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USER MANUAL



PH3000

pH TRANSMITTER

2-wire 4-20MA



TO MEASURE  TO KNOW



pH Scale : 0 ÷ 14.00 pH
Temperature Scale : -10.0 ÷ +120.0 °C
Power Supply : 10/30 Vdc

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1 GENERAL

This manual applies to the PH3630 digital 2-wire transmitter DIN RAIL housing.

It explains the purpose of the equipment, describes the components of the system and the procedures for installing, operating and calibrating the equipment.

Some maintenance suggestions are also provided.

2 FUNCTIONAL DESCRIPTION

This transmitter, when connected to the pH electrode, provides a digital readout of the pH of aqueous solutions.

The transmitter will perform manual or automatic temperature compensation to correct pH readings for temperature related variations. Temperature information is displayed by pushing button "2" marked "TEMP".

The transmitter provides an isolated 4/20 mA output, proportional to the pH value which is suitable for data acquisition systems, recorders, controllers or other input devices that require a 4/20 mA input.

The front panel contains trimmer pots for Zero and Slope adjustments. "Zero" is adjusted with trimmer "3" marked "ZERO" and "Slope" is adjusted with trimmer "4" marked "SENS".

The unit is protected against power supply inversion.

3 PHYSICAL DESCRIPTION

The transmitter enclosure is designed for DIN rail mounting.

It consists of a plastic case with front panel which is coated by a polycarbonate membrane to ensure maximum anti-corrosion characteristics.

For field applications mounting in a splash proof or weather resistant box is suggested.

Connections to power supply, loads, recorder, RTD, electrodes and probe are installed onto the terminal block connector.



4 GENERAL WARNINGS AND INFORMATION FOR ALL USERS

4.1 WARRANTY

This product is guaranteed for all manufacturing defects.

Please take a look at the terms and conditions described on the Warranty certificate at the end of the manual.

4.2 AFTER SALES SERVICE

Nieuwkoop B.V./B&C offers to all of its Customers the following services:

- a free of charge technical assistance over the phone for problems regarding installation, calibration and regular maintenance;
- a repairing service in our Aalsmeer (Netherlands) headquarter for all types of damages, Calibration or for a scheduled maintenance.

Please take a look at the technical support data sheet at the end of the manual for more details.

4.3 CE MARKING

This instrument is manufactured according to the following European Community directives:

- 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment"
- 2014/30/EU "Electromagnetic compatibility" EMC
- EN 61326-2-3/2013 "Electromagnetic compatibility" EMC
 - Controlled electromagnetic environment
- EN 55011/2009 "Radio-frequency disturbance characteristics"
 - Class A (devices for usage in all establishment other than domestic)
 - Group 1 (Industrial equipment that do not exceed 9kHz)

The marking  is placed on the packaging and on the S/N label of the instrument.

4.4 SAFETY WARNINGS

It is important to underline the fact that electronic instruments are subject to accidents. For this, it is important to take all necessary precautions to avoid damages caused by malfunctions.

All types of operations must be performed by authorized and trained staff.

The use of this controller must respect the parameters described in chapter "Technical specification", so to avoid potential damages and a reduction of its operating life.



5 SPECIFICATIONS

Display	LCD
Input	pH electrode RTD Pt100 3 wires
Output	4/20 mA dc isolated
Scales	0.00/14.00 pH -10.0/120.0 °C
Temperature compensation	manual or automatic
Zero	adjustable $\pm 15\%$
Sensitivity (Span)	adjustable from 86% to 112%
Input current	$< 2 \text{ pA}$
Input resistance	$> 10^{12} \Omega$
Operating temperature	0/50 °C
Operating humidity	95% without condensation
Power supply	10/30 VDC
Isolation	500 V input to output
Terminal block	detachable
Net Weight	200 g
Dimensions	105 x 95 x 58 mm (6 modules)
Mounting	DIN Rail



6 PHYSICAL INSTALLATION

The transmitter must be installed into an enclosure for outdoor or indoor use and may be located close to the measuring point or some distance away in a control area.

To ensure best operational performance, it is suggested that the transmitter be located within 30 feet of the electrode, and long cable runs be made with conventional coaxial electrode cable.

