

1 YEAR
WARRANTY



User's Guide



Shop online at

omega.com

OMEGA

omega.com

e-mail: info@omega.com

*For latest product manuals:
omegamanual.info*

ISO 9001
CERTIFIED
CORPORATE QUALITY
STAMFORD, CT

ISO 9001
CERTIFIED
CORPORATE QUALITY
MANCHESTER, UK

Made In China

PHCN-85 pH/ORP CONTROLLER

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2011 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.

Notes before Operation

1. Notice before operation:

- (1) Carefully read the relevant parts of this manual before installation and operation to prevent wrong operation, measurement error and damage of instrument.
- (2) Improper installation and unsuitable flow speed will cause measurement error, please read the installation passage in detail.
- (3) This instrument makes precise electrochemical measurement, and its installation and operation should be performed by technicians with relevant professional knowledge.
- (4) As some special conditions, please contact Omega for further details.

Content

I CONCEPTION.....	1
I FEATURES.....	1
II APPLICATIONS.....	2
III TECHNICAL INDEX.....	3
II INSTALLATION.....	4
I METER INSTALLATION.....	4
II WIRE CONNECTION INTRODUCTION.....	5
III ADJUSTMENT.....	6
I PARAMETER SETTING.....	7
A. NORMAL USER SETTING.....	7
B. ENGINEERING USER	9
II MEASURE AND CALIBRATION	10
A. BUFFER SOLUTION CALIBRATION.....	11
B. OFF-LINE CALIBRATION.....	12
C. MAINTENANCE OF SENSORS.....	13
D. THE USAGE OF SENSORS.....	14
TROUBLE SHOOTING.....	14
APPENDIX I.....	16
APPENDIX II.....	16

I Conception

PHCN-85 is our new pH/ORP meter with color screen display. The meter with 32-bit processor, ARM core operation system.

i Features

✧ 3.5 inch 320×240 TFT color screen.

Virtual pointer or Digital style interface display. Multi-parameter display.

✧ OFFLINE/INLINE calibration selection, 6 point buffer solution calibration.

✧ Automatic/manual temperature compensation function. The meter temperature range could up to 100℃。

✧ Configuration pH/ORP/temperature, (4~20) mA current support instrument/transmitter mode.

✧ Photoelectric switch could set (pH/ORP output/temperature output/timing output /pH PID adjustment. It can drive pulse metering pump or extension control.

✧ RS485 MODBUS-RTU protocol

✧ It's convenient to check the current status, transmitting status, mV value by menu.



<ul style="list-style-type: none"> ✧ DC24V Power supply polarity internal automatic identification ✧ EMC design with better ability on anti-interference. 	
<ul style="list-style-type: none"> ✧ Calendar function which can set timing and reserved timing. 	<ul style="list-style-type: none"> ✧ Password protection

ii Applications

- ✧ High level water quality management. Automatic running.
- ✧ High pure water /ultra pure water management control. The meter is used for Electronics, electric power, pharmaceutical, fine chemical, clinical medical science, life science research
- ✧ The meter is used for Industrial process solution salinity analysis of Water treatment, desalination, concentrate management, circulating cooling water, industrial coating, large-scale water treatment equipment
- ✧ The meter is used for inline monitoring of Metallurgy, petrochemical, industrial cleaning.

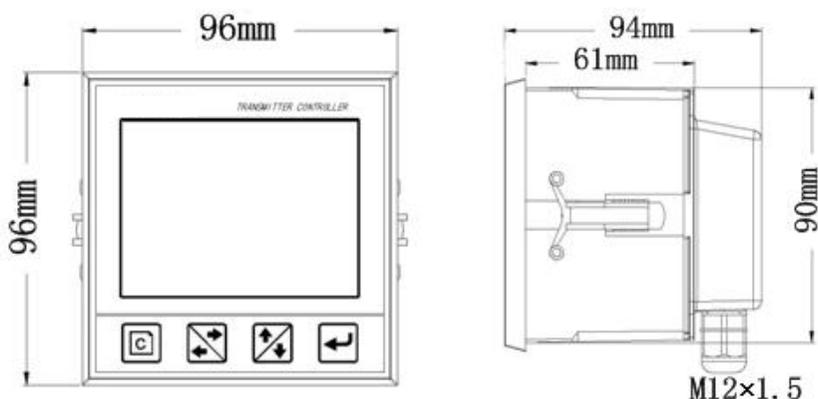
iii Technical index.

