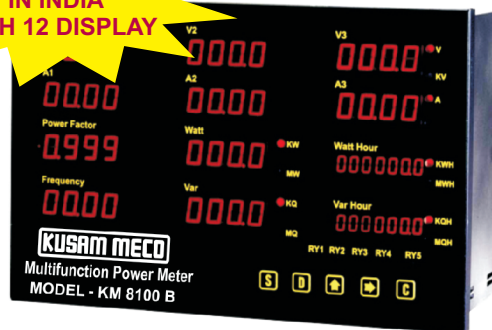


## DIGITAL MICROPROCESSOR MULTIFUNCTION TRMS POWER METER

Series 8100

### UNIQUE FEATURES :

- Displays 12 parameters simultaneously 3V, 3A, W, Var, WH, VarH, PF, Hz
- Applicable Standard : DIN IEC 688
- Suitable for : 1Ø 2W; 1Ø 3W; 3Ø 3W; 3Ø 4W systems
- 10 Years Power-Off Memory for set data
- With RS-485 Modbus Output
- User friendly setting of Demand parameters :
- Demand Time interval setting (0-60 minutes)
- Synchronising time with Electricity Board meter timing.
- Maximum Demand (Sanctioned Demand) & Target Demand Setting.
- Displays Demand forecast
- Displays remaining Time interval (of the Demand period)
- Displays Present Demand
- Displays usable remaining Demand.
- Software for Load & Demand Analysis (optional)



Model - KM 8100 B

### INSTALLATION & PERFORMANCE

- **Accuracy :** V, A, W, =  $\pm 0.2\%$  Fs+2C at 23°C  $\pm 3^\circ\text{C}$ .  
Var, WH, VarH, PF =  $\pm 0.4\%$  rdg + 2 Count,  
Hz =  $\pm 0.02\%$  Fs + 1C at 23°C  $\pm 3^\circ\text{C}$ .
- **Display Range:** V, A, W, Var, PF, Hz, 0.56" Super Red LED 4 Digits = 0 ~ 9999 Counts, PT, CT User Selectable. WH; VarH, 0.36" Super Red LED, 7 Digits = 0 ~ 9999999 Counts.
- **Response Time:**  $\leq 1$  Sec.
- **Memory Capacity:** 10 Years Power Off Memory for set Data.
- **Dielectric Strength:** AC 2.8KV / Min, Input / Power / Case, as per DIN IEC 688.
- **Impulse:** 6 KV 1.2 x 50  $\mu\text{s}$ , ANSI C37.90a / 1983 ; DIN IEC 1000.4 -5, 4-4.
- **Stability:**  $\leq 0.2\%$  / Year
- **Operation Condition:** -10°C ~ + 55°C; 20 ~ 95% RH Non- Condensed.
- **Storage Condition:** -40°C ~ + 75°C; 20 ~ 95% RH Non- Condensed
- **Power Supply:** AC 85 ~ 265V and DC 100 ~ 300V ; 24V DC (optional)
- **Mounting :** Panel Flush Mounting.

### GENERAL SPECIFICATIONS :

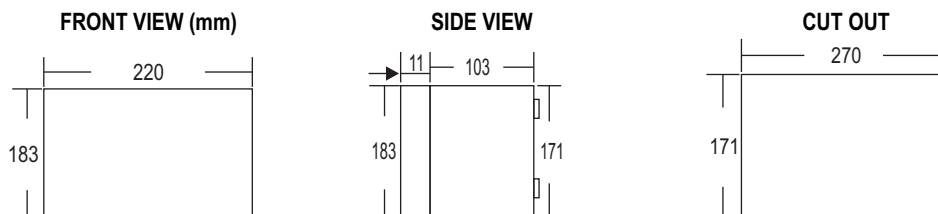
- INPUT :**
- \* Input Voltage Range : Voltage: 55 ~ 300V AC, 45 ~65Hz or 300 ~ 600V AC, 45 ~ 65Hz.  
P.T. Ratio programmable upto 9999/KV
  - \* Input Voltage Over Range : Voltage : 200% Continuous, 300% of rating for 10 sec.
  - \* Input Current Range: Current : 110% for rating. 0-1A or 0-5A.  
C.T. Ratio programmable upto 9999/5A.
  - \* Input Current Over Range : Current : 400% Continuous, 2000% of rating for 10 Sec.
  - \* Input Frequency: 45Hz ~ 70 Hz.
  - \* Input Burden: Voltage 0.25VA / Unit, Current 0.25VA / Unit, at 50/60Hz

Model KM 8100 B

INPUT (V)		INPUT (C)		OUTPUT		AUX. POWER	
A	55 ~ 300V	A	1A	F	RS485 modbus	C	DC 24V
C	300 ~ 600V	B	5A	O	4 Units Analog	F	AC 85 ~265V
Y	SPECIAL	Y	SPECIAL	M	4 Units Analog + RS485		DC 100~300V
				N	NONE	Y	SPECIAL
				Y	SPECIAL		

In 3 Ø 4 w system Voltage ( INPUT ( V ) : is Line - Neutral Voltage  
When ordering specify Model code number and variable (e.g. 8100B-A-A-F--F)  
Code number : Model - Input Voltage - Input Current - Output - Auxillary power.

### DIMENSION :



All Specifications are subject to change without prior notice

# HOW THE MAXIMUM DEMAND CONTROLLER SAVES PENALTY

## MODEL KM 8100 B

### OUTPUT :

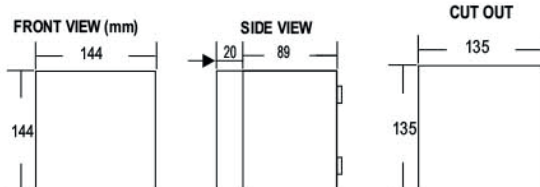
In this Instrument there are 4 Relay outputs for Demand Control : In this instrument we can set the TARGET DEMAND (approx. 10%) below the SANCTIONED demand. When the present demand exceeds the target demand, the relay Output switches ON. These relay outputs can be connected to least priority loads. When the relay turns on, the loads are switched off. When the present demand falls below the target demand, the relay switches ON the loads one by one. Delay time can be set for the relay control. Thus the present demand never exceeds the sanctioned demand & the customer is saved from paying penalty. This instrument also displays the remaining usable Demand, so that the load schedule can be programmed accordingly.

