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5302A

Operation Manual

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5302A AC Power Source with energy analyzer manual catalog

Chapter 1 Introduction

1.1 General Description

5302A AC Power Source with Power/Energy Analyzer is based on 270VA AC Source integrate with multi-measurement function power meter, The AC power source can integrating Prodigit 33XXF series DC Load to measuring AC and DC power parameter to calculating efficiency of UUT, The all in one LCD display can display all electronic characteristic for user analysis that is more convenience for user operating.

1.2 Features

Multi range measurement functions provide high reliability and accuracy measurements.
Voltage meter 2 ranges 150V/300V
Current meter 4 ranges 10mA / 20mA / 200mA /2A
Wattage meter 8 ranges 1.5W / 3W (at 10mA) / 3W(at 20mA) / 6W / 30W / 60W / 300W / 600W .

1.2.1 Auto range for DAM.
1.2.2 Large size LCD panel can display voltage, current, power, frequency, power factor, efficiency, inrush current and output on/off degrees on the LCD display simultaneously.
1.2.3 High accuracy and high resolution Green Power measurement can easily Standby power measurement compliance to Energy Star 2.0, IEC62301 requirement that can be measuring no load test less than 0.3W.
1.2.4 Efficiency measurement with 33XX/G series dc load.
1.2.5 RS-232 remote interface.
1.2.6 External AC source input terminal can provide more capacity 600VA(300Vrms/2A) maximum to replace 5302A 270VA AC source, this tome the 5302A become to a precision power meter.
1.2.7 Protection functions: OCP, OPP and OTP.

1.3 Accessories

1.3.1 5302A operation Manual..... 1 PC
1.3.2 Power cord ……..... 1 PC
1.3.3 RS232 Cable ……..... 1 PC

1.4 Options

1.4.1 3310F Series DC Load and 3302F Mainframe
1.4.2 P/N：64809094 RS-232 Cable x 1 PC for communication with 5302A
1.4.3 P/N：13300F509 RS-232 interface BD x 1

1.5 Input Specifications

AC Input Rating		
Voltage range	115Vac±10%	230 Vac ±10%
Frequency range	47-63Hz	
Fuse	12A/250V(5×20 mm)	12A/250V(5×20 mm)
Dimension	440W × 440D × 97.7Hmm	
Weight	22 kg	

Table 1-1 Line input specification

1.6 Output Specifications

Power	270VAmax
Type	Linear
Voltage	10 ~ 150Vrms / 10 ~ 305 Vrms
Accuracy	0.2%±0.2%F.S.
Resolution	0.1V
Distortion	THD ≦ 0.5% (R load)
Load regulation	±0.5% ± 0.5V
Line regulation	±0.5% ± 0.5V
Current	2.0 Arms/1.0 Arms
Frequency	40.0 ~ 70Hz
Resolution	0.1Hz
Triac Mode	Leading/Trialing Edge
Range	0°~180°
Resolution	1°
Angle(ON/OFF)	0~360°
Resolution	1°
Protection	OCP,OTP,OPP ,Short
ACV meter (Vrms)	150V/305V
Resolution	0.1V
Accuracy	± 0.5% OF (Reading + Range)
ACA meter (Arms)	10mA / 20mA / 200mA /2000mA(Auto range for AC Source) / 200A(for Inrush)
Resolution	0.001mA / 0.01mA / 0.1mA / 1mA / 0.1A (for Inrush)
Accuracy	±0.5% OF (Reading + Range)
ACW meter	1.5W / 3W/ 6W / 30W / 60W/300W/600W
Resolution	0.001W / 0.001W / 0.001W / 0.01W / 0.01W / 0.1W / 0.1W
Accuracy	± 0.5% OF (Reading + Range)
DCW meter	Same as 3310F Series
PF meter	± 0.01~1.00
Resolution	0.01
Accuracy	1% of (Reading + Range)
Frequency meter	40~70Hz
Resolution	0.1Hz
Accuracy	± 0.1Hz
Efficiency meter	Corresponds to ACW and DCW, ± 1.0% of (Reading + Range)

Integration Meas. Power/ Time	From 0.000mWh~999.9KWh
	1 Sec ~ 99H59M59S
Inrush Delay/Period	0~99.9mS/0.1~99.9S
Meter Meas. Rate Interval	100mS/200mS/500mS/1S/5S/10S
Interface	RS-232
External AC Source	300Vrms/2A/600VA

Table 1-2 5302A specifications

Note * : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃, Except as noted

Chapter 2 Installation

2.1 Inspection

The 5302A AC Source was carefully inspected before shipment. If instrument damage has occurred during transport, please inform Prodigit's sales and service office or representative.

Your 5302A AC Source was shipped with a power cord for the type of outlet used at your location. If the appropriated cord was not included, please contact your nearest Prodigit sales office to obtain the correct cord. Refer to “check line voltage “to check the line voltage selection and fuse type.

2.2 Check line voltage

5302A AC Source can work exchanging power 115V and 230V, the working voltage is lapelled in the power input end adjacent place of rear board, please confirm first before using whether the working voltage lapelled and your voltage of using are the same, if when you use the voltage to be different from working voltage that 5302A AC Source labels, please establish the working voltage again according to the following steps.

2.2.1 Close the switch of 5302A AC Source front board (the position of 0).

2.2.2 Establish the switch and lie on 5302A AC Source rear board, please consult Fig. 2-1 and establish the 2.2.2 correct working voltage, the settlement of the voltage is explained as follows:

a. Establish the switch to 115V position to establish the voltage of using as 115 V promptly.

b. Establish the switch to 230V position to establish the voltage of using as 230 V promptly.

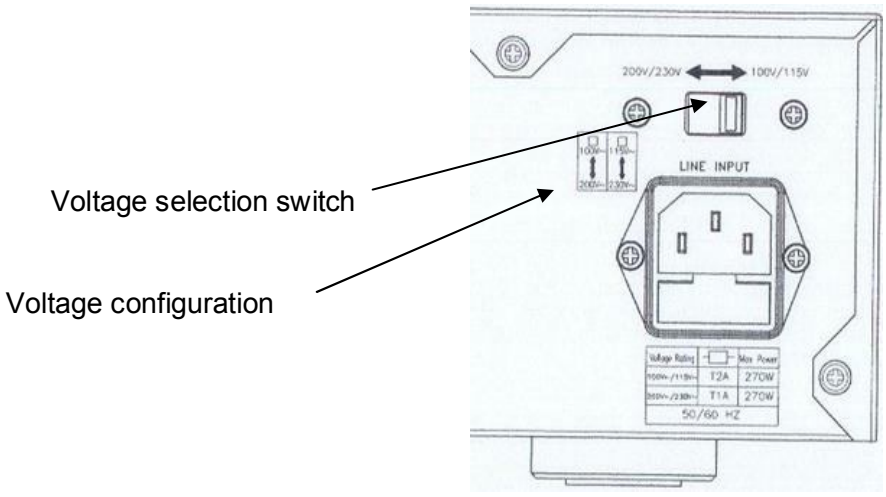


Fig 2-1 SET OF SWITCH

2.2.3 Mark the correct voltage on the rear panel of 5302A AC Source.
2.2.4 Check the rating of the line fuse and replace it with the correct fuse if necessary.
2.2.5 The line fuse is located below the AC line receptacle see Fig 2-2. With the power cord removed, use a small screwdriver to extract the fuse holder from under the AC socket.

Replace the fuse with the appropriate type as indicated in Table 1-1. These fuses are normal-blow fuses.
2.2.6 Reinstall fuse holder and connect the power cord.

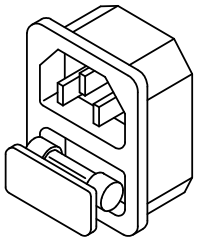


Fig 2-2 AC LINE RECEPTACLE

2.3 Grounding requirements

The 5302A AC Source is equipped with three conductor cable which plugs in an appropriate receptacle to ground the instrument's cover.

2.4 Environmental requirements

2.4.1 Indoor use.
2.4.2 Installation category I.
2.4.3 Pollution degree 2.
2.4.4 Altitude up to 2000 meter.
2.4.5 Relative humidity 80%.
2.4.6 Ambient temperature 0℃~ 40℃.

2.5 Repair and correct serving

If the instrument is damaged, please attach a tag to the instrument to identify the owner and indicated the require service or repairing. And inform the Prodigit sales and service office or representative.

2.6 RS-232 interface function

5302A AC Source has offered a RS-232 stand (FEMALE) to connect the device on the back board; this connection device connects the port with computer RS-232 to join by way of one of one.

Fig 2-3 RS-232 interface

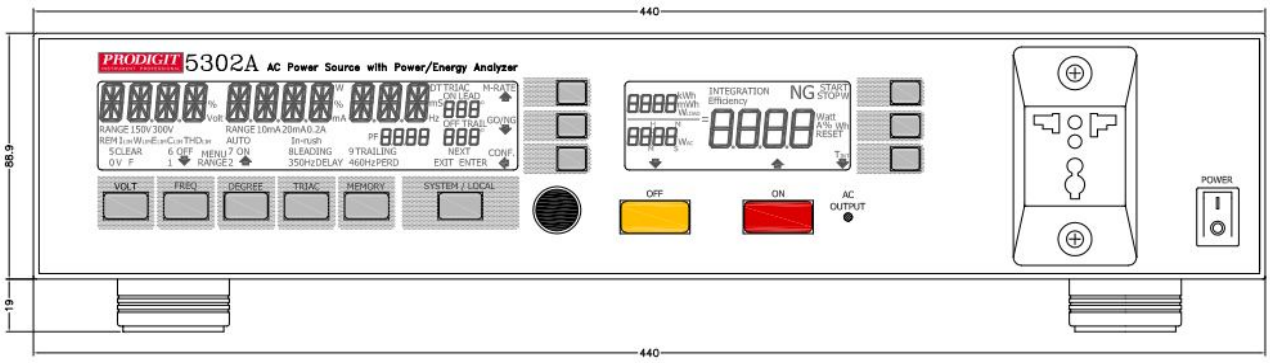
2.7 Clean

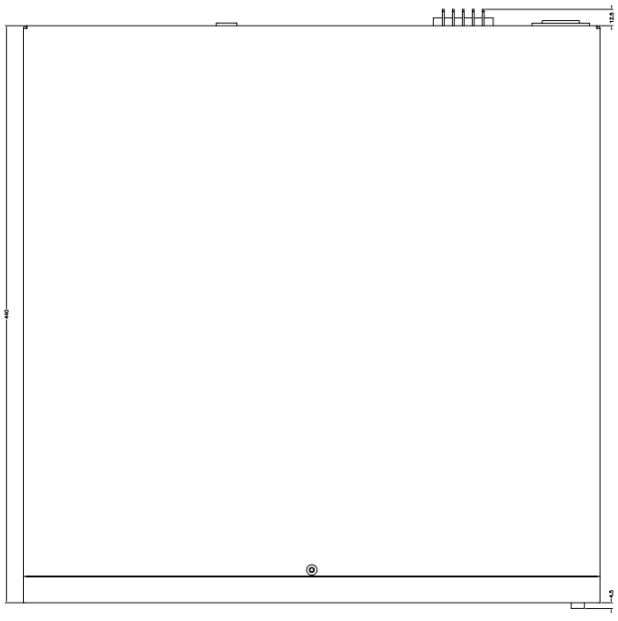
Use a soft or slightly damp cloth to clean this product.

BEFORE you clean the unit, switch the mains power off and disconnect the input lead.

- Please do NOT use any organic solvent capable of changing the nature of the plastic such as benzene or acetone.
- Please ensure that no liquid is allowed to penetrate this product.

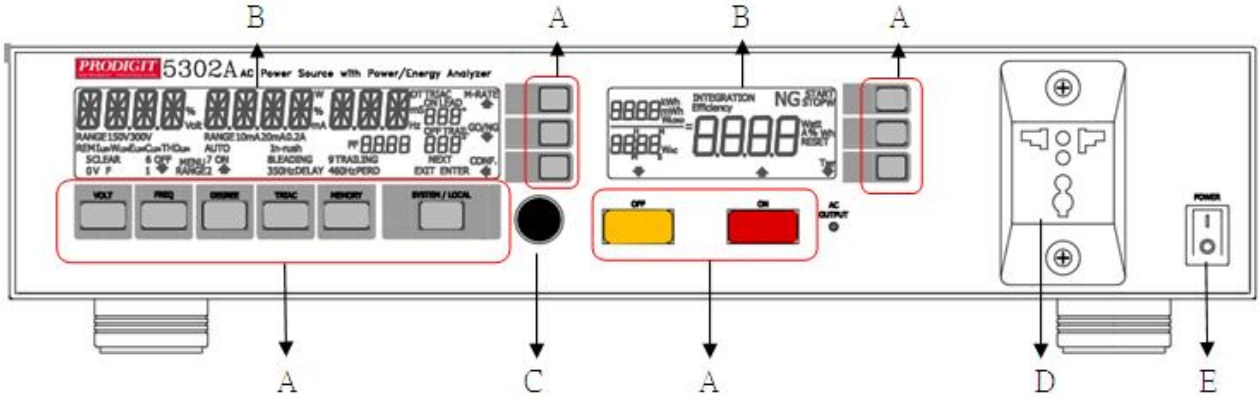
2.8 Dimensions



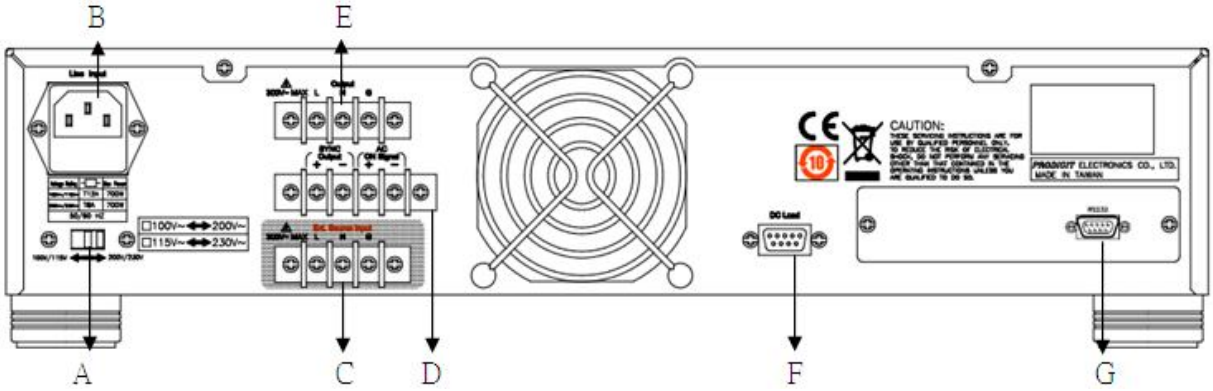


Chapter 3 Operation

3.1 Front Panel

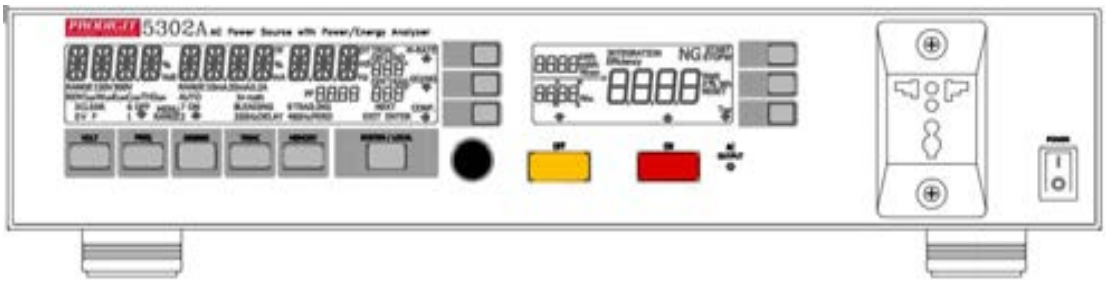


A. Operation key, the detail description as section 3.3.
B. Display Area, include Vrms, Arms, PF. TRIAC mode, AC ON/OFF degree and power parameter. , the detail description as section 3.3.
C. Knob switch for increase or decrease setting volume, press for decimal point shift.
D. AC SOURCE output receptacle.
E. 5302A Power switch.