Model No.	PHCN-85 pH/ORP transmitting controller		
Measurement Parameter	Range	Resolution	Accuracy
pH	0.00 ~14.00	0.01	±0.1
ORP	(-1999 ~ +1999) mV	1mV	±5mV(Indicator)
Temperature	(0.0 ~ 100.0) °C	0.1°C	±0.5
Medium temperature compensation	(0.0~100.0) °C		
Temperature components	Pt1000 temperature components		
(4~20) mA Current output	Channels	Double channels	
	Features	Isolated, adjustable, reversible, 4-20MA output, instruments/ transmitter mode.	
	Loop resistance	400Ω (max), DC 24V	
	Resolution	±0.1mA	
Control contact	Channels	Triple channels	
	Contact	Photoelectric relay output	
	Programmable	Programmable (temperature、pH/ORP) output	
	Features	Could set pH/ORP/ temperature/ timing. NO/NC/pH PID selection	
	Resistance load	50mA (max) AC/DC 30V	
Data communication	RS485,modbus protocol		
Power supply	DC 24V±4V		

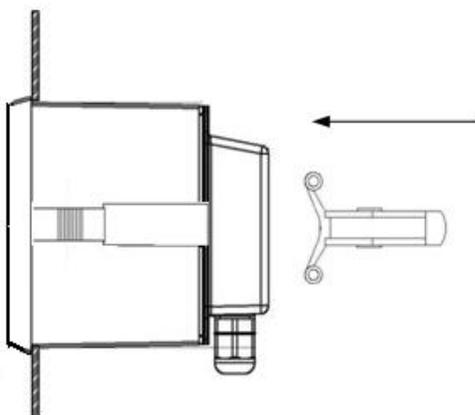
Consumption	<5.5W
Working environment	Temperature: (0~50) °C Relative Humidity : ≤85%RH(non- condensing)
Storage	Temperature : (-20~60)°C Relative Humidity: ≤85%RH(non- condensing)
Protection level	IP65 (with rear cover)
Outline dimension	96mm ×96 mm ×94mm (H×W×D)
Hole dimension	91mm×91mm
Installation	Panel.

II Installation

i Meter installation



1. Installed meter in position of the hole :91mm×91mm(H×W)
2. Fix the meter with one pair of clamp.

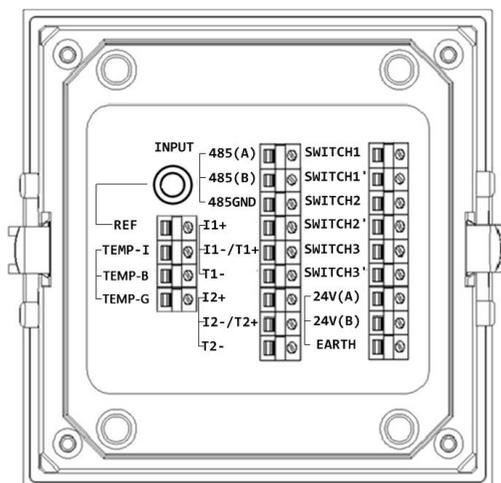


- When disassemble the meter, please take off the clamp slowly, at the same time, hold the meter carefully.



Please avoid installing in direct sunlight, because UV will damage LCD display screen sunlight.

ii Wire connection introduction



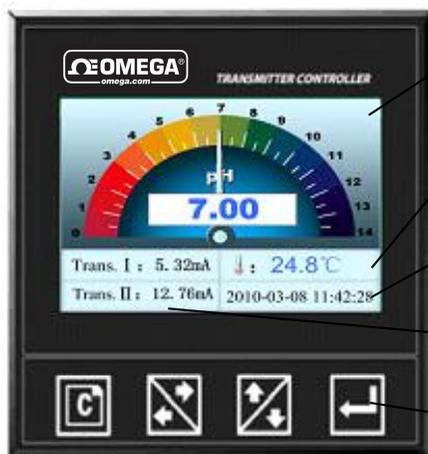
INPUT	Measuring electrode line of pH / ORP Sensor
REF	Reference electrode line of pH / ORP sensor
TEMP-I	White (Single color wire)
TEMP-B	RED/BLACK(Short to TEMP-G if 2-wire sensor)
TEMP-G	RED/BLACK
485A/485B/485GND	RS485 port
I1+/I1-	1st channel (4 ~ 20) mA instrument mode, instrument internal power supply
T1+/T1-	1st channel (4 ~ 20) mA transmitter mode, conditioning module external power supply.
I2+/I2-	2nd channel (4 ~ 20) mA instrument mode, instrument internal power supply
T2+/T2-	2nd channel (4 ~ 20) mA transmitter mode,

	conditioning module external power supply.
SWITCH1/ SWITCH1'	1st channel photoelectronic switch control contact/ Automatic polarity identification
SWITCH2/ SWITCH2'	2nd channel photoelectronic switch control contact / Automatic polarity identification
SWITCH3/ SWITCH3'	3rd channel photoelectronic switch control contact / Automatic polarity identification
24VA	Power input interface , connect with DC 24V , non-polarity.
24VB	
EARTH	Grounding

