User Manual of

Power Quality Instrument

Applicable Model:

SFERE820A





Notices for Use

Please read this manual carefully before using this device and be sure to observe the following notes while using it:

NOTE:

• This device must be operated and maintained by a professional who has read this manual.

• Before performing any internal or external operations on the device, disconnect all input signals and power supplies and make sure that the secondary terminals of the voltage transformer are not short-circuited and the secondary terminals of the current transformer are not open-circuited.

• Be sure to use an appropriate voltage measuring device to confirm that there is no voltage present in any of the device's components.

- The electric parameters supplied to the device must be within the rated range.
- Please do not touch the terminals of the device while it is working.

• To use the communication function of the device, please connect it to a secure communication network.

The following circumstances may result in the device being damaged or operating improperly:

- The operating environment is out of range.
- The voltage of the auxiliary power supply is out of range.
- The frequency of the power distribution system is out of range.
- The signal input exceeds the maximum rating.
- The polarity of the current or voltage input is incorrect.
- The connection is not as required.

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1. Introduction

1.1 Overview

SFERE820A is characterized by precise power parameter measurement, energy metering, and power quality monitoring capabilities, and meets IEC 61000-4-30 A for power quality. With a rich package of I/O modules for on-site equipment state monitoring and control, it can be easily integrated with various intelligent power monitoring systems and energy management systems to share a wealth of monitoring data and power quality data.

1.2 Model function

	Functions	Sfere820A	
Display Mode	TFT LCD (Color display)	5"	
	Three-phase voltage (Va, Vb, Vc, Uab,Ubc, Uca)	•	
	Three-phase current (Ia, Ib, Ic)	•	
	Neutral current (In)	•	
	Active power (P, Pa, Pb, Pc)	•	
	Reactive power (Q, Qa, Qb, Qc)	•	
Real-time	Apparent power (S, Sa, Sb, Sc)	•	
Measurement	Power factor (Pf)	•	
	Frequency (F)	•	
	Demand	•	
	Max/Min values	•	
	Phase angle	•	
	Bi-directional active energy	•	
	Bi-directional reactive energy	•	
Energy Metering	Four-quadrant reactive electric energy	•	
	Apparent energy	•	
	Bi-directional tariff energy	•	

[Note 1]: "-" - not available, "•"- available, "0" - optional.

	Voltage deviation	•
	Frequency deviation	•
	Unbalance	•
	THD (Voltage, Current)	•
	Harmonic content(2 nd -51 st)	•
	Inter-harmonic ratio	•
	Voltage flicker	•
Power Quality	Rapid voltage change	•
	Voltage swell	•
	Voltage dip	•
	Voltage interruption	•
	Crest factor	•
	k-factor of current	•
	Transient capture	80µs
	ITIC/SEMI F47 curve	•
	Voltage	•
	Current	•
	Active power	•
Alarms	Reactive power	•
	Apparent power	•
	Power factor	•
	Frequency	•
	SOE log	1,024 events
	PQ event log	1,024 events
	Waveform record	1,024 events

Data Records	Data freeze	•
	EN50160 report	60 events
	Data Memory	2GB
	Digital input	4
Input/Output	Relay output	4
Communication	Modbus-RTU Through RS485 interface	•
	IRIG-B	•
Time synchronization	Modbus- RTU	•
	FM2: 4 digital inputs	0
Ontional Madulas	FM3: 2 relay outputs	0
Optional Modules	FM11: RS485 port, Modbus-RTU protocol	0
	FM24: Ethernet port, Modbus-TCP, Web- sever	0

2. Technical Specification

Accuracy			
Voltage (Va/Vb/Vc)	Class 0.1 (IEC 61557-12)		
Voltage (Uab/Ubc/Uca)	Class 0.1 (IEC 61557-12)		
Current (Ia/Ib/Ic)	Class 0.1 (IEC 61557-12)		
Current (In)	Class 0.1 (IEC 61557-12)		
Active Power (P/Pa/Pb/Pc)	Class 0.2 (IEC 61557-12)		
Reactive Power (Q/Qa/Qb/Qc)	Class 0.2 (IEC 61557-12)		
Apparent Power (S/Sa/Sb,Sc)	Class 0.2 (IEC 61557-12)		
Power Factor (PF/PFa/PFb/PFc)	Class 0.2 (IEC 61557-12)		
Frequency (F)	Class 0.1 (IEC 61557-12)		
Active Energy (EP+)	Class 0.2S (IEC 61557-12)		

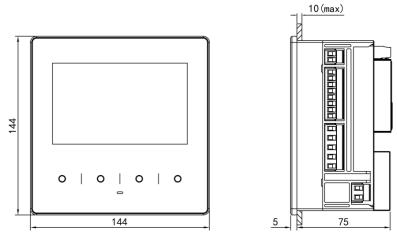
Reactive Energy (EQ+)	Class 0.5S(IEC 61557-12)
Power Quality Parameters	IEC 61000-4-30 Cl. A
Environmental Characteristics	
Working Temperature	-25°C+70°C
Storage Temperature	-25°C+70°C
Relative Humidity	5%95%RH, without condensation
Working Altitude	≤ 2000m (CAT III)
Pollution Degree	2
Mechanical Characteristics	
Dimension	144mm×144mm×80mm
Protection Degree	Face frame: IP54; rear housing: IP20
Safety Characteristics	
Measurement Category	300V (CAT III)
Safety	IEC 61010-1, double insulation
Auxiliary Power Supply	
Voltage	AC/DC 80V270V
Frequency	50/60Hz ± 5Hz
Power Consumption	≤10VA
Voltage Measurement Input	
Rated Value	3×230/400 VAC
Measurement Range	10 – 276VAC (L - N)
	17 – 480VAC (L - L)
Overload	Continuous: 1.2Vn; instantaneous: 2Vn/1min
Frequency	45Hz65Hz
Current Measurement Input	

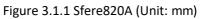
Rated Value	3×/1A or/5A
Minimum Operating value	10mA
Overload	Continuous: 2In; instantaneous: 20In/0.5s
Sampling time	
Number	256 samples/cycles at 50Hz/60Hz
Data update rate	200ms
Display update rate	1s
Digital Input	
Number	4
Туре	Dry contact, built-in DC 24V
Relay Output	
Number	4
Contact Capacity	AC 250V/5A or DC30V/5A
Pulses of Electric Energy	
Number	1
Туре	Photocoupler isolation
Communication Port	
Number	1
Port	RS485
Baud rate	2.4kbps 115.2kbps
Protocol	Modbus-RTU
Real-time Clock	
Clock Drifting	≤0.5s/day
Terminals	
Torque	0.5N·m

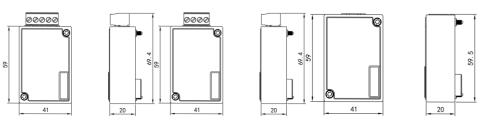
Applicable Standards	
GB/T 39853/ IEC 62586	Power Quality Measurement in Power Supply System
GB/T 18216.12/ IEC 61557-12	Power metering and monitoring devices (PMD)
GB/T 17626.2/ IEC 61000-4-2	Immunity to electrostatic discharge, Level 4
GB/T 17626.3/ IEC 61000-4-3	Immunity to radio-frequency field, Level 3
GB/T 17626.4/ IEC 61000-4-4	Immunity to electrical fast transients/bursts, Level 4
GB/T 17626.5/ IEC 61000-4-5	Surge Immunity, Level 4
GB/T 17626.8/ IEC 61000-4-8	Immunity to power frequency magnetic fields, Level 4
CE	Safety
EN50160	Power quality report

3. Installation

3.1 Dimensions







FM2, FM3, FM11, FM24

Figure 3.1.2 Extension Module (Unit: mm)

3.2 Installation

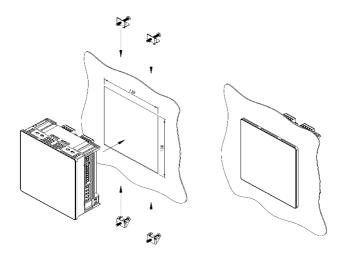


Figure 3.2.1 Installation Diagram

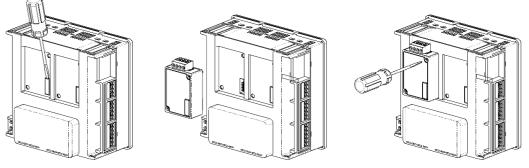


Figure 3.2.2 Module installation Diagram

Note: FM24 module can only be installed in position (1) (see Figure 3.3.1.2) After the FM24 module is connected, no other modules can be installed in position (1).

