



# User Guide

## PQM-1000s

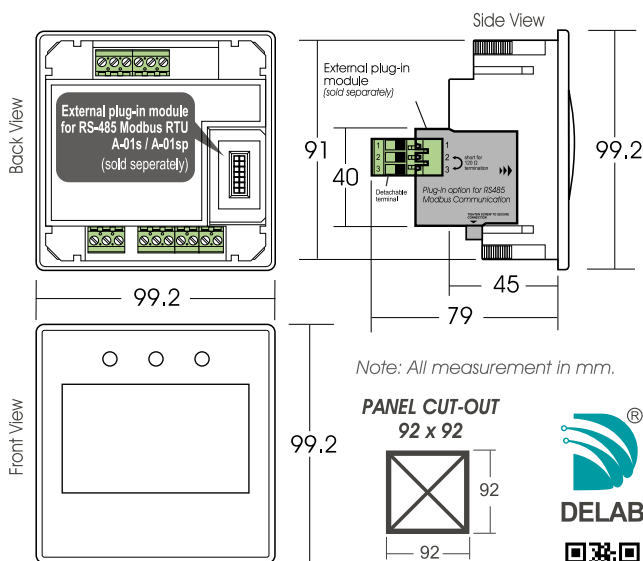
Digital Power Quality Network Analyzer

### features

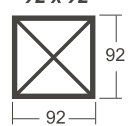
- True RMS Measurement
- Waveform Display for Voltage and Current
- Graphical Phasor Display
- Harmonics Spectrum Bar Graph Display
- 4 Quadrant Energy Measurement
- Demand for kW, kVA and Ampere (Max, Previous, Rolling)
- Info / Event Summary Page Display
- Phase Supply LED Indicator
- Phase Rotation Indication

Complies with:  
IEC 60255-27-Clause 10.6.4.2 / 4.3 ; EN 61326-1  
External Plug-in Module for RS-485 Modbus RTU  
Model: A-01s / A-01sp (isolated type)

### Casing Dimension



PANEL CUT-OUT  
92 x 92

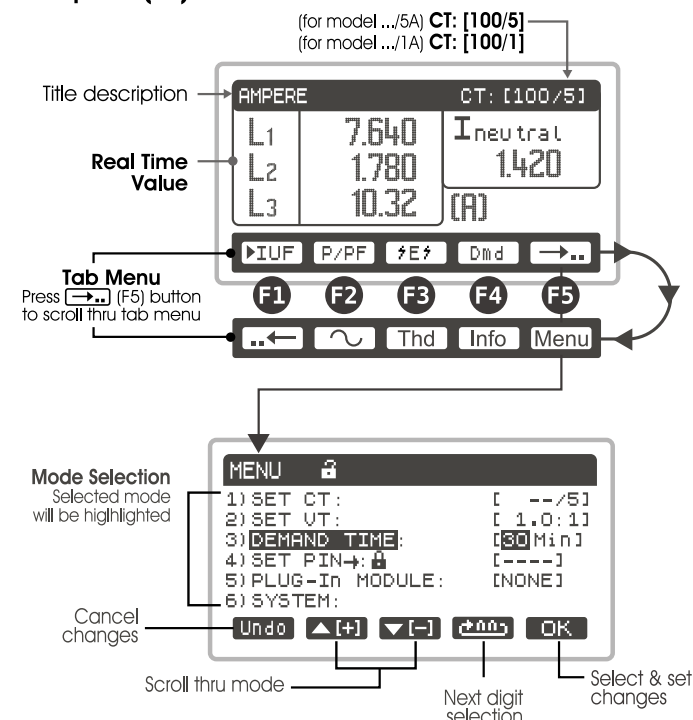


Note: Specification subject to change without prior notification (please visit [www.delab.com.my](http://www.delab.com.my) for latest specification)

## Menu Page

Set CT, VT, Demand Time, Pin Lock, Plug-in Module & System

At Home page:  
Press **[→]** (F5 button) to scroll thru tab menu for **[Menu]** tab then press (F5) button to enter Menu mode.



### Setting Range

1) Set CT Primary	0 ~ 10,000 / 5 (A) : For model CT.../5A 0 ~ 4,000 / 1 (A) : For model CT.../1A
2) Set VT	1.0 ~ 2500.0 : 1
3) Set Demand Time	10 ~ 60 mins
4) Set Pin Lock	0000 ~ 9999 (4 digits)
5) Plug-In Module	None or A-01 (RS-485 Modbus RTU) Address : 1 ~ 247 Baud rate : 0.3 ~ 38.4 kbps Parity : None / Odd / Even (press SAVE)
6) System (->press OK)	Backlit : Auto / 1~7 Contrast : 0 ~ 15 Phase Fail LED : Flash / Off Factory Reset : Yes / No

Note : All modes exit automatically if left untouched for more than 20 secs.

