µP-PID

PID Controller for pH, ORP, Conductivity, Oxygen, Turbidity, Chlorine, Chlorine Dioxide, Chlorites, Peracetic Acid, Ozone and other oxidising substances, Sulphites, Metabisulphites and other reducing substances

Microprocessor based PID controller, fully programmable, for the analysis and control of many physico-chemical parameters. Instrument configuration is easily performed via display and keyboard and calibration is automatic. Measure and temperature are indicated on a 5 digit red LED display. The instrument includes a galvanically isolated control output, 4÷20 mA or 0÷10 V, and 4 digital outputs (from relay); one of them can be used for digital control output, the other three DO can be configured as NC or NO via software and can be programmed as low alarm, high alarm, alarm with hysteresis or windows alarm. Two digital inputs are available, one for digital hold of the measure, and one for the input of an external alarm (e.g. level switch, temperature switch etc.) The instrument is optionally available with cleaning sequence included. Typical use of these instruments is for on line PID control of various physico-chemical parameters.

Advantages

- **Direct input from electrochemical sensors and pertinent temperature sensor**
- **Automatic thermo compensation of the measure via software through specific algorithms**
- **Display indication of both analysis and temperature values**
- **Flexible PID algorithm**
- **4÷20 mA or 0÷10 V control output, galvanically isolated**
- **Digital control output, time duration (PID on R1 relay)**
- **4 digital outputs from relay, programmable**
- **2 digital inputs, programmable**
- **Capability to drive sensor cleaning through a relay; programmable cleaning sequence**
- **Advanced self-diagnostic features; sensor diagnostic capability**
- **Suitable for panel mounting and for outdoor installation (IP 65 protection degree)**
- **Great flexibility, can measure many other parameters besides the ones listed above**
- **Easy to use: menus and functionalities are the same for all the analysers of the family**

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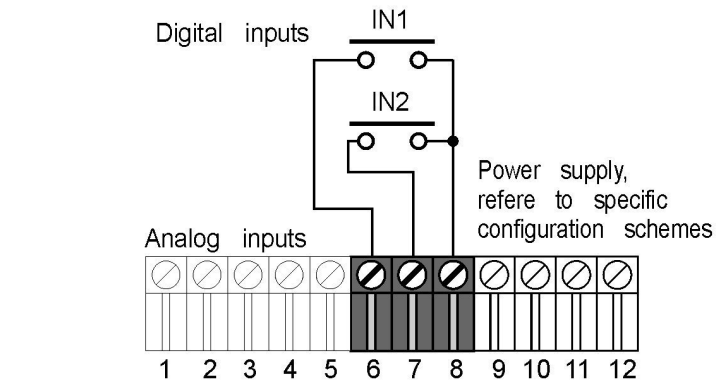
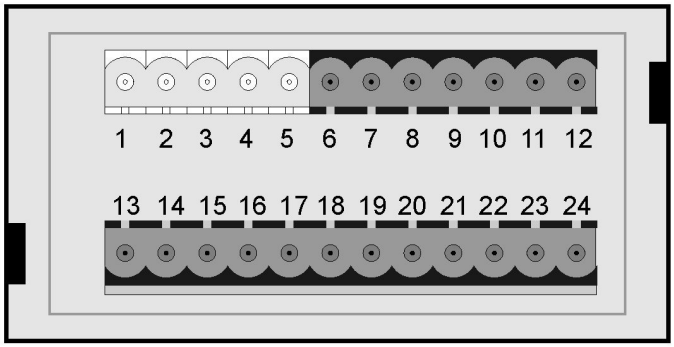
Operating principle and realization

