

**Quick operation manual of PD666-□S series****Three phase multi-functional digital panel meters**

Thank you for using the products of Zhejiang CHINT Instrument & Meter Co., Ltd. In order to have a safe and correct use of the instrument, please read this manual carefully and make sure to pay attention to the following points in use:

- This instrument must be installed and maintained by the qualified professionals;
- The input signals and auxiliary power supply must be cut off before wiring of the instrument;
- Make sure every part of the instrument without voltage by continuously using appropriate voltage detection device;
- The following conditions will lead to the damage or abnormal operation of the device:
  - Incorrect ratio setting of the instrument;
  - Out of range of auxiliary power supply, voltage, current, frequency;
  - Incorrect input polarity of current or voltage;
  - The terminals are not connected according to the requirements;

**一. Technical parameters**

Table 1

Technical parameters		Index		
Input signal	Connection mode		Three phase three wire, three phase four wire	
	Voltage	Rated value	AC220V、AC450V,the other specification can be custom-made	
		Overload	Continuously:1.2 times instant:2 times/5s	
		Consumption	≤2VA(per phase)	
		Resistance	>500k Ω	
	Current	Rated value	AC 1A、AC 5A	
		Current overload	Continuously:1.2 times instant:10 times/5s	
Consumption of the current circuit		≤1VA(per phase)		
	Resistance	<20m Ω (per phase)		
Frequency	Input range	45Hz~65Hz		
Power supply	Supply voltage range		AC/DC85V~264V, 50Hz/60Hz	
	Consumption		<5W / 1.5VA	
Clock (※)	Battery capacity of the clock		≥200mAh	
	Accuracy of the clock(error per day)		≤0.5s/d (23℃)	
Output	Display		Block code LCD or LED display	
	Measure parameters	Voltage	Class 0.5	resolving power 0.1V
		Current	Class 0.5	resolving power 0.001A
		Frequency	Class 0.5	resolving power 0.01Hz
		Active power	Class 0.5	resolving power 0.1W
		Reactive power	Class 1	resolving power 0.1var
		Power factor	Class 0.5	resolving power 0.001
	Energy	Active energy	Class 0.5S	resolving power 0.01kWh Conform to GB/T 17215.322-2008
		Reactive energy	Class 2	resolving power 0.01kvarh Conform to GB/T 17215.323-2008
	Energy	Energy measurement	Support forward、reverse measurement active energy, four-quadrant measurement reactive energy.	
Pulse constant		Active 10000 imp/kWh, reactive 10000imp/kvarh, the other constants can be custom-made		
Pulse signal output(note 2)		Supply active、reactive energy optical signal and optocoupler collector open-circuit electrical signal impulse output, pulse length:80±16ms.		
Auxiliary function	Protocol	ModBus_RTU		

Note 1: the other performance index, please refer to GB/T 22264.1-2008 the requirement of the indoor meters.  
 Note 2: PD666-2S□、PD666-6S□ series supply 1 set of pulse output, PD666-3S□、PD666-8S□ series supply 2 set of pulse output.

二. Wiring instructions:

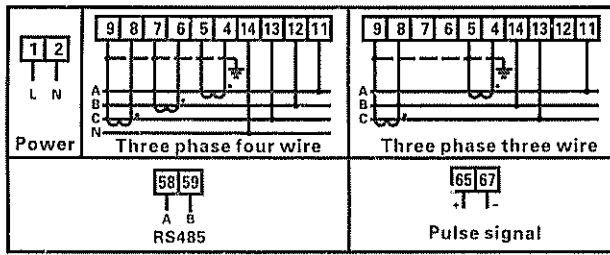


Figure 1 wiring diagram of three phase multi-functional meters (PD666-2S□、PD666-6S□ Series)

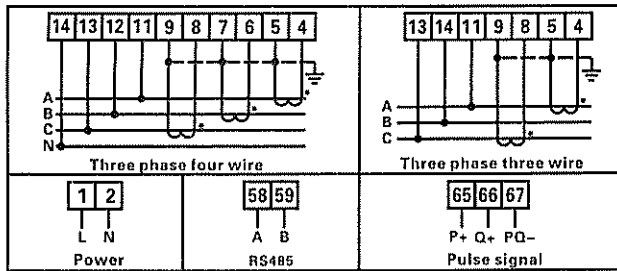


Figure 2 wiring diagram of three phase multi-functional meters (PD666-3S□、PD666-8S□ Series)

