9.4.1 General Specification

Model	IT9121E
AC input voltage	100VAC－240VAC　50/60HZ
Warm-up time	Apporx 30 minutes
Operating Environment	Temperature:5°C-40°C
	Humidity: 20%-80% (non-condensation)
	Altitude: ≤2,000m
Storage Environment	Temperature: -20°C -50°C
	humidity 20%-80% (non-condensation)
	Altitude: ≤2,000m
Installation	Indoors
Safety	IEC 61010－1、EN 61010－1 、Measurement CAT Ⅱ
Pollution degree	Pollution degree 2
EMC	IEC 61326
Maximum power consumption	50VA
Battery backup	Backup the setting parameters
Dimension	214.5mmW×88.2mmH×354.6mmD

9.4.2 Screen Display

Item	Detailed Information	
Display Interface Specification	Dimension	4.3-inch color liquid crystal display (TFT)
	Full screen pixel	480(horizontal) × 272(vertical) points
	Waveform display pixel	384(horizontal) × 194(vertical) points
	Operating temperature	-20℃~ 70℃
	Storage temperature	-30℃~ 80℃
	Value display	Currently set up as a matrix display.It is optional to display the array number.

9.4.3 Input Parameters

Input parameter	Description			
Input terminals type	Voltage	plug-in terminal(safety terminal)		
Input type	Current	Direct input	large binding post	
		External current sensor input	DB9 connector	
Input type	Voltage	Floating input through resistive voltage divider		
	Current	Floating input through shunt		
Measure range	Voltage	CF=3:15V, 30V, 60V, 150V, 300V, 600V. CF=6:7.5V, 15V, 30V, 75V, 150, 300V.		
	Current	Direct input	CF=3:5mA,10mA,20mA,50mA,100mA,200mA,0.5A,1A,2A,5A,10A,20A. CF=6:2.5mA,5mA,10mA,25mA,50mA,100mA,250mA,0.5A,1A,2.5A,5A,10A.	
		Sensor input	EX1, CF=3:2.5V, 5V, 10V. CF=6:1.25V, 2.5V, 5V. EX2, CF=3:50mV, 100mV, 200mV, 500mV, 1V, 2V. CF=6:25mV, 50mV, 100mV, 250mV, 500mV, 1V.	
Input impedance	Voltage	Input resistanceApprox.2MΩ,input capacitace: Approx.13pF(in parallel with the resistance)		
	Current	Direct input range5mA~200mA	Input resistance: Approx.505mΩ Input resistance: Approx.505mΩ	
		Direct input range0.5A~20A	Input resistance: Approx 5mΩ Input inductance: Approx0.1μH	
		Sensor input	Input resistance: Approx 100kΩ（2.5V~10V） Input resistance: Approx 20kΩ（50mV~2V）	
Continuous maximum allowabl	Voltage	peak value of 1.5kV or RMS value of 1kV, whichever is less		
	Current	Direct input range 5mA~200mA	peak value of 30A or RMS value of 20A,whichever is less	

Input parameter	Description		
e input		Direct input range 0.5A~20A	peak value of 100A or RMS value of30A,whichever is less
		Sensor input	Peak value less than or equal to 5 times of the rated range
Instantaneous maximum allowable input(1s)	Voltage	peak value of 2kV or RMS value of 1.5kV,whichever is less	
	Current	Direct input range 5mA~200mA	peak value of 30A or RMS value of 20A,whichever is less
		Direct input range 0.5A~20A	peak value of 150A or RMS value of 40A,whichever is less
		Sensor input	Peak value less than or equal to 10 times of the rated range
Input bandwidth	DC,0.5Hz~100KHz		
Continuous maximum Common-mode voltage	600Vrms,CAT Ⅱ		
Line filter	select OFF, cutoff frequency of 500Hz		
Frequency filter	select OFF, cutoff frequency of 500Hz		
Digital filter	select OFF, cutoff frequency of 5KHz and 10KHz (this item has not been set up yet)		
Range	range of each unit can be set separately		
A/D converter	Simultaneous conversion voltage an current inputs Resolution:18-bit Maximum conversion rate: 10μs		

9.4.4 Voltage and Current Accuracy

Item	Specification	
Requirements	temperature	23±5° C, hundity: 30 ~ 75%RH.
	Input waveform	Sine wave crest factor:3, common-mode voltage: 0V
	Number of displayed digits	5digits (6 digits when including the decimal point)
	Frequency filter	Turn on to measure voltage or current of 200Hz
	30 minutes after warm-up time has passed	
	After zero-level compensation or measurement range is changed	
Accuracy (The following accuracy is the sum of the reading error and the range error) * f is the frequency of input signal in the reading error formula, the unit is kHz.		
	DC	±(0.1% of reading+0.2% of range)
	0.5Hz≤f<45Hz	±(0.1% of reading+0.2% of range)
	45Hz≤f≤ 66Hz	±(0.1% of reading+0.2% of range)
	66Hz<f≤ 1kHz	±(0.1% of reading+0.2% of range)
	1kHz<f≤10kHz	±(0.07*f)% of reading+0.3% of range)
	10kHz<f≤100kHz	±(0.5% of reading+0.5% of range)±[{0.04×(f-10)}% of reading]

