CPM-50 多功能集合式電表

中文操作手冊

A-13-CPM-50(V2.30)-Manual(TC)-091101

CPM-50(V2.30) 多功能 集合式 電力分析表 操作手冊

■ 產品說明

CPM-50 系列 多功能 電力分析表 具有豐富的功能和更高的精度，不僅集合了各項的三相電量測量/顯示、能量累計、諧波測量(31 次總諧波失真率或各次諧波含量)、故障報警、網路通訊功能，而且加入了四象限電能計量，警報及事件記錄等功能。大螢幕、高清晰液晶顯示充分滿足您的視覺要求，高亮度白色背光顯示使您在日光下亦能清楚查閱測量資料。

除俱有兩組 DI(標準配備)外，另可選購 I/O 模組(另加 2*DI、2*DO、2*Relay 及一組 15Vdc 供 DI 使用。這些 I/O 點皆可個別規劃成各種輸出入功能；如遠端量測接點狀態、控制輸出、警報等….。

■ 特點

- 量測 1P2W、1P3W、3P3W、3P4W，不需指定型號，可配合現場 PT 及 CT 元件(Element)數適當設定接線方式，即可執行量測各種參數。
- **多功能、高精度:** 電壓、電流測量精度為 0.2 級 (True-RMS)；功率與能量測量精度為 0.5 級(四象限測量)
- **超短型設計、安裝方便:** 尺寸符合 DIN96X96 標準，安裝深度僅為 55mm(含 I/O 模組 63mm)，即使是在抽屜式開關盤內，CPM-50 也可安裝。
- **大尺寸 LCD 顯示:** 大螢幕、高清晰的液晶顯示器。一個畫面具有 5 個參數顯示，所有測量資料均可通過按鍵輕鬆翻閱。LCD 具有高亮度白色背光，以幫助您在日光下或光線差的環境下使用，背光的點亮方式也可以有多種選擇。

■ 應用

變配電自動化　中、低壓配電系統　智慧建築　能源管理系統　工業機器設備　工業自動化

電力自動化(SCADA)系統

CPM-50 可作為儀錶單獨使用，取代傳統的儀錶，亦可作為電力監控系統（SCADA）之前端量測單元，用以遠端電量量測與控制。工業標準的 RS-485 通訊介面和 MODBUS 通訊協定，使得連接網路輕鬆便捷，是 SCADA 系統的理想選擇。

遠端電力監視控制

CPM-50 雖然是以測量為主的儀錶，但它還附帶了豐富、靈活的 I/O 功能，這使得它完全可以勝任作為分散式 RTU 的要求，實現遠端量測、控制、計量於一體。

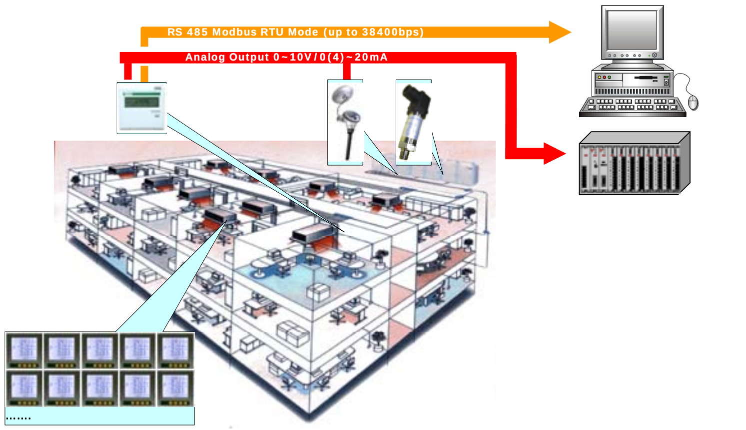
電能質量分析

與傳統儀錶相比，CPM-50 具備了電力品質分析的功能。各相電壓、電流的總諧波畸變率（THD），各次諧波分量（2-31 次）和電壓、電流不平衡度均可即時測量。

電能管理

CPM-50 可以進行雙向四象限有功功率、有功電能的累計，精度符合 IEC60253-22 0.5S 級，能夠提供計量資料，內嵌參數最大值/最小值記錄功能和需量測量功能，配合監控軟體可以幫助用戶統計各線路的能量消耗狀況，調整負載配置及使用。

Building automation for Mutifunction Power Meters, Temperature, Humidity and Pressure



量測顯示定義及說明

- **U(電壓):** 顯示各相電壓、線電壓及其平均電壓
- **I(電流):** 顯示各相電流、中性線電流及其平均電 流
- **P(有效功率):** 各相有效功率及總有效功率
- **Q(無效功率):** 各相無效功率及總無效功率
- **S(視在功率):** 各相視在功率及總視在功率
- **F(頻率):** 以 A 相電壓頻率當作系統頻率
- **kwh(有效電能):** 單位為 kwh，並俱方向性；顯示正值時為消耗電能，顯示負值時為供應電能
  - **Import (imp):** 消耗電能
  - **Export (exp):** 供應電能
  - **Total:** │消耗電能│+│供應電能│(絕對值後相加)
  - **Net:** │消耗電能│-│供應電能│(絕對值後相減)
- **kvarh(無效電能):** 單位為 kvarh，並俱方向性；顯示正值時為電感性無效電能，顯示負值時為電容性無效電能
  - **Import (imp):** 電感性無效電能
  - **Export (exp):** 電容性無效電能
  - **Total:** │電感性無效電能│+│電容性無效電能│ (絕對值後相加)
  - **Net:** │電感性無效電能│-│電容性無效電能│(絕對值後相減)
- **THD(總諧波失真率):** 此失真率通常是表示電力系統的電力品質。
- **Real time clock(日期時間):** 可設定真實時間，並顯示。

- **Over limit alarming:** In CPM-50, when the metering data is over the pre-setting limit and over pre-setting time interval, the over limit alarming will be picked up. The over limit value and time will be recorded and the maximum number of records is 9. The digital output (DO) can be used as trigger to light or sound alarming. There can be maximum 9 in equations related to the over limit alarming. Any satisfaction of the in equations will trigger the over limit alarming. Any one of the 9 equations can be assigned to one of the digital output (DO). An example is given in the following to describe how the first in equation is being set and determined.

Remark: The related registers should be pre-set in order to finish the above process, and the registers are pre-set through communication.

In equation enable register: register EN_INEQU, **bit0~bit8** corresponding to 1to 9 inequation.

Bit(n)=0 forbid the nth inequation.

Bit(n)=1 enable the nth inequation.

The 9 variables (var1 to var9) can be any of the 34 parameters.

Table 3.1

Number	0	1	2	3	4	5	6	7	8
Parameter	F	V_1	V_2	V_3	V_{lnavg}	V_{12}	V_{23}	V_{31}	V_{llavg}
Number	9	10	11	12	13	14	15	16	17
Parameter	I_1	I_2	I_3	I_{avg}	I_n	P_1	P_2	P_3	P_{sum}
Number	18	19	20	21	22	23	24	25	26
Parameter	Q_1	Q_2	Q_3	Q_{sum}	S_1	S_2	S_3	S_{sum}	PF_1
Number	27	28	29	30	31	32	33	34	
Parameter	PF_2	PF_3	PF	U_{unbl}	I_{unbl}	P_d	Q_d	S_d	

Limit setting register: register Ref1 to Ref9

The setting of the Ref register should be the up limit or the low limit of the parameter. The range of the parameter limit is related to the format of the register.

Time limit setting register: register Limit_t

Limit_t is the time interval limit. It is an integer from 0 to 255. One digit is 300ms. Zero means no time limit. Trigger the record and alarming output immediately on the over limitation. All the inequations have the same time limit.

If the Limit_t=20,

the time limitation is 20x300=6000ms.

Inequation sign register: INEQU_Sign1 to INEQU_Sign9.

INEQU_Sign=0, select <, the low limit

INEQU_Sign=1, select >, the up limit

The DO select register:

Associated DO1 register bit0~bit8 correspond to the first to ninth inequation.

Bit(n)=0, DO1 do not associate with the nth inequation

Bit(n)=1, DO1 associate with the nth inequation

Associated DO2 register bit0~bit8 correspond to the first to ninth inequation.

Bit(n)=0, DO2 do not associate with the nth inequation

Bit(n)=1, DO2 associate with the nth inequation

- Example: If current I_1 goes over the high limit and time interval limit 15 Seconds, trigger the over limit alarm record and DO1 output. The CT ratio of the current I_1 is 200/5. The High limit of current I_1 is set to be 180A. The setting of the registers is as following,

Enable the inequation1: EN_INEQU register bit(0)=1

The current I_1 is number 9 in Table 3.1 The setting of the Var1 is 9.

The relation of real current and the data stored in register is,

Real current=(data in registerxCT1/5)/1000

The CT1 is 200 and high limit of current is 180A, then the data in register is 4500. The setting of the Ref1 is 4500.

Time limit is 15 Seconds and the one digit is 300ms, then the setting of Limit_t1 is 50.

As it is the high limit, the INQU_Sign1 should be 1.

Use DO1 as alarm signal output, then the bit0 of the associated DO1 should be 1.

Only recent 9 groups of the alarming record can be stored in memory of CPM-50. The format of the record is,

Address	Content	Remark
Alarming record addr.	Alarming parameter number	Refer to Table3.1
Addr +1	Alarming value	Record the value of alarming
Addr +2	Year	Alarming date
Addr +3	Month	
Addr +4	Date	
Addr +5	Hour	Alarming time
Addr +6	Minute	
Addr +7	Second	

When the alarming parameter resume normal (no longer over the limit), it is also recorded. User can get the total period of over limit time.

Remark: when the alarming parameter resume to normal, the highest bit of Varbit15 is set to be 1.

- **Energy pulse output:** The two digital outputs (DO) can be selected as energy pulse output. Any two of the 8 Active energy and Reactive energy can be assigned to be as the pulse output. The pulse width and pulse ratio can be set, while pulse width means how long the duration of the pulse is and pulse ratio means how much energy that one pulse is represented. When the energy accumulates to the setting limit, there will be a pulse output from the assigned DO port.

Pulse output assignment register: any integer from 0 to 8. The digit 0 means no assignment, while 1 to 8 corresponding to Ep_imp, Ep_exp, Eq_imp, Eq_exp, Ep_total, Ep_net, Eq_total and Eq_net respectively.

Pulse ratio register: any integer from 1 to 6000. One digit represents 0.1kwh or kvarh. This value is the minimum resolution of energy pulse output.

Pulse width setting register: any integer from 1 to 50. One digit represents 20ms.

The minimum time interval between two adjoining output pulses is 20ms. If the pulse width is 20ms, then maximum number of output pulses is 25 in one Second. If the pulse width is 80ms, then the maximum number of output pulse is 10. In practice the pulse width and the pulse ratio is selected according to system power.

Relay output: The two relay output (option) can be used to control electric switch or equipment. There are two output modes of the relay, latching or momentary. Momentary mode is often used to control the electric switch. The closing time interval can be selected between 50ms to 3000ms.

CPM-52 特有功能

- **Demand(需量):** CPM-52 才具備此功能。分為有效功率需量、無效功率需量、視在功率需量；其計算方式為移動平均法(sliding window)。計算時間設定範圍為 1 ~ 30 分鐘；平均時間為 1 次/分鐘。
  - 例如：計算時間設定為 3 分鐘，
    第一分鐘的平均有效功率 = 12
    第二分鐘的平均有效功率 = 14
    第三分鐘的平均有效功率 = 10,
    因此 第三分鐘末總有效功率需量
    = (12+14+10)/3=12
    (1 分鐘的平均 有效功率需量)
    第四分鐘的平均有效功率 = 8,
    因此 第四分鐘末總有效功率需量
    = (14+10+8)/3=10
    (1 分鐘的平均 有效功率需量)
- **CF/Crest factor(電壓波峰因素):** CPM-52 才具備此功能。此因素通常是表示波峰特性；因素的大小將影響系統絕緣特性。
- **K factor(電流波形因素):** CPM-52 才具備此功能。此因素通常是表示電流波形特性；此因素的大小將變壓器、馬達造成溫升。
- **Telephone Interference Factor (THFF):** The interference factor to telephone communication system. The function of the THFF exists in CPM-52 only.
- **Three phase unbalance factor(三相不平衡度):** 此因素為顯示三相電壓及電流的不平衡百分比。
- **Max/Min statistics(最大/小值紀錄):** 電壓、電流、有效功率、無效功率、視在功率、功率因素、頻率、需量等量測電量的最大/小值，將被紀錄在 NV-RAM 中，便於日後系統及異常分析。
- **Phase Angle different(相角差):** 此為電壓與電流的相角差；量測範圍從 0 to 360°。
  當電壓接線為三相三線(2LL)時，此值為 V_{23}、I_1、I_2 及 I_3 與 V_{12} 之間的相角差。 當電壓接線為三相四線(2LN 或 3LN) 時，此值為 V_2、V_3、I_1、I_2 及 I_3 與 V_1 之間的相角差。

■ 訂購規格選擇表

CPM- [Model Number] **-** [A Input range | V Input range] **-** [DI | DO | RL] (OPTION 1) **-** [AUX. POWER] (OPTION 4)

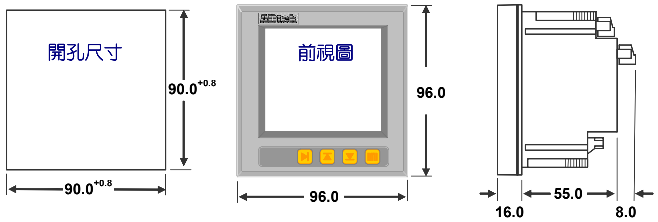
CODE	MODEL NUMBER
51	Standard
52	With individual Harmonic and Demand

