CHITAI ELECTRONIC CORP.

2406N
USER MANUAL (REV. 2.0)

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CONTENTS

1. Introduction

This manual contains all of the information warnings that must be followed by the order to insure proper use of instrument and to maintain it a completely safe operating condition.

1.1 General introduction

The 2406N is a micro-processor based power meter with a 16 bits CPU (Center process unit) and equipped with full-digitized measuring，indicating，calibrating and output functions. By its high speed of clock (14.7456MHz) and sampling (5555 times/sec)，2406N provides a very high level accuracy measuring; even to a harmonic distorted signal，it can measure accurately as well. 2406N not only can measure AC Voltage、AC Current、AC Power、Power Factor、Frequency simultaneously，but also have some special function such as Data hold、Range hold、CT Ratio setting、Correction of display value。

In communication，we use the most convenient and the easiest RS-232 as our standard output port. 2406N is indeed a good power measuring instrument of low cost and is easy to use.

1.2 Specifications

Warm up：＞30 minutes

Display：3 windows，4 digits，0.56" LED

Minimum input：5 ％ of Range

Response：2 cycles / sec

Input over indication："O.L"

Operating temp：0～50℃，RH＜80 ％

Temp. coefficient：±0.01％ FS/℃

Aux. power：AC90～264V，50 / 60Hz

Dimension：247mmW × 89mmH × 280mmD

Weight：2.5kg

[Voltage]

Range：80.00V，160.0V，320.0V，640.0V (Auto range or Manual)

Computation：True rms

Input impedance：≧1MΩ on all range

Maximum input：1000V(peak)，700V(rms)

Accuracy (23℃ ± 5 ℃)：

(40Hz ~400Hz) ± 0.1% of reading ± 0.1% of range

[Current]

Two range select：

    (1) 2.500A，5.000A，10.00A，20.00A　[Auto range or Manual]

    (2) 25.00mA，50.00mA，100.0mA，200.0mA[Auto range or Manual]

Computation：True rms

Input impedance：0~20A (0.01Ω);0~200mA (1Ω)

Maximum input：30A (Peak)，20A rms (standard)

Accuracy (23℃ ± 5 ℃)：

    (40Hz ~ 400Hz) ± 0.1% of reading ± 0.1% of range

CT ratio range：1 to 99

[Watt]

  Range：

  Current 0~20A

V W A	2.500A	5.000A	10.00A	20.00A
80.00V	200.0W	400.0W	800.0W	1600W
160.0V	400.0W	800.0W	1600W	3200W
320.0V	800.0W	1600W	3200W	6400W
640.0V	1600W	3200W	6400W	12.80KW

  Current 0~200mA

V W A	25.00mA	50.00mA	100.0mA	200.0mA
80.00V	2.000W	4.000W	8.000W	16.00W
160.0V	4.000W	8.000W	16.00W	32.00W
320.0V	8.000W	16.00W	32.00W	64.00W
640.0V	16.00W	32.00W	64.00W	128.0W

Computation：True rms

Accuracy (23 ± 5 ℃)：(Sine Wave)

  (40Hz ~ 400Hz) ± 0.2% of reading ± 0.2% of range

[Power Factor]

  Range：0.001 to 1.000

  Computation：W ÷ (V × A) ＝ PF

[Frequency]

  Range：40.0Hz　to　400.0Hz

  Accuracy (23℃ ± 5 ℃)：± 0.2% of reading

[Communication]　(Option)

