



NSA3 Smart Station Monitoring Unit

Technical Manual

Third generation · box transformer measurement & protection + communication gateway + fiber switching + cable monitoring

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/

Contents

1. Overview
2. Functions
3. Technical data
4. Configuration
5. Dimensions and mounting
6. Front panel
7. Typical drawings
8. Warranty and service

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

NSA3 is AOYI's third-generation smart station monitoring unit, installed in the box-type transformers (pad-mounted step-up substations) of solar and wind plants. Besides transformer measurement, control and protection, it integrates a communication gateway and a fiber-ring switch, monitors the cable sheath grounding current, and senses cable-joint temperatures wirelessly (433 MHz). All signals are collected and forwarded to the plant SCADA and dispatch systems.

Certification: PCCC product certification to DL/T 478-2013 and GB/T 7261-2016 (certificate 26P12108001R0S).

2. Functions

1. Communication

Up to 8 RS-485 master ports for inverters, combiner boxes and multifunction meters; 4 Ethernet ports for IP cameras and inverter networks; 2 fiber ports forming a self-healing ring; built-in 433 MHz receiver for cable-joint temperature sensors.

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. Cable grounding current

1 grounding-current input for on-line monitoring of sheath circulating-current waveform, amplitude and growth rate, with alarms; historical sampling to assess insulation condition.

5. Cable-joint temperature

Wireless (433 MHz) on-line monitoring of cable-joint temperatures and trends; sensor address, threshold and reporting interval are configurable; over-temperature alarm.

6. 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.

7. Control (relay outputs)

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

8. 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.

9. 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	$\pm 1\%$

2. Digital inputs

Input type	AC/DC 220 V dry-contact inputs, opto-isolated with surge absorption, insulation $\geq$ AC 1500 V
------------	--

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
Wireless	433 MHz cable-joint temperature sensors

5. Power supply

Auxiliary supply	AC/DC 220 V, tolerance $\pm 20\%$
Supply frequency	50 Hz, tolerance $-6\% \dots +2\%$
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

