



PNS630

Hand-held IEC61850 Network Analyzer

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Introduction

PNS630 hand-held IEC61850 network analyzer was designed for smart substation maintenance. IEC61850-8-1 (Goose), IEC61850-9-2 messages can be monitored and analyzed, digital relay test function also equipped. SMV, GOOSE message numerical and status analysis were realized and displayed visually by its numerical analyzing function. Message sending (IEC61850-9-2, GOOSE message) and GOOSE subscribe function can meet the require of digital relay test. B code, IEC61588 and optical power measurement are supported. Portable, stable, humanized PNS630 is the effective device for smart substation maintenance.

Interface Description





Function Interface



SMV Receiving

SMV receiving and display

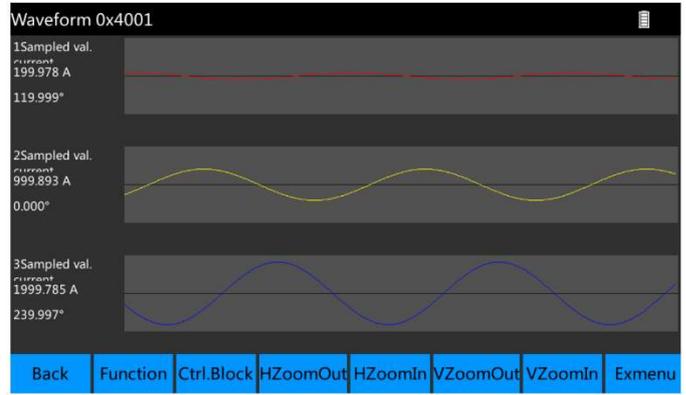
Real-time RMS, waveform, vector diagram, sequence component, power, harmonics, polarity, message statistic, message monitoring, dual-AD test.

Effective Value 0x4001

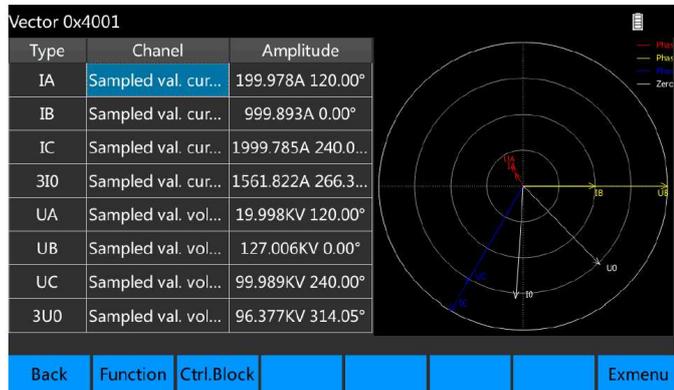
No.	Chanel	Amplitude	Angle	Frequency
1	Effective Value	4.999A	120.00°	60.0Hz
2	Waveform	4.999A	0.00°	60.0Hz
3	Vector	4.999A	240.00°	60.0Hz
4	sequence comp	0.000A	119.90°	60.0Hz
5	Power	63.503V	120.00°	60.0Hz
6	Harmonic	63.503V	0.00°	60.0Hz
7	Polarity	63.503V	240.00°	60.0Hz
8	Statistics	0.004V	120.00°	60.0Hz