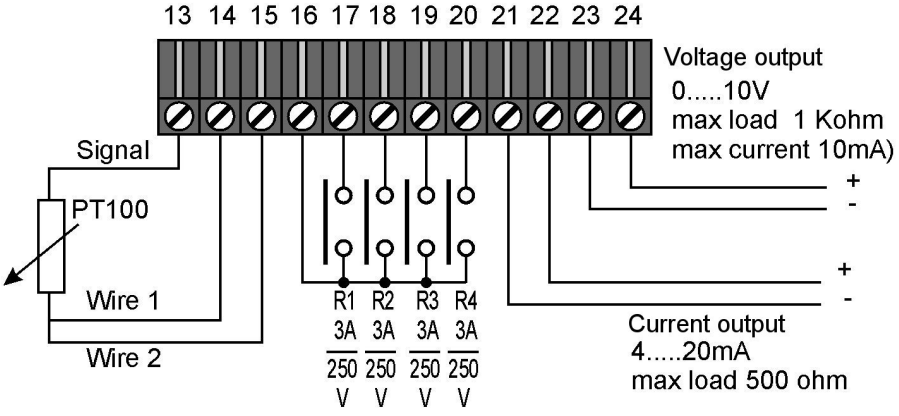
The Series μP includes microprocessor based PID controllers for the control of pH, ORP, Conductivity, Turbidity, Dissolved Oxygen, Oxygen in Air, Oxidising Substances (as Chlorine, Chlorine Dioxide, Chlorites, Ozone, Peracetic Acid, Permanganate, Bromine), Reducing Substances (as Metabisulphite, sulphite, sulphur anhydride etc.). It can be directly connected to the sensor of one of the a.m. parameters and to the pertinent temperature sensing element. The measure is compensated for temperature variations, displayed in engineering units and retransmitted on a 4÷20 mA or 0÷10 V analogue output that can be freely associated to any interval inside the measuring range (ONLY for control output on relay R1, otherwise the analogue output is used to drive the PID control action). The instrument provides 4 digital outputs that can be configured as NC or NO via software and can be programmed as low alarm, high alarm, alarm with hysteresis or windows alarm. The 4 digital outputs are from relays. If the control output is from relay R1 is used for PID control action. Two digital inputs are available, one for digital hold of the measure, and one for the input of an external alarm (e.g. level switch, temperature switch etc.). The instrument is optionally available with cleaning sequence included: in this version it can drive the chemical cleaning of the sensor through a specific algorithm, with programmable timers, driving the detergent pump through R4 relay.
The instrument is sturdy and compact and is available for outdoor mounting, included in an IP65 housing, for panel mounting included into a plastic case, 48 x 96 mm, IP 54 protection degree and for panel mounting included into a plastic case, 48 x 96 mm, IP 54 protection degree, c/w a transparent front cover.

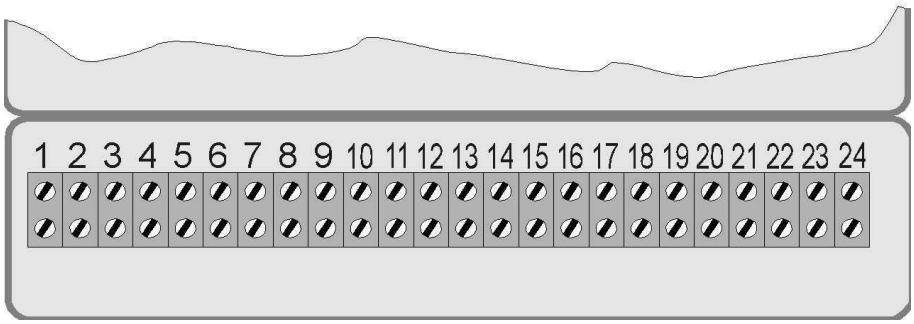
Installation, Maintenance and Calibration

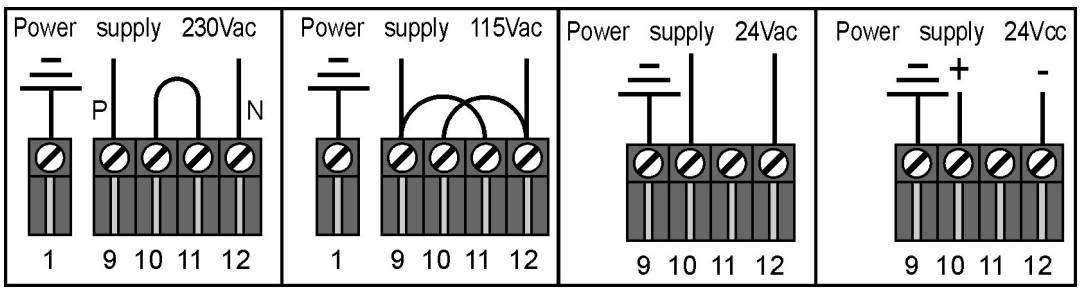
The instrument is supplied completely programmed according to customer specifications (if indicated in the order). Install the instrument and complete wirings according to instruction manuals, then power up and verify that the instrument configuration complies with process requirements. Now operate a calibration of the measuring chain.
The instrument does not require specific maintenance, it is only necessary to periodically check the calibration. The frequency of calibration check depends upon the kind of analysis operated and the process in which the instrument is installed.


