WP96-3H DIGITAL DISPLAY POWER FACTOR&PHASE METER OPERATIONAL INSTRUCTION MANUAL

Please read through the manual before installment and operation
Please keep the manual for future use

Chapter 1.General Introduction

● Usage

Digital display power factor and phase meter is a new generation of programmable intelligent metes, which is mainly used in the real-time measurement and indication on power factor value and phase(power factor angle) value of signal-phase or three-phase electric wiring and can remotely transmit the measured data of electrical quantity via RS485 interface or analog quantity transmitting output interface. With features of high precision, good stability, calibration-free long-term operation and onsite parameter setting on a panel, it is an idea substitute of traditional dial power factor & phase meter or ordinary digital power factor & phase meter.

● Technical feature

The top feature of this series instruments is generalized and modularized design mode, single instrument simultaneously integrates the power factor, phase and frequency measurement line and realizes the function that power factor meters examine the frequency and phase value through keyboard and phase meters examine the frequency and power factor value. With free options of switching value output (higher and lower limit alarm) module, analog quantity transmitting output modular, RS485 digital communication module, each module is designed as push-pull mode and user can freely assemble, increase or decrease any functional modules of instrument according to demands. It can conveniently realize the setting of many parameters of higher and lower limit or range alarm of instrument, alarm switching contrast, communication address and communication baud rate, transmitting output mode, transmitting output range and digital filtering mode by the keyboard of instrument. The calibrating potentiometer inside the meter is cancelled and soft calibration is adopted instead. The modular and uniform design mode substantially reduces the production costs of the meter , which makes it highly cost-effective.

Chapter 3 Technical Parameters

3.1 Power factor measurement display range：0.000C～0.500C～1.000～0.500L～ 0.000L

3.2 Phase measurement display range：0° ～359.9°

3.3 Frequency measurement display range：45.00～65.00Hz

3.4 Accuracy rating of power factor measurement：±0.01

3.5 Accuracy rating of phase measurement：±1°

3.6 Resolution：Power factor display resolution is 0.001，frequency display resolution is 0.01Hz，phase display resolution is 0.1°

3.7 Sampling rate：About 3 times /sec.

3.8 Rated input voltage：AC100V±10%、220V±10%、380V±10%

3.9 Input current：1～5A

3.10 Input circuit power consumption of voltage：＜1VA

3.11 Input circuit power consumption of current：＜0.5VA

3.12 Auxiliary power supply：AC/DC85～260V or AC220V±10% 50/60Hz

3.13 Auxiliary supply consumption：＜3VA

3.14 No input signal reminders：Displaying character “----”

3.15 Alarm Output: Higher and lower limit alarm output by the same reply, contact rating is AC250V/2A、DC30V/2A。

3.16 Transmitting output: can be set freely as DC0～10mA、0～20mA or 4～20mA, accuracy rating is ±0.5%FS, electrical isolation between the signal input and auxiliary power supply

3.17 Transmitting output load resistance：≤250Ω

3.18 Setting range of higher and lower limit alarm or transmitting output：power factor meter: 0.000C～1～0.001L、Phase meter: 0～359.9°