3.3 Wirings

3.3.1 Typical Wiring Diagram

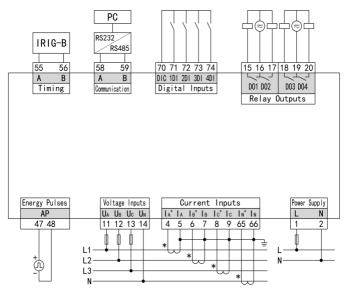


Figure 3.3.1.1 Typical wiring diagram

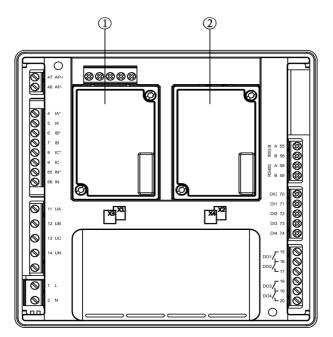


Figure 3.3.1.2 Back-end Diagram

3.3.2 Voltage/Current Input Connection

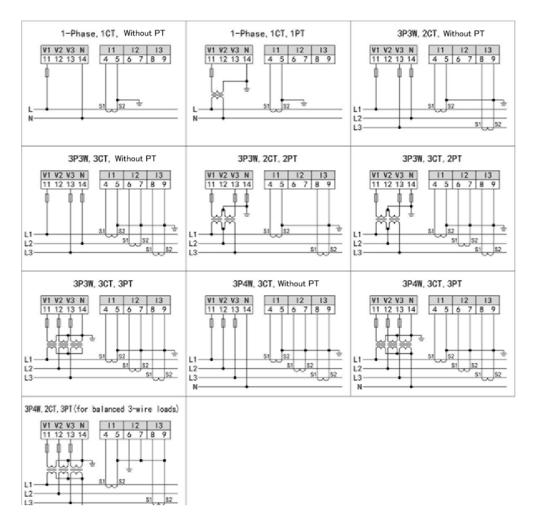
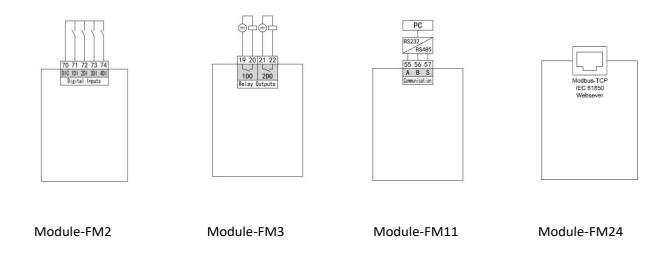


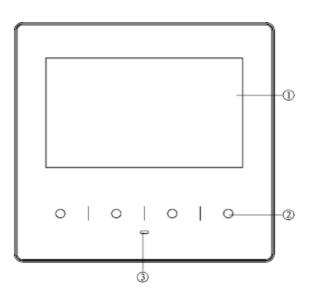
Figure 3.3.2.1 Voltage/Current Input Connection Diagram

3.3.3 Module Wiring



4. **Operation**

4.1 Panel



1 Display window

Content Prompt: The currently displayed content will be prompted in the center of each interface;

Page Number: Each interface has a unique number, which is displayed in the upper right corner of the interface;

Data Window: It displays various data contents;

2 Button

There are four prompt areas for button function icons at the bottom of each interface, indicating the present function of each physical button.

Users can set the device parameters with those buttons.

③ Indicator led

Button functions

lcons	Description
	Increase the selected data bits.
	Move down the options/page down/change parameters.
	Move in a circular way to the left to change or display data.
	Move in a circular way to the right to change or display data.
Back	Return directly to the "Main Menu" page, return to the previous menu or discard modifications.
Enter	Enter the selected option.
Confirm	Confirm.
Zoom	Zoom in or out to display the image.
Edit	Edit the options.
Turn	Turn to next page.
	Invalidate the present button.

Modification methods for values:

Press " **T** to move and modify the data bit, and then press " **T** to cyclically increase the present data bit.

Entering and exiting of programming state:

Entering of programming state: On the main interface, press " and " and " to change the selected item into "System Setup", and then press " Enter " to enter the interface of programming setup. Generally, users can enter by selecting "User Setup". After entering the correct programming protection password, they will enter the programming Setup and start setting parameters (the default programming password is 0001, and users can modify it as necessary).

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Exiting of programming state: When you have already returned to the first-tier menu of programming interface, Press the button " Beck ". Now, the device will prompt whether to save the modifications. Select "Yes" to save the modifications and return to the main menu, or select "No" to abandon saving the modifications and return to the main menu.

4.2 Display

4.2.1 Display Menu

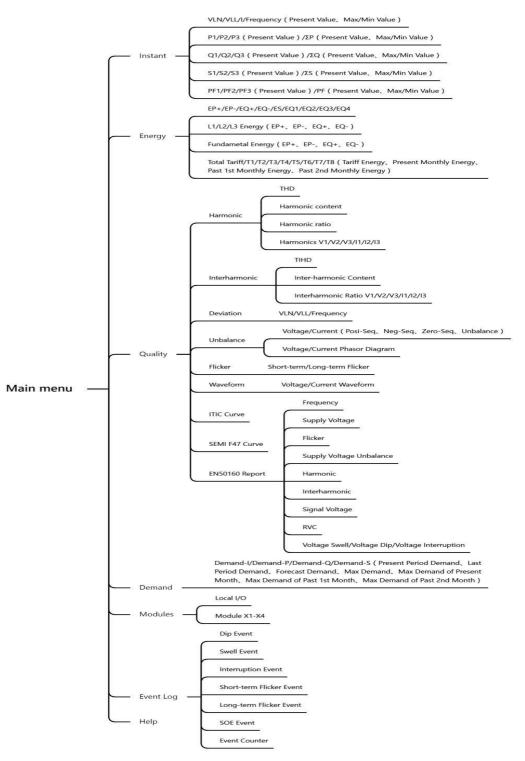


Figure 4.2.1 Overview of Display Menu

4.2.2 Display Features

4.2.2.1 Real-time measurement

No.	Display	Description
1	Real-time overview 1.01 V1 219.022 V P1 1.092 kW V2 218.391 V P2 1.087 kW V3 218.594 V P3 1.093 kW U12 378.594 V PF1 1.000 1000 U23 378.469 V PF2 1.000 101 U31 378.952 V PF2 1.000 11 U31 378.952 V PF2 1.000 11 U31 378.952 V PF2 1.000 11 U31 378.953 A F 49.998 Hz I2 4.9806 A S 3.273 kVA I3 5.0033 A F 49.998 Hz	Real-time measurement overview
2	O Voltage 1.02 Max Min V1 219.022 V 219.142 V 000.000 V V2 218.391 V 220.042 V 000.000 V V3 218.594 V 220.741 V 000.000 V U12 378.594 V 379.154 V 000.000 V U23 378.469 V 380.147 V 000.000 V U31 378.952 V 379.986 V 000.000 V	Voltage Phase to neutral voltage V1=219.022V V2=218.391V V3=218.594V Phase to phase voltage U12=378.594V U23=378.469V U31=378.952V
3	O Current 1.03 I1 4.9987 A 5.0010 A 0.0000 A I2 5.0014 A 5.0014 A 0.0000 A I3 4.9997 A 5.0003 A 0.0000 A In 0.0001 A 0.0007 A 0.0000 A	Current I1=4.9987A I2=5.0014A I3=4.9997A Neutral current In=0.0001A
4	O Active power 1.04 Max Min P1 1.1002 kW P2 1.0997 kW P3 1.1003 kW P 3.3002 kW 3.3002 kW 3.3012 kW	Active power P1 =1.1002kW P2=1.0997kW P3=1.1003kW P= 3.3002kW

