

ZeroVAR[®] PC POWER FACTOR CONTROLLER & NETWORK ANALYZER 18 STEPS



User Guide

Technical Specifications

Supply Voltage	: 220Vac±%20(L1-N), 50/60Hz
Power Consumption	: <5VA
Current Transformer	: .../5A
Current Measuring Range	: 0,05..7A
Control Outlet	: Relay, 5A/250Vac (Omron)
Cosφ Adjustment	: Inductive(0,80...1,00) Capacitive(0,80...1,00)
Cos Adjustment Step	: 0,01
Step Delay	: Step On : Adjustable 1.....500sec. Off Delay : Adjustable 1.....500sec. Discharge: Adjustable 1.....500sec.
Alarm Delay	: Adjustable 1.....500sec.
Temperature Control	
Max. Temperature Limit	: It can be adjusted 0....80°C
Min. Temperature limit	: It can be adjusted 0....80°C
Factory Set Values	: Cosφ =1,00 : Current Transformer Rate : 1 : Ton=1sec; toff=1sec; t discharge=1sec. : Inductive Reactive Rate : %15 : Capacitive Reactive Rate : %10
Working Temperature	: -5 ... +55 °C
Display	: Graphic LCD Screen
Protection Class	: Front Ip54 : Connecting terminals : Ip20
Weight	: 1kg

General Specifications

- * Easy Installation
- * Measures & Controls Inductive and Capacitive powers
- * Graphic LCD screen
- * Adjustment contains measurement and compensation modes
- * Automatic step recognition and
- * 18 +1 steps.
- * Compensates each phase separately or according to their average
- * Senses current directions of phases
- * All electrical parameters for each phase shown as graphic and numeric
- * Current & Voltage harmonics are shown as graphic and numeric (till 32nd harmonic)
- * Measures Cosφ, tgφ current voltage and powers
- * Senses under currents (50ma)
- * Controls panel temperature
- * Class 0,5

Adjustment Menu

- * Cosφ
 - Inductive Adjustment
 - Capacitive Adjustment
- * Transformer Rates
 - Current Transformer Rate
 - Voltage Transformer Rate
- * Time Adjustment
 - Step On
 - Delay OFF
 - Discharge
 - Alarm Delays
- * Temperature Adjustment
 - Max. Temperature Limit
 - Min. Temperature Limit
- * Alarms
 - Under&Over Voltage value
 - Under&Over Current value
 - Ind. Limit / Cap. Limit
 - Over Harmonic value
 - Over current Harmonic value
 - Under&Over Temperature value

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General Specifications

Start Screen

Keys

1- Instrument Adjustment

- 1-1 $\cos\phi$ Adjustment
- 1-2 transformer Rates Adjustment
- 1-3 Delay Time Adjustment
- 1-4 Temperature Adjustment
- 1-5 Alarm Adjustment

2- Measurement And Step Adjustment

- 2-1 Voltage Current $\cos\phi$
- 2-2 $\cos\phi$
- 2-3 $\tan\phi$
- 2-4 Active Power
- 2-5 Reactive Power
- 2-6 Apparent Power
- 2-7 Voltage Graphic
- 2-8 Current Graphic
- 2-9 Voltage Current Graphic
- 2-10 Voltage Harmonic
- 2-11 Current Harmonic
- 2-12 Step Power
- 2-13 All Measurements

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- 3-1 Auto Compensation
- 3-2 Manuel Compensation
- 3-3 Test mode

Connection Schema

Target $\cos\phi$ Table

Dimensions

Technical Specifications

Notes.....

MEASUREMENT MENU

- * Voltage , Current , $\cos\phi$
- * $\cos\phi$
- * $\tan\phi$
- * Active Power
- * Reactive Power
- * Apparent Power
- * Voltage Graphic
- * Current Graphic
- * Voltage , Current Graphic
- * Voltage Harmonic
- * Current harmonic
- * Step Power
- * All Measurements

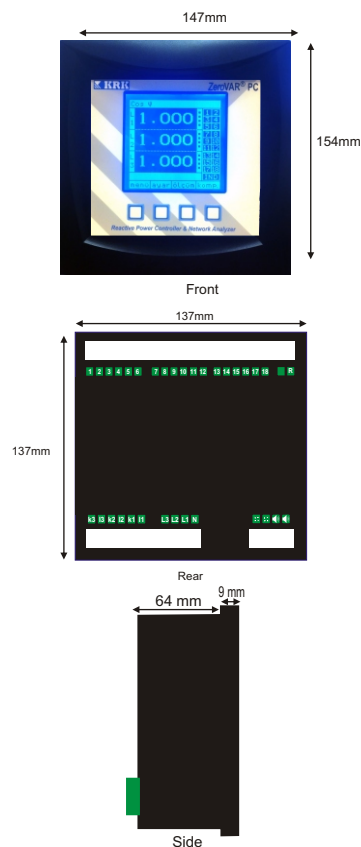
COMPENSATION MENU

- * Compensation Monitoring Screen
- * $\cos\phi$
- * $\tan\phi$
- * Voltage , Current
- * Active Power
- * Reactive Power
- * Apparent Power