  RS-232

2. Dimension and stand
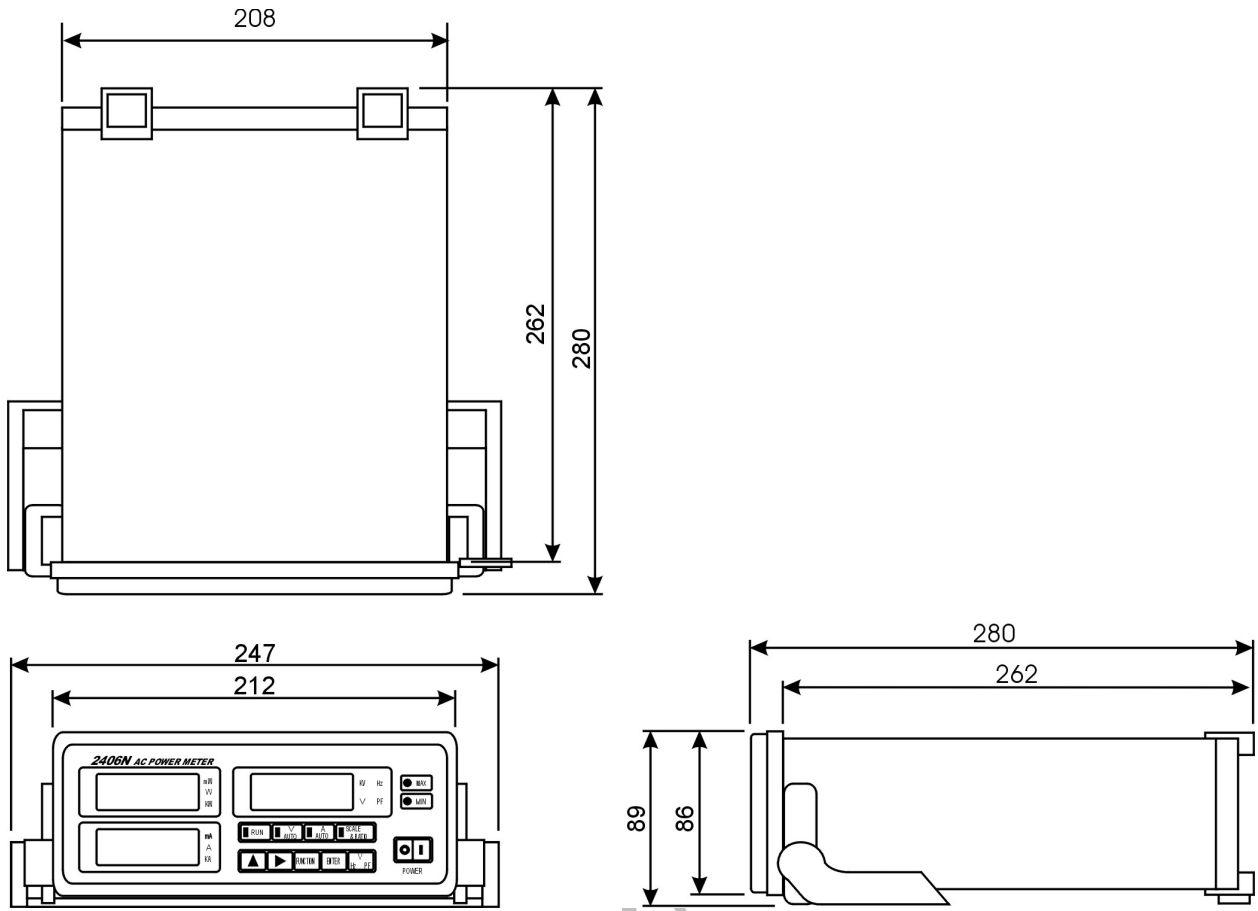
2.1 Dimension of outline

Fig .1   Unit：mm

2.2 Function of stand

There are 3 positions for the stand.　Fig.2 illustrates the position when 2406N is retracted horizontally.　Fig.3 illustrates the position when 2406N stands up.　Fig.4 illustrates the position when 2406N is carried by hand.　Fig.5 illustrates the way for changing the position of stand. Pull the stand by two hands to left and right side, then turn it to the position what you and loosen it.