### Technical Data

#### Aux Power Supply

Model (220a) : 65~275 Vac, 90~300 Vdc  
Model (024d) : 18~72 Vdc  
Consumption : < 3VA

#### Current Measurement

AC Input Range : 0.005~6.500 A  
Accuracy : ± 0.5 %  
CT Range : 0~10,000 / 5A  
0~4,000 / 1A  
Burden : < 0.1 VA at 5A

#### Voltage Measurement

AC Input Range : 0~300 VLN  
0~500 VLL  
Accuracy : ± 0.5 %  
VT Range : 1.0 ~ 2500.0:1

#### Power Measurement

W, VAR, VA, PF, Cos φ  
Accuracy : ± 1.0 %

#### Frequency Measurement

Range : 45~65 Hz  
Accuracy : ± 0.1 %

#### Energy Measurement (4 Quadrant)

Range : 0.0 ~ 9,999,999,999.9 (kWh, kVAh, kVAh)

#### Network Type

3P4W, 3P3W, 3P3W (ARON) & 1P2W

#### Display Type

Graphical LCD with white LED backlight

#### Mechanical

Operating Temp. : -5°C ~ +55°C  
IP Rating : IP54 (front panel)  
Installation : Panel flush mount  
Dimension (mm) : 99.2(h) x 99.2(w) x 45(d)  
Weight : approx. 310 gram

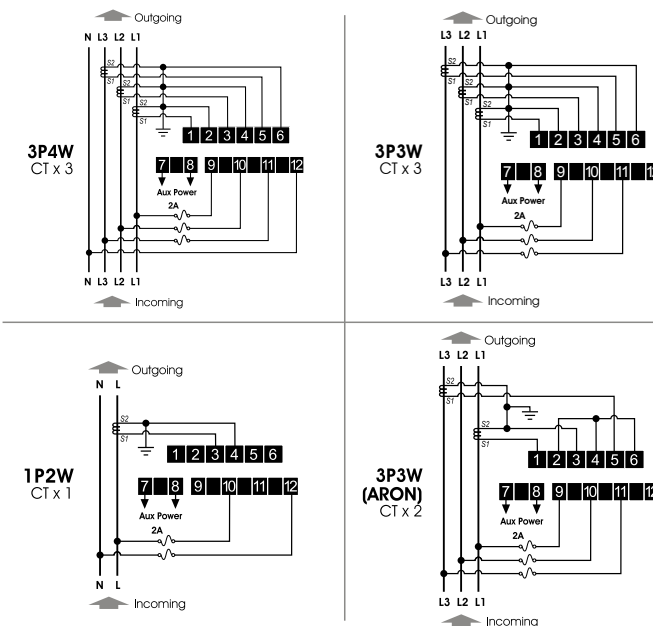
#### Communication

A-01s / A-01sp Plug in module  
Modbus RTU RS-485 (isolated type)

Selectable address: 1~247

Selectable baud rate (kbps):  
0.3, 0.6, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4  
Selectable parity: None / Odd / Even

### Wiring



## ▶ IUF Default Home Page - Ampere Page

AMPERE		CT: [100/5]
L1	7.640	I <sub>neutral</sub> (A)
L2	1.780	
L3	10.32	

### Default Home Page (AMPERE PAGE)

Select by pressing the corresponding button to view :

F1 - Voltage (L-N) ▶ F1 - Voltage (L-L)

Press (F1) button to view **VOLTAGE (L-N)** page

VOLTAGE (L-N)		Asymmetry
L1	243.4	2.3%
L2	244.4	
L3	245.3	

Press (F1) button to view **VOLTAGE (L-L)** page

Phase Rotation Indication

VOLTAGE (L-L)		Freq (Hz)
L1-2	422.4	50.00
L2-3	424.7	
L3-1	424.4	

Press (F1) button to view **AMPERE** page

Press (F1) button to view **AMPERE** page

## P/FF Power Parameters - kW, kVar, kVA, PF, cosφ

POWER [kW]		Σ(kW)
L1	240.87	729.03
L2	243.81	
L3	244.35	

At Default Home Page, press (F2) button to view **Power Parameters** page.