- **DEMAND MANAGEMENT & DEMAND CONTROL :** THE MAXIMUM DEMAND CONTROLLER indicates MAXIMUM DEMAND (SANCTIONED), TARGET DEMAND, PRESENT DEMAND, DEMAND FORECAST & REMAINING USABLE DEMAND & REMAINING TIME DURING ONE CYCLE. THESE FEATURES ARE MOST ESSENTIAL FOR PROPER DEMAND MANAGEMENT.
- **MAXIMUM DEMAND :** It is the Maximum Demand value which is sanctioned by the Electric supply Company at the time of application for sanction of load. E.g. 1000 KVA.
- **TARGET DEMAND :** It is the Maximum Demand value which we do not want to exceed. If there is no power cut, Target Demand is equal to Maximum Demand e.g. If there is 25% power cut then Target Demand will be 750 KVA if Maximum Demand is 1000 KVA.
- **PRESENT DEMAND :** It is zero at the beginning of the demand interval and increases as the load increases within the time interval of the demand period (= 30 minutes). At the end of this period it returns to zero.
- **DEMAND FORECAST :** According to the variation in the connected load this display will indicate the Maximum Demand which will be reached at the end of demand period (= 30 minutes). This will allow the user to plan the load pattern in accordance with the demand forecast, so as to avoid exceeding the Target Demand.
- **USEABLE REMAINING DEMAND :** According to the Current Maximum Demand (connected load) the Demand Controller will calculate the Usable Demand which can be used by the consumer in the remaining demand period (= 30 minutes - time elapsed) such that the Maximum Demand is within the Target demand Value. E.g. if the target demand is set at 750 KVA and the demand period = 30 minutes, then at the beginning, the useable demand = 750 KVA & the time display = 30 minutes. If the load is 1200 KVA at the beginning (more than the Maximum Demand and Target Demand), then the useable demand shall get reduced from 750 KVA, in the remaining time. 10 Minutes later, if the load is not changed, if the useable demand displays 600 KVA, and the remaining time displays 20 minutes, it means that the useable demand in the next 20 minutes left is 600 KVA. If the current load is not reduced from 1200 KVA to 600 KVA, then there is a risk of exceeding the Target Demand 20 minutes later. Therefore current load must be reduced so as to reduce the KVA.  
On the contrary if the load is less than 750 KVA in the beginning, then the usable remaining demand shall increase. If the usable demand displays 1000 KVA and the remaining time displays 10 minutes and the current load is 600 KVA, it means that 400 KVA more load can be connected for the remaining 10 minutes. The user can self arrange or adjust the load in accordance with the above explanation, so that the user does not exceed the Target Demand.

### MAXIMUM DEMAND REPORT OF OCTOBER (Sample Reports) Date : 1 - 10 - 09 Time 9.02am

RECORD	KW	KVA	KVAR	TIME
1	1.04	0.84	0.91	9.02
2	1.05	0.85	0.92	9.05
3	1.09	0.89	0.96	9.20
4	1.11	0.91	0.98	9.27
5	1.23	1.03	1.1	9.43

### DIMENSION :



All Specifications are subject to change without prior notice



G-17, Bharat Industrial Estate, T. J. Road, Sewree (W), Mumbai - 400 015. INDIA.  
**Sales Direct.:** 022 -24156638, **Tel. :** 022-241224540, 24181649, **Fax :** 022 - 24149659  
**Email :** kusam\_meco@vsnl.net, **Website :** www.kusamelectrical.com,

**KUSAM-MECO**®

**MULTIFUNCTION  
POWER METER**

**MODEL**

**KM 8100A / KM 8100B**

**KM 8100C**

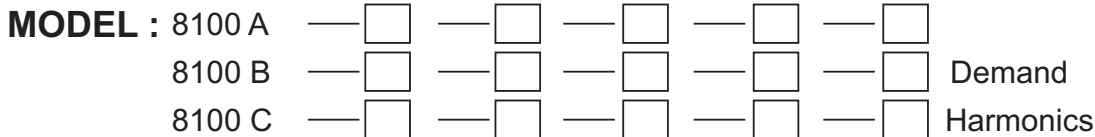
**OPERATION MANUAL**

# Microprocessor Multifunction Power Meter

## MODEL 8100

### Features :

- Applicable Standard : Answer for DIN-IEC 688
- Display at one time : 3V· 3A· W· Var· WH· VarH· PF· Hz· Harmonics· Demand
- Measurable 1 $\phi$  2W· 1 $\phi$  3W· 3 $\phi$  3W· 3 $\phi$  4W
- Harmonics Analyze Voltage, Current for 31 times, Display for 15 times.
- Demand Management & Demand Control
- 10 Years Power-Off Memory for 5000 data
- With RS-485 Modbus Output



	INPUT	INPUT/C	OUTPUT	SETTING FUNCTION	AUX. POWER
A	55 ~ 300V	A 1A	F O M P Q N Y	A N Y	C F Y
C	300 ~ 600V	B 5A	RS-485 modbus 4 Units Analog 4 Units Analog+RS-485 Print Function+RS-485 Full Function NONE SPECIAL	4 Units Hi-Lo set NONE SPECIAL	DC 24V AC 85~265V DC 100~300V
Y	SPECIAL	Y SPECIAL			SPECIAL

3 $\phi$  4 $\omega$  Voltage Line-Neutral

### Specifications :

#### INPUT :

- Input Frequency : 45Hz ~ 70Hz.  
 Input Burden : Voltage 0.25VA/Unit, Current 0.25VA/Unit, as 50/60Hz.  
 Input Range : Voltage : 55~300V AC, 45~65Hz or 300~600V AC, 45~65Hz  
 Current : 110% for rating.  
 Input Over : Voltage : 200% Continuous, 300% of rating for 10 sec.  
 Current : 400% Continuous, 2000% of rating for 10 Sec., 8000% of rating for 0.5 Sec.

#### OUTPUT :

- DC Current : 0 - 20 mA DC  
 Load resistance drive : output drive 10 VDC maximum  
 DC Voltage : 0 - 10 V DC  
 Load resistance drive : output drive 5 mA maximum

Output	Load Resistance
0 - 20 mA :	500 $\Omega$
4 - 20 mA :	500 $\Omega$

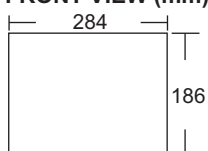
Output	Load Resistance
0 - 5 V :	1 K $\Omega$
1 - 5 V :	1 K $\Omega$
0 - 10 V :	2 K $\Omega$

- Output Protection : Without Damage for Output Open or Short Circuit.  
 Output Response Time :  $\leq$  1 Sec.  
 Digital Output Load : RS-485 Output, Isolate Type with MODBUS RTU mode., 4800, 9600, 19200 Baud Rate, User Selectable.