Retraction

Fig .2

As A Foot

Fig .3

As A Handle

Pull To Left

2406N AC POWER METER

POWER

Pull To Right
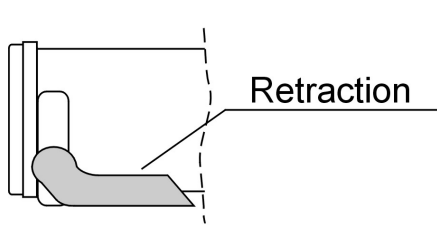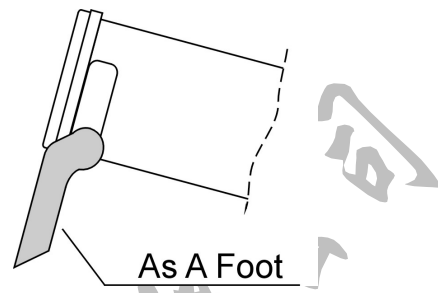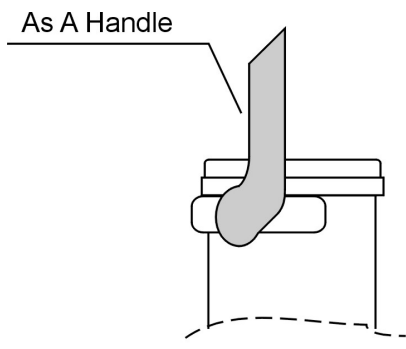
Fig .4
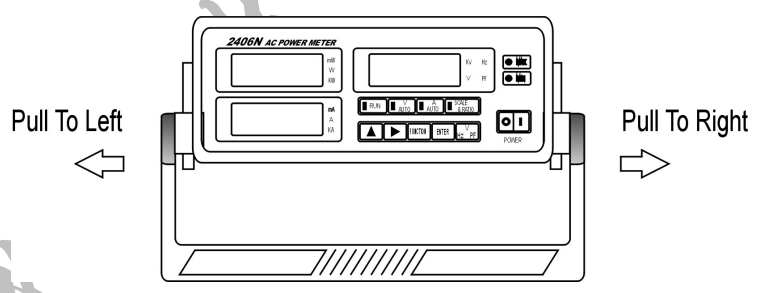
Fig .5

3. Description of back panel

Power Inlet

Fig For Input

Fuse For Input

RS-232
RS-485

AC 90~264V ⚠

20 A

2A

V+　V−　G　20 A+　200mA+　A−

1　2　3　4　5　6

Input Terminal Board
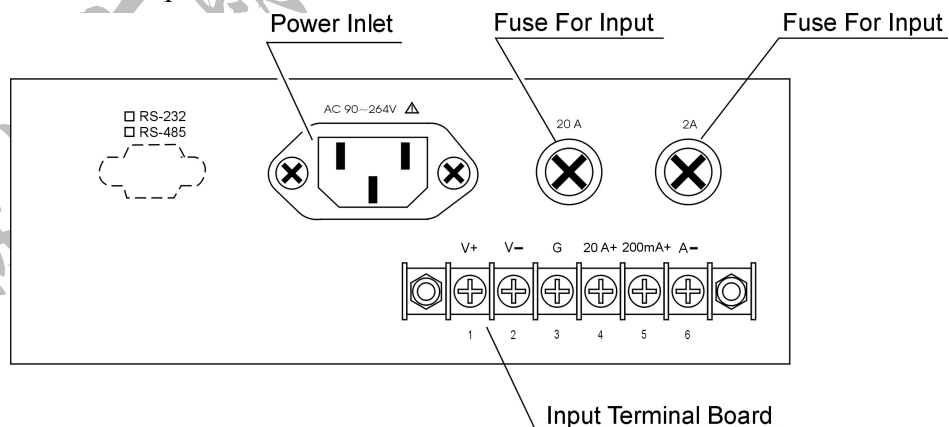
⚠ Please replace it with same size of fuse when the original is damaged.

4. Wiring

4.1 Without PT or CT

4.2 With CT
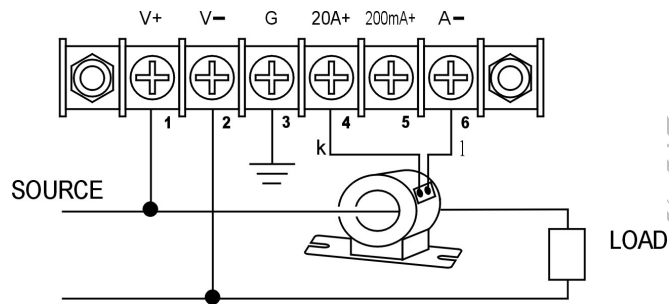
4.3 Via a socket box
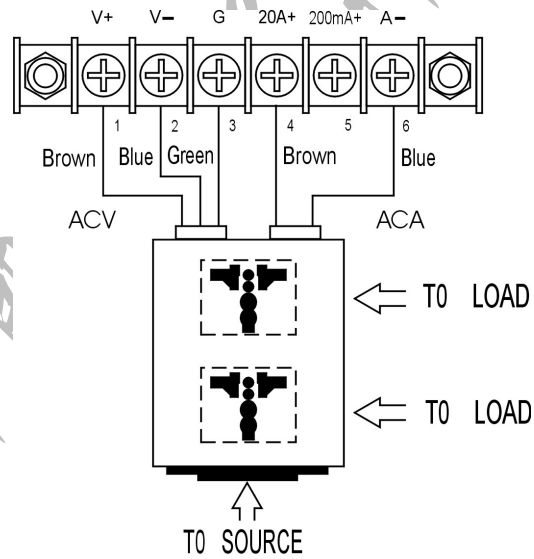
4.4 Pin of communication port