III Adjustment



Digital style



Virtual pointer style

Reading type and value

Temperature

Date

Trans.current

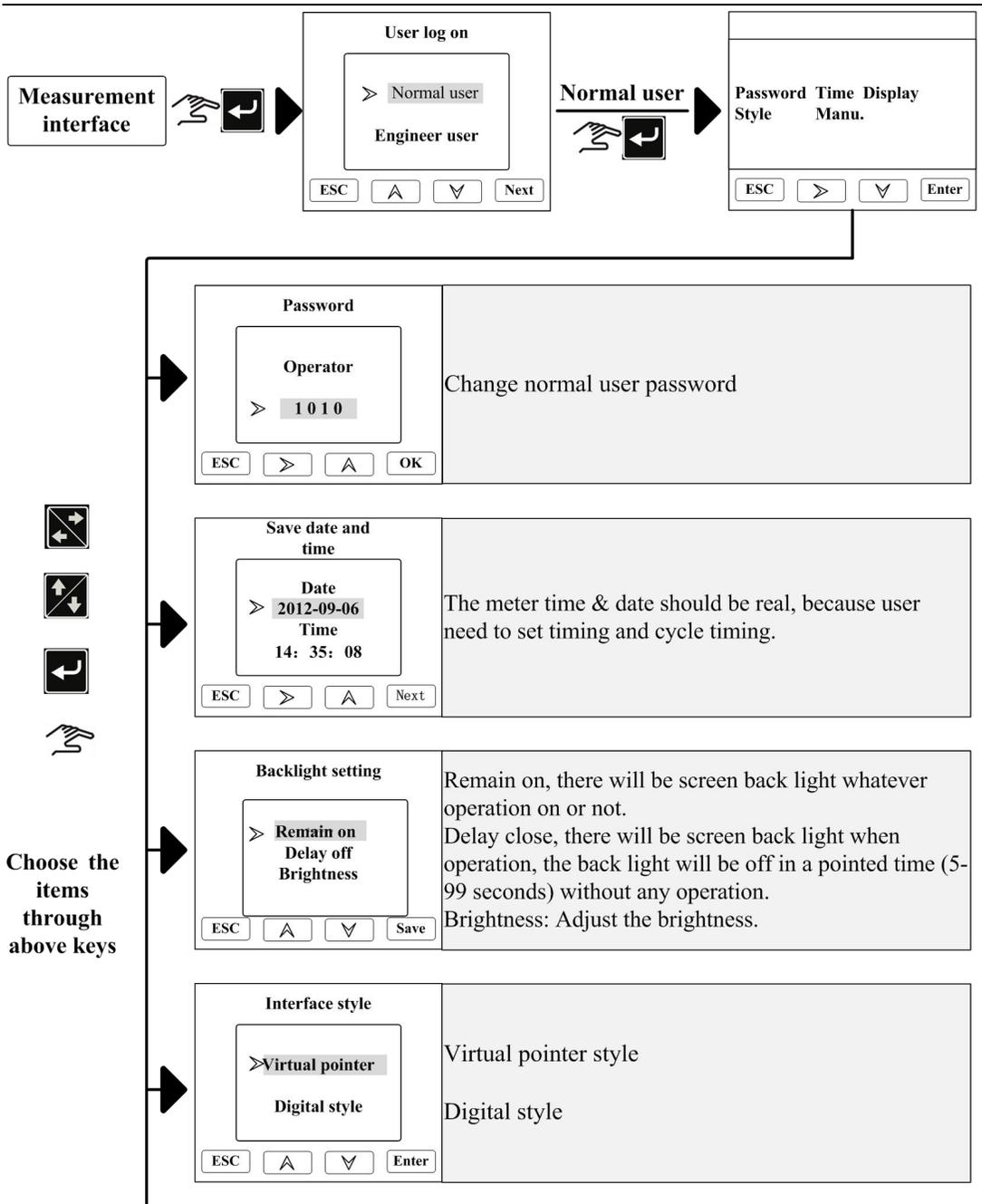
Keys

Key board introduction

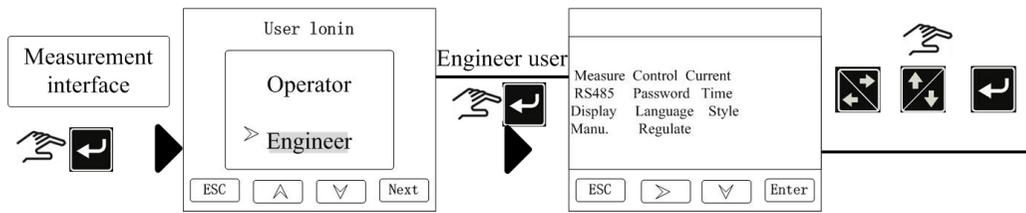
Key board	Name	Functions
	ESC	<ol style="list-style-type: none"> 1. Check parameter current corresponding setting under running. 2. Finish the appointed functions 3. Return to previous menu or main interface.
	SELECT	<ol style="list-style-type: none"> 1. Move cursor. 2. Under parameter setting, it's used for left or right selection.
	ADD	<ol style="list-style-type: none"> 1. Adjust the Number from 0 to 9. 2. Under parameter setting, it's used for up and down selection.
	ENTER	<ol style="list-style-type: none"> 1. Enter main menu. 2. Confirm the parameter, then enter next menu.

