

# ZHYQ Digital Controller Operation Manual



## PD9001

## 1. Functional and Technical Index

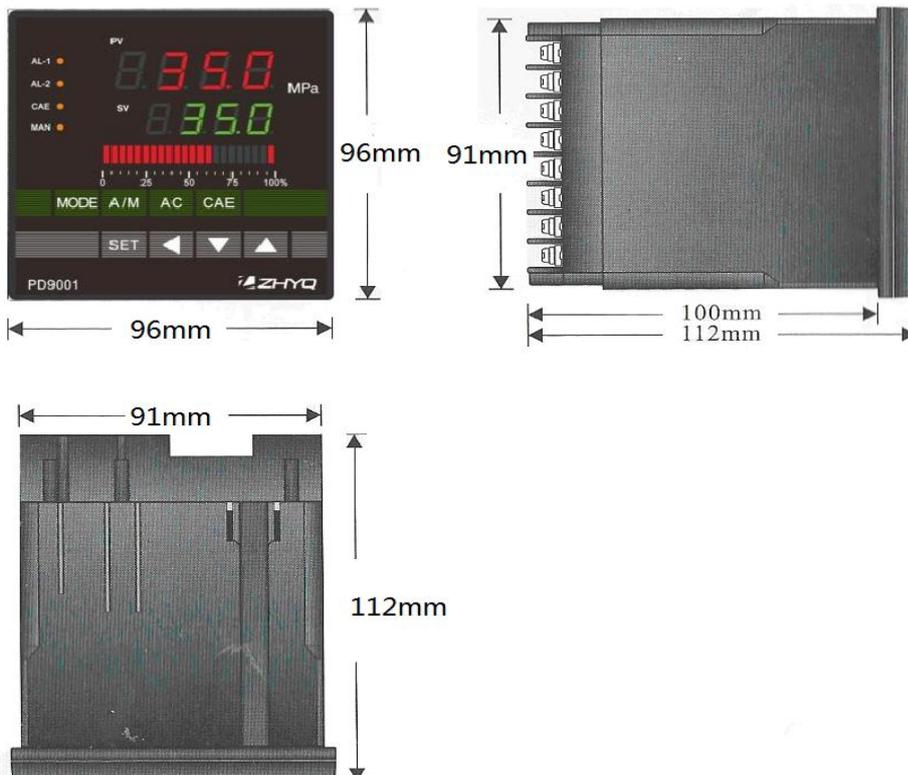
PD9001 is PID intelligent pressure controller integrate a number of international advanced electronic & Single-chip computer technology ,meanwhile with high cost performance and adaptability of the fluctuate conditions of power grid can completely replace the same imported high-grade pressure controllers or controllers overseas. the beautiful shape , complete functions & excellent anti-interference performance to ensure the stability and reliability of the system.

### The instrument technical indicators are as follows:

- ☆ Digital Display : Double layer double color four digital display ( green and red )
- ☆ Electronic bar display: 20 segments electronical bar indicate the output power
- ☆ The range of display : 0000~9999 (radix point alterable)
- ☆ Accuracy: 0.2%FS±1
- ☆ the display of indicator light : AL-1, AL-2, CAE, MAN
- ☆ Pressure range : programmable setting
- ☆ Sampling frequency : 50times/s
- ☆ Alarm output : two circuits with programmable alarm Settings
- ☆ Input : 2mV/V、3.3mV/V、0~10mA、0~20mA、4~20mA、0~5V、1~5V、0~10V ( order stated )
- ☆ PID output : 0~5V、0~10V、4~20mA ( order stated )
- ☆ work environment : 0~55℃ & ≤80%RH
- ☆ Working power supply : 85~265VAC, 50~60Hz;
- ☆ Controller size : 96×96mm , Hole size : 92×92mm