Current Resolution		Voltage Resolution	
Current Range	Resolution	Voltage Range	Resolution
5mA	0.0001mA	15V	1mV
10mA	0.001mA	30V	1mV
20mA	0.001mA	60V	1mV
50mA	0.001mA	150V	10mV
100mA	0.01mA	300V	10mV
200mA	0.01mA	600V	10mV
500mA	0.01mA	-	-
1A	0.1 mA		
2A	0.1 mA		
5A	0.1 mA		
10A	1 mA		
20A	1 mA		

9.4.5 Power Accuracy

<table>
<tr><th>Item</th><th colspan="2">Specification</th></tr>
<tr><td>Requirements</td><td colspan="2">same as the conditions for voltage and current. Power factor:1</td></tr>
<tr><td rowspan="6">Accuracy(The following accuracy is the sum of the reading error and the range error)
* f is the frequency of input signal in the reading error formula, the unit is kHz.</td><td>DC</td><td>±(0.1% of reading+0.2% of range)</td></tr>
<tr><td>0.5Hz≤ f<45Hz</td><td>±(0.3% of reading+0.2% of range)</td></tr>
<tr><td>45Hz≤f ≤ 66Hz</td><td>±(0.1% of reading+0.1% of range)</td></tr>
<tr><td>66Hz<f ≤ 1kHz</td><td>±(0.2% of reading+0.2% of range)</td></tr>
<tr><td>1kHz<f≤10kHz</td><td>±(0.1% of reading+0.3% of range)±[{0.067×(f-1)}% of reading]</td></tr>
<tr><td>10kHz<f≤100kHz</td><td>±(0.5% of reading+0.5% of range)±[{0.09×(f-10)}% of reading]</td></tr>
<tr><td>Influence of power factor</td><td colspan="2">when power factor (PF)=0 (S:apparent power)
• ±0.2% of S for 45Hz≤f≤66Hz
• ±{(0.2+0.2×f)% of S }for up to 100kHz as reference data f is frequency of input signal in kHz
when 0<PF<1(Φ:phase angle of the Voltage and current)
(power reading)×[(power reading error%)+(power range %)×
(power range/indicated apparent power value)+{tanΦ×(influence when PF=o)%}]</td></tr>
<tr><td>When the line filter is turned ON</td><td colspan="2">45~66Hz:Add 0.3% of reading
<45Hz:Add 1% of reading</td></tr>
<tr><td>Temperature coefficient</td><td colspan="2">same as the temperature coefficient for voltage and current</td></tr>
<tr><td>Accuracy when the crest factor is set to 6</td><td colspan="2">accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3</td></tr>
<tr><td>Accuracy of apparent power S</td><td colspan="2">voltage accuracy +current accuracy</td></tr>
<tr><td>Accuracy of reactive power Q</td><td colspan="2">accuracy of apparent power +(√1.0004-PF2)-(√1-PF2) ×100%</td></tr>
<tr><td>Accuracy of power Factor PF</td><td colspan="2">±[(PF–PF/1.0002)+|cosØ-cos{Ø+sin-1(influence from the power factor when PF=0%/100)
±1digit when voltage and current are at the measurement range rated input.</td></tr>
<tr><td>Accuracy of phase difference Φ</td><td colspan="2">±[|Ø-cos-1(PF/1.0002)|+sin-1{(influence from the power factor when PF=0%/100)
±1digit when voltage and current are at the measurement range rated input.</td></tr>
</table>