A. Input voltage select switch.
B. 5302A LINE INPUT receptacle.
C. External source input terminal.
D. Power ON/OFF synchronous signal output (TTL), the output signal waveform refer to Appendix 1 and 2.
E. Internal source output terminal (same as output receptacle of front panel).
F. Serial port for DC load communication (RS-232 use 1:1 9Pin cable).
G. RS-232 interface port.

3.2 Operation Description



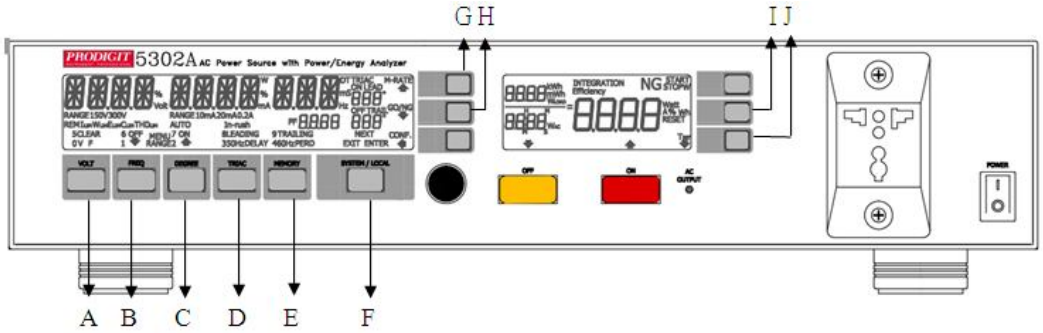
3.2.1 The display will show the model no. and firmware version information about 3 second when power on the 5302A AC Power Source with Power/Energy Analyzer. The system will detecting the load interface port automatically, the power meter will be changed to the accumulation mode when load communication is available.

The system initial setting as following:

AC Source Output Voltage Range 150V
AC Source Output Voltage 115V
AC Source Output Frequency 60Hz
AC Source Output Turn ON/OFF Degree 0° and Turn ON Degree Mode
AC Source Triac Mode Leading 0°/Trailing 180° and Turn OFF Triac Mode
OCP Latch OFF
Meter Reading Rate Every Cycle
Meter Integration Mode OFF and Time at 5 Minute
Meter I-Range Auto
User Define GO/NG Criteria：I_{Limit} = 2.000A，W_{Limit} = 270.0W，E_{Limit} = 50.00%，C_{Limit} = 200.0A
AC Output OFF

Wake-up setting：

The initial data store in memory 0, User can recall memory 0 to call out the system initial. The memory 0 can be modify for user definition to become to user define wake-up setting. .

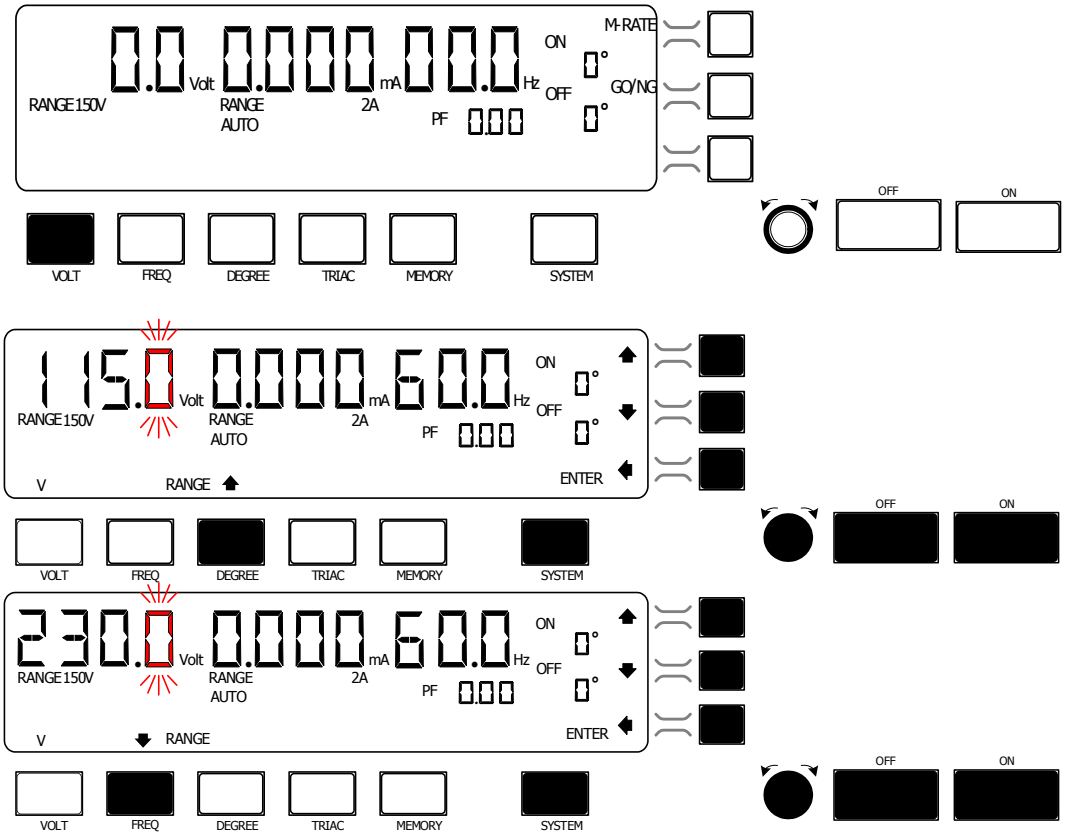


Key definition:
A. VOLT: Voltage setting.
B. FREQ: Frequency setting.
C. DEGREE: Output ON/OFF angle (degree 0~360) setting.
D. TRIAC: TRIAC leading angle or trailing angle setting.
E. MEMORY: Memory recall or store setting.
F. SYSTEM: System parameter setting.

G. M-RATE: Meter update rate setting
H. GO/NG: GO/NG criterion parameter setting.
I. Wh: Power accumulation mode.
J. T_{INT}: Power accumulation time setting.

3.2.2 Voltage output setting

Press “VOLT” key then voltage meter will flash and press “↑” key to increase the voltage setting, press”↓” key to decrease the voltage setting, rotate the knob switch by clockwise to shift the digit to left, rotate the knob switch by anticlockwise to shift the shift to right. Voltage range 1 from 10V to 150V resolution 0.1V, range 2 from 10V to 305V resolution 0.2V.



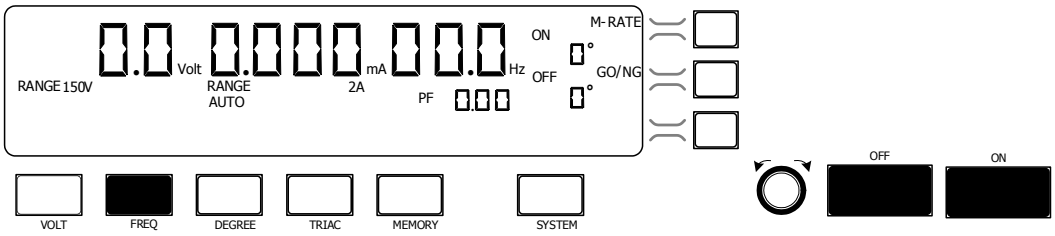
3.2.2.1 Key definition under voltage setting mode

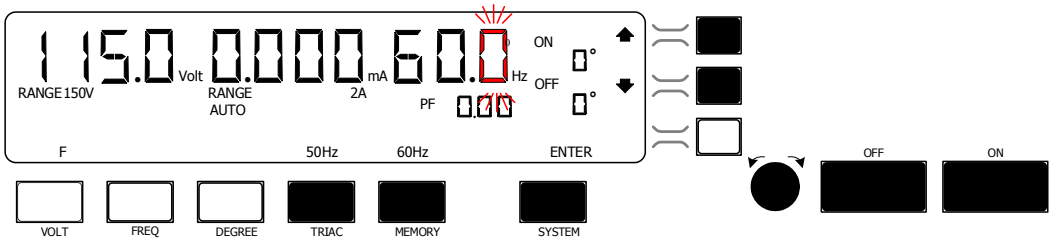
- Press “VOLT” again to escape the voltage setting mode and return to meter mode.
- Press “FREQ” key to change voltage range to lower range (range 1).
- Press “DEGREE” key to change voltage range to higher range (range 2).
- Press “SYSTEM” key to confirm the voltage setting volume and return to meter mode.
- Press “↑“ key or rotate knob switch by clockwise to increase the voltage setting.
- Press “↓“ key or rotate knob switch by anticlockwise to decrease the voltage setting.
- Press “←” key or press knob switch to shift the digit to left.
- Press “ON” key to turn ON the AC output and escape voltage setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.

- The system will be return to meter mode automatically when no any operation in voltage setting mode over 5 second. The system return to meter mode but background is under voltage setting mode, this duration rotate knob switch can increase or decrease the voltage setting when output ON.
- Another key are not available.

3.2.3 Frequency setting

Press “FREQ” key then frequency meter will flash and press “↑” key or rotate knob switch by clockwise to increase frequency setting, press “↓” key or rotate knob switch by anticlockwise to decrease frequency setting, the frequency setting range from 40Hz to 70Hz.



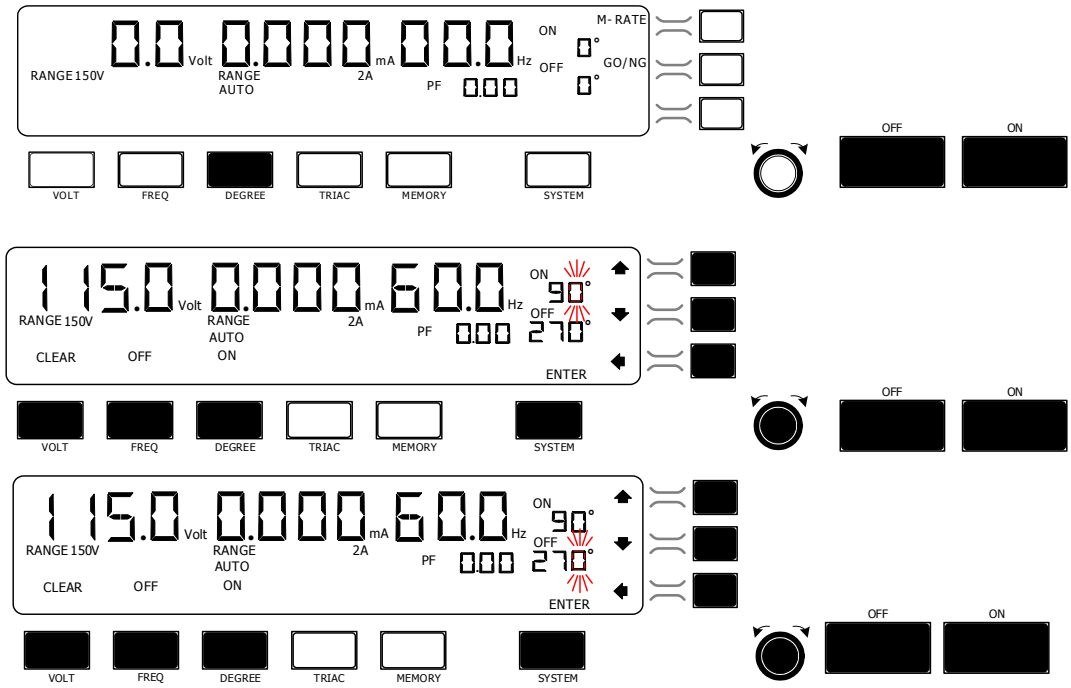


3.2.3.1 Key definition under FREQ setting mode.

- Press “FREQ” key again to escape the frequency setting mode and return to meter mode.
- Press “TRIAC” key to setting frequency 50Hz.
- Press “MEMORY” key to setting frequency 60Hz.
- Press “SYSTEM” key to confirm the frequency setting volume and return to meter mode.
- Press “↑“ key or rotate knob switch by clockwise to increase the frequency setting. The frequency range is 40 to 70Hz.
- Press “↓“ key or rotate knob switch by anticlockwise to decrease the frequency setting. The frequency range is 40 to 70Hz.
- Press “ON” key to turn ON the AC output and escape frequency setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- The system will be return to meter mode automatically when no any operation in frequency setting mode over 5 second. The system return to meter mode but background is under frequency setting mode, this duration rotate knob switch can increase or decrease the frequency setting when output ON.
- Another key are not available.

3.2.4 AC output ON/OFF degree setting.

Press “DEGREE” key then degree setting LCD will flash ON degree indicator lit on and press “↑ ↓” key to setting the output degree.

