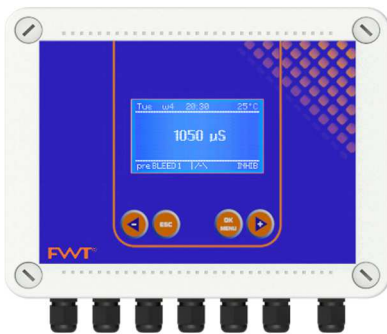


## CTRL EC COOL COOLING TOWER CONTROLLER



**CTRL EC COOL**



**CTRL B EC COOL**

### SOMETHING ABOUT COOLING TOWERS

Cooling water circuits can be found in a range of industries all over the world. Normally circulatory cooling conditioned water is used where fresh water is not possible. Cooling water consumption is minimized and the whole system must be protected from corrosion, sediment and growth of biological organisms.

Nowadays ventilation and air conditioning system control has become a very important operation in view of the latest epidemics caused by various dangerous viruses' diseases, and the always present LEGIONELLA disease: prevention has become the prime concern.

In cooling systems water circulation present losses through evaporation and leakage, water flow must be replenishing with fresh water make-up. To compensate the increase in salt concentration, blow-down (also called bleed) takes place, controlled by EC - ELECTRO CONDUCTIVITY measurement. Blow down operations prevents scaling and corrosion. Another important operation is the chemically conditioning of the make-up water by adding biocides thus disinfecting the water from germs and the growth of algae or biological organisms.

CTRL EC COOL is available with 2 plastic enclosures:

- **CTRL** enclosure IP65, ABS plastic - V0 (fireproof)
- **CTRL B** enclosure IP56 ABS plastic - UL94 HB

### FWT SOLUTION FOR CONTROL AND DOSING OPERATIONS

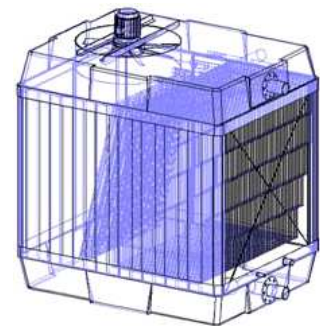
FWT has many years of experience and a comprehensive product range for all processes connected with cooling water conditioning, in a wide variety of designs for every application.

**CTRL EC COOL** is a compact system for cooling tower control for centralising control that addresses the operation of cooling towers in a practical and economic way, specially designed for cooling water treatment and blow-down operations, air scrubbers and humidifiers of any industrial air-conditioning systems.

The controller integrates other process equipment such as: a range of Conductivity sensors (according to measuring range) and versatile control options for flow meters, blow-down solenoid or flap valves.

#### EC COOL is capable of:

- Automatically monitoring total dissolved solids and desalination through CONDUCTIVITY measurements, driving an electro valve or via TIMER;
- Accurate dosing control of scale inhibitors and biocide,
- Corrosion inhibitor dosing via four operating modes;
- Dosing for two biocides dosing pumps;
- Biocide cycles via timer programming;
- Automatic blow-down operation lockout and pre-bleed operations;
- 4-20mA analog current output mode for remote control equipment;
- Flow sensor (proximity switch function);
- Level control for external chemical tanks



### FWT COMPREHENSIVE SOLUTIONS FOR COMPLETE COOLING TOWER SYSTEM

#### DISINFECTION

- Dosing systems for metering of sodium-calcium hypochlorite or bromide products
- Measurement and control technology for variable-dependent dosing of biocides

#### DISPERSION

- Dosing systems for dosing of dispersant chemicals

#### CORROSION PROTECTION

- Dosing systems for metering of corrosion protection products and hardness stabilisers
- Dosing systems for dosing of dispersant chemicals

## CTRL EC COOL FUNCTIONS DESCRIPTION

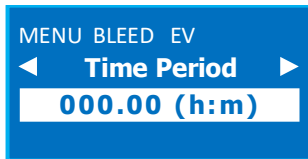
### BLEED OPERATIONS DRIVEN BY TIMER

CTRL EC COOL controller offers two modes concerning the Bleed mode (blow-down) operations of the EV:

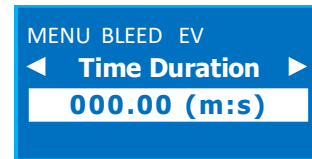
**TIMER mode:** the internal timer independently of the conductivity level in the cooling tower will drive the EV.