	Q	Reactive power	1.05	Reactive power
5	Q1 -0.0002	Max kvar	x Min	Q1=-0.002kvar
	0.0000	kvar		Q2=0.000kvar
	Q3 -0.0002	kvar		Q3=-0.002kvar
	Q -0.0003	kvar 0.0003	3 kvar 0.0000 kvar	Q =-0.003kvar
		> 5		
6	\bigcirc	Apparent power	1.06	Apparent power
0		Ma	-3000-300	
	<mark>51</mark> 1.1001	kVA		S1=1.1001kVA
	<mark>52</mark> 1.1006	kVA		S2=1.1006kVA
	\$3 1.1002 \$ 3.3008	kVA kVA 3.3008		S3=1.1002kVA
	5 5.5006	KVA 5.5008	3 kva 0.0000 kva	S=3.3008kVA
	<	> 5		
7	Q	Power factor	1.07	Power factor
7			2 AB20 11 V	Power factor PF1=1.000
7	 PF1 1.0000 PF2 1.0000 	Power factor	2 AB20 11 V	
7	PF1 1.0000	Power factor	2 AB20 11 V	PF1=1.000
7	PF1 1.0000 PF2 1.0000	Power factor	: Min	PF1=1.000 PF2=1.000 PF3=1.000
7	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max 1.0000	: Min	PF1=1.000 PF2=1.000
7	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max	: Min	PF1=1.000 PF2=1.000 PF3=1.000
7	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max 1.0000	6 Min 0 0.0000 1.08	PF1=1.000 PF2=1.000 PF3=1.000
	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max 1.0000	6 Min 0 0.0000 1.08	PF1=1.000 PF2=1.000 PF3=1.000 PF=1.000
	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max 1.0000	6 Min 0 0.0000 1.08	PF1=1.000 PF2=1.000 PF3=1.000 PF=1.000
	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max 1.0000 > 5 Frequency	6 Min 0 0.0000 1.08	PF1=1.000 PF2=1.000 PF3=1.000 PF=1.000
	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max 1.0000 > 5	1.08	PF1=1.000 PF2=1.000 PF3=1.000 PF=1.000
	PF1 1.0000 PF2 1.0000 PF3 1.0000 PF 1.0000	Power factor Max 1.0000 > 5	1.08	PF1=1.000 PF2=1.000 PF3=1.000 PF=1.000

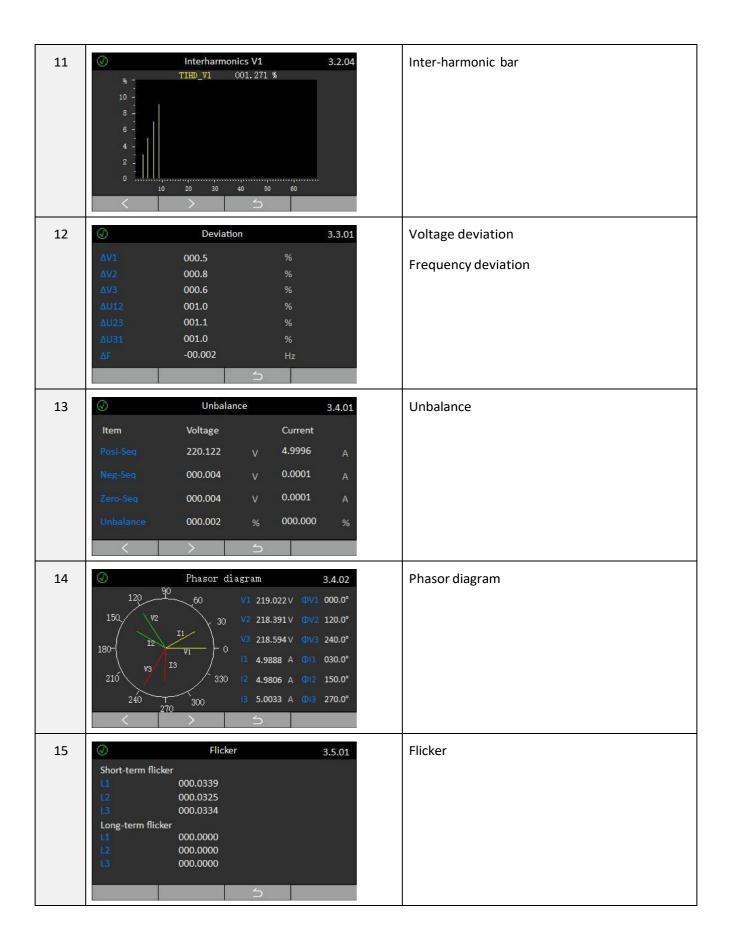
4.2.2.2 Energy metering

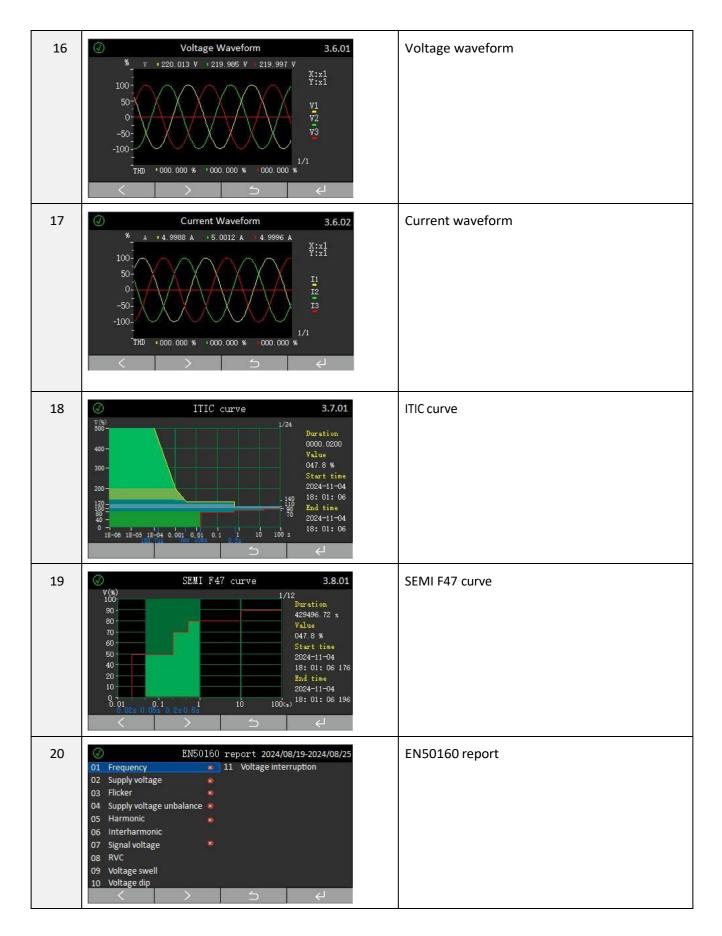
No.	Display	Description
1	Image: Constraint of the constrated of the constraint of the constraint of the constraint of the	Energy overview
2	Image: Contract of the second seco	L1 energy Import active energy EP+ = 2.672kWh Export active energy EP- = 0.322kWh Import reactive energy EP+ = 4.284kvarh Export reactive energy EP- = 1.814kvarh
3	Fundamental energy 2.05 EP+ 0000000007.964 kWh EP- 0000000000.949 kWh EQ+ 0000000001.651 kvarh EQ- 000000000.000 kvarh	Fundamental energy Fundamental import active energy EP+ =7.964kWh Fundamental export active energy EP- = 0.949kWh Fundamental import reactive energy EQ+ = 1.651kvarh Fundamental export reactive energy EQ- = 0.000kvarh
4	Image: Weight of the second	Tariff energy 8 tariffs energy

4.2.2.3 Power quality Metering

No.	Display	Description
1	O Power quality Harmonic Interharmonic Deviation Unbalance Flicker Waveform ITIC curve SEMI F47 curve EN50160 report	Power quality overview
2	THD 3.1.01 THD_V1 001.270 % THD_V2 001.271 % THD_V3 001.269 % THD_I1 001.270 % THD_I2 001.271 % THD_I3 001.270 %	Total harmonic distortion (THD)
3	⊘ Harmonic content 3.1.02 HC_V1 001.271 V HC_V2 001.271 V HC_V3 001.270 V HC_I1 001.270 A HC_I2 001.272 A HC_I3 001.270 A	Harmonic content
4	Image: Constraint of the state of the s	Harmonic ratio
5	Image: Constraint of the state of	Harmonic ratio







ITIC/SEMI F47 Curves

The ITIC and SEMI F47 curves specify the ability of equipment to withstand power supply's voltage disturbances. Their significance lies in being the benchmarks for assessing the tolerance of power equipment

to voltage interference and voltage disturbances in power supply systems.