Back Function Ctrl.Block Exmenu

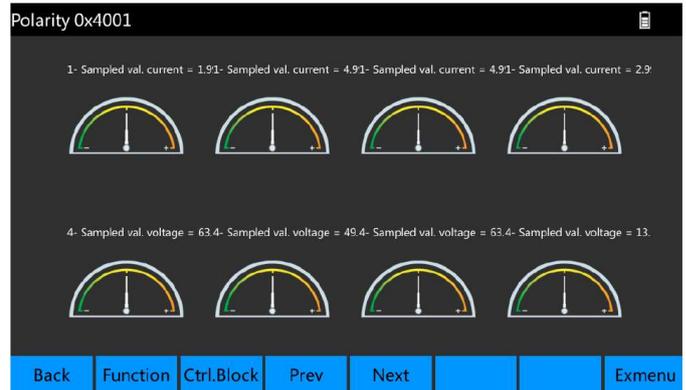
SMV function



Waveform interface



Vector interface



Polarity interface

GOOSE Receiving

GOOSE receiving and display

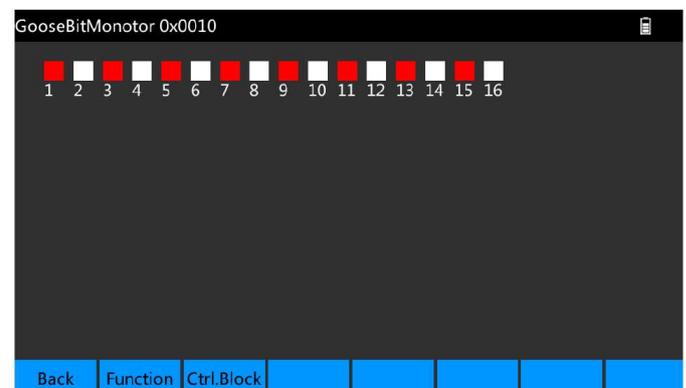
Real-time State, bit-change list, message statistic, message monitoring, GOOSE Publish, GOOSE sending statics, GOOSE Bit Monitoring.

Real value 0x0010

No.	Chanel	DataType	Value
1	Trip/open cmd.	1:BOOLEAN	false
2	Trip/open cmd.	2:BitStr	[00000000000000]
3	Close command	3:BOOLEAN	false
4	Real value	4:BitStr	[00000000000000]
5	Bit-change list	5:BOOLEAN	false
6	Statistics	6:BitStr	[00000000000000]
7	Message monit	7:BOOLEAN	false
8	GSE Publish	8:BitStr	[00000000000000]
9	GooseSendStat	9:BOOLEAN	false
10	GooseBitMonot	10:BitStr	[00000000000000]

Back Function Ctrl.Block Exmenu

Goose function



Goose bit monitor

Manual test

SMV, GOOSE sending, GOOSE subscribe, digital relay manual testing.

Chanel	Amplitude	Angle	Frequency	AmplitudeStep	AngleStep
<input checked="" type="checkbox"/> Ia1	5A	0°	60Hz	0.001A	0°
<input checked="" type="checkbox"/> Ib1	5A	-120°	60Hz	1A	0°
<input type="checkbox"/> Ic1	5A	120°	60Hz	0A	0°
<input type="checkbox"/> Ua1	63.51V	0°	60Hz	0V	1°
<input type="checkbox"/> Ub1	63.51V	-120°	60Hz	0V	0°
<input type="checkbox"/> Uc1	63.51V	120°	60Hz	0V	0°
<input type="checkbox"/> Uz1	63.51V	0°	60Hz	0V	0°

BI1 BI2 BI3 BI4 BI5 BI6 BI7 BI8

Exit SMV Send SV Group + - Lock ExSetting

Status Sequence

10 status sequence at max., faulty simulator to test digital relay.

No.	StateShift	StateData
1	BinaryTrigger:L...	Ia1=0.000;Ib1=0.000;Ic1=0.000;Ua1=0.000;Ub1=0.000;Uc1...
2	ManualTrigger	Ia1=0.000;Ib1=0.000;Ic1=0.000;Ua1=0.000;Ub1=0.000;Uc1...
3	ManualTrigger	Ia1=0.000;Ib1=0.000;Ic1=0.000;Ua1=0.000;Ub1=0.000;Uc1...
4	ManualTrigger	Ia1=0.000;Ib1=0.000;Ic1=0.000;Ua1=0.000;Ub1=0.000;Uc1...

Exit Start Edit Add Del Clear ExSetting

IED Test

Sending dry contact signal, receiving GOOSE message or sending GOOSE message, receiving dry contact signal which realized delay test for IED.

No.	Description	Type	Value	Time
1	Operate	Boolean	FALSE	
2	Operate	Bitstring	[00000000...	
3	Pickup	Boolean	FALSE	
4	Pickup	Bitstring	[00000000...	
5	Operate	Boolean	FALSE	
6	Operate	Bitstring	[00000000...	
7	Pickup	Boolean	FALSE	
8	Pickup	Bitstring	[00000000...	

BI

Exit Send GSE->BI BO->GSE Reset GSE Group ExSetting

Optical Power

The maximum, minimum and average value of optical power signal can be detected and displayed in real time.