This feature is suitable for easier programming **or** in case of conductivity probe failure or for easier programming.

Timer mode main programming steps are:



It selects time period between two bleed valve discharges

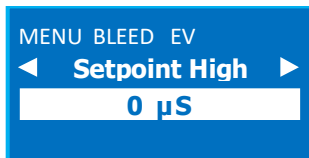


It selects bleed valve length of time EV will be open

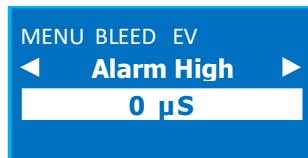
### BLEED OPERATIONS DRIVEN BY CONDUCTIVITY MEASUREMENT

**CONDUCTIVITY mode:** it processes the conductivity level to control blow-down operations; displays shows measured values and transmits it via relay output to open EV electro valve. Electro Conductivity is monitored by a set point: once exceeding the set point, controller will open the solenoid valve and bleed the desalinated and conditioned water.

Alarm settings High and low will ensure maximum control of conductivity parameters.



Set point: reaching set points will open solenoid valve and bleed the desalinated conditioned water.



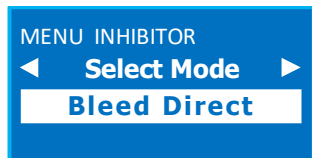
Alarm function set alarm level passed which alarm output relay is ON. It drives auxiliary relay and alarm device.



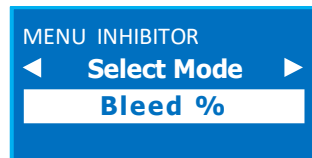
It selects bleed valve length maximum time period in which EV will be active.

### INHIBITOR DOSING CONTROL

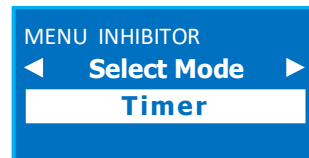
CTRL EC COOL controller features 4 inhibitor dosing pump operations modes:



**BLEED DIRECT** starts Inhibitor dosing when the bleed valve is open (works in parallel to EV)



**BLEED %** inhibitor is dosed after EV closing in % time equal to the last discharge time duration

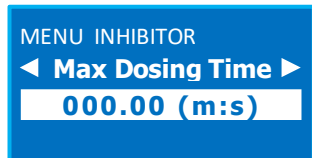


**TIMER** inhibitor dosing via an internal Timer: at the start of each period, dosing pump will work for a pre-set time.



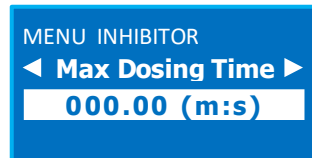
**WATER METER** is active during the re-integration of makeup water and is driven by external water meter pulse proportionally to flow

**Main programming steps:**



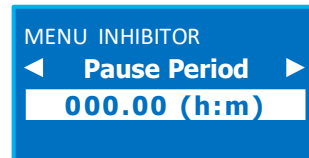
It selects Max dosing time period of inhibitor dosing pump operations.

**Main programming steps:**



It selects Max dosing time period of inhibitor dosing pump operations.

**Main programming steps:**

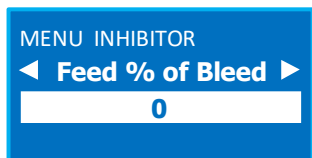


Pause period time: inhibitor dosing pump is OFF for the selected time.

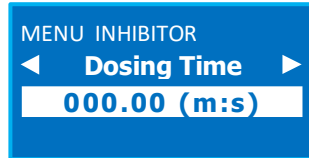
**Main programming steps:**



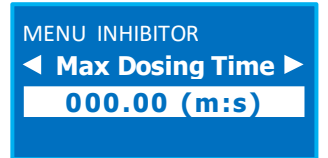
It selects the pulse from the water meter to start inhibitor dosing pump injections.



It sets the percentage of the bleed valve discharge activation time; this is the time corresponding to inhibitor dosing operations.



