



NSA2 Smart Station Monitoring Unit

Technical Manual

Second generation · box transformer measurement & protection + communication gateway
+ fiber switching

V2.0 · October 2026



Beijing Aoyi Xinyuan Technology Co., Ltd.

Address 3B12-2, Yinhe Port Sci-Tech Innovation Center, No. 9 Jinghai 6th Road, Beijing Economic-Technological Development Area, Beijing 100176, China

Phone +86 10 8646 1328

Email sales@aoyipower.com

Web www.aoyipower.com/en/

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Revision V2.0: operating temperature $-40\text{ }^{\circ}\text{C}$... $+70\text{ }^{\circ}\text{C}$; PT100 and 4–20 mA DC inputs 6 in total; up to 10 relay outputs; IEC 61850 supported. All configuration items are optional; the final configuration follows the project drawings and the contractual technical agreement.

1. Overview

NSA2 is a measurement and control unit for the box-type transformers of renewable power plants. It continuously monitors the transformer with telemetry, status, remote control, protection and recording functions. Multiple RS-485 master ports and Ethernet ports integrate inverters, combiner boxes, meters and environmental monitors, and two fiber ports form a self-healing ring to the plant SCADA.

2. Functions

1. Communication

Up to 8 RS-485 master ports and 4 Ethernet ports for inverters, combiner boxes, meters and IP cameras; 2 fiber ports forming a self-healing ring; optional Wi-Fi access point.

2. Telemetry · AC

Up to 3 groups of three-phase AC inputs; measures currents and voltages and calculates line voltages, frequency, power factor, active and reactive power; LED display.

3. Telemetry · DC

PT100 and 4–20 mA inputs, 6 in total, for temperature, humidity, oil temperature and other non-electrical quantities.

4. Status (digital inputs)

Up to 40 digital inputs for transformer and inverter-room signals such as LV breaker and load-break switch positions, fuse blown, smoke alarm.

5. Control (relay outputs)

Up to 10 relay outputs for remote control of switchgear, e.g. LV breaker open/close.

6. Protection

Non-electrical: light gas, heavy gas, transformer high / very high temperature, low oil level, pressure-relief valve operation, etc. Electrical: overcurrent stages I / II / III, ground fault, overvoltage, undervoltage, etc.

7. Records

10 fault waveforms and 500 sequence-of-events (SOE) records.

3. Technical data

1. AC analog inputs

Current input	5 A or 1 A
Voltage input	AC 690 V / 400 V / 100 V
Frequency	50 Hz or 60 Hz
Current / voltage accuracy	Class 0.5
Frequency accuracy	±0.02 Hz
Power / power factor accuracy	±1%

2. Digital inputs

Input type	AC/DC 220 V dry-contact inputs, opto-isolated with surge absorption, insulation ≥ AC 1500 V
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3. Relay outputs

Contact rating	AC 220 V 8.0 A; AC 380 V 1.9 A; DC 250 V 1.5 A
Contact life	> 100,000 operations

4. Communication

Fiber	ST connector, up to 50 km, self-healing ring
Ethernet	10/100Base-TX
RS-485 master	Protocol conversion between MODBUS-RTU and IEC 60870-5-103/104
Protocols	MODBUS-RTU, IEC 60870-5-103/104, IEC 61850
Wi-Fi access point	Optional, password protected, approx. 100 m

5. Power supply

Auxiliary supply	AC/DC 220 V, tolerance ±20%
Supply frequency	50 Hz, tolerance -6% ... +2%
Rated burden	≤ 10 W

6. Environment

Operating temperature	−40 °C ... +70 °C
Storage	Not in acidic, alkaline or explosive atmospheres
Relative humidity	Monthly average max. 90% (monthly average min. temperature 25 °C), non-condensing; ≤ 50% at 40 °C
Atmospheric pressure	80 kPa ... 110 kPa
Environment	No explosion hazard, no conductive dust, no corrosive substances

