

PA-300

THREE PHASE POWER ANALYZER



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| MEASUREMENT PROPERTY | EACH PHASE | 3 PHASE | RANGE | ACC. |
|--|-------------------|----------------|---|--------------|
| • RMS VOLTAGE | ✓ | | 1-255 VAC | %1 ± 1Dgt. |
| • RMS CURRENT | ✓ | | 10 - 5000 mA, 1 - 5000 AAC | %1 ± 2Dgt. |
| • REAL POWER | ✓ | | 0.100-999 W, 0.1- 999 kW | %1.5 ± 1Dgt. |
| • REACTIVE POWER | ✓ | | 0.100-999 VAr, 0.1- 999 kVAr | %1.5 ± 1Dgt. |
| • APPARENT POWER | | ✓ | 0.100-999 VA, 0.1- 999 kVA | %1.5 ± 1Dgt. |
| • TOTAL REAL POWER | | ✓ | 1-9999 W , 1- 9999 kW | %1.5 ± 1Dgt. |
| • TOTAL REACTIVE INDUCTIVE POWER | | ✓ | 1-9999 VAr , 1- 9999 kVAr | %1.5 ± 1Dgt. |
| • TOTAL REACTIVE CAPACITIVE POWER | | ✓ | 1-9999 VAr , 1- 9999 kVAr | %1.5 ± 1Dgt. |
| • TOTAL APPARENT POWER | | ✓ | 1-9999 VA , 1- 9999 kVA | %1.5 ± 1Dgt. |
| • FREQUENCY | | L1 | 40 - 75 Hz | %0.1 ± 1Dgt. |
| • POWER FACTOR | | ✓ | CAP 0.00-1.00 , IND0.00-1.00 | %1 ± 2Dgt. |
| • AVG. POWER FACTOR (UNBALANCED SYST.) | | ✓ | CAP 0.00-1.00 , IND0.00-1.00 | %1 ± 2Dgt. |
| • APPARENT POWER METER | | ✓ | 9999999 VAh 9999999 kVAh | |
| • REAL POWER METER | | ✓ | 9999999 Wh , 9999999 kWh | |
| • REACTIVE INDUCTIVE POWER METER | | ✓ | 9999999 VArh , 9999999 kVArh | |
| • REACTIVE CAPACITIVE POWER METER | | ✓ | 9999999 VArh , 9999999 kVArh | |
| • ODO REAL POWER METER | | ✓ | 9999 Wh , 9999 kWh | |
| • ODO REACTIVE INDUCTIVE POWER METER | | ✓ | 9999 VArh , 9999 kVArh | |
| • ODO REACTIVE CAPACITIVE POWER METER | | ✓ | 9999 VArh , 9999 kVArh | |
| • ODO TIME COUNTER | | | 0 - 99 HOUR | |
| • HIGH CURRENT ALARM OUT | | ✓ | 10-5000mA, 2- 5000 A DELAY:0.5-9.5 sec. | |
| • HIGH VOLTAGE ALARM OUT | | ✓ | 220 - 255 V DELAY:0.5-9.5 sec. | |
| • LOW VOLTAGE ALARM OUT | | ✓ | 2-220 V DELAY:0.5-9.5 sec. | |
| • PHASE SEQUENCE CONTROL | | ✓ | | |
| • CURRENT-VOLTAGE INPUT CONTROL | | ✓ | | |
| • RS- 485 SERIAL OUTPUT | | | Max 1 Km (with repeater up 1 Km) | |
| • WINDOWS 95&98 SOFTWARE | | | Graphic and ACCESS data base | |
| • REAL TIME CLOCK & DATE | | | | |

INTRODUCTION

PA-300 , 3 - phase analyzer device measures many of electrical values on an electric distribution center that supplies high voltage – low voltage , high current control outputs . Also available sending data to computer via RS-485 serial output port which gives you chances to save and report of measured values.

FEATURES

- You may see bellow measured values by the 4*20 lighted LCD screen
- Dimention is DIN 43700 144*144*140
- Membran front panel
- Screen light goes off two minutes later if any push-button not thouched (Power-Save feature)

USING PUSH BUTTONS

There are four push-buttons on front side of the device . These are **F** , **P** , **▲** , **▼** .

F :It is for main menu , total powers and meters .

P :Adjustment menu , viewing alarm delay and meters adjustment menus .

▲ (UP) :Changing bottom line of main menu and increasing the values when adjustment.

▼ (DOWN) :Decreasing the values when adjustment and choosing digits when adjusting meters.

ADJUSTMENTS

When **F** and **P** buttons pressed ten second together , adjustment menus appears and time digits start flashing . Hour adjustment is performed by using up-down buttons and by using **F** button to selecting and adjusting the minutes digitis. Same procedure will apply for date , high voltage , low voltage , current transformer ratio , high current and by using **P** button to choose alarm delay page . In this page voltage and current delay adjustment can be done as above . Passing to meter reset or adjustment page again press **P** button . Difference in this page is to selecting digits by down buttons. By the using **P** button to leave adjustment pages . All settings are memorized and not effected by energy break .

Note : When time meter flashing in the meter reset and adjustment page , rather up or down button can reset the odo time meter and odo meters

RESET

-All values will be reset in the adjustment menu when **▲** and **▼** buttons pressed durings ten seconds together , except meter page . In this case adjustment menu has to be setup again .

-Odo meters will be reset when **▲** and **▼** buttons pressed together in the metter adjustment page

RS 485 TO COMPUTER CONNECTION

Connecting RS 485 comination port on the back side of device to computer makes available all the measured values are watched on WINDOWS 95&98 by specially design program . Also saving measured values to use in future and take print are possible . You need the use RS 485-232 transformer with COM serial port of the computers . Power analyzer can sold with RS 232 comination protocol (Optional) .