CODE		INPUT RANGE
A5		0 ~ 5 A
	V5	0 ~ 500 V

CODE			DI/DO/Relay
I2	N	N	2 DI (Standard)
OPTION 1(I/O Module)			
I4	O2	R2	4 DI, 2 DO & 2R

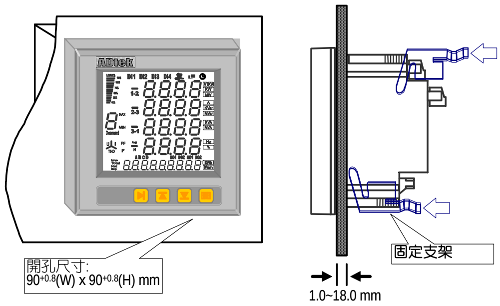
CODE	AXU. POWER
AD	AC 85~264V/ DC100~300V
OPTION 4	
D25	DC 20~56V

■ 外觀尺寸



Unit: mm

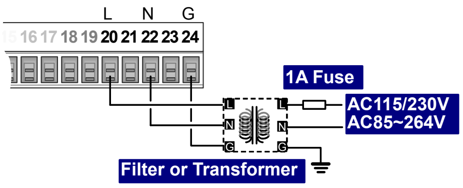
■ 安裝方式



■ 接線圖

接線時，請務必確認電源電壓是否正確並接入正確端子編號。為設備及儀表安全，建議在儀表前安裝保險絲或無熔絲開關。

Auxiliary Power (Terminal Block 2)



電壓 & 電流 輸入 (Terminal Block 1)

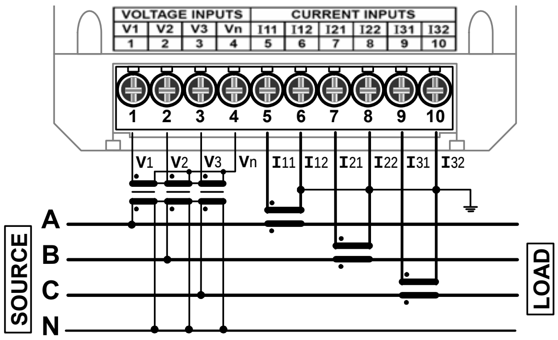
The connection has to relative the page 03 and page 04 of programming level.

電壓接線: AWG16~12(1.3~2.0mm^2)

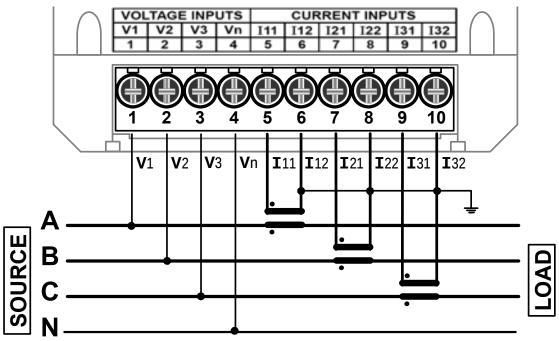
電流接線: AWG15~10(1.5~2.5mm^2)

3Phase 4Wire

- 3 相 4 線 – 3PT / 3CT [設定: 3LN, 3CT]

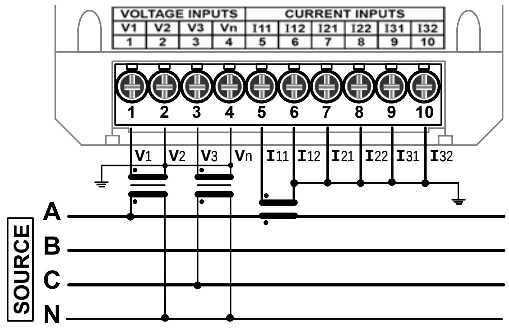


- 3 相 4 線 – 電壓直入(無 PT) / 3CT [設定: 3LN, 3CT]



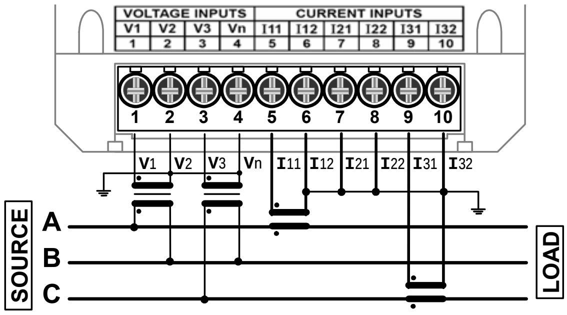
3Phase 4Wire (Balanced Load)

- 3 相 4 線(平衡負載) – 2PT / 1CT [設定: 2LN, 1CT]

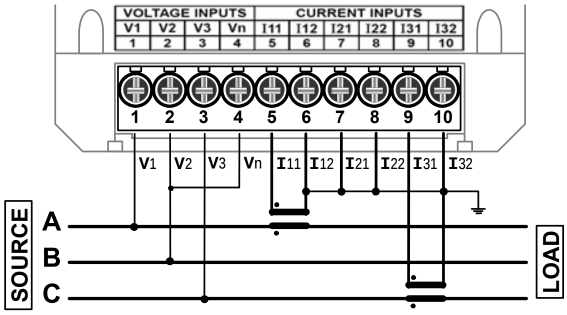


3Phase 3Wire

- 3 相 3 線 – 2PT / 2CT [設定: 2LL, 2CT]

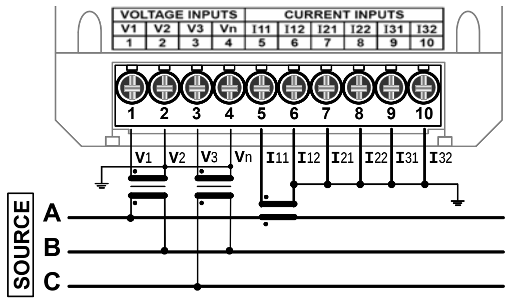


- 3 相 3 線 – 電壓直入(無 PT) / 2CT [設定: 2LL, 2CT]

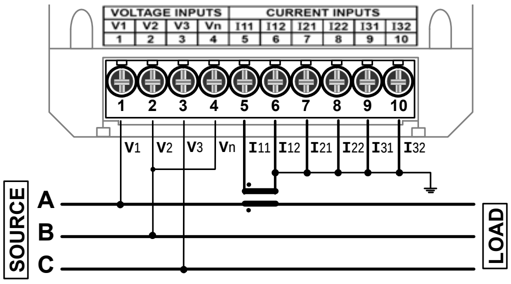


3Phase 3Wire (Balanced Load)

- 3 相 3 線(平衡負載) – 2PT / 1CT [設定: 2LL, 1CT]

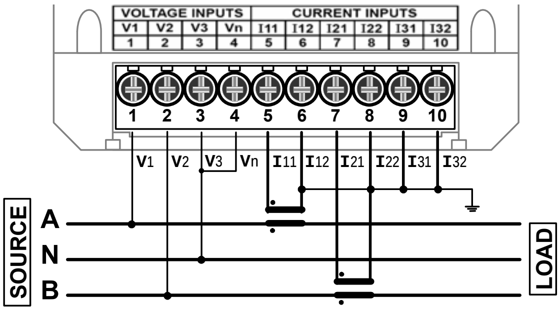


● 3 相 3 線(平衡負載) – 電壓直入(無 PT) / 1CT [設定: 2LL, 1CT]



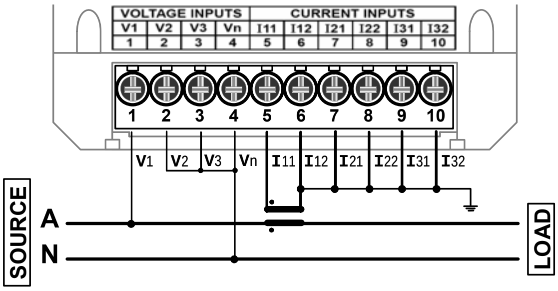
1Phase 3Wire

● 單相 3 線 – [設定: 3LN, 3CT]



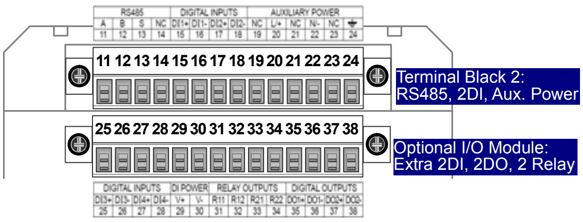
1Phase 2Wire

● 單相 2 線 – [設定: 3LN, 3CT]

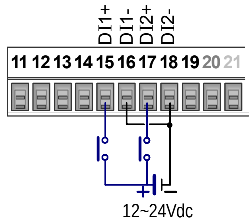


RS485 / 2DI (Terminal Block 2) and Extra 2DI / 2DO / 2Relay (Optional I/O Module)

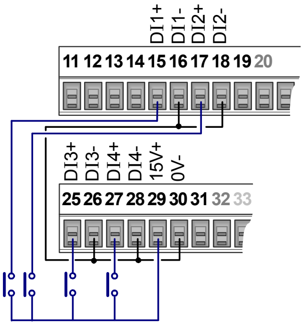
Wiring: AWG22~16(0.5~1.3mm^2)



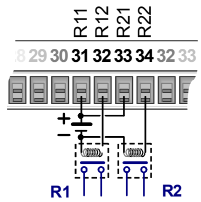
2DI(Standard) with external DC powered



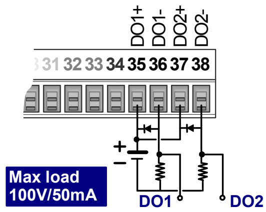
4DI(Optional) with internal DC powered



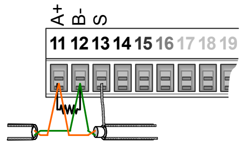
2Relay(Optional) with External Power Relay



2DO(Optional) with External Powered

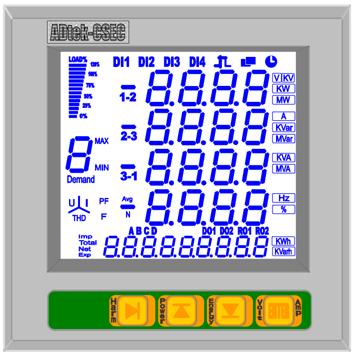


RS485 Communication Port



Max. Distance: 1200M
Terminate Resistor (at latest unit):
120~300 ohm/0.25W(typical: 150 ohm)

■ 面板各部名稱



本儀表具備了大視窗LCD(65wX58h)藍色字體、高亮度白色背光。顯示部分包括了4行4位數數值顯示、1行9位數電能數值及日期時間顯示、I/O狀態顯示、單位及各種量測功能標示…等。其說明如下:

■ 數字顯示視窗
- 8.8.8.8 四行 **4 位數:** 10.0mm 字高；顯示電壓、電流、功率、功率因數、頻率、諧波畸變率(THD)、需量、不平衡度、最大值、最小值等顯示。
- 8.8.8.8.8.8.8.8.8 **一行 9 位數:** 6.0mm 字高；顯示有效電能、無效電能/四象限(耗電、發電、淨電能、總電能)及日期時間等顯示。

■ 單位顯示
- V kV A kW MW kVar MVar kVA MVA Hz kwh kvarh % 。
- 電量顯示值超過 4 位數時，單位會自動切換 K 或 M。

■ I/O 狀態顯示:
- **數位輸入(Digital Input)** DIx**:** 當數位輸入時，DIx 點亮。
- **數位輸出(Digital Output)** DOx**:** 當數位輸出時，DOx 點亮。點亮狀態將依據 DO 設定的模式而有所不同。
- **繼電器輸出(Relay Output)** ROx**:** 當繼電器輸出時，ROx 點亮。點亮狀態將依據繼電器設定的模式而有所不同。
- **脈衝波輸出 ⎍:** ; 當 DO 被設定為對應有效電能(Active Energy)或無效電能(Re-Active Energy)輸出時，⎍ 將根據有效電能或無效電能累積增加，而對應輸出。
- **RS 485 通訊狀態顯示** ▪▫**:** 標示中有兩個狀似電腦螢幕的長方框；較大的表示 Master 的通訊狀態，而較小的表示本機(Slave)的通訊狀態。正常通訊狀態應是兩個長方框交互閃爍。

■ 負載狀態顯示
- **負載比例:** 顯示即時電流為額定滿載的百分比。
- **負載特性:** 當負載特性為電感性時電感符號點亮；當負載特性為電容性時電容符號點亮。
- **不平衡度:** 顯示電壓及電流的三相不平衡度。

■ 量測電量標示符號
- 8 **一個 1 位數:** 10.0mm 字高；以英文字母標示當前四行 4 位數數字視窗所顯示的參數名稱。
  U: 電壓； I:電流；P:有效功率；q:無效功率；S:視在功率。
- PF **(Power Factor):** 標示第四行 4 位數數字視窗所顯示的電量值為 **"功率因素"**。
- F **(Frequency):** 標示第四行 4 位數數字視窗所顯示的電量值為 **"頻率"**。
- 1-2 2-3 3-1**(線對線):** 標示四行 4 位數數字視窗所顯示的電量值為 **"線對線"**。
- 1 2 3 **(相):** 標示四行 4 位數數字視窗所顯示的電量值為 **"相"**。
- N **(Neutral):** 配合 **"I"** 標示第四行 4 位數數字視窗所顯示的電量值為 **"中性線電流"**。
- Avg **(Average):** 標示第四行 4 位數數字視窗所顯示的電量值為 **"平均值"**。
- MAX MIN **(Maximum / Minimum):** 標示四行 4 位數數字視窗所顯示的電量值為 **"最大值"** 或 **"最小值"**。