For the ITIC curve interface displayed by the device, the horizontal axis represents the duration of transient voltage event, and the vertical axis represents the voltage percentage (relative to nominal voltage). The upper curve represents the tolerance of equipment to voltage swells, and the lower curve represents the tolerance of equipment to voltage dips. The area between them represents the normal running range. As shown in the figure below, this interface shows the amplitude-duration distribution of a single transient event.



For the SEMI F47 curve interface displayed by the device, the horizontal axis represents the duration of transient voltage event, and the vertical axis represents the voltage percentage (relative to nominal voltage). The specification stipulates the tolerance time of equipment to voltage dips. The area above red solid line represents that the equipment must ensure normal continuous running under such interference. The equipment can run continuously for 0.02s at 0% of the nominal value, 0.2s at 50% of the nominal value, 0.5s at 70% of the nominal value, 1s at 80% of the nominal value, and 10s at 90% of the nominal value. As shown in the figure below, this interface shows the amplitude-duration distribution of a single transient event.

4.2.2.4 Demand

No.	Display	Description	
1	O Present period demand 4.01 11 4.9877 A 12 4.9794 A 13 5.0022 A P 3.271 kW Q -0.004 kvar S 3.272 kVA	Present period demand 11=4.9877A 12=4.9794A 13=5.0022A P=3.271kW Q=-0.004kvar	
		S=3.272kVA	
2	O Previous period demand 4.02 11 4.9877 A 12 4.9794 A 13 5.0022 A P 3.271 kW Q -0.004 kvar S 3.272 kVA	Previous period demand 11=4.9877A 12=4.9794A 13=5.0022A P=3.271kW Q=-0.004kvar S=3.272kVA	
3	O Forecast demand 4.03 11 4.9877 A 12 4.9794 A 13 4.9999 A P 3.271 kW Q -0.004 kvar S 3.272 kVA	Forecast demand I1=4.9877A I2=4.9794A I3=4.9999A P=3.271kW Q=-0.004kvar S=3.272kVA	
4	Max Demand 4,04 11 4.9895 A 12 4.9815 A 13 5.0049 A P 3.273 kW Q 0.004 kvar S 3.273 kVA	Max demand I1=4.9895A I2=4.9815A I3=5.0049A P=3.273kW Q=-0.024kvar S=3.273kVA	

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4.2.2.5 Module

No.	Display	Description
1	Image: Constraint of the system Local I/O 5.01 Digital inputs Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI1 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI3 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI3 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI3 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI3 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI4 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI4 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI4 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system DI4 Status monitor Image: Constraint of the system Image: Constraint of the system Image: Constraint of the system	Local I/O
2	Image: Wodule X1 5.02 FM2 (4DI) Ver.173A D11 Pluse count 000000006 D12 Status monitor ->>- D13 Status monitor ->>- D14 Status monitor ->>- D14 Status monitor ->>-	Expand module FM2
3	O Module X2 5.03 FM11 (RS485) Ver.173A Address 002 Baud rate 57600 bps Data format N.8.1 Protocol Modbus-RTU	Expand module FM3
4	O Module X3 5.04 FM3 (2D0) Ver.1101 D01 On D02 Off	Expand module FM11

4.2.2.6 SOE logs

No.	Display	Description	
1	O Event log Dip event Swell event Interruption event RVC event Short-term flicker event Long-term flicker event SOE event Event counter	SOE logs overview	
2	O Dip event 6.1.01 No. Start time Description 1/12 0001 2024-01-12 19:01:57 147 L3 voltage dip 1/12 0002 2024-01-12 15:48:12 482 L2 voltage dip 1/03 0003 2024-01-12 14:37:55 478 L1 voltage dip 1/04 0004 2024-01-12 12:23:28 163 L3 voltage dip 1/04 0005 2024-01-12 12:13:45 163 L1 voltage dip 1/04 0006 2024-01-12 06:25:46 233 L1 voltage dip 1/04 0007 2024-01-12 03:13:25 233 L2 voltage dip 1/04 0008 2024-01-12 03:13:25 233 L3 voltage dip 1/14	Dip event logs	
3	O Dip event 6.1.01 No. Start time Description 1/12 0001 2024-01-12 19:01:57 147 L3 voltage dip 0002 2024-01-12 15:48:12 482 L2 voltage dip 0003 2024-01-12 14:37:55 478 L1 voltage dip 0004 2024-01-12 12:23:28 163 L3 voltage dip 0005 2024-01-12 12:13:45 163 L1 voltage dip 0006 2024-01-12 06:25:46 233 L1 voltage dip 0007 2024-01-12 04:14:24 23 L2 voltage dip 0008 2024-01-12 03:13:25 233 L3 voltage dip 0008 2024-01-12 03:13:25 233 L3 voltage dip	Dip event logs	
4	Dip event 6.1.01 No. Start time Description 1/12 0001 2024 Event details tage dip 0002 2024 Type B voltage dip tage dip 0003 2024 End time 2024-01:12 03:13:25 739 tage dip 0004 2024 Min RMS for half-cycle 052.494 V tage dip 0005 2024 Utration 00546.0 ms tage dip 0006 2024 Wave ITIC SEMI tage dip 0007 2024-01-12 03:13:25 733 L2 voltage dip tage dip 0008 2024-01-12 03:13:25 233 L3 voltage dip tage dip	Dip event logs	
5	Swell event 6.2.01 No. Start time Description 1/16 0001 2024-01-12 23:14:22 345 L3 voltage swell 0002 2024-01-12 22:47:19 471 L2 voltage swell 0003 2024-01-12 18:57:50 148 L1 voltage swell 0004 2024-01-12 17:14:03 247 L3 voltage swell 0005 2024-01-12 15:46:22 154 L1 voltage swell 0006 2024-01-12 09:01:54 221 L1 voltage swell 0007 2024-01-12 07:21:21 576 L3 voltage swell 0008 2024-01-12 07:21:21 576 L3 voltage swell	Swell event logs	

		1
	Interruption event6.3.01No.Start timeDescription1/12024-01-12 20:48:34 148L3 voltage interruption2024-01-12 16:17:07 355L2 voltage interruption20032024-01-12 11:01:32 255L1 voltage interruption	Interruption event logs
6	→ <u></u>	
7	O RVC event 6.4.01 No. Start time Description 1/1 0001 2024-01-22 04:52:51 061 L3 rapid voltage change 0002 0002 2024-01-18 08:14:58 872 L2 rapid voltage change 0003 0003 2024-01-12 03:11:51 454 L1 rapid voltage change ✓ > △ ✓	RVC event logs
8	Short-term flicker event 6.5.01 No. Start time Description 1/1 0001 2024-03-5 02:24:22 481 Short-term flicker 0002 2024-01-14 00:29:21 534 Short-term flicker 0003 2024-01-12 11:01:32 255 Short-term flicker	Short term flick event logs
9	O Long-term flicker event 6.6.01 No. Start time Description 1/1 0001 2024-01-14 10:29:21 545 Long-term flicker ✓ > △ ←	Long term flick event logs
10	O SOE event 6.7.01 No. Start time Description 1/1 0001 2024-08-22 17:10:58 145 Power off 0002 2024-08-22 12:54:24 542 Power on 0003 2024-08-22 10:40:43 478 Power off 0004 2024-08-22 10:31:21 487 X2-DI2 off 0005 2024-08-22 08:25:54 245 X2-DI4 off	SOE logs