PC Settings:

- RS 232 PORT : 19200, n,8,1
- SCREEN : 800X600 PIXEL



INPUTS & OUTPUTS

Following inputs can be found in the connection box on the back side of the Power Analyzer

L1(R) : 1.Phase Max 255 V rms, 100ms 2000 peak, input empedance 1.4 MOHM
L2(S) : 2.Phase Max 255 V rms, 100ms 2000 peak, input empedance 1.4 MOHM
L3(T) : 3.Phase Max 255 V rms, 100ms 2000 peak, input empedance 1.4 MOHM
Mp(N) : Neutral
CT1 : Number 1 internal curent transformer , Max 5 Amper , isolated
CT2 : Number 2 internal curent transformer , Max 5 Amper , isolated
CT3 : Number 3 internal curent transformer , Max 5 Amper , isolated
N : Supply voltage Neutral 220 VAC - %25 , + % 10
L : Supply voltage Phase max 20 mA , 4 W

STORAGE TEMPERATURE : -10 to +50 C

RELATIVE HUMIDITY : < %95

Following outputs can be found in the connection box on the back side of the Power Analyzer

RS 485 OUT : Serial output for PC

Voltage protection : Yüksek ve düşük gerilim için role kontak çıkışı,250 VAC 10 A

Current protection : Yüksek akım için role kontak çıkışı,250 VAC 10 A

NOTE : Current protection output works as a compensation control output on the model of PA-300C

WORKING RULES

2-3 second later device energized screen comes out and it is start to work with the production setups . Device has to be setup again for new working conditions .

For efficient working of the device , PA 300 has belows :

- Device protected to any noise comes from input by filters and opto isolators.
- If the CPU of the device locked , otomatic reset circuit makes CPU come back in five second .
- Device setups memorized (EEPROM) and saved for ten years .
- Device saves the measured time , date , meter values in every minutes . Therefore if the power goes off last saved values will be found in memory .

TIME & DATE

You can see time and date information on the fourth line of the first page of the main menu . If the device is energized time and date counter works normaly , otherwise stops with the last time and date information . When the energy comes back easy to calculate how long energy went off . Time adjustment was explained in the adjustment section .

Year
Month
Day
T & D = 18 : 11 26 / 01 / 2000
Minute
Hour

PHASE SEQUENCE, VOLTAGE AND CURRENT INPUT CONTROL

You can see the input controls on the 4. line of the 1. page of the main menu .

Phase sequence
INPUTS = * * * * * * * * * *

- If L1,L2,L3 Phase Currents Sequentially receiving ,
- If L1,L2,L3 Phase Voltage Sequentially receiving ,
- If Current and Voltage Sequentially connected to the right phase .

NOTE : If all the connections are correct (.) appears , otherwise (*) indicates that some or all connections not correct .

SCREEN MENUS

Device has two menus , these are main menu and adjustment menu . You can see these menus below .

MAIN MENU

| | V | mA A | W kW | VAr kVAr | VA kVA |
|-------|-------------|-------------|---------|-------------|-----------|
| L1(R) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L2(S) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L3(T) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| PF | L 1 - . 9 7 | L 2 + . 9 5 | L 3 | 1 . 0 | |

INPUTS = * * * * *
 0.95 F R E Q. = 5 0 . 1 5 H z
 T & D = 1 8 : 1 1 2 6 / 0 4 / 1 9 9 8

You can read 4 differant value from bottom line of the main menu by using ▲ button . The condition is this page has to selected .

TOTAL POWERS

| | |
|--------|--------------------|
| Σ REAL | PWR = 9 9 9 9 kW |
| Σ IND. | PWR = 9 9 9 9 kVAr |
| Σ CAP. | PWR = 9 9 9 9 kVAr |
| Σ APP. | PWR = 9 9 9 9 kVA |

METERS

| | | |
|--------|-----------------|---------|
| kVAh | = 0 0 0 0 0 0 0 | H = 9 9 |
| kWh | = 0 0 0 0 0 0 0 | 0 0 0 0 |
| kVarhi | = 0 0 0 0 0 0 0 | 0 0 0 0 |
| kVarhc | = 0 0 0 0 0 0 0 | 0 0 0 0 |

To choosing pages of main menu by F button .

ADJUSTMENT MENU

```

*          P R O T E C T I O N          *
T & D = 1 8 : 1 1  2 6 / 0 4 / 1 9 9 8
V h i = 2 3 0   V       V l o = 2 1 0   V
C T   = 5 0 0 0 / 5   I h i = 4 9 9 9 A
    
```

```

* P R O T E C T I O N D E L A Y *
V = 9.5   s e c           I = 0.5   s e c
T X I D = 0 0 1           S S R = 0 0 0
R X I D = 0 0 1           C O N T. = 0 0 4
    
```

MODEL=PA-300S
MODEL=PA-300K

```

k V A h   = 0 0 0 0 0 0 0 >< H = 9 9
k W h     = 0 0 0 0 0 0 0   0 0 0 0
k V A r h i = 0 0 0 0 0 0 0   0 0 0 0
k V A r h c = 0 0 0 0 0 0 0   0 0 0 0
    
```

To choosing pages of adjustment menu by **P** button .

POWER FACTOR MEASUREMENT (PF)

You can see sequentially power factor of L1,L2,L3 phases on the 4. line of the 1. page of main menu .

| | V | mA A | W kW | VAr kVAr | VA kVA |
|-------|-------------|-------------|-----------|-------------|-----------|
| L1(R) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L2(S) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L3(T) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| PF | L 1 - . 9 7 | L 2 + . 9 5 | L 3 1 . 0 | | |

Power factor of the L1,L2,L3 phases

On this table (-) indicates capacitive power , (+) indicates inductive power .

Also you can see AVERAGE POWER FACTOR for the unbalanced loads on the 4. line of the 1. page of the main menu .

Average power factor

0.95 F R E Q . = 5 0 . 1 5 H z

FREQUENCY MEASUREMENT (Hz)

You can see frequency of L1 phase on the 4. line of the 1. page of the main menu .

0.95 F R E Q . = 5 0 . 1 5 H z

Frequency of L1 phase .