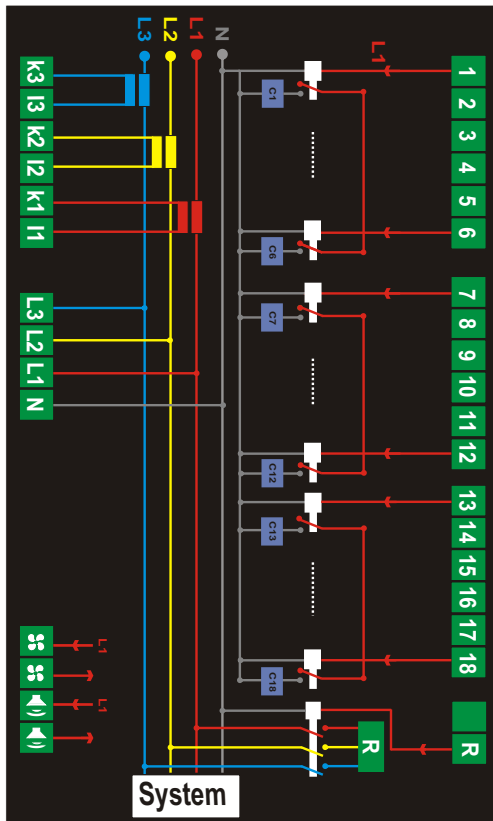
COMPENSATION CONTROL

- * Auto (Intelligent) Control
- * Independent , Average
- * Manuel Control
- * Measurement Test of Steps

Dimensions



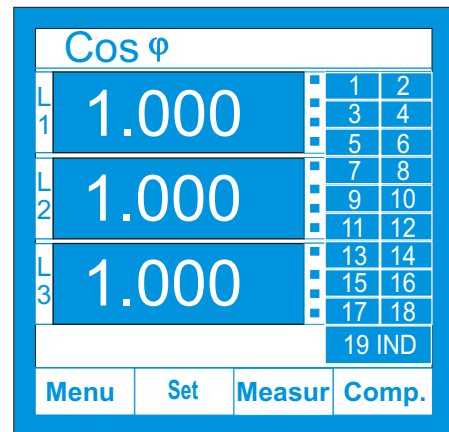
CONNECTION SCHEME



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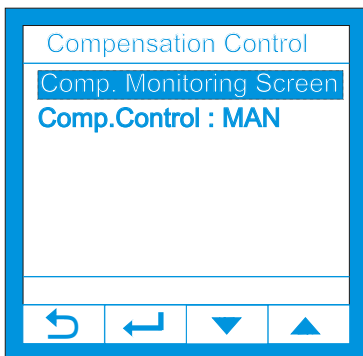
ZeroVAR-PC

START-UP SCREEN

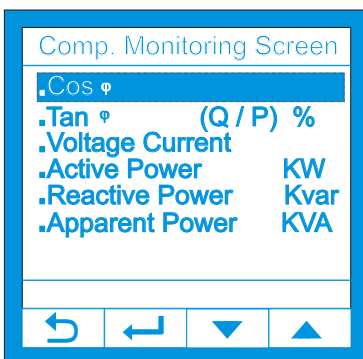


When ZeroVAR PC turns on, start-up screen appears. It is made adjusted adjustments by using Menu, Adjustment, Measurement and Compensation keys at bottom side of the screen. It is available the related keys to choose the wishing choses, to check other values. Please look the next page to see them.

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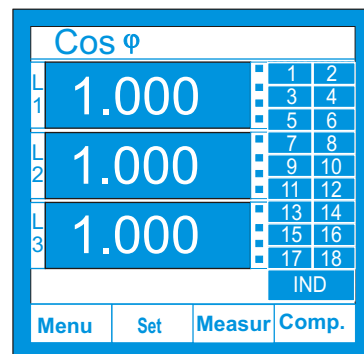
Choose compensation monitoring screen by using UP and **DOWN** keys. Press **ENTER**.



Choose compensation monitoring screen by using UP and **DOWN** keys. Press **ENTER**.
(Compensation Screen is adjusted as Start-Up screen.)

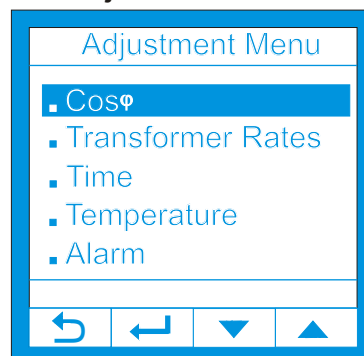
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1- 1-PRODUCT ADJUSTMENT



Find Adjustment Menu by using Adjustment key.

1-1 COS φ Adjustment :



Press **ENTER** to change Cos φ adjustments.