■ 電量品質標示符號
- Demand **(需量):** 標示四行 4 位數數字視窗所顯示的電量值為 **"需量值"**。
- THD **(Total Harmonic Destroy):** 配合 U 標示四行 4 位數數字視窗所顯示的值為 **"各相電壓的諧波失真率"** 及 **"平均電壓諧波失真率"**。配合 I 標示四行 4 位數數字視窗所顯示的值為 **"各相電流的諧波失真率"** 及 **"平均電流諧波失真率"**。

■ **操作按鍵:** 具有四個操作按鍵；**Shift key / Up key / Down key / Enter**。通過四個按鍵的操作可以顯示不同量測畫面以及參數的設定。

■ **通關密碼功能: 設定範圍:0000~9999**；必須輸入正確的密碼，才能夠進入 參數功能階層 進行參數規劃設定；若設定錯誤將會回到量測顯示畫面。若忘記密碼請來電查詢。

■ 操作說明: 進入操作及設定前，請先查閱參數說明及定義

	按 鍵 說 明			其 他 說 明
	Quick View 功能: 可操作 4 個按鍵，即可翻閱所有量測參數。			
		量測顯示畫面	設定畫面	
	Enter key	顯示各項電壓及電流量測畫面	確認設定輸入儲存並跳到下一頁	
	Down key	顯示各項電能量測畫面	數字減少，按 **1** 次減少 **1(9, 8, …,0, 9..)**	
	Up key	顯示各項功率量測畫面	數字增加，按 **1** 次增加 **1(0, 1,..,9,0,…)**	
	Shift key	顯示各項電力品質量測畫面	移動設定位置(閃爍位置)	
	Up key + Enter key	顯示各項電量之最大/小值紀錄畫面		
	Shift key + Enter key	進入參數設定階層	不儲存本頁設定內容，跳出設定畫面回到量測顯示畫面	

■ 量測電量快速翻閱: 以下畫面僅為說明，並不一定符合實際系統

一般操作階層(快速翻閱)

■ 快速翻閱 電壓及電流 量測值， 按 Enter 鍵

在任何量測顯示畫面下

、

相電壓顯示畫面
第 1 行: A 相電壓 U_1=220.4 V
第 2 行: B 相電壓 U_2=220.8 V
第 3 行: C 相電壓 U_3=220.7 V
第 4 行: 平均相電壓 U_{lnavg}=220.6 V
$U_{lnavg}=(U_1+U_2+U_3)/3$
第 5 行: 有效電能: 141.4 kwh
Imp: 消耗(輸入)電能
kwh: 有效電能單位為千瓦小時
LOAD%: 40%，現在負載電流百分比

當電壓接線設定為 2LL(3P 3W)時，無相電壓顯示

按 ENT 鍵 ⬇

線電流顯示畫面
第 1 行: A 相 線電流 I_1=233.3 A
第 2 行: B 相 線電流 I_2=233.3 A
第 3 行: C 相 線電流 I_3=233.3 A
第 4 行: 中性線電流 I_N=698.8 A
第 5 行: 有效電能: 141.7 kwh
Imp: 消耗(輸入)電能
kwh: 有效電能單位為千瓦小時
LOAD%: 40%，現在負載電流百分比

當電流接線設定為 2LL(3P 3W)時，無中性線電流顯示

按 ENT 鍵 ⬇

線電壓顯示畫面
第 1 行: AB 相 線電壓 U_{1-2}=0.0 V
第 2 行: BC 相 線電壓 U_{2-3}=0.0 V
第 3 行: CA 相 線電壓 U_{3-1}=0.0 V
第 4 行: 平均線電壓 U_{avg}=0.0 V
$U_{avg}=(U_{1-2}+U_{2-3}+U_{3-1})/3$

按 ENT 鍵 ⬇

接下一頁

相電流顯示畫面
第 1 行: A 相電流 I_1=232.2 A
第 2 行: B 相電流 I_2=232.3 A
第 3 行: C 相電流 I_3=232.3 A
第 4 行: 平均相電流 I_{avg}=232.2 A
$I_{avg}= (I_1+ I_2+ I_3)/3$
第 5 行: 有效電能: 142.3 kwh
Imp: 消耗(輸入)電能
kwh: 有效電能單位為千瓦小時
LOAD%: 40%，現在負載電流百分比
⊣⊢: 電容性負載

按 ENT 鍵 ⬇ 跳回到第一頁

■ 快速翻閱 電能及時間 量測值，按 Down 鍵

在任何量測顯示畫面下

按 Down 鍵 ⬇

消耗(輸入)有效電能顯示畫面
第 5 行: 有效電能: 438.6 kwh
Imp: 消耗(輸入)電能
kwh: 有效電能單位為千瓦小時

按 Down 鍵 ⬇

輸出有效電能顯示畫面
第 5 行: 有效電能: 130.5 kwh
Exp: 輸出電能
kwh: 有效電能單位為千瓦小時

按 Down 鍵 ⬇ 接下一頁

總有效電能顯示畫面
第 5 行: 有效電能: 569.7 kwh
Total: I 消耗(輸入)電能 I + I 輸出電能 I(絕對值相加)
kwh: 有效電能單位為千瓦小時

Total = I Import I + I Export I

按 Down 鍵 ⬇

淨有效電能顯示畫面
第 5 行: 有效電能: 309.1 kwh
Net: I 消耗(輸入)電能 I - I 輸出電能 I (絕對值相減)
kwh: 有效電能單位為千瓦小時

Net = I Import I - I Export I

按 Down 鍵 ⬇

電感性無效電能顯示畫面
第 5 行: 電感性無效電能: 91.5 kvarh
Imp: 電感性無效電能
kvarh: 電感性無效電能單位為千乏小時

按 Down 鍵 ⬇

電容性無效電能顯示畫面
第 5 行: 電容性無效電能: 2.3 kvarh
Exp: 電容性無效電能
kvarh: 電容性無效電能單位為千乏小時

按 Down 鍵 ⬇

接下一頁

總無效電能顯示畫面

第 5 行: **總無效電能: 93.8 kvarh**

Total: I 電感性無效電能 I +
I 電容性無效電能 I
(絕對值相加)

kvarh: 無效電能單位為千乏小時

按 **Down** 鍵 ⬇

淨無效電能顯示畫面

第 5 行: **淨無效電能: 89.7 kvarh**

Net: I 電感性無效電能 I -
I 電容性無效電能 I
(絕對值相減)

kvarh: 無效電能單位為千乏小時

按 **Down** 鍵 ⬇

日期顯示畫面

第 5 行: **Date: 06(M):08(D):2007(Y)**

按 **Down** 鍵 ⬇

時間顯示畫面

第 5 行: **Clock: 15(h):21(m):45(s)**

按 **Down** 鍵 ⬇ 跳回到第一頁

■ 快速翻閱 功率 量測值，按 Up 鍵

在任何量測顯示畫面下

按 Up 鍵 ⬇

有效功率顯示畫面

第 **1** 行: **A** 相 有效功率 P_1**=49.50 kW**

第 **2** 行: **B** 相 有效功率 P_2**=49.65 kW**

第 **3** 行: **C** 相 有效功率 P_3**=49.61 kW**

第 **4** 行: 總有效功率 P_{sum}**=148.7kW**

$P_{sum} = P_1 + P_2 + P_3$

第 **5** 行: 有效電能: **130.5 kwh**

Exp: 輸出電能

kwh: 有效電能單位為千瓦小時

LOAD%: 40%，現在負載電流百分比

⊣⊢: 電容姓負載

當電壓接線設定為 **2LL(3P 3W)**時，無相有效功率顯示

按 Up 鍵 ⬇

無效功率顯示畫面

第 **1** 行: **A** 相無效功率 Q_1**=0.232 kvar**

第 **2** 行: **B** 相無效功率 Q_2**=0.257 kvar**

第 **3** 行: **C** 相無效功率 Q_3**=0.265 kvar**

第 **4** 行: 總無效功率 Q_{sum}**=0.755 kvar**

$Q_{sum} = Q_1 + Q_2 + Q_3$

第 **5** 行: 有效電能: **130.5 kwh**

Exp: 輸出電能

kwh: 有效電能單位為千瓦小時

LOAD%: 40%，現在負載電流百分比

-ᨏ-: 電感姓負載

按 Up 鍵 ⬇

視在功率顯示畫面

第 **1** 行: **A** 相視在功率 S_1**=49.01 kVA**

第 **2** 行: **B** 相視在功率 S_2**=49.12 kVA**

第 **3** 行: **C** 相視在功率 S_3**=49.11 kVA**

第 **4** 行: 總視在功率 S_{sum}**=147.2 kVA**

$S_{sum} = S_1 + S_2 + S_3$

第 **5** 行: 有效電能: **130.5 kwh**

Exp: 輸出電能

kwh: 有效電能單位為千瓦小時

LOAD%: 40%，現在負載電流百分比

按 Up 鍵 ⬇

接下一頁

功率因數顯示畫面

第 **1** 行 **A** 相 功率因數: **PF_1=0.989**

第 **2** 行 **B** 相 功率因數: **PF_2=0.990**

第 **3** 行 **C** 相 功率因數: **PF_3=0.988**

第 **4** 行 平均功率因數: **PF=0.989**

PF_{avg} = (PF_1+ PF_2+ PF_3)/3

按 Up 鍵 ⬇

功率與功率因數顯示畫面

第 **1** 行: 有效功率 **P_{sum}=146.0 kW**

第 **2** 行: 無效功率 **Q_{sum}=0.000 kvar**

第 **3** 行: 視在功率 **S_{sum}=146.0 kVA**

第 **4** 行: 功率因數 **PF=1.000**

按 Up 鍵 ⬇

功率與頻率顯示畫面

第 **1** 行: 有效功率 **P_{sum}=145.1 kW**

第 **2** 行: 無效功率 **Q_{sum}=0.761 kvar**

第 **3** 行: 視在功率 **S_{sum}=147.0 kVA**

第 **4** 行: 頻率 **Freq.=50.03 Hz**

按 Up 鍵 ⬇

需量與頻率顯示畫面

第 **1** 行: 瓦特需量 **P_{md}=145.1 kW**

第 **2** 行: 乏需量 **Q_{md}=0.761 kvar**

第 **3** 行: 視在功率需量 **S_{md}=147.0 kVA**

第 **4** 行: 頻率 **Freq.=50.03 Hz**

CPM-52 才具備需量功能

按 Up 鍵 ⬇ 跳回到第一頁

■ 快速翻閱 電力品質 量測值，按 Shift 鍵

在任何量測顯示畫面下

按 Shift 鍵 ⬇

電壓(3P4W)諧波失真率顯示畫面

第 **1** 行: **A** 相電壓諧波失真率

$U_1(THD_{V1})$=2.88%

第 **2** 行: **B** 相電壓諧波失真率

$U_2(THD_{V2})$=2.92%

第 **3** 行: **C** 相電壓諧波失真率

$U_3(THD_{V3})$=2.91%

第 **4** 行: 電壓總諧波失真率

$U_{avg}(THD_{Vavg})$=2.90%

$THD_{Vavg} = (U_1(THD_{V1})+ U_2(THD_{V2})+ U_3(THD_{V3}))/3$

按 Shift 鍵 ⬇

電流(3P4W)總諧波失真率顯示畫面

第 **1** 行: **A** 相電流諧波失真率:

$I_1(THD_{I1})$=3.08%

第 **2** 行: **B** 相電流諧波失真率:

$I_2(THD_{I2})$=3.12%

第 **3** 行: **C** 相電流諧波失真率:

$I_3(THD_{I3})$=3.13%

第 **4** 行: 電流總諧波失真率:

$I_{avg}(THD_{Iavg})$=3.11%

$THD_{Iavg} = (THD_{I1}+THD_{I2}+ THD_{I3})/3$

按 Shift 鍵 ⬇

電壓及電流不平衡度顯示畫面

U 電壓不平衡度: **0.0%**

I 電流不平衡度: **0.0%**

按 Shift 鍵 ⬇ 跳回到第一頁

■ **CPM-52** 附加功能

快速翻閱 最大/小值 紀錄值，按 **Up** 鍵 + **Enter** 鍵

在任何量測顯示畫面下

Up 鍵 + **Enter** 鍵 ⬇

相電壓最大值紀錄顯示畫面

第 1 行: $U_1(V_{1\_max})$=220.4 V

第 2 行: $U_2(V_{2\_max})$=220.2 V

第 3 行: $U_3(V_{3\_max})$=220.2 V

Up 鍵 ➡

Up 鍵 ⬅

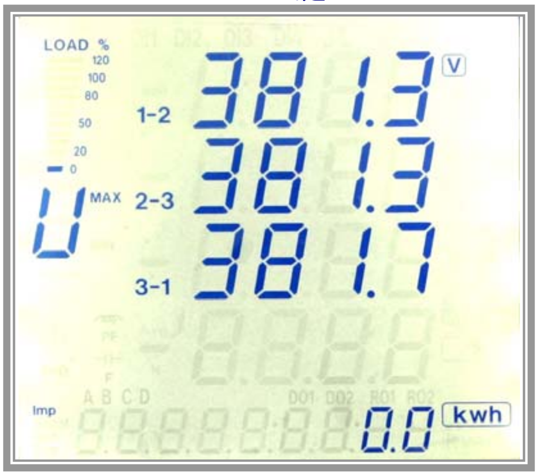
相電壓最小值紀錄顯示畫面

第 1 行: $U_1(V_{1\_min})$= 0.0 V

第 2 行: $U_2(V_{2\_min})$= 0.0 V

第 3 行: $U_3(V_{3\_min})$= 0.0 V

Enter 鍵 ⬇



線電壓最大值紀錄顯示畫面

第 1 行: $U_{12}(V_{12\_max})$= 381.3 V

第 2 行: $U_{23}(V_{23\_max})$= 381.3 V

第 3 行: $U_{31}(V_{31\_max})$= 381.7 V

Up 鍵 ➡

Up 鍵 ⬅

線電壓最小值紀錄顯示畫面

第 1 行: $U_{12}(V_{12\_min})$= 0.0 V

第 2 行: $U_{23}(V_{23\_min})$= 0.0 V

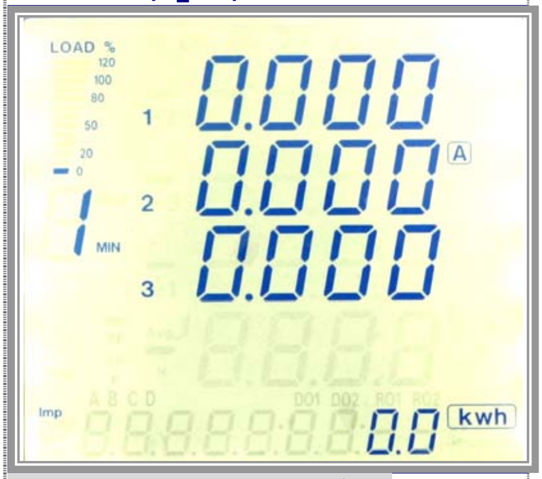
第 3 行: $U_{31}(V_{31\_min})$= 0.0 V

Enter 鍵 ⬇

接下一頁

相電流最大值紀錄顯示畫面
第 1 行: $I_1(I_{1\_max})$= 5.002 A
第 2 行: $I_2(I_{2\_max})$= 5.003 A
第 3 行: $I_3(I_{3\_max})$= 5.003 A