Current signal wire

- 4-----IA\*(input high end of A phase current) 5-----IA(output low end of A phase current)
- 6-----IB\*(input high end of B phase current) 7-----IB(output low end of B phase current)
- 8-----IC\*(input high end of C phase current) 9-----IC(output low end of C phase current)

Voltage signal wire

- 11-----UA(input end of A phase voltage) 12-----UB(input end of B phase voltage)
- 13-----UC(input end of C phase voltage) 14-----UN(input end of earth line voltage)

Auxiliary power supply

- 1 -----L(input live line of auxiliary power supply)
- 2 -----N(input earth line of auxiliary power supply)

Note: add AC/DC85V~264V between L and N (no earth line or live line)

RS485 communication line

- 58-----A (RS485 A end) 59-----B (RS485 B end)

Energy pulse output line(PD666-2S□、PD666-6S□ series)

- 65-----output high end of active energy pulse
- 67-----output low end of active energy pulse

Energy pulse output line(PD666-3S□、PD666-8S□ series)

- 65-----P+(active energy pulse end)66-----Q+(reactive energy pulse end)
- 67-----PQ-(common port)

三. Instructions of programming parameters

Instruction of keys: “Menu” the key of ( “**SET**” ) means “confirm” , the key of “Esc” ( “**<**” ) means “exit” , “**>**” means “reduce” and “**^**” means “add” . Input the password(assumed to be 701),enter the submenu item of “system settings” :

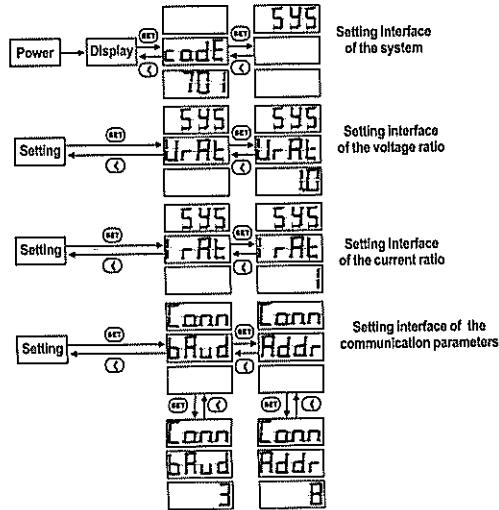


Figure 3 the settings of the common parameters

四. Installation size

Table 2

Model	Panel size (width W × length L)	Shell size (width N × length M × depth D)	Cutting size (width × length)
PD666-2S□	72mm × 72mm	66mm × 66mm × 80mm	68mm × 68mm
PD666-6S□	96mm × 96mm	90mm × 90mm × 80mm	92mm × 92mm
PD666-3S□	96mm × 96mm	90mm × 90mm × 72mm	92mm × 92mm
PD666-8S□	120mm × 120mm	112mm × 112mm × 94mm	114mm × 114mm

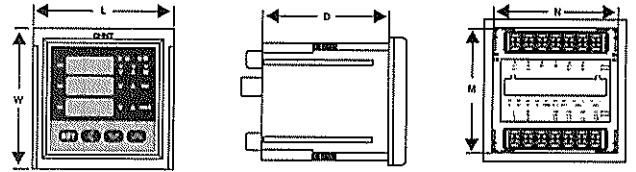


Figure 4 outside view of PD666-2S□、PD666-6S□ series  
(This is the diagrammatic sketch, please take material object as)

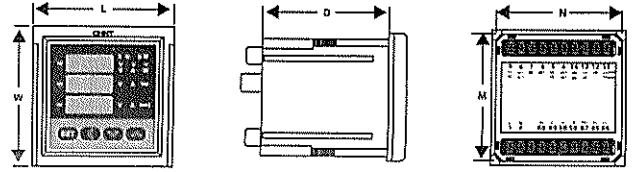


Figure 5 outside view of PD666-3S□、PD666-8S□ series  
(This is the diagrammatic sketch, please take material object as)