It selects Max dosing time period of inhibitor dosing pump operations.



It selects Max dosing time period of inhibitor dosing pump operations.

## BIOCIDE DOSING CONTROL

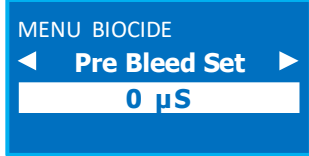
CTRL EC COOL features 2 Biocide dosing programs. Most cooling tower systems include two biocides programs to ensure efficient disinfection quality. Internal timer controls two dosing pumps and various metering processes.

**Biocide mode features many steps to have the most accurate dosing operation with absolute precision.**

**Biocide 1 Program 01**  
**Dosing time (m:s) 01:00**  
**Start time (h:s) 10:30**  
**Days Enabled** Mon : N  
 Tue : N Wed : N Thu : N  
 Fri : N Sat : N Sun : N  
**Weeks** 1:Y 2:N 3:Y 4:N

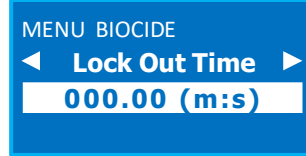
**Biocide 1 Program 01** Program number (up to 99 programs for each biocide)  
**Dosing time (m:s) 01:00** Biocide dosing pump active Time cycle  
**Start time (h:s) 10:30** Biocide dosing pump start dosing time  
**Days Enabled Mon : N..Y** Biocide dosing pump operating days  
**Weeks 1:Y 2:N 3:N 4:N** Biocide dosing pump operating week of the month

**Other functions complementing Biocide operations:**



### PRE-BLEED SETTING

Lower conductivity than selected set point (Set point HIGH) enabling desalination before biocide dosing and disabling bleed EV afterwards. It prevents unnecessary waste of biocide when EV opens at the same time, during or just before Biocide time is up.

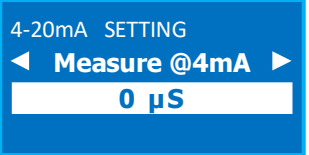


### BLEED LOCK OUT TIME

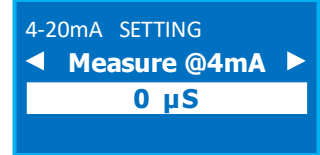
Biocide Lock-out mode: EV bleed operations, Inhibitor dosing pump and Biocide2 dosing pump are stopped for the duration of Biocide1 operations thus avoiding chemical waste and allowing the same to complete its disinfection cycle.

## CTRL EC COOL OTHER FUNCTIONS

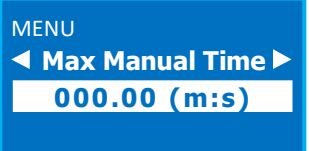
### 4÷20mA1 / 4÷20mA2 mode



At 4 mA corresponds selected set-point, at 20 mA corresponds the max measured distance from selected set-point. Analog mA outputs are protected by galvanic isolation. mA outputs drive data logger or data recorder or other equipment suitable for mA signal.



### MAX MANUAL TIME (EV)



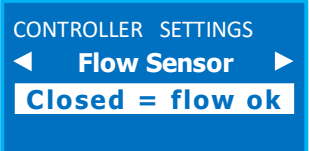
It overrides pre-set programmed EV functions (timer or conductivity) by selecting the maximum time the EV is open (maximum discharge time): this parameter stays in unit memory therefore it's active even after unit has been switch Off. This function is a safety mode in case of conductivity probe failure or other defects or in case the operator, activating manually EV, if forgets to close it

### MANUAL START TIME (EV)



Manual start time, this function overrides EV operations by selecting a time in which the EV is activated manually by pressing ON. This function is a safety measure in case the operator activates manually EV by using the next step and forgets to deactivate EV operations: EV will be closed within selected time.