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 **BACK** key (for the previous Menu)

 **ENTER** key (It enters into chosen option and saves the chosen value.)

 **UP** key

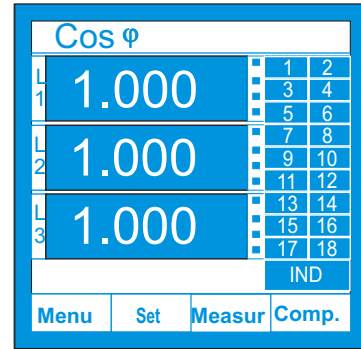
 **DOWN** key

 **RIGHT** key

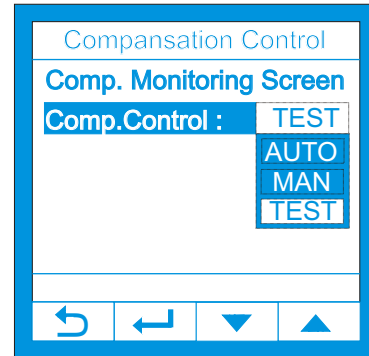
 **LEFT** key

 **HOLD** key (for all measurements)

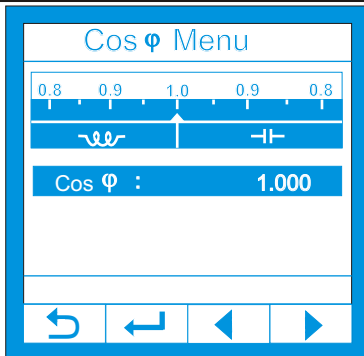
 **PLAY** key (start measuring) (for all measurements)



Enter the Compensation Control Menu at the Start-up Screen by using compensation key (at the bottom-right side).

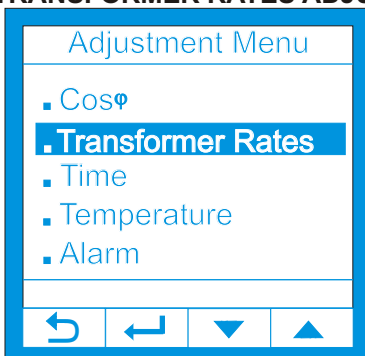


3-3 TEST MODE : Choose TEST option by using **DOWN** key and then press **ENTER**. The product reads and saves automatically connected capacitors.

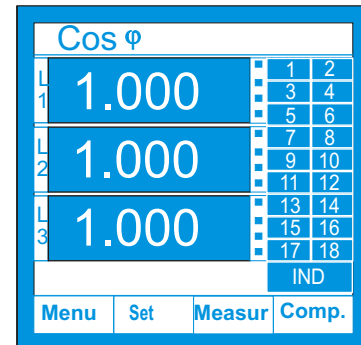


Press **ENTER** key to change Cos ϕ adjustment.
To enter the adjusted values, please use **RIGHT** and **LEFT** keys. Then press **ENTER** key. To go back the Adjustment Menu, press **BACK** key.
(Cos ϕ adjustment can be adjusted between 0,80 / 1.000 Ind and 0,80 / 1.000 Cap.)

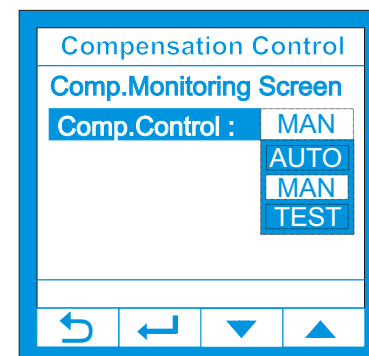
1-2 TRANSFORMER RATES ADJUSTMENT



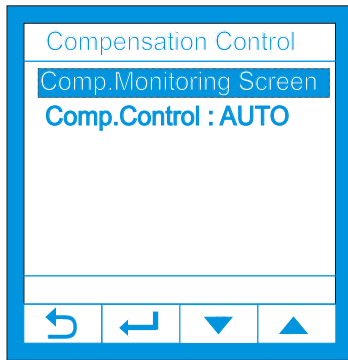
To change transformer rates, press **ENTER** key.



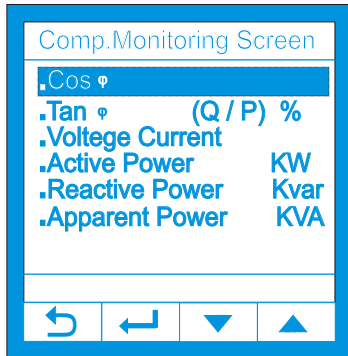
To enter Compensation Control Menu, press Compensation key at the Start-up screen.



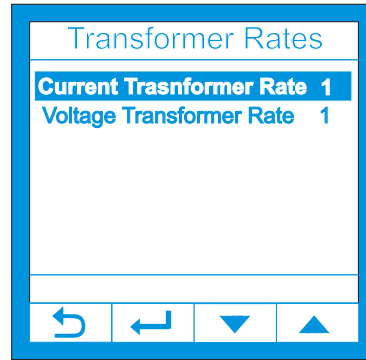
3-2 For MAN Compensation : Choose MAN option by using **DOWN** key and then press **ENTER**.



Choose Comp. Monitoring Screen by using **UP** and **DOWN** keys on the apparent screen.