3.19 Communication interface：RS485 serial communication，applying MODBUS_RTU communication protocol

3.20 Operational environment: places free of gas corruption with temperature of -10~50℃, and relative humidity≤85%RH.

Chapter 4 Setting and Wiring

4.1 Shape and hole cut out dimension

Unit：mm

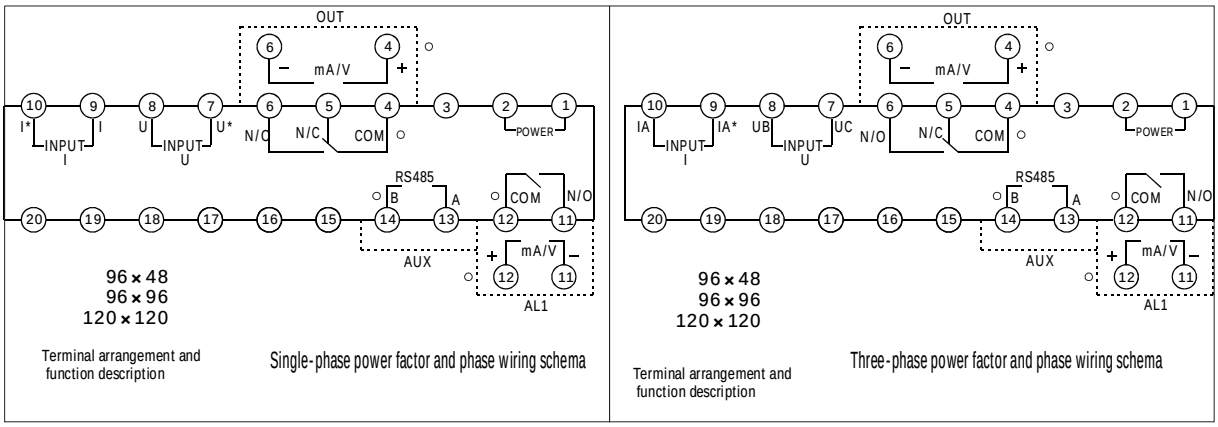
Instrument shape	Panel dimension		Case dimension			Hole cutout dimension	
	W	H	W	H	D	W	H
42 square shape	120	120	110	110	85	111	111
6 square shape	80	80	74	74	85	75	75
96x48 rectangular shape	96	48	90	44	85	91	45
72x72 square shape	72	72	66	66	85	67	67
48x48square shape	48	48	44	44	85	45	45
96x96 square shape	96	96	90	90	85	91	91

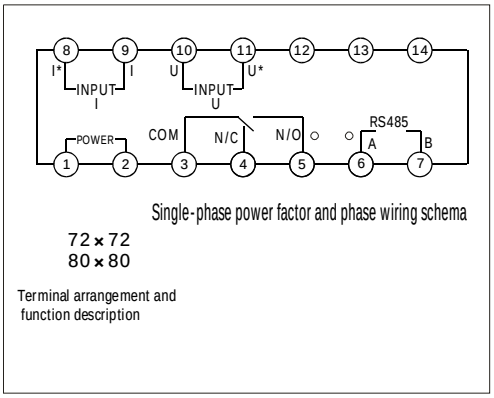
4.2 Method of installation

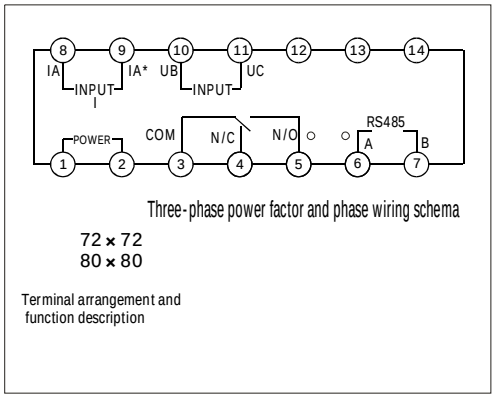
Choose the corresponding hole cutout dimension according to the instrument dimension from the table above, make a hole in the installation screen, insert the instruments into the hole, place the two clamping pieces into the clamping holder and push and tighten them by hand.

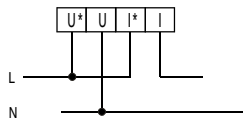
4.3 Description of Wiring and terminal

(Attention: If it is not the same with the wiring schema of the instrument case, please accord to the one of instrument case.)

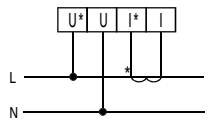




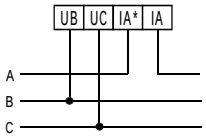




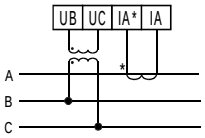
Single-phase power factor and phase wiring schema
Input directly (when Voltage≤600V),
Input directly (when Current≤10A)



Single-phase power factor and phase wiring schema
Input directly (when Voltage≤600V) ,
Input through instrument transformer (when Current＞10A)



Three-phase power factor and phase wiring schema
Input directly (when Voltage≤600V) 、
Input directly (when Current＞10A)



Three-phase power factor and phase wiring schema
Input through instrument transformer (when Voltage＞660V)
Input through instrument transformer (when Current＞10A)

4.3.1 Auxiliary power supply (Power): Instruments need an additional auxiliary power supply to work normally. For economic instruments without any output function additional, the auxiliary power supply is AC 220V, for the instruments with output function additional or obligated output modular socket, it is AC/DC85～260V. Please ensure the electric power provided applies to this series of instruments to prevent damage.