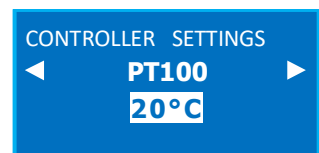
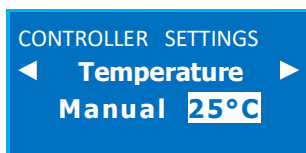
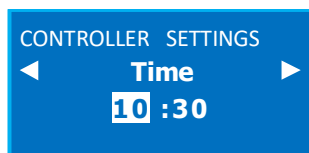
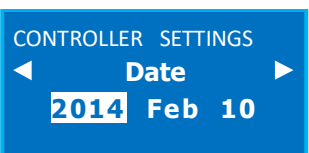
### FLOW SENSOR "PROXIMITY SWITCH" FUNCTION



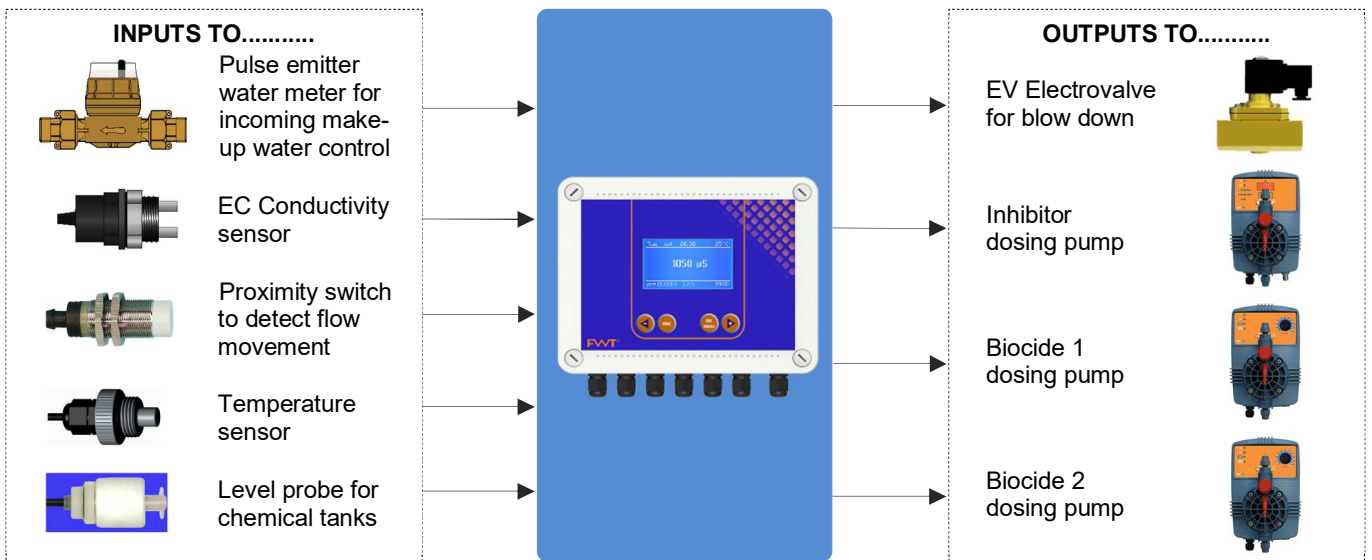
Flow sensor is useful in case no water is running through the sensor cell holder, proximity switch will disable all outputs ensuring that no chemical is added

**DATE AND TIME** It sets the date and time of the controller just like a clock thus driving timer according to exact time.

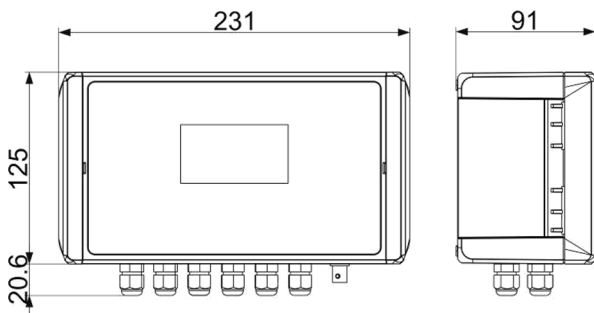
**TEMPERATURE** Manual temperature compensation. 0÷100°C (using temp. probe). Selecting PT100 compensates temperature, EC measurements, always giving the exact value.