VOLTAGE MEASUREMENT (Vrms)

You can find RMS Volt values of three phases on the 1. row of the 1. page of the main menu .
Measrued values are between each phase and neuter .

| | V | mA A | W kW | VAr kVAr | VA kVA |
|-------|-------------|-------------|---------|-------------|-----------|
| L1(R) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L2(S) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L3(T) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| PF | L 1 - . 9 7 | L 2 + . 9 5 | L 3 | 1 . 0 | |

Volt of L3 (T)Phase 1 - 255 Vrms
 Volt of L2 (S) Phase 1 - 255 Vrms
 Volt of L1 (R) Phase 1 - 255 Vrms

CURRENT MEASUREMENT (A,mArms)

You can find RMS Current values of three phases on the 1. row of the 1. page of the main menu .
Each measrued current values belong to each phase .If device has internal current transformer of 5 A
and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a mA .
NOTE : If external current transformer will be used with the device , must not forget CT adjustment .

| | V | mA A | W kW | VAr kVAr | VA kVA |
|-------|-------------|-------------|---------|-------------|-----------|
| L1(R) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L2(S) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L3(T) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| PF | L 1 - . 9 7 | L 2 + . 9 5 | L 3 | 1 . 0 | |

Current of the L3 (T) phase
 1 - 5000 Arms with external current transformer
 10 - 5000 mA rms (CT= 5000/5) with internal current transformer

Current of the L2 (S) phase
 1 - 5000 Arms with external current transformer
 10 - 5000 mA rms (CT= 5000/5) with internal current transformer

Current of the L1 (R) phase
 1 - 5000 Arms with external current transformer
 10 - 5000 mA rms (CT= 5000/5) with internal current transformer

ACTIVE POWER MEASUREMENT(kW,W)

You can find active power values of three phases on the 3. row of the 1. page of the main menu . Each measured kW value belongs to each phase . If device has internal current transformer of 5 A and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a Watt .

NOTE : If external current transformer will be used with the device , must not forget CT adjustment .

| | V | mA A | W kW | VAr kVAr | VA kVA |
|-------|---------|---------|---------|-------------|-----------|
| L1(R) | 2 2 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L2(S) | 2 2 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L3(T) | 2 2 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| PF | L 1 - . | 9 7 | L 2 + . | 9 5 | L 3 1 . 0 |

Active power of the L3 (T) phase

0.1 - 999 kW with external current transformer

0.1 - 999 W (CT= 5000/5) with internal current transformer

Active power of the L2 (S) phase

0.1 - 999 kW with external current transformer

0.1 - 999 W (CT= 5000/5) with internal current transformer

Active power of the L1 (R) phase

0.1 - 999 kW with external current transformer

0.1 - 999 W (CT= 5000/5) with internal current transformer

Also as below you can find total consumption of active power of three phase on the 1. line of the 2. page of the main menu .

| | |
|--------|------------------|
| Σ REAL | PWR=9 9 9 9 kW |
| Σ IND. | PWR=9 9 9 9 kVAr |
| Σ CAP. | PWR=9 9 9 9 kVAr |
| Σ APP. | PWR=9 9 9 9 kVA |

Total consumption of active power of three phase

NOTE: If device has internal current transformer of 5 A and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a W , even written unit on the device kW .

REACTIVE POWER MEASUREMENT (kVAr, VAr)

You can find reactive power values of three phases on the 4. row of the 1. page of the main menu . Each measured kVar value belongs to each phase . If device has internal current transformer of 5 A and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a Var .
NOTE : If external current transformer will be used with the device , must not forget CT adjustment .

| | V | mA A | W kW | VAr kVAr | VA kVA |
|-------|---------|---------|---------|-------------|-----------|
| L1(R) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L2(S) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L3(T) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| PF | L 1 - . | 9 7 | L 2 + . | 9 5 | L 3 1 . 0 |

Reactive power of the L3 (T) phase

0.1 - 999 kVAr with external current transformer

0.1 - 999 VAr (CT= 5000/5) internal current transformer

Reactive power of the L2 (S) phase

0.1 - 999 kVAr with external current transformer

0.1 - 999 VAr (CT= 5000/5) internal current transformer

Reactive power of the L1 (R) phase

0.1 - 999 kVAr with external current transformer

0.1 - 999 VAr (CT= 5000/5) internal current transformer

NOTE: To determine the reactive power if capacitive or inductive , sign of power factor of each phase indicates that moment . If the sign is (-) means capacitive reactive power , other wise (+) inductive reactive power . Also as below you can find total consumption of reactive power of three phases on the 2. and 3.line of the 2. page of the main menu .

| | |
|--------|--------------------|
| Σ REAL | PWR = 9 9 9 9 kW |
| Σ IND. | PWR = 9 9 9 9 kVAr |
| Σ CAP. | PWR = 9 9 9 9 kVAr |
| Σ APP. | PWR = 9 9 9 9 kVA |

Total consumption of capacitive reactive power of three phase

Total consumption of inductive reactive power of three phase

NOTE: If device has internal current transformer of 5 A and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a VAr , even written unit on the device kVAr .

APPARENT POWER MEASUREMENT (kVA,VA)

You can find apparent power values of three phases on the 5. row of the 1. page of the main menu . Each measured kVA value belongs to each phase . If device has internal current transformer of 5 A and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a VA .
 NOTE : If external current transformer will be used with the device , must not forget CT adjustment .

| | V | mA A | W kW | VAr kVAr | VA kVA |
|-------|---------|---------|---------|-------------|-----------|
| L1(R) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L2(S) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| L3(T) | 2 5 5 | 5 0 0 0 | 9 9 9 | 9 9 9 | 9 9 9 |
| PF | L 1 - . | 9 7 | L 2 + . | 9 5 | L 3 1 . 0 |

Apparent power of the L3 (T) phase

0.1 - 999 kVA with external current transformer

0.1 - 999 VA (CT= 5000/5) with internal current transformer

Apparent power of the L2 (S) phase

0.1 - 999 kVA with external current transformer

0.1 - 999 VA (CT= 5000/5) with internal current transformer

Apparent power of the L1 (R) phase

0.1 - 999 kVA with external current transformer

0.1 - 999 VA (CT= 5000/5) with internal current transformer

Also as below you can find total consumption of apparent power of three phases on the 4.line of the 2. page of the main menu .

| | |
|--------|---------------------|
| Σ REAL | PWR = 9 9 9 9 kW |
| Σ IND. | PWR = 9 9 9 9 kVA r |
| Σ CAP. | PWR = 9 9 9 9 kVA r |
| Σ APP. | PWR = 9 9 9 9 kVA |

Total consumption of apparent power of three phase

NOTE: If device has internal current transformer of 5 A and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a VA , even written unit on the device kVA .