Up 鍵 →
Up 鍵 ←



相電流最小值紀錄顯示畫面
第 1 行: $I_1(I_{1\_min})$= 0.0 A
第 2 行: $I_2(I_{2\_min})$= 0.0 A
第 1 行: $I_3(I_{3\_min})$= 0.0 A

Enter 鍵 ↓

功率與功率因數最大值紀錄顯示畫面
第 1 行: P(P_{max})= 3.304 kW
第 2 行: Q(Q_{max})= 0.017 kvar
第 3 行: S(S_{max})= 3.304 kVA
第 4 行: PF(PF_{max})= 1.000

Up 鍵 →
Up 鍵 ←

功率與功率因數最小值紀錄顯示畫面
第 1 行: P(P_{min})= 0.000 kW
第 2 行: Q(Q_{min})= -0.001 kvar
第 3 行: S(S_{min})= 0.000 kVA
第 4 行: PF(PF_{min})= 0.000

Enter 鍵 ↓

接下一頁

最大需量與頻率最大值紀錄顯示畫面

第 **1** 行: **P(P_{max_d})= 0.162 kW**

第 **2** 行: **Q(Q_{max_d})= 0.000 kvar**

第 **3** 行: **S(S_{max_d})= 0.162 kVA**

第 **4** 行: **F(F_{max})= 60.20 Hz**

Up 鍵 →

Up 鍵 ←

最小需量與頻率最小值紀錄顯示畫面

第 **1** 行: **P(P_{min_d})= 0.000 kW**

第 **2** 行: **Q(Q_{min_d})= 0.000 kvar**

第 **3** 行: **S(S_{min_d})= 0.000 kVA**

第 **4** 行: **F(F_{min_d})= 0.00 Hz**

Enter 鍵 ↓ 跳回到第一頁

系統參數設定:

參數設定階層(Programming)

在任何量測顯示畫面下 按 Shift 鍵 + Enter 鍵 ⬇

按 **Shift** 鍵 + **Enter** 鍵 進入參數設定階層 或 跳出 參數設定階層 回到 量測顯示畫面

PASS(Pass word): 通關密碼
設定範圍: 0000 to 9999.
出廠值: 0000
操作按鍵: Shift key, Up key, Down key

- 輸入正確密碼後，按 **Enter** 鍵 便可進入參數設定階層，若密碼錯誤將會跳回量測顯示畫面

Press Key ⬇

Page 01
Add(Address): RS485 Modbus RTU mode 的通訊位址
設定範圍: 001 to 247
出廠值: 001
操作按鍵: Shift key, Up key, Down key

- 在同一 RS485 Modbus RTU mode 網路中，每一台電表必須設定不同的通訊位址

按 ENT 鍵 ⬇

Page 02
bPS(bits per second): Baud rate for RS485 Modbus
選擇範圍: 600, 1200, 2400, 4800, 9600, 19200, 38400
出廠值: 19200
操作按鍵: Up key, Down key

- **CPM-50** 系列 提供的資料格式為: **8 data bit, no parity, 1 start bit and1 stop bit.**

按 ENT 鍵 ⬇

接下一頁

按 ENT 鍵 ↓

按 ENT 鍵 ↓

按 ENT 鍵 ↓

按 ENT 鍵 ↓

Page 03

WIrE-U(Wire-Voltage): 量測電壓的輸入相線選擇

選擇範圍: 3Ln(1P2W,1P3W,3P4W)/
2LL(3P3W)
2Ln(3P4W balanced)

出廠值: 3Ln

操作按鍵: Up key, Down key

Page 04

WIrE-I(Wire-Current): 量測電流的輸入相線選擇

選擇範圍: 3ct(1P2W,1P3W,3P4W) /
2ct(3P3W)
1ct(3P3W balanced,
3P4W balanced)

出廠值: 3ct

操作按鍵: Up key, Down key

Page 05

Pt1(Primary of PT): PT 的一次測電壓設定

設定範圍: 100 ~ 500,000 V

出廠值: 400

操作按鍵: Shift key, Up key,
Down key

Page 06

Pt2(Secondary of PT): PT 的二次測電壓設定

設定範圍: 100 ~ 400 V

出廠值: 400

操作按鍵: Shift key, Up key,
Down key

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Page 07

Ct1(Primary of CT): CT 的一次測電流設定

設定範圍: 5 ~ 10000 A

出廠值: 5

操作按鍵: Shift key, Up key, Down key

按 ENT 鍵 ↓

Page 08

do Type(DO type): 此數位輸出(Digital Output)可設定為 **警報輸出** 做高低值警報 或 對應電能做 **脈衝輸出**。

選擇範圍: PLS(Pulse) / **AL**(Alarm)

出廠值: PLS

操作按鍵: Up key, Down key

※ 警報輸出的相關控制參數設定，必須透過 RS485 來設定。

數位輸出是選配模組 I/O 中的功能，請在訂購型號中選擇 I4O2R2。

按 ENT 鍵 ↓

Page 09

do1 PULS SLct: DO1 對應電能參數輸出設定；若數位輸出(DO)設定為對應電能做脈衝(Pulse)輸出時，可由此畫面設定對應何種電能參數。

選擇範圍: 0(無輸出) /
- **1**(有效輸入電能_Imp) /
- **2**(有效輸出電能_Exp) /
- **3**(無效電感電能_Imp) /
- **4**(無效電容電能_Exp) /
- **5**(有效電能_Total) /
- **6**(有效電能_Net) /
- **7**(無效電能_Total) /
- **8**(無效電能_Net)

出廠值: 0(無輸出)

操作按鍵: Up key, Down key

按 ENT 鍵 ↓

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Page 10

do2 PULS SLct: DO2 對應電能參數輸出設定；若數位輸出(DO)設定為對應電能做脈衝(Pulse)輸出時，可由此畫面設定對應何種電能參數。

選擇範圍: **0**(無輸出) /
- **1**(有效輸入電能_Imp) /
- **2**(有效輸出電能_Exp) /
- **3**(無效電感電能_Imp) /
- **4**(無效電容電能_Exp) /
- **5**(有效電能_Total) /
- **6**(有效電能_Net) /
- **7**(無效電能_Total) /
- **8**(無效電能_Net)

出廠值: 0(無輸出)

操作按鍵: Up key, Down key

按 ENT 鍵 ↓

Page 11

PULS WId(Width of pulse): 脈衝波寬設定

設定範圍: 1 ~ 50(x 20ms)

出廠值: 01

- The pulse width is integer from 1 to 50. One digit is 20ms.

操作按鍵: Shift key, Up key, Down key

按 ENT 鍵 ↓

Page 12

PULS-con(Pulse Count): 脈衝常數設定；1 個脈衝 = 設定值 x 0.1(kwh or kvarh)。

設定範圍: 1 ~ 6000 (x 0.1KW or Kvar)

出廠值: 0001

操作按鍵: Shift key, Up key, Down key

按 ENT 鍵 ↓

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Page 13

ro1 tYPE(Relay 1 output Mode):
繼電器輸出方式選擇，說明如下:
ON/OFF 方式: 量測值達到警報設定條件時，繼電器輸出，當警報條件不成立時，繼電器復歸。
Momentary(暫態)方式: 量測值達到警報設定條件時，繼電器輸出一段已設定的時間(Ton)然後復歸。
選擇範圍: **0**(ON/OFF) / **1**(Momentary)
出廠值: **1**
操作按鍵: Up key, Down key

繼電器輸出是選配模組 I/O 中的功能，請在訂購型號中選擇 I4O2R2。

按 ENT 鍵 ↓

If the ro1 tYPE set to be Momentary, this page will be appearing.

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ro1-con(Close Time Ton of Relay 1): 當繼電器設定為暫態(Momentary)輸出方式時，此設定為繼電器的輸出時間。
設定範圍: 50 ~3000ms
出廠值: 200
操作按鍵: Shift key, Up key, Down key

按 ENT 鍵 ↓

Page 15

ro2 tYPE(Relay 2 output Mode): 與繼電器 1 相同
選擇範圍: **0**(ON) / **1**(Momentary)
出廠值: **1**
操作按鍵: Up key, Down key

繼電器輸出是選配模組 I/O 中的功能，請在訂購型號中選擇 I4O2R2。

按 ENT 鍵 ↓

If the ro2 tYPE set to be Momentary, this page will be appearing.

Page 16

ro2-con(Close Time Ton of Relay 2): 與繼電器 1 相同
設定範圍: 50 ~3000ms
出廠值: 200
操作按鍵: Shift key, Up key, Down key

按 ENT 鍵 ↓

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Page 17

bLt cont(The period of back light on): 顯示螢幕背光時間設定；當設定時間內沒有操作按鍵，背光會自動熄滅，待再次操作按鍵時背光會再度點亮。

設定範圍: **0**(永遠點亮) ~ 120 Min.

出廠值: 001

操作按鍵: Shift key, Up key, Down key

按 ENT 鍵 ↓

Page 18

SLId tIME(Sliding window Time of Demand): 計算需量時的移動平均時間

設定範圍: 1 ~ 30 Minutes

出廠值: 15

操作按鍵: Shift key, Up key, Down key

CPM-52 才具備此功能

按 ENT 鍵 ↓

Page 19

StAt CLr(Clear the maximum and minimum storages): 清除最大/小值紀錄

選擇範圍: **YES** / **no**

操作按鍵: Up key, Down key

CPM-52 才具備此功能

按 ENT 鍵 ↓

Page 20

DAtE(Date): 日期設定

Display format is MM.DD.YYYY

設定範圍: 01.01.2000 ~ 12.31.2099

操作按鍵: Shift key, Up key, Down key

按 ENT 鍵 ↓

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Page 21
tIME(Time): 時間設定
Display format is hh:mm:ss
設定範圍**:** 00:00:00 ~ 23:59:59
操作按鍵**:** Shift key, Up key, Down key

按 **ENT** 鍵 ↓

Page 22
PASS(Pass word): 通關密碼設定
設定範圍**:** 0000 ~ 9999
出廠值**:** 0000
操作按鍵**:** Shift key, Up key, Down key

請務必紀錄此密碼，以便於再次參數設定階層進入時使用

按 **ENT** 鍵 ↓ 跳回到第一頁

RS485(ModBus RTU Mode)

■ Protocol of ModBus RTU Mode

The Modbus RTU protocol is used for communication in CPM. The data format and error check method is defined in Modbus protocol. The half duplex query and respond mode is adopted in Modbus protocol. There is only one master device in the communication net. The others are slave devices, waiting for the query of the master.

Transmission mode The mode of transmission defines the data structure within a frame and the rules used to transmit data. The mode is defined in the following which is compatible with Modbus RTU Mode*.

Start Bit: 1 bit
Data bits: 8 bits
Parity: no parity
Stop bit: 1 bit
Error checking: CRC check

Framing

Address	Function	Data	Check
8-Bits	8-Bits	N x 8-Bits	16-Bits

Address: The address field of a message frame contains eight bits. Valid slave device addresses are in the range of 1~247 decimal. A master addresses a slave by placing the slave address in the address field of the message. When the slave ends its response, it places its own address in this address field of the response to let the master know which slave is responding.

Function: The function code field of a message frame contains eight bits. Valid codes are in the range of 1~255 decimal. When a message is sent from a master to a slave device the function code field tells the slave what kind of action to perform.

Code	Meaning	Action
01	Read Relay Output Status	Obtain current status of Relay Output
02	Read Digital Input (DI) Status	Obtain current status of Digital Input
03	Read Data	Obtain current binary value in one or more registers
05	Control Relay Output	Force Relay to a state of on or off
16	Preset Multiple-Registers	Place specific binary values into a series of consecutive Multiple-Registers

Data: The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF hexadecimal. The data field of messages sent from a master to slave devices contains additional information which the slave must use to take the action defined by the function code. This can include items like discrete and register addresses, the quantity of items to be handled, and the count of actual data bytes in the field. For example, if the master requests a slave to read a group of holding registers (function code 03); the data field specifies the starting register and how many registers are to be read. If the master writes to a group of registers in the slave (function code 10 hexadecimal), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

If no error occurs, the data field of a response from a slave to a master contains the data requested. If an error occurs, the field contains an exception code that the master application can use to determine the next action to be taken. The data field can be nonexistent (of zero length) in certain kinds of messages.

