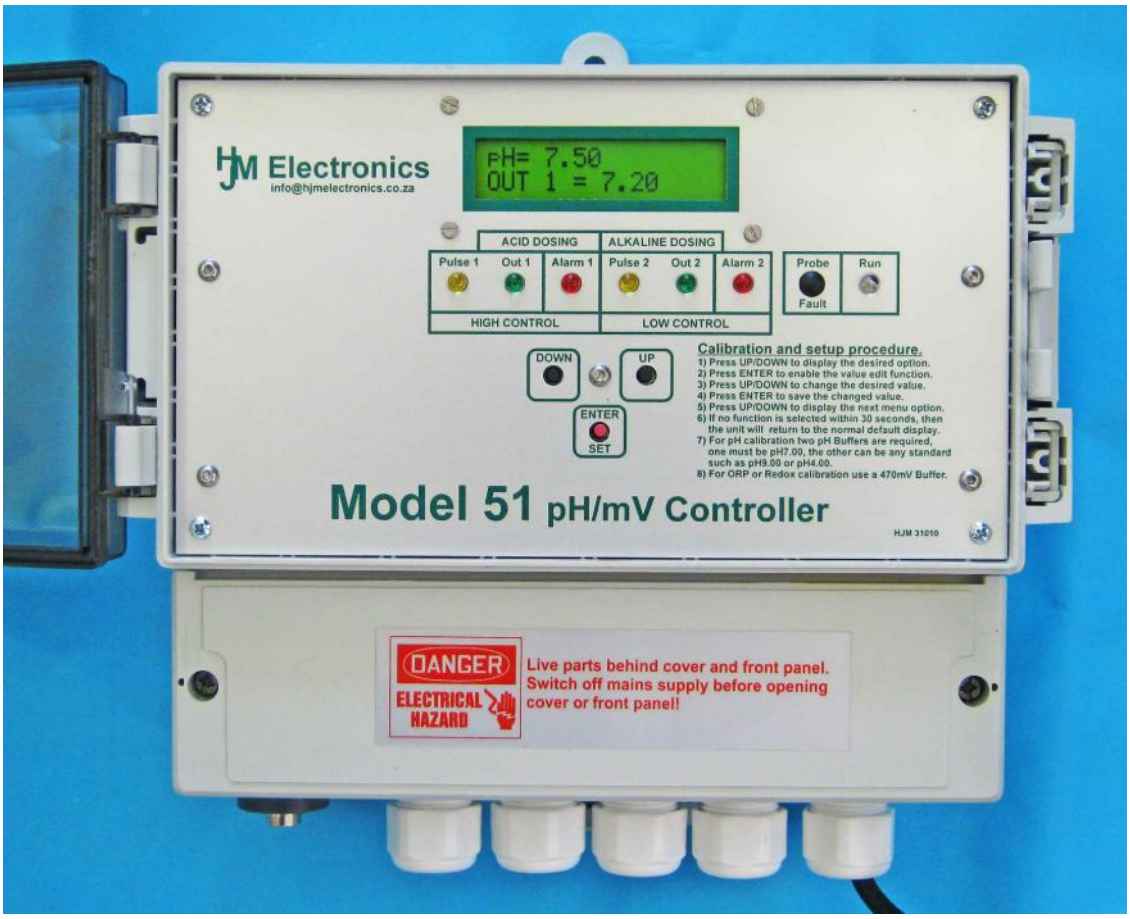
HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

Model 51 ORP (mV) CONTROLLER.



GENERAL DESCRIBTION.

The Model51 is a dual-channel, micro-processor based ORP controller.
The signal form the ORP electrode is optically isolated before it is sent to the micro-processor behind the front panel. This 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 ORP reading and set-points are displayed on a LCD screen with a build-in backlight.
“HIGH CONTROL” works on a high going ORP.
“LOW CONTROL” works on a low going ORP.
The “HIGH CONTROL” and “LOW CONTROL” set-points can be set independently as well as the “Alarm 1” and “Alarm 2” set-points.
The pulse-rate of the “Pulse1” and “Pulse2” outputs can be set separately.

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

Model 51 ORP (mV) CONTROLLER.

STANDARD SPECIFICATIONS:

Power requirement:	200-240V, AC only.
Power consumption:	10 VA
Instrument fuse:	100mA
Output fuse:	5A
ON/OFF SWITCH:	Used for remotely switching controller on or off.
Range:	-1000mV to +1000mV.
Accuracy:	+- 10mV (After calibration).
Display:	2 x 16 characters LCD module with backlight.
	The backlight functions are: "Always ON".
	"Always OFF"
	"Ambient".
µProcessor:	Microchip PIC18F4525.
Software:	Version HJM335
pH input:	BNC connector. Electrically isolated.
pH pre-amplifier:	PCB mount, epoxy encapsulated for moisture protection.
RUN light:	Green LED. Indicates that the µProcessor is running.
UP/DOWN buttons:	Used to select software options.
ENTER/Set button:	Used to set software options.