Power Resolution							
Range		Voltage Range					
		15V	30V	60V	150V	300V	600V
Current Range	5mA	0.001mW/mvar/mVA	0.01mW/mvar/mVA	0.01mW/mvar/mVA	0.01mW/mvar/mVA	0.1mW/mvar/mVA	0.1mW/mvar/mVA
	10mA	0.01mW/mvar/mVA	0.01mW/mvar/mVA	0.01mW/mvar/mVA	0.1mW/mvar/mVA	0.1mW/mvar/mVA	0.1mW/mvar/mVA
	20mA	0.01mW/mvar/mVA	0.01mW/mvar/mVA	0.01mW/mvar/mVA	0.1mW/mvar/mVA	0.1mW/mvar/mVA	1mW/mvar/mVA
	50mA	0.01mW/mvar/mVA	0.1mW/mvar/mVA	0.1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA
	100mA	0.1mW/mvar/mVA	0.1mW/mvar/mVA	0.1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA
	200mA	0.1mW/mvar/mVA	0.1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA	10mW/mvar/mVA
	500mA	0.1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA	10mW/mvar/mVA	10mW/mvar/mVA
	1A	1mW/mvar/mVA	1mW/mvar/mVA	1mW/mvar/mVA	10mW/mvar/mVA	10mW/mvar/mVA	10mW/mvar/mVA
	2A	1mW/mvar/mVA	1mW/mvar/mVA	10mW/mvar/mVA	10mW/mvar/mVA	10mW/mvar/mVA	0.1W/var/VA
	5A	1mW/mvar/mVA	10mW/mvar/mVA	10mW/mvar/mVA	10mW/mvar/mVA	0.1W/var/VA	0.1W/var/VA
	10A	10mW/mvar/mVA	10mW/mvar/mVA	10mW/var/VA	0.1W/var/VA	0.1W/var/VA	0.1W/var/VA
	20A	10mW/mvar/mVA	10mW/mvar/mVA	0.1W/var/VA	0.1W/var/VA	0.1W/var/VA	1W/var/VA

9.4.6 Voltage Current and Power measurements

Item	Specification
Measurement method	digital sampling method
Crest factor	3 or 6
Wiring system	(one element model):single-phase ,two-wire(1P2W)

Item	Specification	
Range select	select manual or auto ranging	
Auto range	Range increase When meet any of the following conditions, the range will increase automatically. • Urms or Irms is greater than 110% of the current setting range • PF=3: the values of the input signal Upk and Ipk are greater than 330% of the current setting range • PF=6: the values of the input signal Upk and Ipk are greater than 660% of the current setting range Range decrease When meet any of the following conditions, the range will decrease automatically. • Urms or Irms is less than or equal to 30% of the current setting range • PF=3: the values of the input signal Upk and Ipk are less than 300% of the current setting range • PF=6: the values of the input signal Upk and Ipk are less than 600% of the current setting range	
	Name	Symbols and meanings
Measurement parameters	voltage current	Select RMS(the true RMS value of voltage andcurrent) 、 MEAN:(the rectified mean value calibrated to theRMS value of the voltage andthe true RMS value of the current)、RMN (rectified mean value of voltage and current DC:(simple average of voltage and current)、 AC: alternating current 、 PP: (peak value of voltage and peak value of current)
	active power [W]	P
	reactive power [var]	Q
	apparent power [VA]	S
	power factor	PF
	phase difference (°)	φ
	frequency(Hz)	fU (FreqU): voltage frequency 、 fI (FreqI): current frequency
	max/mix of voltage	Upk+: voltage positive peak、 Upk- :

Item	Specification	
	(V)	voltage negative peak
	max/mix of current (A)	Ipk+: current positive peak 、 Ipk- : current negative peak
	crest factor (The ratio of peak value and RMS)	Ucf: crest factor of voltage, Icf : crest factor of current
	integration	TM:integration time 、 WP:sum of positive and negative watt hour 、 WP+:positive power sum 、 WP-:negative power sum 、 q:sum of positive and negative ampere-hour、q+:positive ampere -hour sum 、 q-:negative ampere-hour sum
Measurement synchronization source	Select voltage, current, or the entire period of the data updata interval for the signal used to achieve synchronization during measurement.	
Line filter	Select OFF or ON (cutoff frequency at 500Hz)	
Peak measurement	Measures the peak (max,min) value of voltage,current or power from the instantaneous current or instantaneous power that is sampled.	

9.4.7 Frequency Measurement

Item	Specification	
Measurement item	voltage or current frequencies applied to one selected input element can be measured	
Frequency measurement range	vaties depending on the data update interval (see description given later)as follows	
	Data update interval	measurement range
	0.1s	25Hz ≤ f ≤100kHz
	0.25s	10Hz ≤ f ≤ 100kHz
	0.5s	5Hz ≤ f ≤ 100kHz
	1s	2.5Hz ≤ f ≤ 100kHz
	2s	1.5Hz ≤ f ≤ 50kHz
	5s	0.5Hz ≤ f ≤ 20kHz
Frequency filter	select OFF or ON (cutoff frequency of 500Hz)	

Item	Specification
Accuracy	requirements : When the input signal level is 30% or moreof the measurement range if the crest factor is set to 3 (60% or more if the crest factor is set to 6) , frequency filter is ON when measuring voltage or current of 200Hz or less. Accuracy:±(0.06%of reading)

