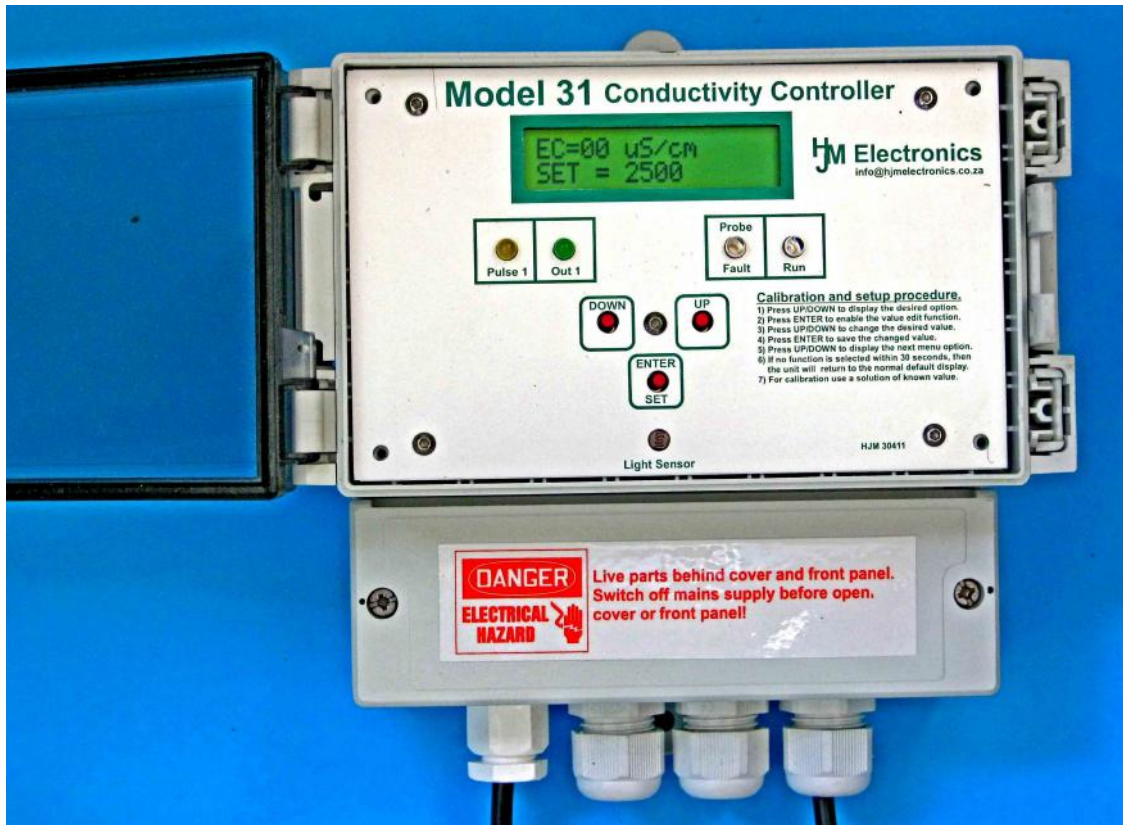


Model 31 CONDUCTIVITY CONTROLLER.



GENERAL DESCRIPTION.

The Model 31EC is a single-channel, micro-processor based EC (Electrical Conductivity) controller.

The signal from the 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 EC reading is displayed on the top line of the LCD display

The set-point and temperature are displayed alternatively on the bottom line of the LCD display.

A light-sensor controls the backlight of the display.

The maximum pulse rate can be set from 20-180 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.

The “BLEED” option is used to switch a solenoid valve to limit the conductivity in a cooling tower and works on a high going EC.

The “DOSE” option is used to dose a chemical product and to maintain a certain conductivity. It works on a low going EC.

The automatic temperature compensation works over a 0-90degC range.

Model 31EC V76



HJM Electronics

Instrumentation for the Water-Treatment Industry

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

Model 31 CONDUCTIVITY CONTROLLER.

STANDARD SPECIFICATIONS: (SN550&up)

Power requirement:	200-240V, AC only.
Power consumption:	5 VA
Instrument fuse:	100mA
Output fuse:	5A
INTERLOCK:	Used for remotely switching controller on or off.
Range:	As per serial label.
Accuracy:	+/- 5% of full-scale (After calibration).
Display:	2 x 16 characters LCD module with backlight. The backlight options are: "Always ON", "Always OFF" "Ambient".
μ Processor:	Microchip PIC18F4523/5.
Firmware:	Versions 31EC75 and up.
EC input:	Electrically isolated.
Temperature sensor:	10K NTC Thermistor. Range: 0-90degC.
Pulse 1:	Proportional pulse output for dosing pump.
Maximum pulse rate:	20-180 pulses/minute adjustable
Pulse 1 light:	Yellow LED.
Out 1:	On/ Off or proportional time output. N/O & NC relay contacts, 5A into resistive load. Potential free or 220Vac Suppressed with 47 R and 0.033 μ F. (Will supply 2,5mA current when the relay is switched off!).
Out1 light:	Green LED.
Probe Fault light:	Red LED.
RUN light:	Flashing green LED. Indicates that the μ 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. 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	<u>Isolated</u> . Range: 0-full-scale, Proportional to EC reading. <u>or</u> as a 4-20mA control signal. Maximum load 600 Ohm. Accuracy: +- 0.05mA
Suitable Probes:	CSP-C , Carbon probe. Range: 0-5000 μ S and higher. 7m cable. CSP-Ti , Titanium probe. Range: 0-2500 μ S. 7m cable CSP-Ti-01 , Titanium probe. Range: 0-250 μ S. 5m cable.