METERS

There are 99 hours countable two digit time odo counter , four digit odo meters and seven digit meters in the 3. page of the main menu . When the device powered all counters and meters starts to work . To meet with right results all counters and meters must be reset as explained before in the adjustment menu .

| | | | | |
|-------------|---|---------------|-----|---------|
| k V A h | = | 0 0 0 0 0 0 0 | H = | 9 9 |
| k W h | = | 0 0 0 0 0 0 0 | | 0 0 0 0 |
| k V A r h i | = | 0 0 0 0 0 0 0 | | 0 0 0 0 |
| k V A r h c | = | 0 0 0 0 0 0 0 | | 0 0 0 0 |

Capacitive reactive power meter .
 Inductive reactive power meter.
 Active power meter .
 Apparent power meter. Odo time meter 00 - 99 hours

NOTE: If device has internal current transformer of 5 A and (Current Transformer Ratio) CT=5000/5 , values on the screen comes out as a VAh,Wh, VARhi and VARhc , even written unit on the device kVAh, kWh ,kVARhi and kVARhc .

ALARM AND PROTECTION

Device can use as a high voltage , low voltage , high current protection relay . If one of the phase exceed the setup limits , alarm output relay starts to be active with the setup delay time . When the phase conditions turns normal , alarm output relay goes inactive position . Same time alarm conditions appears on the screen .

| | |
|-----------------------------------|---------------------|
| * P R O T E C T I O N * | |
| T & D = 1 8 : 1 1 | 2 6 / 0 4 / 1 9 9 8 |
| V h i = 2 3 0 V | V l o = 2 1 0 V |
| C T = 5 0 0 0 / 5 | I h I = 4 9 9 9 A |

High current limits 1 - 5000 Arms vey a 10- 5000 mArms
 High voltage limits 200 - 255 Vrms
 Low voltage limits 1 - 220 Vrms

| | |
|---------------------------------|-----------------|
| * D E L A Y S & C O N T R O L * | |
| V = 9 . 5 s e c | COMP = 0 0 0 |
| T X I D = 0 0 1 | SENSOR = 0 0 0 |
| R X I D = 0 0 1 | CONTROL = 0 0 4 |

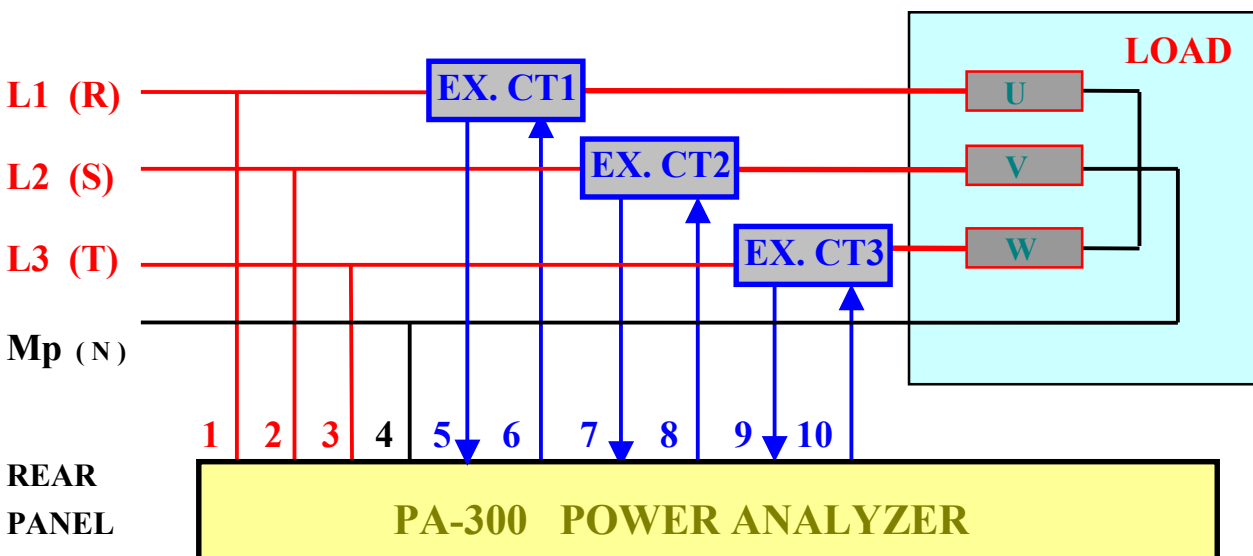
High and low voltage delay time 0.5 - 9.5 second
 Compensation relay delay time for open&close 0.5 - 9.5 second