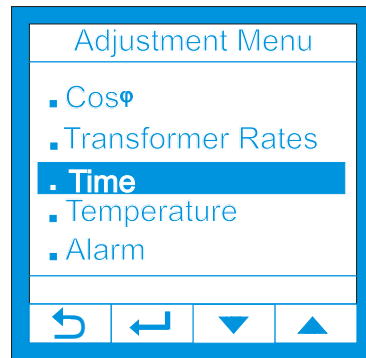


Choose **Comp.** Monitoring Screen by using **UP** and **DOWN** keys on the apparent screen. Then press **ENTER**.



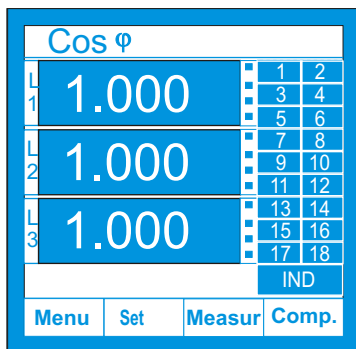
Press **ENTER** key to fix Current Transformer Rate. Then press **ENTER**. Then adjust the adjusted value by using **UP** and **DOWN** keys. It can be made the same steps to adjust Voltage Transformer Rate.

1-3 Time Adjustment

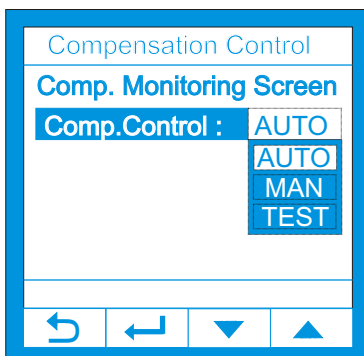


Press **ENTER** to change the Time adjustments.

3- COMPENSATION CONTROL



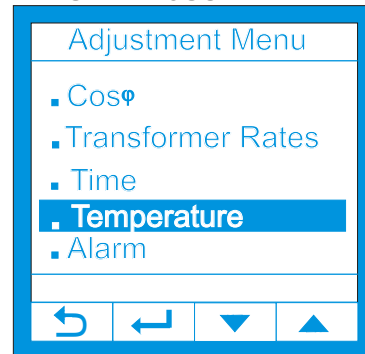
Enter the Compensation Control Menu by using **Comp.** Key at the Start-up screen.



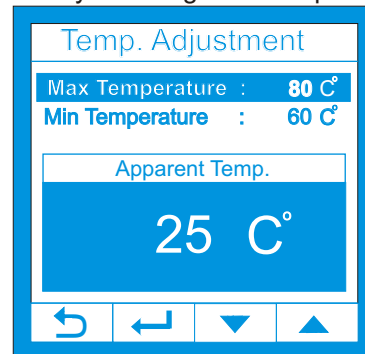
3-1

FOR AUTO COMPENSATION : Choose **AUTO** option by using **DOWN** key and press **ENTER** key.

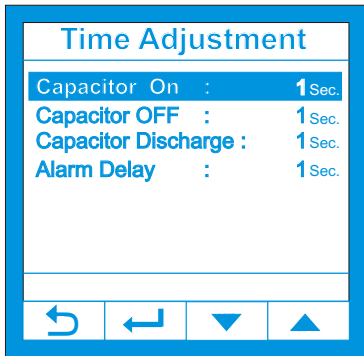
1-4 TEMPERATURE ADJUSTMENT



Press **ENTER** key to change the Temperature adjustments



Press **ENTER** key to adjust Max. Temperature limit. Find the adjusted value by using **UP** and **DOWN** keys and press **ENTER**. To go back Adjustment Menu, press **BACK** key. To change Min. Temperature limit, use the same steps. (The enviroment temperature is shown as digital on the screen)

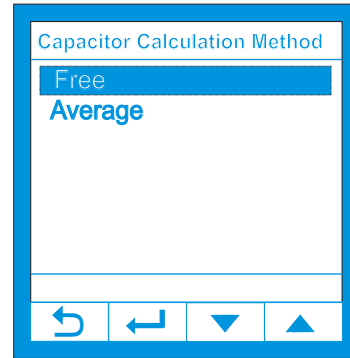


Press **ENTER** key to change Capacitor ON time. Enter the adjusted time by using **UP** or **DOWN** keys and press **ENTER**.

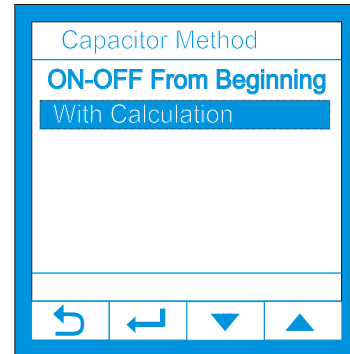
Capacitor ON time can be adjusted between 1sec and 500sec.

To go back Adjustment menu press **BACK** key.

It can be used the same steps to change Capacitor OFF, Capacitor Discharge and Alarm Delay times.