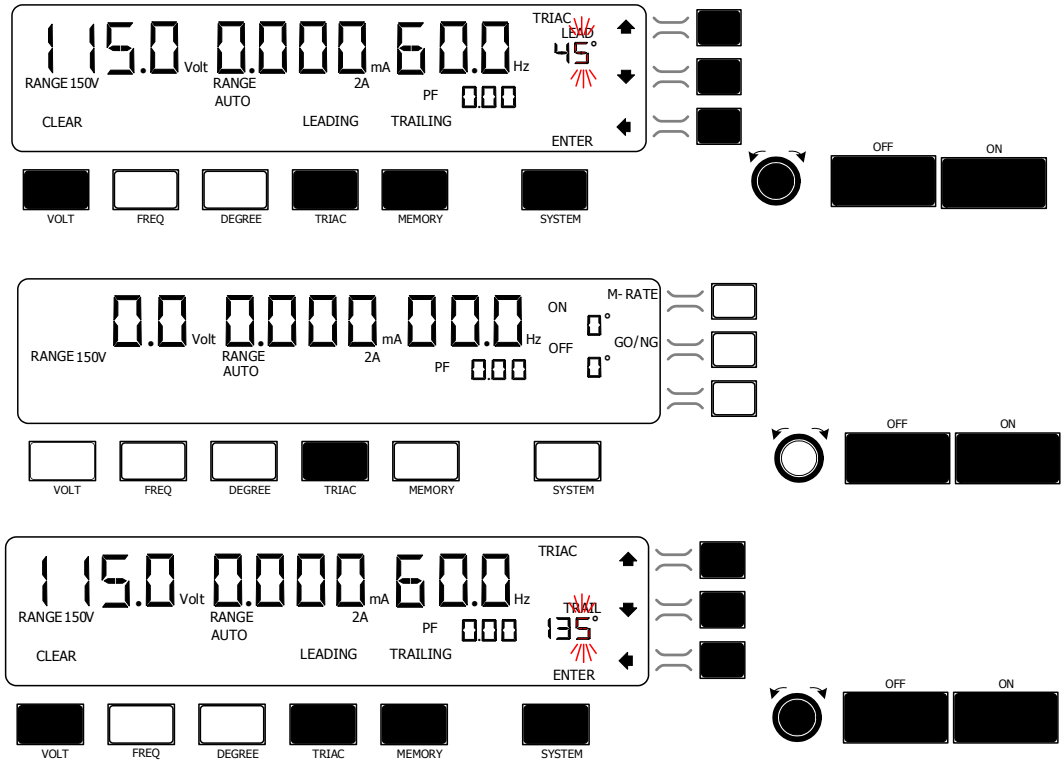


3.2.4.1 Key definition under DEGREE setting mode.

- Press “VOLT” key to clear the degree to zero.
- Press “FREQ” key to setting OFF degree.
- Press “DEGREE” key to setting ON degree.
- Press “SYSTEM” key to confirm the frequency setting volume and return to meter mode.
- Press “↑“ key or rotate knob switch by clockwise to increase the frequency setting. The degree range is 0 to 360.
- Press “↓“ key or rotate knob switch by anticlockwise to decrease the frequency setting. The degree range is 0 to 360.
- Press “ON” key to turn ON the AC output and escape frequency setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- The system will be return to meter mode automatically when no any operation in DEGREE setting mode over 5 second. The system return to meter mode but background is under degree setting mode, this duration rotate knob switch can increase or decrease the degree setting when output ON.
- Another key are not available.

3.2.5 TRIAC degree setting

Press “TRIAC” key then leading edge degree setting LCD will flash LEAD indicator lit on and press “↑ ↓” key or rotate knob switch to setting the output degree, the setting range is 0 to 180 degree.



3.2.5.1 Key definition under TRIAC degree setting mode.

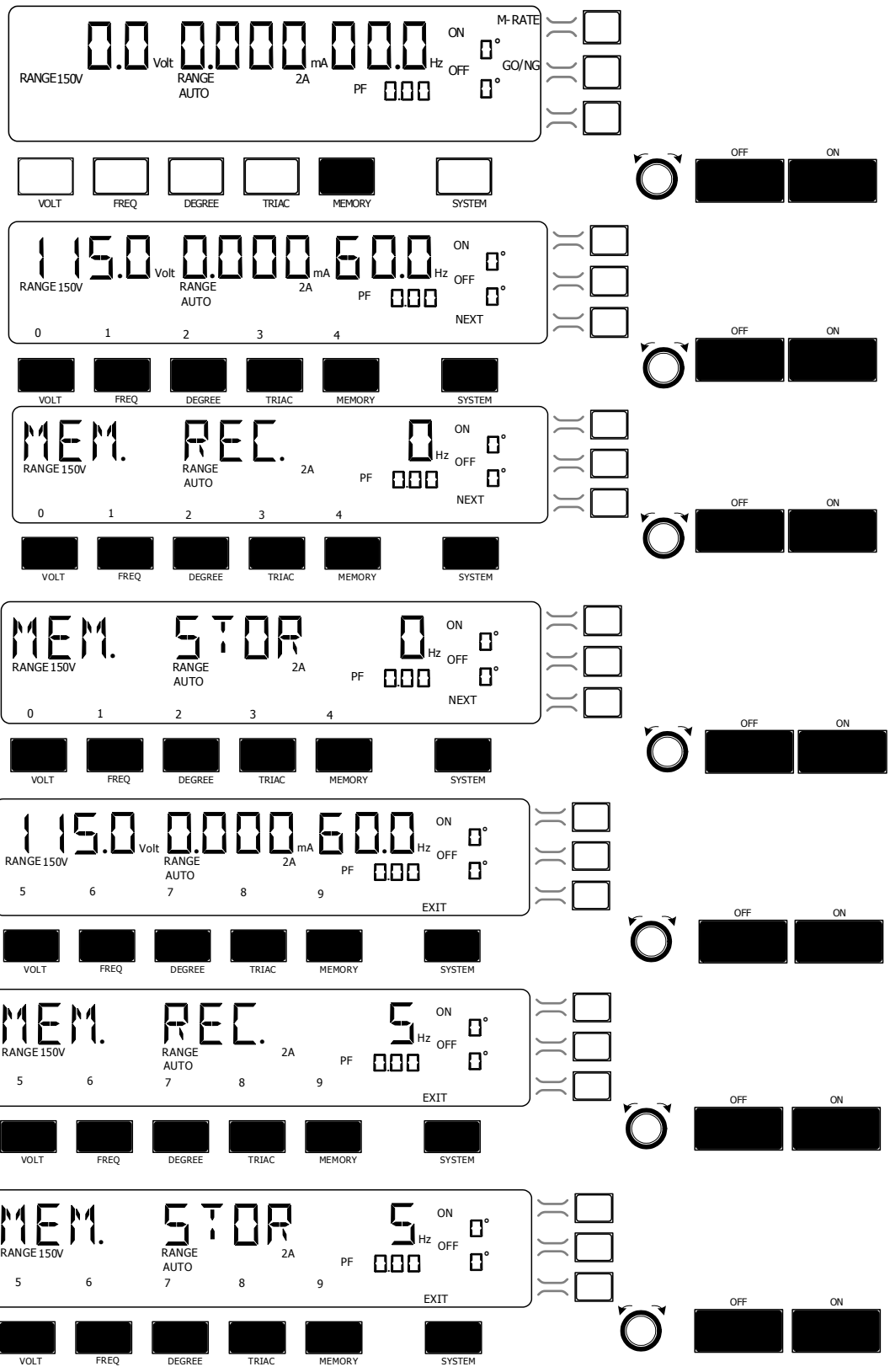
- Press “VOLT” key to clear the degree to initial setting, the leading edge initial degree is 0, the trailing edge initial degree is 180.
- Press “TRAIC” key to setting lead edge degree, and LEAD indicator lit on.
- Press “MEMORY” key to setting trailing edge degree, and TRAIL indicator lit on.
- Press “SYSTEM” key to confirm the frequency setting volume and return to meter mode.
- Press “↑“ key or rotate knob switch by clockwise to increase the degree setting. The degree range is 0 to 180.
- Press “↓“ key or rotate knob switch by anticlockwise to decrease the frequency setting. The degree range is 0 to 180.
- Press “ON” key to turn ON the AC output and escape frequency setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- The system will be return to meter mode automatically when no any operation in TRAIC degree setting mode over 5 second. The system return to meter mode but background is under TRAIC degree setting mode, this duration rotate knob switch can increase or decrease the degree setting when output ON.
- Another key are not available.

3.2.6 MEMORY Recall and Store setting

Press MEMORY key to recall or store the parameter of setting, the parameter includes voltage setting, frequency setting, ON/OFF degree, TRIAC … etc.

Press MEMORY key then 0~4 memory number will lit on the LCD. Press the number key shortly to recall the memory data, and press the number key longer than 3 second

to store the setting parameter to the memory. Press “NEXT” key to next page of memory, the total memory are 10 sets (0~9).

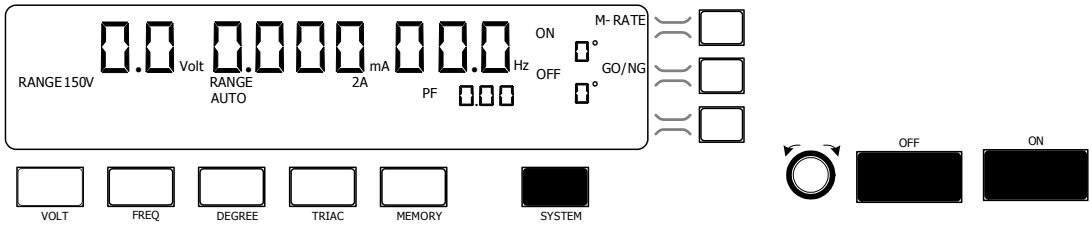


3.2.6.1 Key definition under MEMORY degree setting mode.

- Press “VOLT” key shortly to recall memory 0 or 5. Press the key longer then 3 second to store the parameter to memory 0 or 5.
- Press “FREQ” key shortly to recall memory 1 or 6. Press the key longer then 3 second to store the parameter to memory 1 or 6.
- Press “DEGREE” key shortly to recall memory 2 or 7. Press the key longer then 3 second to store the parameter to memory 2 or 7.
- Press “TRIAC” key shortly to recall memory 3 or 8. Press the key longer then 3 second to store the parameter to memory 3 or 8.
- Press “MEMORY” key shortly to recall memory 4 or 9. Press the key longer then 3 second to store the parameter to memory 4 or 9.
- Press “SYSTEM” key to next page or exit the memory recall or store mode to meter mode.
- Press “ON” key to turn ON the AC output and escape memory recall or store mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- The system will be return to meter mode automatically when no any operation in MEMORY setting mode over 5 second.
- Another key are not available.

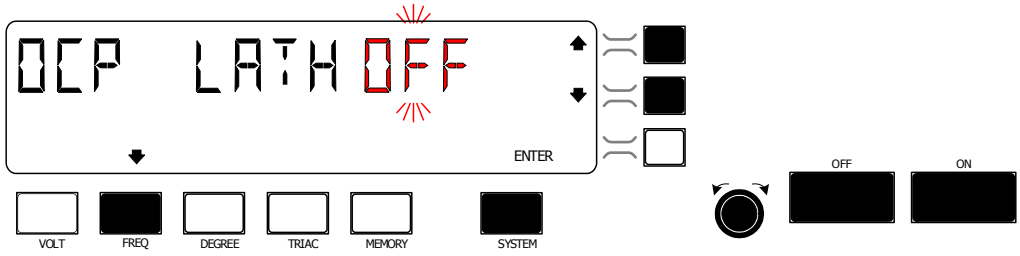
3.2.7 SYSTEM parameter setting

Press SYSTEM key to setting the parameter of system, first is go to local, and another item as OCP Latch ON/OFF, external source input ON/OFF, PQT(Power Quality Test) test ON/OFF, press “ ↑ ↓ ” to change the item



3.2.7.1 OCP LATCH setting (Initial OFF)

If OCP LATCH setting to OFF, The AC source will be OFF automatically after 3 second when OCP active, and current meter display flush OCP and beep on. If OCP LATCH setting to ON, then the AC source will not be OFF automatically when OCP active, and current meter display flush OCP and beep on until press nay key to disable the alarm.



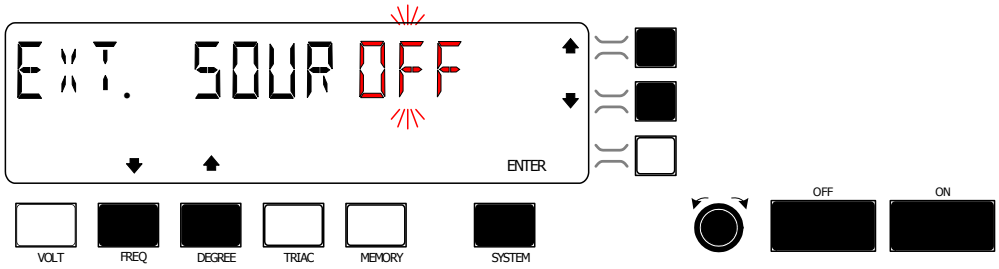
3.2.7.1.1 Key definition under OCP LATGH setting mode.

- Press “FREQ” key to next item external source ON/OFF setting.
- Press “SYSTEM” key to confirm the setting and return to meter mode.
- Press “ ↑ ↓ ” key or rotate the knob switch to change ON/OFF setting.

- Press “ON” key to turn ON the AC output and escape OCP LATCH setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- Another key are not available.

3.2.7.2 EXT. SOUR ON/OFF setting (Initial OFF)

To setting Source from internal or external, setting EXT. SOUR OFF for internal 270VA AC source enable, setting ON for external AC source enable, the external AC source specification range are 300V, 2A, 600VA maximum. The voltage meter range is fixed in range 2(300V) when external source enable, and all of AC source setting are disable.



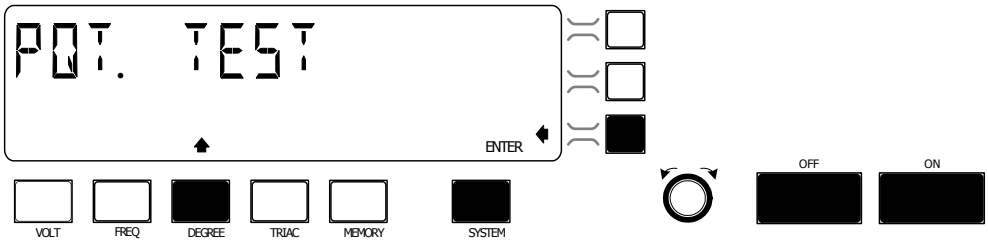
3.2.7.2.1 Key definition under OCP LATGH setting mode.

- Press “FREQ” key to next item PQT.TEST setting.
- Press “DEGREE” key to last item OCP LATCH ON/OFF setting.
- Press “SYSTEM” key to confirm the setting and return to meter mode.
- Press “↑ ↓” key or rotate the knob switch to change ON/OFF setting.
- Press “ON” key to turn ON the AC output and escape OCP LATCH setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- Another key are not available.