## INPUTS / OUTPUTS DIAGRAM FUNCTIONS



## ENCLOSURES / OVERALL DIMENSIONS



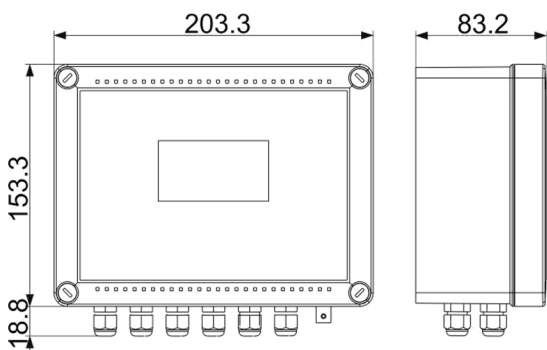
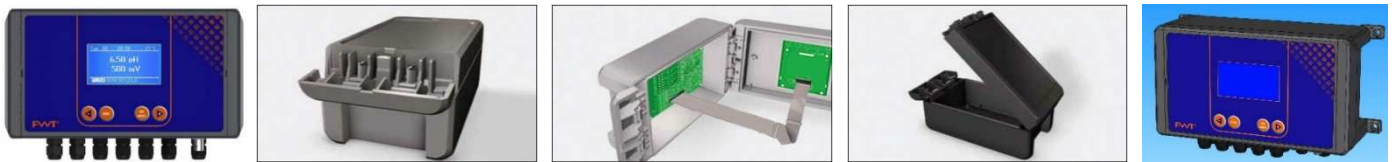
### WALL MOUNTING ENCLOSURE CTRL (IP66)

Plastic ABS-V0 fire-proof-IP66, hinged front panel with safe lock.

**CTRL** Dimension mm

Net weight: 1230 gr Gross weight: 1255 gr

*The hinged quick-release catch ensures that the lid cannot be lost. With the hinged quick release catch, the lid can be opened to the left or right.*



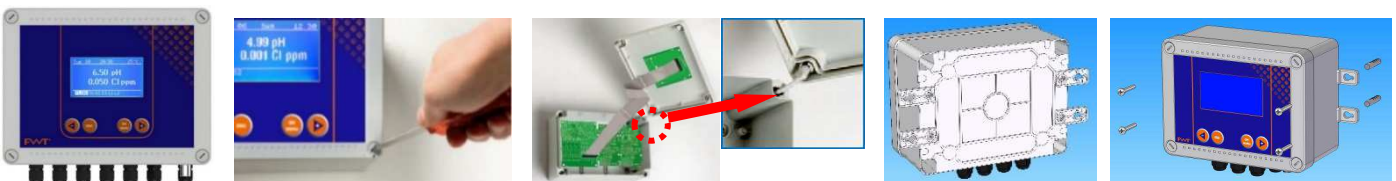
### WALL MOUNTING ENCLOSURE CTRL B (IP56)

Plastic ABS-V0 fire-proof-IP56, front panel with captive screws..

