HJM Electronics
Instrumentation for the Water-Treatment Industry
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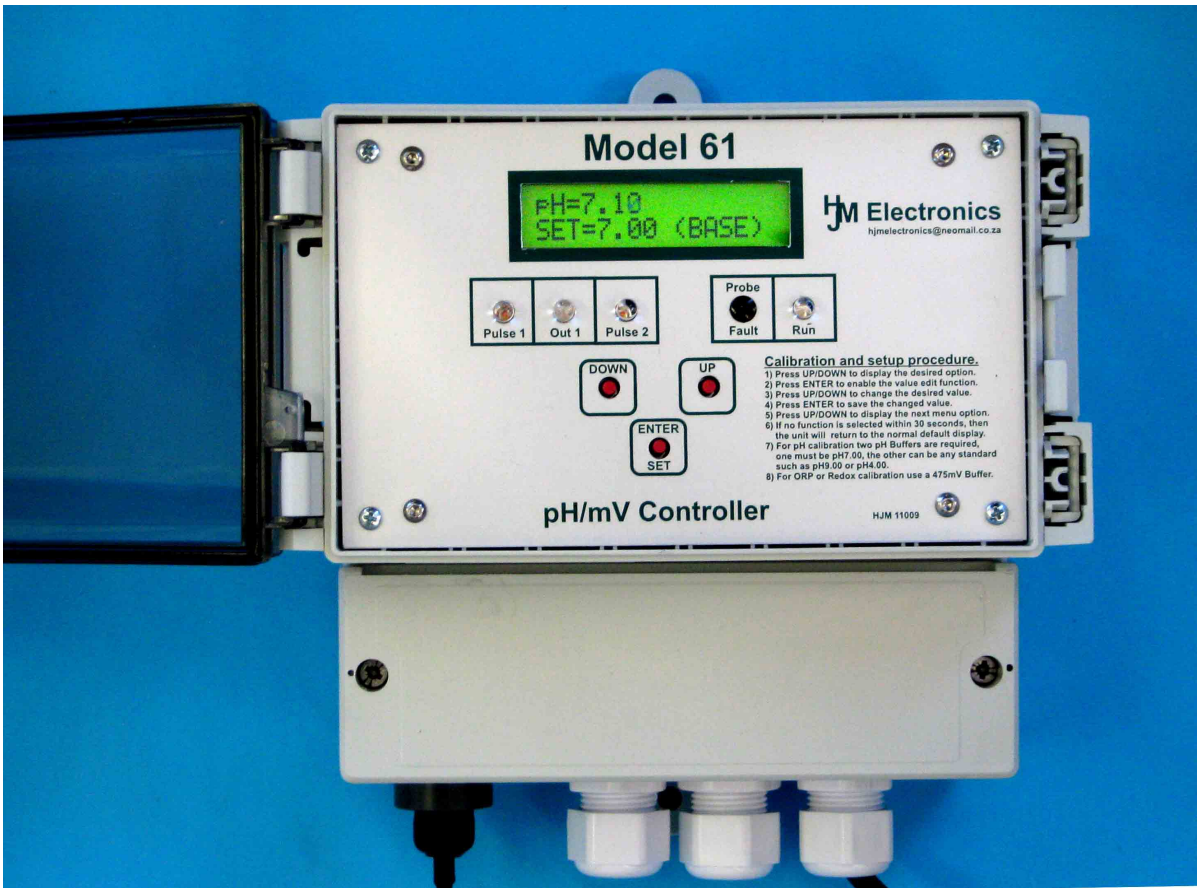
Model 61 pH CONTROLLER.



GENERAL DESCRIBTION.

The Model61 is a single-channel, micro-processor based pH controller.
The signal form the pH electrode is optically isolated before it is sent to the micro-processor behind the front panel. The micro-processor controls the all the output- as well as programming- and set-up functions.
This arrangement eliminates ground-loop and signal feed-back errors.
Three push-buttons on the front panel allow for the easy programming of the controller.
The pH reading and set-point are displayed on a LCD screen with a build-in backlight controlled by a light-sensor.
A proportional pulse output is supplied for the control of solenoid-driven dosing pumps. The maximum pulse rate can be set from 50-180 pulses/minute.
“OUT1” is a relay output that can be set as an “On/Off” output or as a “Proportional Time” output to control a motor driven dosing pump.
“ACID” is used to dose acid and works on a high going pH.
“BASE” is used to dose an alkaline product and works on a low going pH.