Caution! To avoid damage, the source output will be “OFF” automatically when setting external source ON/OFF.

3.2.7.3 PQT. TEST setting

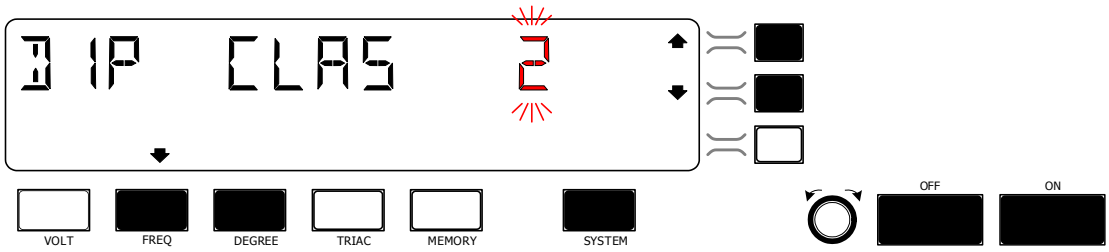
Power Quality Test function provide IEC/EN 61000-4-11 simulation test, there are voltage dips, short interrupt and voltage variations immunity test.



3.2.7.3.1 Key definition under PQT. TEST setting mode.

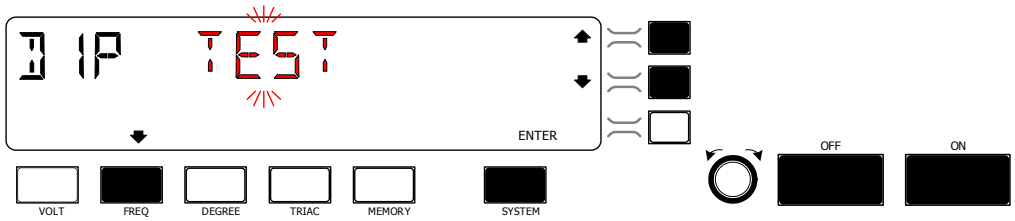
- Press “DEGREE” key to last item EXT. SOURCE ON/OFF setting.
- Press “SYSTEM” key to confirm the setting and return to meter mode.
- Press “←” key to next hierarchy item to select DIP Interrupt or variation.
- Press “ON” key to turn ON the AC output and escape OCP LATCH setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- Another key are not available.

3.2.7.3.2 PQT. TEST item DIP, INTERRUPT、VARIATION test parameter



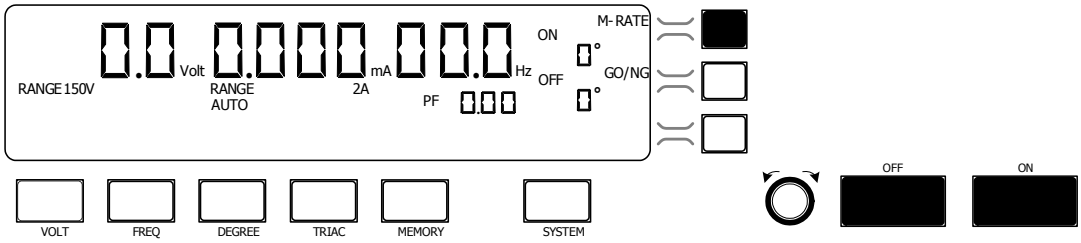
- Press “FREQ” key to next item or press “DEGREE” key to last item.
- Press “SYSTEM” key to confirm the setting and start up the test and the LCD will display flush “TEST” to means under testing, which will be return to the setting mode when the test is finished.
- Press “ ↑ ↓ ” key to setting class 2 or class 3 in DIP and interrupt test item.
- Press “ON” key to turn ON the AC output.
- Press “OFF” key to turn OFF the AC output.
- Another key are return to last item.

Note! The PQT test function have to under output ON condition, and setting external source OFF



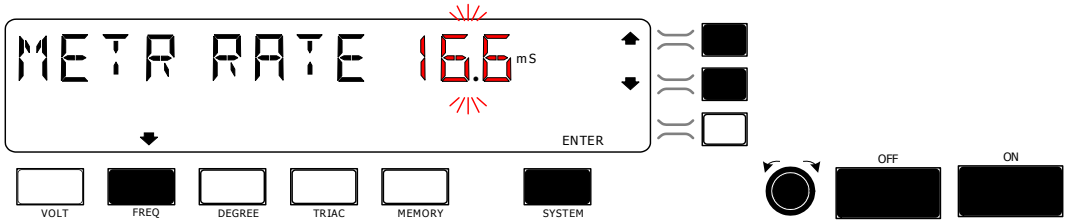
3.2.8 M-RATE Meter update rate setting

The meter update rate can be setting to different update rate, some application need to setting different meter update rate, the M-RATE can setting meter update rate, Meter I-Range and Meter In-rush, The item as following Meter Update Rate ⟷ Meter I-Range ⟷ Meter In-rush.



3.2.8.1 Meter Update Rate setting

The Meter Update Rate is for voltage, current and power meter update rate setting, initial is one cycle(by frequency detected) update rate. That can be set to 0.1S, 0.2S, 0.5S, 1.0S, 2.0S, 5.0S and 10S。If setting to 0.2 second (0.2/0.01667 = 11.99 cycles) when frequency is 60Hz, that means the voltage, current and power meter update per 12 cycles measuring data.

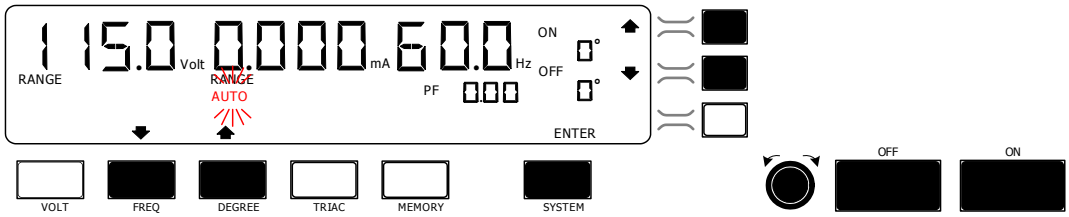


3.2.8.1.1 Key definition under METER RATE setting mode.

- Press “FREQ” key to next item Meter I-Range.
- Press “SYSTEM” key to confirm the setting and return to meter mode.
- Press “↑ ↓” key or rotate the knob switch to setting update rate.
- Press “ON” key to turn ON the AC output and escape M-RATE setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- Another key are not available.

3.2.8.2 Meter I-Range setting

There are 5 ranges for current meter, the ranges as following AUTO ↓ ↑ 10mA ↑ ↓ 20mA ↑ ↓ 0.2A ↑ ↓ 2A, the current meter unit is mA.

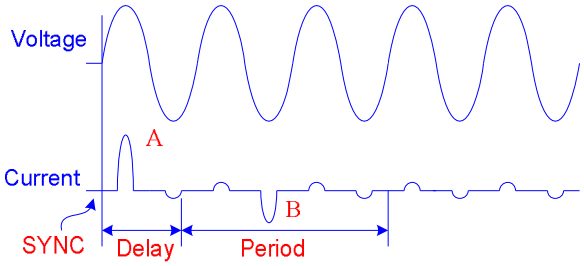


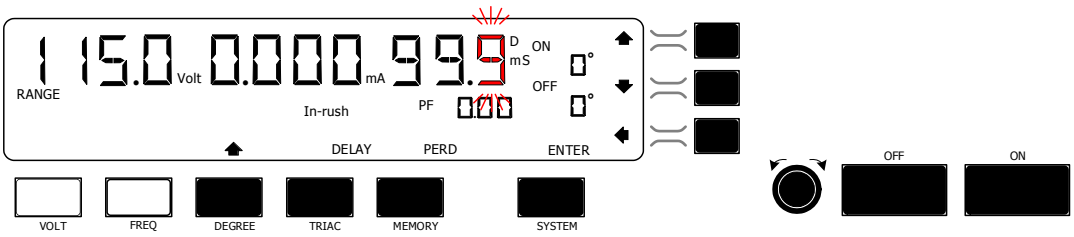
3.2.8.2.1 Key definition under Meter I-Range setting mode.

- Press “FREQ” key to next item Meter In-Rush.
- Press “DEGREE” key to last item Meter Update Rate mode
- Press “SYSTEM” key to confirm the setting and return to meter mode.
- Press “↑ ↓” key or rotate the knob switch to setting the range.
- Press “ON” key to turn ON the AC output and escape M-RATE setting mode to meter mode.
- Press “OFF” key to turn OFF the AC output.
- Another key are not available.

3.2.8.3 Meter In-rush setting

There 2 parameter in the In-rush current measuring function, The delay and T(period) parameter can be setting, delay time can setting from 0.0 to 99.9ms, initial is 0 ms, and the T(period) time can setting from 0.1 to 99.9 second, initial 3 second.



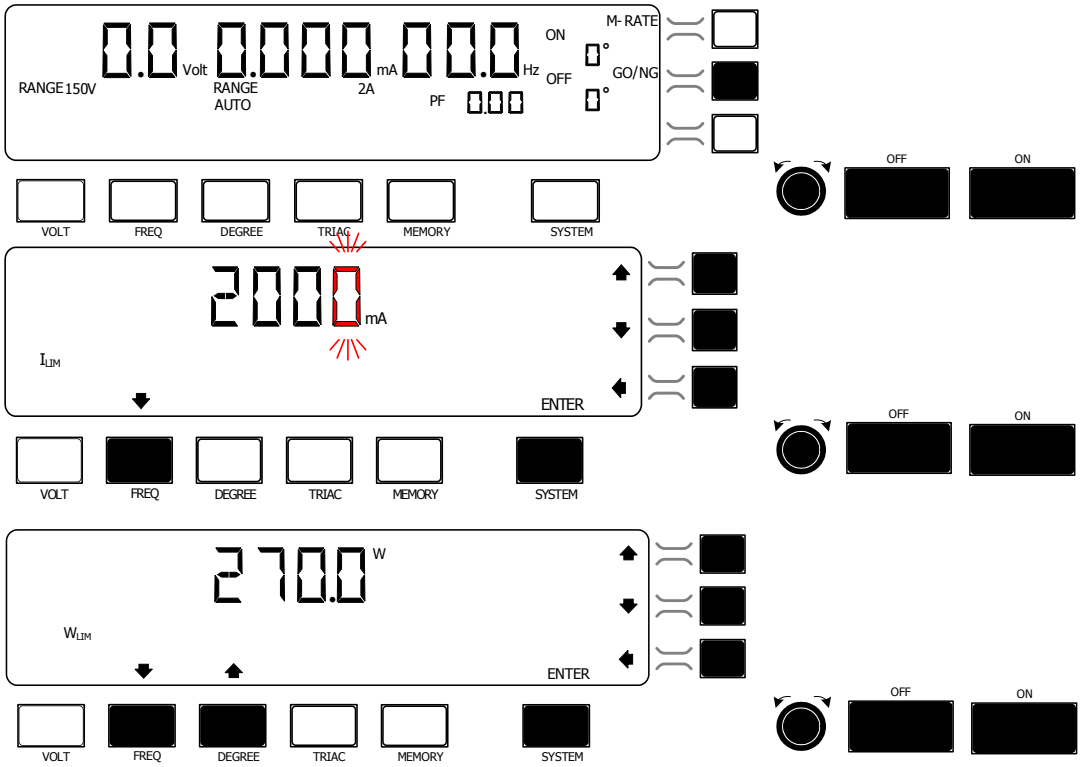


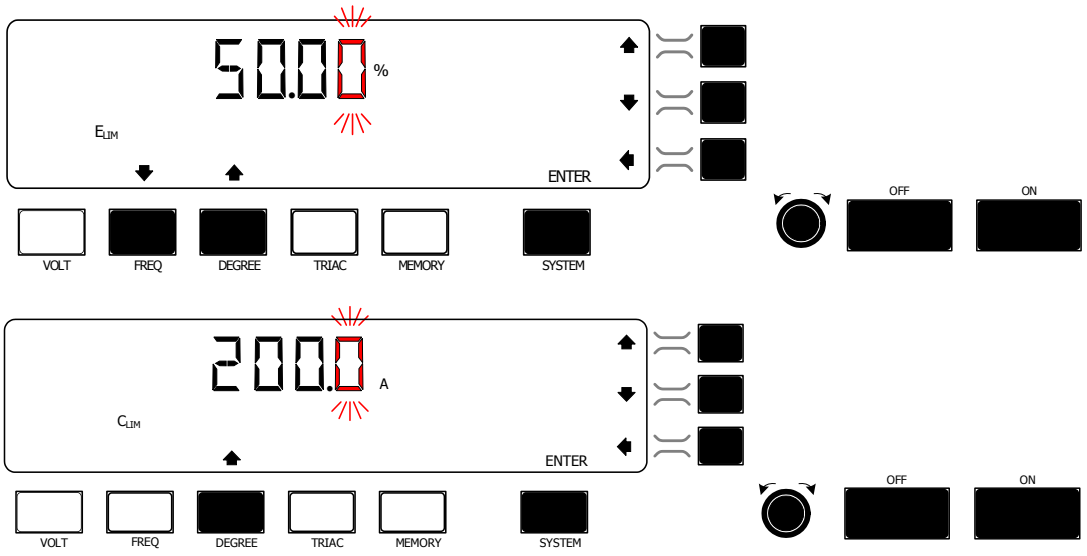
3.2.8.3.1 Key definition under Meter In-Rush setting mode.

- Press “DEGREE” key to next item Meter I-Range.
- Press “TRIAC” key to setting delay time, and the indicator “D” lit on.
- Press “MEMORY” key to setting period time, and the indicator “T” lit on.
- Press “SYSTEM” key to confirm the setting and return to meter mode and process output OFF to ON to measuring the in-rush current automatically.
- Press “↑ ↓” key or rotate the knob switch to setting the delay or period time.
- Press “ON” key to turn ON the AC output and process output OFF to ON to measuring the in-rush current automatically.
- Press “OFF” key to turn OFF the AC output.
- Another key are not available.

3.2.9 GO/NG criterion setting

The GO/NG criterion setting is for ILIMIT(current), WLIMIT(wattage), ELIMIT(Efficiency) and CLIMIT(In-rush current) , the ILIMIT initial setting is 2.000 A, WLIMIT initial setting is 270 W, ELIMIT initial setting is 50.00%, CLIMIT initial setting is 200A, The NG indicator will be lit on when efficiency reading is lower then setting level (50.00%) or current, power or in-rush current reading higher then setting level.



