HJM Electronics
Instrumentation for the Water-Treatment Industry
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Model 11 CONDUCTIVITY CONTROLLER.

GENERAL DESCRIBTION.

The Model 11EC is a single-channel, micro-processor based EC (Electrical Conductivity) controller.
The micro-processor controls the all the output- as well as programming- and set-up functions.
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.
"OUT" is a relay output that can be set as an "On/Off" output (default setting) or as a "Proportional Time" output to control a motor driven dosing pump or solenoid valve.
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 an 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.

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STANDARD SPECIFICATIONS: (SN260up)

Power requirement:	200-240V, AC only.
Power consumption:	5 VA
Instrument fuse:	100mA
Output fuse:	2A
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".***
µProcessor:	Microchip PIC18F2523.
Firmware:	Versions 11EC22 and up.
Temperature sensor:	10K NTC Thermistor. Range: 0-90degC.
Out:	***On/Off*** or proportional time output. N/O & N/C relay contacts, 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 switched off !).
Out light:	Yellow LED.
Probe Fault light:	Red LED. (Indicates that the temperature sensor is disconnected).
RUN light:	Flashing green LED. Indicates that the µProcessor is running.
UP/DOWN buttons:	Used to *select* software options.
SET button:	Used to *set* software options.
Enclosure:	Plastic, light gray color with clear hinged lid. 4-point wall fixing brackets. Size: 192 x 164 x 87mm. (Excluding mounting brackets) Protection: IP 66.
Probes:	**CSP-C, CSP-Ti, CSP-L, CSP-Ti-01 or DIP06-10 conductivity probes.** **CSP-C, CSP-Ti, CSP-L,** = 3/4" BSP, with detachable 4- or 5-core cable. Supplied with 7m of black detachable 4-core PVC cable as standard. **DIP06-10**= Dip-type electrode, 0.6mlong with 10m 4-core cable. These probes have a cell constant of approximately 0,8. **CSP-Ti-01, Titanium** probe. Range: 0-500µS. 5m cable. Supplied with 5m of black 5-core PVC cable for low conductivity as standard. This probe has a cell constant of approximately 8. Temperature ranges: **CSP-C, CSP-L:** 0-90° Celsius. **CSP-Ti:** 0-90° Celsius. **DIP06H-10:** 0-80° Celsius. **DIP06-10:** 0-60° Celsius.
Weight:	1.60Kg, including probe and 7m cable.

STANDARD FACTORY DEFAULT SETTINGS:

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

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INSTALLATION.

WALL MOUNTING.

The Model 11 controller can be mounted by using the 4 wall-mounting brackets.

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 11 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.

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TERMINAL CONNECTIONS:

220V INPUT:
19 = E (Earth) input. (linked to 13 = E (Earth) output).
18 = N (Neutral) input. (linked to 12 = N (Neutral) output).
17 = L (Live) input.

ON/OFF SWITCH.
Used for remotely switching controller on or off. Must be linked if not used!
15 + 16 = ON/OFF SWITCH.

220V OUTPUT:
14 = L (Live) output.
13 = E (Earth) output. (linked to 19 = E (Earth) input)
12 = N (Neutral) output. (linked to 18 = N (Neutral) input)

OUTPUT RELAY:
11 = N/O, Relay output (L2).
10 = C, Relay common (L1). Link to 14 for 220V output.
9 = N/C, Relay output (L3).

PROPORTIONAL PULSE OUTPUT:
21 + 22 = Pulse1 relay output. **(NOT USED)**

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)

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OPERATING INSTRUCTIONS (SN001&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 µS/cm

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

SET
EC = XXXX µS/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

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

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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:

ALWAYS OFF - off all the time
ON-OFF - relay is on/off at above/below the set point (default).
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 the Proportional Time output has been selected.!

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 ROPORTIONAL CTRL= XXX uS/cm

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

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 PERIOD= 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= 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 minimum ON) Time = XX Sec

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

SET MINIMUM 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.

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 **'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.
Always OFF - always OFF
Allways 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 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.
Relay Function: ON/OFF
Relay Control Range: 2% of full-scale
Temperature displayed: On