Error Check: Messages include an error's checking field that is based on a Cyclical Redundancy Check (CRC) method. The CRC field checks the contents of the entire message. It is applied regardless of any parity check method used for the individual characters of the message. The CRC field is two bytes, containing a 16bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message.

The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal, an error results. The CRC is started by first preloading a 16-bit register to all 1's. Then a process begins of applying successive 8-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC. During generation of the CRC, each 8-bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next 8-bit bytes exclusive ORed with the register current value and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value. When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

Format of communication

Add	Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo	CRC16 hi	CRC16 lo
06H	03H	00H	00H	00H	21H	84H	65H

Addr: address of slave device
Fun: function code
Data start reg hi: start register address high byte
Data start reg lo: start register address low byte
Data #of reg hi: number of register high byte
Data #of reg lo: number of register low byte
CRC16 Hi: CRC high byte
CRC16 Lo: CRC low byte

1. **Read Status of Relay (Function Code 01):** This function code is used to read status of relay.
   1=On
   0=Off
   There are 2 Relays in CPM series. The Address of each Relay is
   Relay1=0000H,
   Relay2=0001H.
   The following query is to read Relay Status of the device Number 17.

   Query

Add	Fun	Relay start reg hi	Relay start reg lo	Relay #of regs hi	Relay #of regs lo	CRC16 hi	CRC16 lo
11H	01H	00H	00H	00H	02H	BFH	5BH

   Response
   The CPM response includes the CPM address, function code, quantity of data byte, the data, and error checking. An example response to read the status of Relay1 and Relay2 is shown as following.
   The status of Relay1 and Relay2 is responding to the last 2 bit of the data.
   Relay1: bit0 Relay2: bit1

Add	Fun	Byte Count	Data	CRC hi	CRC lo
11H	01H	01H	02H	D4H	89H

   The content of the data is,

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	0

   MSB **LSB**
   Relay1 = OFF (LSB), Relay2=ON (Left to LSB)

2. **Read the Status of DI (Function Code 02):** This function code is used to read status.
1=On
0=Off
There are 4 DIs in CPM series. The Address of each DI is
DI1=0000H,
DI2=0001H,
DI3=0002H,
DI4=0003H.
The following query is to read the 4 DI Status of the device Number 17.

Query

Add	Fun	DI start addr hi	DI start addr lo	DI num hi	DI num lo	CRC16 hi	CRC16 lo
11H	02H	00H	00H	00H	04H	7BH	59H

Response
The CPM response includes the CPM address, function code, quantity of data characters, the data characters, and error checking. An example response tread the status of 4 DIs is shown as following.
The status of each is responding to the last 4 bit of the data.
DI1: bit0 DI2: bit1 DI3: bit2 DI4: bit3

Add	Fun	Byte Count	Data	CRC 16 hi	CRC 16 lo
11H	02H	01H	03H	E5H	49H

The content of the data is,

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	1

MSB **LSB**
DI1=On DI2=On DI3=Off DI4=Off

3. **Read Data (Function Code 03)**

Query
This function allows the master to obtain the measurement results of CPM series.
An example as following to read the 3 measured data (F, V1 and V2) from slave device number 17, the data address of F is 0130H, V1 is 0131H and V2 is 0132H.

Add	Fun	Data start addr hi	Data start addr lo	Data #of regs hi	Data #of regs lo	CRC16 hi	CRC16 lo
11H	03H	01H	30H	00H	03H	06H	A8H

Response
The CPM response includes the CPM address, function code, quantity of data byte, data, and error checking.
An example response to read F, V1 and V2(F=1388H (50.00Hz), V1=03E7H (99.9V), V2=03E9H (100.1V) is shown as following

Add	Fun	Byte Count	Data 1 Hi	Data 1 Lo	Data 2 Hi	Data 2 Lo	Data 3 Hi	Data 3 Lo	CRC16 hi	CRC16 lo
11H	03H	06H	13H	88H	03H	E7H	03H	E9H	7FH	04H

4. **Control Relay (Function Code 05)**
Query
This message forces a single Relay either on or off. Any relay that exist switch in the CPM can be forced to be either status (on or off). The address of Relays starts at 0000H (Relay1=0000H, Relay2=0001H). The data value FF00H will set the Relay on and the value 0000H will turn it off; all other values are illegal and will not affect that relay.

The example below is a request to the device number 17 to turn on Relay1.

Add	Fun	DO addr hi	DO addr lo	Value hi	Value lo	CRC16 hi	CRC16 lo
11H	05H	00H	00H	FFH	00H	8EH	AAH

Response

The normal response to the command request is to retransmit the message as received after the Relay status has been altered.

Add	Fun	Relay addr hi	Relay addr lo	Value hi	Value lo	CRC16 hi	CRC16 lo
11H	05H	00H	00H	FFH	00H	8EH	AAH

5. Preset / Reset Multi-Register(Function Code 16)

Query

Function 16 allows the user to modify the contents of a Multi-Register. Any Register that exists within the CPM can have its contents changed by this message.
The example below is a request to a device number 17 to Preset Ep_imp(17807783.3KWH), while its Hex Value 0A9D4089H. Ep_imp data address is0156H and 0157H.

Add	Fun	Data Start addr hi	Data Start addr lo	Data regs Hi	Data regs Lo	Byte Count	Value Hi	Value Lo	Value Hi	Value lo	CRC 16 Hi	CRC 16 Lo
11H	10H	01H	56H	00H	02H	04H	0AH	9DH	40H	89H	4DH	B9H

Response

The normal response to a preset Multi-Register request includes the CPM address, function code, data start register, the number of registers, and error checking.

Add	Fun	Data Start addr hi	Data Start addr lo	Data regs Hi	Data regs Lo	CRC 16 Hi	CRC 16 Lo
11H	10H	01H	56H	00H	02H	A2H	B4H

■ CPM-50 ADDRESS TABLE **Address number are Hexadecimal

Name	Address	Range	Explain	Initial	Write/Read	Note
CPM Parameter Setting			Function 03 Read; Function 16 Presetting			
Pass Word	0100h	0~9999	Pass Word		R/W	
Address	0101h	1~247	Device address of RS485 Communication		R/W	
Baud Rate	0102h	600~38400	Baud Rate of RS485 Communication		R/W	
Wiring of Voltage Input	0103h	0~2	Voltage Input Wiring Mode **0:** 3LN, **1:** 2LN, **2:** 2LL		R/W	
Wiring of Current Input	0104h	0~2	Current Input Wiring Mode **0:** 3CT, **1:** 1CT, **2:** 2CT		R/W	
Primary of PT	0105h* (Hi Word)	100~500000	Primary Value of PT		R/W	
	0106h* (Lo Word)		Primary Value of PT		R/W	
Secondary of PT	0107h	100~400	Secondary Value of PT		R/W	
Primary of CT	0108h	5~10000	Primary Value of CT		R/W	
DO Mode	0109h	0~1	Digital output mode **0:** Pulse Output **1:** Alarm Output		R/W	
DO1 vs. Energy pulse o/p	010Ah	0~8	Energy Parameter Number associated with DO1. Please refer to the table 3.1.		R/W	
DO2 vs. Energy pulse o/p	010Bh	0~8	Energy Parameter Number associated with DO2. Please refer to the table 3.1.		R/W	
Pulse Width	010Ch	1~50	Pulse Width		R/W	
Pulse Rate	010Dh	1~6000	Pulse Rate		R/W	
RO1 Mode Selection	010Eh	0~1	Relay1 Energized Mode **0:** Latch **1:** Momentary		R/W	
	010Fh	50~3000	Relay1 Pulse Width		R/W	
RO2 Mode Selection	0110h	0~1	Relay2 Energized Mode **0:** Latch **1:** Momentary		R/W	

Name	Address	Range	Explain	Initial	Write/Read	Note
	0111h	50~3000	Relay2 Pulse Width		R/W	
	0112h	0~120	LCD Back light Time		R/W	
	0113h	1~30	Demand Slid Window Time.		R/W	
	0114h	0~1	Reset for maximum/minimum **1:** Yes , **0:** No		R/W	
Status Input (DI)			**Function 02 Reading**			
	0000h		DI1 status **1:** ON , **0:** OFF		R	
	0001h		DI2 status **1:** ON , **0:** OFF		R	
	0002h		DI3 status **1:** ON , **0:** OFF		R	Option-I/O
	0003h		DI4 status **1:** ON , **0:** OFF		R	
Relay Statue and Control			**Function 01 Reading;** **Function 05 Controlling**			
	0000h		Relay1 status **1:** ON , **0:** OFF		R/W	Option-I/O
	0001h		Relay2 status **1:** ON , **0:** OFF		R/W	
Power Measurements			**Function 03 Read;**			
Frequency	0130h	0~7000	Frequency $F_{\_r}$(the numerical value in register) **The real physical value is** **$F= F_{\_r}/100$**		R	
V_1	0131h	0~65535	Phase Voltage V_{1_r}(the numerical value in register) **The real physical value is** **$V_1= V_{1\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
V_2	0132h	0~65535	Phase Voltage V_{2_r}(the numerical value in register) **The real physical value is** **$V_2= V_{2\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
V_3	0133h	0~65535	Phase Voltage V_{3_r}(the numerical value in register) **The real physical value is** **$V_3= V_{3\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
V_{lnavg}	0134h	0~65535	Average Phase Voltage V_{lnavg_r}(the numerical value in register) **The real physical value is** **$V_{lnavg}= V_{lnavg\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
V_{12}	0135h	0~65535	Line Voltage V_{12_r}(the numerical value in register) **The real physical value is** **$V_{12}= V_{12\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
V_{23}	0136h	0~65535	Line Voltage V_{23_r}(the numerical value in register) **The real physical value is** **$V_{23}= V_{23\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
V_{31}	0137h	0~65535	Line Voltage V_{31_r}(the numerical value in register) **The real physical value is** **$V_{31}= V_{31\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
V_{llavg}	0138h	0~65535	Average Line Voltage V_{llavg_r}(the numerical value in register) **The real physical value is** **$V_{llavg}= V_{llavg\_r}$×(PT1/PT2)/10 (Unit: V)**		R	
I_1	0139h	0~65535	Current I_{1_r}(the numerical value in register) **The real physical value is** **$I_1= I_{1\_r}$×(CT1/5)/1000 (Unit: A)**		R	
I_2	013Ah	0~65535	Current I_{2_r}(the numerical value in register) **The real physical value is** **$I_2= I_{2\_r}$×(CT1/5)/1000 (Unit: A)**		R	

Name	Address	Range	Explain	Initial	Write/Read	Note
I_3	013Bh	0~65535	Current I_{3_r}(the numerical value in register) **The real physical value is** **I_3= I_{3_r}×(CT1/5)/1000 (Unit: A)**		R	
I_{avg}	013Ch	0~65535	Average Current I_{avg_r}(the numerical value in register) **The real physical value is** **I_{avg}= I_{avg_r}×(CT1/5)/1000 (Unit: A)**		R	
I_n	013Dh	0~65535	Neutral Line Current I_{n_r}(the numerical value in register) **The real physical value is** **I_n= I_{n_r}×(CT1/5)/1000 (Unit: A)**		R	
P_1	013Eh	-32768~32767	Phase Active Power P_{1_r}(the numerical value in register) **The real physical value is** **P_1= P_{1_r}×(PT1/PT2)×(CT1/ 5) (Unit: W)**		R	
P_2	013Fh	-32768~32767	Phase Active Power P_{2_r}(the numerical value in register) **The real physical value is** **P_2= P_{2_r}×(PT1/PT2)×(CT1/ 5) (Unit: W)**		R	
P_3	0140h	-32768~32767	Phase Active Power P_{3_r}(the numerical value in register) **The real physical value is** **P_3= P_{3_r}×(PT1/PT2)×(CT1/ 5) (Unit: W)**		R	
P_{sum}	0141h	-32768~32767	System Active Power P_{sum_r}(the numerical value in register) **The real physical value is** **P_{sum}= P_{sum_r}×(PT1/PT2)×(CT1/ 5) (Unit: W)**		R	
Q_1	0142h	-32768~32767	Phase Reactive Power Q_{1_r}(the numerical value in register) **The real physical value is** **Q_1= Q_{1_r}×(PT1/PT2)×(CT1/ 5) (Unit: Var)**		R	
Q_2	0143h	-32768~32767	Phase Reactive Power Q_{2_r}(the numerical value in register) **The real physical value is** **Q_2= Q_{2_r}×(PT1/PT2)×(CT1/ 5) (Unit: Var)**		R	
Q_3	0144h	-32768~32767	Phase Reactive Power Q_{3_r}(the numerical value in register) **The real physical value is** **Q_3= Q_{3_r}×(PT1/PT2)×(CT1/ 5) (Unit: Var)**		R	
Q_{sum}	0145h	-32768~32767	System Reactive Power Q_{sum_r}(the numerical value in register) **The real physical value is** **Q_{sum}= Q_{sum_r}×(PT1/PT2)×(CT1/ 5) (Unit: Var)**		R	
S_1	0146h	0~65535	Phase Apparent Power S_{1_r}(the numerical value in register) **The real physical value is** **S_1= S_{1_r}×(PT1/PT2)×(CT1/ 5) (Unit: VA)**		R	
S_2	0147h	0~65535	Phase Apparent Power S_{2_r}(the numerical value in register) **The real physical value is** **S_2= S_{2_r}×(PT1/PT2)×(CT1/ 5) (Unit: VA)**		R	
S_3	0148h	0~65535	Phase Apparent Power S_{3_r}(the numerical value in register) **The real physical value is** **S_3= S_{3_r}×(PT1/PT2)×(CT1/ 5) (Unit: VA)**		R	
S_{sum}	0149h	0~65535	System Apparent Power S_{sum_r}(the numerical value in register) **The real physical value is** **S_{sum}= S_{sum_r}×(PT1/PT2)×(CT1/ 5) (Unit: VA)**		R	