The transmitter's housing is designed for DIN Rail mounting.

The electrode's coax cable must be protected by a sheath and not installed near power cables.

Extension cables should be avoided. When necessary, always use only high insulation terminals.

When installing "in line" electrodes it is suggested to follow the specific instructions given by the sensor's manufacturer.



7 ELECTRICAL INSTALLATION

The electrical installation consists of:

- connecting the power supply to the transmitter;
- connecting the electrode or the probe to the transmitter;
- connecting the temperature sensor.

(See Fig. 3)

All connections within the transmitter are made on the terminal block.

7.1 CONNECTING THE POWER

- connect dc power "+" to terminal "1" marked "+".
- connect the terminal marked "-" to terminal "+" of the load.
- connect dc power "-" to terminal "-" of the load.

The unit is protected against eventual inverted connections.

WARNING: Verify the supply voltage prior to connection to the transmitter.

7.2 CONNECTING THE ELECTRODE (PROBE)

Electrode cabling is a critical part of the whole system.

- use a low noise coax cable on overall length between sensor and input terminals of the transmitter;
- low noise cable has, in general, a black conductive layer between the central conductor and the shield. Be sure this layer is removed;
- extension cables should be avoided. When necessary, always use only high insulation terminals;
- avoid installing cable near any power cables;
- connect the shield of the coax cable (reference electrode) to the terminal "11" marked "R";
- connect the central conductor (glass electrode) to the terminal "10" marked "V".



7.3 CONNECTING THE TEMPERATURE SENSOR

The model PH3630 features Automatic Temperature Compensation carried out by means of a RTD Pt100.

The Temperature sensor has to be installed in the same solution being measured, close to the electrode in-line or in the tank.

ATTENTION

In order to activate the ATC function, prior to connecting the RTD between terminal "4-5-6" marked "T1-T2-T3", it is necessary to remove the jumpers from terminals "3-4" and "5-6".

These jumpers must be reinstalled when operating the transmitter in Manual Temperature mode.

The RTD connection as above described will also provide a digital display of Temperature values. The sample Temperature value is displayed by pushing the Key pad "2" marked "Temp" on the front panel. The Temperature readout will not disrupt the measuring functions of the transmitter.

8 SYSTEM CHECKING

Before connecting the system to the power supply:

- check that all connections are installed correctly;
- check that all cables are properly fastened to prevent strain on the connections;
- check that all terminal-strip connections are mechanically and electrically solid.

9 OPERATING THE SYSTEM

9.1 PRE-OPERATION CHECK

The system's controls and indicators are all located on the front panel.

The transmitter LCD will be displayed to indicate that the unit is on.

Push the key pad "2" to check the sample temperature (if RTD is connected), or the manual temperature value (RTD not connected and jumpers installed).

The circuit boards of the unit are pre-adjusted at the factory.

If sensors and probes have been installed correctly as previously described, the system should operate correctly requiring only the electrode calibration.

WARNING: improper wiring connections which result in damage to the transmitter are not covered under warranty.



9.2 ELECTRICAL CALIBRATION

The following procedures can be used to verify that the pH transmitter is operating satisfactorily, and it can be repeated periodically to check that the transmitter is maintaining electrical calibration:

- connect a pH simulator to terminals "10 - 11" marked "V - R".
- simulate pH values over the entire scale.
- adjust "ZERO" and "SLOPE" with the trimmers located on the front panel.
- check the input insulation following the instruction of the simulator.
Input current must be lower than 2 pA.

9.3 CALIBRATING THE pH TRANSMITTER

All pH instruments manufactured by Nieuwkoop B.V./B&C are laboratory calibrated and verified using a standard pH electrode with a zero point at 7.00 pH. Slope is verified at 20°C.

Before using the electrode or calibrating, check that the electrode glass membrane has been stored wet.

If the protective cap is empty and the electrode is dry, immerse the electrode in a buffer solution or tap water (do not use distilled water) for three hours before operating.

See general instructions provided by the electrode manufacturer for further details.

Buffer solutions pH with a pH value of 4 - 7 - 9 are available to calibrate the transmitter.

Immerse the electrode in the buffer solution pH-7 and adjust the trimmer marked "ZERO". Immerse the electrode in the buffer solution pH-4 or pH-9 and adjust the trimmer marked "SENS".