7. Electromagnetic compatibility

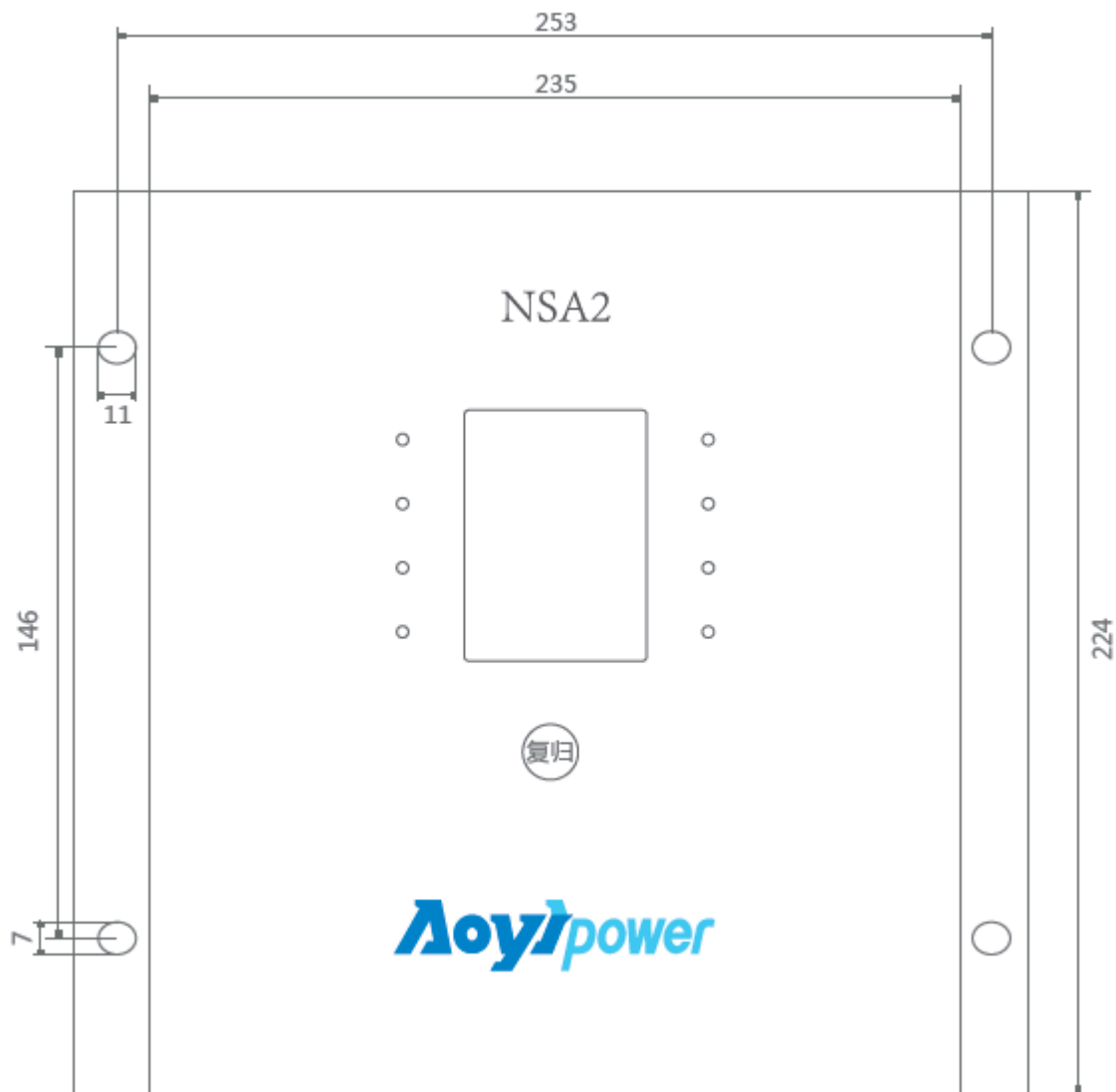
Electrostatic discharge immunity	GB/T 14598.14 (IEC 60255-22-2) Level III
Oscillatory wave immunity	GB/T 14598.13 (IEC 60255-22-1) Level III
Radiated RF field immunity	GB/T 14598.9 (IEC 60255-22-3) Level III
Electrical fast transient / burst immunity	GB/T 14598.10 (IEC 60255-22-4) Level A
Surge immunity (1.2/50 μs)	GB/T 14598.18 (IEC 60255-22-5) Level III
Conducted RF disturbance immunity	GB/T 14598.17 (IEC 60255-22-6) Level III
Power-frequency immunity	GB/T 14598.19 (IEC 60255-22-7) Level A
Conducted and radiated emissions	GB/T 14598.16 (IEC 60255-25)

4. Configuration

Maximum configuration. All items are optional; the final configuration follows the project drawings.