RS-232

RXD   TXD   GND
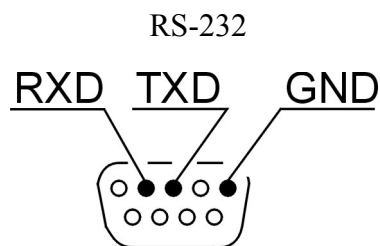
5. Key function

5.1 Description of front panel

5.1.1 Front panel
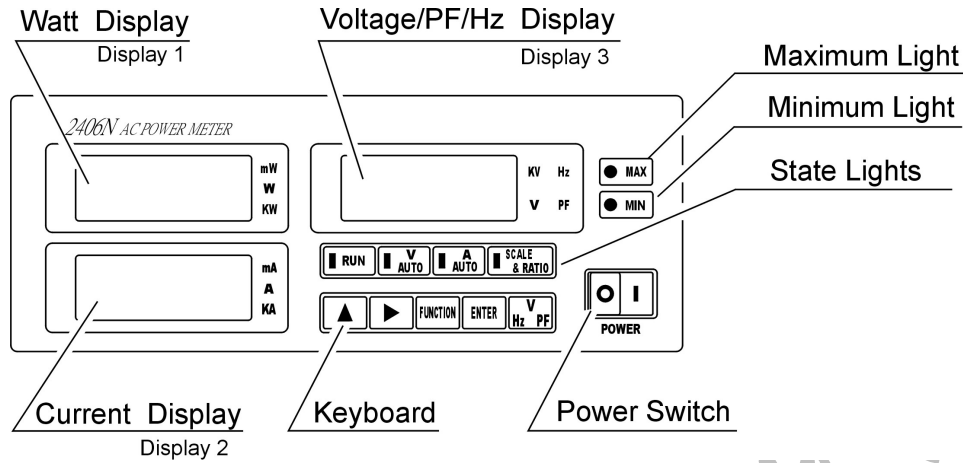
5.1.2 "Max" light

When 2406N was switched to Max. value-displaying mode, this light will be on. In this time the data showed in the 3 displays are the Max. value held by 2406N since power on or reset key was pressed.

5.1.3 "Min" light

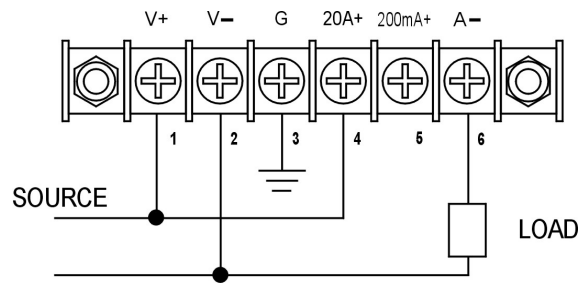When 2406N was switched to Min. value-displaying mode, this light will be on. In this time, the data showed in the 3 displays are the Min. value held by 2406N since power on or reset key was pressed.

5.1.4 State light

RUN	：Flash when 2406N runs normally and steadily on when runs abnormally or at "Hold" mode.
V AUTO	：On when voltage is in auto-range, otherwise off.
A AUTO	：On when current is in auto-range, otherwise off.
SCALE &RATIO	：When the CT Ratio (the ratio of current transformer) or REF value was set to any value except"1", this light will be on.

