# PNA1000
## IEC61850 Digital Substation Network Analyzer



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### Product description

PNA1000 is applied in the digital substation for network communications system, communications process and the real time monitoring of different messages.

It analyzes, warns and records the whole process, data and the abnormal incidents that secure the substation working.

- Warn and detect the faults in substation by monitoring network communications process and status.
- It could do 24-hours online monitoring and analyzing of the IEC61850 message communication in the substation.
- Warn and exclude the hidden dangers by monitoring and analyzing the network messages in station level and process level.
- Provide complete data and analysis methods to substation operation, fault device in station and secondary system fault by visual data and abnormal incident's records.

Record and storage capacity: 1100Mb/s
Accuracy: 100%
Frame lost rate: 0%
EMC tests approved by SGC

# Features

- ### Get hardware time mark by FPGA

  The event time of all messages including SV, GOOSE, MMS and PTP are stamped by a high performance FPGA, with a 50ns timestamp precision. Accurate record and analysis of the realtime process in a substaion can be implemented. More accurate record of the SV jitter from MUs.

- ### Mass data compression technique

  The data compression ratio is as high as 4:1 by applying the data compression algorithm. In the same situation, it gets longer data storage and provides complete data object.
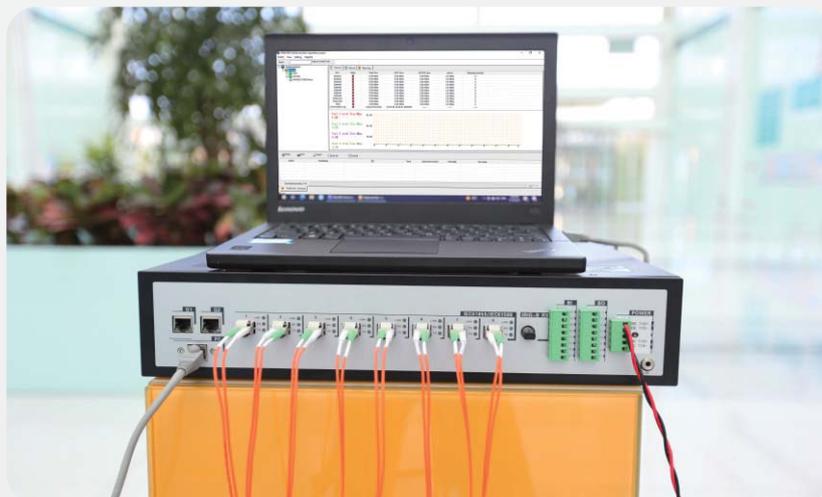
- ### Pcap format for the recorded files

  The recorded files are Pcap format that does not need to convert and can be shared with the software and device directly.
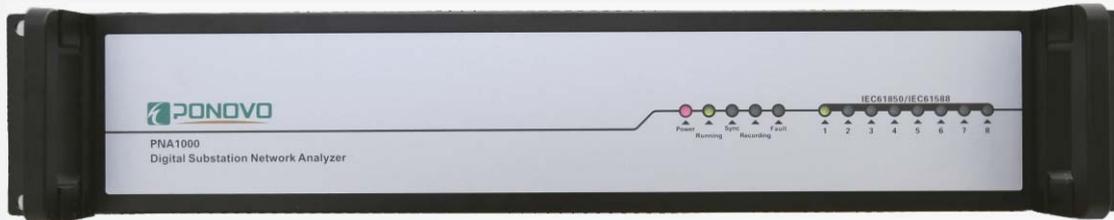
- ### Accuracy