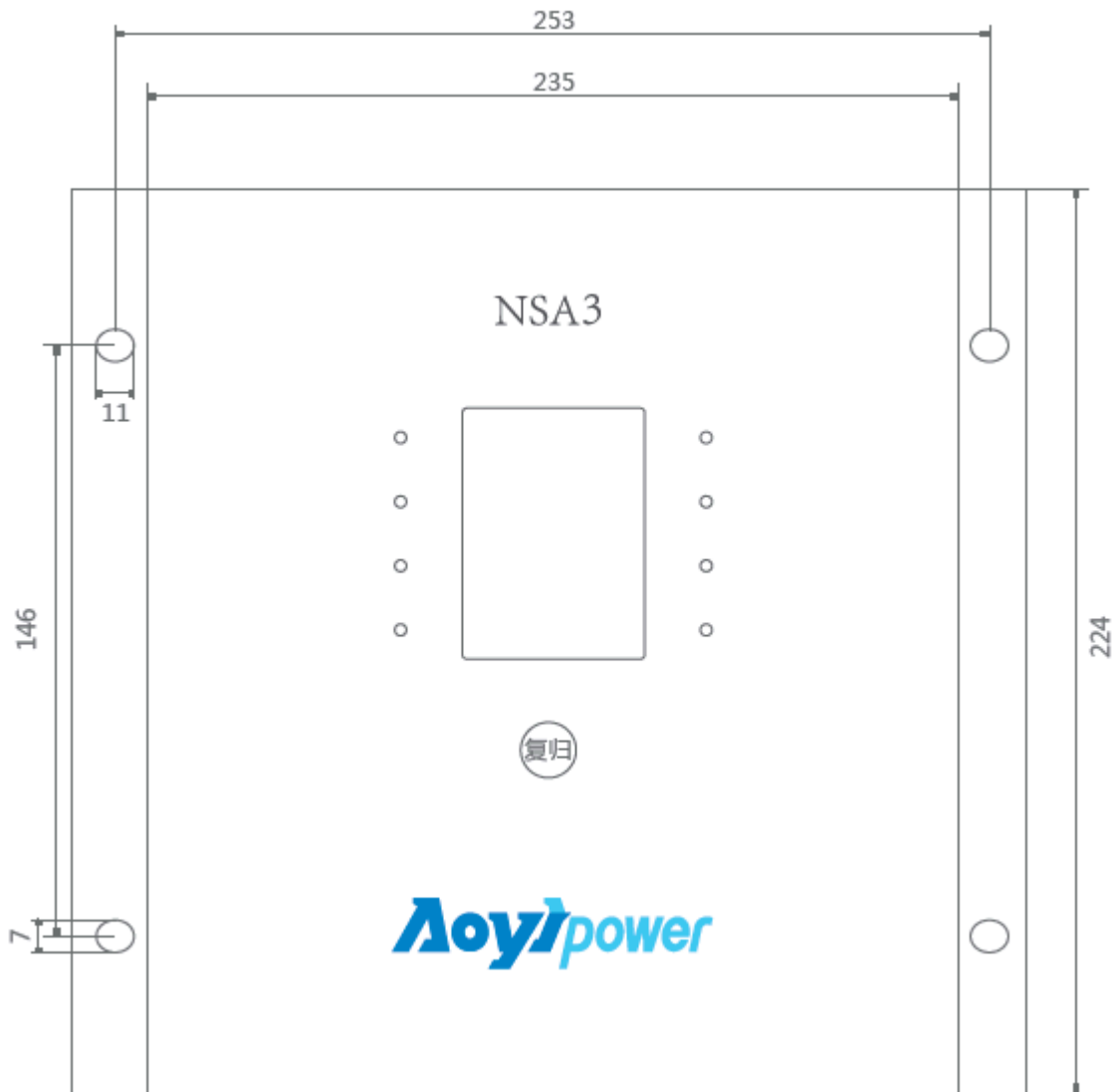
Electrostatic discharge immunity	GB/T 14598.14 (IEC 60255-22-2) Level III
Oscillatory wave immunity	GB/T 14598.13 (IEC 60255-22-1) Level III
Radiated RF field immunity	GB/T 14598.9 (IEC 60255-22-3) Level III
Electrical fast transient / burst immunity	GB/T 14598.10 (IEC 60255-22-4) Level A
Surge immunity (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	NSA3
1	AC input groups	3
2	DC inputs (PT100 / 4–20 mA)	6 in total
3	Grounding-current input	1
4	Digital inputs	40
5	Relay outputs	10
6	Fiber ports	2
7	Ethernet ports	4
8	RS-485 master ports	8
9	433 MHz wireless receiver	Yes
10	Protection	Electrical and non-electrical
11	Records	500