i Parameter setting

A. Normal user setting

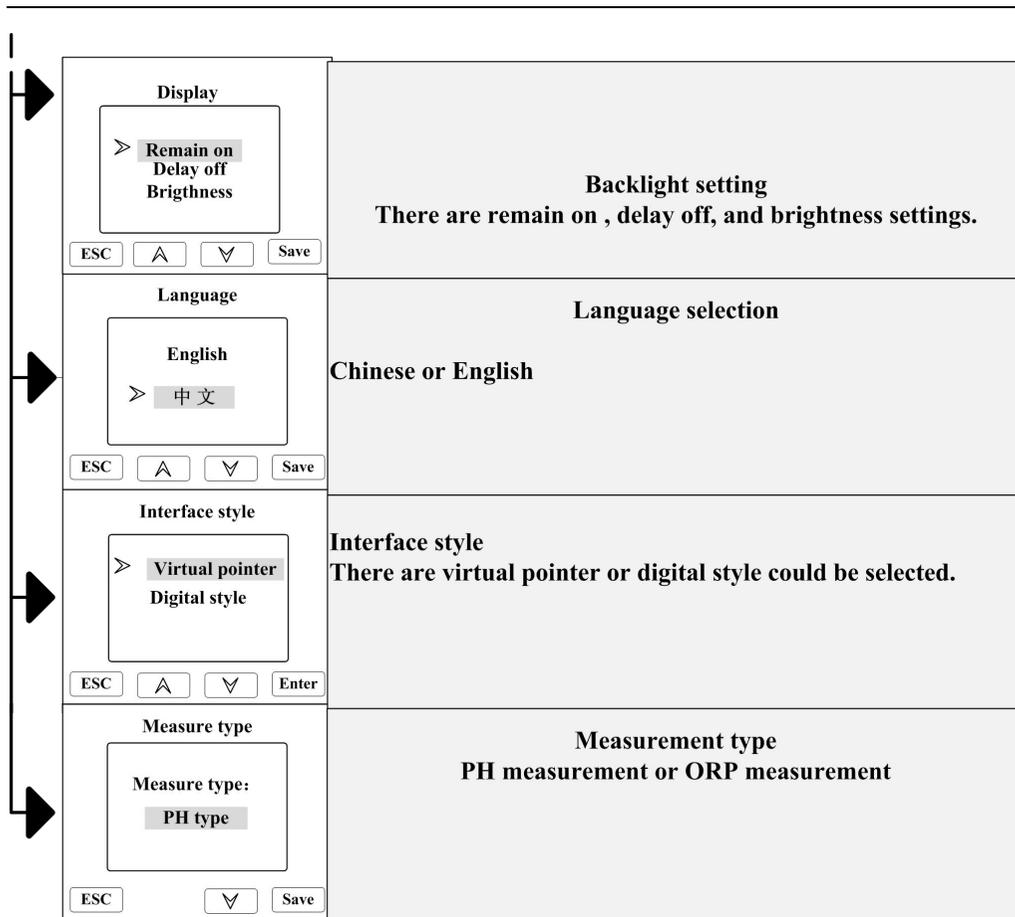


B. Engineering user



Press Up and down to select the item, then press Enter.

<p>Measure setup</p> <p>Search: calibrate line</p> <p>°C/°F selection Temp. compensation Filter constant Factory reset</p> <p>ESC ▲ ▼ Enter</p>	<p>Measurement parameter</p> <p>Buffer solution calibration: ONLINE , of OFF LINE calibration °C/°F selection: temperature units selection Temperature compensation: automatic or manual temperature compensation Filter depth: adjust the filter depth to make the parameter accurate. Factory reset: restore the parameters if incorrect operation or data</p>
<p>Control parameter</p> <p>> 1.Switch I setting 2.Switch II setting 3.Switch III setting</p> <p>ESC ▲ ▼ Enter</p>	<p>Control parameter</p> <p>Triple channels photoelectronic switch should with the same parameter setting. The switches could control the output of parameters. Configuration pH/ORP/ temperature NO, NC high low limit alarm. Under PH measurement , there are PID adjustment control,cycle timing, reserve time functions (There is no PID function for ORP measurement)</p>
<p>Trans. channel select</p> <p>> Trans I config Trans. II config</p> <p>ESC ▲ ▼ Enter</p>	<p>Transmitting parameter.</p> <p>Double channels transmitting parameter setting which could configure the parameter output.</p>
<p>RS485</p> <p>> Baud rate:9600 Address: 001</p> <p>ESC ▼ Next</p>	<p>Communication parameter.</p> <p>RS485 baud rate and address setting. Please find the protocol on Appendix.</p>
<p>Password</p> <p>> Operator 0000 Engineer</p> <p>ESC > ▲ Next</p>	<p>Password setting.</p> <p>Operator , engineer password settings.</p>
<p>Set date and time</p> <p>> Date 2012-09-07 Time 14: 46: 15</p> <p>ESC > ▲ Next</p>	<p>Date and time setting</p> <p>Set and modify the date and time</p>



⚠ System will go back to measurement interface automatically in case of no operation within three minutes in parameters check or parameters setting menu.

ii Measure and calibration

Calibrations

pH/ORP sensors are electrochemical and their sensitivity decreases with influence of time and medium. In order to get an accurate measurement, it is suggested to often calibrate sensor's slope. The calibration period relay on the influence from the measured medium.