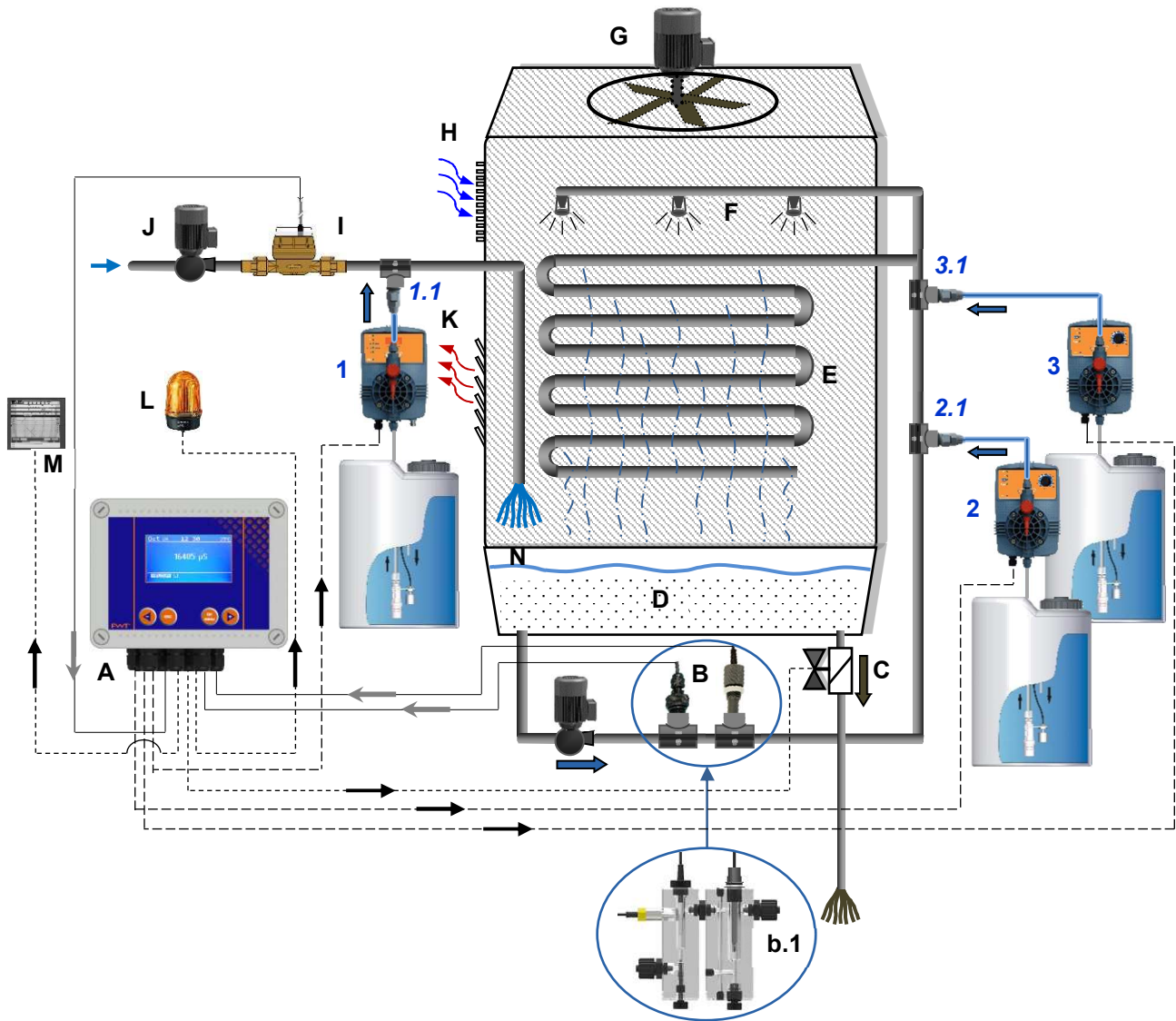
**CTRL B** Dimension mm

Net weight: 900 gr Gross weight: 955 gr

*The enclosure features 1 captive screw (1/4 turn) for lid quick opening / closing allowing easy access for commissioning and service, and perfect seal. Open enclosure lid secured by captive screw. The captive screw position can be moved to other three fixing points.*



# COOLING TOWER INSTALLATION



<b>A</b>	CTRL+ EC COOL controller	<b>J</b>	Fresh water intake pump
<b>B</b>	Conductivity and temperature probes	<b>K</b>	Warm air out
<b>b.1</b>	<i>in alternative: by-pass cell with flow sensor</i>	<b>L</b>	Sound or Light Alarm device
<b>C</b>	Blow down solenoid valve	<b>M</b>	4÷20 mA output to Data logger
<b>D</b>	Collection basin: cooled water out	<b>1</b>	Inhibitor dosing pump
<b>E</b>	Distribution and Serpentine system	<b>1.1</b>	<i>Inhibitor injection point</i>
<b>F</b>	Spray nozzles	<b>2</b>	Biocide 1 dosing pump
<b>G</b>	Fan	<b>2.1</b>	<i>Biocide injection point</i>
<b>H</b>	Cool air IN	<b>3</b>	Biocide 2 dosing pump
<b>I</b>	Pulse water meter: makeup water	<b>3.1</b>	<i>Biocide injection point</i>

**NOTE:** the above installation drawing is just an example of installation. However, each system to be treated differs from one another, therefore ensure first that installation respond to application requirements.