FACTORY DEFAULT SETTINGS:

Setpoint 1:	+ 800mV
ALARM 1:	+ 900mV
Maximum Pulse Rate 1:	150 pulses/Minute Maximum.
Relay 1 Function:	Proportional Time output.
Relay 1 Period:	60 seconds
Setpoint 2:	+ 600mV
ALARM 2:	+ 500mV
Maximum Pulse Rate 2:	150 pulses/Minute Maximum.
Relay 2 Function:	Proportional Time output.
Relay 2 Period:	60 seconds
Relay minimum ON time:	15 seconds
Alarm Hysteresis:	60mV
Pulse Maximum Range:	150mV
Backlight:	Ambient.

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

Model 51 ORP (mV) CONTROLLER.

STANDARD SPECIFICATIONS:

HIGH CONTROL OUTPUTS:

Pulse 1:	Proportional pulse output for dosing pump.
Maximum Pulse rate 1:	30-180 pulses/Minute
Pulse 1 light:	Yellow LED.
Out 1 relay:	On/ Off, Proportional Time or permanently off. 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 relay is switched off).
Out1 light:	Green LED.
Alarm 1 relay:	On/ Off or permanently off. 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 relay is switched off).
Out1 light:	Red LED.

LOW CONTROL OUTPUTS:

Pulse 2:	Proportional pulse output for dosing pump.
Maximum Pulse rate 1:	30-180 pulses/Minute
Pulse 2 light:	Yellow LED.
Out 2 relay:	On/ Off, Proportional Time or permanently off. 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 relay is switched off).
Out2 light:	Green LED.
Alarm 2 relay:	On/ Off or permanently off. 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 relay is switched off).
Out 2 light:	Red LED.

4-20mA OUTPUT:

4-20mA output	Isolated. Range: -1000 to +1000mV, proportional to mV reading. Maximum load 600 Ohm. Accuracy: +- 0.1mA

ENCLOSURE:

Front label:	Anodized aluminium, green on matt silver.
Enclosure:	Polycarbonate, light grey colour with clear hinged lid.
(TL2, TR1, M)	2 or 3 point wall mounting or clips on to DIN rail. Protection: IP 65. Size: 230 x 185 x 117 mm. (240 x 235 x 120 including cable glands and brackets) Mounting holes distance: 205mm.
Weight:	1.67Kg.

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

Model 51 ORP (mV) CONTROLLER.

INSTALLATION.

WALL MOUNTING.

The Model 51mV controller can be mounted by using the 2 mounting brackets, or it can be mounted on a DIN rail using the optional DIN rail clips.

INSTALLATION.

Before installing the mV 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 probe cable next to other cables, motors, fans or generators.

DO: a) Install instrument under cover where possible.
b) Mount instrument in a dry and clean position with easy access.
c) Run the pH probe 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 ORP probe.

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 51 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 appropriate link marked “DOSE1”, “DOSE2”, “AL1” or “AL2”.
These links are located on the power board between the terminals and the output relays.

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

Model 51 ORP (mV) CONTROLLER.

TERMINAL CONNECTIONS:

220V INPUT:

10 = E (Earth) input. (linked to 15,16,17 = E (Earth) output)
11 = N (Neutral) input. (linked to 18,19,29 = N (Neutral) output)
12 = L (Live) input.

ON/OFF SWITCH.

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

220V OUTPUT:

21+22+23= L (Live) output. (5A fused).
18+19+20= N (Neutral) output. (linked to 11 = N (Neutral) input)
15=16=17= E (Earth) output. (linked to 10 = E (Earth) input)

HIGH CONTROL OUTPUTS:

PROPORTIONAL PULSE1.
43 + 44 = Pulse1 relay output.
OUT1 RELAY (DOSING1):
37 = N/O, Relay output.
38 = C, Relay common.
ALARM1 RELAY:
33 = N/O, Relay output.
34 = C, Relay common.

LOW DOSING OUTPUTS:

PROPORTIONAL PULSE2.
41 + 42 = Pulse2 relay output.
OUT2 RELAY (DOSING2):
35 = N/O, Relay output.
36 = C, Relay common.
ALARM2 RELAY:
31 = N/O, Relay output.
32 = C, Relay common.