## 2. Instrument panel and terminals diagram instruction

### 2.1 ) Controller size



## 2.2 ) Panel & buttons instruction

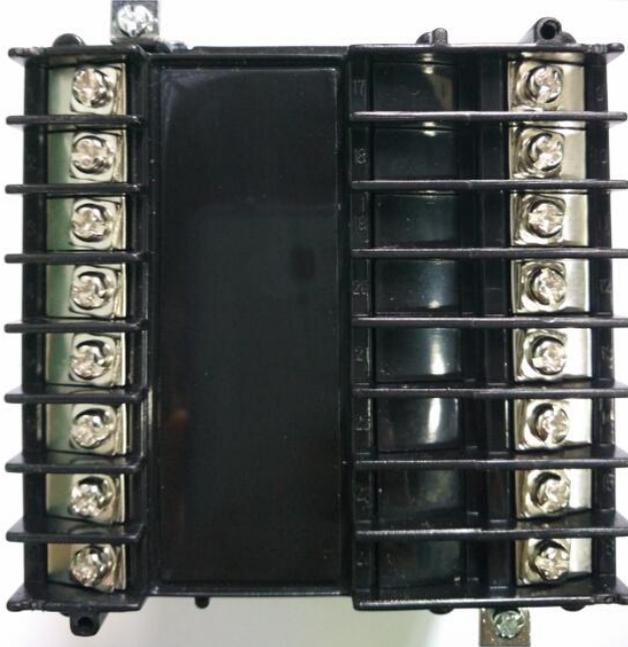
- a) PV display window:
  1. set status: parameter code display settings
  2. measuring status: display real-time pressure value
- b) SV display window:
  1. set status: display setting values
  2. measuring status: display controller pressure value
- c) MPa: pressure unit
- d) 0-100% : output power display bar
- e) AL-1: first alarm indicator
- f) AL-2 : second alarm indicator
- g) CAE: calibration indicator
- h) MAN: manual operation indicator
- i) MODE: mode key (empty) , Complete withdrawal from the main Menu
- j) A/M: Auto/Manual switch operation key
- k) AC: reset key
- l) CAE: calibration key
- m) SET: Function key : the pressure value would be zero clearing , if you press the function key and AC reset key at the same time .
- n) < : Shift key : if you mistake the zero clearing operation , now you need to press function key and the shift key for 5 seconds to restore the calibration value .
- o) ∨: Moving down key
- p) ∧: moving up key



## 2.3) Lights Instruction

- a) The first alarm indicator light AL-1, when it alarms , the indicator light is on , when it doesn't , the indicator light is off .
- b) The second alarm indicator light AL-2, when it alarms , the indicator light is on , when it doesn't , the indicator light is off .
- c) The calibration indicator light CAE , when the instrument do the automatic calibration operation , the indicator light starts flickering , otherwise it will off .
- d) The manual status indicator light MAN ,when the manual status selected , the light is on , when the automatic state selected , it will be off .

2.4) Wiring terminals diagram instruction



2.4.1) transducer input ( mV/V)

terminal	Function ( transducer wiring diagram)		terminal	Function
	5pins	6pins		
1	S+ ( blue )	S+ ( blue )	9	AL-2 relay common (C)
2	E+ ( red)	E+ ( red)	10	AL-2 relay Normal Open (NO)
3	S – ( white)	S – ( white)	11	AL-1 relay Normal Close (NC)
4	E- (yellow)	E- (yellow)	12	AL-1 relay common (C)
5	CAL(black)	CAL( brown/black)	13	AL-1 relay Normal Open (NO)
6	shielded	shielded	14	220V power supply input L
7	PID output +	PID output +	15	220V power supply input N
8	PID output-	PID output-	16	Ground

2.4.2) transducer input ( 4-20mA, 0-5V ,0-10V )

terminal	Function ( transducer wiring diagram)			terminal	Function
	5pins (0-5V ,0-10V)	6pins (0-5V ,0-10V)	5pins, 6pins (4-20mA)		
1	S+ ( blue )	S+ ( blue )	S+ ( blue )	9	AL-2 relay common (C)
2	E+ ( red)	E+ ( red)	E+ ( red)	10	AL-2 relay Normal Open (NO)
3	blank	blank	blank	11	AL-1 relay Normal Close (NC)
4	E- (yellow)	E- (yellow)	blank	12	AL-1 relay common
5	blank	blank	blank	13	AL-1 relay Normal Open (NO)
6	shielded	shielded	shielded	14	220V power supply input L
7	PID output +	PID output +	PID output +	15	220V power supply input N
8	PID output-	PID output-	PID output-	16	Ground