Range	Frequency Resolution
f<10Hz	0.001 Hz
10Hz≤f<100Hz	0.01 Hz
100Hz≤f<1000Hz	0.1 Hz
1kHz≤f<10kHz	1 Hz
10kHz≤f<100kHz	10 Hz

9.4.8 Fundamental Frequency

Fundamental frequency	sample rate	window width	upper limit of* analysis orders*
10Hz ~ 75Hz	f*1024	1	50
75Hz ~ 150Hz	f*512	2	32
150Hz ~ 300Hz	f*256	4	16
300Hz ~ 600Hz	f*128	8	8
600Hz ~ 1200Hz	f*64	16	4
*the upper limit of analysis orders can be decrease			

9.4.9 Accuracy

*When line filter is off, the accuracy shown below is the sum of reading and range errors.

Frequency	Voltage	Current	Power
10Hz≤f<45Hz	0.15% of reading +0.35% of range	0.15% of reading +0.35% of range	0.15% of reading +0.50% of range
45Hz ≤ f ≤ 440Hz	0.15% of reading +0.35% of range	0.15% of reading +0.35% of range	0.20% of reading +0.50% of range
440Hz<f ≤ 1kHz	0.20% of reading +0.35% of range	0.20% of reading +0.35% of range	0.40% of reading +0.50% of range
1kHz<f ≤ 2.5kHz	0.80% of reading +0.45% of range	0.80% of reading +0.45% of range	1.56% of reading +0.60% of range
2.5kHz<f ≤ 5kHz	3.05% of reading +0.45% of range	3.05% of reading +0.45% of range	5.77% of reading +0.60% of range

9.4.10 Oscilloscope Function

Channel	2
Measurement	Voltage and current
Bandwidth(-3dB)	DC : 10 kHz
Sample rate	100kHz
Record length	Each channel is 300 points
Horizontal system	
The level of scale range	500us/case, 1ms/case, 2ms/case, 5ms/case, 10ms/case, 20ms/case, 50ms/case, 100ms/case, 200ms/case, 500ms/case
The accuracy of horizontal cursor	Each case is ±4.0%
Vertical system	
Vertical scale range	CF=3: Range/case CF=6:Range*2/case
The accuracy of the vertical cursor	Each case is ±4.0%
Maximum input voltage	1800V (DC+AC peak)
Maximum input current	60A (DC+AC peak)
Triggle system	
Trigger source	Voltage, current and EXT
Trigger type	Edge(rising edge, falling edge, arbitrary edge)
Trigger mode	Automatic, Normal, Single

9.4.11 Interface Specification

USB Interface

Item	Specification
Interface type	Type B (socket)
Electrical and mechanical specifications	USB 2.0
Transmission speed	Maximum speed is 12Mbps
Port number	1
Power supply	Self-powered
Support service	Remote control
Support system	Run PC with Windows 7(SP4 version or

Item	Specification
	update version), Windows XP or Windows Vista,standard USB interface.

USB peripheral equipment interface

Item	Specification
Interface type	Type A (socket)
Electrical and mechanical specifications	USB 2.0
Transmission speed	Maximum speed is 12Mbps
Port number	1
Power supply	Power supply 5V、500mA2 (per port)
Support USB large capacity memory	USB flash memory (meet USB Mass Storage Class Specification)
Support system	Run PC with Windows 7(SP4 version or update version), Windows XP or Windows Vista,standard USB interface.

GPIB Interface(Only for IT9100(G) series)

Item	Specification
Available equipment	America NI Company • AT-GPIB • PCI-GPIB or PCI-GPIB+ • PCMCIA-GPIB, PCMCIA-GPIB+ or PCIe-GPIB Drive program: NI-488.2M 1.60 or update version
Electrical and mechanical specifications	IEEE St'd 488-1978 (JIS C 1901-1987)
Functional specification	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
Protocol	IEEE St'd 488.2-1992
Encoding	ISO (ASCII)
Mode	The address mode can be set

Serial port(RS-232)

Item	Specification
Electrical Specification	Comply with EIA-232(RS-232) standard
Connection type	Point to point
Communication type	Full duplex

Synchronization	Start and stop can be synchronized
Baud rate	The baud rate can be set(Default:9600)
Start bit	1 bit
Data length	8 bits
Parity bit	NONE
Stop bit	1 bit

Ethernet Communication

Item	Specification
Port number	1
Interface	RJ-45
Electrical and mechanical specifications	IEEE802.3
Transmission system	**E**thernet (100BASE-TX)
Transmission speed	Maximum speed: 100Mbps
Communication protocol	TCP/IP
Support equipment	FTP service、DHCP、DNS、Remote control (VXI-11)

Please contact ITECH for the correcponding information about the supportable USB device.

*The above specifications may be subject to change without prior notice.