This manual contains safety information that if ignored can endanger life or result in serious injury. They are indicated by this icon.

Keep the instrument protected from sun and water. Avoid water splashes.

# OPERATING INSTRUCTIONS FOR "MTOWER" INSTRUMENT

REMOTE CONTROL AND SETUP
**https://www.e-nimbus.com**

Read Carefully !

ENGLISH Version

| | |
|---|---|
| Descrizione Prodotto<br>*Product Description* | Sistema per torri evaporative, serie MTOWER - MTOWER 2HC - MTOUER PLUS<br>*System for evaporative tower, MTOWER - MTOWER 2HC - MTOUER PLUS - series* |
| Codici Identificativi Prodotto<br>(i simboli "_" completano il codice del prodotto in base alla configurazione delle varianti)<br>*Product Identification Codes*<br>*(the "_" symbols complete the product code based on the configuration of the variants)* | **MTOWERN _____** |

# GENERAL SAFETY GUIDELINES

**Danger!**

In emergencies the instrument should be switched off immediately! Disconnect the power cable from the power supply!

When installing always observe local regulations!

Manufacturer is not liable for any unauthorized use or misuse of this product that may cause injury, damage to persons and / or materials.

**Caution!**

Instrument must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!

Feeder should be interlocked with a no-flow protection device to automatically shut-off the pumps when there is no flow!

Pumps and accessories must be serviced and repaired by qualified and authorized personnel only!

Always discharge the liquid end before servicing the instrument!

Empty and rinse the liquid end before work on a pump which has been used with hazardous or unknown chemicals!

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

Instrument must be operated / serviced by trained technicians only!

All connection operations must be performed while the instrument is not connected to main supply!

# Introduction.

The “MTOWER” is a fully featured cooling towers controller with two-way biocide options and inhibitor / bleed control. Cooling towers are heat removal devices used to transfer process waste heat to the atmosphere. Cooling towers may either use the evaporation of water to remove process heat and cool the working fluid to near the wet-bulb air temperature or rely solely on air to cool the working fluid to near the dry-bulb air temperature. Common applications include cooling the circulating water used in oil refineries, chemical plants, power plants and building cooling

All information is provided through a large backlit LCD display (128x64). Using a revolutionary wheel control the instrument can be easily programmed. MTOWER is housed in an IP65 plastic box.
Measures are: L325 x H235 x D125 (including wheel and connectors).

Main features of “MTOWER” are:

**BLEED**

**INHIBITOR with 5 working modes**
(Feed&Bleed, Feed&Bleed Percentual , PercentalTime, WaterMeter, WaterMeter PPM)

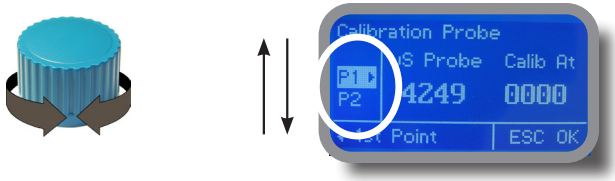
**BIOCIDE with weekly program**

## The wheel.

Located in the upper right side of “MTOWER” there is a wheel used to control the instrument.
Wheel can be rotated in both directions to scroll over menus and / or pressed to confirm highlighted selection / value

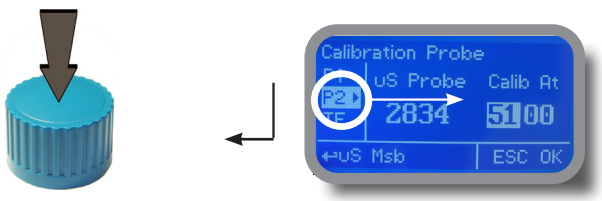
**- Edit single field submenu by pressing wheel twice.**

**- When in main screen keep wheel pressed to switch “OFF” instrument. Repeat procedure to switch “ON” instrument.**




Rotate the wheel to cycle-loop through all options.

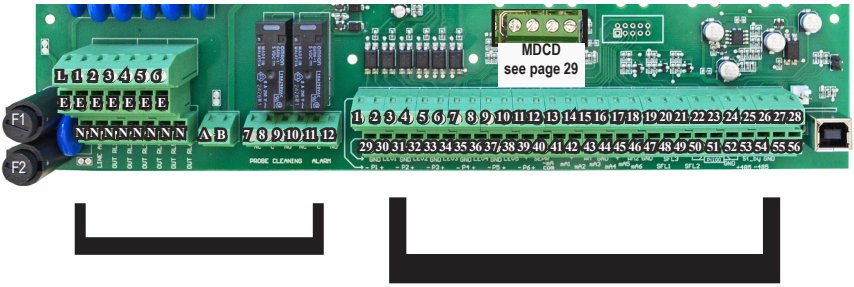
Clockwise or Counterclockwise.




Press wheel to move
on submenu for selected option.