### 3. Parameter table instruction

Symbol	Name	Setting Range	Explain	Initial value
Fast setting state				
SV	Setting value	1~9999	pressure control target value setting	random
P	Proportional Band	0.1~99.9	PID parameter : P	60.0
I	Integral Time	0.0~99.9	PID parameter : I	10.0
D	Differential Time	0.0~99.9	PID parameter : D	0.0
AL-1	First pressure alarm value setting	0~9999	Alarm value can be setting according to process requirements	ED 80%
AL-2	second pressure alarm value setting	0~9999	Alarm value can be setting according to process requirements	ED 20%
Systematic setting state				
OL-U	Output amplitude high limited	0.0~100%	The maximum amplitude of PID control output (Auto/Manual available )	80.0%
OL-L	Output amplitude low limited	0~high limited	The minximum amplitude of PID control output (Auto available )	0.0
ED	Transducer pressure range	1~9999	According to the transducer full range	1000
DOT	Decimal point location selection	0000 000.1 00.01 0.0001	dddd: no decimal ddd.d : 1 decimal dd.dd : 2 decimal d.ddd : 3 decimal	00.01
ESCL	Zero/span value setting	Base on the transducer	Make sure the transducer output no load (pressure)	
LOAD	Signal loading value	Base on the transducer	When loaded into the external signal after a certain amount, press the "<" button, enter the full value reduced.	
CNFN	Full value conversion	1~9999	Compared with range value, reduced full pressure corresponding to the code	
SEL1	First pressure alarm function setting	HJ LJ	HJ: alarming the measured value exceeds the setting value LJ: alarming the measured value lower than the setting value	HJ
HC-1	First pressure alarm hysteresis zone setting	0~250	Hysteresis zone can be set according to process requirement	0
SEL2	second pressure alarm function setting	HJ LJ	HJ: alarming the measured value exceeds the setting value LJ: alarming the measured value lower than the setting value	HJ
HC-2	second pressure alarm hysteresis zone setting	0~250	Hysteresis zone can be set according to process requirement	0



DP	Pressure division value	0001 0002 0005	0001: last one digital display : 0-9 0002: last one digital display :even 0005: last one digital display : 0 、 5	0001
FUCT	fuzzy control type	0、 1	0: fast adjust type 1: amplitude adjust type	1
LOCK	parameters lock	0、 1	0: parameters are not locked the parameter are available 1: parameters are locked . the parameters are unavailable but conversion key	001
TS	Output adjustment cycle	0.2、 0.4~10		0.2

#### 4. Parameter settings instruction

##### 4.1) auto control / manual control state shift

in the working state , press the "A/M" , observation "MAN" and "SV" light data.  
"MAN" light: manual control state, "SV" shows the actual output percentage;  
"MAN" dark, automatic control state, "SV" shows that pressure control target.

##### 4.2) manual adjust output

In working state, instrument according to the instructions by 4.1 first, adjust to manual control status ;  
"SV" shows the percentage of the actual output value;  
(for example: if output type 4 ~ 20 mA, SV shows a value of 80.0, the actual output value of 16.8 mA)  
Press "∨" , reduce output;  
Press "∧" , increase the output.

##### 4.3 ) Sampling data reset

make sure connected with pressure transducer or transmitter, and the current no pressure ;  
In working state, instrument according to the instructions by 4.1 first, adjust to manual control status ;  
press the "MODE" and "AC" keys at the same time , "SV" will shows "0005" , then loosen the button  
"SV" shows a digital countdown, timing to zero, "PV" data record reset.

##### 4.4) sampling data reset recovery

In working state, instrument according to the instructions by 4.1 first, adjust to manual control status ;  
press "AC" key once, it will return to the result of a reset operation before.  
For example: if "PV" shows the result "- 0.02";  
According to 4.3 operation, display the results into a "00.00".  
Again according to 4.4 operation, display the results for the "-0.02" .

##### 4.5) CAE calibration (only applicable to pressure sensor with a calibration line)

Sure has been properly connected pressure sensor, and the current no pressure status;  
In working state, instrument according to the instructions by 4.1 first, adjust to manual control status ;  
Press "CAE" , CAE lights;

"PV" should be show 80% of full pressure range .

**For example:** the current "PV" shows "00.00", full pressure range set to "10.00"

Press "CAE", the "PV" shows "8.00".

**The functional role :** if "PV" shows deviation is too much , the instrument need to calibration;

If "PV" no change, can be initially determined sensor is faulty.