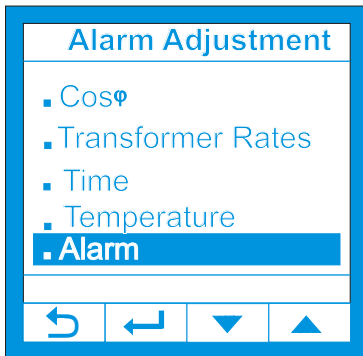


Choose Capacitor Calculation Method by using **UP** and **DOWN** keys at opened screen, then press **ENTER**.

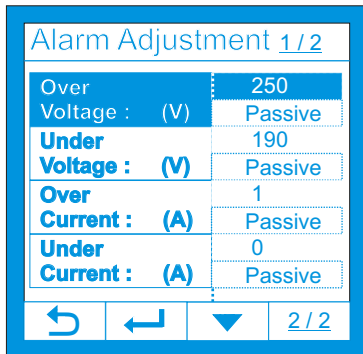


Choose Capacitor Method by using **UP** and **DOWN** keys on opened screen. Then press **ENTER**.

1-5 ALARM ADJUSTMENT



Press **ENTER** key to change Alarm adjustments.

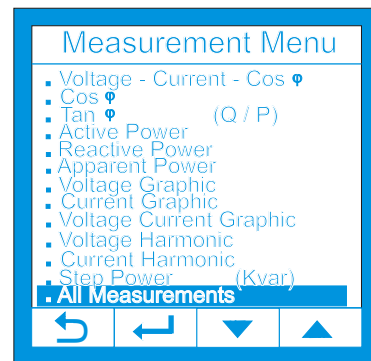


To change Over Voltage Limit, press **ENTER**. Find the value by using **UP** and **DOWN** keys.

Press **ENTER** to fix the adjusted value.

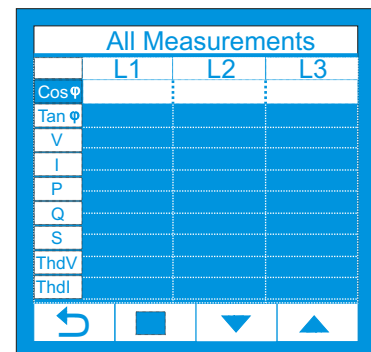
Choose ACTIVE/PASSIVE by using **UP** and **DOWN** keys. Then press **ENTER**.

It is possible to see other alarms as well, if it is pressed 2/2 key.

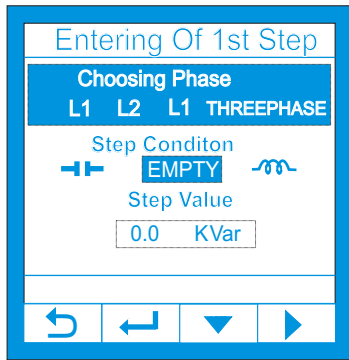


2-13

All Measurements : Choose All Measurements option to see all measurements by using **DOWN** key. Press **ENTER**.

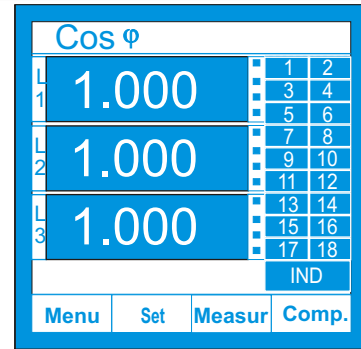


It is monitored all measurements on the opened screen and it can be stopped by using **HOLD** key. The device shows normal measurement mode, when it is pressed **PLAY** key.

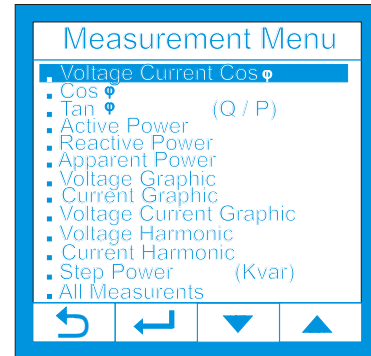


Choose Choosing Phases by using **RIGHT** key on the opened screen.
 Choose Step Condition by using **RIGHT** key and press **DOWN** key.
 Press **ENTER** to fix the Step Value.
 Enter the adjusted value by using **UP** and **DOWN** keys. Then press **ENTER**.
 Press **BACK** key to go to any menu.
 (19th step is the output of shunt reactor)

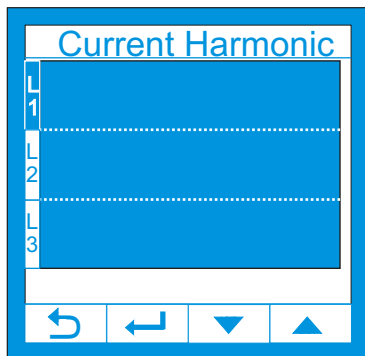
2- POWERS OF MEASUREMENT AND STEP



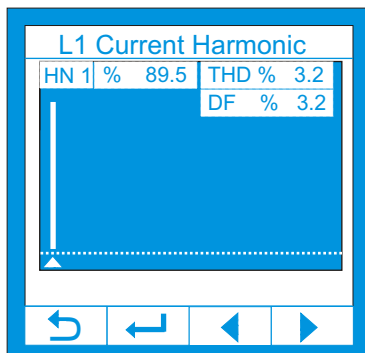
Enter the Measurement Menu by using Measurement key at the Start-up screen.