MODEL=PA-300C
 MODEL=PA-300S
 MODEL=PA-300K

**REAR PANEL
CONNECTION BOX**

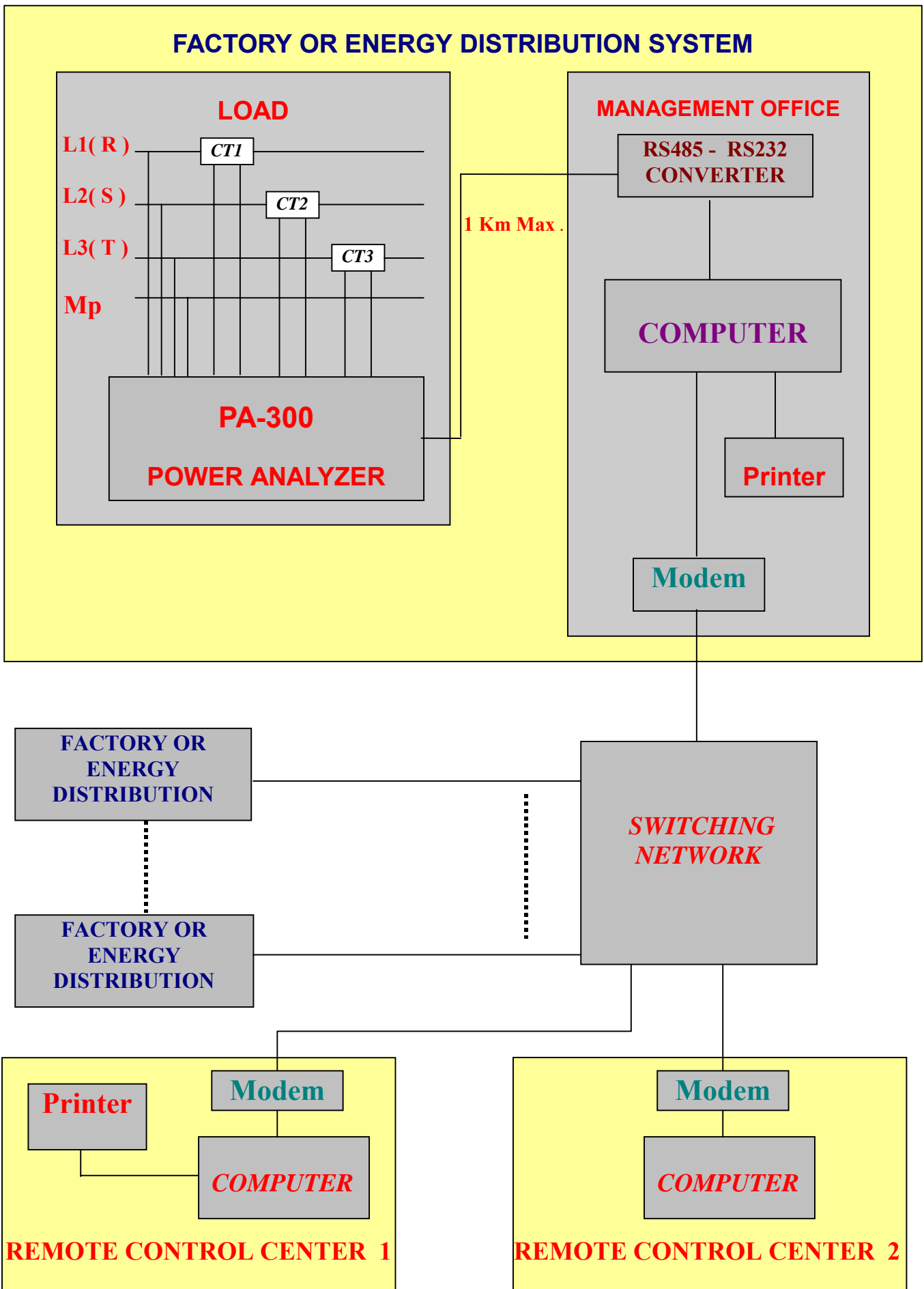
CURRENT TRANSFORMERS RATIO (EX. CT)

| | | |
|-----------|-----------------------------|---|
| 1 | L1 (R) PHASE INPUT | 5/5 |
| 2 | L2 (S) PHASE INPUT | 20/5 |
| 3 | L3 (T) PHASE INPUT | 30/5 |
| 4 | Mp (N) NEUTRAL | 50/5 |
| 6 | I1 CURRENT IN | 60/5 |
| 5 | I1 CURRENT OUT | 75/5 |
| 7 | I2 CURRENT IN | 80/5 |
| 8 | I2 CURRENT OUT | 100/5 |
| 9 | I3 CURRENT IN | 150/5 |
| 10 | I3 CURRENT OUT | 200/5 |
| 11 | N SUPPLY NEUTRAL | 250/5 |
| 12 | L SUPPLY PHASE | 300/5 |
| 13 | NO | COMPENSATION CONT. HIGH CURRENT PROTECTION |
| 14 | COM. 220 V, 10 A | |
| 15 | NC | |
| 16 | NO | HIGH-LOW VOLTAGE PROTECTION |
| 17 | COM. 220 V, 10 A | |
| 18 | NC | |
| 19 | RS - 485 | 2000/5 |
| 20 | OUT | 2500/5 |
| | | 3000/5 |
| | | 4000/5 |
| | | 5000/5 |