1 Six points buffer solution pH(10.00/9.18/7.00/6.86/4.01/4.00) can be auto recognizable at calibration.

2. Two points slope calibration can be selected when used for acid or alkaline media for a long time.

3. Long time stored pH sensor must stay in KCl solution for 12 hrs before calibration.

Arise in diluted hydrochloric acid for two minutes is recommended at calibration for dry and sensitive glass bulb.

2. The indicator is furnished with off-line calibration with mV input to pH sensor. For details please refer to the instructions to Off-line Calibration.

A. Buffer Solution Calibration

1. According to the range, select the buffer stuff.

In pH measurement, enter the interface of pH On-line calibration as per instructions, input the present temperature of buffer solution and press  to enter the interface of buffer solution calibration.

Interface indicates pH calibration point option 10.00, press  button. Interface will indicate "put pH sensor in buffer solution 10.00 after cleaning". Press button  to skip this and enter the next sub menu.

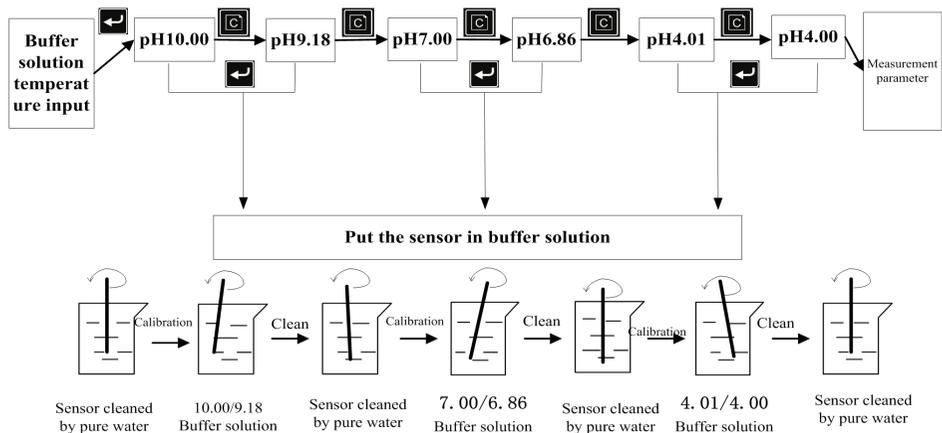
Place the cleaned sensor into the present buffer solution and press  button. Interface will display "sensor outputs mV", please press button  to save.

System will go into the next sub menu after calibration. In the mean time, place the cleaned sensor in the buffer solution indicated by the indicator and complete every calibration in turn.

"Please replace the sensor" will be displayed in the screen when there is something wrong with calibration. Please check whether the makeup of the buffer solution is correct or not and recalibrate.

The next calibration will not be done until the present calibration is made successfully.

The process of On-line calibration is shown as follows.



Note: Press Button  to skip and press button  to select or save.

B. Off-line calibration

When field calibration is not good to carry on, the calibration to sensor's slope by using lab devices and buffer solution is recommended. Take notes of corresponding mV value of buffer solution in room temperature. Input of this record value to off-line calibration is called as manual input calibration.

In pH measurement, enter the interface of pH Off-line calibration as per instructions, input the present temperature of buffer solution and press  to enter the interface of Off-line calibration.

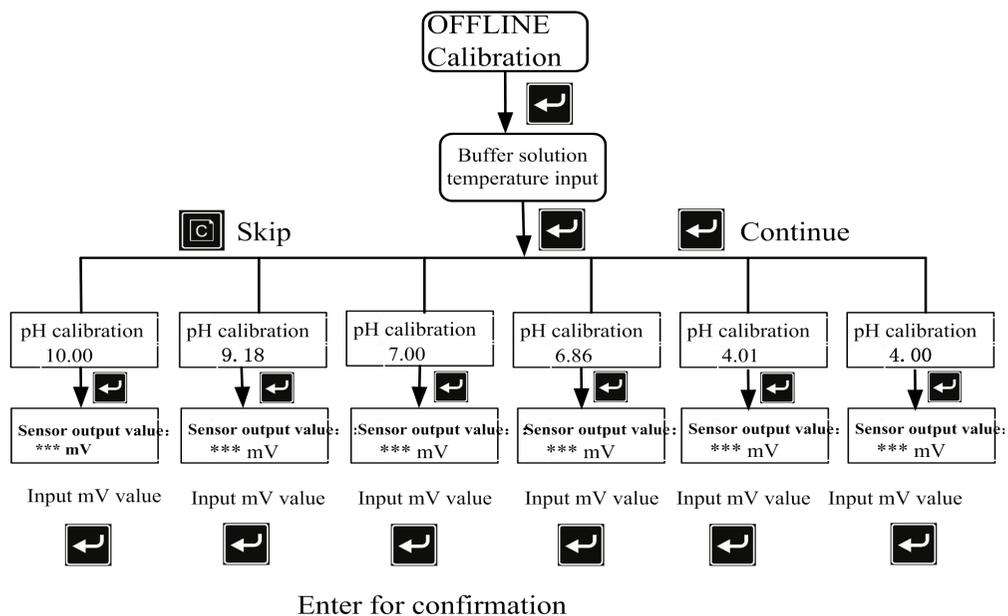
Interface indicates pH calibration point option 10.00, press button . Interface will indicate "sensor outputs mV value". Input corresponding mV to pH 10.00. Press button  to skip this and enter the next sub menu.