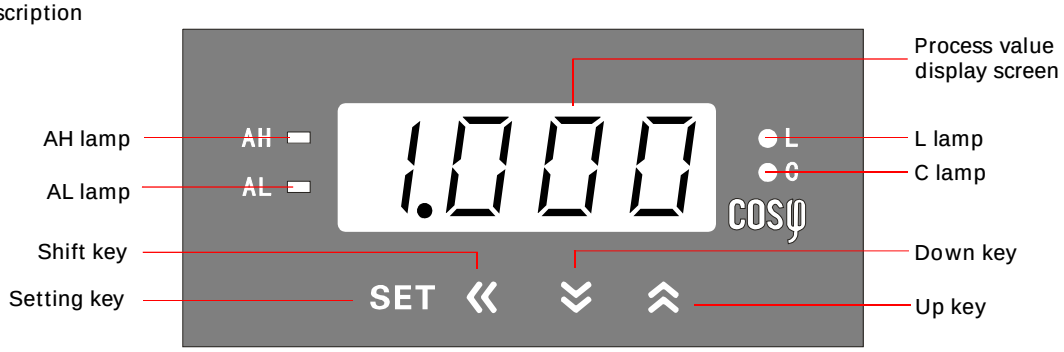
4.3.2 Signal Input: U* represents fire wire terminal of AC input voltage signal, I* is current inlet wire. When the voltage is higher than AC600V, you should consider of using PT, while the current is higher than AC10A, you should consider of using CT and installing the fuse of 1A.

4.3.3 Output port: the meter can have three output ports at the most, i.e. OUT port, AL1 port and AUX port. Except that AUX port is Rs485 communication port, other two output ports can be set on the keypad so that they support alarm output and transmitting output or communication output respectively. Please insert the functional module into the socket at the back of the terminal firstly and then set the type of port output in line with that of the installed module. The meter does not support several identical functional modules,

Terminal description: COM terminal is public terminal for the relay contact point output or the positive terminal of DC current signal output and the "A" terminal of RS485 communication output; N/C terminal is the normally-closed contact point terminal; N/O terminal is the normally-open contact point terminal or the negative terminal of DC current signal output and "B" terminal of RS485 communication output.

