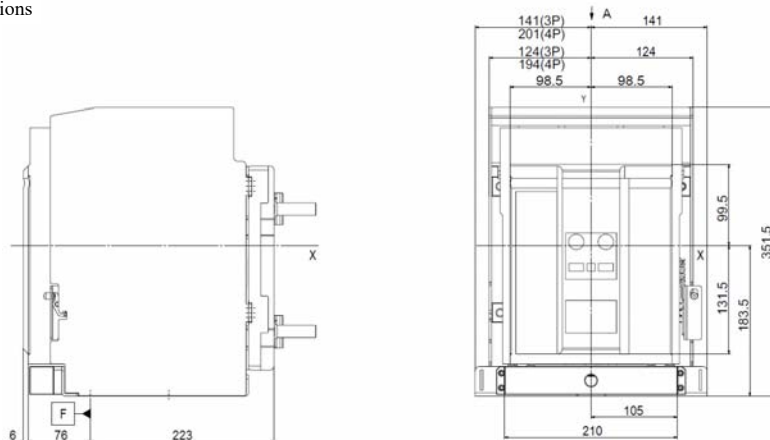
Note: The limit deviation of the opening dimensions is  $\pm 0.5$ .

## External and installation dimensions of adapter (in mm)

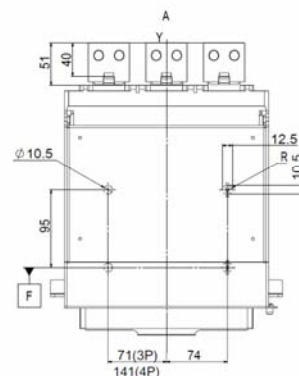


# External and installation dimensions of NDW3-1600 actuating circuit breaker (in mm)

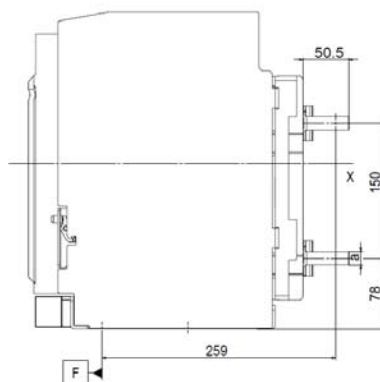
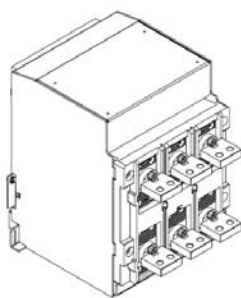
Dimensions



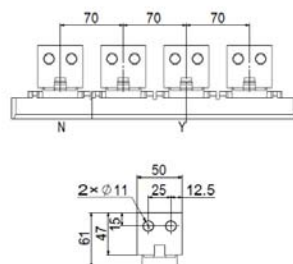
Fixed Details



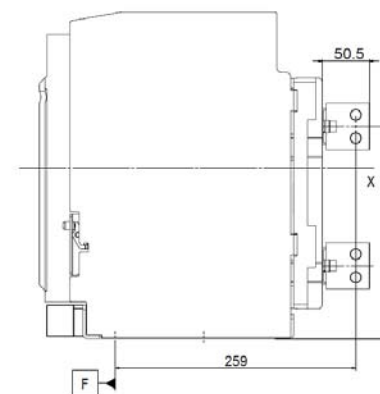
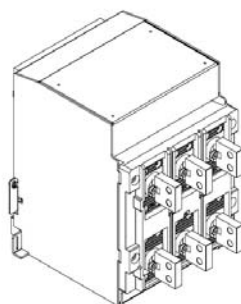
Horizontal wiring



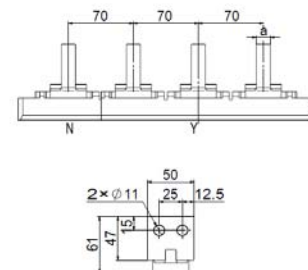
Details



Vertical wiring



Details



| Rated working current  | Dimensions of bus (mm) |
|------------------------|------------------------|
| 200A、400A、630A         | 10                     |
| 800A、1000A、1200A、1600A | 15                     |

Note: X and Y axes are the symmetric axes of the front mask

## 9. Installation Mode

The actuating circuit breaker with an adapter of the products is installed vertically in the cabinet bearing the maximum slope with the vertical installation plane about 5°.

## 10. Packaging and Storage

Each set of actuating circuit breaker of the products covered with a waterproof plastic bag shall be packaged with special wooden cases, which are fixed in the case with screws. If the mechanical interlock and other circuit breaker accessories are required, they shall be placed in wooden cases provided with installation manuals and certificates of the actuating circuit breaker. Controller, adapter, electric interlocking harness, adapter mounting bracket and fastening screws of the products shall be covered with a waterproof plastic bag separately. The controller and adapter shall be put in a special pearl wool case while the special case and other components in the special carton packaging boxes with the pearl wool cushion provided with installation manuals and certificates of the NDQ5W product.

Products should be stored in a warehouse with the ambient temperature of  $-55^{\circ}\text{C} \sim +70^{\circ}\text{C}$  and the corresponding relative humidity below 80% without acidic, alkali or other corrosive gas in the surrounding air. Under the conditions above, the storage period shall be no more than 18 months since the manufacturing date.

## 11. Environmental Compliance

Comply with the requirements of RoHs directives.

## 12. List of Accessories and Installation

For the accessory list of the actuating circuit breaker, please refer to the product specification of the NDW3-1600 air circuit breaker;

The accessory list of other controller components is as follows:

| SN | Name  | Specification | Quantity                          |  |
|----|---|---------------|-----------------------------------|--|
|    |   |               | Products with a 2L/2LB controller | Products with a 3L/3LB/QL/QLB controller |
| 1  | Adapter mounting bracket                      | --            | 2                                 | 3  |
| 2  | Adapter and mounting bracket fastening screws | M4            | 14 pieces                         | 21 pieces                                |
| 3  | Power module fastening screws                 | M4            | 4 pieces                          | 6 pieces                                 |

## 13. Precautions

- Installation, operation, use and maintained of the electrical equipment shall be performed by qualified professionals;
- The main circuit wiring shall be proper; the N-pole of the different power supplies must be connected with that of each actuating circuit breaker of ATSE properly and reliably in the TT/TN power distribution system;
- 3P products must be connected to the zero line in the TT/TN power distribution system;
- When the transfer controller is connected for commissioning and normal operation, the button lock of each actuating circuit breaker must be locked (self-equipped). It is strictly prohibited to operate the

circuit breaker manually with power on and test run shall be done with the transfer switching controller;

- Be sure to choose the controller with the control voltage of 380V in the IT power distribution system.