Input the corresponding mV value to pH10.00, press  to save and enter the next calibration menu.

"Pls replace the sensor" will be displayed in the screen when there is something

wrong with calibration. . Input corresponding mV value once again . The next calibration will not be done until the present calibration is made successfully.

The process of Off-line calibration is shown as follows.



C. Maintenance of sensors

To avoid a sensor drying out, the sensor should be kept in the protection cap with KCl solution in 3.0mol/L.

Timely clean the sensor and calibrate the same on the indicator.

If the sensor is dirty occur or coated , wash it with HCl or NaOH solution in 0.01mol/L and rinse with clean water.

If the above methods are unable to reset slope, it means that the sensor should be replaced.

The platinum surface of ORP sensor should be shining. If not, wash it with HCl

or NaOH solution in 0.01mol/L and rinse with distilled water.

If the surface of platinum is polluted and formed oxidation film, the platinum could be polished with sand paper and toothpaste, then clean it with distilled water

Place the sensor into 3.5 mol/L KCl solution for 6 hours before usage.

Buffer solution gets different values at different temperature so please confirm the temperature of buffer solution at calibration.

D. The usage of sensors

pH/ORP sensors are consumables .Long term storage is not suggested .

A replacement must be calibrated once again on the indicator .

Pls don't remove the protection cap when not in use.

Do not use sensors to measure any organic solution which will damage or dissolve them (Contact Omega for special electrodes).

High temperature humidity, strong electromagnetic , or flammable or combustible environments are no good for their storage and usage.

Trouble shooting

When the measurement is incorrect or unstable, pls consider the followings.

The problem is caused by indicator or sensor?

interference source is from indicator or sensor?

4-20mA is instrument mode or transmitting mode?

Ports are without wire connection:

mA Mode	Output port	Port voltage	Cable voltage
instrument mode	I+/I-	>12V DC	None
transmitting mode	T+/T-	None	DC24V

Common fault inspection and trouble shooting:

Problem	Possible causes	Trouble shooting
No display when powered on	A. Bad connection of power supply B. Instrument fault	A. check to see if there is 24V volts between power terminals 24VA and 24VB. B. Contact Omega
Unstable display	A. Improper wire connection of sensor B. Air bubbles on sensor	A. refer to the instruction manuals B. select the proper measurement point or change the location
Big deviation	A. indicator or sensor's fault B. setting problem	A Check whether there is installation problem. Changes are needed. B. Check the settings of parameters
High purity water measurement is on a low side	A. indicator or sensor's fault B. dead angle exists at the installation	A. Find out the source and take the steps. B Clean the sensor and change the installation position
Difference at transmitting data	A. instrument fault B. incorrect setting on PLC engineering value	A. Connect the DC ammeter with instrument to measure the loop current, check the displayed value of the instrument and judge the reason. B. Check the mA loop resistance and reset the receiving module migration

Complete Set

- Transmitting controller 1pc (including one pair of fast installation clamp/back cover)
- Instruction manual 1pc
- Temperature sensor 1pc (optional)

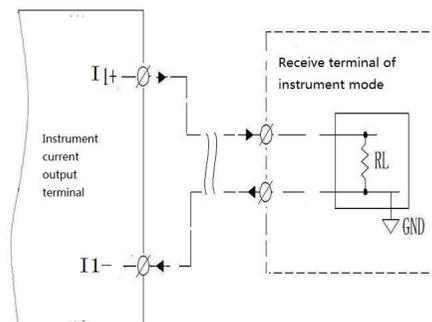
appendix I

RS485 communication protocol

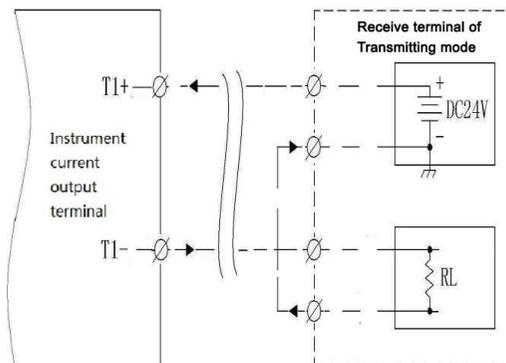
Set the Baud rate and address in the communication parameters setting menu .Keep the Baud rate and upper computer exactly same otherwise, it can not be connected to the computer.

appendix II

Build up signal collection and linkage control system through configurable two channels mA transmitting and three channels photoelectric relay .mA transmitting is divided into instrument mode and transmitting mode.