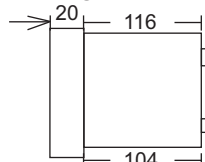
### INSTALLATION & PERFORMANCE :

- Accuracy : V· A· W· =  $\pm$ 0.2% Fs+2C at 23°C  $\pm$ 3°C. Var· WH· VarH· PF =  $\pm$ 0.4%RD+2C,  
 Hz =  $\pm$ 0.02% Fs+1C at 23°C  $\pm$  3°C., THD =  $\pm$ 2%  
 Display Range : V· A· W· Var· PF· Hz, 0.56" Super Red LED 4 Digits =0~9999 Counts, PT· CT User Selectable.  
 WH; VarH, 0.36" Super Red LED, 7 Digits = 0 ~ 9999999 Counts.  
 Response Time :  $\leq$  1 Sec.  
 Memory Capacity : 10 Years Power Off Memory for 5000 Data.  
 Dielectric Strength : AC 2.8KV / Min, Input/Power/Case, DIN IEC 688.  
 Impulse : 6 KV 1.2x50 uS, ANSI C37.90a / 1983. DIN IEC 1000.4 - 5, 4 -4.  
 Stability :  $\leq$  0.2% / Year.  
 Temperature Coefficient :  $\leq$  100ppm /  $^{\circ}$ C from 0 ~ 60 $^{\circ}$ C,  
 Operation Condition : -10 $^{\circ}$ C ~ +55 $^{\circ}$ C 20 ~ 95% RH Non-Condensed.  
 Storage Condition : -40 $^{\circ}$ C ~ +75 $^{\circ}$ C 20 ~ 95% RH Non-Condensed.  
 Power Supply : AC 85~265V and DC 100~300V of Power can be withstood.  
 Mounting : Panel Flush Mounting.

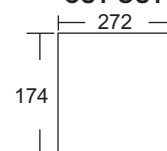
#### FRONT VIEW (mm)



#### SIDE VIEW




#### CUT OUT



# *Microprocessor Multifunction Power Meter Model-KM-PM-8100 A*

<b>1. Panel Operation.....</b>	<b>1</b>
<b>2. Display Discription.....</b>	<b>2</b>
<b>3. Number Setting.....</b>	<b>3</b>
<b>4. Printing Function.....</b>	<b>6</b>
<b>5. Alarm Function.....</b>	<b>7</b>
<b>6. Time Setting.....</b>	<b>8</b>
<b>7. Analogy Output.....</b>	<b>8</b>
<b>8. Communication Function.....</b>	<b>10</b>
<b>9. Example.....</b>	<b>13</b>

# 1. Panel Operation :

DEM <input type="radio"/> H <input type="radio"/>	V1 <input type="text"/>	V2 <input type="text"/>	V3 <input type="text"/>	<input type="radio"/> V <input type="radio"/> KV
A1 <input type="text"/>	A2 <input type="text"/>	A3 <input type="text"/>	<input type="radio"/> A <input type="radio"/> THD%	
Minus <input type="radio"/>	Power Factor <input type="text"/>	Watt <input type="text"/>	<input type="radio"/> KW <input type="radio"/> MW	Watt Hour <input type="text"/>
				<input type="radio"/> KWH <input type="radio"/> MWH
Frequency <input type="text"/>	Var <input type="text"/>	<input type="radio"/> KW <input type="radio"/> MW	Var Hour <input type="text"/>	<input type="radio"/> KQH <input type="radio"/> MQH
		RY1 <input type="radio"/>	RY2 <input type="radio"/>	RY3 <input type="radio"/>
<b>DIGITAL POWER METER</b> MODEL-KM-PM-8100A		<input type="button" value="S"/>	<input type="button" value="D"/>	<input type="button" value="↑"/>
		<input type="button" value="→"/>	<input type="button" value="C"/>	

## Function :

**S** : SELECT BIT  
**D** : DATA  
**C** : Special Function Clear WH QH

↑ : UP (change number)  
 → : RIGHT (shift digit)

## "S" Button :

1. **S** (to enter setting mode) ' and display 01 data.
2. **D** (to enter 01 setting function) ' then press D to 02 (setting data).
3. As entering setting value ' perform ↑ and → to changer setting value.
4. On mode 01 "Wait" ' operate **S** to elect each statue point 01,02,...,09.
5. Or press **D** only ' order sequence is : 01 ~ setting value ~ 02 ~ setting value ~ 03 ~ setting value ~ 04 ~ setting value ~ and so on.

"C" Button : perform ↑ and → , key in password, press "D" again.

When display first page, clear +/-WH (WH) ' +/-QH(QH)

"↑ → " : Cross Pages (First Page ↔ Fourth Page)

## 2. Display Discription :

### First Page

### Basic Display

RV (R Phase Voltage)	SV (S Phase Voltage)	TV (T Phase Voltage)
A1 (R Phase Current)	A2 (S Phase Current)	A3 (T Phase Current)
PF (Power Factor)	W (Watt)	+WH/-WH (Watthour)
HZ (Frequency)	Q (Var)	+QH/-QH (Varhour)
<input type="button" value="S"/> <input type="button" value="D"/> <input type="button" value="↑"/> <input type="button" value="→"/> <input type="button" value="C"/>		

- +WH/-WH(WH) : When W(W) positive, display +WH. When W(W) negative, display -WH.
- +QH/-QH(QH) : When Q(Q) positive, display +QH. When Q(Var) negative, display -QH.

### Second Page Demand Display (Optional)

DEM <input type="radio"/>	Demand Remaining time	Useable Remaining Demand	Target Demand
		Demand Forecast	Maximum Demand
		Present Demand	Historical Demand
	Year / Month	Day / Hour	Min / Sec
<input type="button" value="S"/> <input type="button" value="D"/> <input type="button" value="↑"/> <input type="button" value="→"/> <input type="button" value="C"/>			

### Third Page Harmonics Voltage (Optional)

H <input type="radio"/>	Voltage 1 time Harmonics	Voltage 9 times Harmonics	Voltage Total harmonics <input type="radio"/> V/KV
	Voltage 3 times Harmonics	Voltage 11 times Harmonics	Total harmonics percentage <input type="radio"/> THD%
	Voltage 5 times Harmonics	Voltage 13 times Harmonics	
	Voltage 7 times Harmonics	Voltage 15 times Harmonics	

### Fourth Page Harmonics Current (Optional)

H <input type="radio"/>	Current 1 time Harmonics	Current 9 times Harmonics	Current Total harmonics
	Current 3 times Harmonics	Current 11 times Harmonics	Total harmonics percentage <input type="radio"/> A
	Current 5 times Harmonics	Current 13 times Harmonics	<input type="radio"/> THD%
	Current 7 times Harmonics	Current 15 times Harmonics	
<input type="button" value="S"/> <input type="button" value="D"/> <input type="button" value="↑"/> <input type="button" value="→"/> <input type="button" value="C"/>			

### 3. Number Setting :

3.1 Enter 01 ~ 09 functions and setting Value, press " ↑ & → " to change setting value.

Press "S", enter setting value condition, 01 display shines, then press "D", the screen shows as follows :