Chapter 5 Programming and Usage

5.1 Panel description

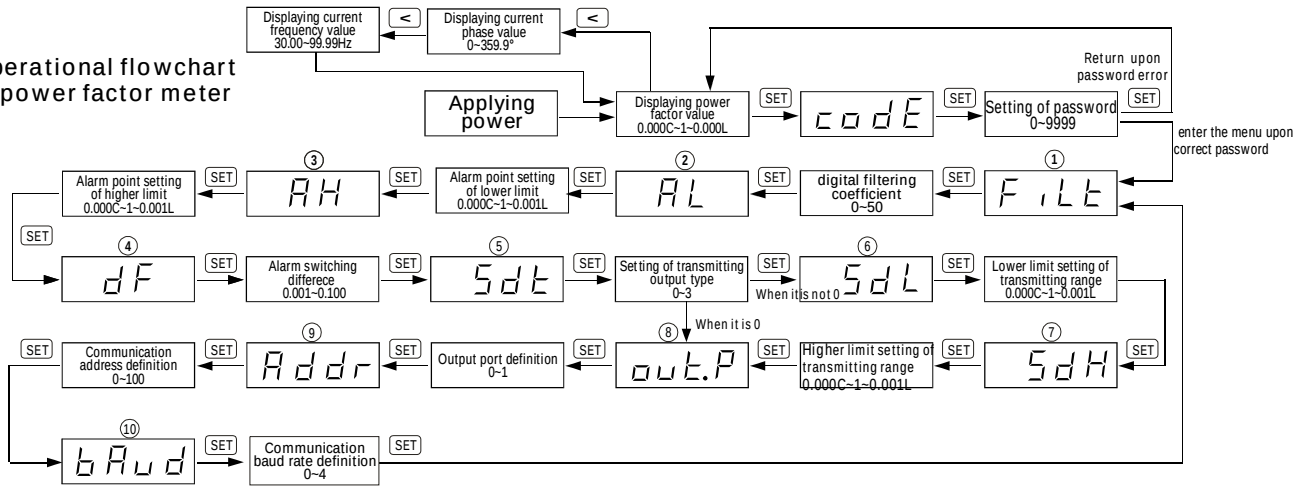


AL lamp：AL Lamp remains lit while lower limit alarming output acts.
AH lamp：AH Lamp remains lit while higher limit alarming output acts;
L lamps: L lamps remains lit while the measuring value is inductive
C lamps: C lamps remains lit while the measuring value is capacitive

5.2 How to operate

when applying power and enters measuring valve display statues automatically 2s later. When it is power factor meter, the current phase angle and frequency value can be examined in return by pressing the shift key (display sparklingly, return if there is no key action for 60s), When it is phase meter, the current power factor and frequency value can be examined in return by pressing the shift key (display sparklingly, return if there is no key action for 60s). Enter programming status by pressing down SET key.

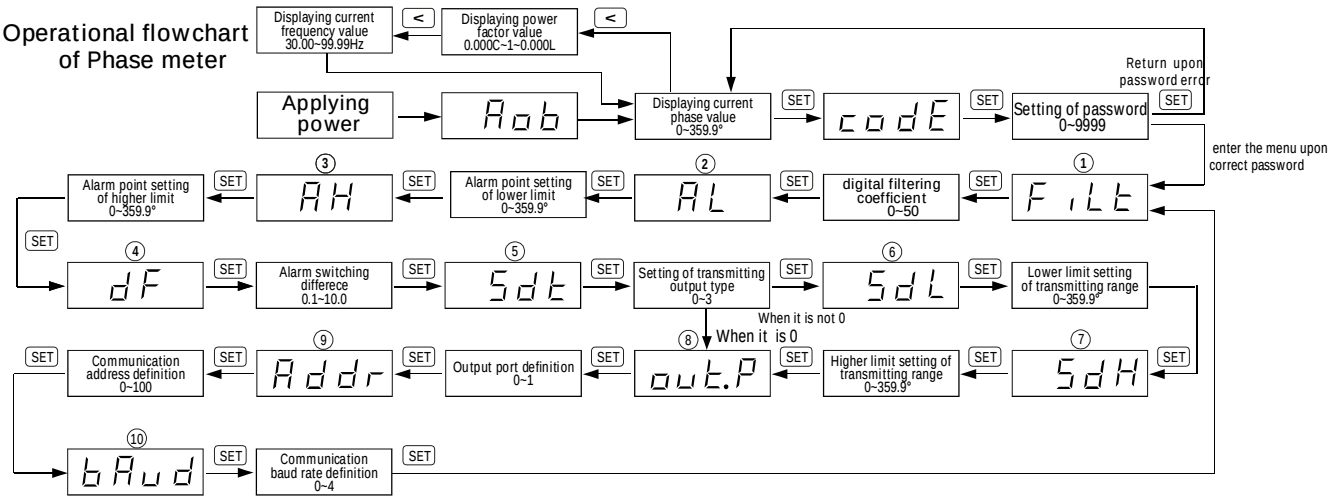
Operational flowchart of power factor meter



Explanations: 1. the password to enter menu is 803

2. Press down the SET key for 2s to quit programming status under the parameter display status and it will return to measuring value display status automatically if there is no key action for 60s under the programming status.
3. Economic instruments have no menus, which can't enter programming status.