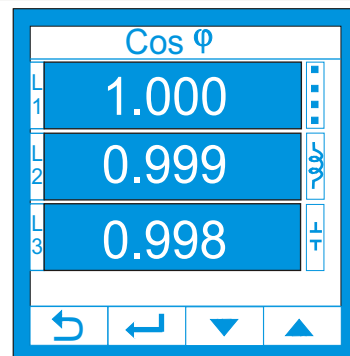
2-1 Press **ENTER** key to see Voltage Current - Cos ϕ measurements.



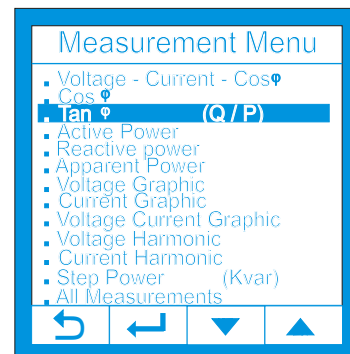
It can be seen current harmonics belong to L1,L2,L3 phases on the opened screen. To see each phase as full screen as harmonic and total harmonic values, choose **DOWN** key L1,L2,L3 phases which are left side of the screen. Then press **ENTER** key.



It can be seen after how many harmonics and total harmonic on the opened screen. It can be changed values from 1st to 32nd harmonics by using **RIGHT** and **LEFT** keys.



Cos ϕ
 It can be seen immediate Cos ϕ values belong to L1,L2,L3 phases on the opened screen. It can be seen the system is End. or Cap. from indicator at right side of the Cos ϕ screen. Press **BACK** key to go back the Measurement Menu.



2-3
 To observe the Tan ϕ values, come to Tan ϕ option by using **DOWN** key and press **ENTER** key.

Voltage - Current - Cos φ			
L1	220 . 6 V	18 . 2 A	0.999
L2	222 . 0 V	16 . 5 A	0.999
L3	221 . 7 V	17 . 6 A	0.998

It can be seen the immediate Voltage Current - Cos φ values belong to L1,L2,L3 phases at the Voltage Current - Cos φ screen. Also it can be seen the reactive power is Ind. or Cap at that moment. Press **BACK** key to go back to Measurement Menu.

Measurement Menu	
Voltage - Current - Cos φ	
Cos φ	
Tan φ (Q / P)	
Active Power	
Reactive power	
Apparent Power	
Voltage Graphic	
Current Graphic	
Voltage Current Graphic	
Voltage Harmonic	
Current Harmonic	
Step Power (Kvar)	
All Measurements	

2-2 To observe Cos φ values, open the Cos φ option by using **DOWN** key and press **ENTER** key.

Measurement Menu	
Voltage - Current - Cos φ	
Cos φ	
Tan φ (Q / P)	
Active Power	
Reactive power	
Apparent Power	
Voltage Graphic	
Current Graphic	
Voltage Current Graphic	
Voltage Harmonic	
Current Harmonic	
Step Power (Kvar)	
All Measurements	

2-12

Step Power :Find the Step Power option to see and to change Step Power by using **DOWN** key. Then press **ENTER** key.

Step Power (Kvar)			
	L1	L2	L3
Q 1			
Q 2			
Q 3			
Q 4			
Q 5			
Q 6			
Q 7			
Q 8			
Q 9			
Q 10			

It can be checked the steps till 19th step by using **UP** and **DOWN** keys on the opened screen and it can be seen which phase they are belong to.

To change values, choose related step by using **UP** or **DOWN** keys and press **ENTER**.

Tan φ (Q/P)	
L1	0 %
L2	1.6 %
L3	1.2 %

It can be seen immediate Tan φ values belong to L1,L2,L3 phases on apparent screen and it can checked system is END. or CAP. at the right side of screen. To go back Measurement Menu, press **BACK** key.

Measurement Menu	
Voltage - Current - Cos φ	
Cos φ	
Tan φ (Q / P)	
Active Power	
Reactive power	
Apparent Power	
Voltage Graphic	
Current Graphic	
Voltage Current Graphic	
Voltage Harmonic	
Current Harmonic	
Step Power (Kvar)	
All Measurements	

2-4

Active Power:
To observe Active Power values, open Active Power option by using **DOWN** key. Press **ENTER**.

L1 Voltage Harmonic			
HN 1 %	89.5	THD %	3.2
		DF %	3.2

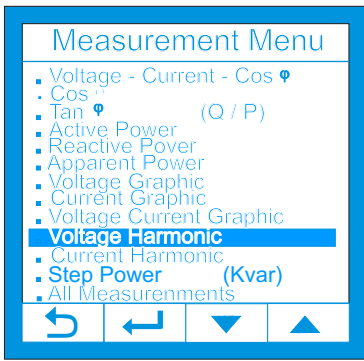
It can be checked after how many harmonic and total harmonic values.