5.1.5 Description of key function

| ▲ | ：At measuring mode, press this key to make the three displays show Max. value, Min. value of presently measuring value. At setting mode, press this key to select the data what you want. |

| ► | ：At measuring mode, press this key to clear the Max. value or Min. value and re-load new value. At setting mode, press this key to select the digit that you want to change its number. |

| FUNCTION | ：Press the key to go into setting mode. Press this key sequentially, the following words will show in window 1 and window 3 one by one. |
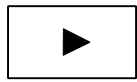
CURR SHNT → VOLT RANG → CURR RANG → CURR CT → VOLT REF →

(Note)

CURR REF → BAUD RATE → 485 ADDR → QUIT
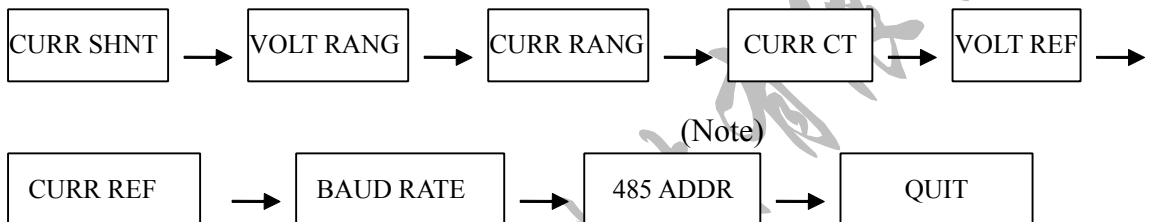
Note：Designed for future use, not available in this type.

| ENTER | ：At measuring mode, press this key to hold the value measuring at present. The "RUN" light will be on steadily when 2406N is at "HOLD" mode. Press again,2406N will return to measuring mode. At setting mode, press this key to save the data that you want to set into 2406N. |

Note：The Max. value and Min. value is being grasped continuously by 2406N whatever it is in "Hold" mode or measuring mode.
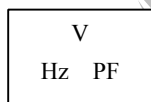
| V Hz PF | ：Press this to switch window 3 to show Hz or PF value. The window 3 Will show voltage value every time when 2406N is turned on. |

5.2 Use of keys

5.2.1 Setting for current input range

The two input ranges, 20A and 200mA, of 2406N are designed for different load. Selecting and setting the corresponding input range by key on the front board to avoid error readout after start.

Procedure：

```
                    (Note.1)        (Note.2)                          (Note.3)
                   ┌──────┐        ┌──────┐                          ┌──────┐
                   │      │        │      │                          │      │
            ┌────────────┐   ┌──────────┐   ┌──────────┐   ┌────────────┐
┌───────────┐│ FUNCTION   │→│    ▲      │→│  ENTER    │→│ FUNCTION   │→┌────────────────┐
│ Measuring ││   KEY      │ │   KEY     │ │   KEY     │ │   KEY      │ │Return to measuring│
└───────────┘└────────────┘ └──────────┘ └──────────┘ └────────────┘ └────────────────┘
```

Note.1：Repeat it till "CURR SHNT" appears.

Note.2：Repeat it till all digits are set.

Note.3：Repeat it till "QUIT" appears.

5.2.2 Setting for voltage and current range

There are 5 choice of voltage and current range in 2406N.

Voltage：640V、320V、160V、80V、AUTO

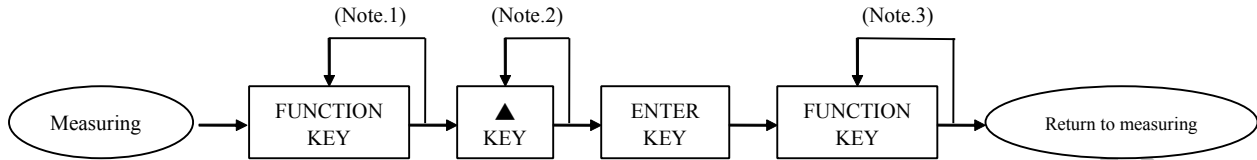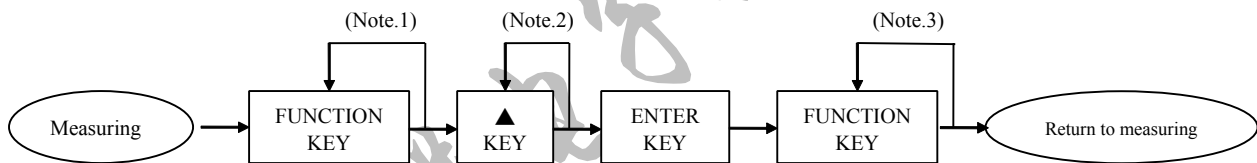Current：20A、10A、5A、2.5A、AUTO