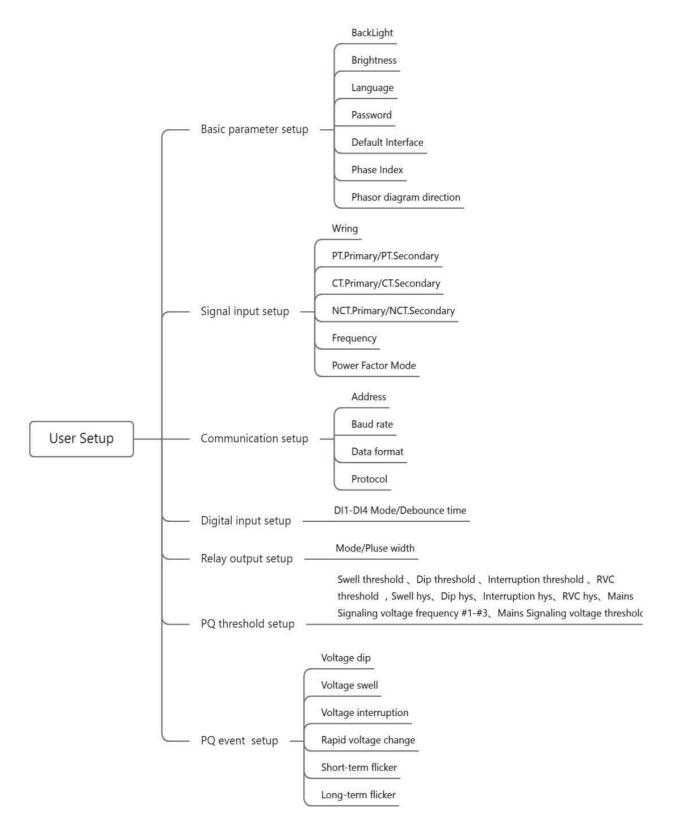
\bigcirc	Event counter	6.8.01	Event counter
No.	Event type	Number	
0001	Dip event	0095	
0002	Swell event	0125	
0003	Interruption event	0003	
0004	RVC event	0003	
0005	Short-term flicker event	0003	
0006	Long-term flicker event	0001	
0007	SOE event	0005	
	5	لے	

4.2.2.7 Help

No.	Display			Description
1	✓ F Measurement version Display version Power on time Load run time Current time	He1p 0000.240822 1000.240822 0000217976 0000049245 2024-09-01 15; 37	7.01	Help page

4.3 Setup

4.3.1 Setup Menu



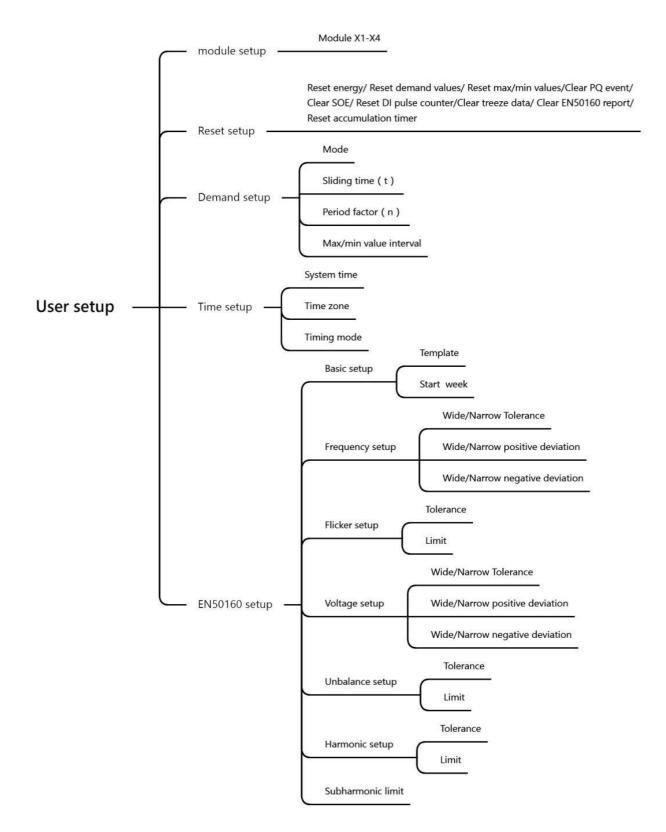


Figure 4.3.1.1 Overview of Setup Menu

4.3.2 Basic Parameter Setup

Display	Menu1	Menu2
	Back Light	01 99min
		00 - always on
	Brightness	Level 1Level5
	Language	English
	Password	00009999
		Main menu
		Instant overview
		Voltage
		Current
		Active power
		Reactive power
		Apparent power
		Power factor frequency
Ø Basic parameter setup	Default interface	Energy overview
BackLight 04)min Brightness Level 3		L1/L2/L3 energy
Language English Password 0001		Fundamental energy
Default interface Main menu Phase index 1.2.3		Tariff energy
Phasor diagram direction Anti-clockwise		Present monthly energy
		THD
		Harmonic content
		Harmonic ratio
		Inter-harmonic content
		Inter-harmonic ratio
		Deviation
		Unbalance Phasor diagram
		Flicker
		Voltage Waveform
		Current Waveform
		Present Demand

	Last demand
	Predicted demand
	Max demand
	Max demand of present month
	Digital I/O
	Module X1X4
	About
Phase index	a, b, c
Phasor diagram direction	Clock wise/Anti-clock wise

4.3.3 Signal Input Setup

Display	Menu1	Menu2
	Wiring mode	3P3W/3P4W
Signal input setup	PT Primary	1999999V
Wiring mode3P4WPT Primary000220 V	PT Secondary	1600V
PT Secondary 220 V CT Primary 000005 A	CT Primary	1999999A
CT Secondary 5 A NCT Primary 000005 A	CT Secondary	16A
NCT Secondary 5 A Frequency 50 Hz Power factor mode IEC-C	NCT Primary	1999999A
< > < <	NCT Secondary	16A
	Frequency	50Hz/60Hz
	Power factor mode	IEC-C/IEEE-C/IEC-P

4.3.4 Communication Setup

	Display		Menu1	Menu2
Ø	Communication setup		Slave Address	1247
Address Baud rate Data Format Protocol		001) 57600bps N. 8. 1 Modbus-RTU	Baud rate	2400bps115200bps
			Data format	E81, O81, N81, N82
-			Protocol	Modbus-RTU
<	> 5	۲		

4.3.5 Digital Input Setup

	Display		Menu1	Menu2
No. DI1 DI2 DI3 DI4	Digital input setup Mode status monitor status monitor status monitor status monitor	Debounce time 010 ms 010 ms 010 ms 010 ms 010 ms	Mode	Status monitor/ Pulse counting
			Debounce time	101000ms

4.3.6 Relay Output Setup

Display		Menu1	Menu2
⊘	Off 000.0 s	Mode	Off/On/Alarm
< > 5	L	Pulse width	0.1 999.9s

4.3.7 Power quality threshold setup

Display	Menu1	Menu2
	Swell threshold	100180%
	Dip threshold	0100%
	Interruption threshold	0100%
Q < PQ threshold setup > PQ event	RVC threshold	16%
Swell threshold110 %Dip threshold090 %Interruption threshold010 %	Swell hysteresis	010%
RVC threshold 010 % Swell hys 002 %	Dip hysteresis	010%
Dip hys 002 % Interruption hys 002 %	Interruption hysteresis	010%
RVC hys 002 % < > → ←	RVC hysteresis	03%
	Mains signaling voltage frequency	50.0 2575.0Hz
	Mains signaling voltage	0.31 00%
	threshold	

0 <	PQ threshold setup	>
Mains signal	ling voltage	
Frequency # Frequency # Frequency #3 Threshold	2	0050.00 Hz 0050.00 Hz 0050.00 Hz 005.0 %
<	> 5	€J

4.3.8 PQ event setup

Display	Menu1	Menu2
PQ event setup	Swell	Enable/Disable
Voltage dip 🥌 Voltage swell	Dip	Enable/Disable
Voltage interruption Rapid voltage change	Interrupt	Enable/Disable
Short-term flicker 🧼 Long-term flicker 🍅	RVC	Enable/Disable
	Short term flick	Enable/Disable
< > < 4	Long term flick	Enable/Disable