STANDARD FACTORY DEFAULT SETTINGS:

Setpoint:	50% of full-scale
Dosing:	BLEED.
Relay1 Output Function:	ON/OFF.
Relay1 minimum ON time:	10 seconds
Relay1 minimum OFF time:	10 seconds
Backlight:	Ambient



HJM Electronics

Instrumentation for the Water-Treatment Industry

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

Model 31 CONDUCTIVITY CONTROLLER.

INSTALLATION.

WALL MOUNTING.

The Model 31 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 EC 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 EC 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 EC 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 MUST 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 EC 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 31 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 47nF capacitor above the "OUTPUT" terminals.

Model 31 CONDUCTIVITY CONTROLLER.

TERMINAL CONNECTIONS:

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 (L3).

PROPORTIONAL PULSE OUTPUT:

41 + 42 = **Pulse1** relay output.

EC PROBE CONNECTIONS:

- 1 = 1 EC Probe, Electrode 1.
- 2 = 2 EC Probe, Electrode 2.
- 3 = 3 EC Probe, Temperature sensor 1.
- 4 = 4 EC Probe, Temperature sensor 2.
- 5 = 5 EC Probe, Screen (if used)

4-20 mA SIGNAL.

The isolated 4-20mA signal can be used as a recording signal.

It operates over a 0-fulscale range.

- 8 = - 4-20 mA output.
- 9 = + 4-20 mA output.

Model 31 CONDUCTIVITY CONTROLLER.

OPERATING INSTRUCTIONS (SN550&up)

PROBE CALIBRATION.

Note: The controller has been pre-calibrated with the probe provided and has been soak- tested for a minimum of 24 hours.

It does not need calibration during normal use.

Incorrect readings are normally caused by deposits on the electrodes.

Dirty electrodes must be cleaned before the unit is calibrated.

If no electrode has been supplied then the unit has been calibrated with a test box.

If a different probe is fitted to the controller proceed as follows:

Calibration with a conductivity standard solution:

Immerse the probe in a solution of known value.

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

CALIBRATION ==>
Press SET

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

CALIBRATION(SET)
EC= XXX

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

SET Calibration
EC= XXX XX %

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

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

SETPOINT ADJUSTMENT:

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

SETPOINT
EC = XXX μ S/cm

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

SET Setpoint
EC = XXXX μ S/cm

'**UP**' and '**DOWN**' adjusts the setpoint.

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

CONTROL TYPE:

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

CONTROL TYPE
Bleed (SET)

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

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

Model **31** CONDUCTIVITY CONTROLLER.

OPERATING INSTRUCTIONS

PULSE 1 ADJUSTMENT:

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

PULSE OUTPUT
Disabled (SET)

Pressing '**SET**' to "**ENABLE**" or "**DISABLE**" function.

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

This setting is only available if Pulse 1 Output has been ENABLED!

PULSE RATE:

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

MAX. PULSE RATE
XXX per Minute

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

SET PULSE RATE
XXX per Minute

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

The setting range is 20 – 180 pulses per Minute.

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

This setting is only available if the Proportional Time output has been selected or Pulse 1 output has been enabled!

PROPORTIONAL CONTROL ADJUSTMENT:

(This is the control range of the proportional signal).

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

PROPORTIONAL
CTRL = XXX uS/cm

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

SET PROPORTIONAL
CTRL= XXX uS/cm

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

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

Model **31** CONDUCTIVITY CONTROLLER.

OPERATING INSTRUCTIONS

RELAY FUNCTION:

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

RELAY FUNCTION:
On/Off Prop.Time, Off

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**'.

This setting is only available if ON/OFF output has been selected !

RELAY CONTROL RANGE:

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

Relay Ctrl Range:
EC = XXX

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

SET Ctrl Range
EC = XX Sec

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

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

This settings are only available if Prop. Time output has been ENABLED !

RELAY PERIOD: (= total of RELAY ON + RELAY OFF time).

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
Period = XX Sec

'**UP**' and '**DOWN**' adjusts the period value.

Range is 3 – 120 seconds.

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

MINIMUM RELAY ON TIME:

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.

Model 31 CONDUCTIVITY CONTROLLER.

OPERATING INSTRUCTIONS

TEMPERATURE DISPLAY:

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

TEMPERATURE DISP
On

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

Off - Temperature not displayed.

On - Temperature displayed alternatively with setpoint.

Pressing '**UP/DOWN**' advances to the next 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 '**UP/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 reaches 0.

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

FACTORY DEFAULT SETTINGS:

SET: 50% of full-scale.

Control Type: BLEED.

Pulse Output: DISABLED

Relay Function: ON/OFF

Relay Control Range: 2% of full-scale

Range: 2-10%

Temperature displayed: On

OPTIONAL FUNCTIONS.

1) 4-20mA OUTPUT SIGNAL:

Note: The default 4-20mA signal is set as a “**Recording Signal**” and works over a 0-fullscale 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: 00 uS/cm**” setting.

mA Setpoint
 Shift: 00 uS/cm

Press the **UP/DOWN** buttons to change the **mA Shift** over a -2% to +2% range, in 0.4% steps.

The default setting is 0%.

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 0-fullscale 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 -2% to +2%. The default is 0%.
- 4) The “**mA Maximum**” setting is used limit 20mA output from 60% to 100%.
(13.6mA to 20 mA).
It is used limit the speed of a variable speed drive dosing pump.

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

PLEASE NOTE:

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