#### **4.6) Using CAE calibration the instrument zero / span (only applicable to pressure sensor with a calibration line)**

Sure has been properly connected pressure sensor, and the current no pressure status;

In working state, instrument according to the instructions by 4.1 first, adjust to manual control status ;

press the "MODE" and "CAE" button at the same time, until the "SV" shows "0028", then loosen the button;

"SV" shows a digital countdown, timing to zero, zero span end of calibration.

#### **4.7) Modify the user password**

In working state, instrument according to the instructions by 4.1 first, adjust to manual control status ;

press the "MODE" and "A/M" button at the same time, "PV" shows "PASS";

Press the "<" adjust "SV" Numbers flashing, flashing a is modified;

press " ^ " or " v " adjust the flashing value up to down ;

After enter the password, press "SET" to validate (initial password: "0000");

Password authentication is passed, enter into new password Settings, "PV" shows "NPAS";

Press the "<" adjust "SV" Numbers flashing, flashing a is modified;

press " ^ " or " v " adjust the flashing value up to down ;

After setting the new password, click "MODE" button to return to work.

**Notice :** in order to protect the parameters of the instrument user privacy, the meter no backdoor password. So once the user changed the initial password, please your new password . If lost the new password and cause parameters can be setting problem, the user need to ship back the instrument to the manufacturer to unlock. All fees by the user.

#### **4.8) pressure control target value setting (SV setting)**

In working state, press "SET" once, "PV" shows "SV" ;

Press "<" to adjust "SV" Numbers flashing, flashing a is modified;

press " ^ " or " v " adjust the flashing value up to down ;

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into proportional band (P) parameter Settings.

#### **4.9) proportional band parameter "P" settings :**

In working state, press the "SET" twice, "PV" shows "P";

Press "<" to adjust "SV" Numbers flashing, flashing a is modified;

press " ^ " or " v " adjust the flashing value up to down ;

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into Integral Time (I) parameter Settings.

**4.10) Integral time parameter “I” settings**

In working state, press the "SET" three times , "PV" shows " I ";  
Press "<" to adjust "SV" Numbers flashing, flashing a is modified;  
press " ^ " or " \ " adjust the flashing value up to down ;  
Setup completed, press "MODE" button to return to work, or press the "SET" button enter into differential time (D) parameter Settings.

**4.11) Differential time parameter “D” settings**

In working state, press the "SET" four times , "PV" shows " D ";  
Press "<" to adjust "SV" Numbers flashing, flashing a is modified;  
press " ^ " or " \ " adjust the flashing value up to down ;  
Setup completed, press "MODE" button to return to work, or press the "SET" button enter into AL-1 parameter Settings.

**4.12 ) The first pressure alarm (AL-1) value settings :**

In working state, press the "SET" five times , "PV" shows " AL-1 ";  
Press "<" to adjust "SV" Numbers flashing, flashing a is modified;  
press " ^ " or " \ " adjust the flashing value up to down ;  
Setup completed, press "MODE" button to return to work, or press the "SET" button enter into AL-2 parameter Settings.

**4.13 ) The second pressure alarm (AL-2) value settings :**

In working state, press the "SET" six times , "PV" shows " AL-2 ";  
Press "<" to adjust "SV" Numbers flashing, flashing a is modified;  
press " ^ " or " \ " adjust the flashing value up to down ;  
Setup completed, press "MODE" button to return to work, or press the "SET" button enter into pressure control target value setting .

**4.14) Output amplitude high limited value settings**

In working state, press the "SET" once , " PV " shows " SV " , then loosen the button  
Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U "  
Press "<" to adjust "SV" Numbers flashing, flashing a is modified;  
press " ^ " or " \ " adjust the flashing value up to down ;  
Setup completed, press "MODE" button to return to work, or press the "SET" button enter into output amplitude low limited value settings .

**For example :** if the controller output is 0-10v , Output amplitude high limited value setting " 80.0 " ; then the controller output maximum value will be 8V , no matter manual or automatic adjust , the controller output value is not more than 8V .

**The functional role:** to prevent poor feeding, collection the coasters phenomenon caused by pressure drop.The exact value setting , need users according to the actual usage Settings.

#### 4.15) Output amplitude low limited value settings

In working state, press the "SET" once , "PV" shows "SV" , then loosen the button

Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .

Press " SET " once again , enter into output amplitude low limited value settings , " PV " shows " OL-L " .