Function	Button	Range & Instruction of Functions
01 PW	→	Among 3P4W~1P2W~1P3W~3P3W cyclic switch (34W mark change)
02 PT	→↑	Show1 PT equals to one multiple (enter 02 condition, press " → " to display)
03 U-unit	→	Unit mark of "V" , "KV" will vary.
04 U-dot	→	The decimal of first V line will vary.
05 CT	→↑	Show 1 CT equals to one multiple (enter 05 condition ' press " →" to display)
06 A-dot	→	The decimal of second A line will vary
07 W-unit	→	Unit mark of "KW" - "MW" , "KVar" - "MVar" will vary.
08 W-dot	→	The decimal of second & third W, Q line will vary.
09 Special function	→↑	00-99 press "D" again to enter below function.
06 Baud	→	Baud among 9600-19200-38400 -1200-2400-4800 cyclic switch.
07 Address	→↑	Modbus conventional address.
15 History data saving interval time	→↑	History data set 1-999 minutes per interval to save data. Save one-hour, set to 060 minutes.
16 Set time	→↑	Calibrate present time
17 Set demand interval time	→↑	Set basic time (1-60 min)
18 Set demand W / VA	→	Select demand unit as V A or W
19 Clear printing data	→↑	Key in password
20 Set W, V analogy output	→↑	0 ~ 9999
25 Set target demand	→↑	0 ~ 9999
26 Set maximum demand	→↑	0 ~ 9999
28 Clear maximum demand	→↑ D	Key in correct password, enter D to clean history maximum demand and occurred time.
50 Alarm Function		Please see alarm function setting description
51 Alarm / Demand Control switch	→↑ D	Press "D" to assure, "S" to cancel setting, " → or ↑ " to change setting
87 Change password	→↑	Key in old password and new codes twice (except zero)
99 Save altered data	→↑ D	Key in correct password to save

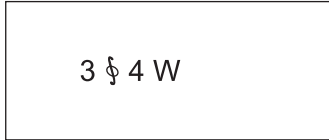
PS: 09-16 and 09-28 functions need to be set personally.

Note : inner setting password is 88 (password alterable)



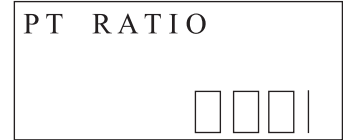
3.2 First operate S to enter into setting statute, 00 (display) winks ' then press D to enter 01 function, afterward perform D' and pictures are shows as follows :

1.



Operate →, 1 § 2 W ·  
1 § 3 W · 3 § 3 W · 3 § 4 W  
are selectable.

2.



Operate →, twinkling digit,  
↑ (change its digit value)

3.



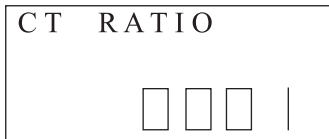
Operate →, to select V or K V

4.



Operate →, to select the  
position of radix point.

5.



Operate →, twinkling digit,  
↑ (change its digit value)

6.



Operate →, select the position  
of radix point.

7.



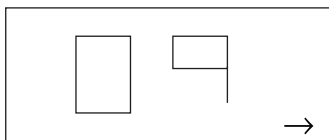
Operate →, select KW, MW  
or Q. Change in-phase.

8.



Operate →, select the radix point  
W, Var, WH, VarH. Change in-phase.

9.

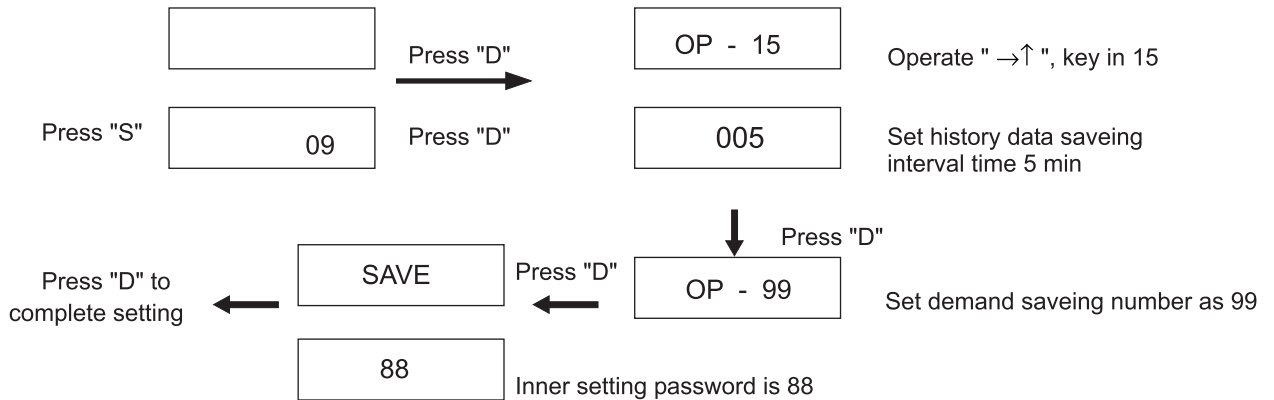


Press D to enter special function.

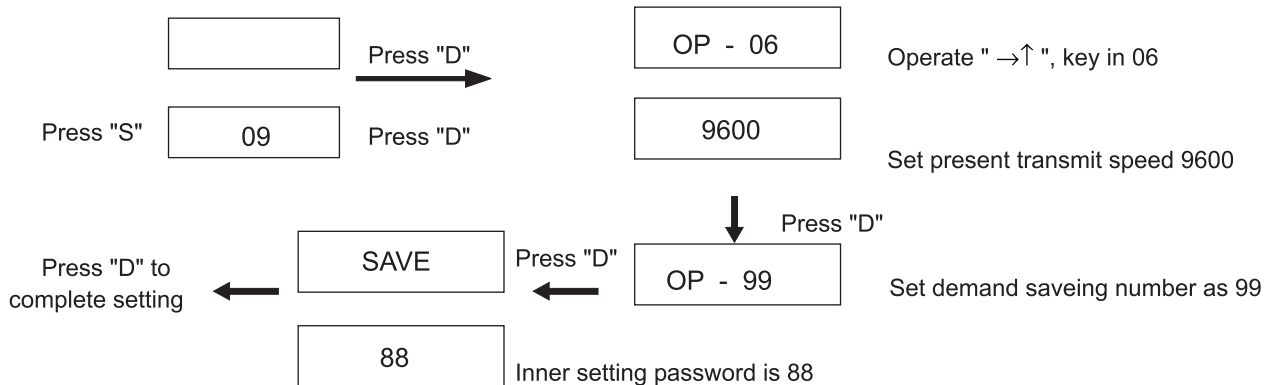
**3.3 Example Other 09 Functions Discription :** press "S" (after entering 09 Function), and then press "D".