It can be changed values from 1st to 32nd harmonic by using **RIGHT** and **LEFT** keys.

Measurement Menu	
Voltage - Current - Cos φ	
Cos φ	
Tan φ (Q / P)	
Active Power	
Reactive power	
Apparent Power	
Voltage Graphic	
Current Graphic	
Voltage Current Graphic	
Voltage Harmonic	
Current Harmonic	
Step Power (Kvar)	
All Measurements	

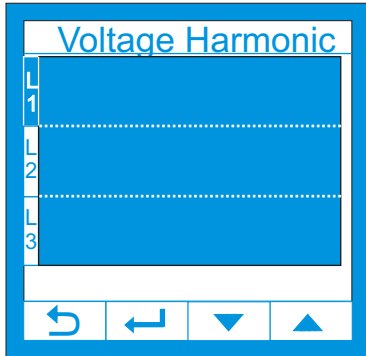
2-11

Current Harmonic :To check Current Harmonics, choose Current Harmonic option by using **DOWN** key and press **ENTER**.



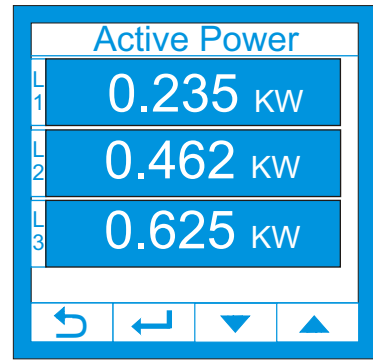
2-10

To see Voltage Harmonic, choose Voltage Harmonic option by using **DOWN** key. Then press **ENTER**.

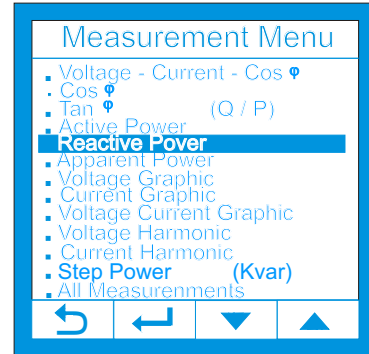


It can be checked Voltage Harmonics belong to L1,L2,L3 phases.

To checked harmonic and total harmonic of each phase on the full screen, choose L1,L2,L3 options at the left side of the screen by using **DOWN** key and press **ENTER**.



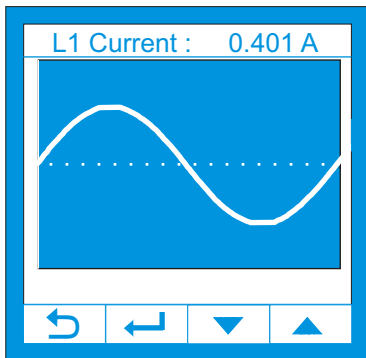
It can be checked immediate Active Power values which belong to L1,L2,L3 phases on the related screen. To go back Measurement Menu, press **BACK** key.



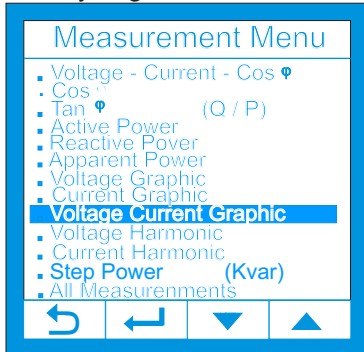
2-5

Reactive Power :To observe reactive power values, open Reactive Power option by using **DOWN** key. Press **ENTER**.

Select using and then press ENTER.



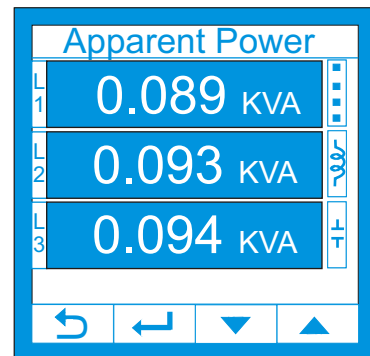
Press **BACK** key to go back to Measurement Menu.



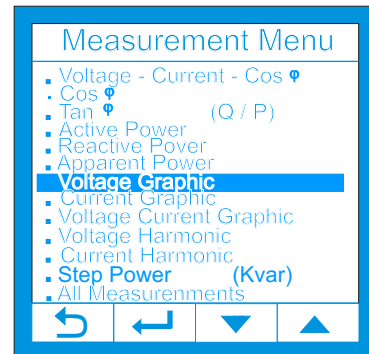
2-9

Voltage Current Graphic :

To check voltage current graphic which belong to L1,L2,L3 phases separately and as full screen, choose Voltage Current Graphic option by using **DOWN** key. Then press **ENTER**.