Digital inputs
IN1
IN2
Power supply,
refere to specific
configuration schemes
Analog inputs
1 2 3 4 5 6 7 8 9 10 11 12


1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24


13 14 15 16 17 18 19 20 21 22 23 24
Voltage output
0.....10V
max load 1 Kohm
max current 10mA)
Signal
PT100
Wire 1
Wire 2
R1 3A 250 V
R2 3A 250 V
R3 3A 250 V
R4 3A 250 V
+
-
+
-
Current output
4.....20mA
max load 500 ohm


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24


Power supply 230Vac
P
N
1 9 10 11 12
Power supply 115Vac
1 9 10 11 12
Power supply 24Vac
9 10 11 12
Power supply 24Vcc
+
-
9 10 11 12

µP-PID

Technical Specifications

Housing Mod.µPxxRxxxAxxx(panel mtg):. Noryl, IP 54 protection, 48 x 96X100 mm. Inst.space: 45 x 92 mm
Housing Mod.µPxxRxxxBxxx (panel mtg), with transparent front cover:.....
.....Noryl, IP 54 protection, 48 x 96X100 mm. Inst.space: 45 x 92 mm; polycarbonate transparent front cover
Housing Mod.µPxxRxxxCxxx (outdoor install.):.....ABS, IP 65 prot.degree; dim. 175x2400x180 (wxhxd) mm
Input signal:.....from sensor: pH, ORP, Conductivity, Turbidity, D.O., Cl_2, ClO_2, PAA, $KMnO_4$, Br_2,
.....$S_2O_5^=$, SO_2, $SO_3^=$, or other and from pertinent temperature sensor, Pt100.
Input signal pc board:.....Mod.µPxxRxBxxxx: integral to sensor; Mod.µPxxTxAxxxx: integral to transmitter
Digital inputs: .....2, from NPN static contact or from voltage free contact,
.....max.voltage 18 V; max. closure current 4 mA;
.....In standard functionality mode: IN1 : Digital hold of reading (freezing);
.....IN2: alarm from external equipment (level switch, pressure switch, temperature switch etc.).
.....If present, the alarm is locally indicated through LED “WASH/AL” flashing
Display:.....red LED, h 12.5 mm, 5 digit and algebraic sign, programmable decimal point, selectable range
Digital outputs:.....4 alarm set points, output from relays, SP, 3A – 250 V, resistive load.
.....The alarms can be configured as low alarm, high alarm, window alarm, alarm with hysteresis.
.....Each set-point has programmable differential. R4 relay, in Mod.µPxxTxx2xxxx instruments,
.....including cleaning sequence, is used to drive detergent dosing pump for sensor chemical cleaning
.....If control action is on contact output (OUT = 0) relay R1 is used to drive the control.
Analogue output:.....4÷20 mA or 0÷10 V through pertinent connection to terminal board.
.....4÷20 mA: max.load 500 Ω;
.....0÷10 V: load resistance must be ≥ 1 kΩ, max.current 10 mA. Galvanic isolated outputs.
.....If control output is through relay (OUT = 0) or if it is disabled (OUT = 2)
.....output signal can be freely associated to any interval inside the measuring range.
Analog output accuracy and linearity:.....Accuracy: 0.01 %; Linearity: 0.0025 %
Measuring range (Where required, specify desired measuring range at order):

- pH and pH(Sb).....-1.00 ÷ +15.00 pH
- ORP.....- 2000 ÷+2000 mV
- Conductivity.....0.0÷20.0 / 0.0÷200.0 / 0.0÷2000.0 µS
  .....0.000÷20.000 / 0.00÷200.00 / 0.0÷2000.0 mS
- Turbidity.....0.0 ÷ 2000.0 NTU
- D.O:.....0.000÷20.000 ppm 0÷100% O_2
- O_2 in air:.....0÷100% / O_2 0÷21% O_2
- Chlorine and Oxidising Substances:.....0÷2000 ppb / 0.00÷10.00 ppm / 0.0÷2000.0 ppm
- Reducing substances:.....0.0÷2000 ppb / 0.00÷10.00 ppm / 0.0÷2000.0 ppm
- Other.....-99999 ÷ + 99999, with selectable decimal point.