If automatic temperature compensation is to be used, the RTD must also be immersed into the buffer solutions. Allow the RTD to reach thermal equilibrium before adjusting the "ZERO" and "SENS" trimmers.

Check the calibration periodically.



10 NORMAL OPERATION

As solution passes the installed electrode, the display will indicate instantly the pH value of the solution currently being measured.

10.1 MANUAL TEMPERATURE COMPENSATION

The manual temperature compensation is available when the RTD Pt100 is not installed.

- install the jumpers between "3 - 4" and "5 - 6".
- push the key pad "2" on the front panel (fig. 1) and adjust the trimmer "R5" marked "T MAN" to indicate the desired temperature value on the display (fig.3).



11 PREVENTIVE MAINTENANCE

11.1 TRANSMITTER

Quality components have been used to ensure a high level of reliability.

Frequency of maintenance or recalibration is variable based on each particular application.

As with any electronic device, the mechanical components, such as potentiometers and connectors, are the most probable sources of potential problems.

- check for damage of the electrolyte capacitors if the transmitter is exposed to temperatures above 60 °C.
- check for damage in all the electronic components if the transmitter is subjected to excessive voltage or powers surges.
- check for damage of the electronic and mechanical components if the meter is dropped.
- repeat the pre-operation check periodically to ensure proper operation.
- check that all the connections are free from moisture and contamination such as rust and corrosion.

WARNING:

Disconnect the power supply to the monitor before performing the following procedures:

- Inspect the printed circuit boards for dirt and corrosion; clean as necessary and blow dry.
 - Tighten all the terminal-board connections and mounting hardware.
-

11.2 SENSOR

Coatings on the pH electrodes glass measuring surface can affect operation.

Solutions which are high in alkaline content (above 10 pH) and or solutions which contain slurries, oils, grease etc., will require regular cleaning and inspection of the electrode's glass measuring surface.

Suggested methods for cleaning the electrode include chemical cleaning (except hydrofluoric acid) and non-abrasive detergent washing.

Also ultrasonic methods may be used.



12 TROUBLESHOOTING GUIDE

Symptoms	Probable cause	Remedy
LCD not displayed	power source problem; incorrect power wiring	check power supply check wiring
Display reading too high/low	electrode failure; meter uncalibrated	clean sensor calibrate with buffers
Display reading does not change	electrode damage; short circuit	electrode replacement check cable
Slope will not adjust	electrode damage; open temp. circuit	electrode replacement check ATC sensor/jumpers