Port	Real value(dBm)	verage value(dBm)	Max. value(dBm)	Min. value(dBm)
OEP1	-19.0658	-19.0775	-19.0658	-19.1009
OEP2	0.0000	0.0000	0.0000	0.0000
OEP3	0.0000	0.0000	0.0000	0.0000
OEP4	-21.3668	-21.3867	-21.3668	-21.4267
OSP1				
OSP2				

Exit Refresh

MU delay testing

The accuracy of the MU sync and delay can be tested by MU synchronization method.

Item	Value
MU Delay Test	1311us

Exit Stop Delay Test Synch. Time

Network flux testing

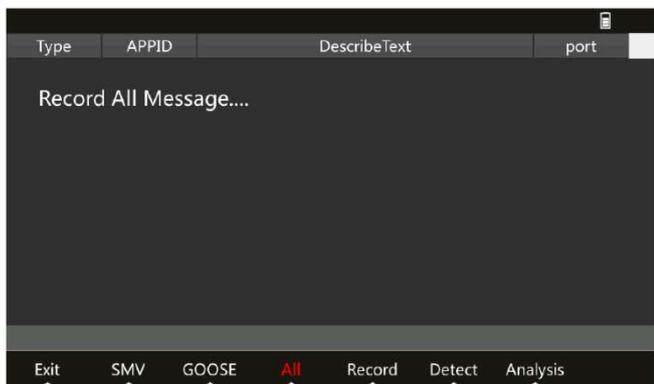
Probe and display the type and flux of the network message.

Package Type	Message Number	FlowKB/s	Percent
SMV	1536004	585	4%
GOOSE	0	0	0%
1588	0	0	0%
Other	0	0	0%
Total	1536004	585	4%

Exit Sheet Graph port Refresh

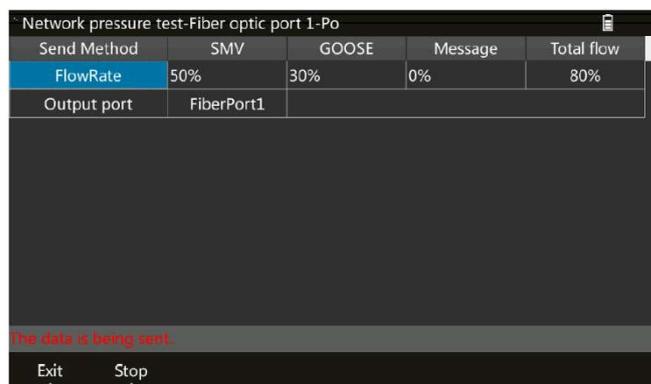
Waveform record

Record the waveform and exports the messages to analyze, statistic and playback for further analysis.



Network

Provide different flux of SMV, GOOSE, network message to give pressure to the network.



Time

IEEE1588, IRIG-B code. If there is no time source, it will show unsynchronized.



MMS (Manufacturing Message Specification)

Read IEC61850 communication model of the IEDs such as communication data, data sets and report control blocks.



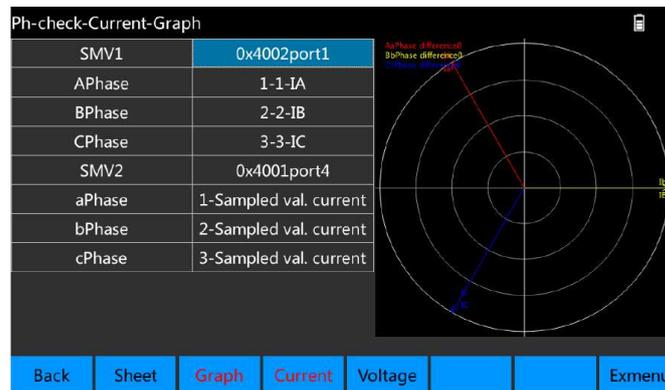
SOE time test

Simulate multiple bit-change events. Set the interval time and the times of the GOOSE to Binary Input or Binary Output to GOOSE, then test the conversion delay time of these test points, and finally obtain the average of the delay time according to the test results.



Phase-check

Choose 1 channel of voltage or current as reference, and its amplitude, phase, frequency, amplitude difference, and angle difference as reference as well to check the next voltage phase-sequence and RMS in the same side or different side.





