



# HJM Electronics

Instrumentation for the Water-Treatment Industry

Tel:+27+ (0)11 452-2066 E-mail: info@hjmelectronics.co.za

## Model 61 mV CONTROLLER.



### GENERAL DESCRIPTION.

The Model 61mV is a single-channel, micro-processor based mV controller. The signal from the mV electrode is optically isolated before it is sent to the micro-processor behind the front panel. The micro-processor controls 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 mV reading and set-point are displayed on a LCD screen with a built-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.

“DOSE” is used to dose chemical to increase the mV reading.

“BLEED” is used to decrease the mV reading.



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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.   |
| <b>Range:</b>       | <b>-1000 to +1000 mV.</b>   |
| Accuracy:           | +/- 10 mV (After calibration).  |
| Display:            | 2 x 16 characters LCD module with backlight.<br>The backlight options are: "Always ON".<br>"Always OFF"<br>"Ambient".   |
| $\mu$ Processor:    | Microchip PIC18F4523.   |
| Software:           | Version: <u>HJM653H</u> and up.   |
| mV input:           | BNC connector.  |
| mV 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.<br>N/O relay contact, 5A into resistive load.<br>Potential free or 220Vac<br>Suppressed with 47 R and 0.033 $\mu$ F.<br>(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 $\mu$ Processor 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.<br>Protection: IP 545. Size: 184 x 160 x 140 mm.<br>Mounting holes distance: 180mm.  |
| Protection:         | IP 65.  |
| Size:               | 184 x 180 x 140 mm.   |
| Front label:        | Anodised aluminium, green on silver.  |
| 4-20mA output       | <u>Isolated</u> . Range: -100mV to +1000mV, Proportional to mV reading.<br><u>or</u> as a 4-20mA control signal.<br>Maximum load 600 Ohm.<br>Accuracy: +/- 0.05mA   |

### STANDARD FACTORY DEFAULT SETTINGS:

|                        |                                      |
|------------------------|--------------------------------------|
| Setpoint 1:            | +500mV                               |
| Control:               | Dose                                 |
| 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:            | 60mV                                 |
| Pulse Maximum Range:   | 60mV                                 |
| Backlight:             | Ambient                              |
| 4-20mA Output:         | -1000mV to +1000mV recording signal. |

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### INSTALLATION.

#### WALL MOUNTING.

The Model 61mV 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 mV controller, a bit of thought has to be given to the position where the unit is to be installed.

- AVOID:**
- Splashing or dripping of liquids against the control panel.
  - Mounting the controller close to steam traps or hot water trenches.
  - Installation in highly corrosive environment, i.e. chlorine fumes or corrosive gasses and liquids.
  - Installation in places where strong mechanical vibrations are present.
  - Running mV probe cable next to other cables, motors, fans or generators.
- DO:**
- Install instrument under cover where possible.
  - Mount instrument in dry and clean position with easy access.
  - Run mV cable separately from other cables.
  - Install the instrument as close as possible to the probe.

- Connect all outputs first.
- 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!

- Connect the mV 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 61mV 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:

- Please ensure that the Mains input wires are connected to the correct terminals.  
Failure to do so will render the fuse protection inoperative!
- The relay-contact suppression network will supply 3,5mA 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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## Model 61 mV CONTROLLER.

### TERMINAL CONNECTIONS:

#### 4-20 mA SIGNAL.

The isolated 4-20mA signal can be used as a recording signal. It operates over a -1000 to +1000 mV range.

8 = -, 4-20 mA output.

9 = +, 4-20 mA output.

#### 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

20 = N/C, Relay output (L2).

#### PROPORTIONAL PULSE OUTPUT:

43 + 44 = Pulse1 relay output.

#### 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 3,5mA 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 47nF capacitor above the "OUTPUT" terminals.



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### OPERATING INSTRUCTIONS

#### PROBE CALIBRATION.

Note: The controller has been pre-calibrated with -1000mV, 0mV and +1000mV signals, generated with a mV test box.