FRONT PANEL

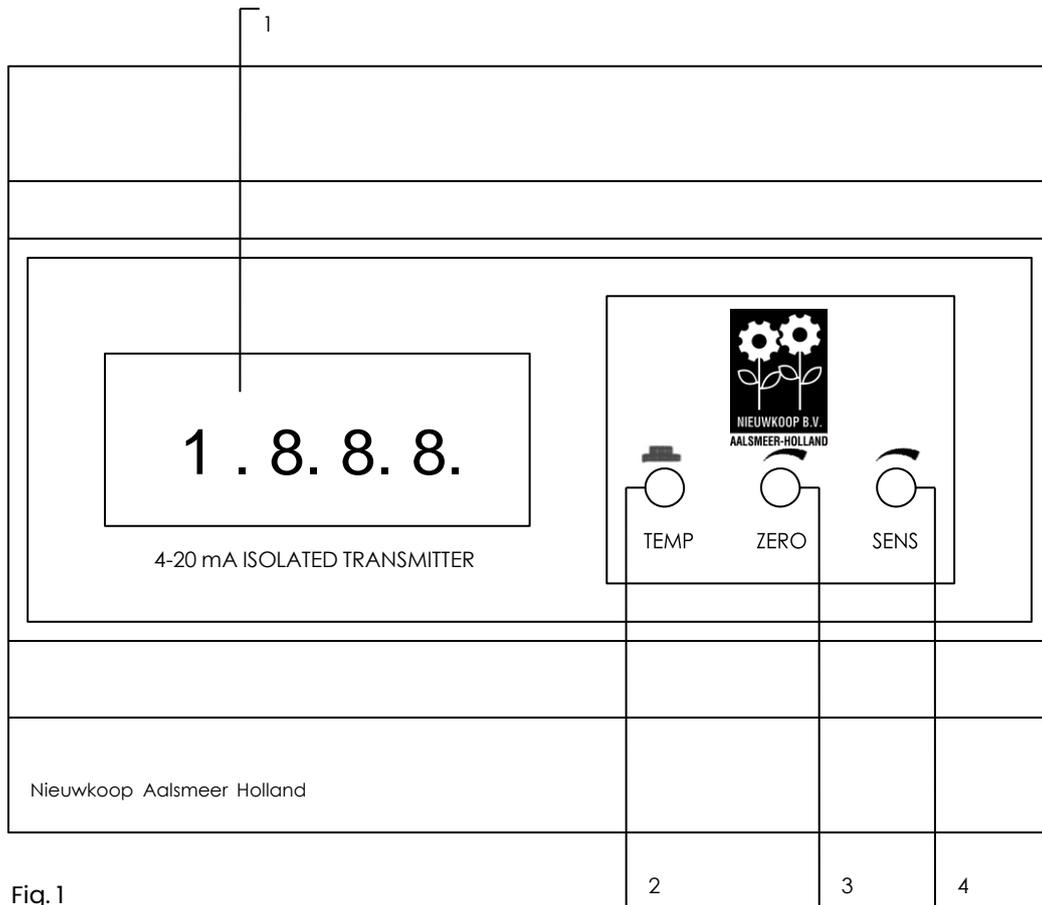


Fig.1

1. Display
2. Temperature display actuator
3. Zero calibration