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STANDARD SPECIFICATIONS:

Power requirement:	200-240V, AC only.
Power consumption:	5 VA
Instrument fuse:	250mA
Output fuse:	5A
INTERLOCK:	Used for remotely switching controller on or off.
Range:	pH0 to pH14.
Resolution:	+/- 0.02pH
Accuracy:	+/- 0.1pH (After calibration).
Temperature Range:	0-80 Degrees Celsius. Manual compensation. Automatic option available (10K NTC thermistor).
Display:	2 x 16 characters LCD module with backlight. The backlight options are: "Always ON". "Always OFF" "Ambient".
µProcessor:	Microchip PIC18F4525.
Software:	Version HJM630 and up.
pH input:	BNC connector. Electrically isolated.
pH pre-amplifier:	PCB mount, epoxy encapsulated for moisture protection.
Pulse 1:	Proportional pulse output for dosing pump.
Maximum pulse rate:	50-180 pulses/minute adjustable
Pulse 1 light:	Yellow LED.
Out 1:	On/ Off or proportional time output. N/O relay contact, 5A into resistive load. Potential free or 220Vac Suppressed with 47 R and 0.033 µF. (Will supply 2,5mA current when the relay is off).
Out1 light:	Red LED.
Probe Fault light:	NOT USED.
RUN light:	Flashing green LED. Indicates that the µProcessor is running.
UP/DOWN buttons:	Used to select software options.
ENTER/Set button:	Used to set software options.
Enclosure:	Polycarbonate, light gray color with clear hinged lid. Protection: IP 545. Size: 184 x 160 x 140 mm. Mounting holes distance: 180mm.
Protection:	IP 65.
Size:	184 x 180 x 140 mm.
Front label:	Anodised aluminium, green on silver.
4-20mA output	Isolated. Range: 0-14 pH, Proportional to pH reading. Maximum load 600 Ohm. Accuracy: +- 0.05mA

STANDARD FACTORY DEFAULT SETTINGS:

Setpoint 1:	pH 7.00
Dosing:	Acid
Maximum Pulse Rate 1:	150 pulses/Minute Maximum.
Relay Output Function:	Proportional Time output.
Relay Period:	90 seconds
Relay minimum ON time:	15 seconds
Hysteresis:	0,5 pH
Pulse Maximum Range:	1 pH
Backlight:	Ambient

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INSTALLATION.

WALL MOUNTING.

The Model 61 controller can be mounted by using the 2 mounting brackets, or it can be mounted on a DIN rail using DIN rail clips (optional extra).

INSTALLATION.

Before installing the pH controller, a bit of thought has to be given to the position where the unit is to be installed.

AVOID: a) Splashing or dripping of liquids against the control panel.
b) Mounting the controller close to steam traps or hot water trenches.
c) Installation in highly corrosive environment, i.e. chlorine fumes or corrosive gasses and liquids.
d) Installation in places where strong mechanical vibrations are present.
e) Running pH probe cable next to other cables, motors, fans or generators.

DO: a) Install instrument under cover where possible.
b) Mount instrument in dry and clean position with easy access.
c) Run pH cable separately from other cables.
d) Install the instrument as close as possible to the probe.

1) Connect all outputs first.
2) Connect 220V supply to mains input terminals. This supply should be earth-leakage protected, and MUST include an earth wire. Under no circumstances must the instrument be connected to a two-wire supply only.

IMPORTANT NOTE:
Please ensure that the Mains input wires are connected to the correct terminals.
Failure to do so will render the fuse protection inoperative!

3) Connect the pH probe. REMOVE THE PROTECTIVE CAP.

ELECTRICAL CONNECTIONS.

All electrical installations are subject to municipal and government regulations and must be carried out by suitably qualified personnel only!

WARNING !