Measure intervals associated to analogue output ONLY for OUT = 0 and OUT = 2) :

- pH and pH(Sb): .....freely selectable inside the limits -1.00 and +15.00 pH
- ORP: .....freely selectable inside the limits - 2000 and +2000 mV
- Conductivity:.....freely selectable inside selected measuring range
  .....(0.0÷20.0 / 0.0÷200.0 / 0.0÷20000.0 µS; 0.000÷20.000 / 0.00÷200.00 / 0.0÷2000.0 mS)
- Turbidity: ..... freely selectable inside the limits 0.0 and 2000.0 NTU
- D.O..... freely selectable inside the limits 0.00÷20.00 ppm 0÷100% O_2
- O_2 in air:.....freely selectable inside measuring range: 0÷100% / O_2 0÷21% O_2
- Cl_2 and Oxidizing Substances: freely select.inside meas.range (0÷2000 ppb, 0÷10 ppm, 0÷2000 ppm)
- Reducing Substances: . freely selectable inside meas.range (0÷2000 ppb, 0÷10 ppm or 0÷2000 ppm)
- Other:.....freely selectable inside the limits -99999 e + 99999

Integration (smoothing): .....programmable
Range of temperature compensation:.....-9.9°C to 99.9°C, 0.1°C resolution; -50°C to 300°C 1°C resolution
Power supply: .....Mod.µPxxR1xxxxxx : 24 Vac, ±10%, 50/60 Hz, maximum consumption 3.3 VA
.....Mod.µPxxR4xxxxxx : 24 Vdc, ±10%, 50/60 Hz, maximum consumption 3.3 VA
.....Mod.µPxxR2xxxxxx : 115/230 Vac, ±10%, 50/60 Hz, maximum consumption 3.3 VA
Data storage:..... E^2prom stores data also during power shut off

CE compliance:.....according to pertinent rules (93/68CEE – electromagnetic compatibility; low voltage)
Electrical classification:.....for safe area installation
Ambient temperature limits during operation:.....0 ÷ 50 °C
Storage temperature limits:.....0 ÷ 60 °C

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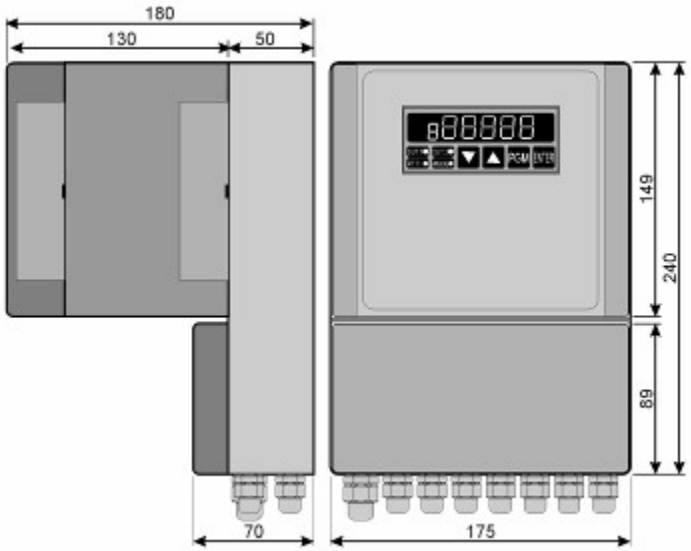
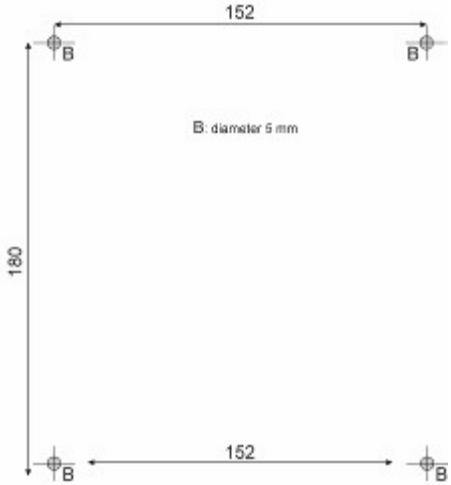
Controller setting:

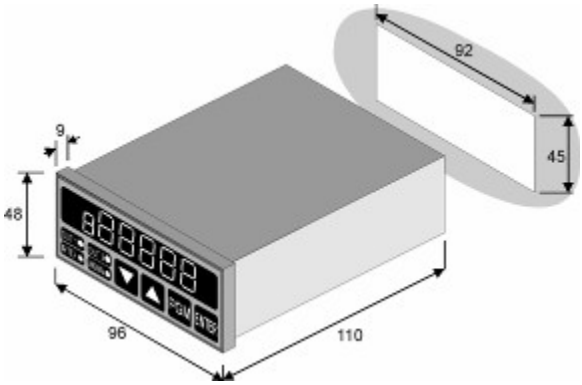
Digital control output (Relay R1) (OUT = 0) .....time proportional, (P or PID)
Analogue control output (OUT = 1).....selectable, 4÷20 mA or 0÷10 V
.....through the connections on the terminal board
Setting the controller control action:.....Proportional (P)
.....Proportional+Integral (P+I)
..... Proportional+Integral+Derivative (P+I+D)