五. Communication protocol

Table 3

Parameter address	Parameter code	Instruction of the parameters	Type of data	Length of data Word	Read&write attributes
Keyboard parameters (detailed function see the instruction of the programming parameters. the actual value of the parameter with(*) = communication parameter value × 0.1)					
0000H	REV.	Reserved, actual read is the version number	16-bit with symbols	1	R/W
0001H	UCode	Programming password code	16-bit with symbols	1	R/W
0002H	CLrE	Electric energy zero clearing CLrE(1: zero clearing)	16-bit with symbols	1	R/W

0003H	net	Selecting of the connection mode net(0:3P4W,13P3W)	16-bit with symbols	1	R/W
0004H	RESERVED	reserved	16-bit with symbols	1	R/W
0005H	RESERVED	reserved	16-bit with symbols	1	R/W
0006H	IrAt	multiplying power of the current transformer IrAt	16-bit with symbols	1	R/W
0007H	UrAt	multiplying power of the potential transformer UrAt (*)	16-bit with symbols	1	R/W
0008H	RESERVED	reserved	16-bit with symbols	1	R/W
0009H	RESERVED	reserved	16-bit with symbols	1	R/W
000AH	Disp	Display in-tum time (s) Disp	16-bit with symbols	1	R/W
000BH	B.LCD	Backlight lightened time control (s)	16-bit with symbols	1	R/W
000CH	B.Light	Backlight brightness control, reserved for a while	16-bit with symbols	1	R/W
002CH	Protocol	Protocol changing-over	16-bit with symbols	1	R/W
002DH	Addr	Communication address Addr	16-bit with symbols	1	R/W
002FH	bAud	Communication baud rate bAud	16-bit with symbols	1	R/W
Electric quantity of the secondary side					
2000H	Uab	Line-line voltage, the unit is V(it is invalid for 3 phase 4 wire)	single precision floating decimal	2	R
2002H	Ubc		single precision floating decimal	2	R
2004H	Uca		single precision floating decimal	2	R
2006H	Ua	Phase-phase voltage, the unit is V(it is invalid for 3 phase 3 wire)	single precision floating decimal	2	R
2008H	Ub		single precision floating decimal	2	R
200AH	Uc		single precision floating decimal	2	R

200CH	Ia	The data of three phase current,the unit is A (Ib is invalid when three phase three wire)	single precision floating decimal	2	R
200EH	Ib		single precision floating decimal	2	R
2010H	Ic		single precision floating decimal	2	R
2012H	Pt	Conjunction active power, the unit is W	single precision floating decimal	2	R
2014H	Pa	A phase active power, the unit is W	single precision floating decimal	2	R
2016H	Pb	B phase active power, the unit is W (invalid when three phase three wire)	single precision floating decimal	2	R
2018H	Pc	C phase active power, the unit is W	single precision floating decimal	2	R
201AH	Qt	Conjunction reactive power, the unit is var	single precision floating decimal	2	R
201CH	Qa	A phase reactive power, the unit is var	single precision floating decimal	2	R
201EH	Qb	B phase reactive power, the unit is var (invalid when three phase three wire)	single precision floating decimal	2	R
2020H	Qc	C phase reactive power, the unit is var	single precision floating decimal	2	R
2022H	RESERVED	reserved	single precision floating decimal	2	R
2024H	RESERVED	reserved	single precision floating decimal	2	R
2026H	RESERVED	reserved	single precision floating decimal	2	R
2028H	RESERVED	reserved	single precision floating decimal	2	R
202AH	PFt	Conjunction power factor	single precision floating decimal	2	R