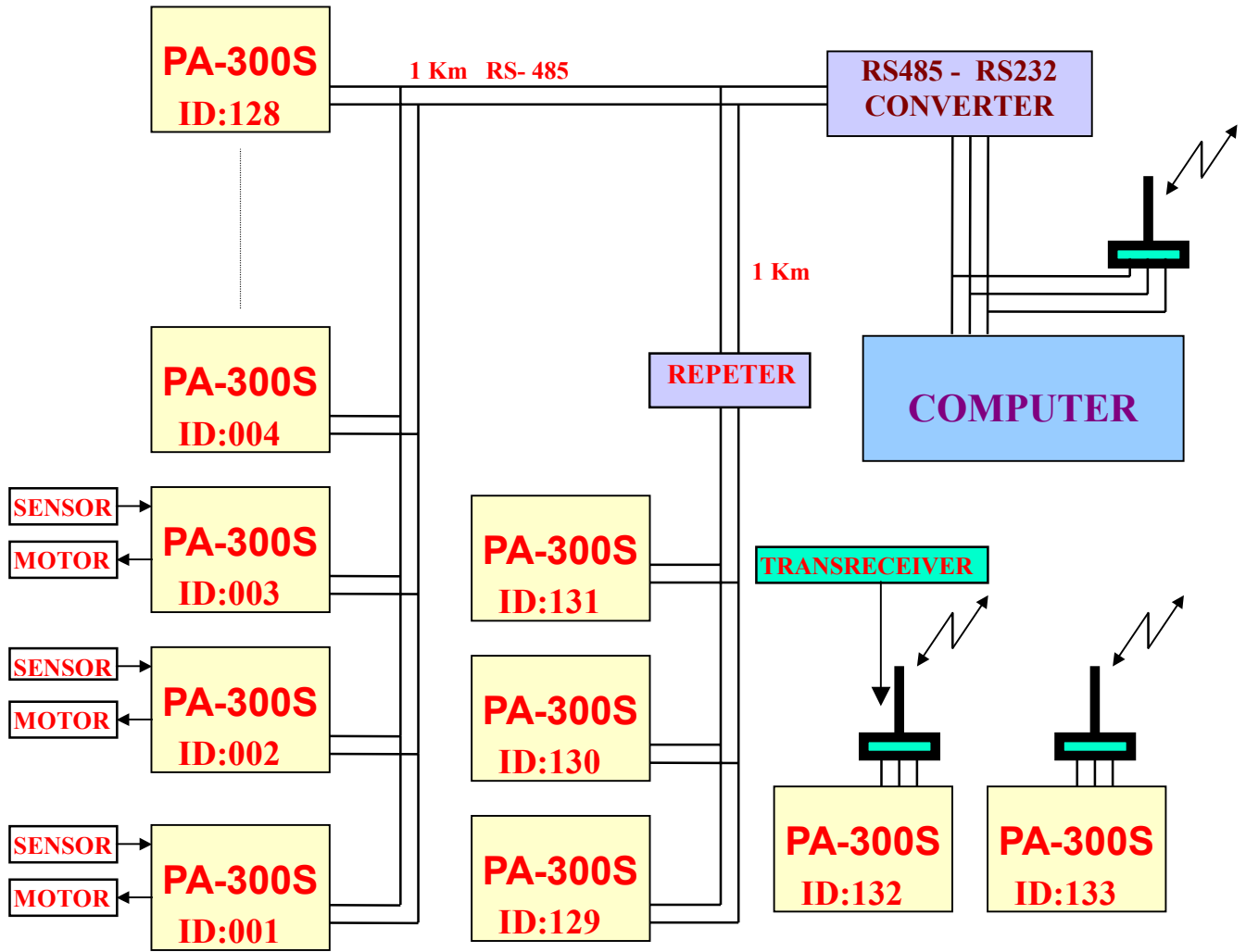


CONNECTION SCHEME

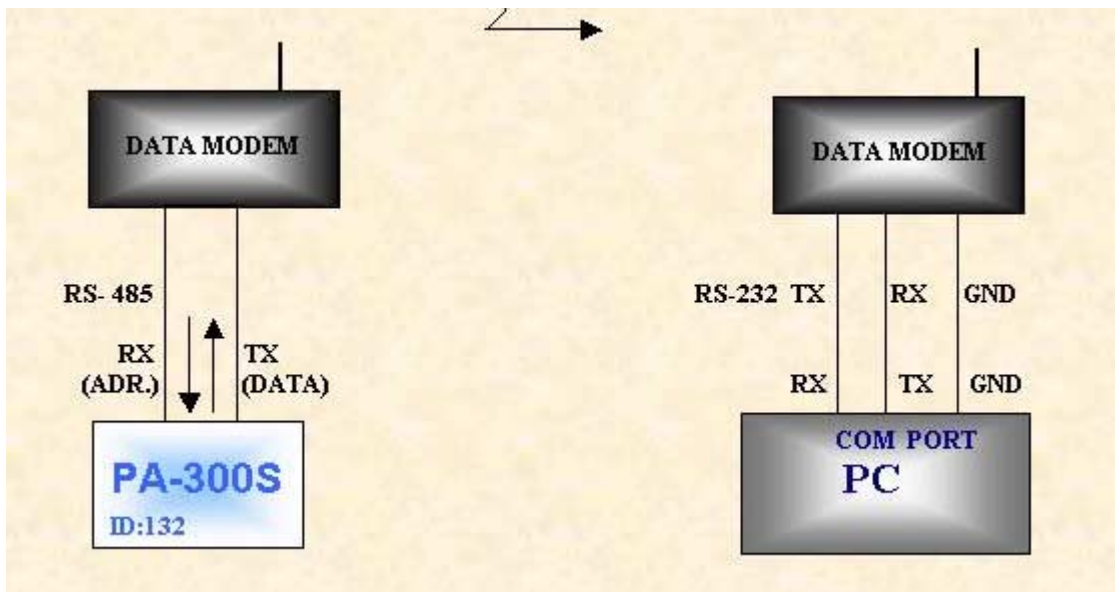
REMOTE CONTROL NETWORK STRUCTURE



WIRE SYSTEM NETWORK STRUCTURE



WIRELESS MODEM SYSTEM REMOTE CONTROL



SERIAL I/O : 19200 or 9600 , n , 8 , 1 1-30 Km. (VARIOUS RF OUTPUT POWER)

PC MAIN SCREENS

TRUE RMS POWER ANALYZER - [SENSOR & COUNTERS]

OPTIONS GRAPHICS MAIN

POWER & ENERGY ANALYZER

M A I N

TIME and DATE = 10:34 07 / 02 / 2001

| CASE | V | mA | W | VAr | VA | PF |
|-------|-----|------|-------|-------|-------|--------|
| L1(R) | 210 | 3547 | 716,2 | 209,3 | 744,9 | + 0.96 |
| L2(S) | 210 | 3544 | 716,3 | 204,3 | 744,2 | + 0.96 |
| L3(T) | 211 | 3552 | 720,0 | 215,4 | 749,5 | + 0.96 |

TOTAL POWERS & ALARMS

| | | | |
|---------------|-------------|---------|--------------------------|
| REAL | 2152,5 W | ADDRESS | 000 |
| REACTIVE(IND) | 629,0 VAr | STATUS | (V)ALARM (DALARM) |
| REACTIVE | 629,0 VAr | AUTO WR | <input type="checkbox"/> |
| APPARENT | 2238,6 VA | AUTO | <input type="checkbox"/> |
| IND.NORMAL | CAP.NORMAL | CLEAR | <input type="checkbox"/> |
| IND.(%)= 33 | CAP.(%)= 20 | | |
| AVERAGE PF | + 0.96 | | |
| FREQUENCY | 49.96 Hz | | |