# Mainboard Connections.

Unplug instrument from main power supply then perform connections to probes and / or selected outputs by following the above picture. **For easy understanding board has been divided into two parts: Power connections and I/O connections.**




Power Connections

I/O Connections

## Power Connections:

**F1: General fuse (6.3AT)**
**F2: Circuit fuse (3.15AT)**
**A-B: 230Vac fuse protected**

**Main power supply (from 90VAC to 265VAC):**
L (live), E (earth), N(neutral)

**Setpoint Outputs**
**(voltage output is the same as for main power supply):**

| | |
|---|---|
| 1 - E - N | (F1 fuse protected) Bleed Valve (Powered Version) / Biocide 1* |
| 2 - E - N | (F1 fuse protected) Inhibitor |
| 3 - E - N | (F1 fuse protected) Biocide 1 |
| 4 - E - N | (F1 fuse protected) Biocide 2 |
| 5 - E - N | (F1 fuse protected) Pre-biocide 1 |
| 6 - E - N | (F1 fuse protected) Pre-biocide 2 |

**Bleed Valve (Free Voltage Version):** 7(N.C.), 8(C), 9(N.O.) Free Voltage relay contact / Biocide 1*

**General Alarm output:** 10(N.C.), 11(C), 12(N.O.) Free Voltage relay contact

***Please check with customer support for availability of this output (customized software only)**

**Warning: Connections must be performed by qualified and trained personnel only.**



Warning: Do not connect the power supply of the dosing pumps in PWM mode.
Warning: Maximum relay output power consumption in PWM mode: 5 W.

## I/O Connections:

| | STANDBY OUT (1-8) | | | PROPORTIONAL OUT (9-12) | | |
|---|---|---|---|---|---|---|
| **Proportional / standby outputs:** | 1: - Biocide1 | 3: - Biocide2 | 5: - Pre-biocide1 | 7: - Pre-biocide2 | 9: - Biodispersant* | 11: - Inhibitor |
| | 2 + Biocide1 | 4: + Biocide2 | 6: + Pre-biocide1 | 8: + Pre-biocide2 | 10: + Biodispersant* | 12: + Inhibitor |

**mA outputs (500 Ohm max resistive load):**

mA Outputs Active – Do not connect any external voltage - Driver voltage without load: 15V

13: Common
14: mA output 1 (conductivity)
15: mA output 2 (temperature)

GND shared!

**RS485:**

26: + Signal RS485 (A)
27: - Signal RS485 (B)

GNS shared!

**Tank Level inputs:**

29 (-) ; 30 (+) Biocide 1 Level
31 (-) ; 32 (+) Biocide 2 Level
33 (-) ; 34 (+) Pre-biocide 1 Level
35 (-) ; 36 (+) Pre-biocide 2 Level
37 (-) ; 38 (+) Inhibitor Level

(-) GND shared

OPTIONS

**FLOW sensor (mod. "SEPR") input:**

39(+ Brown) ; 40(Black) ; 41(- Blue)
41 shortcut with block n.37

**MANIFOLD input:**

39(White) ; 40(Black)
41 shortcut with block n.37

OPTIONS

**(Hall effect) pulse sender water meter (makeup water):** 42(+12VDC) ; 43(INPUT) ; 44(GND)
**(Contact) Pulse sender water meter (makeup water):** 43(INPUT) ; 44(GND)

OPTIONS

**(Hall effect) Pulse sender water meter (bleed water):** 45(+12VDC) ; 46(INPUT) ; 47(GND)
**(Contact) Pulse sender water meter (bleed water):** 46(INPUT) ; 47(GND)

OPTIONS

**Temperature Probe input (mod. "ETEPT"):** 50(green) ; 51(brown) ; 52(white) ; 53(yellow)
(remove resistance before to install probe)

**Temperature Probe input (PT100) with ECDIND probe:** 50(green) + 51 ; 52(white) + 53
(Rif. Appendix B - MDIND probe connection)

**USB port:** Factory reserved



*enable disinfection through biodispersant (biodisp) in setup menu

# Cooling tower basic knowledge.

### What is a (wet, atmospheric) cooling tower?

A cooling tower is a heat rejection device, which extracts waste heat to the atmosphere though the cooling of a water stream to a lower temperature. The type of heat rejection in a cooling tower is termed “evaporative” in that it allows a small portion of the water being cooled to evaporate into a moving air stream to provide significant cooling to the rest of that water stream. The heat from the water stream transferred to the air stream raises the air’s temperature and its relative humidity to 100%, and this air is discharged to the atmosphere. Evaporative heat rejection devices such as cooling towers are commonly used to provide significantly lower water temperatures than achievable with “air cooled” or “dry” heat rejection devices, like the radiator in a car, thereby achieving more cost-effective and energy efficient operation of systems in need of cooling. Think of the times you’ve seen something hot be rapidly cooled by putting water on it, which evaporates, cooling rapidly, such as an overheated car radiator. The cooling potential of a wet surface is much better than a dry one.

Common applications for cooling towers are providing cooled water for air-conditioning, manufacturing and electric power generation. The smallest cooling towers are designed to handle water streams of only a few gallons of water per minute supplied in small pipes like those might see in a residence, while the largest cool hundreds of thousands of gallons per minute supplied in pipes as much as 15 feet (about 5 meters) in diameter on a large power plant.