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202CH	PFa	A phase power factor (invalid when three phase three wire)	single precision floating decimal	2	R
202EH	PFb	B phase power factor (invalid when three phase three wire)	single precision floating decimal	2	R
2030H	PFc	C phase power factor (invalid when three phase three wire)	single precision floating decimal	2	R
2032H	RESERVED	reserved	single precision floating decimal	2	R
2034H	RESERVED	reserved	single precision floating decimal	2	R
2036H	RESERVED	reserved	single precision floating decimal	2	R
2038H	RESERVED	reserved	single precision floating decimal	2	R
203AH	RESERVED	reserved	single precision floating decimal	2	R
203CH	RESERVED	reserved	single precision floating decimal	2	R
203EH	RESERVED	reserved	single precision floating decimal	2	R
2040H	RESERVED	reserved	single precision floating decimal	2	R
2042H	RESERVED	reserved	single precision floating decimal	2	R
2044H	Freq	Frequency	single precision floating decimal	2	R
2046H	RESERVED	reserved	single precision floating decimal	2	R
2048H	RESERVED	reserved	single precision floating decimal	2	R
204AH	RESERVED	reserved	single precision floating decimal	2	R
204CH	RESERVED	reserved	single precision floating decimal	2	R
204EH	RESERVED	reserved	single precision floating decimal	2	R
2050H	DmPt	Total active power demand	single precision floating decimal	2	R
2052H	RESERVED	reserved	single precision floating decimal	2	R
Electrical data of the secondary side					

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4000H	RESERVED	reserved	single precision floating decimal	2	R
4002H	RESERVED	reserved	single precision floating decimal	2	R
4004H	RESERVED	reserved	single precision floating decimal	2	R
4006H	RESERVED	reserved	single precision floating decimal	2	R
4008H	RESERVED	reserved	single precision floating decimal	2	R
400AH	RESERVED	reserved	single precision floating decimal	2	R
400CH	RESERVED	reserved	single precision floating decimal	2	R
400EH	RESERVED	reserved	single precision floating decimal	2	R
4010H	RESERVED	reserved	single precision floating decimal	2	R
4012H	RESERVED	reserved	single precision floating decimal	2	R
4014H	RESERVED	reserved	single precision floating decimal	2	R
4016H	RESERVED	reserved	single precision floating decimal	2	R
4018H	RESERVED	reserved	single precision floating decimal	2	R
401AH	RESERVED	reserved	single precision floating decimal	2	R
401CH	RESERVED	reserved	single precision floating decimal	2	R
401EH	ImpEp	(current)positive active total energy	single precision floating decimal	2	R
4020H	RESERVED	reserved	single precision floating decimal	2	R
4022H	RESERVED	reserved	single precision floating decimal	2	R
4024H	RESERVED	reserved	single precision floating decimal	2	R
4026H	RESERVED	reserved	single precision floating decimal	2	R
4028H	ExpEp	(Current)negative active total energy	single precision floating decimal	2	R
402AH	RESERVED	reserved	single precision floating decimal	2	R
402CH	RESERVED	reserved	single precision floating decimal	2	R

402EH	RESERVED	reserved	single precision floating decimal	2	R
4030H	RESERVED	reserved	single precision floating decimal	2	R
4032H	Q1Eq	(current) first quadrant reactive total energy	single precision floating decimal	2	R
4034H	RESERVED	reserved	single precision floating decimal	2	R
4036H	RESERVED	reserved	single precision floating decimal	2	R
4038H	RESERVED	reserved	single precision floating decimal	2	R
403AH	RESERVED	reserved	single precision floating decimal	2	R
403CH	Q2Eq	(current) second quadrant reactive total energy	single precision floating decimal	2	R
403EH	RESERVED	reserved	single precision floating decimal	2	R
4040H	RESERVED	reserved	single precision floating decimal	2	R
4042H	RESERVED	reserved	single precision floating decimal	2	R
4044H	RESERVED	reserved	single precision floating decimal	2	R
4046H	Q3Eq	(current) third quadrant reactive total energy	single precision floating decimal	2	R
4048H	RESERVED	reserved	single precision floating decimal	2	R
404AH	RESERVED	reserved	single precision floating decimal	2	R
404CH	RESERVED	reserved	single precision floating decimal	2	R
404EH	RESERVED	reserved	single precision floating decimal	2	R
4050H	Q4Eq	(current) fourth quadrant reactive total energy	single precision floating decimal	2	R
4052H	RESERVED	reserved	single precision floating decimal	2	R
4054H	RESERVED	reserved	single precision floating decimal	2	R
4056H	RESERVED	reserved	single precision floating decimal	2	R
4058H	RESERVED	reserved	single precision floating decimal	2	R

All the electric quantity data read by the communication is quadratic numerical, the rate is excluded, complement numbers are the representation of negative numbers. Following is the detailed conversion method.