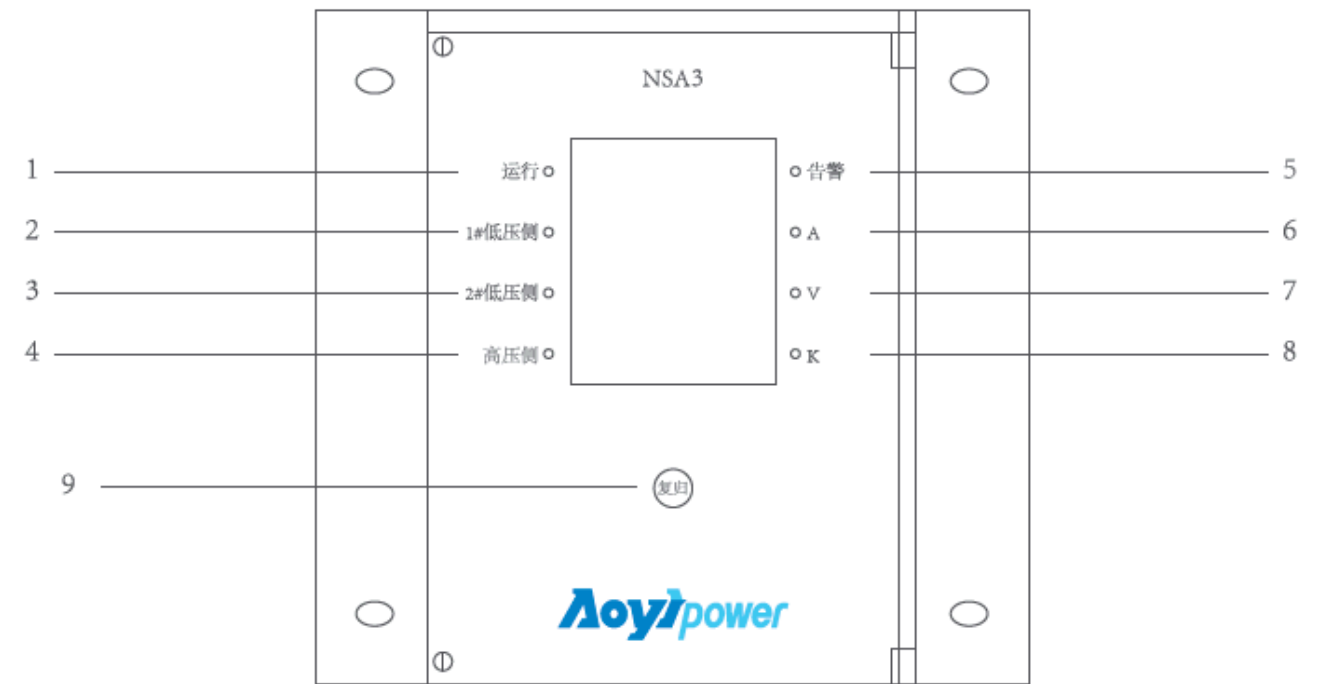
5. Dimensions and mounting



Dimensions (mm)

Flush panel mounting, fixed by four holes on both sides of the front plate; body depth 235 mm, plus at least 80 mm for rear wiring.