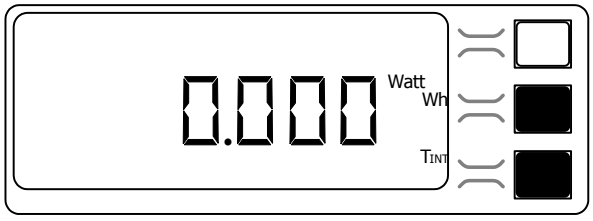


3.2.9.1 Key definition under Meter In-Rush setting mode.

- Press “FREQ” key to next item.
- Press “DEGREEC” key to last item.
- Press “SYSTEM” key to confirm the setting and return to meter mode.
- Press “ ↑ ↓ ←” key or rotate the knob switch to setting the criterion level.
- Press “ON” key to turn ON the AC output and return to meter mode.
- Press “OFF” key to turn OFF the AC output.
- Another key are not available

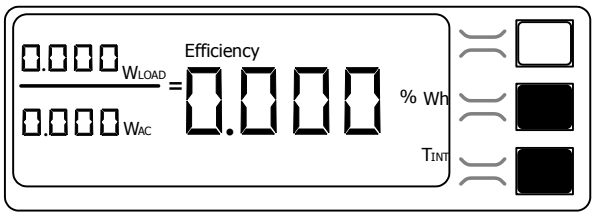
3.2.10 Power and Integration Energy meter setting

The unit display is “Watt” when 5302A no connected the DC load, which means the meter is power meter. As below picture.

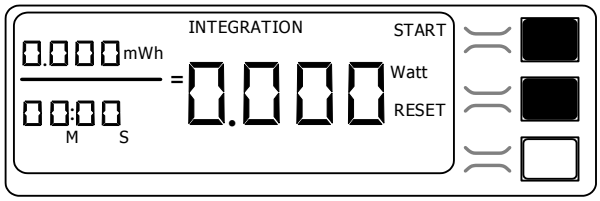


The top side indicator “Efficiency” lit on when 5302A is connected the DC load, which means the meter is energy meter, the left up side corner is DC power meter, and AC power meter is on the left down side corner, the efficiency calculating as

$$EFF.=\frac{W_{LOAD}}{W_{AC}}$$

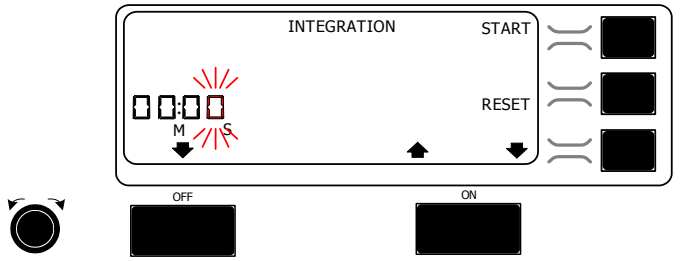


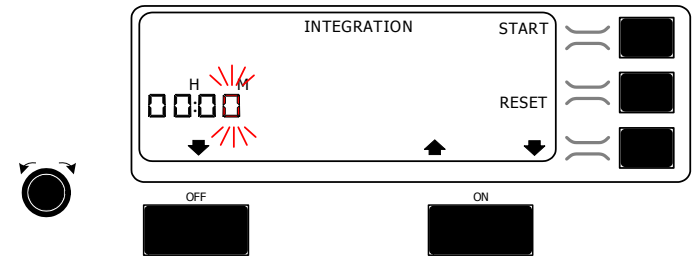
Press Wh to enter Integration Energy mode, and the T_{INT} is for accumulation time setting of integration energy mode. Top side indicator “INTEGRATION” lit on when change to Integration Energy mode, the power meter display on middle. Left up side corner is KWH meter, left down side corner is elapse (accumulation) timer.



3.2.10.1 Accumulation timer of Integration Energy mode

Press TINT to enter the Integration Energy mode, the key and operation as below description.





- Press “↓”(OFF) “↑” (ON) or rotate knob switch to increase or decrease the energy accumulation timer, the setting is 0 second to 99 hour 59 minute 59 second (0~359999 second).
- Press right down side corner “↓” to confirm the setting and return to power meter mode.
- Press “START” key to confirm the timer setting and start up to accumulating the time and KWH.

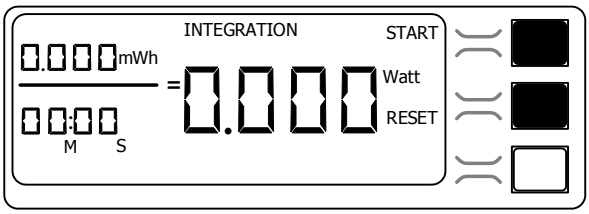
Note! If the timer setting to zero (0) means free run mode. No any accumulation time limitation.

3.2.10.2 Operation of Integration Energy mode

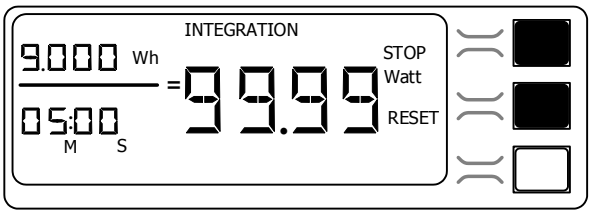
Press Wh key to enter the Integration Energy mode, the key and operation as below description

No DC Load connected (power mode)

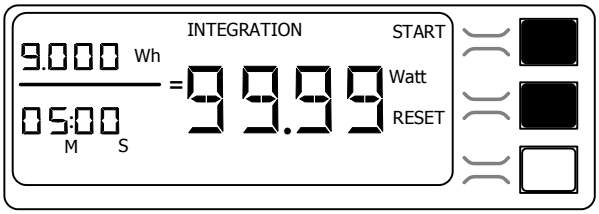
Pressed Wh



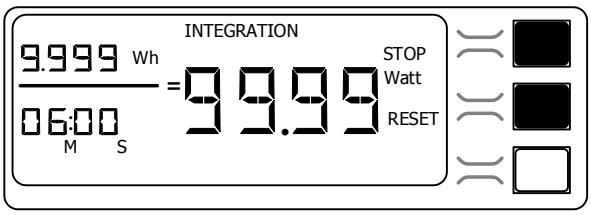
Pressed START to accumulate



Pressed STOP

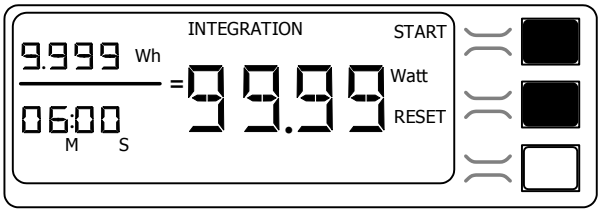


Press START to accumulated again

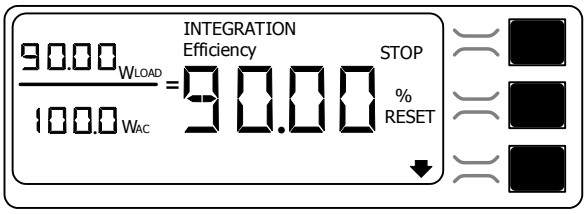


DC Load connected (Energy mode)

Pressed Wh



Press "↓" to accumulate



- Power mode accumulation

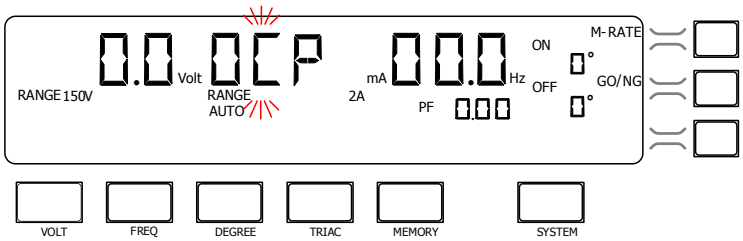
$$W_{AC} = \frac{WH}{Time}$$

- Energy mode accumulation

$$EFF\% = \frac{(W_{LOAD}/W_{AC})}{Time}$$

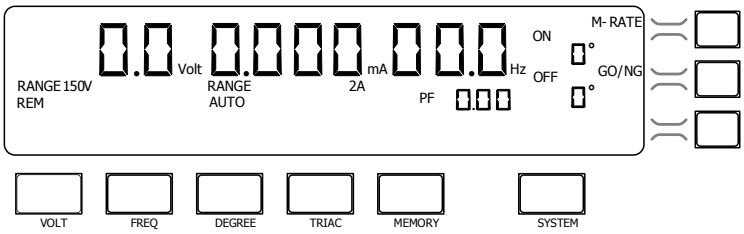
3.2.11 OCP Protection

The output will be shut down when output current higher than 2.000A, the over current protection will be active, the system will display OCP and alarm up. Please press any key to reset the OCP when OCP LATCH setting to ON, The will be reset automatically after OCP activity when OCP LATCH setting to OFF.

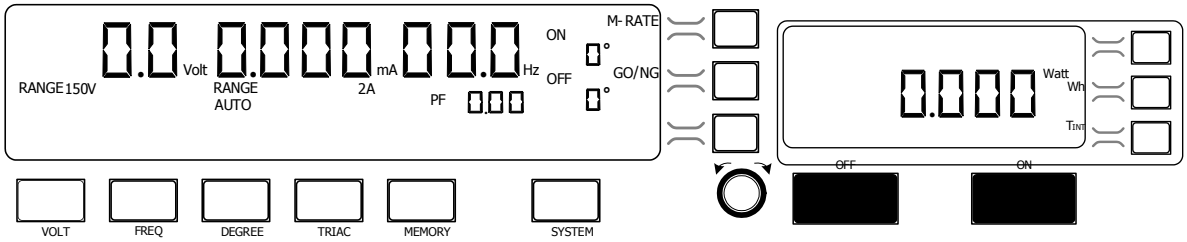


3.2.12 Remote and local indicator

The “REM indicator will lit on when 5302A received any programming command from the remote interface, the all key pads beside SYETEM key of front panel is disable. Press “SYSTEM” key to go to local mode, the “REM” indicator will lit off.



3.2.13 Source output ON/OFF



Press ON to turn on the source output by the voltage setting, the output LED indicator will lit on, press OFF to turn off the source output, the output LED indicator will lit off.

Chapter 4 Remote control programming operation

4.1 Introduction

If your unit is fitted with a computer interface RS232 socket will be present on the rear panel. The interface allows the 5302A settings to be configured remotely and measurements read back.

4.2 RS-232 setup

The RS232 interface of the 5302A is set up as follows.

Baud-rate ：9600~115200bps

Parity ：None

Data bit ：8 bits

Stop bit ：1 bit

Handshaking ：Hardware (RTS/CTS).

The RS232 Interface connector of 5302A rear panel, RS232 is shown in Fig4-1.

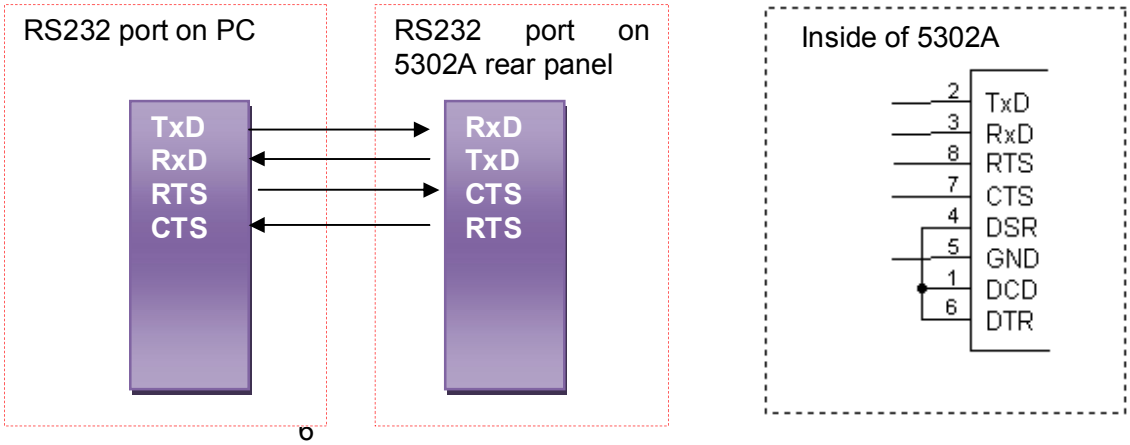
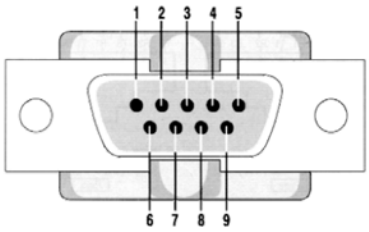


Fig 4-1 RS232 INTERFACE CONNECTION OF REAR PANEL



PIN	Abbreviation	Description
Pin1	CD	Carrier Detect
Pin2	RXD	Receive
Pin3	TXD	Transmit
Pin4	DTR	Data Terminal Ready
Pin5	GND	Ground
Pin6	DSR	Data Set Ready
Pin7	RTS	Request To Send
Pin8	CTS	Clear To Send
Pin9	RI	Ring Indicator

PC RS232 Port

4.2 Programming Syntax, Parenthesis & Terminators

A variety of indicators are used in the description of the computer commands and in the Summary tables. The syntax used is defined as follows:

- **SP** Space, the ASCII code is 20 Hexadecimal.
- **;** Semicolon, Program line terminator, the ASCII code is OA Hexadecimal.
- **NL** New line, Program line terminator, the ASCII code is OA Hexadecimal.
- **NR2** Digits with decimal point. It can be accepted in the range and format of ###.##### For example: 30.12345. In this instance the 5302A will read up to five significant figures after the decimal point. The decimal point can be omitted If not required.
- **NR1** Digits without decimal point.

4.2.1 Parenthesis

The following parenthesis are used in the command descriptions to indicate whether a command is necessary or optional and whether a choice has to be made. The symbols merely used to illustrate the nature of the contents.

{ } is Necessary — The contents of the { } symbol must be used as part of the computer command, it cannot be omitted.

[ ] is Optional — The contents of the [ ] symbol indicates that the command is optional. The use of the contents depends on the testing application.

| is Necessary Choice — This symbol means a choice must be made between the stated commands. For example “LOW|HIGH” means a LOW or HIGH choice needs to be made as part of the command.

? is Necessary Choice — Where a question mark is present it indicates that a choice needs to be made. This maybe entering a numerical value that needs to be set

4.2.2 Terminators

You have to send the program line terminator character after sending a computer command, the available command terminator characters that are accepted by the 5302A is listed in Table 4-1.

LF
CR

Table 4-1 Command Terminators

Semicolon ＂;＂ The semicolon ＂;＂ is a back-up command, the semicolon allows you to combine command statements on one line to create a command sequence.