Table 4

Parameter name	Conversion formula	Unit	Parameter item
Voltage	$U = \text{URMS}(x=a, b, c) \times \text{UrAt} \times 0.1 \times 0.1$	V	Ua,Ub,Uc,Uab,Ubc,Uca
current	$I = \text{IRMS}(x=a, b, c) \times \text{IrAt} \times 0.001$	A	Ia,Ib,Ic
Active power	$P = \text{Ps}(x=a, b, c) \times \text{UrAt} \times \text{IrAt} \times 0.1 \times 0.1$	W	Pa,Pb,Pc
Reactive power	$Q = \text{Qs}(x=a, b, c) \times \text{UrAt} \times \text{IrAt} \times 0.1 \times 0.1$	var	Pt,Qa,Qb,Qc
Power factor	$\text{PF} = \text{PFs}(x=a, b, c) \times 0.001$		PFa,PFb,PFc,PFt
Frequency	$F = \text{Freq} \times 0.01$	Hz	F
Energy	$E_p = E \times \text{UrAt} \times \text{IrAt}$	kWh kvarh	ImpEp, ExpEp, Q1Eq, Q2Eq, Q3Eq, Q4Eq

Data format: single precision floating decimal adopts standard IEEE754 format; there are total 32 bits of IEEE single precision floating decimal format, contains three form fields: 23-bit decimal f, 8-bit biased exponent e, 1-bit symbol s. Put these fields continuously in a 32-bit word and encoding. 0:22 bit contains 23-bit decimal f; 23:30 bit contains 8-bit index number e; the 31 st contains the symbol s. As show in the following:

- a) the 31st bit is the sign bit, it's the positive number when 1, otherwise it's the complex number, the reading value is denoted by s;
- b) the 30th ~ 23rd bit is the powerful number, the reading value is denoted by e;
- c) the 22nd ~ 0 bit total 23 bits is used as coefficient, regarded as binary number, the decimal system of the decimal is assumed to be x;

then according to specified, the decimal number of the floating number is denoted as:  $x = (-1)^s \cdot (1 + f) \cdot 2^{(e-127)}$ .

Take A phase current Ia(200CH) as an example:

Read command frame: 01 03 20 0C 00 02 0F C8 (01 is the table address, 03 is the read command, 200C is A phase current address, 0002 is the data

length(floating data), 0FC8 is the check code of CRC16

Return frame: 01 03 04 45 9C 38 00 3C D1 (01 is the table address, 03 is the read command, 04 is the returned data quantity of the read register, 459C3800 is the floating data, DC70 is the check code of CRC16)

Ia measurement =  $0x459C3800$  (floating number) \* current ratio \* 0.001 = 4999(decimal number) \* current ratio \* 0.001。

Take the current ratio Irat(0006H) as an example:

Write command frame: 01 10 00 06 00 01 02 00 0A 26 31 (01 is the table address, 10 is the read command, 0006 is the current ratio address, 0001 is the number of the registers, 02 is the data quantity of the read register, 000A is the current ratio data, 26 31 is the check code of CRC16).

Return frame: 01 10 00 06 00 01 E1 C8 (01 is the table address, 10 is the read command, 0006 is the current ratio address, 0001 is the quantity of the registers, E1 C8 is the check code of CRC16).



Manufacturer: Zhejiang CHINT Instrument&Meter Co.,Ltd.  
Address: Bridge Industrial Zone,325603 Wenzhou,Zhejiang,China  
P.C: 325603  
Tel.: 86-577-62877777  
FAX: 86-577-62891577  
Technical Support Hotline: 0577-62877777-9561  
Quality Complaints: 0577-62919999 8008577777  
Counterfeit Complaints Hotline: 0577-62789987  
Website: <http://www.chint.com>  
Email: [ztyb@chint.com](mailto:ztyb@chint.com)  
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