Select by pressing the corresponding button to view :

F2 - kW F3 - kVar F4 - kVA  
F5 - Power Factor ▶ F5 - cos φ

POWER [kVar]		Σ(kVar)
L1	112.80	91.020
L2	212.40	
L3	43.020	

POWER [kVA]		Σ(kVA)
L1	269.82	763.05
L2	244.76	
L3	248.46	

POWER FACTOR		PFavg
L1	0.972	0.965
L2	0.860	
L3	0.979	

Press (F1) button to return to previous tab menu

COS (φ)		COS φ avg
L1	0.906	0.992
L2	0.996	
L3	0.985	

## ⚡ Energy Parameters - kWh, kVarh, kVAh

ENERGY [kWh]	
E <sub>imp</sub>	0,000,000,388.1
E <sub>exp</sub>	0,000,000,172.9

At Default Home Page, press (F3) button to view **Energy Parameters** page.

Select by pressing the corresponding button to view :

F2 - kVarh F3 - kWh F4 - kVAh

Import Energy  
Export Energy

ENERGY [kVarh]	
E <sub>(h)</sub>	0,000,000,354.1
E <sub>(c)</sub>	0,000,000,276.3

Press (F1) button to return to previous tab menu

Inductive Energy  
Capacitive Energy

ENERGY [kVAh]	
E <sub>app</sub>	0,000,000,223.8

Apparent Energy

## ⏱ Demand Parameters for kW, kVA & Ampere (Max, Rolling, Previous)

At Default Home Page, press (F4) button to view **Demand Parameters** page.

Select by pressing the corresponding button to view.

F2 - kVA ▶ F2 - I (A) ▶ F2 - kW  
F3 - Roll ▶ F3 - Previous ▶ F3 - Max  
F4 - 0.0 (Reset / Restart Demand)

	Maximum Demand	Rolling Demand	Previous Demand
<b>kW</b>	L1: 321.16 Σ(kW) L2: 325.08 Σ(kW) L3: 325.80 (kW) Max Demand	L1: 419.40 Σ(kW) L2: 43.234 Σ(kW) L3: 45.548 (kW) Rolling Demand	L1: 321.16 Σ(kW) L2: 325.08 Σ(kW) L3: 325.80 (kW) Prev Demand
<b>kVA</b>	L1: 359.76 Σ(kVA) L2: 326.32 Σ(kVA) L3: 331.28 (kVA) Max Demand	L1: 79.777 Σ(kVA) L2: 74.850 Σ(kVA) L3: 76.668 (kVA) Rolling Demand	L1: 359.76 Σ(kVA) L2: 326.32 Σ(kVA) L3: 331.28 (kVA) Prev Demand
<b>I (A)</b>	L1: 2.184k I <sub>avg</sub> L2: 2.166k I <sub>avg</sub> L3: 2.185k (A) Max Demand	L1: 11.78 I <sub>avg</sub> L2: 11.16 I <sub>avg</sub> L3: 11.42 (A) Rolling Demand	L1: 1.600k I <sub>avg</sub> L2: 1.457k I <sub>avg</sub> L3: 1.470k (A) Prev Demand

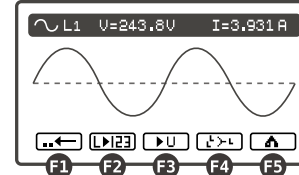
To reset **Max Demand** / To restart **Rolling Demand**  
Press (F2) button to select page (kVA / I (A) / kW)

	Max Demand (kW)	Rolling Demand (kW)
L1	HOLD FOR 3.0 SEC TO RESET MAX DEMAND	HOLD FOR 3.0 SEC TO RESTART DEMAND
L2	325.08 (kW) Max Demand	45.548 (kW) Rolling Demand
L3	325.80 (kW) Max Demand	45.548 (kW) Rolling Demand

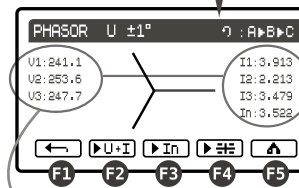
Press (F2) to select kVA page

Press (F3) button to view Rolling Demand

## ~ Voltage & Ampere Waveform Page



F1 (←): Back to previous tab menu  
F2 (▶): Scroll thru L1, L2, L3 phase  
F3 (↔): To switch view between : Voltage only, Ampere only or Voltage & Ampere simultaneously for the selected phase  
F4 (⏏): To view **Phasor diagram**  
F5 (⏠): To Home page



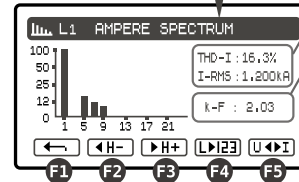
F1 (←): Back to previous page  
F2 (U+I): To switch view between : Voltage only ; Ampere only ; Voltage & Ampere  
F3 (In): **I neutral Phasor** Press & hold (F3) button  
F4 (≡): **Phasor Angle Definition** Press & hold (F4) button  
F5 (⏠): To Home page