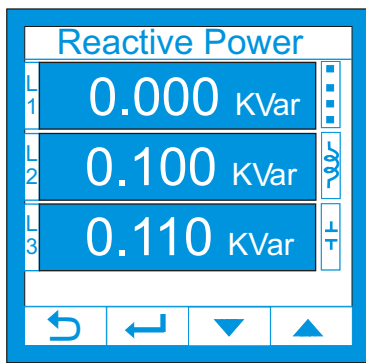
It can be checked immediate Apparent Power values which belong to L1,L2,L3 phases on the Apparent Power option. To go back to Measurement Menu, press **BACK** key.



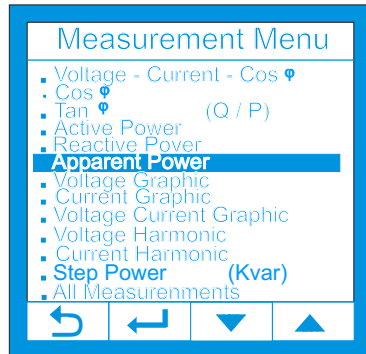
2-7

Voltage Graphic :

To see voltage graphics belong to L1,L2,L3 phases on the system, find Voltage Graphic option by using **DOWN** key. Then press **ENTER**.



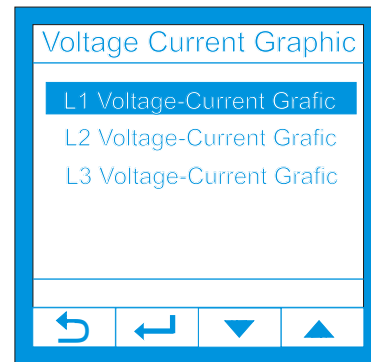
It can be checked immediate Active Power values belong to L1,L2,L3 phases in the system.
It can be checked reactive power type END or CAP belong to each phase by using the indicators at the right side of the screen. Press **BACK** key to go back measurement menu.



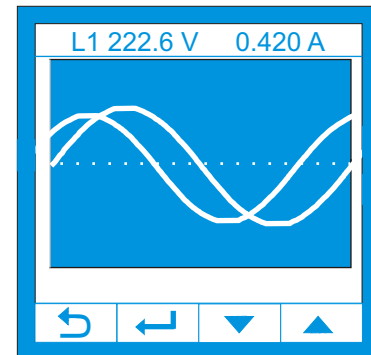
2-6

Apparent Power :

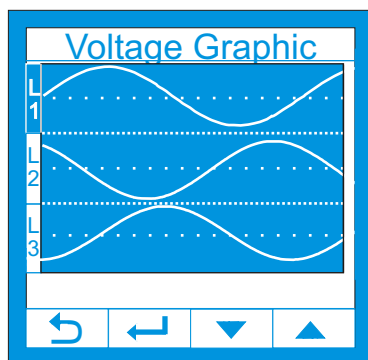
To observe the power values used in the system, find Apparent Power option by using **DOWN** key. Then press **ENTER**.



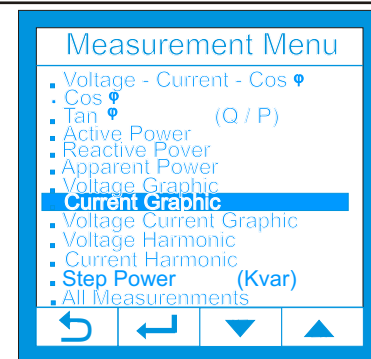
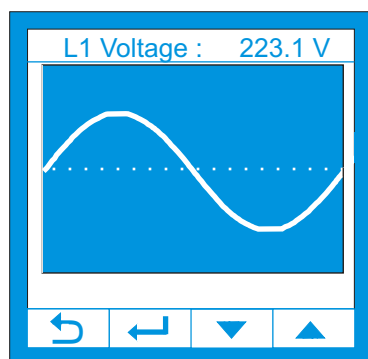
Choose the adjusted option which to be seen by using **UP** or **DOWN** keys from " Voltage Current Graphic" screen and press **ENTER**.



It can be seen Voltage and Current graphics on the opened screen.

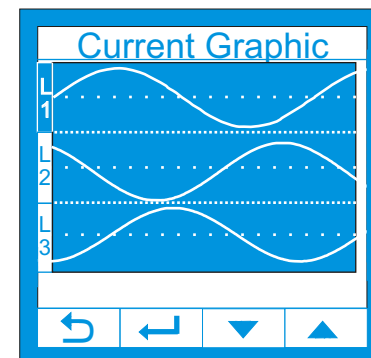


Voltage Graphic : It is seen Voltage graphics belong to L1,L2,L3 phases on the opened screen.
To monitor Voltage graphics and Voltage values belong to L1,L2,L3 phases at the left side of the screen as full screen, choose it by using **DOWN** key and press **ENTER**.
To go back to Measurement Menu, press **BACK** key.



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Current Graphic : To see the Current graphics belong to L1,L2,L3 phases at the system, choose Current Graphic option by using **DOWN** key and press **ENTER**.



Current Graphic : It is seen the Current graphics belong to L1,L2,L3 phases on the opened screen.
To monitor the Current Graphics and the Current values at the left side of the screen as full screen, choose it by using **DOWN** key and press **ENTER**.