PROTECTION & REMOTE CONTROL

| PROTECTION LIMITS | STATUS | OFF | LOAD OFF |
|-------------------|----------|---------------------|-------------|
| HIGH VOLTAGE | 255 VAC | NORMAL | SENSOR OFF |
| LOW VOLTAGE | 1 VAC | NORMAL | RX ID |
| HIGH CURRENT | 4999 mA | NORMAL | RX CONT. |
| SEC / MIN | COMM- 1 | RESET | TX ID |
| | | ODO | TX CONT. |
| | | METERS | 1 |
| | | TIME | 0 |
| | | WR. DATA | SCAN ID |
| OUTPUT DELAY | | | SCAN END ID |
| VOLTAGE | 001,0sec | VT RATIO = 1 | SCAN&WRTIME |
| C. DELAY | 001,0sec | CT RATIO = 5000 / 5 | 60 |

METERS & PF CONTROL

| | | |
|-------------------|-----------------|----------|
| REAC. CAP. NORMAL | STATUS | 04 - 000 |
| REAC. CAP.(%)= 2 | C. DELAY | 001,0sec |
| REAC. IND. ALARM | CAPACITOR ON | |
| REAC. IND.(%)= 26 | PF.CNT. (%)= 25 | |
| VArh | 3932 | HOURL |
| Wh | 3627 | 87 |
| VArh(IND) | 956 | 3623 |
| VArh(CAP) | 80 | 955 |
| | | 80 |

MAIN

MAIN

| | V | A | kW | kVAr | kVA | PF |
|-------|---|-----|-----|------|-----|--------|
| L1(R) | 6 | 175 | 0,9 | 0,6 | 1,1 | + 0.85 |
| L2(S) | 5 | 175 | 0,7 | 0,5 | 0,9 | + 0.84 |
| L3(T) | 5 | 175 | 0,7 | 0,5 | 0,9 | + 0.81 |

Power Analyzer PC program has 4 parts . These are Main , Total Powers , Protection &Control , Total Meters

MAIN : In this part , voltage , current , active power , reactive power , apparent power , power factor can be observed for momentary measurement by three phase base .

TOTAL POWERS : In this part reactive power restriction can be observed for momentary as a alarm , beside , total active , reactive and apparent power . Ratios are $kVAr(ind.)=1/3 * kW$ and $kVAr(cap.)=1/5 * kW$. Also FREQUENCY and AVARAGE PF can be measured .

Aalarms are seen in very detail like which numbered Power Analyzer send what kind of alarm . If AUTO WR options is selected than by the alarm comes out , which unit , what kind of alarm , time , date will be written to database automaticly . AUTO options helps immediatly to connect to units which gives alarm and makes available to search in detail . CLEAR button resets the alarm informations .

PROTECTION & CONTROL :In this section alarm restrictions , states , relay delay timing for alarms can be observed .

VOLTAGE VAR and LOAD OFF show sensor state to be connected to the unit and current protection relay state .

SEC/MIN shows graphes in minutes base .

VT RATIO lets you to insert voltage transformer ratio therefore high voltage measurement will be available . All measurement units change by the voltage transformer ratio .

COMM shows which communication ports of PC is being used .

TX ID shows units address that has to be written specific area .

TX CONT shows what kind of control command to be send Power Analyzer . Needed control command number has to written specific area . These control commands are as below :

4 = Current relay output off

5 = Current relay output on

6 =Sensor automatic control (If sensor input is on than current relay output on , if sensor input is off than current relay output off)

7 =Manual current relay output control

130 =4 digit odo meters reset on Power Analyzer

131 =7 digit meters reset on Power Analyzer

132 = Clock reset on power analyzer

RX ID shows address information send by the unit that asures screen information belongs to which unit .

RX CONT shows control command which is sent to unit by PC .

RX ID and RX CONT are must be same with TX ID and TX CONT .If not , communication has problem .

WR. DATA option helps all the data being written to database . If this option is selected than recording will be performed in certain period according to the SCAN & WR. TIME

If SCAN ID options selected than more than one unit will be scanned .

SCAN AND ID shows last unit to be scanned . First unit is showed by the TX ID .