Specifications

Interface

Optical Ethernet	4x100Mbps optical Ethernet port receiving/sending 9-2 message, GOOSE message, 1588 (LC type, wavelength: 1310nm)
Optical Serial	2 receiving ports for FT3, B-code, PPS signal. 2 sending ports for FT3, B-code (ST type, wavelength: 850nm, baud rate of 2.5M/5M/10M are supported).
Ethernet	100 Mbps Ethernet port, type: RJ-45
Dry Contact	1 pair dry contact inputs 1 pair dry contact outputs
Micro SD	Micro SD used for recording and saving the waveform, pictures files and importing SCL configuration files
USB Device	Connect to PC as a memory device
Power Supply	Connect to the power adaptor

Operate Environment

Environment Temperature	-5 ~ +45°C
Storage Temperature	-25 ~ +70°C
Relative Humidity	5%- 95%
Storage Humidity	≤ 85%
Atmosphere Pressure	86kPa-106kPa

Power

In-built battery group	12.6V 4400mAh Li-ion battery group
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Power Adaptor

Input	AC 100-240V, 50/60Hz
Output	DC 15V, 1.66A

Charge Time	It takes 4-6 hours for the battery to be charged. (LED off: charged; LED on: charging). It is strongly recommend that: keep the time no less than 12 hours for the first three times charge of the new battery.
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Stand-by Time	Continuously working over 6 hours after charged
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Performance

Dynamic response time less than 2s
Remote measurements response time less than 2s
Remote information response time less than 2s
Transmission distance>1km, outputs accuracy at the level of 0.5
The average largest error of sending SMV< 100ns
Measurement accuracy better than 0.05%, accuracy of phase better than 0.01°, when the frequency in the range of 30.0Hz to 70.0Hz, voltage of SV in the range of 0.01Ue to 2Ue. While current of SV in the range of 0.01Ie-40Ie.
Resolution of GOOSE receiving < 1ms
IRIG-B synchronization was supported and the error within 1us.
Measurement range of the optical power: -31dbm ~ +14dbm
Wave-length can be measured: 1310nm; 850nm
SCL file importing function was equipped to extract the instances of ICD.

Safety Standard

Anti-interference of ESD: GB/T 17626.2-2006 grade4
Anti-interference of RF EMF: GB/T 17626.3-2006 grade3
Anti-interference of EFT/B: GB/T 17626.3-2006 grade4
Anti-interference of PFMF: GB/T 17626.3-2006 grade3

Mechanical Dimensions and Weight

Dimensions	190mm (W) x210mm (H) x64mm(D)
Weight	≤1.35kg



PONOVO NF802 relay test set sends IEC60044 to MU, then MU sends SMV to PNS630.

Performance Characteristic

- Support standard of IEC61850-9-2, IEC60044-7/8, GOOSE. Can receive and send message at any logical nodes between interval layer and process layer in smart substation.
- Support SCD analysis. SMV, sampling channel information, GOOSE message are configured automatically.
- SMV, GOOSE message monitoring and message abnormal statistics are supported. Remote measuring function was equipped and the measurements can be monitored by sheet, waveform, vector, sequence etc.
- IEC60044-7/8(FT3), SMV message receiving/sending function are equipped. Baud rate of 2.5M/5M/10M are available.
- IEC 61850-9-2/9-2LE message receiving/sending function are equipped. ASDU number from 1 to 8 are available.
- Message monitoring and recording (standard pcap format) function are equipped. Recording analysis is also supported.
- Support phase check test function.
- IRIG-B and IEEE1588 synchronization function are supported. Time sync and time source reading functions are also provided.
- Simulate the MU to output IEC61850-9-2, IEC60044-7/8 messages and test the digital relay.
- SMV status sequence function is supported the number of the status sequence can reach 10 at the maximum. Results clearly and GOOSE action also represented by the method of experiment result list.
- Optical digital voltage testing, dc reactor testing, polarity of the transformer testing are supported.
- Optical power measurement is supported. Testing range: -31dbm ~ +14dbm. Testing wavelength: 1310nm.
- 1 pair of dry contact binary input and 1 pair of output was equipped. IED delay test function was supported.
- Network flux test is supported. It can analysis the message flux in real time.
- Provide different flux of SMV, GOOSE messages to give pressure to the network.
- The accuracy of the MU sync and delay can be tested by MU synchronization method.
- The device equipped 7 inch capacitive touch screen, friendly interface, detailed information and easy to operate.
- It is powered by battery group, portable. Continuously working over 6 hours after charged.

Test Examples



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