The Model 61 control system has NOT BEEN CERTIFIED AS INTRINSICALLY SAFE ! Therefore DO NOT INSTAL IN AN ENVIRONMENT WHERE FLAMMABLE OR EXPLOSIVE DUST OR GASSES ARE PRESENT.

IMPORTANT NOTES:

a) Please ensure that the Mains input wires are connected to the correct terminals.
Failure to do so will render the fuse protection inoperative!

b) **The relay-contact suppression network will supply 2,5mA current even when the relay is switched off!** This can prevent small loads such as small relays and neon lights from switching off. Should this happen, remove the 47 Ohm resistor or the "Suppresscraft" capacitor above the "OUTPUT" terminals.

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TERMINAL CONNECTIONS:

4-20 mA SIGNAL.

The isolated 4-20mA signal can be used as a recording signal.
It operates over a 0-14pH range.
8 **= -,** 4-20 mA output.
9 **= +,** 4-20 mA output.

OPTIONAL TEMPERATURE SENSOR (10K NTC):

6= 10K NTC.
7= 10K NTC.
Note: This option is only available if it has been enabled on manufacture and if the terminals have been fitted.
The automatic temperature compensation option is available using a 10K NTC thermistor.
This is a hard-wired option and has to be specified on order.

220V INPUT:

10 **= E** (Earth) input. (linked to 16 = E (Earth) output)
11 **= N** (Neutral) input. (linked to 17 = N (Neutral) output)
12 **= L** (Live) input.

ON/OFF SWITCH.

Used for remotely switching controller on or off. Must be linked if not used!
13 + 14 = ON/OFF SWITCH.

220V OUTPUT:

15 **= L** (Live) output.
16 **= E** (Earth) output. (linked to 10 = E (Earth) input)
17 **= N** (Neutral) output. (linked to 11 = N (Neutral) input)

OUT1 RELAY:

18 **= N/O,** Relay output (L2).
19 **= C,** Relay common (L1). Link to 15 for 220V output

PROPORTIONAL PULSE OUTPUT:

43 + 44 = Pulse1 relay output.

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OPERATING INSTRUCTIONS

PROBE CALIBRATION.

Note: The controller has been pre-calibrated with pH0, pH7 and pH14 signals generated with a pH test box. These settings are the based on the signals generated by the ideal pH probe at a temperature of 25 degrees Celsius.

1) Set the temperature of the buffer solutions:
To set the temperature of the buffer solutions, press the **UP/DOWN** buttons until the following screen appears:

TEMPERATURE Compensation=XX

Pressing **'SET'** moves you to the next setting screen.

SET TEMPERATURE Compensation= XX

'UP' and **'DOWN'** adjusts the temperature value..
Press **'SET'** again to accept the setting.

2) Calibrate with a pH7.00 buffer solutions:
With the probe in pH7.00 buffer press the **UP/DOWN** buttons until the following screen appears:

CALIBRATE pH7 pH= X.XX

Pressing **'SET'** moves you to the next setting screen.

SET Calib. pH7 pH7= X.XX XX %

'UP' and **'DOWN'** adjusts the pH7 value with the % change indicated.
Press **'SET'** again to accept the setting.

3) Calibrate with a pH4.00 buffer solutions:
With the probe in pH4.00 buffer press the **UP/DOWN** buttons until the following screen appears:

CALIBRATE pH4/10 pH= X.XX

Pressing **'SET'** moves you to the next setting screen.

SET Calib.pH4/10 pH4= X.XX XX %

'UP' and **'DOWN'** adjusts the pH4 value with the % change indicated.
Press **'SET'** again to accept the setting.

4)Set the operating temperature of the process liquid:
To set the temperature press the **UP/DOWN** buttons until the following screen appears:

TEMPERATURE Compensation=XX

Pressing **'SET'** moves you to the next setting screen.

SET Temperature Compensation= XX

'UP' and **'DOWN'** adjusts the temperature value..
Press **'SET'** again to accept the setting.

FUNCTIONS SETUP.

SETPOINT:

Press the **UP/DOWN** buttons until the following screen appears:

SETPOINT: pH= X.XX (ACID/BASE)

Pressing **'SET'** moves you to the next setting screen.