Operate "→↑", adjust display to 06, operate "D" again, display present BAUD, operate "→↑", select speed value and save.  
 Operate "→↑", adjust display to 07, operate "D" again, display present address, operate "→", select address 01 ~ 255 and save.  
 Operate "→↑", adjust display to 15, operate "D" again, show change of history data saving interval time display, key in history data saving interval tim and press "D".  
 Operate "→↑", adjust display to 16, operate "D" again, show change of present time display, key in present time and press "D".  
 Operate "→↑", adjust display to 87, operate "D" again, show change display, key in old password and the same new password twice.  
 Operate "→↑", adjust display to 99, operate "D" again. To save display, key in password (99), then press "D" to save 01 ~ 08 and 15 · 16 · 87 setting function of 09 Functions.

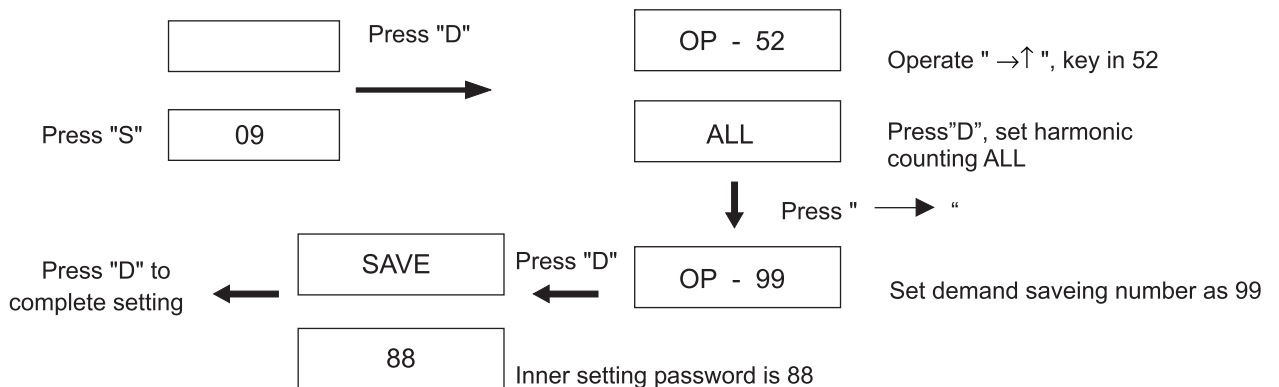
**3.3.1 Press →, enter basic display**



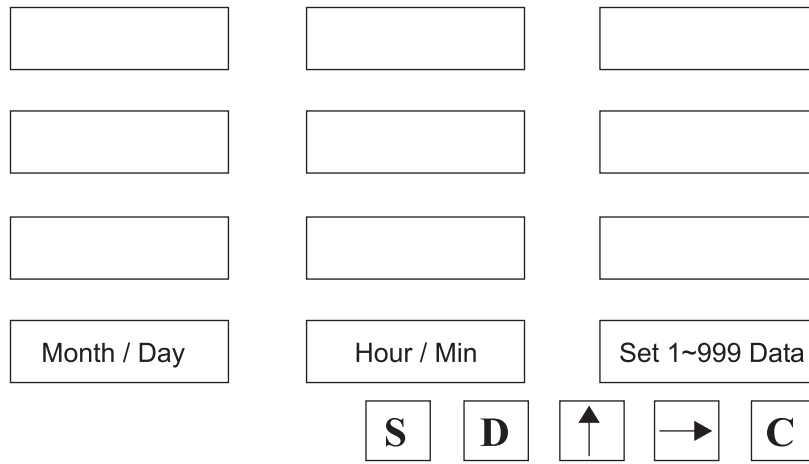
**3.3.2 Press →, enter basic display**



**3.3.3 Harmonic ODD/ALL select Press →, enter basic display**

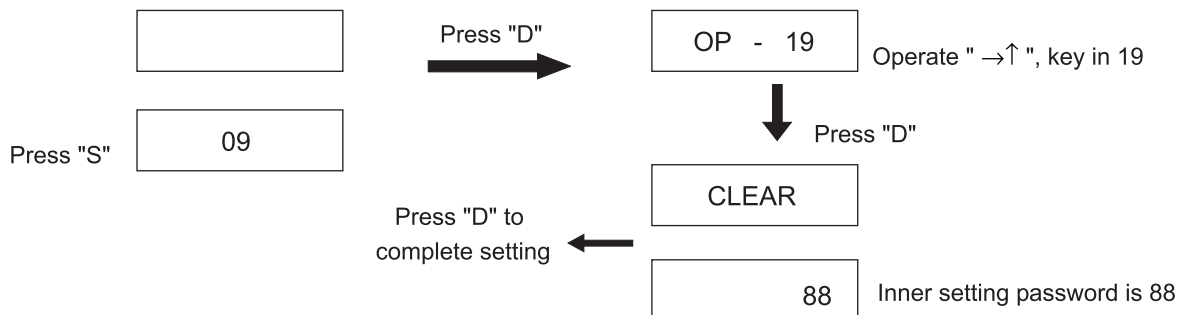


## 4. Printing Function (Optional)



- 4.1 Press "D", adjust setting value, operate " →↑ ", key in printing time and no. of printouts and press "D" again.
- 4.2 Press print button to show above display, press "S" to move out and won't print, press "D" start printing from setting hour 1 ~ 999. (If press "S" won't print, press "D" to start new printing)
- 4.3 Use present time as basis to search data source and find the first qualified data (regardless of time resetting problem ) to print, if data undiscoverable won't print.
- 4.4 Electricity shutdown during operation, history data can't save or print, or data undiscoverable won't print.
- 4.5 Other 09 Functions Discription : press "S" (after entering 09 Function), and then press "D". Operate " →↑ ", adjust display to 19, then press "D", show clear saved data display. Key in correct password, press "D" to clear.

4.5.1 Press →, enter basic display.



4.6 Printing Data Form :

Month - Day Hour : Min  
 V=11.00 11.00 11.00KV  
 A=5.000 5.000 5.000A  
 W=999.9KW Q=000.0KW  
 PF=0.999 + WH = 999999.9KW

### Printing Specifications:

1. Use EPSON microprocessor instruction code
2. RS-232 communication
3. ASS II word type.
4. Print 24 or more letters each line. Paper 48mm width.
5. Clearness over 8 dots / mm.
6. High speed printing 62 mm / sec

## 5. Alarm Function (function 09-50) Optional :

ON Delay Time function code is N ; OFF Delay Time function code is F

Press "S", enter 09 function, operate " →↑ " key in 50, operate "D" to show alarm setting display.

Operate "D" again, panel "RY1" shines, operate " →↑ ", adjust display as below :

1. Time delay moving point : operate " ↑ → ", adjust display to 006 condition.
2. ON Delay Time & OFF Delay Time setting type, operate " ↑ → ", adjust display to F condition.
3. Function code : operate " ↑ → ", adjust display to 00 condition. (R phase voltage)
4. Alarm setting type : operate " ↑ → ", adjust display to H condition.
5. Setting value : operate " ↑ → ", adjust display to 2230 condition.