  It guarantees 100% integrity and accuracy, 0% frame lost rate in condition of 1100Mb/s flow access.
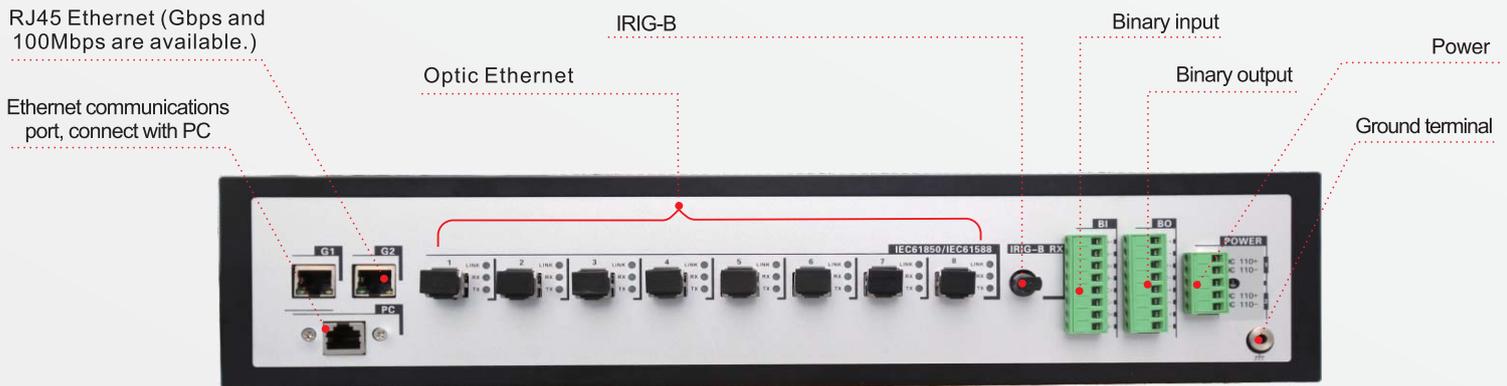  No abnormal incidents with frame size 64/128/256/512/1024/1280/1518 and full load of optics.

# Front panel



**Front panel**



RJ45 Ethernet (Gbps and 100Mbps are available.)

Ethernet communications port, connect with PC

Optic Ethernet

IRIG-B

Binary input

Binary output

Power

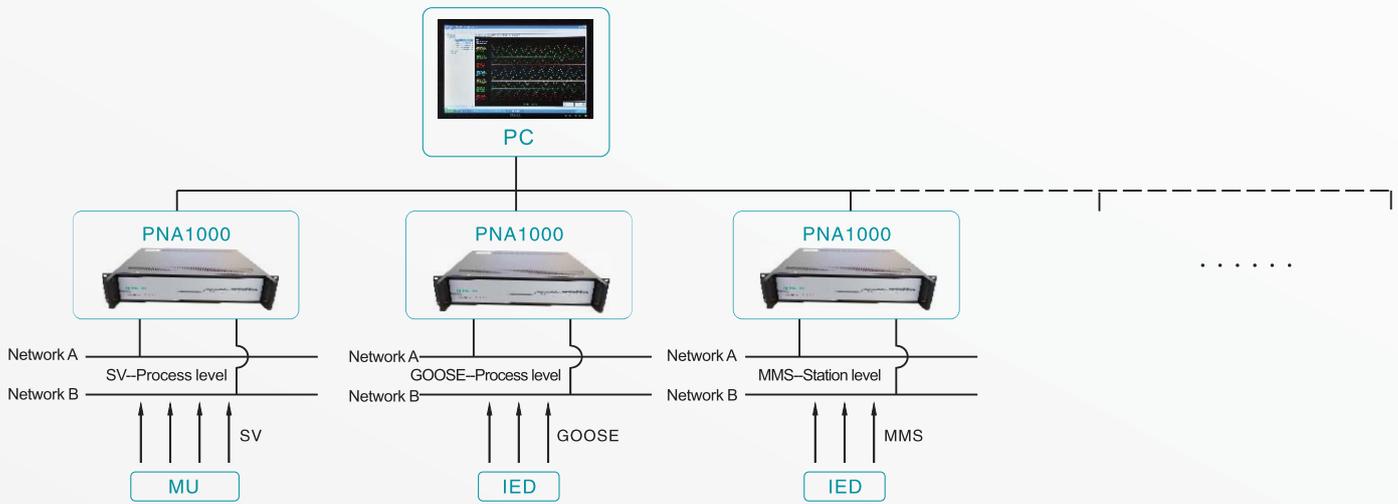Ground terminal

**Rear panel**

# Hardware components

● **Management unit**

HMI of the system to manage the analysis and record unit

● **Analysis and record unit**

Access to the process level/ station level of substation, receive all the messages (Process level: SMV, GOOSE, GMRP and PTP, etc; Station level: MMS, TCP/IP, NTP/SNTP, FTP, ARP, ICMG and IGM, etc ) from process/ station levels, and analyzer and compress the messages and the communications status in real-time.