Press "<" to adjust "SV" Numbers flashing, flashing a is modified;

press " ^ " or " \ " adjust the flashing value up to down ;

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into Transducer pressure range value settings .

**For example :** if the controller output is 0-10v , Output amplitude high limited value setting " 10.0 " ; then the controller output maximum value will be 1V , no matter manual or automatic adjust , the controller output value is not less than 1V .

In the manual control , is not subject to this value, the lowest drops to zero.

**The functional role:** to prevent discharging stuck, instantaneous pressure caused by the phenomenon of downtime. The exact value setting , need users according to the actual usage Settings.

#### 4.16 ) Transducer pressure range value settings .

Instrument range should be match with the instrument range setting value , then it will display the properly pressure value . so firstly check the transducer range, if such ranges does not match, follow these steps.

In working state, press the "SET" once , "PV" shows "SV" , then loosen the button .

Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .

Then Press " SET " twice , enter into transducer pressure range value settings , " PV " shows " ED " .

Press "<" to adjust "SV" Numbers flashing, flashing a is modified;

press " ^ " or " \ " adjust the flashing value up to down ;

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into Decimal point location settings .

**For example :** if the controller current range is " 10.00 " , and transducer pressure range is 15MPa , according to the above steps, and setting the controller range to "15.00".

#### 4.17) The decimal point location settings

In working state, press the "SET" once , "PV" shows "SV" , then loosen the button .

Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .

Then Press " SET " three times , enter into decimal point location settings , " PV " shows " DOT " .

Press "<" to adjust the decimal point location ;

Setup completed, press "MODE" button to return to work, or press the "SET" button enter zero/ span value settings .

**4.18) zero/ span value settings .**

This operation will cause the collect data is not accurate, please strictly according to the following instructions:

Make sure the transducer connection is correct, and the current for no pressure status ;

In working state, press the "SET" once , " PV" shows " SV " , then loosen the button .

Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .

Then Press " SET " four times , enter into zero/span value settings , " PV " shows " ESCL " .

Press "<" to calibration zero , controller enter into signal load status , " PV" shows " LOAD " .

Load the signal , " SV " shows value will be changed ( you through add pressure to load the signal)

After load signal finished , press "<" enter into full value conversion settings , " PV " shows "CNFN " .

Press "<" to adjust "SV" Numbers flashing, flashing a is modified;

press "^" or "v" adjust the flashing value up to down ;

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into the first pressure alarm function settings .

**4.19 ) the first pressure alarm function settings (SEL1)**

In working state, press the "SET" once , " PV" shows " SV " , then loosen the button .

Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .

Then Press " SET " five times , enter into the first pressure alarm function settings , " PV " shows " SEL1" .

Press "^" or "v" to shift the first pressure alarm function (HJ or LJ ) status .

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into the first pressure alarm hysteresis zone setting .

**4.20 ) the first pressure alarm hysteresis zone setting ( HC-1) .**

In working state, press the "SET" once , " PV" shows " SV " , then loosen the button .

Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .

Then Press " SET " six times , enter into the first pressure alarm hysteresis zone setting , " PV " shows " HC-1 " .

Press "<" to adjust "SV" Numbers flashing, flashing a is modified;

press "^" or "v" adjust the flashing value up to down ;

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into the second pressure alarm function settings .

**For example :** according to the 3 settings different value , The first pressure alarm (AL-1) value, the first pressure alarm function (SEL1 ) and the first pressure alarm hysteresis zone ( HC-1)

**Example 1 :**

if setting the AL-1 as "5.00 " , setting the SEL-1 as "HJ" , setting the HC-1 as " 0.20 " .

In working state, AL-1 relay working status as following :



"PV" collect data	AL-1 NC terminal	AL-1 NO terminal	AL-1 indicator
More than 5.20	open	close	light
Between 4.8 and 5.2	maintain the previous state		
Less than 4.8	close	open	dark

**Example 2 :**

if setting the AL-1 as "5.00 " , setting the SEL1 as "LJ" , setting the HC-1 as " 0.20 " .  
In working state, AL-1 relay working status as following :

"PV" collect data	AL-1 NC terminal	AL-1 NO terminal	AL-1 indicator
More than 5.20	close	open	dark
Between 4.8 and 5.2	maintain the previous state		
Less than 4.8	open	close	light

**4.21 ) the second pressure alarm function settings (SEL2)**

In working state, press the "SET" once , " PV" shows " SV " , then loosen the button .  
Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .  
Then Press " SET " seven times , enter into the second pressure alarm function settings , " PV " shows " SEL2" .  
Pressure " ^ " or " \ " to shift the second pressure alarm function (HJ or LJ ) status .  
Setup completed, press "MODE" button to return to work, or press the "SET" button enter into the scnd pressure alarm hysteresis zone setting .