Name	Address	Range	Explain	Initial	Write/Read	Note
PF1	014Ah	-1000~1000	Phase Power Factor PF1_r(the numerical value in register) The real physical value is PF1= PF1_r/1000		R	
PF2	014Bh	-1000~1000	Phase Power Factor PF2_r(the numerical value in register) The real physical value is PF2= PF2_r/1000		R	
PF3	014Ch	-1000~1000	Phase Power Factor PF3_r(the numerical value in register) The real physical value is PF3= PF3_r/1000		R	
PF	014Dh	-1000~1000	System Power Factor_r(the numerical value in register) The real physical value is PF= PF_r/1000		R	
Vunbl	014Eh	0~3000	Voltage Unbalance Factor Uunbl_r(the numerical value in register) Vunbl=(Uunbl_r/1000)×100%		R	
Iunbl	014Fh	0~3000	Current Unbalance Factor Iunbl_r(the numerical value in register) Iunbl=(Iunbl_r/1000)×100%		R	
Load Type	0150h	4Ch/43h/52h	Load Type (L/C/R) **4Ch:** L **43h:** C **52h:** R		R	
Pmd	0151h	-32768~32767	Power Demand Pmd_r(the numerical value in register) The real physical value is Pmd= Pmd_r×(PT1/PT2)×(CT1/ 5) (Unit: W)		R	CPM -52 only
Qmd	0152h	-32768~32767	Reactive power Demand Qmd_r(the numerical value in register) The real physical value is Qmd= Qmd_r×(PT1/PT2)×(CT1/ 5) (Unit: Var)		R	CPM -52 only
Smd	0153h	0~65535	Apparent Power Demand Smd_r(the numerical value in register) The real physical value is Smd= Smd_r×(PT1/PT2)×(CT1/ 5) (Unit: VA)		R	CPM -52 only
	0154h					
	0155h					
Energy Measurements			**Function 03 Read; Function 16 Preset**			
Imp Active Energy*	0156h* **(Hi word)**	0~99999999.9	Import Active Energy Ep_imp_r(the numerical value in register)		R/W	
	0157h* **(Lo word)**		Import Active Energy Ep_imp_r(the numerical value in register) **The real physical value is** **Ep_imp= Ep_imp_r / 10 (Unit: Kwh)**		R/W	
Exp Active Energy *	0158h* **(Hi word)**	0~99999999.9	Export Active Energy Ep_exp_r(the numerical value in register)		R/W	
	0159h* **(Lo word)**		Export Active Energy Ep_exp_r(the numerical value in register) **The real physical value is** **Ep_exp= Ep_exp_r / 10 (Unit: Kwh)**		R/W	
Imp Reactive Energy*	015Ah* **(Hi word)**	0~99999999.9	Import Reactive Energy Eq_imp_r(the numerical value in register)		R/W	
	015Bh* **(Lo word)**		Import Reactive Energy Eq_imp_r(the numerical value in register) **The real physical value is** **Eq_imp= Eq_imp_r / 10 (Unit: Kvarh)**		R/W	
Exp Reactive Energy *	015Ch* **(Hi word)**	0~99999999.9	Export Reactive Energy Eq_exp_r(the numerical value in register)		R/W	
	015Dh* **(Lo word)**		Export Reactive Energy Eq_exp_r(the numerical value in register) **The real physical value is** **Eq_imp= Eq_imp_r / 10 (Unit: Kvarh)**		R/W	

Name	Address	Range	Explain	Initial	Write/Read	Note
Total Active Energy*	015Eh* (Hi word)	0~99999999.9	Active Energy Ep_total_r(the numerical value in register)		R/W	
	015Fh* (Lo word)		Active Energy Ep_total_r(the numerical value in register) **The real physical value is** **Ep_total= Ep_total_r / 10 (Unit: Kwh)**		R/W	
Net Active Energy*	0160h* (Hi word)	0~99999999.9	Net Active Energy Ep_net_r(the numerical value in register)		R/W	
	0161h* (Lo word)		Net Active Energy Ep_net_r(the numerical value in register) **The real physical value is** **Ep_net= Ep_net_r / 10 (Unit: Kwh)**		R/W	
Total Reactive Energy*	0162h* (Hi word)	0~99999999.9	Reactive Energy Eq_total_r(the numerical value in register)		R/W	
	0163h* (Lo word)		Reactive Energy Eq_total_r(the numerical value in register) **The real physical value is** **Eq_total= Eq_total_r / 10 (Unit: Kvarh)**		R/W	
Net Reactive Energy*	0164h* (Hi word)	0~99999999.9	Net Reactive Energy Eq_net_r(the numerical value in register)		R/W	
	0165h* (Lo word)		Net Reactive Energy Eq_net_r(the numerical value in register) **The real physical value is** **Eq_net= Eq_net_r / 10 (Unit: Kwh)**		R/W	
	0166h				R/W	
	0167h				R/W	
Power Quality Measurements			**Function 03 Read;**			
THD_{V1}	0168h	0~10000	Total Harmonic Distortion of V_1 or V_{12}, THD_{V1_r}(the numerical value in register) **The real physical value is** **$THD_{V1}= THD_{V1\_r} / 10000 \times 100\%$**		R	
THD_{V2}	0169h	0~10000	Total Harmonic Distortion of V_2 or V_{23}, THD_{V2_r}(the numerical value in register) **The real physical value is** **$THD_{V2}= THD_{V2\_r} / 10000 \times 100\%$**		R	
THD_{V3}	016Ah	0~10000	Total Harmonic Distortion of V_3 or V_{31}, THD_{V3_r}(the numerical value in register) **The real physical value is** **$THD_{V3}= THD_{V3\_r} / 10000 \times 100\%$**		R	
THD_{V_avg}	016Bh	0~10000	Average Total Harmonic Distortion of Voltage, $THD_{V\_avg\_r}$(the numerical value in register) **The real physical value is** **$THD_{V\_avg}= THD_{V\_avg\_r} / 10000 \times 100\%$**		R	
THD_{I1}	016Ch	0~10000	Total Harmonic Distortion of I_1, THD_{I1_r}(the numerical value in register) **The real physical value is** **$THD_{I1}= THD_{I1\_r} / 10000 \times 100\%$**		R	
THD_{I2}	016Dh	0~10000	Total Harmonic Distortion of I_2, THD_{I2_r}(the numerical value in register) **The real physical value is** **$THD_{I2}= THD_{I2\_r} / 10000 \times 100\%$**		R	
THD_{I3}	016Eh	0~10000	Total Harmonic Distortion of I_3, THD_{I3_r}(the numerical value in register) **The real physical value is** **$THD_{I3}= THD_{I3\_r} / 10000 \times 100\%$**		R	
THD_{Iavg}	016Fh	0~10000	Total Harmonic Distortion of I_{avg}, THD_{Iavg_r}(the numerical value in register) **The real physical value is** **$THD_{Iavg}= THD_{Iavg\_r} / 10000 \times 100\%$**		R	

Name	Address	Range	Explain	Initial	Write/Read	Note
IH_{V1}	0170h ~ 018DH	0~10000	Individual Harmonic of V_1 or V_{12} (2nd to 31st), $IH_{V1\ r}$(the numerical value in register) **The real physical value is** **$IH_{V1} = IH_{V1\ r}$ / 10000×100%**		R	CPM -52 only
THD_{V1_O}	018Eh	0~10000	Total Odd Harmonic Distortion of $V_{1\ O}$ or $V_{12\ O}$, $THD_{V1\ O\ r}$(the numerical value in register) The real physical value is $THD_{V1\ O}$= $THD_{V1\ O\ r}$ / 10000×100%		R	CPM -52 only
THD_{V1_E}	018Fh	0~10000	Total Even Harmonic Distortion of $V_{1\ E}$ or $V_{12\ E}$, $THD_{V1\ E\ r}$(the numerical value in register) The real physical value is $THD_{V1\ E}$= $THD_{V1\ E\ r}$ / 10000×100%		R	CPM -52 only
CF_{V1}	0190h	0~65535	Crest factor of V_1 or V_{12}, $CF_{V1\ r}$(the numerical value in register) The real physical value is CF_{V1} = $CF_{V1\ r}$ / 1000		R	CPM -52 only
$THFF_{V1}$	0191h	0~10000	Telephone interference factor of V_1 or V_{12}, $THFF_{V1\ r}$(the numerical value in register) The real physical value is $THFF_{V1}$ = $THFF_{V1\ r}$ / 10000 ×100%		R	CPM -52 only
IH_{V2}	0192h ~ 01AFh	0~10000	Individual Harmonic of V_2 or V_{23} (2nd to 31st), IH_{V2} r(the numerical value in register) The real physical value is IH_{V2} = $IH_{V2\ r}$ / 10000×100%		R	CPM -52 only
THD_{V2_O}	01B0h	0~10000	Total Odd Harmonic Distortion of $V_{2\ O}$ or $V_{23\ O}$, $THD_{V2\ O\ r}$(the numerical value in register) The real physical value is $THD_{V2\ O}$= $THD_{V2\ O\ r}$ / 10000×100%		R	CPM -52 only
THD_{V2_E}	01B1h	0~10000	Total Even Harmonic Distortion of $V_{2\ E}$ or $V_{23\ E}$, $THD_{V2\ E\ r}$(the numerical value in register) The real physical value is $THD_{V2\ E}$= $THD_{V2\ E\ r}$ / 10000×100%		R	CPM -52 only
CF_{V2}	01B2h	0~65535	Crest factor of V_2 or V_{23}, $CF_{V2\ r}$(the numerical value in register) The real physical value is CF_{V2} = $CF_{V2\ r}$ / 1000		R	CPM -52 only
$THFF_{V2}$	01B3h	0~10000	Telephone interference factor of V_2 or V_{23}, $THFF_{V2\ r}$(the numerical value in register) The real physical value is $THFF_{V2}$ = $THFF_{V2\ r}$ / 10000 ×100%		R	CPM -52 only
IH_{V3}	01B4h ~ 01D1h	0~10000	Individual Harmonic of V_3 or V_{31} (2nd to 31st), $IH_{V3\ r}$(the numerical value in register) The real physical value is IH_{V3} = $IH_{V3\ r}$/10000×100%		R	CPM -52 only
THD_{V3_O}	01D2h	0~10000	Total Odd Harmonic Distortion of $V_{3\ O}$ or $V_{31\ O}$, $THD_{V3\ O\ r}$(the numerical value in register) The real physical value is $THD_{V3\ O}$= $THD_{V3\ O\ r}$ / 10000×100%		R	CPM -52 only
THD_{V3_E}	01D3h	0~10000	Total Even Harmonic Distortion of $V_{3\ E}$ or $V_{31\ E}$, $THD_{V3\ E\ r}$(the numerical value in register) The real physical value is $THD_{V3\ E}$= $THD_{V3\ E\ r}$ / 10000×100%		R	CPM -52 only
CF_{V3}	01D4h	0~65535	Crest factor of V_3 or V_{31}, $CF_{V3\ r}$(the numerical value in register) The real physical value is CF_{V3} = $CF_{V3\ r}$ / 1000		R	CPM -52 only

Name	Address	Range	Explain	Initial	Write/Read	Note
$THFF_{V3}$	01D5h	0~10000	Telephone interference factor of V_3 or V_{31}, $THFF_{V3\ r}$(the numerical value in register) The real physical value is $THFF_{V3}$ = $THFF_{V3\ r}$ / 10000 ×100%		R	CPM-52 only
IH_{I_1}	01D6h ~ 01F3h	0~10000	Individual Harmonic of I_1 (2nd to 31st), $IH_{I_1\ r}$(the numerical value in register) The real physical value is IH_{I_1} = $IH_{I_1\ r}$ / 10000×100%		R	CPM-52 only
$THD_{I_1\_O}$	01F4h	0~10000	Total Odd Harmonic Distortion of $I_{1\ O}$, $THD_{I_1\ O\ r}$(the numerical value in register) The real physical value is $THD_{I_1\ O}$= $THD_{I_1\ O\ r}$ / 10000×100%		R	CPM-52 only
$THD_{I_1\_E}$	01F5h	0~10000	Total Even Harmonic Distortion of $I_{1\ E}$, $THD_{I_1\ E\ r}$(the numerical value in register) The real physical value is THD_{I_1} E= $THD_{I_1\ E\ r}$ / 10000×100%		R	CPM-52 only
KF_{I_1}	01F6h	0~65535	K factor of I_1, $KF_{I_1\ r}$(the numerical value in register) The real physical value is KF_{I_1} = $KF_{I_1\ r}$ / 10		R	CPM-52 only
IH_{I_2}	01F7h ~ 0214h	0~10000	Individual Harmonic of I_2 (2nd to 31st), $IH_{I_2\ r}$(the numerical value in register) The real physical value is IH_{I_2} = $IH_{I_2\ r}$ / 10000×100%		R	CPM-52 only
$THD_{I_2\_O}$	0215h	0~10000	Total Odd Harmonic Distortion of $I_{2\ O}$, $THD_{I_2\ O\ r}$(the numerical value in register) The real physical value is $THD_{I_2\ O}$= $THD_{I_2\ O\ r}$ / 10000×100%		R	CPM-52 only
$THD_{I_2\_E}$	0216h	0~10000	Total Even Harmonic Distortion of $I_{2\ E}$, $THD_{I_2\ E\ r}$(the numerical value in register) The real physical value is $THD_{I_2\ E}$= $THD_{I_2\ E\ r}$ / 10000×100%		R	CPM-52 only
KF_{I_2}	0217h	0~65535	K factor of I_2, $KF_{I_2\ r}$(the numerical value in register) The real physical value is KF_{I_2} = $KF_{I_2\ r}$ / 10		R	CPM-52 only
IH_{I_3}	0218h ~ 0235h	0~10000	Individual Harmonic of I_3 (2nd to 31st), $IH_{I_3\ r}$(the numerical value in register) The real physical value is IH_{I_3} = $IH_{I_3\ r}$ / 10000×100%		R	CPM-52 only
$THD_{I_3\_O}$	0236h	0~10000	Total Odd Harmonic Distortion of $I_{3\ O}$, $THD_{I_3\ O\ r}$(the numerical value in register) The real physical value is $THD_{I_3\ O}$= $THD_{I_3\ O\ r}$ / 10000×100%		R	CPM-52 only
$THD_{I_3\_E}$	0237h	0~10000	Total Even Harmonic Distortion of $I_{3\ E}$, $THD_{I_3\ E\ r}$(the numerical value in register) The real physical value is $THD_{I_3\ E}$= $THD_{I_3\ E\ r}$ / 10000×100%		R	CPM-52 only
KF_{I_3}	0238h	0~65535	K factor of I_3, $KF_{I_3\ r}$(the numerical value in register) The real physical value is KF_{I_3} = $KF_{I_3\ r}$ / 10		R	CPM-52 only