The controller displays the mV signal generated by the mV/ORP or REDOX probe.

The standard ORP buffer solution generates a +470mV signal.

(Other values are available but may be hard to find)

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

CALIBRATE +470 mV  
ORP= XXX

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

SET Calibration  
470 mV= +XXX (XX)

**'UP'** and **'DOWN'** adjusts the 470mV value with the % change indicated.

Press **'SET'** again to accept the setting.

#### FUNCTIONS SETUP.

##### SETPOINT:

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

SETPOINT  
ORP= XXX (DOSE/BLEED)

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

SET Setpoint  
ORP=XXX (DOSE/BLEED)

**'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  
DOSE (Press SET)

Pressing **'SET'** toggles between **'DOSE'** and **'BLEED'** control mode.

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



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#### 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= XX 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:

**PROP.PULSE**  
**RANGE MAX=XX mV**

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

**SET PROP.PULSE**  
**RANGE MAX=XX mV**

'**UP**' and '**DOWN**' adjusts the maximum rate value.

Range is 30 – 150 mV.

Press '**SET**' again to accept the setting.

#### HYSTERESIS:

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

**HYSTERESIS**  
**ORP HYST=XXX mV**

This is the OUT1 Output relay hysteresis value.

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**  
**ORP HYST=XXX mV**

'**UP**' and '**DOWN**' adjusts the maximum rate value.

Range is 30 – 150 mV.

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**'.



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### OPERATING INSTRUCTIONS

#### **RELAY PERIOD:**

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 RELAY**  
**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 TIME: (only applies if 'MODULATED' 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 = 15 seconds.

Range maximum = (**RELAY PERIOD/2**) 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!



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## OPTIONAL FUNCTIONS.

### 1) 4-20mA OUTPUT SIGNAL:

Note: The default 4-20mA signal is set as a “Recording Signal” and works over a -1000mV to +1000mV range.

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

4-20mA Output:  
Recording Signal

Pressing ‘**SET**’ toggles between ‘Recording Signal’ and “Control Signal” control mode.

4-20mA Output:  
Control Signal

Note: The 4-20mA “Control Signal” signal linked to the “Proportional Pulse” setting and works over the same range. It can be used to control a variable speed drive dosing pump.

Pressing ‘**DOWN**’ advances to the “mA Setpoint Shift: 0mV” setting.

mA Setpoint  
Shift: 0mV

Press the **UP/DOWN** buttons to change the **mV Shift** over a -20mV to +20mV range, in 2mVpH steps.

The default setting is 0mV.

Press ‘**SET**’ to accept the setting.

Pressing ‘**DOWN**’ advances to the “mA Maximum” setting.

mA Maximum  
100%

Press the **UP/DOWN** buttons to change the **mA Maximum** over a 60-100% range.

This limits the maximum 20mA output to less than 100%.

Press ‘**SET**’ to accept the setting.

The default setting is 100%.

### Notes:

- 1) The **default 4-20mA signal** is set as a “Recording Signal” and works over a -1000mV to +1000mV range.
- 2) The 4-20mA “Control Signal” signal is linked to the “Proportional Pulse” setting and works over the same range.  
It can be used to control a variable speed drive dosing pump.
- 3) The “mA Setpoint Shift” setting allows the 4mA output to be offset from the “SETPOINT” by -20mV to +20mV. The default is 0mV.
- 4) The “mA Maximum” setting is used to limit the 20mA output from 60% to 100%.  
(13.6mA to 20 mA).  
It is used limit the maximum speed of a variable speed drive dosing pump.

Note: The default 4-20mA signal is set as a “Recording Signal” and works over a 0pH-14pH range.

### **PLEASE NOTE:**

**Loading the factory-default values will change the 4-20mA signal to a “Recording Signal” !**

Model61 mV V653

Model 61mV V640