No.	Item	NSA2
1	AC input groups	3
2	DC inputs (PT100 / 4–20 mA)	6 in total
3	Digital inputs	40
4	Relay outputs	10
5	Fiber ports	2
6	Ethernet ports	4
7	RS-485 master ports	8
8	Protection	Electrical and non-electrical
9	Records	500

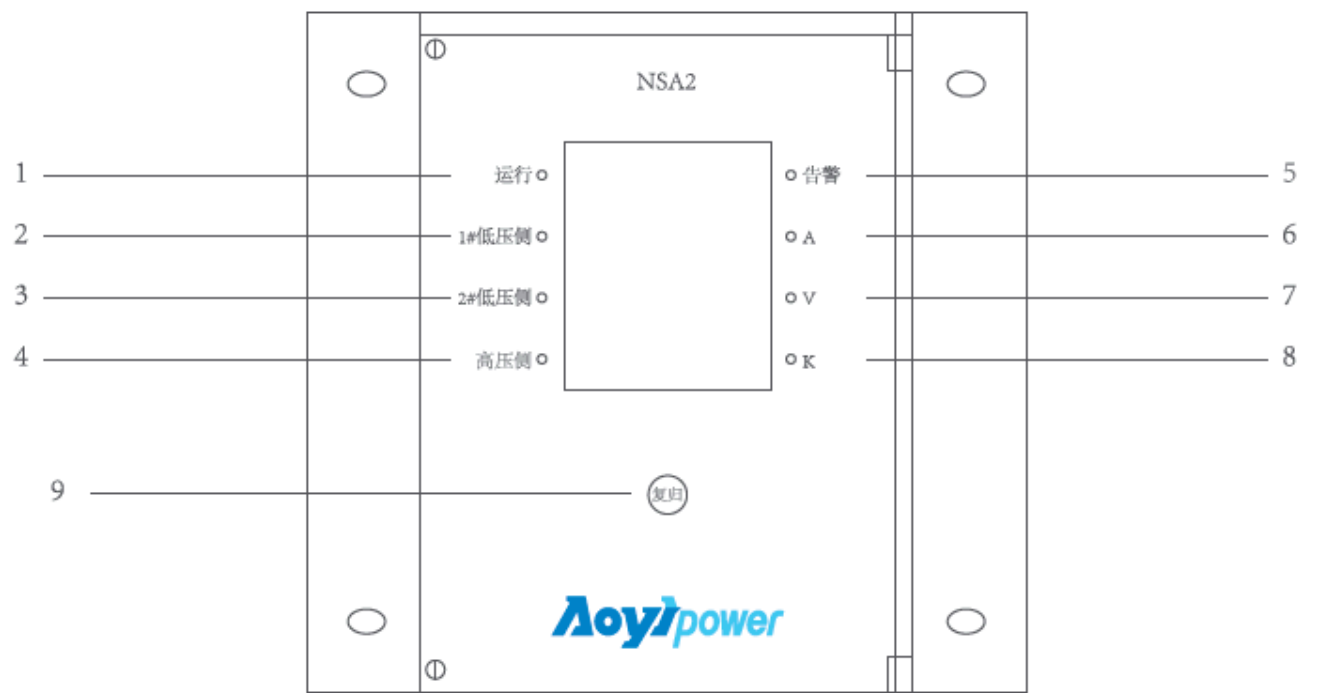
5. Dimensions and mounting



Dimensions (mm)

Flush panel mounting, fixed by four screws on both sides of the front plate; body depth 225 mm, plus at least 80 mm for rear wiring.