4.3 5302A programming command list

The setting and query commands for the 5302A are list below in table 4-2, 4-3 and 4-4.

Functions	Descriptions	Syntax
Setting	Setting source output ON/OFF degree	DEGR {ON | OFF | 1 | 0} <NR2>
	Energy accumulate start/stop	ENST {ON | OFF | 1 | 0}
	Energy accumulation mode ON/OFF	ENER {ON | OFF | 1 | 0}
	Clear error register (Note2)	ERR:CLEAN
	Setting external source input ON/OFF	EXT {ON | OFF | 1 | 0}
	Setting In-rush current delay time 0~99.9mS	IDLY <NR2>
	Setting In-rush current function ON/OFF	INR {ON | OFF | 1 | 0}
	Setting In-rush current measure time (Period) 0.1~99.9S	ITIM <NR2>
	Reset OCP alarm	OCP
	Setting OCP latch ON/OFF	OCPL {ON | OFF | 1 | 0}
	Setting source output ON/OFF	OUT {ON | OFF | 1 | 0}
	Recall memory 0~9	RECL {0 ~ 9}
	Setting M-RATE meter update rate 0~6 (One Cycle, 0.1, 0.5, 1, 2, 5, 10)	STAV {0 ~ 6}
	Setting the energy accumulation mode timer, the range is 0~359999s, the unit is second.	STEN <NR1>
	Setting I-range, 0=Auto, 1=10mA, 2=20mA, 3=0.2A, 4=2A	STIR {0 ~ 4}
	Store memory 0~9	STOR {0 ~ 9}
	Setting PQT class level, n = 1~3 (n=1 when PQT Mode = 3)	CLSn
	Setting internal source output frequency 40~70Hz	FREQ <NR2>
	Setting PQT Mode 1~3 (need to setting output voltage volume first)	PMOD {0 ~ 3}
	Setting internal AC SOURCE output voltage range.	RANG {HIGH | LOW | 1 | 0}
	Setting Trailing edge and Leading edge degree.	STTR <NR2>
	Setting TRIAC mode for trailing (ON) or leading (OFF)	TRAI {ON | OFF | 1 | 0}
	Setting TRIAC mode ON/OFF	TRIA {ON | OFF | 1 | 0}
	Setting internal AC SOURCE output volume.	VOLT <NR2>

Table 4-2 Setting command list

Functions	Descriptions	Syntax
Query	Query output voltage ON/OFF degree	DEGR {ON | OFF | 1 | 0}?
	Query error register (Note 2)	ERR:READ?
	Query state flag (Note 3)	FLAG1?
	Query error state flag (Note 4)	FLAG2?
	Query In-rush current delay time	IDLY?
	Query In-rush current measure time (Period)	ITIM?
	Query DC load connected	RELD?
	Query firmware version	VER?
	Query model no.	*IDN?
	Query Energy mode ON/OFF	ENER?
	Query internal AC SOURCE frequency setting	FREQ?
	Query M-RATE meter update rate，0 ~ 6 (One Cycle, 0.1, 0.5, 1, 2, 5, 10)	STAV?
	Query energy accumulation time setting (0~359999 second = 99'H, 59'M, 59'S)	STEN?
	Query I-Range 0=Auto, 1=5mA, 2=20mA, 3=0.2A, 4=2A	STIR?
	Query trailing edge or leading edge degree	STTR?
	Query accumulated time 0~359999 second (99'H, 59'M, 59'S)	TIME?
	Query TRIAC mode, 1: trailing edge mode, 0: leading edge mode.	TRAI?
	Query TRIAC mode ON/OFF	TRIA?
	Query internal AC SOURCE voltage setting	VOLT?
	Query PQT Busy state (0 = idle, 1 = busy)	PQTB?

Table 4-3 Query command list

Functions	Descriptions	Syntax
Measurement	Query output current reading	MEAS:CURR?
	Query efficiency reading	MEAS:EFF?
	Query output frequency reading	MEAS:FREQ?
	Query in-rush current reading	MEAS:INR?
	Query load power reading	MEAS:LPOW?
	Query PF reading	MEAS:PF?
	Query power reading	MEAS:POWR?
	Query output voltage reading	MEAS:VOLT?
	Query Wh reading (0~999.9)	MEAS:WH?
	Query Wh reading unit, 0 = not energy mode, M=mWh, N=Wh, K= KWh)	MEAS:WUNI?

Table 4-4 Measurement command list

Note 1:
1. Voltage unit is (V).
2. Current unit is (mA).
3. In-rush current unit is (A).
4. Frequency unit is (Hz).
5. Power unit is (W).

Note 2: Error register are 6 bytes.

Bytes	code	Descriptions
High Byte	128	Setting degree range error
	64	Setting frequency range error
	32	Setting Voltage range error
	16	EEPROM memory data error
	8	External source frequency error
	4	Watt reading error
	2	Peak current over
	1	Voltage over
Low Byte	128	NA
	64	NA
	32	NA
	16	DC Load no response
	8	Power Meter no response
	4	AC Source no response
	2	STORE command error
	1	RECALL command error

EX. The error code will be 006000 when watt reading and peak current over the specifications.

Note 3: State flag

Bytes	Bits	Descriptions
1	B7	0=Leading mode，1=Trailing mode
	B6	0=Triac mode off，1=Triac mode on
	B5	0=Output off，1=Output on
	B4	0=OCP latch off，1=OCP latch on
	B3	0=Inrush mode off，1=Inrush mode on
	B2	
	B1	0=Internal AC source，1=External AC source
	B0	0=Volt Low Range，1=Volt High Range

Note 4: Error state flag

Bytes	Bits	Descriptions
1	B7	
	B6	0=PQT no error，1=PQT error
	B5	0=OTP no error，1=OTP error
	B4	0=EEPROM no error，1=EEPROM error
	B3	0=Ext. AC source no error，1= Ext. AC source error
	B2	0=OPP no error，1=OPP error
	B1	0=OCP no error，1=OCP error
	B0	0=No error，1=Some error occurred

4.4 Remote command descriptions

4.4.1 Setting command

DEGR
Syntax: DEGR{sp} {ON | OFF | 1 | 0} <NR2>
Purpose: To setting output voltage ON/OFF degree
Description:
This command can setting 5302A output voltage ON and OFF degree, the degree range is 0 to 360 degree.

- To setting output voltage ON degree on 90 degree
  Ex. DEGR{sp}ON{sp}90
- To setting output voltage OFF degree on 180 degree.
  Ex. DEGR{sp} OFF{sp}180

ENST
Syntax: ENST{sp} {ON | OFF | 1 | 0}
Purpose: To setting energy accumulation start or stop.
Description:
This command is setting the energy accumulation mode ON or OFF.
Note! The energy accumulation mode have to ON first to start or stop the energy accumulating.

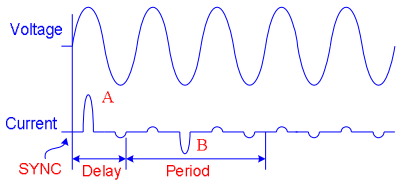
ENER
Syntax: ENER {sp}{ON | OFF | 1 | 0}
Purpose: To turn ON or OFF energy accumulation mode.
Description:
To turn ON or OFF the energy accumulation mode.

ERR:CLEAN
Syntax: ERR:CLEAN
Purpose: To clear error register.
Description:
This command to clear the error register to 000000.

EXT
Syntax: EXT{sp} {ON | OFF | 1 | 0}
Purpose: To setting external AC source ON/OFF
Description:

- To setting external AC source ON(enable)
  EX. EXT{sp} ON
- To setting external AC source OFF(disable).
  EX. EXT{sp} OFF

IDLY
Syntax: IDLY{sp} <NR2>
Purpose: To setting In-rush current delay time.
Description:
Inrush current, input surge current or switch-on surge is the maximum, instantaneous input current drawn by an electrical device when first turned on.
The delay time range is 0~99.9 ms.



INR
Syntax: INR{sp} {ON | OFF | 1 | 0}
Purpose: To setting inrush current mode ON/OFF.
Description:
This command to setting inrush current mode ON, after setting inrush mode ON, then setting output ON to start measuring inrush current.

ITIM
Syntax: ITIM <NR2>
Purpose: To setting inrush current measurement (Period) time.
Description: The measurement (Period) time range is 0.1~99.9 second.

OCP
Syntax: OCP
Purpose: To reset OCP alarm
Description:
To reset OCP alarm when OCP protection active, this command not available in OCP LATCH setting to OFF.

OCPL
Syntax: OCPL {ON | OFF | 1 | 0}
Purpose: To setting OCP LATCH ON/OFF.
Description:
The 5302A output will shut down automatically when over current occurred, and OCP circuit trigged, the display will show “OCP’ and alarm, there are 2 method to reset the protection alarm, the alarm and OCP will be reset in 3 second after alarm, if OCP LATCH setting to OFF, If setting to ON, the alarm will be reset by user press any key.

OUT
Syntax: OUT {ON | OFF | 1 | 0}
Purpose: To setting source output ON/OFF
Description
This command setting source output ON/OFF.

RECL
Syntax: RECL {0 ~ 9}
Purpose: Recall the setting parameter and state from memory data.
Description:
To recall setting parameter from memory 0~9.

STAV
Syntax: STAV {0 ~ 6}
Purpose: To setting M-RATE meter update rate
Description:
The M-RATE meter update rate can setting to one cycle (by frequency), 0.1, 0.5, 1, 2, 5 and 10 second.
STAV{sp}0 Setting update the voltage, current and power meter every one cycle.
STAV{sp}6 Setting update the voltage, current and power meter every 10 second.

STEN
Syntax: STEN {NR1}
Purpose: To setting energy mode accumulating time
Description:
To setting energy mode accumulating time, normally time setting is 5 minute(300 second) for stand-by mode no load power measurement, the range is 0~35999 second and without decimal point, unit is second.

STIR
Syntax: STIR {0 ~ 4}
Purpose: To setting current meter range.
Description:
The current meter range is auto, 10mA, 20mA, 200mA and 2000mA.
STIR{sp}0 To setting current meter on auto range.
STIR{sp}4 To setting current meter on 2000mA range

STOR
Syntax: STOR {0 ~ 9}
Purpose: Store the parameter and state to memory 0~9.
Description:
To store the setting parameter and state to memory 0~9

CLSn
Syntax: CLSn
Purpose: To setting PQT class level.
Description:
The PQT test have 3 mode for Voltage DIP, voltage short interrupt and voltage variation, there are different class definition. n=1 ~ 3.
Voltage DIP(PMOD=1)；class 2 or 3
Voltage short interrupt (PMOD=2)；class 2 or 3.
Voltage variation (PMOD=3)；class 1 only.

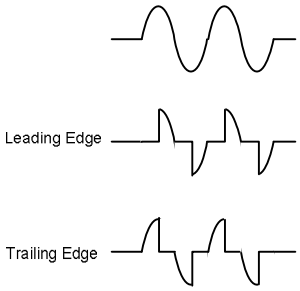
FREQ
Syntax: FREQ <NR2>
Purpose: To setting output voltage frequency.
Description:
The 5302A frequency range from 40 to 70Hz.

PMOD
Syntax: PMOD {0 | 1 | 2 | 3}
Purpose: To setting PQT mode
Description:
There are 3 test mode, Voltage DIP, short interrupt and variation. Mode 0 is exit the PQT test mode.
Description
PMOD{sp}0 Exit PQT test mode.
PMOD{sp}1 Setting to voltage DIP mode.
PMOD{sp}2 Setting to voltage short interrupt mode.
PMOD{sp}3 Setting to voltage variation mode.

RANG
Syntax: RANG {HIGH | LOW | 1 | 0}
Purpose: To setting source voltage range.
Description:
The AC Source output voltage have 2 range, range low (0) for 10~150Vrms, range high (1) for 10~306Vrms.

STTR
Syntax: STTR <NR2>
Purpose: To setting TRIAC mode edge degree.
Description:
To setting TRIAC edge degree, the degree range is 0~180 degree.

TRAI
Syntax: TRAI {ON | OFF | 1 | 0}
Purpose: To setting leading edge or trailing edge of TRIAC mode.
Description:
There are 2 edge mode can be setting, TRAI OFF for leading edge and TRAI ON for trailing edge.



TRIA
Syntax: TRIA {ON | OFF | 1 | 0}
Purpose: To setting TRIAC mode ON/OFF
Description:
This command to setting TRIAC mode ON/OFF.

VOLT
Syntax: VOLT <NR2>
Purpose: To setting source output voltage
Description:
The output voltage have 2 range, range 1 can setting 0~150V and range can setting 10~306V,
Note! To setting voltage over 150V what will be not available in range 1, the output voltage will be not change and the error register will be set.

4.4.2 Query Command

DEGR
Syntax: DEGR {ON | OFF | 1 | 0}?
Purpose: Query output voltage ON/OFF degree.
Description:
Query output voltage ON/OFF degree.
DEGR{sp}ON? Query output voltage ON degree
DEGR{sp}OFF? Query output voltage OFF degree

ERR:READ?
Syntax: ERR:READ?
Purpose: Query error register
Description:
The error register provide 6 bytes error message as below table.

Bytes	code	Descriptions
High Byte	128	Setting degree range error
	64	Setting frequency range error
	32	Setting Voltage range error
	16	EEPROM memory data error
	8	External source frequency error
	4	Watt reading error
	2	Peak current over
	1	Voltage over
Low Byte	128	NA
	64	NA
	32	NA
	16	DC Load no response
	8	Power Meter no response
	4	AC Source no response
	2	STORE command error
	1	RECALL command error

EX. The error code will be 006000 when watt reading and peak current over the specifications.

FLAG1?
Syntax: FLAG1?
Purpose: Query state flag.
Description:
The 5302A operating state record in below flag register.

Bytes	Bits	Descriptions
1	B7	0=Leading mode，1=Trailing mode
	B6	0=Triac mode off，1=Triac mode on
	B5	0=Output off，1=Output on
	B4	0=OCP latch off，1=OCP latch on
	B3	0=Inrush mode off，1=Inrush mode on
	B2	
	B1	0=Internal AC source，1=External AC source
	B0	0=Volt Low Range，1=Volt High Range

FLAG2?
Syntax: FLAG2?
Purpose: Query error state flag.
Description:
The 5302A error state record in below error state flag register, ERR:CLEAN can reset the register to 0.

Bytes	Bits	Descriptions
1	B7	
	B6	0=PQT no error，1=PQT error
	B5	0=OTP no error，1=OTP error
	B4	0=EEPROM no error，1=EEPROM error
	B3	0=Ext. AC source no error，1= Ext. AC source error
	B2	0=OPP no error，1=OPP error
	B1	0=OCP no error，1=OCP error
	B0	0=No error，1=Some error occurred

IDLY?
Syntax: IDLY?
Purpose: Query inrush current measurement delay time setting.
Description:
This command to query inrush current measurement delay time setting.