Control parameters setting:

Proportional Band:.....0÷30%
Time for control action actuation (increasing output):.....0,1÷3000,0 sec
Time for control action actuation (decreasing output):.....0,1÷3000,0 sec
Cycle time relay 1 (only for OUT = 0).....0,1÷120 sec
Master Reset:.....-30%÷+30%
Integrative time:.....1÷1000 sec
Derivative time:.....1÷1000 sec
Direct/Reverse action:.....Direct or reverse
Lower limit for analogue output.....0%-LFS
Higher limit for analogue output.....LIS-100%
Lower limit for the set point (lower limit for control range).....-99999÷+99998
Higher limit for the set point (higher limit for control range).....SETIS÷+99999







µP-PID

Order code breakdown

	µP	xx	R	x	x	x	x	xx	x
Microprocessor based PID controller	µP								
Measured parameter									
pH		01							
pH with antimony electrode (Sb)		02							
ORP		03							
Conductivity		04							
Turbidity		05							
Dissolved Oxygen (cell Mod.332I, 332C, 332P)		06							
Dissolved Oxygen (cell Mod.332B)		21							
Oxygen in Air		66							
Chlorine		22							
Chlorine dioxide		23							
Ozone		24							
Peracetic acid		25							
Permanganate		26							
Bromine		27							
Oxidizing power		28							
Temperature		29							
Ion Selective Electrodes (ISE)		30							
Metabisulphites		33							
Hydrogen Peroxide		40							
Clorites		42							
Conductivity, toroidal cell		44							
Other		99							
PID Controller, fixed code			R						
Power Supply									
24 Vac 50/60 Hz				1					
24 Vdc				4					
115/230 Vac 50/60 Hz (Note 1)				5					
Cell constant of the conductivity cell to be connected									
Standard (for all instruments except uP04R)					A				
Code not in use					B				
Only for uP04R : cell constant K = 0,1 cm					C				
Only for uP04R: cell constant K = 1 cm					D				
Only for uP04R: cell constant K = 10 cm					E				
Only for uP04R: cell constant K = 100 cm					F				
Special execution					Z				
Cleaning sequence									
Not included						1			
Enabled						2			
Housing									
IP 54 for panel mounting							A		
IP 54 for panel mounting, c/w transparent front cover							B		
IP 65 hosing for outdoor installation							C		

Note 1: specify if required power supply is 115 VAC or 230 VAC at order.

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	µP	xx	R	x	x	x	x	xx	x
Measuring Range									
Reserved								0	
pH with glass electrode, pH differential electrodes		0-14 pH						10	
pH with Antimony electrodes		0-14 pH						11	
ORP		-2000 mV - + 2000 mV						20	
Dissolved Oxygen		NOT USED						31	
		0-20 ppm						32	
		0-100%						33	
Oxygen in air		(Note 2) 0-100%						34	
		(Note 3) 0-21%						35	
Conductivity		0-20 uS						41	
		0-200 uS						42	
		0-2000 uS						43	
		0-20 mS						44	
		0-200 mS						45	
		0-2000 mS						46	
Reducing Substances		0-2000 ppb						51	
		0-10 ppm						52	
		0-2000 ppm						53	
Oxidising Substances		0-2000 ppb						61	
		0-10 ppm						62	
		0-2000 ppm						63	
Turbidity		0-2 NTU						71	
		0-20 NTU						72	
		0-200 NTU						73	
		0-2000 NTU						74	
Temperature		-50°C - + 300°C						80	
Other								99	
Temperature compensation range									
-9.9°C to 99.9°C									A
-50°C to 300°C									B

Note 2: in the range 0-100 % O_2 the value 100% corresponds to the normal concentration of oxygen in air, that is 21% O_2 on the total of the other gasses that compose the air.

Note 3: in the range 0-21 % O_2 the value 21% corresponds to the normal concentration of oxygen in air, that is 21% O_2 on the total of the other gasses that compose the air.

Accessories included in the supply

Support for panel mounting (only for µPxxRxxxAxxx and µPxxRxxxBxxx).