Operational flowchart of Phase meter



5.3、Program parameter specification

Serial code	Parameter code	Parameter name	Setting range	Description
1	FILt	Digital filtering coefficient FILT	0 ~ 50	It is used to set the filtering coefficient of the meter's measured value so that the meter's measured value can be more stable. The setting of filter coefficient can normally affect the response time of the meter. The bigger the filter coefficient is, the more stable the measured value will be; the lower the response time is, the poorer the measurement timeliness will be.
2	AL	Alarm point setting of lower limit AL	0.000C ~ 1 ~ 0.001L (Power factor meter) 0 ~ 359.9° (Phase meter)	Setting overrunning alarm range of instruments together with higher limit alarm point, the setting value should be lower than setting value of higher limit. (Details of setting range definition is in appendix one)
3	AH	Alarm point setting of higher limit AH	0.000C ~ 1 ~ 0.001L (Power factor meter) 0 ~ 359.9° (Phase meter)	Setting overrunning alarm range of instruments together with lower limit alarm point, the setting value should be higher than setting value of lower limit. (Details of setting range definition is in appendix one)
4	dF	Alarm switching differece DF	0.001 ~ 0.100 (Power factor meter) 0.1 ~ 10.0° (Phase meter)	When the instrument is at critical state of alarm point, the alarm switching difference can be set in order to avoid the continuous action of alarm output.
5	dt	Delay time of alarm dt	0.0 ~ 60.0(s)	For setting the delay time of alarm output. For example, if "dt" is set as 10s, the alarm output relay will operated when the measuring value is higher than AH setting value or lower than AL setting value for lasting 60 s. It is invalid for cancelling the alarm
6	SdL	Lower limit of transmitting range SDL	0.000C ~ 1 ~ 0.001L (power factor meter) 0 ~ 359.9° (phase meter)	Define the measuring range of electric quantity corresponding to transmitting output together with setting of transmitting range higher limit. The lower limit set value shall be within the meter's measuring range and lower than the higher limit set value of the transmitting range. The transmitting output range will affect the transmitting output accuracy of instruments. When the transmitting range is greater than or equal to the scope of instruments, the accuracy is 0.5%; when it is less than the scope of the instruments, its accuracy and stability will decrease proportionately. So we suggest don't set the transmitting output setting range lower than 50% of the scope.(Details of setting range definition is in appendix one)
7	SdH	Higher limit of transmitting range SDH	0.000C ~ 1 ~ 0.001L (power factor meter) 0 ~ 359.9° (phase meter)	Define the measuring range of electric quantity corresponding to transmitting output together with setting of transmitting range lower limit. The higher limit set value shall be within the meter's measuring range and higher than the lower limit set value of the transmitting range. (Details of setting range definition is in appendix one)
8	Sdt	Transmitting output type SDT	0 ~ 2	SDT=0, DC0 ~ 10mA transmitting output SDT=1, DC0 ~ 20mA transmitting output SDT=2, DC4 ~ 20mA transmitting output
9	Addr	communication address definition ADDR	1 ~ 247	Local communication address for setting instruments, which is the exclusive one in the whole communication bus.
10	bAud	communication baud rate BAUD	0 ~ 4	When BAUD=0, with no communication functions When BAUD=1, communication baud rate is 1200bit/s When BAUD=2, communication baud rate is 2400bit/s When BAUD=3, communication baud rate is 4800bit/s When BAUD=4, communication baud rate is 9600bit/s

5.4、Cautions

5.4.1 Please confirm if the instrument power supply, input signal and each terminal wiring are correct and reliable before applying the power.

5.4.2 The wrong sequence and direction of instrument input signal have the possibility to cause the abnormal indicating value of instruments and wrong alarm and transmitting output.

5.4.3 The instrument must be preheated for 15 minutes to guarantee the precision of measurement and check.

5.4.4 The instrument should not be rapped, knocked and vibrate excessively and its using environment should meet the technical requirements.

Chapter 6 Packing and Storage

The instrument and accessories with packing should keep storage conditions cool and dry and free of wet and gas corruption with temperature not more than 70℃ and not less than -40℃ , and relative humidity≤85%