200.0mA、100.0mA、50.00mA、25.00mA、AUTO

Procedure：

```
                    (Note.1)        (Note.2)                          (Note.3)
                   ┌──────┐        ┌──────┐                          ┌──────┐
                   │      │        │      │                          │      │
            ┌────────────┐   ┌──────────┐   ┌──────────┐   ┌────────────┐
┌───────────┐│ FUNCTION   │→│    ▲      │→│  ENTER    │→│ FUNCTION   │→┌────────────────┐
│ Measuring ││   KEY      │ │   KEY     │ │   KEY     │ │   KEY      │ │Return to measuring│
└───────────┘└────────────┘ └──────────┘ └──────────┘ └────────────┘ └────────────────┘
```

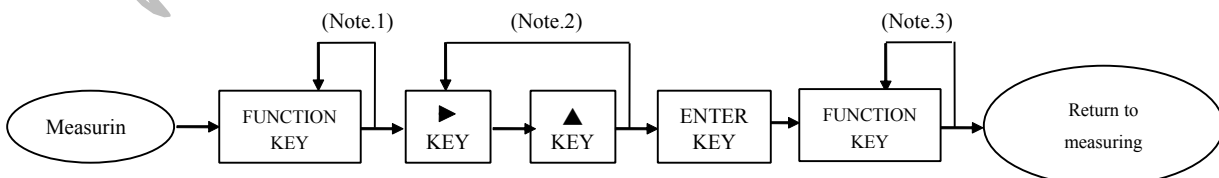Note.1：Repeat it till "CURR RANG" appears.

Note.2：Repeat it till all digits are set.

Note.3：Repeat it till "QUIT" appears.

5.2.3 Setting for CT ratio

When current input is via a current transformer (CT), the CT ratio must be set into 2406N to show the real value in display.

Procedure：

```
                    (Note.1)              (Note.2)                        (Note.3)
                   ┌──────┐              ┌──────┐                        ┌──────┐
                   │      │              │      │                        │      │
            ┌──────────┐  ┌────────┐  ┌────────┐  ┌────────┐  ┌──────────┐
┌──────────┐│ FUNCTION │→│  ▶      │→│   ▲     │→│ ENTER   │→│ FUNCTION │→┌──────────┐
│ Measurin ││   KEY    │ │  KEY    │ │  KEY    │ │  KEY    │ │   KEY    │ │Return to │
└──────────┘└──────────┘ └────────┘ └────────┘ └────────┘ └──────────┘ │measuring │
                                                                        └──────────┘
```

Note.1：Repeat it till "CURR CT" appears.

Note.2：Repeat it till all digits are set.

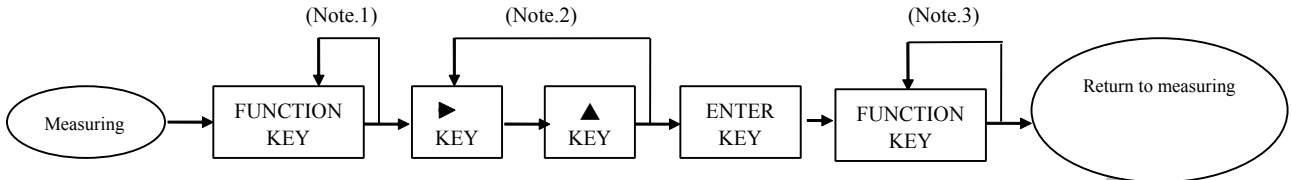Note.3：Repeat it till "QUIT" appears.

5.2.4 Setting for REF value

When the instrument is too old to measure correctly or owing to some other reason it's accuracy is out of specification, set REF value to correct it. The equation is as follow：

New value in display ＝ original value × REF value (REF：0.800~1.200)

Original value：the value when REF value ＝ 1
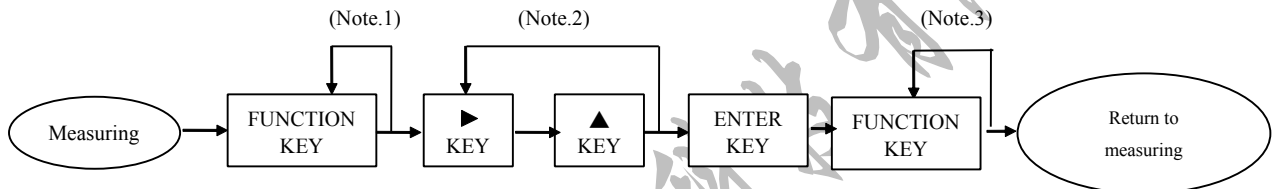
The procedure of setting voltage's REF：

Note.1：Repeat it till "VOLT REF" appears.