Press "S" into 09 function, operate " →↑ ", key in 99, operate "D" to enter. Key in password to save.

<u><b>006</b></u>	<b>F</b>	<u><b>00</b></u>
Time	OFF Delay Time	Function Code
<u><b>H</b></u>		<u><b>223.0</b></u>
State		Setting Data

6. 223.0 is moving point.

The diagram means R Phase Voltage is larger than 223.0V alarming movement.

FUN CODE	NAME	REMARK
00	RV	R Phase Voltage
01	SV	S Phase Voltage
02	TV	T Phase Voltage
03	RA	R Phase Current
04	SA	S Phase Current
05	TA	T Phase Current
06	W	Watt
07	Q	Var
08	PF	Power Factor
09	Freq	Frequency

Example : Adjust second unit alarm to T Phase Current larger than 4.5A. Delay 24 sec. movement :

<u><b>024</b></u>	<b>N</b>	<u><b>05</b></u>
Time	ON Delay Time	Function Code
<u><b>H</b></u>		<u><b>4.500</b></u>
State		Setting Data

Press "S", enter 09 function, operate " →↑ " key in 50, operate "D" to show alarm setting display.

Operate "D" again, panel "RY2" shines, operate " →↑ ", adjust display as below.

1. Time delay moving point : operate " ↑ → ", adjust display to 024 condition.
2. ON Delay Time & OFF Delay Time setting type, operate " ↑ → ", adjust display to N condition.
3. Function code : operate " ↑ → ", adjust display to 05 condition. (T phase current)
4. Alarm setting type : operate " ↑ → ", adjust display to H condition.
5. Setting value : operate " ↑ → ", adjust display to 4500 condition.

Press "S" move out to 09 function, operate " →↑ ", key in 99, operate "D" to enter and key in password to save.

## 6. Time Setting :

		Day of weeks	5
		Year / Month / Date	04. 03. 05
		Hour / Min / Sec	12. 50. 35

Example Time sets to Friday, Mar 5th 2004, 12:50 a.m. 35 sec.:

Press "S", enter 09 function, operate " →↑ ", key in 16, operate "D", shows time setting display, operate " →↑ " again, adjust display as above : 5 in the first row means Friday, second row means year/month/date ' third row means hour/min/sec.

## 7. Analogy Output (Optional) :

Analogy output answer value (The data is real input value, **no relation with PT · CT setting**.)

Within 3 phase 4 wire, voltage value below is phase voltage):

Example 1 : When RV 0~220V answers to 4~20mA

Inner setting 60 of Function 09, analogy output function specification: (Set 1~Set 4 analogy output setting)

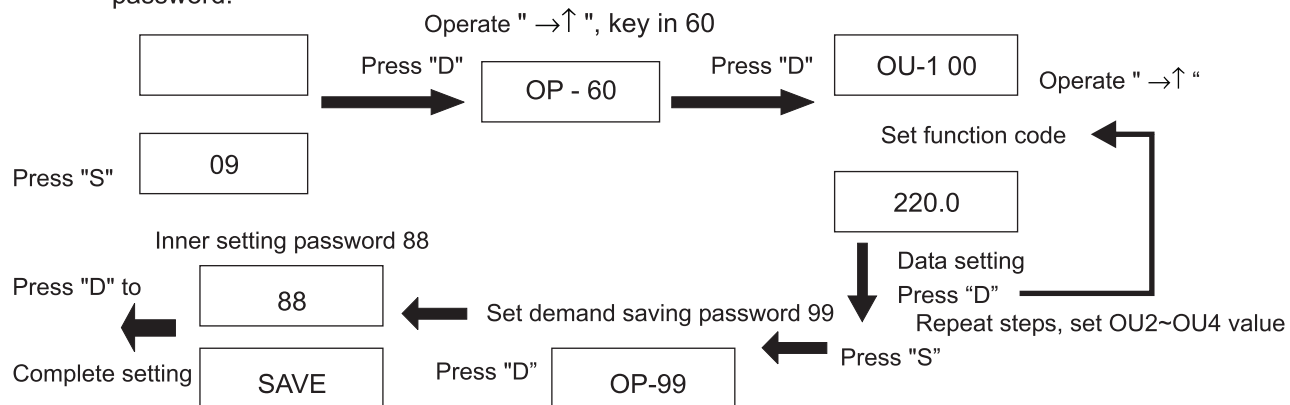
Press "S", enter 09 function, operate " →↑ ", key in 60, operate "D" to show alarm setting display :

1. Operate "D" on the "OU-1" panel again, operate " →↑ " to adjust display as follows.

2. Function code, operate " ↑ → ", adjust display to 00 condition. ® phase voltage)

3. Setting value file, operate " ↑ → ", adjust display to 2200 condition. (Answer to 20 mA)

Press "S", move out to 09 function, operate " →↑ ", key in 99, operate "D" to enter and key in saving password.



FUN CODE	NAME	REMARK
00	RV	R Phase Voltage
01	SV	S Phase Voltage
02	TV	T Phase Voltage
03	RA	R Phase Current
04	SA	S Phase Current
05	TA	T Phase Current
06	W	Watt
08	PF	Power Factor
09	Freq	Frequency (50-5, 50-2, 50-1, 60-5, 60-2, 60-1)
10	Present Demand	Present Demand
11	Historical Max Demand	Historical Max Demand
12	Forecast Demand	Demand Forecast

**Example 2.** RA: 0~2.5A answer to 4~20mA

Inner setting 60 of Function 09, analogy output function specification: (Set 1~Set 4 analogy output setting)

Press “S”, enter 0 9 function, operate "→↑", key in 60, operate “D” to show alarm setting display :

1. Operate “D” on the “OU-2” panel again, operate "→↑" to adjust display as follows.
2. Function code, operate "↑→", adjust display to 0 3 condition. ( R phase current )
3. Setting value file, operate "↑→", adjust display to 2 5 0 0 condition. (Answer to 20mA)

Press “S”, move out to 0 9 function, operate "→↑", key in 99, operate “D” to enter and key in saving password.