4.3.9 Module setup

Display	Menu1
✓ Module setup Module X1 - No Module Module X2 - No Module Module X3 - No Module Module X4 - No Module Vodule X4 - No Module	Module setup

4.3.10 Reset setup

Display	Menu1	Menu2
	Reset energy values	Enable/ Disable
	Reset demand values	Enable/ Disable
Reset setup Reset energy Reset demand values	Reset max/min values	Enable/ Disable
Reset max/min value	Clear PQ event logs	Enable/ Disable
Clear SOE Reset DI pluse counter Clear freeze data	Clear SOE logs	Enable/ Disable
Clear EN50160 report Reset accumulation timer	Reset DI pulse counter	Enable/ Disable
< > ~ ~	Clear freeze data	Enable/ Disable
	Clear EN50160 report	Enable/ Disable
	Reset accumulation timer	Enable/Disable

4.3.11 Demand setup

Display		Menu1	Menu2
Demand setup		Mode	Sliding block/Fixed block
Mode Sliding time(t) Period factor(n)	Sliding) 01 min 15t	Sliding time	1min60 min
Max/min value interval	History	Period factor	1t30 t
		Max/min interval	Historical /1/5/15/30/60/1440 min
$\langle \rangle $	L		

4.3.12 Time setup

Display	Menu1	Menu2
Time setupSystem time2024-08-23 14: 10: 58Time zoneGMT-12:00Timing modeModbus	System time	Year/Month/day/hour/ minute/second
	Time zone	GMT-12:00GMT+13
	Timing mode	Modbus/IRIG-B/Web /NTP
→ <u></u>		

4.3.13 EN50160 Setup

	Display	Menu1	Menu2	Menu3
			Template	LV/MV/HV
🖉 < Basic setup	EN50160 setup >	Basic update	Start week	MondaySunda y
Template Frequency setup Wide tol. Pos.dev. Neg.dev. Flicker setup Tolerance	LV Start week Sunday 100.00 % Narrow tol. 099.50 % 104.00 % Pos.dev. 101.00 % 094.00 % Neg.dev. 099.00 % 095.00 % Limit 001.00 %		Wide/Narrow Tolerance Wide/Narrow positive deviation Wide/Narrow negative deviation	0100% 0200% 0100%
		Flick setup	Tolerance	0100%
			Limit	0100

5. Functions

5.1 Real-time measurements

The device can measure the full electric parameters of power grid.

Measurement		Phase	Total	max	Min	Average	Demand
	Phase voltage	•	_	•	•	•	_
Voltage	Line voltage	•				•	—
	Fundamental voltage	•				—	—
	Current	•	_	•	•	•	•
Current	Neutral current	_	•	•	•	_	—
	Fundamental	•	-			_	—
	current						
	Active power	•	•	•	•	•	•
Power	Reactive power	•	•	•	•	•	•
	Apparent power	•	•	•	•	•	•
Power factor		٠	٠	•	•	_	_
Frequency		_	•	•	•	_	_

5.2 Energy metering

The device can meter energies, which are specifically as follows:

- Bidirectional active energy/reactive energy
- Fundamental active energy/reactive energy
- Four-quadrant reactive energy
- Apparent energy
- Tariff energy

The energy values displayed by the device are all primary values, which are obtained by multiplying the secondary value by magnification ratios of voltage and current transformers. All electric energy values are based on secondary values. The minimum resolution for accumulation of secondary electric energy values is 1Wh or 1varh, and the minimum display resolution of electric energy values is 0.001kWh or 0.001kWarh.

The maximum energy that can be retained is 4,294,967,295Wh on the secondary side. The display range of electric energy is initially 99,999,999,999,999kWh (99.9 billion kWh). There will be no overflow during normal service life of the device. Users can manually reset and clear the electric energy data according to their own needs (user password is required).

The device provides 6 sets of daily tariffs that can be set, weekly tariffs or 12 time zone tariffs that are

optional, and 90 variable holidays that can be set. When the switching time is reached or the year/month registers of switching time are directly written with 0xFFFF, the present rate setting will be directly overwritten by backup rate setting, and the switching time register will be cleared (the device will always run under the present rate setting).

The following tariff energy will be recorded:

- Present total/T1/T2/T3/T4/T5/T6/T7/T8 energy
- Total/T1/T2/T3/T4/T5/T6/T7/T8 energy for this month
- Historical total/T1/T2/T3/T4/T5/T6/T7/T8 energy for past 1 month to past 12 months.

5.3 Demand

The device can provide present period demand, previous period demand, maximum demand, maximum demand of present month, maximum demand of previous month and maximum demand of past 2 months, and two calculation methods, i.e., sliding block and fixed block, and the relevant setup can be made through communication.

The device can measure basic demand values, including 6 fixed demand values (I1, I2, I3, P, Q,S) and 10 optional demand values (see communication manual).

The demand can be measured with 2 methods: sliding block and fixed block. The time parameter setup involved include t (sliding time, unit: minute) and T (sliding cycle/interval time, unit: minute).

Sliding block: Every t minutes, it calculates the average demand value in the most recent T minutes, makes judgments and records, and conducts automatic meter reading for the monthly demand.

Fixed block: Every T minutes, it calculates the average demand value in the most recent T minutes, makes judgments and records, and conducts automatic meter reading for the monthly demand.

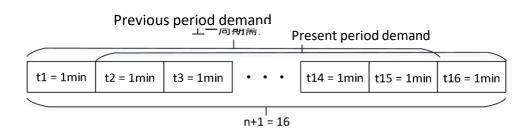
5.3.1 Sliding Block Demand

The setup related to sliding calculation are as follows:

- ♦ Mode: Sliding Block.
- ♦ Sliding Time (t): "1" minute.
- ♦ Period Factor (n): Set to "15".

The calculation method is shown in Figure 5.2.1.1:

- Previous period Demand = $(dmd_{t1}+dmd_{t2}+...+dmd_{t14}+dmd_{t15})/15$
- Present period Demand = $(dmd_{t2}+ dmd_{t3}+ ... + dmd_{t15}+ dmd_{t16})/15$



5.3.2 Fixed Block Demand

The setup related to fixed block calculation are as follows:

- ♦ Mode: Fixed block.
- ♦ Sliding Time (t): "1" minute.
- ♦ Period Factor (n): "15".

The calculation method is shown in Figure 5.2.2.1:

- Previous period demand = $(dmd_{t1} + dmd_{t2} + ... + dmd_{t14} + dmd_{t15})/15$
- Present period demand = $(dmd_{t16}+ dmd_{t17}+ ... + dmd_{t29}+ dmd_{t30})/15$

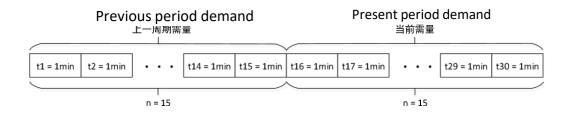


Figure 5.2.2.1 Fixed Block Demand Calculation

5.4 Max/Min Values

The device provides two types of max/min values i.e., interval values or historical values. When the interval time is set to "0", it is the historical value; when it is not set to "0", it is the interval value. When the interval time is set to 15min and the current time is 12:20, the values displayed by the device is the values within 12:00-12:15.

The device provides basic max/min data, including 15 fixed max data,15 fixed min data and 34 programmed data.

5.5 Power Quality

5.5.1 Power Quality

The device can monitor and analyze the power quality of grid, including the following measurement parameters:

Voltage deviation, frequency deviation, harmonics, inter-harmonics, unbalance, flicker, swell, dip, interruption and voltage rapid change.