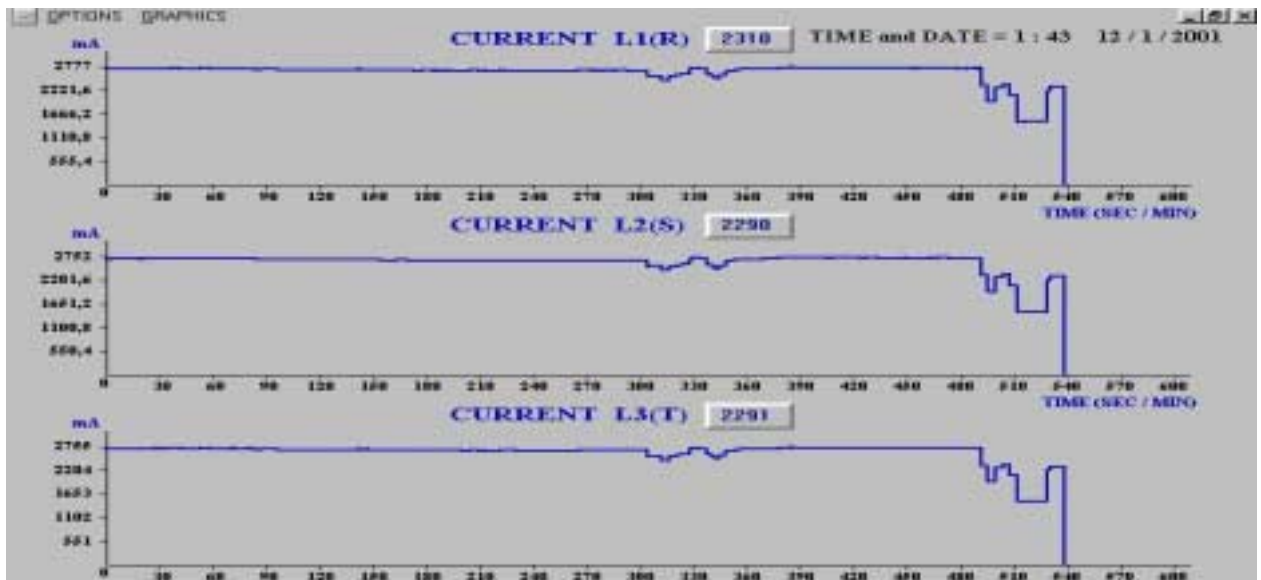
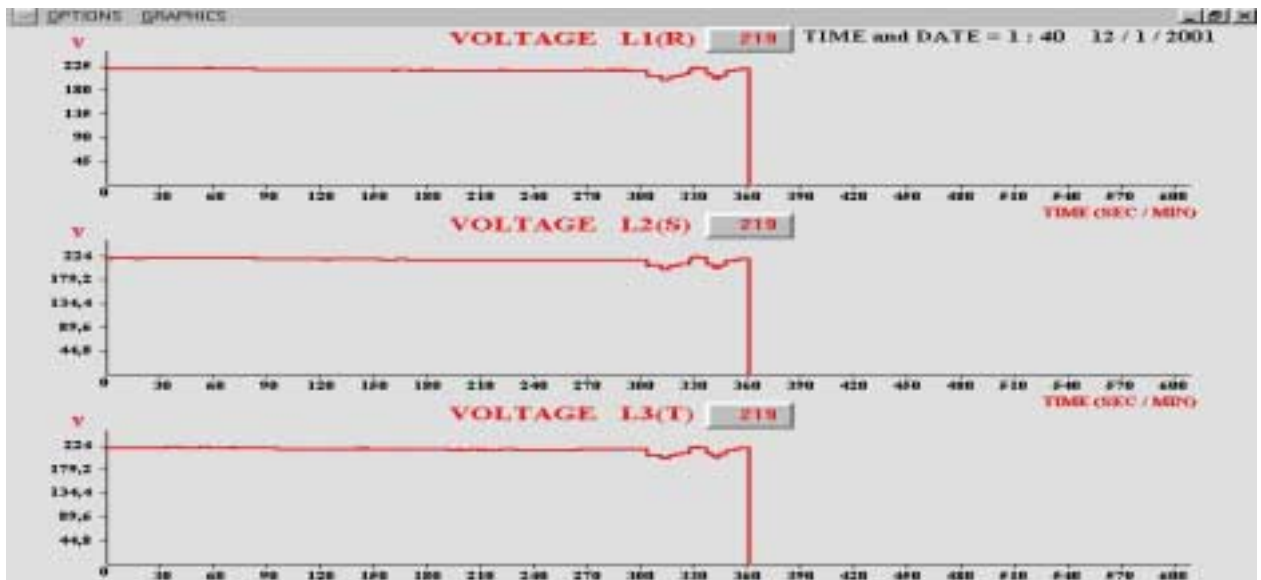
SCAN & WR. TIME shows scan and write time sequences .

TOTAL METERS :This section is for power meters .There are three type meters .

- 1- 4 digid ODO meters . These meters shows consumed energy for certain time . Time can be described for 99 hours . These meters can be reset from unit or from PC
- 2- 7 digid meters . These meters count consumed energy from at the begining . These meters can be reset from unit or from PC
- 3- Meter nemed COUNTER counts the pulse which comes from other devices . This device could be water meter , gass meter etc.
- 4- $kVAr$ ih / kWh ratio can be observed momentary on the model of PA-300C . COPM. CONT. Section shows compensation control value .
- 5- CAPACITOR OFF helps the understand if capacitor on or off .

Also alarm can be observed for reactive power restriction and rate of reactive to active . If reactive inductive ($kVAr$ ih) power less than $1/3$ active power then state shows no alarm otherwise shows alarm . Therefore we can see if any fine has to be paid .

PC GRAPHIC SCREENS



PC DATABASE SCREEN

DATA BASE

| | | | | | | | | | | |
|------------------|-----------------|---------|----|--------------|-----|-------|---------------------|----------------|----|----|
| 1 47 | 5 1 2001 | ADDRESS | 1 | | | | | | | |
| | V | A | kW | kVAr | kVA | PF | COUNTER = | 1 | | |
| L1(R) | 29 | 755 | 22 | 3 | 22 | -0,99 | APPARENT (kVAh)= | 672 | | |
| L2(S) | 29 | 748 | 21 | 3 | 22 | -0,99 | REAL (kWh)= | 640 | | |
| L3(T) | 29 | 749 | 21 | 3 | 22 | -0,99 | INDUCTIVE (kVArh)= | 160 | | |
| | | | | | | | CAPACITIVE (kVArh)= | 27 | | |
| VT RATIO = | | 1 | | AVERAGE PF = | | -0,98 | | REAC. CAP. % = | | 4 |
| CT RATIO = | | 5000 | | | | | | REAC. IND. % = | | 25 |
| TOTAL kW= | | | 65 | | | | ODO HOUR = | | 0 | |
| TOTAL kVAr(ind)= | | | 0 | | | | REAL (kWh)= | | 14 | |
| TOTAL kVAr(cap)= | | | 9 | | | | INDUCTIVE (kVArh)= | | 3 | |
| TOTAL kVA= | | | 65 | | | | CAPACITIVE (kVArh)= | | 1 | |

⏪ ⏩ DATA ⏪ ⏩

PC ALARM SCREEN

ALARM

ALARM STATUS

| | |
|---------------|--------------|
| ALARM ADDRESS | ALARM TYPE |
| 6 | HIGH CURRENT |

⏪ ⏩ DATA ⏪ ⏩

1 : 59

27 / 1 / 2000