OU-2                      03  
Analogy output Set 2        Function Code  
  
2.500  
Data setting

**Example 3.** PF: -0.5~1~0.5COS θ answer to 4~20mA

Inner setting 60 of Function 09, analogy output function specification: (Set 1~Set 4 analogy output setting)

Press “S”, enter 0 9 function, operate "→↑", key in 60, operate “D” to show alarm setting display :

1. Operate “D” on the “OU-3” panel again, operate "→↑" to adjust display as follows.
2. Function code, operate "↑→", adjust display to 0 8 condition. ( PF )
3. Setting value file, show PF display condition. Inner setting value is -0.5 ~ 1 + 0.5 COS θ answer to 4~12~20mA operate "↑→", adjust display to 2 5 0 0 condition. (Answer to 20mA)

OU-3                      08  
Analogy output Set 3        Function Code  
  
PF  
Data setting

**Example 4.** Frequency : 60± 5Hz answer to 4~20mA; (50-5, 50-2, 50-1, 60-5, 60-2, 60-1) / 4~20 mA Selectable

Inner setting 60 of Function 09, analogy output function specification: (Set 1~Set 4 analogy output setting)

Press “S”, enter 0 9 function, operate "→↑", key in 60, operate “D” to show alarm setting display :

1. Operate “D” on the “OU-4” panel again, operate "→↑" to adjust display as follows.
2. Function code, operate "↑→", adjust display to 0 9 condition. ( Frequency )
3. Setting value file, operate "↑→", adjust display to 60-5 condition. (55~60~65 answer to 4~12~20mA)

Press “S”, move out to 0 9 function, operate "→↑", key in 99, operate “D” to enter and key in saving password.

OU-4                      09  
Analogy output Set 4        Function Code  
  
60-5  
Data setting

**Example 5.** Watt : 0~2.000KW answer to 4~20mA

Inner setting 60 of Function 09, analogy output function specification: (Set 1~Set 4 analogy output setting)

Press “S”, enter 0 9 function, operate "→↑", key in 60, operate “D” to show alarm setting display :

1. Operate “D” on the “OU-2” panel again, operate "→↑" to adjust display as follows.
2. Function code, operate "↑→", adjust display to 0 6 condition. ( Watt )
3. Setting value file, operate "↑→", adjust display to 2000 condition. (Answer to 20mA)

Press “S”, move out to 0 9 function, operate "→↑", key in 99, operate “D” to enter and key in saving password.

OU-2                      06  
Analogy output Set 2        Function Code  
  
2.000  
Data setting

## 8. Communication Function :

8.1 With one unit of RS 485 communication model (terminal 16 positive ` terminal 17 negative)

With one unit of RS 232 communication model (terminal is 9 pin, D type terminal)

Use ModBus RTU can connect 32 machines.

### 8.2 MODBUS :

*MODBUS-RTU MODE Protocol*

BAUD : 1200 . 2400 . 4800 . 9600 . 19200 . 38400 ;

STARTBIT = 1 ` DATABITS = 8 ` STOPBITS = 1 ` PARITYBITS = 0

Master request reading (8 Byte total)				
Address	Function	Start_Address	Point	CRC16
8-Bits	8-Bits	16-Bits	16-Bits	16-Bits (Lo, Hi)
XXH	03H	XXH,XXH	XXH, XXH=N	XXH, XXH

Slaver write back ( 5+n Byte total )				
Address	Function	Byte_Count	Data	CRC16
8-Bits	8-Bits	16-Bits	Nx 8-Bits	16-Bits (Lo, Hi)
XXH	03H	XXH=N	XXH, XXH, XXH,.....	XXH, XXH

Master request reading (8 Byte total)				
Address	Function	Start_Address	Point	CRC16
8-Bits	8-Bits	16-Bits	16-Bits	16-Bits (Lo, Hi)
XXH	06H	XXH, XXH	XXH, XXH	XXH, XXH

Master request printing saved data reading (8 Byte total)				
Address	Function	Start_Num	Num	CRC16
8-Bits	8-Bits	16-Bits	16-Bits	16-Bits (lo, hi)
XXH	63H	XXH, XXH	XXH, XXH=N	XXH, XXH

Slaver write back Packet ( 38 Byte total )				
Address	Function	Now_Num	Data	CRC16
8-Bits	8-Bits	16-Bits	32-BYTE	16-Bits (Lo, Hi)
XXH	63H	XXH,XXH	XXH, XXH, XXH,.....	XXH,XXH

**Slaver write back Packet is innumerous ' every packet has 38 BYTES.**

Example : DMMPX address is 31 ' PC reads address of 31 DMMP, from 100 (64H) start reading to 200 (C8H) data.

PC dispatches 1 FH+63H+00H+64H+00H+C8H+CRCL+CRCH

DMMPX will revert 1FH+63H+00H+64H+(.....data=32.....)+CRCL+CRCH

1FH+63H+00H+65H+(.....data=32.....)+CRCL+CRCH

( Total 200 )

1FH+63H+01H+2CH+(.....data=32.....)+CRCL+CRCH

**UNIT : One Word (Two Byte)**

### UNIT : One Word (two Byte)

Point	Name	Note	(R:Read ' W:Write)
1	S_V1	R phase voltage ( unsigned int)	R
2	S_V2	S phase voltage ( unsigned int)	
3	S_V3	T phase voltage ( unsigned int)	
4	S_A1	R phase current ( unsigned int)	
5	S_A2	S phase current ( unsigned int)	
6	S_A3	T phase current ( unsigned int)	
7	S_W1	R phase power	
8	S_W2	S phase power	
9	S_W3	T phase power	
10	S_W	W	
11	S_Q	Var	
12	S_Pf	PF	
13	S_Freq	Frequency	
14	WHP	(Long) WH	
15			
16	WHM	(Long) WH (negative)	
17			
18	QHP	(Long) QH	
19			
20	QHM	(Long) QH (negative)	
21			
22	W,V,A Point	W : V . A POINT. W=W*10^(b11,b10,b9,b8); V=V*10^(b7,b6,b5,b4) ; A-A*10 (b3,b2,b1,b0) :	R/W
23	Realy status W, VUnit	BIT7=RY4, BIT6=RY3; BITS5=RY2; BIT4=RY1; Bit2----(1=KV . 0=V)' bit1----(1=MW . 0=W) ' bit 0=demand (0=W/1=V*A).	R/W
24	BAUD	BAUD (0=1200 ' 1=2400 ' 2=4800 ' 3=9600 ' 4=19200 ' 5=38400 ; NORMAL 3=9600)	R/W
25	ADDRESS	ADDRESS ( 0~99 ' NORMAL 50)	R/W
26=1	CT	CT (0~9999)	R/W
27	PT	PT (0~9999)	R/W
28	Mode	(0=3P4W, 1=1P2W, 2=1P3W,3=3P3W ; NORMAL 3P4W)	R/W
29	OV	OV CONTROL FLA : 15_OV1, 14_OV2, 13_OV3, (Phase Voltage) 12_OA1,11_OA2,10_OA3,9_OW1,8_OW2,7_OW3,6_OW,5_OQ,4_OVR, 3_OVS,2_OVT, (wire voltage) 1=ODemPresent, 0_O Demand Forecast	R
30	DA_W_MAX	Reserve (Analogy Output Setting)	R
31	Historical Demand	Max Demand	R
32	Demand Year/Month	Max Demand Time (BCD)	R
33	Demand Day/Hour		
34	Demand Min/Sec		
35	Target Demand	Target Demand	
36	Max Demand	Rating Max Demand	R/W
37	Demand Forecast	Forecast Demand	R
38	Present Demand	Cumulative Demand	R
39	Demand Time	Demand Interval Time	R/W
40	Print Time	Print Reserve Interval Time	R/W
41	Print W Address		R/W
42	Week	0x00 , 0x01~0x07	R/W