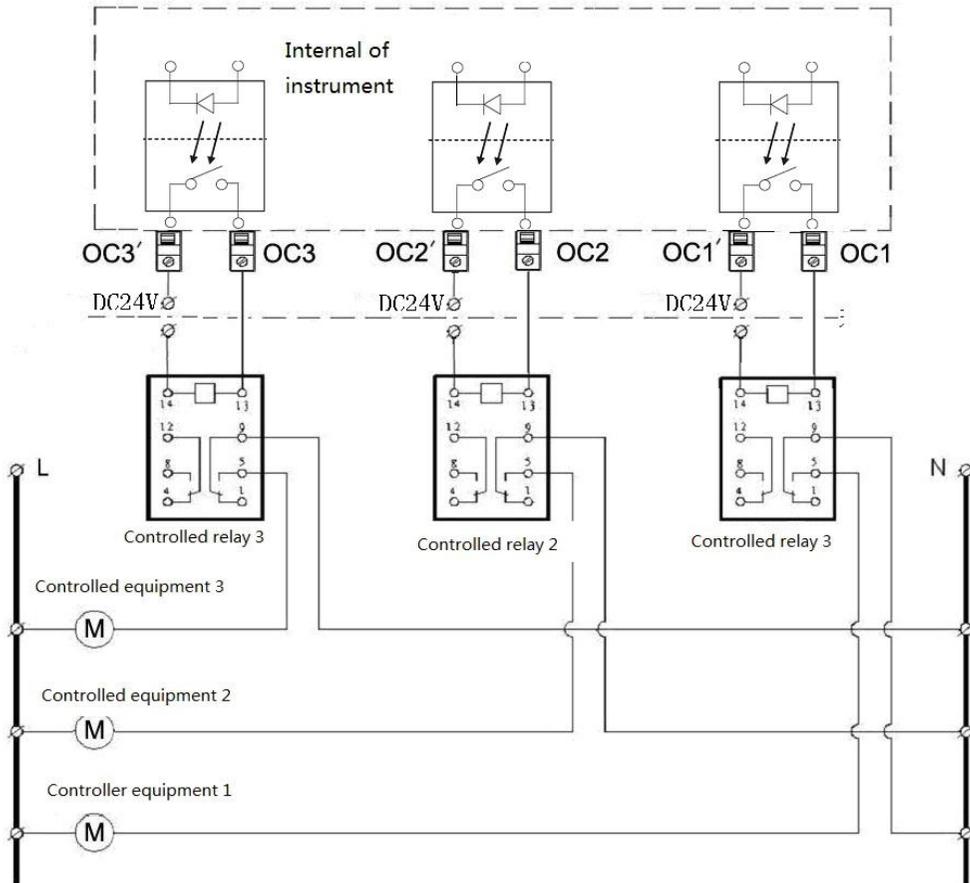
External connection in Instrument mode



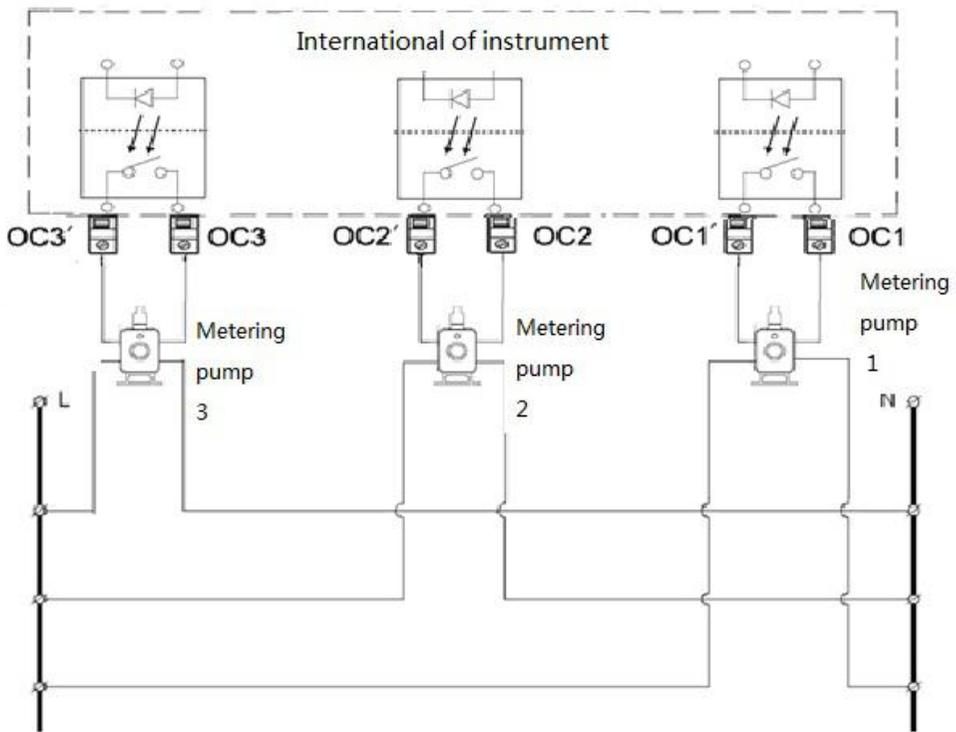
External connection in transmitting mode