Max/Min Statistics Value with Time Stamps			Function 03 Read;			
Name	**Address**	**Range**	**Explain**	**Initial**	**Write/Read**	**Note**
$V_{1\ max}$	0239h	0~65535	$V_{1\ max}$		R	CPM-52 only
Year	023Ah	2000~2099	Time Stamp of V_{1_max}		R	
Month	023Bh	1~12			R	
Day	023Ch	1~31			R	
Hour	023Dh	0~23			R	
Minute	023Eh	0~59			R	
Second	023Fh	0~59			R	
$V_{2\ max}$	0240h	0~65535	$V_{2\ max}$		R	CPM-52 only
Year	0241h	2000~2099	Time Stamp of V_{2_max}		R	
Month	0242h	1~12			R	
Day	0243h	1~31			R	
Hour	0244h	0~23			R	
Minute	0245h	0~59			R	
Second	0246h	0~59			R	
$V_{3\ max}$	0247h	0~65535	$V_{3\ max}$		R	CPM-52 only
Year	0248h	2000~2099	Time Stamp of V_{3_max}		R	
Month	0249h	1~12			R	
Day	024Ah	1~31			R	
Hour	024Bh	0~23			R	
Minute	024Ch	0~59			R	
Second	024Dh	0~59			R	
$V_{12\ max}$	024Eh	0~65535	$V_{12\ max}$		R	CPM-52 only
Year	024Fh	2000~2099	Time Stamp of V_{12_max}		R	
Month	0250h	1~12			R	
Day	0251h	1~31			R	
Hour	0252h	0~23			R	
Minute	0253h	0~59			R	
Second	0254h	0~59			R	
$V_{23\ max}$	0255h	0~65535	$V_{23\ max}$		R	CPM-52 only
Year	0256h	2000~2099	Time Stamp of V_{23_max}		R	
Month	0257h	1~12			R	
Day	0258h	1~31			R	
Hour	0259h	0~23			R	
Minute	025Ah	0~59			R	
Second	025Bh	0~59			R	
$V_{31\ max}$	025Ch	0~65535	$V_{31\ max}$		R	CPM-52 only
Year	025Dh	2000~2099	Time Stamp of V_{31_max}		R	
Month	025Eh	1~12			R	
Day	025Fh	1~31			R	
Hour	0260h	0~23			R	
Minute	0261h	0~59			R	
Second	0262h	0~59			R	
$I_{1\ max}$	0263h	0~65535	$I_{1\ max}$		R	CPM-52 only
Year	0264h	2000~2099	Time Stamp of I_{1_max}		R	
Month	0265h	1~12			R	
Day	0266h	1~31			R	
Hour	0267h	0~23			R	
Minute	0268h	0~59			R	
Second	0269h	0~59			R	
$I_{2\ max}$	026Ah	0~65535	$I_{2\ max}$		R	CPM-52 only
Year	026Bh	2000~2099	Time Stamp of I_{2_max}		R	
Month	026Ch	1~12			R	
Day	026Dh	1~31			R	
Hour	026Eh	0~23			R	
Minute	026Fh	0~59			R	
Second	0270h	0~59			R	

Name		Address	Range	Explain	Initial	Write/Read	Note
I_{3_max}		0271h	0~65535	I_{3_max}		R	CPM-52 only
	Year	0272h	2000~2099	Time Stamp of I_{3_max}		R	
	Month	0273h	1~12			R	
	Day	0274h	1~31			R	
	Hour	0275h	0~23			R	
	Minute	0276h	0~59			R	
	Second	0277h	0~59			R	
P_{max}		0278h	-32768~32767	P_{max}		R	CPM-52 only
	Year	0279h	2000~2099	Time Stamp of P_{max}		R	
	Month	027Ah	1~12			R	
	Day	027Bh	1~31			R	
	Hour	027Ch	0~23			R	
	Minute	027Dh	0~59			R	
	Second	027Eh	0~59			R	
Q_{max}		027Fh	-32768~32767	Q_{max}		R	CPM-52 only
	Year	0280h	2000~2099	Time Stamp of Q_{max}		R	
	Month	0281h	1~12			R	
	Day	0282h	1~31			R	
	Hour	0283h	0~23			R	
	Minute	0284h	0~59			R	
	Second	0285h	0~59			R	
S_{max}		0286h	0~65535	S_{max}		R	CPM-52 only
	Year	0287h	2000~2099	Time Stamp of S_{max}		R	
	Month	0288h	1~12			R	
	Day	0289h	1~31			R	
	Hour	028Ah	0~23			R	
	Minute	028Bh	0~59			R	
	Second	028Ch	0~59			R	
PF_{max}		028Dh	-1000~1000	PF_{max}		R	CPM-52 only
	Year	028Eh	2000~2099	Time Stamp of PF_{max}		R	
	Month	028Fh	1~12			R	
	Day	0290h	1~31			R	
	Hour	0291h	0~23			R	
	Minute	0292h	0~59			R	
	Second	0293h	0~59			R	
F_{max}		0294h	0~7000	F_{max}		R	CPM-52 only
	Year	0295h	2000~2099	Time Stamp of F_{max}		R	
	Month	0296h	1~12			R	
	Day	0297h	1~31			R	
	Hour	0298h	0~23			R	
	Minute	0299h	0~59			R	
	Second	029Ah	0~59			R	
P_{md_max}		029Bh	-32768~32767	P_{md_max} (Maximum Demand of Active Power)		R	CPM-52 only
	Year	029Ch	2000~2099	Time Stamp of P_{md_max}		R	
	Month	029Dh	1~12			R	
	Day	029Eh	1~31			R	
	Hour	029Fh	0~23			R	
	Minute	02A0h	0~59			R	
	Second	02A1h	0~59			R	
Q_{md_max}		02A2h	-32768~32767	Q_{md_max} (Maximum Demand of Reactive Power)		R	CPM-52 only
	Year	02A3h	2000~2099	Time Stamp of Q_{md_max}		R	
	Month	02A4h	1~12			R	
	Day	02A5h	1~31			R	
	Hour	02A6h	0~23			R	
	Minute	02A7h	0~59			R	
	Second	02A8h	0~59			R	

Name	Address	Range	Explain	Initial	Write/Read	Note
S_{md_max}	02A9h	0~65535	$S_{md\ max}$ (Maximum Demand of Apparent Power)		R	CPM-52 only
Year	02AAh	2000~2099	Time Stamp of S_{md_max}		R	
Month	02ABh	1~12			R	
Day	02ACh	1~31			R	
Hour	02ADh	0~23			R	
Minute	02AEh	0~59			R	
Second	02AFh	0~59			R	
$V_{1\ min}$	02B0h	0~65535	$V_{1\ min}$ (Minimum value record of V_1)		R	CPM-52 only
$V_{2\ min}$	02B1h	0~65535	$V_{2\ min}$ (Minimum value record of V_2)		R	
$V_{3\ min}$	02B2h	0~65535	$V_{3\ min}$ (Minimum value record of V_3)		R	
$V_{12\ min}$	02B3h	0~65535	$V_{12\ min}$ (Minimum value record of V_{12})		R	
$V_{23\ min}$	02B4h	0~65535	$V_{23\ min}$ (Minimum value record of V_{23})		R	
$V_{31\ min}$	02B5h	0~65535	$V_{31\ min}$ (Minimum value record of V_{31})		R	
$I_{1\ min}$	02B6h	0~65535	$I_{1\ min}$ (Minimum value record of I_1)		R	
$I_{2\ min}$	02B7h	0~65535	$I_{2\ min}$ (Minimum value record of I_2)		R	
$I_{3\ min}$	02B8h	0~65535	$I_{3\ min}$ (Minimum value record of I_3)		R	
P_{min}	02B9h	-32768~32767	P_{min} (Minimum value record of total active power)		R	
Q_{min}	02BAh	-32768~32767	Q_{min} (Minimum value record of total re-active power)		R	
S_{min}	02BBh	0~65535	S_{min} (Minimum value record of total apparent power)		R	
PF_{min}	02BCh	-1000~1000	PF_{min} (Minimum value record of average power factor)		R	
F_{min}	02BDh	0~7000	F_{min} (Minimum value record of system frequency)		R	
$P_{md\ min}$	02BEh	-32768~32767	$P_{md\ min}$ (Minimum Demand of Active Power)		R	
$Q_{md\ min}$	02BFh	-32768~32767	$Q_{md\ min}$ (Minimum Demand of Reactive Power)		R	
$S_{md\ min}$	02C0h	0~65535	$S_{md\ min}$ (Minimum Demand of Apparent Power)		R	

V2.30 版新增位置

Power Measurements for primary Function 03 Read;

Name	Address	Range	Explain	Initial	Write/Read	Note
Frequency	02D0h* (Hi word)	0~7000	Frequency		R	
	02D1h* (Lo word)					
V_1	02D2h* (Hi word)	0~429496729.6V	Phase Voltage V_1(primary)		R	
	02D3h* (Lo word)					
V_2	02D4h* (Hi word)	0~429496729.6V	Phase Voltage V_2(primary)		R	
	02D5h* (Lo word)					
V_3	02D6h* (Hi word)	0~429496729.6V	Phase Voltage V_3(primary)		R	
	02D7h* (Lo word)					
V_{lnavg}	02D8h* (Hi word)	0~429496729.6V	Average Phase Voltage V_{ln}(primary)		R	
	02D9h* (Lo word)					
V_{12}	02DAh* (Hi word)	0~429496729.6V	Line Voltage V_{12}(primary)		R	
	02DBh* (Lo word)					

Name	Address	Range	Explain	Initial	Write/Read	Note
V_{23}	02DCh* (Hi word) 02DDh* (Lo word)	0~429496729.6V	Line Voltage V_{23}(primary)		R	
V_{31}	02DEh* (Hi word) 02DFh* (Lo word)	0~429496729.6V	Line Voltage V_{31}(primary)		R	
V_{llavg}	02E0h* (Hi word) 02E1h* (Lo word)	0~429496729.6V	Average Line Voltage V_{ll}(primary)		R	
I_1	02E2h* (Hi word) 02E3h* (Lo word)	0~4294967.296A	Phase Current I_1(primary)		R	
I_2	02E4h* (Hi word) 02E5h* (Lo word)	0~4294967.296A	Phase Current I_2(primary)		R	
I_3	02E6h* (Hi word) 02E7h* (Lo word)	0~4294967.296A	Phase Current I_3(primary)		R	
I_{avg}	02E8h* (Hi word) 02E9h* (Lo word)	0~4294967.296A	Average Phase Current I_{avg}(primary)		R	
I_n	02EAh* (Hi word) 02EBh* (Lo word)	0~4294967.296A	Phase Current I_n(primary)		R	
P_1	02ECh* (Hi word) 02EDh* (Lo word)	-2147483648~ 2147483648W	Phase Active Power P_1(primary)		R	
P_2	02EEh* (Hi word) 02EFh* (Lo word)	-2147483648~ 2147483648W	Phase Active Power P_2(primary)		R	
P_3	02F0h* (Hi word) 02F1h* (Lo word)	-2147483648~ 2147483648W	Phase Active Power P_3(primary)		R	
P_{SUM}	02F2h* (Hi word) 02F3h* (Lo word)	-2147483648~ 2147483648W	Total Active Power P_{sum}(primary)		R	
Q_1	02F4h* (Hi word) 02F5h* (Lo word)	-2147483648~ 2147483648Var	Phase Re-active Power Q_1(primary)		R	
Q_2	02F6h* (Hi word) 02F7h* (Lo word)	-2147483648~ 2147483648Var	Phase Re-active Power Q_2(primary)		R	
Q_3	02F8h* (Hi word) 02F9h* (Lo word)	-2147483648~ 2147483648Var	Phase Re-active Power Q_3(primary)		R	