Note.2：Repeat it till all digits are set.

Note.3：Repeat it till "QUIT" appears.

The procedure of setting current's REF：
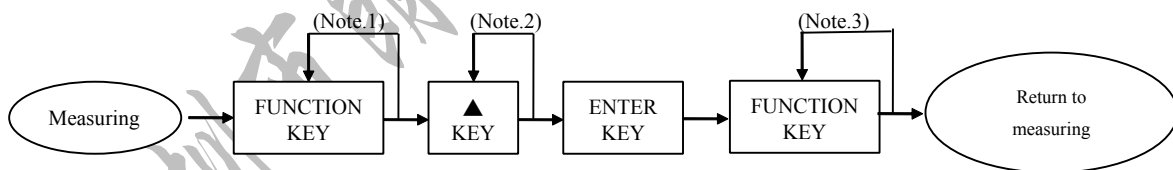

Note.1：Repeat it till "CURR REF" appears.

Note.2：Repeat it till all digits are set.

Note.3：Repeat it till "QUIT" appears.

5.2.5 Setting for Baud Rate

There are 4 BAUD RATE, 300、1200、2400 and 9600 available for selected in 2406N．

Procedure：

Note.1：Repeat it till " BAUD RATE " appears.

Note.2：Repeat it till all digits are set.

Note.3：Repeat it till "QUIT" appears.

5.2.6 Table of alphabet showed in displays

SYMBOL	8	b	C	d	E	F	9	h	ı	U	L	N	n	o	P	9	r	5	t	u	U	8	Y	=
ALPHABET	A	B	C	D	E	F	G	H	I	J	L	M	N	O	P	Q	R	S	T	U	V	W	Y	Z

COMMUNICATION of 2406N （Please attach the ending-code " \r ", same as 0x0D to each

command) (Error Command Response " !> " character)

1. Parameter (Set from keyboard)

ITEM	RANGE
Current Ratio	1 – 99
Voltage Reference	0.800 - 1.200
Current Reference	0.800 - 1.200
Baudrate	300，1200，2400，9600
Address	
Parity	None (No option)
Number of data bits	8 (No option)
Number of stop bits	1 (No option)

2. RS232   Command (N81)

COMMAND	DESCRIPTION
F00	Data Hold Enable
F01	Data Hold Disable
R00	Set Voltage Range = 640.0V
R01	Set Voltage Range = 320.0V
R02	Set Voltage Range = 160.0V
R03	Set Voltage Range = 80.00V
R04	Set Current Range = 20.00A (Option = 200.0mA)
R05	Set Current Range = 10.00A (Option = 100.0mA)
R06	Set Current Range = 5.000A (Option = 50.00mA)
R07	Set Current Range = 2.500A (Option = 25.00mA)
R08	Set Voltage Range = Auto
R09	Set Current Range = Auto
R10	Set Current = 20A
R11	Set Current = 200mA
V00	Read Voltage
V01	Read Current
V02	Read Active Power (Watt)
V04	Read Power Factor
V08	Read Maximum Voltage
V09	Read Maximum Current
V10	Read Maximum Active Power (Watt)
V11	Read Minimum Voltage
V12	Read Minimum Current
V13	Read Minimum Active Power (Watt)
V14	Read Parameter : Current Ratio
V15	Read Parameter : Voltage Reference
V16	Read Parameter : Current Reference
V17	Read Parameter : Voltage Range
V18	Read Parameter : Current Range
V19	Hz
V20	Read Input Range : 2.000E+1=20A, 2.000E-1=200mA

S03	Set ID Code
S04	Compare ID Code

Example:(Please send the data by string and attach an ending-code 0x0D " \r ")

1.Set ID Code = 1234

S03 : 1234\r

2.Compare ID Code = 1234

If the old ID code is same as the new-setting ID code, responds " Chi Tai "

If the old ID code is not same as the new-setting ID code, responds " CT-2406.. "