Note: The connection of mA transmitting for the second channel is same as above

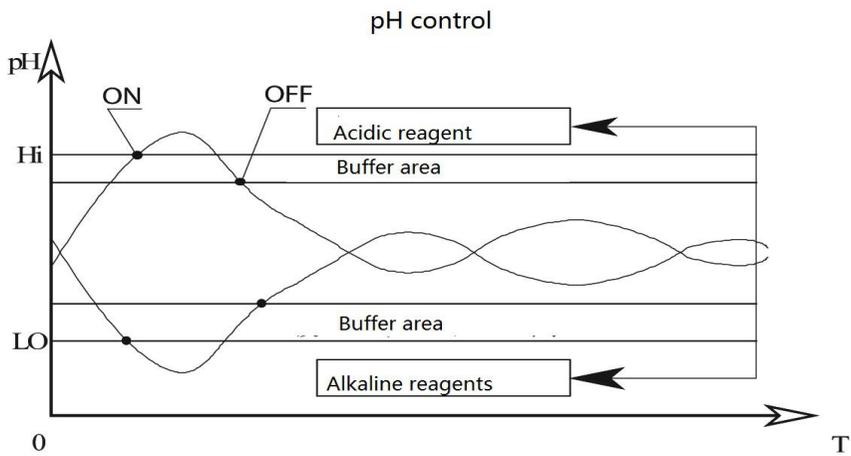
Photoelectric switch connection:



Driving high voltage or power load by using intermediate relay



Dosing pump controlled by Photoelectric switch



HIGH and LOW limit can control pH

omega.com®

Ω OMEGA®

OMEGAnet® Online Service
omega.com

Internet e-mail
info@omega.com

Servicing North America:

U.S.A.: OMEGA Engineering, Inc., One Omega Drive, P.O. Box 4047
ISO 9001 Certified Stamford, CT 06907-0047 USA
Toll-Free: 1-800-826-6342 TEL: (203) 359-1660
FAX: (203) 359-7700 e-mail: info@omega.com

Canada: 976 Bergar
Laval (Quebec), H7L 5A1 Canada
Toll-Free: 1-800-826-6342 TEL: (514) 856-6928
FAX: (514) 856-6886 e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada: Sales Service: 1-800-826-6342/1-800-TC-OMEGA®
Customer Service: 1-800-622-2378/1-800-622-BEST®
Engineering Service: 1-800-872-9436/1-800-USA-WHEN®

**Mexico/
Latin America** En Español: 001 (203) 359-7803 FAX: 001 (20) 359-7807
info@omega.com.mx e-mail: espanol@omega.com

Servicing Europe:

Benelux: Managed by the United Kingdom Office
Toll-Free: 0800 099 3344 TEL: +31 20 347 21 21
FAX: +31 20 643 46 43 e-mail: sales@omegashop.nl

Czech Republic: Frystatska 184
733 01 Karviná, Czech Republic
Toll-Free: 0800-1-66342 TEL: +420-59-6311899
FAX: +420-59-6311114 e-mail: info@omegashop.cz

France: Managed by the United Kingdom Office
Toll-Free: 0800 466 342 TEL: +33 (0) 161 37 29 00
FAX: +33 (0) 130 57 54 27 e-mail: sales@omega.fr

Germany/Austria: Daimlerstrasse 26
D-75392 Deckenpfronn, Germany
Toll-Free: 0800 6397678 TEL: +49 (0) 7056 9398-0
FAX: +49 (0) 7056 9398-29 e-mail: info@omega.de

United Kingdom: OMEGA Engineering Ltd.,
ISO 9001 Certified River Bend Technology Centre, Northbank
Irlam, Manchester M44 5BD United Kingdom
Toll-Free: 0800-488-488 TEL: +44 (0) 161 777-6611
FAX: +44 (0) 161 777-6622 e-mail: sales@omega.co.uk

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

**Where Do I Find Everything I Need for
Process Measurement and Control?
OMEGA...Of Course!
Shop online at omega.comSM**

TEMPERATURE

- ☑ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- ☑ Transducers & Strain Gages
- ☑ Load Cells & Pressure Gages
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

FLOW/LEVEL

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

pH/CONDUCTIVITY

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Data Logging Systems
- ☑ Recorders, Printers & Plotters

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

**ENVIRONMENTAL
MONITORING AND CONTROL**

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

M5572/0516