Alternate between RMS value and Phase Angle value every 3 seconds

## Thd Total Harmonic Distortion Page

	[U]	[A]
L1	1.7%	16.3%
L2	0.5%	2.0%
L3	0.8%	5.0%

F1 (←): Back to previous tab menu  
F2 (←H) / F3 (H+): Scroll thru **Odd Harmonic Spectrum** to select 1st ~ 31st Harmonics spectrum  
F4 (⏏): To display **Spectrum Bar Graph**  
F5 (⏠): To Home page



Selected Phase info  
k factor for selected Phase current  
F1 (←): Back to previous page  
F2 (←H) / F3 (H+): Scroll thru **Odd Harmonic Spectrum** to select 1st ~ 31st Harmonics spectrum  
F4 (▶): To switch view between : Voltage or Ampere Spectrum Bar Graph  
F5 (↔): To switch view between : Voltage or Ampere Spectrum Bar Graph

## Info Device Info Page

Clear Min/Max : Press (F4) CLR Min / (F5) CLR Max to clear recorded value. Value will also be clear when the device is power ON

Press (F3) to view Voltage Info

VIP INFO		U	A	kW	PF
L1:	244.5	80.22	16.062	0.893	
L2:	244.8	81.53	16.196	0.996	
L3:	245.0	82.21	16.244	0.964	
FREQ:	50.00MHz	0	48.502	0.965	

Press (F3) : Ampere Info

VOLTAGE INFO		U <sub>1</sub>	U <sub>2</sub>	U <sub>3</sub>	U <sub>avg</sub>	U <sub>max</sub>
U1:	244.5	391.1	225.4	225.4	225.4	
U2:	244.8	391.3	225.2	225.2	225.2	
U3:	245.0	392.4	225.7	225.7	225.7	
U <sub>0</sub> :	0.1V	0.1V	0.1V	0.1V	0.1V	
Max Elapsed (hh:mm:ss):	00:03:18					

Press (F3) : THD Voltage Info

AMPERE INFO		A	I-Min	I-Max	Last-DMD
I1:	1.200k	1.200k	1.200k	225.4	0.000
I2:	1.093k	1.093k	1.093k	225.2	0.000
I3:	1.102k	1.102k	1.102k	225.7	0.000
I <sub>0</sub> :	0.1V	0.1V	0.1V	0.1V	0.000
Max Elapsed (hh:mm:ss):	00:05:18				

Press (F3) : THD Ampere Info

THD VOLTAGE INFO		THD	Min	Max
L1:	1.7%	1.7%	1.7%	1.7%
L2:	0.5%	0.5%	0.5%	0.5%
L3:	0.8%	0.8%	0.8%	0.8%
Max Elapsed (hh:mm:ss):	00:10:18			

Press (F3) : kW Info

THD AMPERE INFO		THD	Min	Max
L1:	1.7%	1.7%	1.7%	1.7%
L2:	0.5%	0.5%	0.5%	0.5%
L3:	0.8%	0.8%	0.8%	0.8%
Max Elapsed (hh:mm:ss):	00:10:18			

Highlighted value is the max value.

Display elapsed time on Max value:  
hh : mm : ss /  
dd : hh : mm /  
> 100 days

Model  
Version  
Operation Hour Shows the total operated hours of device

DEVICE INFO	
PQM	1000S
VER	1.0.08
OPHR	0,000,015.22

Whenever Current Energy values are factory reset or overflow, these values will be stored here.

Prev Reset ENERGY	
IMPORT:	0,000,000,097.6 kWh
EXPORT:	0,000,000,000.0 kWh
IND:	0,000,000,018.2 kVarh
CRP:	0,000,000,005.8 kVarh
APPARENT:	0,000,000,007.8 kVAh

Press (F3) : Device Info

Current ENERGY	
IMPORT:	0,000,000,097.6 kWh
EXPORT:	0,000,000,000.0 kWh
IND:	0,000,000,018.2 kVarh
CRP:	0,000,000,005.8 kVarh
APPARENT:	0,000,000,007.8 kVAh

Press (F3) : Previous Reset Energy

kW INFO				
P1:	16.062	16.062	16.062	16.062
P2:	16.196	16.196	16.196	16.196
P3:	16.244	16.244	16.244	16.244
DP:	48.502	48.502	48.502	48.502

Press (F3) : Current Energy Info

kW INFO				
P1:	16.062	16.062	16.062	16.062
P2:	16.196	16.196	16.196	16.196
P3:	16.244	16.244	16.244	16.244
DP:	48.502	48.502	48.502	48.502

To view start up display logo