ITIM?
Syntax: ITIM?
Purpose: Query inrush current measurement (Period) time
Description:
This command to query inrush current measurement (Period) time.

RELD?
Syntax: RELD?
Purpose: Query the DC load is be connected.
Description:
This command to query the DC load is be connected.

VER?
Syntax: VER?
Purpose: Query firmware version
Description:
To query firmware version.

***IDN?**
Syntax: *IDN?
Purpose: Query model identify information
Description:
Query device information, model name 5302A

ENER?
Syntax: ENER?
Purpose: Query energy accumulation mode ON/OFF
Description:
Query energy accumulation mode ONOFF.

FREQ?
Syntax: FREQ?
Purpose: Query frequency setting
Description
Query frequency setting, the frequency range is 40~70Hz

STAV?
Syntax: STAV?
Purpose: Query M-RATE meter update rate setting
Description: The M-RATE meter update rate setting is one cycle (by frequency), 0.1, 0.5, 1, 2, 5, 10 second.
STAV? Return 0, that means the range setting is one cycle, so the voltage, current and power meter will be update in every cycle.
STAV? Return 6, that means the range setting is 10 second, so the voltage, current and power meter will be update in every 10 second.

STEN?
Syntax: STEN?
Purpose: Query energy accumulation mode timer setting.
Description:
Query timer setting of energy accumulation mode, the range is 0~359999 second.

STIR?
Syntax: STIR?
Purpose: Query the current meter range.
Description:
Query the current meter range, the range is 0 (auto range), 1 (10mA), 2 (20mA), 3 (200mA), 4 (2000mA).

STTR?
Syntax: STTR?
Purpose: Query TRIAC mode degree setting.
Description:
Query TRIAC mode degree setting, the setting range is 0~180 degree.

TIME?
Syntax: TIME?
Purpose: Query the accumulated time of energy accumulation mode.
Description:
Query the accumulated time, the time range is 0~359999 second.

TRAI?
Syntax: TRAI?
Purpose: Query the TRIAC mode edge setting.
Description:
Query the TRIAC mode edge setting, 0 for leading edge, 1 for trailing edge.

TRIA?
Syntax: TRIA?
Purpose: Query TRIAC mode ON/OFF
Description:
Query TRIAC mode is ON or OFF, 1 for ON, 0 for OFF.

VOLT?
Syntax: VOLT?
Purpose: Query 5302A source output voltage.
Description:
Query 5302A source output voltage, the voltage range is 10~306V.

PQTB?
Syntax: PQTB?
Purpose: Query PQT state
Description:
Query PQT state, 0 for idle, 1 for busy (testing).

4.4.3 Measurement Command

MEAS:CURR?
Syntax: MEAS:CURR?
Purpose: Query current reading
Description:
MEAS:CURR? Measurement current reading, the unit is A

MEAS:EFF?
Syntax: MEAS:EFF?
Purpose: Query efficiency reading
Description:
Query efficiency reading, the unit is %, range is 0~100%

MEAS:FREQ?
Syntax: MEAS:FREQ?
Purpose: Query frequency reading.
Description:
Query frequency reading , the unit is Hz, range is 40~70Hz.

MEAS:INR?
Syntax: **MEAS:INR?**
Purpose: Query inrush current reading.
Description:
Query inrush current reading, the unit is A, range is 0~200A.

MEAS:LPOW?
Syntax: MEAS:LPOW?
Purpose: Query DC power reading of DC load.
Description:
Query DC power reading, the unit is W, range is by DCV load module.

MEAS:PF?
Syntax: MEAS:PF?

Purpose: Query PF reading.
Description:
Query PF reading, the unit is NA, range is 0.01~1.00

MEAS:POWR?
Syntax: MEAS:POWR?
Purpose: Query AC power reading
Description:
Query power meter reading. The unit is W.

MEAS:VOLT?
Syntax: MEAS:VOLT?
Purpose: Query voltage reading.
Description:
Query voltage reading, the unit is V.

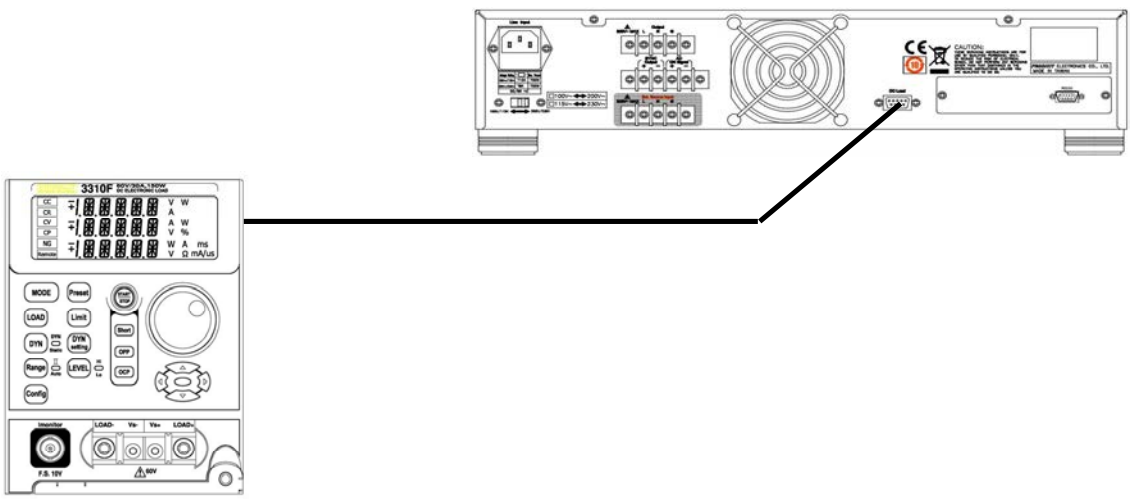
MEAS:WH?
Syntax: MEAS:WH?
Purpose: Query accumulated energy.
Description:
Query accumulated energy, the unit is mWh, Wh or KWh. The unit setting can query from MEAS:WUNI? Command.

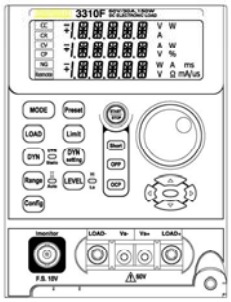
MEAS:WUNI?
Syntax: MEAS:WUNI
Purpose: Query the accumulation energy unit.
Description:
0 Not energy accumulation mode
1 M; unit is mWh.
2 N; unit is Wh.
3 K; unit is KWh.

Chapter 5 Applications

5.1 Efficiency Test

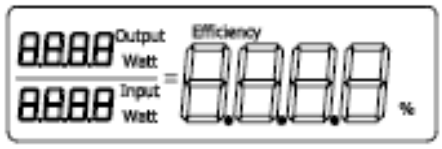
5.1.1 Connected DC load to the load connect port of 5302A rear panel with a 1:1 9Pin D-sub connect.
Note! **5302A just support F series load mainframe.



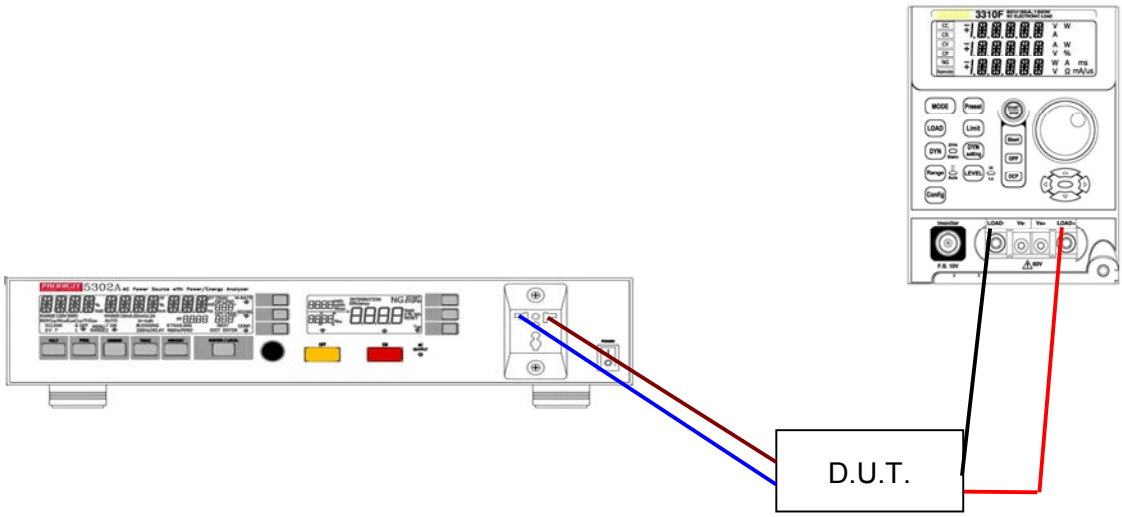


The 5302A Power meter will change to efficiency meter as below

$$EFF.=\frac{W_{LOAD}}{W_{AC}}$$



5.1.2 Connect D.U.T. input to 5302A and output to DC load.



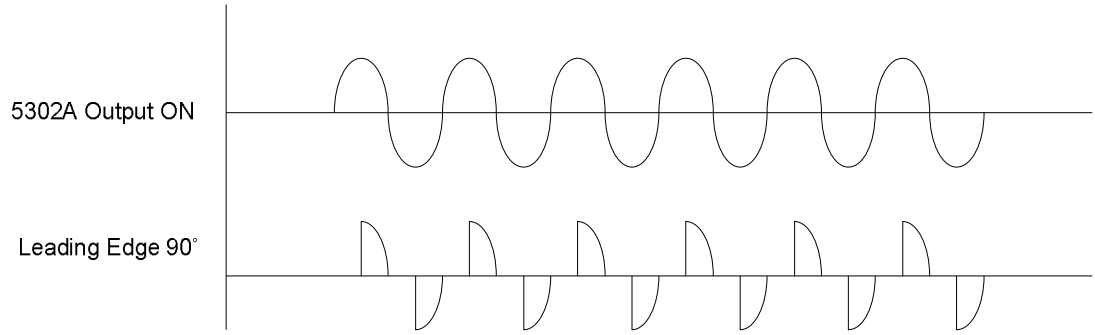
5.1.3 Setting AC source and DC load all test parameter and then AC output ON and Load ON, the 5302A efficiency meter will display the efficiency percentage as AC power and DC power.

5.2 Dimming (Triac mode) test

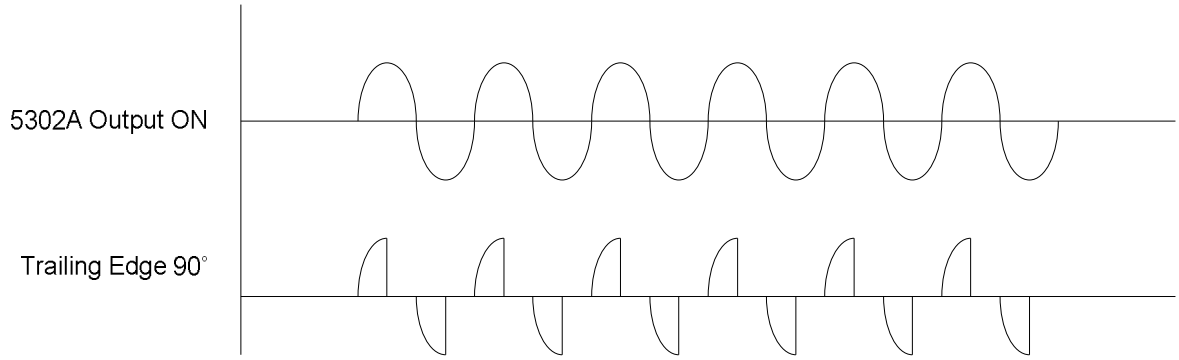
Dimmers are devices used to lower the brightness of a light. By changing the voltage waveform applied to the lamp, it is possible to lower the intensity of the light output. Although variable-voltage devices are used for various purposes, the term dimmer is generally reserved for those intended to control light output from resistive incandescent, halogen, and (more recently) compact fluorescent lights (CFLs) and light-emitting diodes (LEDs). More specialized equipment is needed to dim fluorescent, mercury vapor, solid state and other arc lighting.

Modern dimmers are built from TRIAC instead of SCR and variable resistors, because they have higher efficiency. Dimming control is a normally application in lighting. 5302A provide the TRIAC simulation waveform for TRIAC dimmer test, there leading edge and trailing edge mode.

Leading Edge:



Trailing Edge:



5.3 Power Quality Test (PQT)

Electrical and electronic equipment may be affected by voltage dips, short interruptions or voltage variations of power supply.

Voltage dips and short interruptions are caused by faults in the network, primarily short circuits, in installations or by sudden large changes of load. In certain cases, two or more consecutive dips or interruptions may occur. Voltage variations are cause by continuously varying loads connected to the network.

The IEC/EN 61000-4-11 standard applies to electrical and electronic equipment having a rated input current not exceeding 16 A per phase, for connection to 50 or 60Hz a.c. networks

It does not apply to electrical and electronic equipment for connection to 400 Hz a.c. networks.

Preferred test level and durations for voltage dips and short interruptions as below

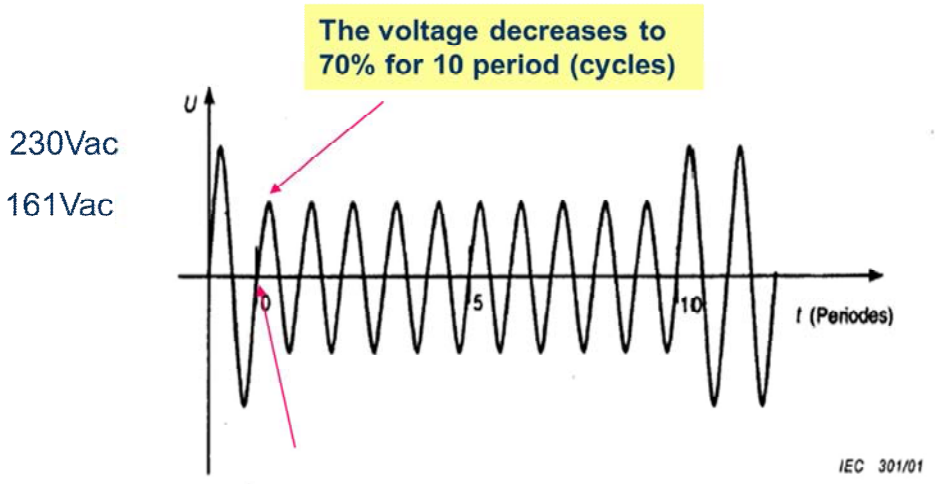
Test level and durations for voltage dips(50 Hz/60 Hz)

Class 1	Case by case according to the equipment requirements				
Class 2	0% during 1/2 cycle	0% during 1 cycle	70% during 25/30[a] cyclecs		
Class 3	0% during 1/2 cycle	0% during 1 cycle	40% during 10/12[a] cycle	70% during 25/30[a] cycle	80% during 250/300[a] cycle
[a] "25/30 cycles" means "25 cycles for 50Hz test" and "30 cycles for 60Hz test".					