SET Setpoint pH= X.XX (ACID/BASE)

'UP' and **'DOWN'** adjusts the setpoint value.
Press **'SET'** again to accept the setting.

SELECT CONTROL:

Press the **UP/DOWN** buttons until the following screen appears:

SELECT CONTROL: ACID (Press SET)

Pressing **'SET'** toggles between **'ACID'** and **'BASE'** control mode.
Pressing **'DOWN'** advances to the next setting.

PULSE RATE:

Press the **UP/DOWN** buttons until the following screen appears:

MAX. PULSE RATE RATE= XX ppm

Pressing **'SET'** moves you to the next setting screen.

SET Max. Rate: RATE= XXX ppm

'UP' and **'DOWN'** adjusts the maximum rate value.
The setting range is 50 – 180 ppm.
Press **'SET'** again to accept the setting.

PULSE RANGE:

Press the **UP/DOWN** buttons until the following screen appears:

PROPORTIONAL PULSE MAX=X.XX

Pressing **'SET'** moves you to the next setting screen.

SET PROPORATIONAL PULSE MAX=X.XX

'UP' and **'DOWN'** adjusts the maximum rate value.
Range is 0.10 – 1.00 pH.
Press **'SET'** again to accept the setting.

HYSTERESIS:

Press the **UP/DOWN** buttons until the following screen appears:

HYSTERESIS pH HYST= X.XX

This is the OUT1 Output relay hysteresis value.
On ACID DOSING, the relay energizes at the SETPOINT and de-energizes at SETPOINT - HYSTERESIS.
On BASE DOSING, the relay energizes at the SETPOINT and de-energizes at SETPOINT + HYSTERESIS.
There is a 10 second delay.
Pressing **'SET'** moves you to the next setting screen.

SET Hysteresis pH HYST=X.XX

'UP' and **'DOWN'** adjusts the maximum rate value.
Range is 0.10 – 2.00 pH.
Press **'SET'** again to accept the setting.

RELAY FUNCTION:
Press the **UP/DOWN** buttons until the following screen appears:

RELAY FUNCTION: OFF/ON-OFF/Prop.Time

Pressing **'SET'** steps through the options:

OFF - off all the time
ON-OFF - relay is on/off at above/below the set point
Prop.Time - Pulse width modulated output at a period set as PERIOD with a minimum ON time of **'RELAY MIN ON TIME'.**

RELAY PERIOD: (only applies if 'Prop.Time' has been selected)
Press the **UP/DOWN** buttons until the following screen appears:

RELAY PERIOD PERIOD= XX Sec

Pressing **'SET'** moves you to the next setting screen.

SET Period: PERIOD= XX Sec

'UP' and **'DOWN'** adjusts the period value.
Range is 60 – 240 seconds.
Press **'SET'** again to accept the setting.

MINIMUM RELAY ON/OFF TIME: (only applies if 'Prop.Time' has been selected)
Press the **UP/DOWN** buttons until the following screen appears:

RELAY min ON/OFF TIME= XX Sec

Pressing **'SET'** moves you to the next setting screen.

SET Min. ON/OFF TIME= XX Sec

'UP' and **'DOWN'** adjusts the minimum on time value.
Range is 15-60 seconds.
Press **'SET'** again to accept the setting.

LCD BACKLIGHT:
Press the **UP/DOWN** buttons until the following screen appears:

LCD BACKLIGHT: AMBIENT/OFF/ON

Pressing **'SET'** steps through the options:
AMBIENT - the LCD backlight is turned on if the ambient light level drops too low.
OFF - always OFF
ON - always ON
Pressing **'DOWN'** advances to the next setting.

DEFAULT VALUES:
WARNING! THIS WILL RESET ALL SETTING TO FACTORY DEFAULT!
Press the **UP/DOWN** buttons until the following screen appears:

DEFAULT VALUES: PRESS SET (HOLD)

Press **'SET'** for 3 seconds to load the factory-set default values.

DEFAULT VALUES HOLDING .. X Sec

Hold the **'SET'** button in until the countdown is over.

PLEASE NOTE: Setting the default values will change ALL the settings to the factory-defaults!