4. Slope calibration



DIMENSIONS

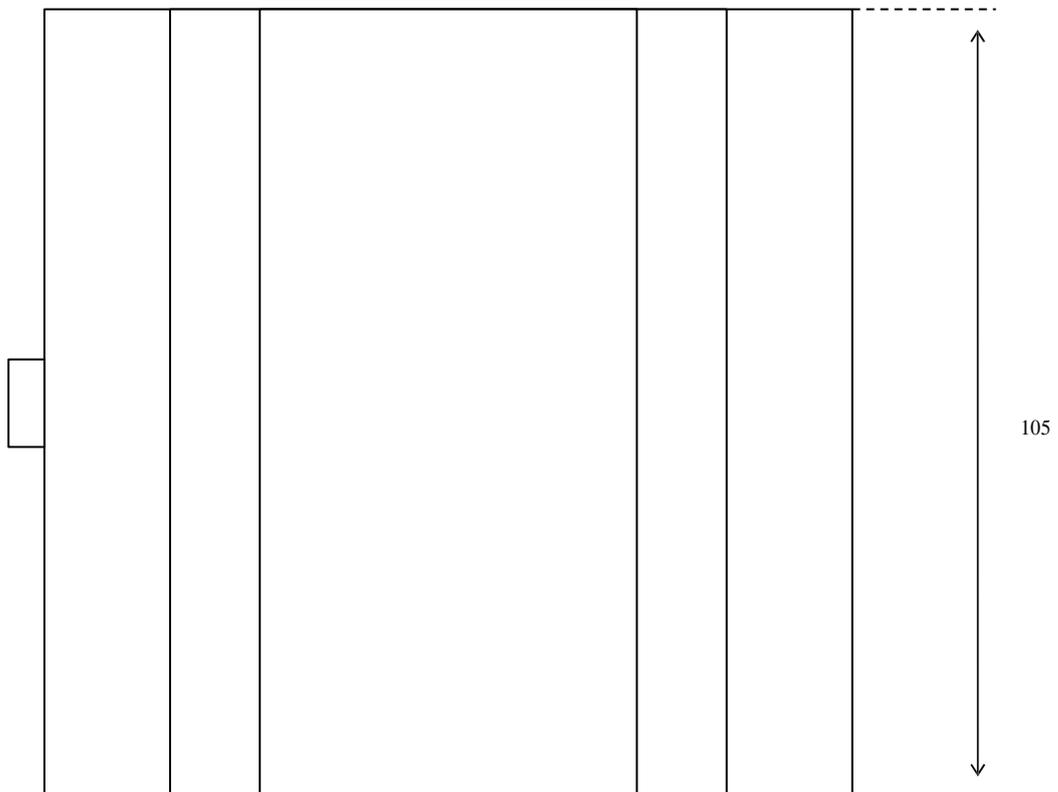
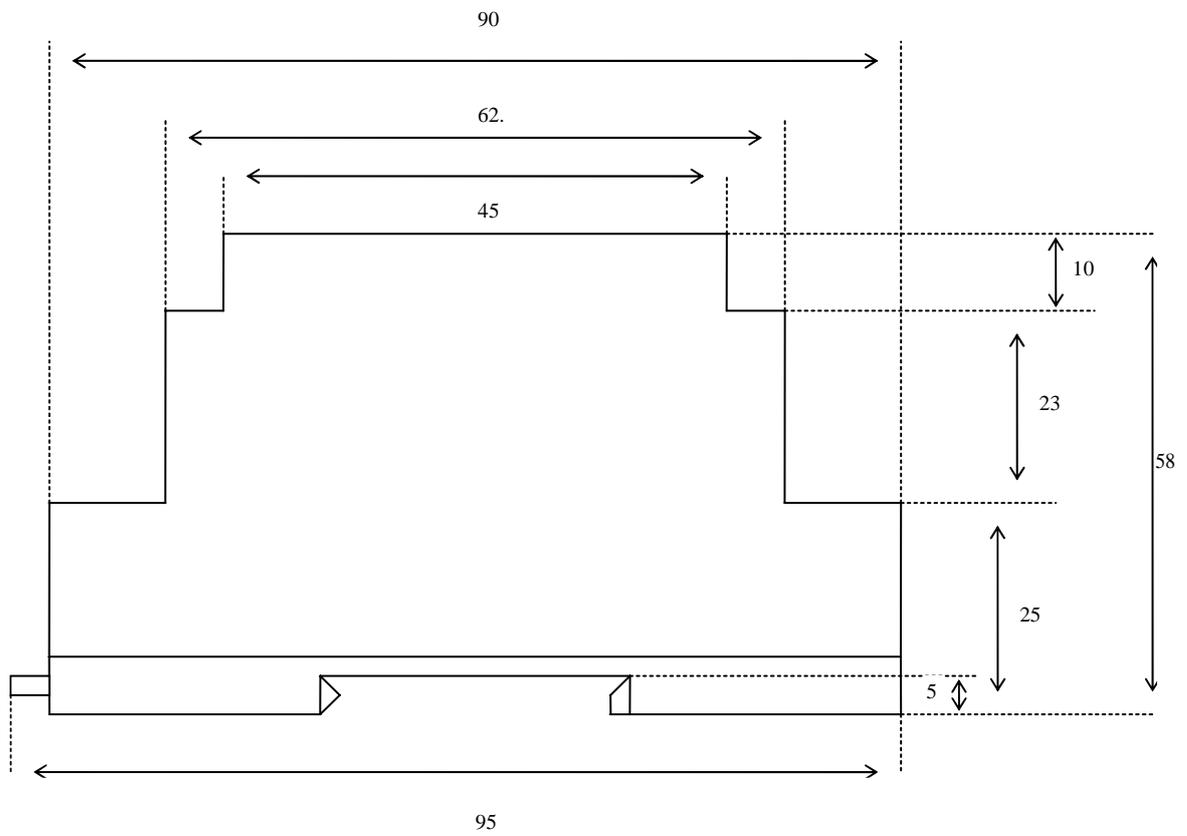