## Diagram



## Specifications

| Record unit | |
| --- | --- |
| Hardware | Optional |
| Data access | ≥1100Mb/s |
| Power supply | AC ：220Vor110V (only one gear) |
| | DC ：220Vor110V(only one gear) |
| Ethernet port | 2 RJ45 Ethernet ports (Gbps and 1000Mbps are available.) |
| | 8 pairs of LC ports, supporting 9-2, GOOSE, MMS and PTP messages. |
| Communication port | 1 RJ45 Ethernet port |
| Synchronization interface | 1 IRIG-B port (ST) |
| Synchronized accuracy | <700ns |
| 24 hours accuracy | <130ms |
| Potential free output | 4 |
| Immunity Test | Stand the Radiated electromagnetic field disturbance tests at severity 4 |
| | Stand the Electrical fast transient/burst immunity test at severity 4 |
| | Stand the burst immunity test at severity 4 |
| | Stand the Electrostatic discharge tests at severity 4 |
| | Stand the Surge immunity test at severity 4 |
| | Stand the Immunity to conducted disturbances induced by radio frequency fields at severity 4 |
| | Stand the Power frequency immunity tests at severity 4 |
| | Stand the Voltage dips and short interruption with 100ms (200ms for real) at severity 5 |
| Message access capability | 100Mb/s / port, complete record data with total flow 1100Mb/s and 0% |
| | package loss rate. |
| Message storage capacity | Based on the number of MU*. |
| Indication lights | Power, Running,  Sync, Recording, Fault |

*Note: It is evaluated on single kit. The MU channel number is 22 at 50Hz.

| Equivalent MU | Flow | Messages | Storage days |
| --- | --- | --- | --- |
| 20 | 20Mb/s | 80-100 thousands frame/s | 7 |
| 32 | 32Mb/s | 130-150 thousands frame/s | 4.5 |
| 40 | 40Mb/s | 160-200 thousands frame/s | 3.5 |

# Optional Function

| | |
|---|---|
| 1 | GOOSE Selection in the offline analysis |
| 2 | Flow diagram, Display 4 items in 40 with 1 minute. Add a "Save" button to save present view.<br><br>Use EXCEL file to play back the wave.<br><br>PS: the flow refresh period is adjustable. |
| 3 | Flow peak value set |
| 4 | Watch dog: error-close, ok-open |
| 5 | SSD and data-read/save in separate disk |
| 6 | Set IP: netmask 255.255.0.0 |
| 7 | Restart |
| 8 | Different orders for fault data |
| 9 | Save PACP files in different optic Ethernet.<br><br>1. Add optic display function in offline analysis, for example, MAC of GOOSE will be displayed in offline analysis<br><br>2. Add "Save as…"in the offline analysis |
| 10 | PCAP-Comtrade conversion |
| 11 | Only one IP (can be set) |
| 12 | PCAP file replay |
| 13 | COMTRADE file editing |
| 14 | COMTRADE file merge |

# Appendix: Standard Function

| | |
|---|---|
| **Online analysis** | Analysis Unit management |
| | Real time network traffic monitoring and alarm |
| | Traffic rush alarm (threshold settable) |
| | Traffic flow diagram, display 4 items within a settable refresh period. The diagram can be saved in Excel file. |
| | Real time communication monitoring and alarm |
| | Real time message analysis and alarm |
| | Alarm history enquiry |
| | Search record files by alarms |
| | Search record files by time |
| | Message record download and analysis |
| | MU dta jitter monitoring and alarms |
| | Real time SMV waveform monitoring |
| | Real time Goose status monitoring |
| | Real time MMS communication monitoring |
| **Offline analysis** | SCD information and signals auto matching |
| | Message analysis |
| | Abnormal message position locate |
| | Traffic flow and abnormality statistics |
| | MU data jitter analysis |
| | SMV waveform analysis |
| | SMV vector analysis |
| | GOOSE single point selection and analysis |
| | Goose position shift time analysis |
| | MMS communication analysis |
| | PTP clock mode analysis |
| **Data analysis** | Waveform scaling |
| | Single channel analysis |
| | Duplicate channel analysis |
| | Feeder components analysis |
| | Transformer components analysis |
| | Waveform printing |

# Professional Solution Provider For The Power World

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Substation Network Analyzer

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