5.5.2 Fundamental Wave Analysis

The device can provide the following fundamental data:

• Split-phase fundamental phase/line voltage

- Split-phase fundamental current
- Split-phase/total fundamental active power
- Split-phase/total fundamental reactive power
- Split-phase/total fundamental apparent power
- Split-phase/total fundamental power factor

5.5.3 Crest Factor

The device calculates the crest factor by analyzing a complete voltage and current cycle to provide crest factors of three-phase voltage and current:

Crest factor = Peak value / r.m.s value

5.5.4 k-Factor

The device calculates the k-factor based on the calculated harmonic data of current to provide k-factor of threephase current:

$$k = \frac{\sum_{h=2}^{h=h\max} I_h h^2}{I_{th}^2}$$

In which, h refers to the harmonic order, I_h refers to the value of harmonic distortion for the hth current harmonic, and I_{th} refers to the value of total harmonic distortion. the device is capable of measuring $2^{nd} - 51^{st}$ harmonics. Therefore, h_{max} is equal to 51.

5.5.5 Voltage Deviation

Changes in the running mode of power supply and distribution system and slow variations in load will cause the voltage at various points of the system to change accordingly. The difference between voltage at each point and rated voltage is known as voltage deviation, which is usually expressed as a percentage. The calculation method is as follows:

$$\Delta U = \frac{U - U_N}{U_N} \times 100\%$$

In which

- ΔU is Voltage deviation
- U is Real Voltage
- UN is rated voltage.

5.5.6 Frequency Deviation

Frequency deviation refers to the difference between actual value and nominal value of system frequency under normal running conditions in the power system. The calculation method is as follows:

Frequency deviation = Actual frequency - Nominal frequency

5.5.7 Harmonic and Inter-harmonic

Harmonics: Perform Fourier series decomposition on the periodic alternating quantity to obtain components with frequencies that are integer multiples of the fundamental frequency higher than 1;

Inter-harmonics: Perform Fourier series decomposition on the periodic alternating quantity to obtain components with frequencies that are not equal to integer multiples of the fundamental frequency higher than 1;

The device provides the following harmonic data:

- Split-phase 2nd ... 51st voltage/current harmonic ratio
- voltage/current THD
- voltage/current harmonics content
- Split-phase harmonic active power
- Split-phase harmonic reactive power
- Split-phase 2nd... 51st inter-harmonic ratio of voltage/current
- Voltage/current inter-harmonics content

5.5.8 Unbalance

For 3-phase 4-wire system, the device calculates voltage and current unbalance according to the calculated positive and negative sequence components of voltage and current; for 3-phase 4-wire system, the device calculates voltage and current unbalance according to the calculated maximum and average voltage and current values.

For 3-phase 4-wire System:

$$Unb2 = \frac{U2}{U1} \times 100$$
$$Unb0 = \frac{U0}{U1} \times 100$$
$$Inb2 = \frac{I2}{I1} \times 100$$
$$Inb0 = \frac{I0}{I1} \times 100$$

For 3-phase 3-wire System:

$$Unb = \frac{\max(U - Uavg)}{Uavg} \times 100$$
$$Inb = \frac{\max(I - Iavg)}{Iavg} \times 100$$

The device simultaneously provides the real and imaginary parts of fundamental wave of voltage and current.

5.5.9 Voltage Flicker

The human visual response to unstable illumination caused by voltage fluctuations (lamp flickering) is known as flicker. In other words, flicker reflects the impact of lamp flickering caused by voltage fluctuations on human visual perception.

The device provides short-term and long-term flicker values along with time stamps. Specifically, the short-term flicker update cycle is 10min, while the long-term flicker update cycle is 2h.

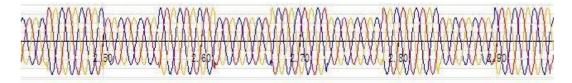


Figure 4.2.2.3.8.1 Waveform Screenshot of Voltage Flicker

5.5.10 Voltage Swell, dip and Interruption

Voltage Swell: Under power-frequency conditions, the root-mean-square value of voltage rises to 1.1-1.8 times of rated voltage.

Voltage dip: Under power-frequency conditions, the root-mean-square value of voltage drops to 0.1 0.9 times of rated voltage.

Voltage Interruption: Under power-frequency conditions, the root-mean-square value of voltage drops below 0.1 times of rated voltage for not more than 1min.

The device provides the following functions:

- Split-phase voltage swell, dip and interruption events
- Occurrence and end time, duration and extreme values during voltage swell, dip and interruption events
- Waveform recordings of voltage swell, dip and interruption events

The device provides the following relevant parameter Setup:

- Event enable setting
- Selection and setting of data sources for event
- Setup for event threshold, hysteresis and determination of occurrence duration

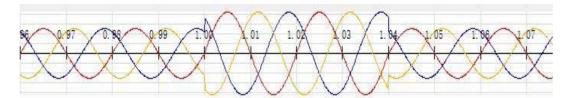
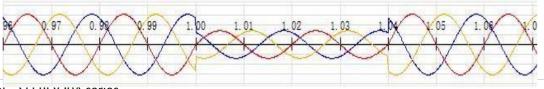


Figure 4.2.2.3.9.1 Waveform Screenshot of Voltage Swell



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Figure 4.2.2.3.9.2 Waveform Screenshot of Voltage dip

Figure 4.2.2.3.9.3 Waveform Screenshot of Voltage Interruption

5.5.11 Rapid Voltage Change

Rapid voltage change refers to a rapid transition in the effective value of voltage between two stable



voltage states, with the maximum change in effective voltage value not exceeding the threshold for voltage swell or dip. the device provides the following functions:

- Rapid change events of split-phase/total voltage
- Occurrence and end time, duration, \triangle **Umax** and \triangle **Uss** of rapid voltage change event
- Waveform recordings during a rapid voltage change event the device provides the

following relevant parameter Setup:

- Event judgment enable setting
- Event judgment threshold and hysteresis setting

 \triangle Umax: It refers to the maximum absolute value of difference between the last Uavg before an RVC event starts and any Urms during the event. For a multiphase system, it refers to maximum value among \triangle Umax of all phases.

 \triangle Uss: It refers to the absolute value of difference between the last Uavg before an event starts and the first Uavg after the event ends. For a multiphase system, the maximum value among all phases is taken.

Uavg: It refers to the arithmetic mean of 100 consecutive Urms. Urms: It refers to the effective value of voltage half-wave.

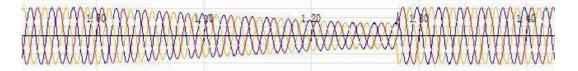


Figure 4.2.5 Waveform Screenshot of Rapid Voltage Change

5.6 Alarm

The device can provide independent alarms with enable, limit, hysteresis, and delay time. When an alarm is triggered, the register value of the alarm state of the communication address table will be updated accordingly.

The alarm item includes voltage, current, power, THD etc. Triggering Conditions of Alarm:

- 1) The corresponding alarm is enabled.
- 2) The value is more than the threshold in case of upper limit alarms; the value is less than the

threshold in case of lower limit alarms.

3) The duration exceeds the delay time Release Conditions of Alarm:

The value is less than the threshold - hysteresis in case of upper limit alarms; the value is more than the value of threshold + hysteresis in case of lower limit alarms.

Alarm item:

LN-Voltage	N-phase Current		
LL-Voltage	Total Active Power		
Current	Total Reactive Power		
Total Apparent Power	1 st 50 th current inter-harmonic content		
Total Power Factor	1 st 50 th voltage inter-harmonic content		
Zero-sequence voltage unbalance	1 st 50 th current inter-harmonic content		
Negative-sequence voltage unbalance	DI1 ON		
Zero-sequence current unbalance	DI1 OFF		
Negative-sequence current unbalance	DI2 ON		
Fundamental Voltage	DI2 OFF		
Fundamental Current	DI3 ON		
Voltage Deviation	DI3 OFF		
Frequency	DI4 ON		
Frequency Deviation	DI4 OFF		
THD-V	X1-DI1 ON		
TOHD-V	X1-DI1 OFF		
TEHD-V	X1-DI2 ON		
THD-I	X1-DI2 OFF		