Fig. 2



REAR PANEL CONNECTIONS

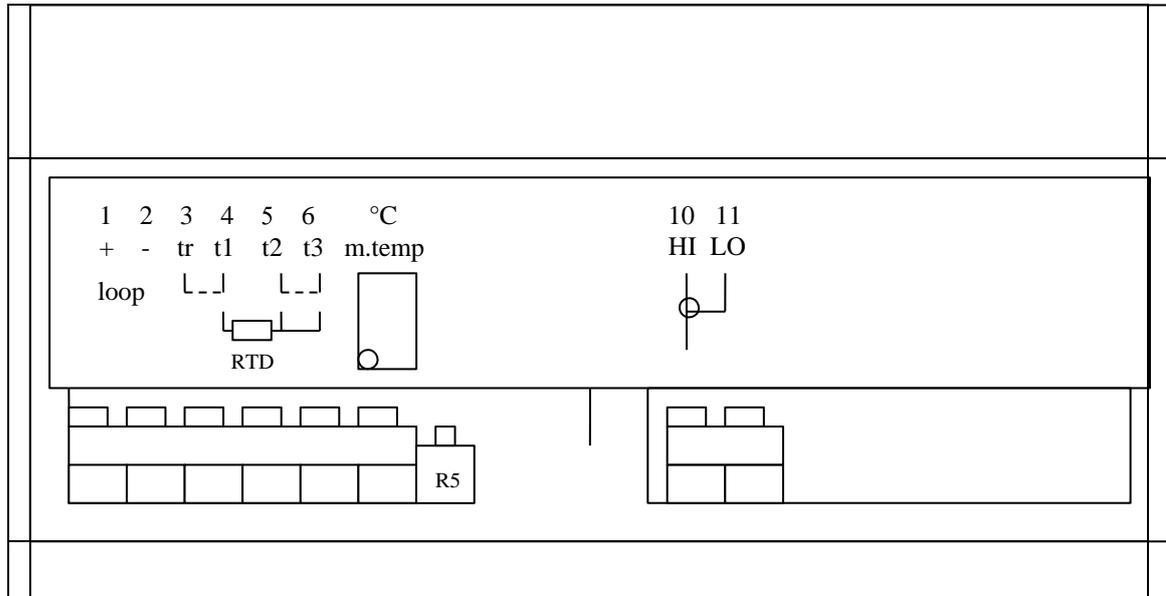
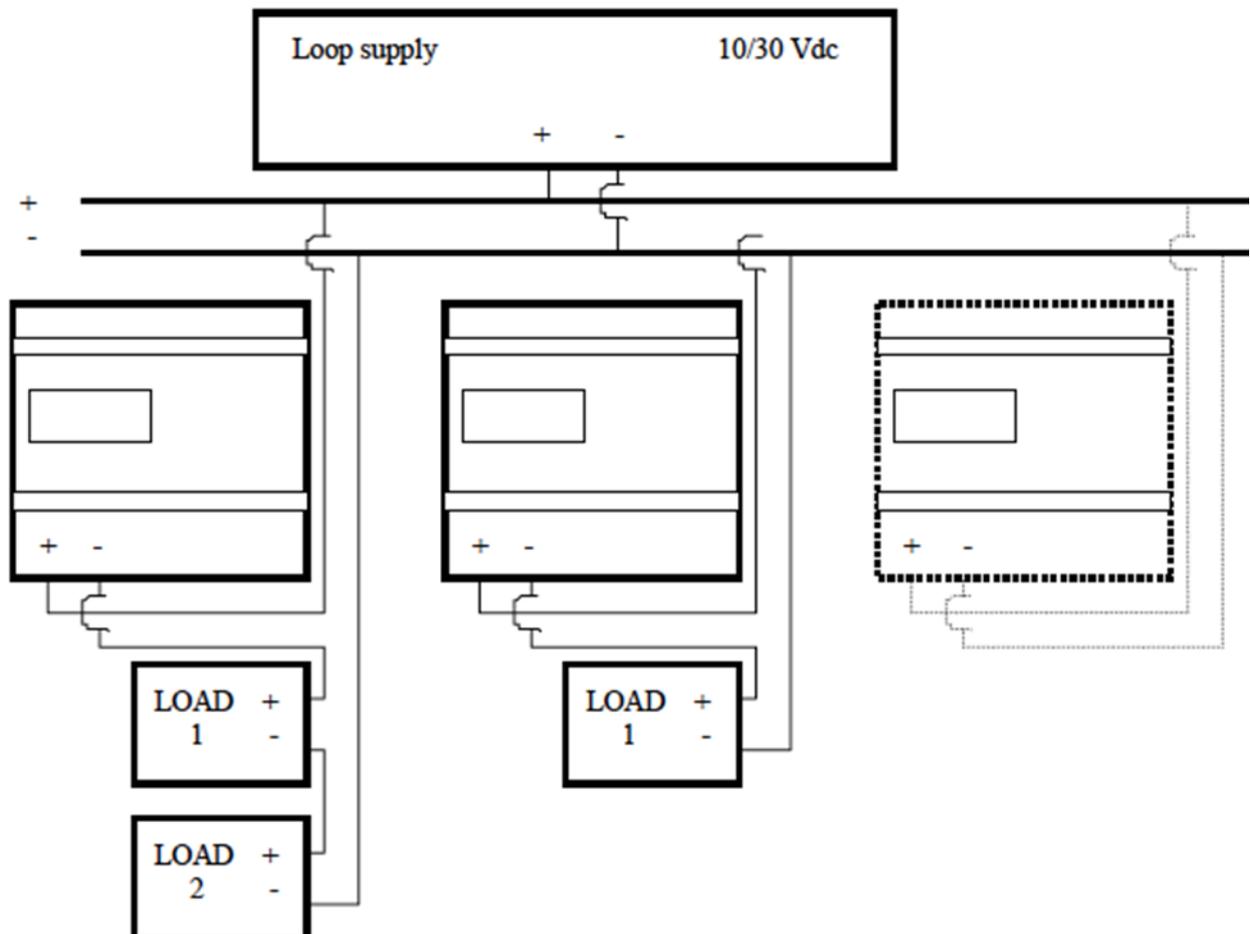
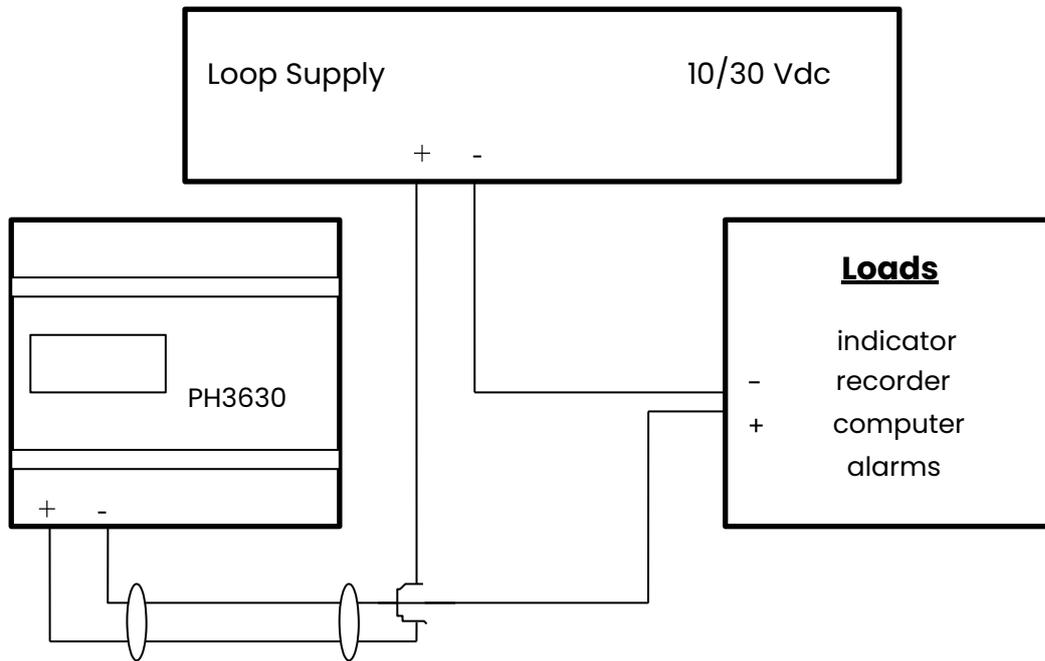


Fig. 3

- | | | |
|-----|----|--|
| 1. | | Loop supply (+ input) |
| 2. | | Loop supply (- input) |
| 3. | 4. | Manual temperature compensation jumper |
| 5. | 6. | Manual temperature compensation jumper |
| 4. | 5. | RTD input (A.T.C.) |
| 10. | | pH input (HI) |
| 11. | | Reference input (LO) |
| R5 | | Manual temperature control |



CONNECTION EXAMPLES





TO MEASURE  TO KNOW

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