6. Front panel

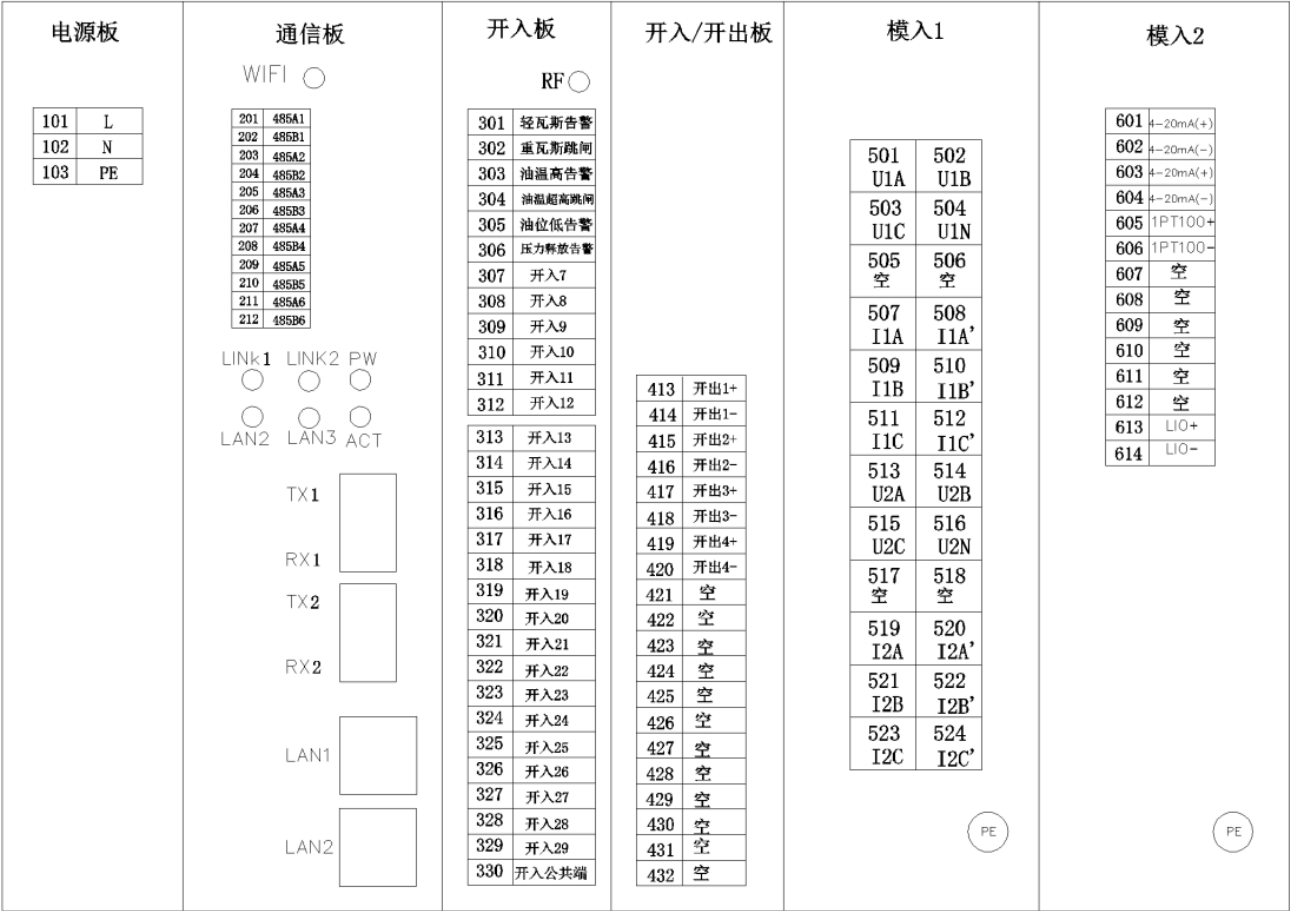


Front panel

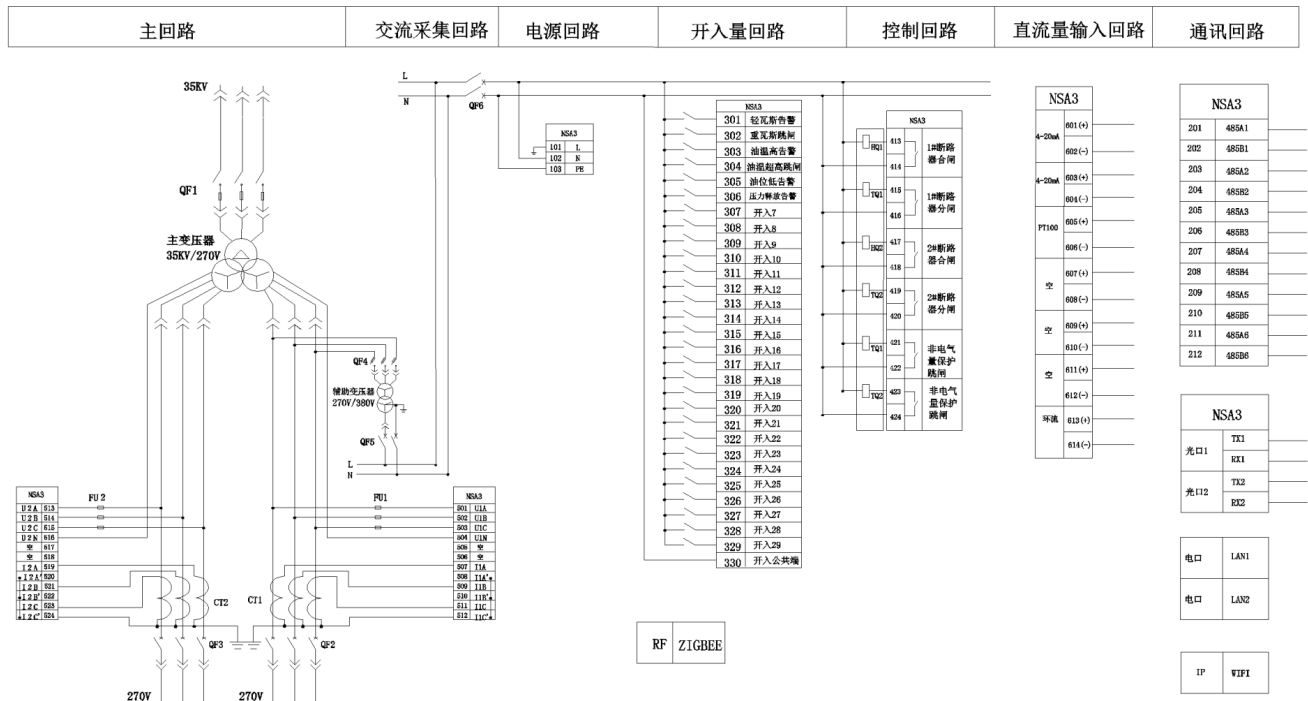
No.	Name	Type	Function
1	RUN	LED (green)	On after normal start-up; off when an alarm occurs
2	LV side 1#	LED (red)	Display shows LV side 1# currents and voltages
3	LV side 2#	LED (red)	Display shows LV side 2# currents and voltages
4	HV side	LED (red)	Display shows HV side currents and voltages
5	ALARM	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)



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

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/