43	Year / Month	0x00~0x99 ' 0x01~0x12	R/W
44	Day / Hour	0x01~0x31 ' 0x00~0x23	R/W
45	Min / Sec	0x00~0x59 ' 0x00~0x59 Present System Time	R/W
46	VH1	One time voltage harmonics	R
47	VH_ALL	Total voltage harmonic	R
48	VH_PER	Total voltage harmonics percentage	R
49	VH3	Three times voltage harmonics	R
50	VH5	Five times voltage harmonics	R
51	VH7	Seven times voltage harmonics	R
52	VH9	Nine times voltage harmonics	R
53	VH11	Eleven times voltage harmonics	R
54	VH13	Thirteen times voltage harmonics	R
55	VH15	Fifteen times voltage harmonics	R
56	IH1	One times current harmonics	R
57	IH_ALL	Total current harmonics	R
58	IH_PER	Total current harmonics percentage	R
59	IH3	Three times current harmonics	R
60	IH5	Five times current harmonics	R
61	IH7	Seven times current harmonics	R
62	IH9	Nine times current harmonics	R
63	IH11	Eleven times current harmonics	R
64	IH13	Thirteen times current harmonics	R
65	IH15	Fifteen times current harmonics	R
66	S_V1	Total Voltage	R
67	S_A1	Total Current	R
68	VH17	Seventeen times voltage harmonics	R
69	VH19	Nineteen times voltage harmonics	R
70	VH21	Twenty-one times voltage harmonics	R
71	VH23	Twenty-three times voltage harmonics	R
72	VH25	Twenty-five times voltage harmonics	R
73	VH27	Twenty-seven times voltage harmonics	R
74	VH29	Twenty-nine times voltage harmonics	R
75	VH31	Thirty-one times voltage harmonics	R
76	IH17	Seventeen times current harmonics	R
77	IH19	Nineteen times current harmonics	R
78	IH21	Twenty-one times current harmonics	R
79	IH23	Twenty-three times current harmonics	R
80	IH25	Twenty-five times current harmonics	R
81	IH27	Twenty-seven times current harmonics	R
82	IH29	Twenty-nine times current harmonics	R
83	IH31	Thirty-one times current harmonics	R

Example :

DS\_V1=inbuff [adr\_v1]\*256+inbuff [adr\_v1+1];

WHP=inbuff [adr\_whp]\*256+inbuff [adr\_whp +1]+(inbuff [adr\_whp+2]\*256+inbuff [adr\_whp+3])\*65536;

# RS-485 Modbus

Address 12 S-PF 65038 ~~~~~ 64539 | 999 ~~~~ 500

Power Factor Value -500 (C) ~~~ -999 | 999 ~~~~~ +500 (L)

Power Factor (L) displays directly.

When Power Factor (C), 65538 - Address 12 S-PF = Power Factor value.

Example : Present PF = -0.800 , 65538 - 800 = 64738 (Address 12 S-PF)

Meaning :

When Address 12 S-PF value > 60000, Power Factor is negative (C)

Power Factor value = 65538 - obtained value (Address 12 S-PF)

When Address 12 S-PF value < 2000

Power Factor value = obtained value (Address 12 S-PF)

Var obtained value is indicative value, Power Factor judges (C) or (L).

## 9. Example :

Key in 3 φ 3W 3.3KV/110V, 40/5A (PT=30 multiple, CT=8 multiple)

Indicate 3.300KV 0~40.00A 0~240.0KW (KVar) :

Press "S", enter 01 select file, press "D" again, operate " → ", adjust display to 3 φ 3W condition.

Press "S" or "D", enter 02 PT multiple file, press "D", again, operate " → ↑ ", adjust PT multiple to 30 multiple condition.

Press "S" or "D", enter 03 voltage unit file, press "D", operate " → ", adjust voltage unit to KV condition.

Press "S" or "D", enter 04 voltage decimal file, press "D", operate " → ", adjust voltage decimal to 0.000KV condition.

Press "S" or "D", enter 05 CT multiple file, press "D", operate " → ↑ ", adjust CT multiple to 8 multiple condition.

Press "S" or "D", enter 06 current decimal, press "D" again, operate " → ", adjust current decimal to 00.00A condition.

Press "S" or "D", enter 07 watt unit selection, press "D" again, operate " → ", adjust display unit to KW, Kvar, KWH, KvarH condition.

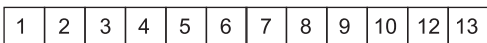
Press "S" or "D", enter 08 watt decimal file, press "D" again, operate " → ", adjust decimal to 000.0KW, Kvar, KWH, KvarH condition.

Press "S" or "D", enter 09 Save, operate " → ↑ " adjust display to 88, then operate "D", display save, key in password, Press "D" to save.

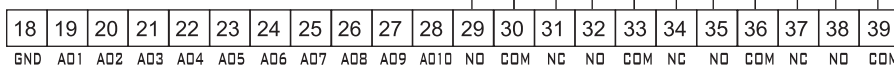
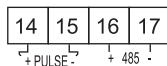
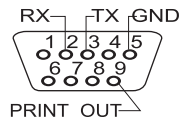
## Connection Diagram :

### WARNING

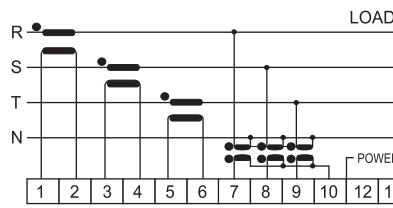
TO AVOID ELECTRIC SHOCK PLEASE.  
NO OPERATOR SERVICEABLE  
COMPONENTS INSIDE. DO NOT REMOVE COVERS.  
REFER SERVICING TO QUALIFIED PERSONNEL.



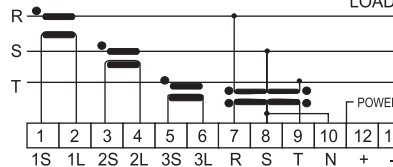
1S 1L 2S 2L 3S 3L R S T N +POWER-



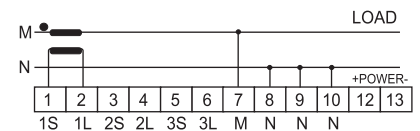
3P4W 3 ELEMENT



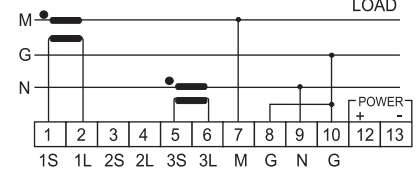
3P3W 3 ELEMENT



1P 2W



1P 3W



3P 3W 2 ELEMENT