勘誤：2010/7/1：位址 02E0~0322 改成 02EA~0323

Name	Address	Range	Explain	Initial	Write/Read	Note
Q_{SUM}	02FAh* (Hi word)	-2147483648~ 2147483648Var	Total Re-active Power Q_{SUM}(primary)		R	
	02FBh* (Lo word)					
S_1	02FCh* (Hi word)	0~ 4294967296VA	Phase Apparent Power S_1(primary)		R	
	02FDh* (Lo word)					
S_2	02FEh* (Hi word)	0~ 4294967296VA	Phase Apparent Power S_2(primary)		R	
	02FFh* (Lo word)					
S_3	0300h* (Hi word)	0~ 4294967296VA	Phase Apparent Power S_3(primary)		R	
	0301h* (Lo word)					
S_{SUM}	0302h* (Hi word)	0~ 4294967296VA	Total Apparent Power S_{sum}(primary)		R	
	0303h* (Lo word)					
PF_1	0304h* (Hi word)	-1000.000~ 1000.000PF	Phase Power Factor PF_1(primary)		R	
	0305h* (Lo word)					
PF_2	0306h* (Hi word)	-1000.000~ 1000.000PF	Phase Power Factor PF_2(primary)		R	
	0307h* (Lo word)					
PF_3	0308h* (Hi word)	-1000.000~ 1000.000PF	Phase Power Factor PF_3(primary)		R	
	0309h* (Lo word)					
PF	030Ah* (Hi word)	-1000.000~ 1000.000PF	Average Power Factor PF_{avg}(primary)		R	
	030Bh* (Lo word)					
P_{md}	030Ch* (Hi word)	-2147483648~ 2147483648W	Maximum Demand of Active Power P_{md}(primary)		R	
	030Dh* (Lo word)					
Q_{md}	030Eh* (Hi word)	-2147483648~ 2147483648Var	Maximum Demand of Re-active Power Q_{md}(primary)		R	
	030Fh* (Lo word)					
S_{md}	0310h* (Hi word)	0~ 4294967296VA	Maximum Demand of Apparent Power S_{md}(primary)		R	
	0311h* (Lo word)					
Load Type	0312h* (Hi word)	76/67/82	The type of load 76: Inductive Load 67: Capative Load 82: Resistance Load		R	
	0313h* (Lo word)					
Θ_{V1-V2}	0314h* (Hi word)	0~90.0Deg	Angle of V_1 and V_2		R	
	0315h* (Lo word)					
Θ_{V1-V3}	0316h* (Hi word)	0~90.0Deg	Angle of V_1 and V_3		R	
	0317h* (Lo word)					

Name	Address	Range	Explain	Initial	Write/Read	Note
$\Theta_{V1\text{-}I1}$	0318h* (Hi word)	0~90.0Deg	Angle of V_1 and I_1		R	
	0319h* (Lo word)					
$\Theta_{V1\text{-}I2}$	031Ah* (Hi word)	0~90.0Deg	Angle of V_1 and I_2		R	
	031Bh* (Lo word)					
$\Theta_{V1\text{-}I3}$	031Ch* (Hi word)	0~90.0Deg	Angle of V_1 and I_3		R	
	031Dh* (Lo word)					
$\Theta_{V12\text{-}V23}$	031Eh* (Hi word)	0~90.0Deg	Angle of V_{12} and V_{23}		R	
	031Fh* (Lo word)					
$\Theta_{V12\text{-}I1}$	0320h* (Hi word)	0~90.0Deg	Angle of V_{12} and I_1		R	
	0321h* (Lo word)					
$\Theta_{V12\text{-}I3}$	0322h* (Hi word)	0~90.0Deg	Angle of V_{12} and I_3		R	
	0323h* (Lo word)					

Date and Time table — **Function 03 Read; Function 16 Presetting**

Name	Address	Range	Explain	Initial	Write/Read	Note
Year	032Ah	2000~2099			R/W	
Month	032Bh	1~12			R/W	
Day	032Ch	1~31			R/W	
Hour	032Dh	0~23			R/W	
Minute	032Eh	0~59			R/W	
Second	032Fh	0~59			R/W	

Alarm Parameter Register Setting — **Function 03 Read; Function 16 Presetting**

Name	Address	Range	Explain	Initial	Write/Read	Note
	0330h	0~8	9 condition inequalities enable Registers Bit0~8 corresponding to 1st~9th inequality		R/W	
	0331h	0~255	Time limit Register		R/W	
	0332h		Register associated DO1 with inequalities, Associated DO1 Bit0~8 corresponding to 1st~9th inequality **1:** Yes **0:** No		R/W	
	0333h		Register associated DO2 with inequalities, Associated DO2 Bit0~8 corresponding to 1st~9th inequality **1:** Yes **0:** No		R/W	
	0334h	0~34	Register associated 1st inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	0335h	0~1	Relation symbol selecting register, INEQU_sign1 **0:<** Low limit **1:>** High limit		R/W	
	0336h	Related with variable	Limit value for 1st inequality, Ref1		R/W	
	0337h	0~34	Register associated 2nd inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	0338h	0~1	Relation symbol selecting register, INEQU_sign2 **0:<** Low limit **1:>** High limit		R/W	

Name	Address	Range	Explain	Initial	Write/Read	Note
	0339h	Related with variable	Limit value for 2nd inequality, Ref2		R/W	
	033Ah	0~34	Register associated 3rd inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	033Bh	0~1	Relation symbol selecting register, INEQU_sign3 **0:<** Low limit **1:>** High limit		R/W	
	033Ch	Related with variable	Limit value for 3rd inequality, Ref3		R/W	
	033Dh	0~34	Register associated 4th inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	033Eh	0~1	Relation symbol selecting register, INEQU_sign4 0:< Low limit 1:> High limit		R/W	
	033Fh	Related with variable	Limit value for 4th inequality, Ref4		R/W	
	0340h	0~34	Register associated 5th inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	0341h	0~1	Relation symbol selecting register, INEQU_sign5 0:< Low limit 1:> High limit		R/W	
	0342h	Related with variable	Limit value for 5th inequality, Ref5		R/W	
	0343h	0~34	Register associated 5th inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	0344h	0~1	Relation symbol selecting register, INEQU_sign6 0:< Low limit 1:> High limit		R/W	
	0345h	Related with variable	Limit value for 6th inequality, Ref6		R/W	
	0346h	0~34	Register associated 7th inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	0347h	0~1	Relation symbol selecting register, INEQU_sign7 0:< Low limit 1:> High limit		R/W	
	0348h	Related with variable	Limit value for 7th inequality, Ref7		R/W	
	0349h	0~34	Register associated 7th inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	034Ah	0~1	Relation symbol selecting register, INEQU_sign8 0:< Low limit 1:> High limit		R/W	
	034Bh	Related with variable	Limit value for 8th inequality, Ref8		R/W	
	034Ch	0~34	Register associated 7th inequality with one of the 34 variables. Please refer to the table of Parameter		R/W	
	034Dh	0~1	Relation symbol selecting register, INEQU_sign9 0:< Low limit 1:> High limit		R/W	
	034Eh	Related with Parameter	Limit value for 9th inequality, Ref9		R/W	

Alarm Recording			Function 03 Read			
Name	Address	Range	Explain	Initial	Write/Read	Note
	0354h		Over limit Status of the 9 inequalities Bit0~8 corresponding to 1st ~9th inequality **0:** No **1:** Yes		R	
	0355h	0~34	Parameter Number of the 1st Alarm record		R	
	0356h	-32768~32767	Parameter Value of the 1st Alarm Record		R	
	0357h	2000~2099	Year of 1st Alarm Record		R	
	0358h	1~12	Month of 1st Alarm Record		R	
	0359h	1~31	date of 1st Alarm Record		R	
	035Ah	0~23	Hour of 1st Alarm Record		R	
	035Bh	0~59	Minute of 1st Alarm Record		R	
	035Ch	0~59	Second of 1st Alarm Record		R	
	035Dh	0~34	Parameter Number of the 2nd Alarm record		R	
	035Eh	-32768~32767	Parameter Value of the 2nd Alarm Record		R	
	035Fh	2000~2099	Year of 2nd Alarm Record		R	
	0360h	1~12	Month of 2nd Alarm Record		R	
	0361h	1~31	date of 2nd Alarm Record		R	
	0362h	0~23	Hour of 2nd Alarm Record		R	
	0363h	0~59	Minute of 2nd Alarm Record		R	
	0364h	0~59	Second of 2nd Alarm Record		R	
	0365h	0~34	Parameter Number of the 3rd Alarm record		R	
	0366h	-32768~32767	Parameter Value of the 3rd Alarm Record		R	
	0367h	2000~2099	Year of 3rd Alarm Record		R	
	0368h	1~12	Month of 3rd Alarm Record		R	
	0369h	1~31	date of 3rd Alarm Record		R	
	036Ah	0~23	Hour of 3rd Alarm Record		R	
	036Bh	0~59	Minute of 3rd Alarm Record		R	
	036Ch	0~59	Second of 3rd Alarm Record		R	
	036Dh	0~34	Parameter Number of the 4th Alarm record		R	
	036Eh	-32768~32767	Parameter Value of the 4th Alarm Record		R	
	036Fh	2000~2099	Year of 4th Alarm Record		R	
	0370h	1~12	Month of 4th Alarm Record		R	
	0371h	1~31	date of 4th Alarm Record		R	
	0372h	0~23	Hour of 4th Alarm Record		R	
	0373h	0~59	Minute of 4th Alarm Record		R	
	0374h	0~59	Second of 4th Alarm Record		R	
	0375h	0~34	Parameter Number of the 5th Alarm record		R	
	0376h	-32768~32767	Parameter Value of the 5th Alarm Record		R	
	0377h	2000~2099	Year of 5th Alarm Record		R	
	0378h	1~12	Month of 5th Alarm Record		R	
	0379h	1~31	date of 5th Alarm Record		R	
	037Ah	0~23	Hour of 5th Alarm Record		R	
	037Bh	0~59	Minute of 5th Alarm Record		R	
	037Ch	0~59	Second of 5th Alarm Record		R	
	037Dh	0~34	Parameter Number of the 6th Alarm record		R	
	037Eh	-32768~32767	Parameter Value of the 6th Alarm Record		R	
	037Fh	2000~2099	Year of 6th Alarm Record		R	
	0380h	1~12	Month of 6th Alarm Record		R	
	0381h	1~31	date of 6th Alarm Record		R	
	0382h	0~23	Hour of 6th Alarm Record		R	
	0383h	0~59	Minute of 6th Alarm Record		R	
	0384h	0~59	Second of 6th Alarm Record		R	
	0385h	0~34	Parameter Number of the 7th Alarm record		R	
	0386h	-32768~32767	Parameter Value of the 7th Alarm Record		R	
	0387h	2000~2099	Year of 7th Alarm Record		R	
	0388h	1~12	Month of 7th Alarm Record		R	
	0389h	1~31	date of 7th Alarm Record		R	
	038Ah	0~23	Hour of 7th Alarm Record		R	
	038Bh	0~59	Minute of 7th Alarm Record		R	
	038Ch	0~59	Second of 7th Alarm Record		R	

Name	Address	Range	Explain	Initial	Write/Read	Note
	038Dh	0~34	Parameter Number of the 8th Alarm record		R	
	038Eh	-32768~32767	Parameter Value of the 8th Alarm Record		R	
	038Fh	2000~2099	Year of 8th Alarm Record		R	
	0390h	1~12	Month of 8th Alarm Record		R	
	0391h	1~31	date of 8th Alarm Record		R	
	0392h	0~23	Hour of 8th Alarm Record		R	
	0393h	0~59	Minute of 8th Alarm Record		R	
	0394h	0~59	Second of 8th Alarm Record		R	
Name	Address	Range	Explain	Initial	Write/Read	Note
	0395h	0~34	Parameter Number of the 9th Alarm record		R	
	0396h	-32768~32767	Parameter Value of the 9th Alarm Record		R	
	0397h	2000~2099	Year of 9th Alarm Record		R	
	0398h	1~12	Month of 9th Alarm Record		R	
	0399h	1~31	date of 9th Alarm Record		R	
	039Ah	0~23	Hour of 9th Alarm Record		R	
	039Bh	0~59	Minute of 9th Alarm Record		R	
	039Ch	0~59	Second of 9th Alarm Record		R	
					R	

Phase angle recording			Function 03 Read			
The phase differences between voltage or Current and U_1(or U_{12})are recorded, The phase differences are used to tell the phase sequence						
Name	**Address**	**Range**	**Explain**	**Initial**	**Write/Read**	**Note**
	039Dh	0~3600	Phase difference V_1/V_2 (3P4W), Phase angle $\theta_{V1\_V2\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V1\_V2} = \theta_{V1\_V2\_r}$ / 10 (Degree)**		R	
	039Eh	0~3600	Phase difference V_1/V_3(3P4W), Phase angle $\theta_{V1\_V3\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V1\_V3} = \theta_{V1\_V3\_r}$ / 10 (Degree)**		R	
	039Fh	0~3600	Phase difference V_1/I_1 (3P4W), Phase angle $\theta_{V1\_I1\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V1\_I1} = \theta_{V1\_I1\_r}$ / 10 (Degree)**		R	
	03A0h	0~3600	Phase difference V_1/I_2(3P4W), Phase angle $\theta_{V1\_I2\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V1\_I1} = \theta_{V1\_I1\_r}$ / 10 (Degree)**		R	
	03A1h	0~3600	Phase difference V_1/I_3(3P4W), Phase angle $\theta_{V1\_I3\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V1\_I3} = \theta_{V1\_I3\_r}$ / 10 (Degree)**		R	
	03A2h	0~3600	Phase difference V_{12}/V_{23}(3P3W) , Phase angle $\theta_{V12\_V23\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V12\_V23} = \theta_{V12\_V23\_r}$ / 10 (Degree)**		R	
	03A3h	0~3600	Phase difference V_{12}/I_1 (3P3W) , Phase angle $\theta_{V12\_I1\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V12\_I1} = \theta_{V12\_I1\_r}$ / 10 (Degree)**		R	
	03A4h	0~3600	Phase difference V_{12}/I_3(3P3W) , Phase angle $\theta_{V12\_I3\_r}$(the numerical value in register) **The real physical value is** **Phase angle $\theta_{V12\_I3} = \theta_{V12\_I3\_r}$ / 10 (Degree)**		R	

文件修訂

2009/11/8: 新增 3P3W 無 PT 接線