TERMINALS NOT USED:

1, 2, 3, 4, 5

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.

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

Model 51 ORP (mV) CONTROLLER.

OPERATING INSTRUCTIONS.

PROBE CALIBRATION.

Note: The controller has been pre-calibrated with 470mV ORP buffer solution.

1) Calibrate with a 470mV buffer solutions:

With the probe in 470mV buffer press the **UP/DOWN** buttons until the following screen appears:

CALIBRATE +470mV **ORP= XXX**

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

SET Calibration **470mV= XXX XX %**

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

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

CONTROL FUNCTIONS SETUP.

HIGH CONTROL:

SETPOINT 1:

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

SETPOINT #1 **ORP= X.XX**

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

SET 1 **ORP= X.XX**

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

RELAY1 FUNCTION (Out 1):

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

RELAY #1 FUNCTION: **OFF / ON-OFF / Prop.Time**

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

ALLWAYS 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 1 PERIOD:

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

RELAY #1 PERIOD **Period= XX Sec**

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

SET Period 1 **Period 1= XX Sec**

'UP' and **'DOWN'** adjusts the period value.
Range is 3 – 120 seconds.
Press **'SET'** again to accept the setting.

MAXIMUM PULSE RATE 1 (Pulse1):

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

MAX. PULSE RATE1 **RATE1= XX ppm**

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

SET Max. Rate1 **RATE= XXX ppm**

'UP' and **'DOWN'** adjusts the maximum rate value.
The setting range is 60 – 180 ppm.
Press **'SET'** again to accept the setting.

ALARM 1 (High Alarm):

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

ALARM #1 **ORP= XXX**

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

SET Alarm 1 **ORP= X.XX**

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

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

CONTROL FUNCTIONS SETUP.

LOW CONTROL :

SETPOINT 2:

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

SETPOINT #2 **ORP= XXX**

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

SET 2 **ORP= XXX**

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

RELAY 2 FUNCTION (Out 2):

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

RELAY 2 FUNCTION: **OFF / ON-OFF / Prop.Time**

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

ALLWAYS 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 2 PERIOD:

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

RELAY 2 PERIOD **PERIOD= XX Sec**

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

SET Period 2 **Periode 2= XX Sec**

'UP' and **'DOWN'** adjusts the period value.
Range is 3 – 120 seconds.
Press **'SET'** again to accept the setting.

MAXIMUM PULSE RATE 2 (Pulse 2):

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

MAX. PULSE RATE2 **RATE= XX ppm**

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

SET Max. Rate 2 **Rate#2= XXX ppm**

'UP' and **'DOWN'** adjusts the maximum rate value.
The setting range is 60 – 180 ppm.
Press **'SET'** again to accept the setting.

ALARM 2 (Low Alarm):

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

ALARM #2 **ORP= XXX**

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

SET Alarm 2 **ORP= XXX**

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

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

CONTROL FUNCTIONS SETUP.
(These setting are common for both channels)

PULSE RANGE:

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

PROPORTIONAL PULSE MAX=XXX

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

SET Proportional Pulse Max=XXX

'UP' and **'DOWN'** adjusts the maximum rate value.
Range is 30-150mV.
Press **'SET'** again to accept the setting.

HYSTERESIS: (for OUT 1 and OUT 2 Relays) (only applies if 'ON/OFF' has been selected)

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

HYSTERESIS ORP HYST= XX mV

This is the OUT1 and OUT2 Output relay hysteresis value.
The OUT1 relay energizes at the SETPOINT and de-energizes at SETPOINT - HYSTERESIS.
The OUT2 relay energizes at the SETPOINT and de-energizes at SETPOINT + HYSTERESIS.
There is a 10 second ON/OFF delay.
Pressing **'SET'** moves you to the next setting screen.

SET Hysteresis ORP Hyst=XX mV

'UP' and **'DOWN'** adjusts the maximum rate value.
Range is 30-150mV.
Press **'SET'** again to accept the setting.

RELAY MINIMUM ON 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 minimum = 2 seconds.
Range maximum = **(RELAY PERIOD-1)** 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 is too low.
Always OFF - always OFF
Always ON - always ON

Pressing **'DOWN'** advances to the next setting.

HJM Electronics
Instrumentation for the Water-Treatment Industry
Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

Model 51 ORP (mV) CONTROLLER.

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!

FACTORY DEFAULT VALUES:

These values are pre-programmed when the controller is manufactured.
OUT 1: 800mV
OUT 2: 600mV
Alarm 1: 900mV
Alarm 2: 500mV