Test level and durations for short interruptions(50 Hz/60 Hz)

Class 1	Case by case according to the equipment requirements
Class 2	0% during 250/300[a] cyclecs
Class3	0% during 250/300[a] cyclecs
[a] "250/300 cycles" means "250 cycles for 50Hz test" and "300 cycles for 60Hz test".	

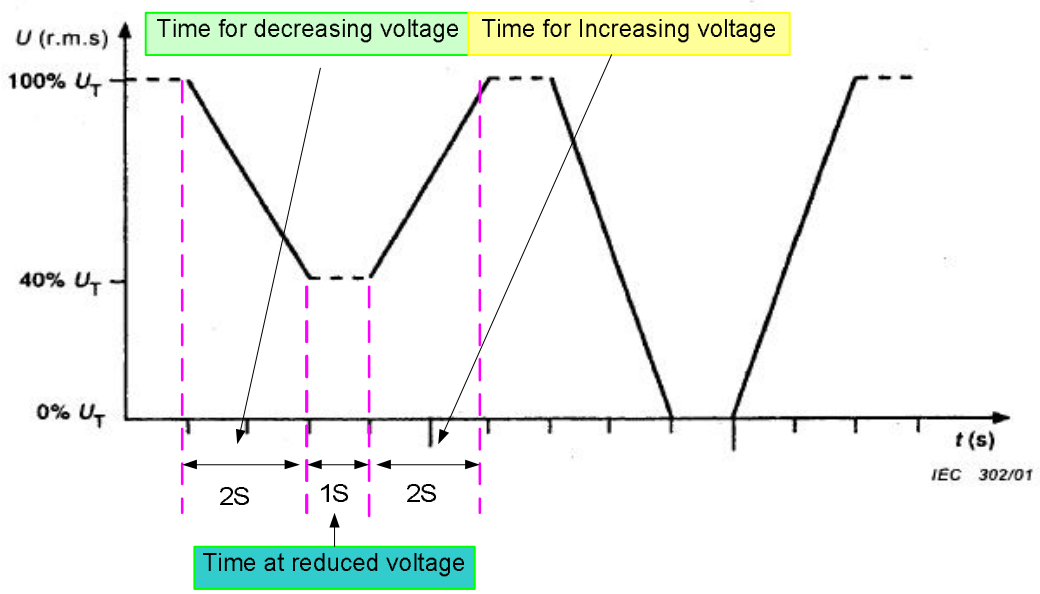
Voltage Dip –70% sine wave graph



Voltage Variations

Test level and durations for voltage variations

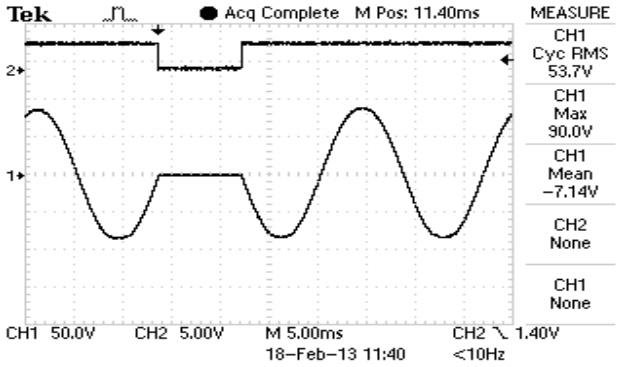
Test level(U_T)	Time for decreaseing	Time for reduced voltage(Sec.)	Time for increasing
40% U_T	2±20%	1±20%	2±20%
0% U_T	2±20%	1±20%	2±20%



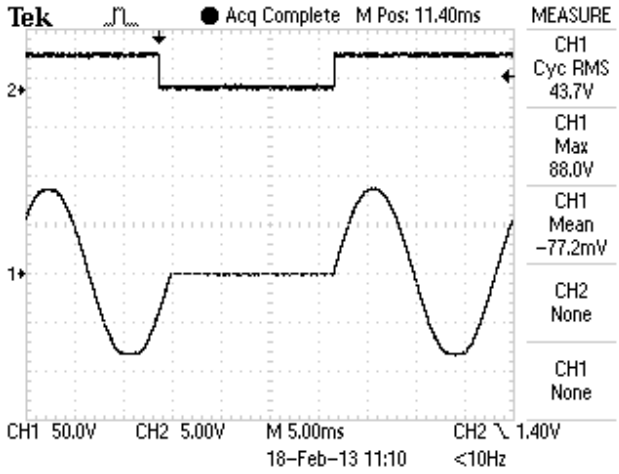
Voltage DIP application
Condition: AC 230V, frequency 60Hz, Class 2

1. Press VOLT key to setting 230V
2. Press FREQ key to setting 60Hz
3. Press SYSTEM key to entry system manual
4. Press FREQ key to next item, OCP LATCH -> EXT. SOUR -> PQT TEST
5. Press LEFT key to PQT manual
6. Press AC ON key
7. Press SYSTEM key to start PQT testing

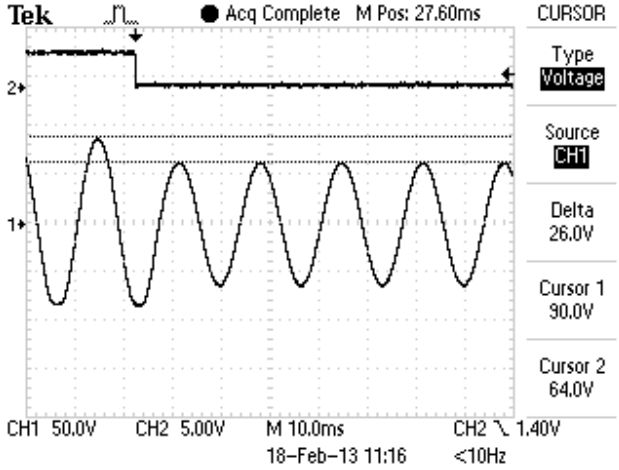
Output Voltage Wave as below
0% during 1/2 cycle



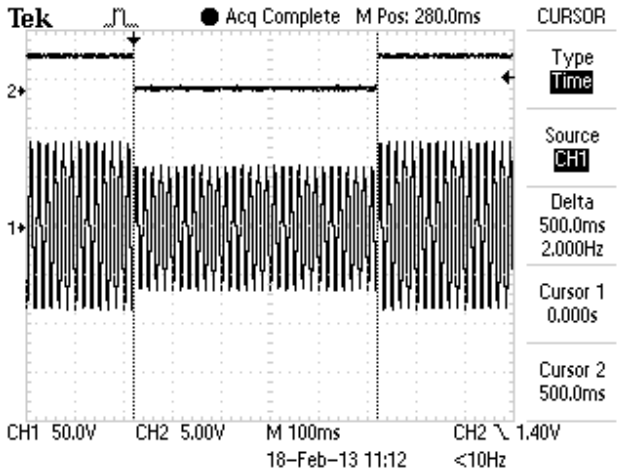
0% during 1 cycle



70% during 30 cycle



Zoom In

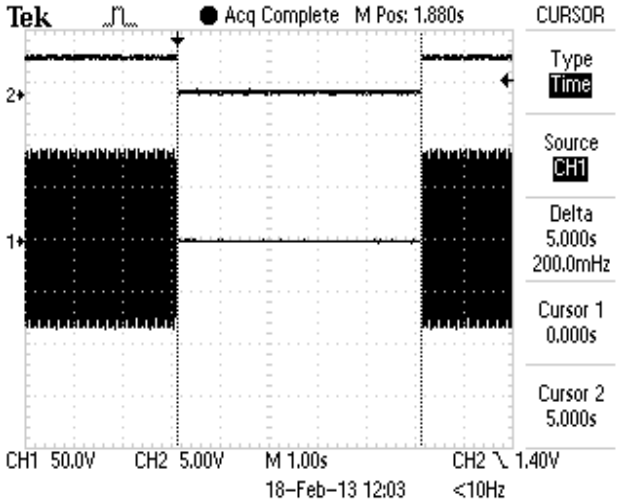


Zoom Out

Voltage short interruption application
Condition: AC 230V, frequency 60Hz, Class 2

1. Press VOLT key to setting 230V
2. Press FREQ key to setting 60Hz
3. Press SYSTEM key to entry system manual
4. Press FREQ key to next item, OCP LATCH -> EXT. SOUR -> PQT TEST
5. Press LEFT key to PQT manual
6. Press FREQ key to select DIP -> Interrupt
7. Press AC ON key
8. Press SYSTEM key to start PQT testing

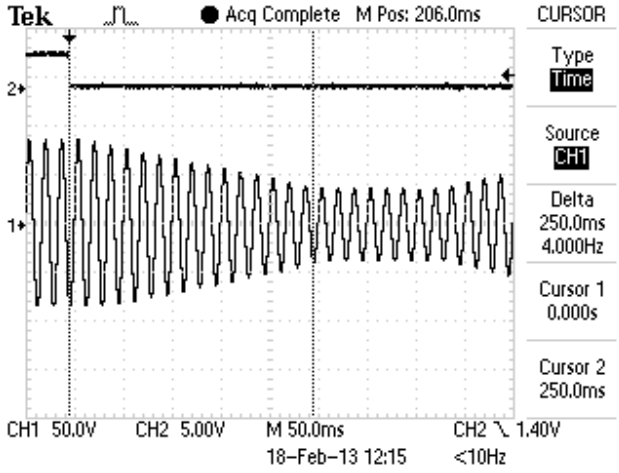
Output Voltage Wave as below
0% during 300 cycles



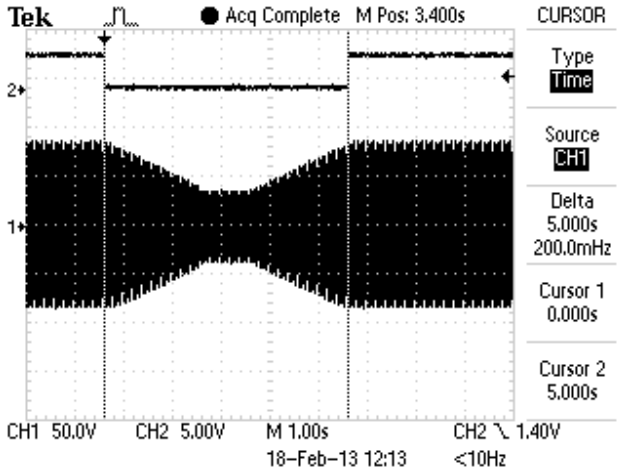
Voltage variation application
Condition: AC 230V, frequency 60Hz, Class 1

1. Press VOLT key to setting 230V
2. Press FREQ key to setting 60Hz
3. Press SYSTEM key to entry system manual
4. Press FREQ key to next item, OCP LATCH -> EXT. SOUR -> PQT TEST
5. Press LEFT key to PQT manual
6. Press FREQ key to select DIP -> Interrupt -> variation
7. Press AC ON key
8. Press SYSTEM key to start PQT testing

Output Voltage Wave as below
40% Timing for 2S,1S,2S

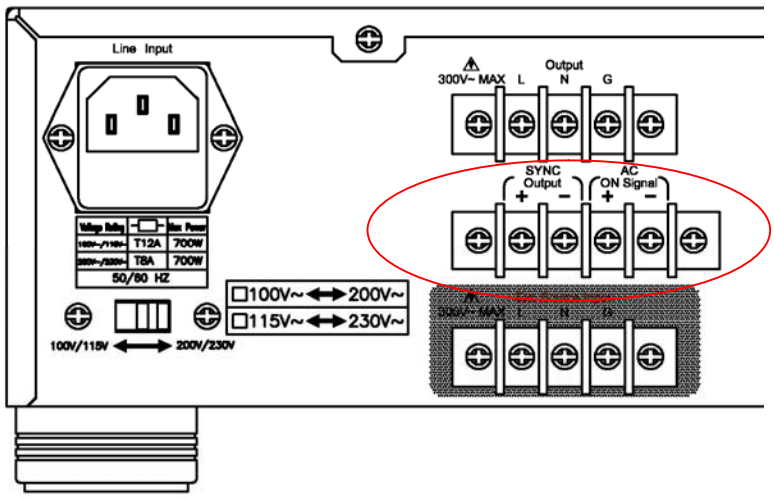


Zoom In

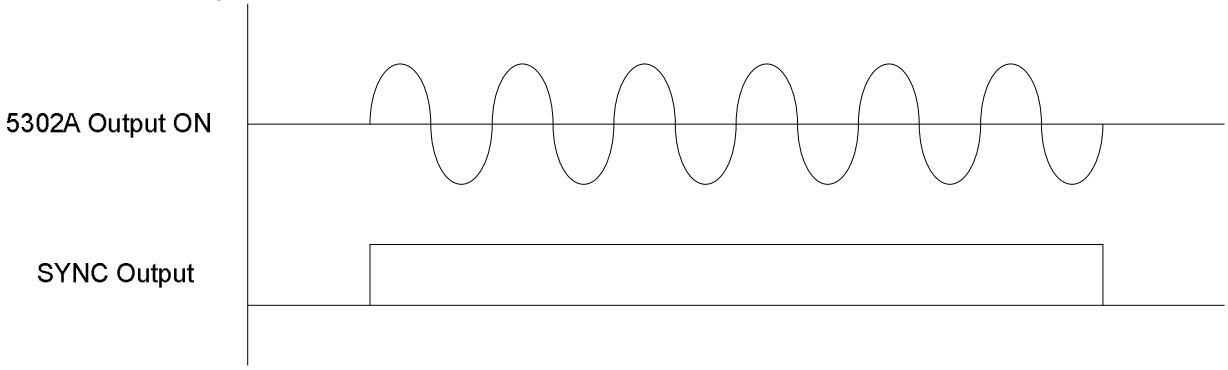


Zoom Out

Appendix 1 Source ON/OFF Sync Output signal



The output signal is TTL level +5V.



Appendix 2 Source ON/OFF AC ON signal

The AC ON signal is TTL level +5V.