TOHD-I	X1-DI3 ON
TEHD-I	X1-DI3 OFF
TIHD-V	X1-DI4 ON
TOIHD-V	X1-DI4 OFF
TEIHD-V	X2-DI1 ON
TIHD-I	X2-DI1 OFF
TOIHD-I	X2-DI2 ON
TEIHD-I	X2-DI2 OFF
HC_V	X2-DI3 ON
HC_I	X2-DI3 OFF
IHC_V	X2-DI4 ON
IHC_I	X2-DI4 OFF
Present demand-P	X3-DI1 ON
Present demand-Q	X3-DI1 OFF
Present demand-S	X3-DI2 ON
Present demand-PF	X3-DI2 OFF
Forecast demand-P	X3-DI3 ON
Forecast demand-Q	X3-DI3 OFF
Forecast demand-S	X3-DI4 ON
Forecast demand-PF	X3-DI4 OFF
Short-term flicker	X4-DI1 ON
Long-term flicker	X4-DI1 OFF
Rapid voltage change	X4-DI2 ON
2 nd 51 st voltage harmonic ratio	X4-DI2 OFF

2 nd 51 st current harmonic ratio	X4-DI3 ON
2 nd 51 st voltage harmonic content	X4-DI3 OFF
2 nd 51 st current harmonic content	X4-DI4 ON
1 st 50 th voltage inter-harmonic content	X4-DI4 OFF

5.7 Event Log

The device provides 1,024 data records for querying, where each record can be divided into two parts i.e., event + occurrence time. The event is divided into a high byte (event classification) and a low byte (specific event), as shown in the following table:

High byte	Event Classification	Low byte	Specific Events
0x00	No event	_	_
0x01	Power on/off event	0x00	Power off
		0x01	Power on
0x02	Over-limit start event	_	
0x03	Over-limit end event	-	see communication manual
		0x00	DI1 ON
		0x01	DI1 OFF
		0x02	DI2 ON
		0x03	DI2 OFF
		0x04	DI3 ON
		0x05	DI3 OFF
		0x06	DI4 ON
0.04	Discont	0x07	DI4 OFF
0x04	DI event	0x08	X1-DI1 ON
		0x09	X1-DI1 OFF
		0x0A	X1-DI2 ON
		0x0B	X1-DI2 OFF
		0x0C	X1-DI3 ON
		0x0D	X1-DI3 OFF
		0x0E	X1-DI4 ON
		0x0F	X1-DI4 OFF

0x10X2-D10N0x11X2-D10F0x12X2-D12OF0x13X2-D12OF0x14X2-D13OF0x15X2-D13OF0x16X2-D14OF0x17X2-D14OF0x18X3-D10N0x19X3-D10F0x10X3-D10F0x18X3-D12OF0x18X3-D12OF0x18X3-D12OF0x18X3-D12OF0x19X3-D13OF0x16X3-D13OF0x17X3-D14OF0x18X3-D10A0x16X3-D10A0x17X3-D14OF0x18X3-D10A0x16X3-D10A0x17X3-D14OF0x20X4-D10N0x21X4-D10N0x21X4-D10A0x22X4-D10A0x23X4-D12OF0x24X4-D10A0x25X4-D13ON0x26N2-D40F0x20N2-D40F0x21X4-D12OF0x22X4-D12OF0x23X4-D12OF0x24X4-D12OF0x25X4-D13ON0x26N2-D40F0x30D010F0x30D010F0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40D101OF0x40<				
0x12X2-012 0N0x13X2-012 0FF0x14X2-013 0N0x15X2-013 0FF0x16X2-014 0N0x17X2-014 0FF0x18X3-011 0FF0x100x190x10X3-012 0FF0x10X3-012 0FF0x11X3-012 0FF0x12X3-013 0N0x12X3-013 0FF0x12X3-013 0FF0x14X3-013 0FF0x16X3-013 0FF0x17X3-014 0FF0x18X3-014 0FF0x19X4-014 0FF0x20X4-014 0FF0x21X4-011 0N0x21X4-012 0FF0x22X4-012 0FF0x23X4-012 0FF0x24X4-013 0N0x25X4-013 0FF0x26X4-014 0FF0x27X4-014 0FF0x20001 0N0x21001 0FF0x22X4-014 0FF0x23X4-014 0FF0x24X4-014 0FF0x26X4-014 0FF0x27X4-014 0FF0x20D01 0N0x31D01 0FF0x32D01 0FF0x33D01 0FF0x34D01 0FF0x34D01 0FF0x34D01 0FF0x34D02 0FF0x34D02 0FF0x34D03 0N0x45D03 0FF			0x10	X2-DI1 ON
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0x05 DO event 0x25 X4-DI3 OFF 0x26 X4-DI4 ON 0x27 X4-DI4 OFF 0x00 D01 ON 0x01 D01 OFF 0x02 D02 ON 0x03 D02 OFF 0x04 D03 ON 0x05 D03 OFF			0x23	X4-DI2 OFF
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0x00 D01 ON 0x01 D01 OFF 0x02 D02 ON 0x03 D02 OFF 0x04 D03 ON 0x05 D03 OFF			0x26	X4-DI4 ON
0x01 D01 OFF 0x02 D02 ON 0x03 D02 OFF 0x04 D03 ON 0x05 D03 OFF			0x27	X4-DI4 OFF
0x02 DO2 ON 0x03 DO2 OFF 0x04 DO3 ON 0x05 DO3 OFF			0x00	DO1 ON
0x03 DO2 OFF 0x04 DO3 ON 0x05 DO3 OFF			0x01	DO1 OFF
0x04 DO3 ON 0x05 DO3 OFF			0x02	DO2 ON
0x05 DO3 OFF			0x03	DO2 OFF
			0x04	DO3 ON
0x06 DO4 ON			0x05	DO3 OFF
			0x06	DO4 ON

			1
		0x07	DO4 OFF
		0x08	X1- DO1 ON
		0x09	X1- DO1 OFF
		0x0A	X1- DO2 ON
		0x0B	X1- DO2 OFF
		0x0C	X2- DO1 ON
		0x0D	X2- DO1 OFF
		0x0E	X2- DO2 ON
		0x0F	X2- DO2 OFF
		0x10	X3- DO1 ON
		0x11	X3- DO1 OFF
		0x12	X3- DO2 ON
		0x13	X3- DO2 OFF
		0x14	X4- DO1 ON
		0x15	X4- DO1 OFF
		0x16	X4- DO2 ON
		0x17	X4- DO2 OFF
		0x00	Setup change
		0x01	Reset energy values
		0x02	Reset demand values
		0x03	Reset max/min values
		0x05	Clear SOE logs
0x06	Meter operation event	0x07	Reset DI pulse counter
		0x09	Reset running timer
		0x0A	Clear PQ event
		0x0B	Clear EN50160 report
		0x0C	Clear freeze data
		OxFF	Clear all records

5.8 Data Freezing

The device can freeze data, including 5 fixed data (import active energy, export active energy, import reactive energy and apparent energy) and 20 optional data. Freeze interval can select 1min,5min,15min,30min,60min or 1440min.

5.9 Address Mapping

The device has 60 registers that its address can be programmed.

For example, if the host computer wants to read "phase voltage-V1", "phase voltage-V2", "phase voltage-V3", and "average phase voltage" in one frame, you can set as follows:

- •Custom data setting 1/2 set to "0x0006"/ "0x0007" (address of phase voltage-V1)
- •Custom data setting 3/4 set to "0x0008"/ "0x0009" (address of phase voltage-V2)
- •Custom data setting 5/6 set to "0x000A"/ "0x000B" (address of phase voltage-V3)
- •Custom data setting 7/8 set to "0x0310"/ "0x0311" (Address of average phase voltage)

After the setting is completed, the host computer can read 8 addresses directly from the 0x1000 to complete a frame reading the above data.

5.10 Digital Input

The digital input module adopts the dry contact mode. Since it is equipped with an built-in power source, the device can be used to monitor the state of the circuit breaker, accumulate the pulses of energy without external power source.

5.11 Relay Output

Relay output can select three modes, including OFF mode, alarm mode and remote-control mode.

5.12 Expand Module

- FM2: 4 digital inputs
- FM3: 2 relay outputs
- FM11: RS485, Modbus-RTU
- FM24: Ethernet port, Modbus-TCP, Websever

The device supports expand module, including FM2, FM3, FM11 and FM24.

Revision History

Version Number	Content	Revision Date
V1.0A	EN Updated	May, 2024
V1.2A	EN Finalized	April, 2025

Elecnova

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