**4.22 ) the second pressure alarm hysteresis zone setting .( HC-2)**

In working state, press the "SET" once , " PV" shows " SV " , then loosen the button .  
Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .  
Then Press " SET " eight times , enter into the second pressure alarm hysteresis zone setting , " PV " shows " HC-2 " .  
Press "<" to adjust "SV" Numbers flashing, flashing a is modified;  
press " ^ " or " \ " adjust the flashing value up to down ;  
Setup completed, press "MODE" button to return to work, or press the "SET" button enter into the pressure division value settings .

**The functional role:** the AL-2 is similar as AL-1 , but AL-2 no NC terminal , we just supply the NO terminal .

**4.23 ) the pressure division value settings**

In working state, press the "SET" once , " PV" shows " SV " , then loosen the button .  
Press " SET " again for 5 seconds , it will enter into output amplitude high limited value setting , " PV " shows " OL-U " , then loosen the button .  
Then Press " SET " nine times , enter into the pressure division value settings . " PV " shows " DP " .

press " $\wedge$ " or " $\vee$ " to adjust "SV" value .

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into the fuzzy control type settings .

#### **4.24 ) the fuzzy control type settings .**

In working state, press the "SET" once , "PV" shows "SV" , then loosen the button .

Press "SET" again for 5 seconds , it will enter into output amplitude high limited value setting , "PV" shows "OL-U" , then loosen the button .

Then Press "SET" ten times , enter into the fuzzy control type settings , "PV" shows "FUCT" .

press " $\wedge$ " or " $\vee$ " to adjust "SV" value .

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into output adjustment cycle settings .

**The functional role:** type 0 adjustment range is big, is suitable for the plate making industry .  
type 1 adjustment range is small, be applicable to the silk industry .

#### **4.25 ) output adjustment cycle settings .**

In working state, press the "SET" once , "PV" shows "SV" , then loosen the button .

Press "SET" again for 5 seconds , it will enter into output amplitude high limited value setting , "PV" shows "OL-U" , then loosen the button .

Then Press "SET" eleven times , enter into the output adjustment cycle settings , "PV" shows "TS" .

press " $\wedge$ " or " $\vee$ " to adjust "SV" value .

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into parameters lock setting .

#### **4.26 ) the parameters lock setting .**

In working state, press the "SET" once , "PV" shows "SV" , then loosen the button .

Press "SET" again for 5 seconds , it will enter into output amplitude high limited value setting , "PV" shows "OL-U" , then loosen the button .

Then Press "SET" twelve times , enter into the parameters lock setting , "PV" shows "LOCK" .

press " $\wedge$ " or " $\vee$ " to adjust "SV" value .

Setup completed, press "MODE" button to return to work, or press the "SET" button enter into the output amplitude high limited setting .

**The functional role:** if lock parameters setting 1 , next time the user enter menu setting need to input the password .

## **5. Safety warning**

5.1 ) the controller terminal for the bare installation, when the controller connected with the power , the body any parts contact the terminal is not allowed

5.2 ) the controller is an open device, please avoid dust, corrosive liquid, high humidity too much or strong vibration environment use.

5.3 ) when the instrument malfunction, please do not open the instrument without authorization.



**6. Order Guide:** with "\*" are required , with "---" is optional

Model	Range (bar)	Input	Output	Power Supply	Alarm	Other requirement
PD9001	*	*	*	*	*	---
Example: PD9001-350BAR-4-20mA-0-10V-220V-2						

**7. ZHYQ contacts :**

Company Name: Shanghai Zhaohui Pressure Apparatus Co.,Ltd.

Address : 5-6F No.8 Building No.115 ,Lane 1276 Nanle Road Songjiang District Shanghai 201600 China

Tel: 86-21-51691919

Fax: 86-21-67755185

Email: [info@zhygsensor.com](mailto:info@zhygsensor.com)

web: <http://www.zhygsensor.com>