6. Front panel

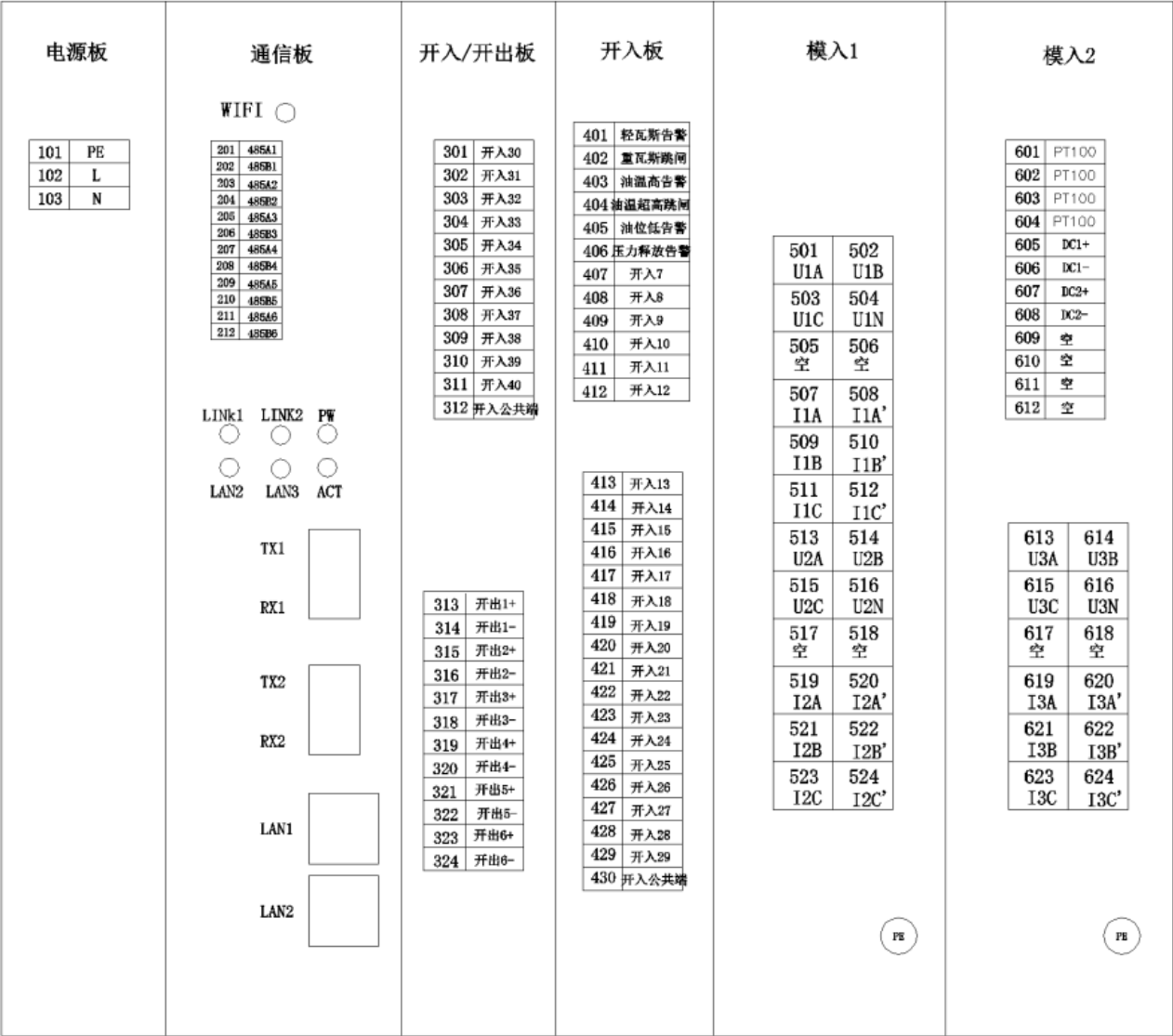


Front panel

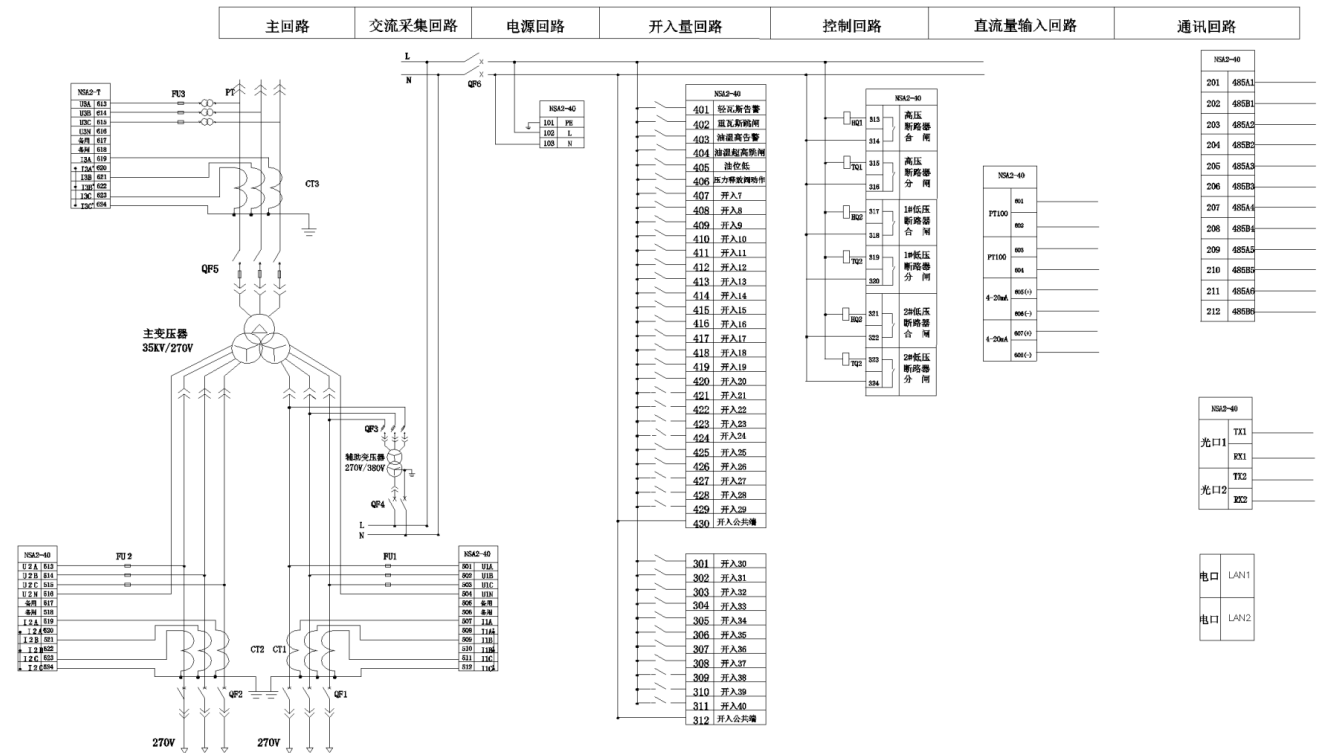
No.	Name	Type	Function
1	RUN	LED (green)	On after normal start-up; off when an alarm occurs
2	LV side 1#	LED (red)	Display shows LV side 1# currents and voltages
3	LV side 2#	LED (red)	Display shows LV side 2# currents and voltages
4	HV side	LED (red)	Display shows HV side currents and voltages
5	ALARM	LED (red)	On while an alarm is present
6	A	LED (red)	Display shows three-phase currents
7	V	LED (red)	Display shows three-phase voltages
8	K	LED (red)	Displayed value is scaled by 1,000
9	RESET	Key	Clears the alarm LED after the alarm has disappeared

7. Typical drawings

Typical examples only. Terminals and wiring vary with the configuration; the project drawings prevail.



Typical rear terminal diagram (example, labels in Chinese)



Typical secondary wiring diagram (example, labels in Chinese)

8. Warranty and service

8.1 Warranty period

12 months from energization or 18 months from shipment, whichever comes first, unless otherwise agreed in the contract.

8.2 Warranty coverage

Products damaged in normal use during the warranty period are repaired or replaced free of charge; where necessary AOYI sends engineers to site. Repairs are charged for damage caused by (1) improper storage or use, or abnormal environmental conditions; (2) incorrect installation or operation; (3) unauthorized modification, disassembly or reassembly.

8.3 Service

Response within 2 hours; on site within 48 hours where required (service points in Beijing and Xi'an). Spare parts remain available for all three product generations.

8.4 Contact

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