The water which evaporates from the cooling tower is replenished via the intake. The water level is kept constant by an independent float switch. The result of these processes is to increase the salt in the reticulating water. Therefore the desalination valve is opened at preset intervals to reduce the salt content. The resulting water loss is supplemented by the intake. An inhibitor is added in proportion to the water intake flow to prevent corrosion and scaling of cooling tower. Biocides are metered at regular intervals to prevent the water in the cooling tower from stagnating.

## TECHNICAL CHARACTERISTICS

Conductivity EC Measuring range and K factor (cell constant):	<ul style="list-style-type: none"> <li>▪ K 1 ranges up to 20.00 mS / Hysteresis / PWM point = 500 <math>\mu</math>S Resolution 10 <math>\mu</math>S</li> <li>▪ K 5 ranges up to 2.000 <math>\mu</math>S / Hysteresis / PWM point = 50 <math>\mu</math>S Resolution 1 <math>\mu</math>S</li> <li>▪ K10 ranges up to 200 <math>\mu</math>S / Hysteresis / PWM point = 0,50 <math>\mu</math>S Resolution 0,1 <math>\mu</math>S</li> <li>▪ K 0.1 ranges up to 50.00 mS / Hysteresis / PWM point = 5000 <math>\mu</math>S Resolution 1000 <math>\mu</math>S (only with graphite sensor electrodes)</li> </ul>
Temperature setting:	Manual or automatic compensation (latter with temperature probe PT100) <ul style="list-style-type: none"> <li>▪ Resolution 0.1% °C    ▪ Accuracy: <math>\pm</math> 0.5% °C</li> </ul>
Temperature probe range:	– 20 ...100°C <ul style="list-style-type: none"> <li>▪ Resolution 0.1% °C    ▪ Accuracy: <math>\pm</math> 0.5% °C</li> </ul>
Power supply / Power consumption:	Universal power supply 100÷250Vac / 5W at 240Vac
Microprocessor technology:	SMD components mounting, digital controls keypad 6 key
Linearity, Stability Reproducibility:	$\pm$ 0.5 % under standard conditions
Display:	back-lit display 126x64; Display visible area 70x37 mm
Delay on Set-point:	Delay time relay activation, programmable for each set-point (999 sec.)
Start-up Delay:	Delay time relay when switching ON the unit, programmable
Power consumption = Nominal current:	230Vac 5,5W=24mA    ▪ 24Vac-dc 5,5W= 230mA    ▪ 12Vdc 5,5W=458mA
Internal electrical protection:	power supplier guarantees electrical protection (instead of fuse)
Level / Remote relay control	Chemical additive level (level switch not included) output voltage +5Vdc
Outputs:	<ul style="list-style-type: none"> <li>Output RELAY 1: EV (electro valve) BLEED ON-OFF mode voltage free contact 5Amax 230Vac</li> <li>Output RELAY 2 INHIBITOR dosing pump ON-OFF mode voltage free contact 5Amax 230Vac</li> <li>Output RELAY 3 BIOCIDE1 dosing pump ON-OFF mode voltage free contact 5Amax 230Vac</li> <li>Output RELAY 4 BIOCIDE2 dosing pump ON-OFF mode voltage free contact 5Amax 230Vac</li> <li>Output AUXILIARY ALARM ON-OFF remote equipment voltage free contact 5Amax 230Vac</li> <li>FLUX sensor (proximity switch) It blocks output operations in case of no flow into the sensor cell</li> <li>0/4...20 mA1 output Adjustable (500 <math>\Omega</math> max input impedance), galvanic separation, EC measure</li> <li>0/4...20 mA2 output Adjustable (500 <math>\Omega</math> max input impedance), galvanic separation, EC measure</li> <li>Unit load: Resistive load 5A at 230Vac / Inductive load 0.5A at 230Vac</li> <li>Insulation voltage relay output: &gt; 3000Vac</li> <li>Relay contact lifespan: <math>\geq</math> 5x10<sup>4</sup> switching operations (5A at 230Vac)</li> <li>Noise Level: Irrelevant</li> </ul>
Unit Working temperature:	Ideal working temperature 5°C÷40°C, withstand 0°C÷45°C
Environmental Conditions:	Possibly dry environment, altitude up to 2000m, Relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C. Pollution degree 2.
Transport and storage conditions:	– 5÷60°C possibly dry environment