The generic term “cooling tower” is used to describe both direct (open circuit) and indirect (closed circuit) heat rejection equipment. While most think of a “cooling tower” as an open direct contact heat rejection device, the indirect cooling tower, sometimes referred to as a “closed circuit cooling tower” is nonetheless also a cooling tower.

A direct, or open circuit cooling tower is an enclosed structure with internal means to distribute the warm water fed to it over a labyrinth-like packing or “fill.” The fill provides a vastly expanded air-water interface for heating of the air and evaporation to take place. The water is cooled as it descends through the fill by gravity while in direct contact with air that passes over it. The cooled water is then collected in a cold water basin below the fill from which it is pumped back through the process to absorb more heat. The heated and moisture laden air leaving the fill is discharged to the atmosphere at a point remote enough from the air inlets to prevent its being drawn back into the cooling tower.

The fill may consist of multiple, mainly vertical, wetted surfaces upon which a thin film of water spreads (film fill), or several levels of horizontal splash elements which create a cascade of many small droplets that have a large combined surface area (splash fill)

An indirect, or closed circuit cooling tower involves no direct contact of the air and the fluid, usually water or a glycol mixture, being cooled. Unlike the open cooling tower, the indirect cooling tower has two separate fluid circuits. One is an external circuit in which water is recirculated on the outside of the second circuit, which is tube bundles (closed coils) which are connected to the process for the hot fluid being cooled and returned in a closed circuit. Air is drawn through the recirculating water cascading over the outside of the hot tubes, providing evaporative cooling similar to an open cooling tower. In operation the heat flows from the internal fluid circuit, through the tube walls of the coils, to the external circuit and then by heating of the air and evaporation of some of the water, to the atmosphere. Operation of the indirect cooling towers is therefore very similar to the open cooling tower with one exception. The process fluid being cooled is contained in a “closed” circuit and is not directly exposed to the atmosphere or the recirculated external water.

In a counter-flow cooling tower air travels upward through the fill or tube bundles, opposite to the downward motion of the water. In a cross-flow cooling tower air moves horizontally through the fill as the water moves downwar

Cooling towers are also characterized by the means by which air is moved. Mechanical-draft cooling towers rely on power-driven fans to draw or force the air through the tower. Natural-draft cooling towers use the buoyancy of the exhaust air rising in a tall chimney to provide the draft. A fan-assisted natural-draft cooling tower employs mechanical draft to augment the buoyancy effect. Many early cooling towers relied only on prevailing wind to generate the draft of air.

# Cooling tower basic knowledge.

If cooled water is returned from the cooling tower to be reused, some water must be added to replace, or make-up, the portion of the flow that evaporates. Because evaporation consists of pure water, the concentration of dissolved minerals and other solids in circulating water will tend to increase unless some means of dissolved-solids control, such as blow-down, is provided. Some water is also lost by droplets being carried out with the exhaust air (drift), but this is typically reduced to a very small amount by installing baffle-like devices, called drift eliminators, to collect the droplets. The make-up amount must equal the total of the evaporation, blow-down, drift, and other water losses such as wind blowout and leakage, to maintain a steady water level.

### Some useful terms, commonly used in the cooling tower industry:

**Drift** - Water droplets that are carried out of the cooling tower with the exhaust air. Drift droplets have the same concentration of impurities as the water entering the tower. The drift rate is typically reduced by employing baffle-like devices, called drift eliminators, through which the air must travel after leaving the fill and spray zones of the towe .

**Blow-out** - Water droplets blown out of the cooling tower by wind, generally at the air inlet openings. Water may also be lost, in the absence of wind, through splashing or misting. Devices such as wind screens, louvers, splash deflectors and water diverters are used to limit these losses.

**Plume** - The stream of saturated exhaust air leaving the cooling tower. The plume is visible when water vapor it contains condenses in contact with cooler ambient air, like the saturated air in one's breath fogs on a cold day. Under certain conditions, a cooling tower plume may present fogging or icing hazards to its surroundings. Note that the water evaporated in the cooling process is "pure" water, in contrast to the very small percentage of drift droplets or water blown out of the air inlets.

**Blow-down** - The portion of the circulating water flow that is removed in order to maintain the amount of dissolved solids and other impurities at an acceptable level.

**Leaching** - The loss of wood preservative chemicals by the washing action of the water flowing through a wood structure cooling tower.

**Noise** - Sound energy emitted by a cooling tower and heard (recorded) at a given distance and direction. The sound is generated by the impact of falling water, by the movement of air by fans, the fan blades moving in the structure, and the motors, gearboxes or drive belts.

# “Mtower” basic treatments.

“Mtower” basically operates three main treatments to grant cooling efficiency: inhibito , bleed and biocide.

### What is the purpose of inhibitor ?

Inhibitor is a chemical compound that, when added to water, decreases the corrosion rate of a metal or an alloy. It prevents cooling tower plant to mantain hoses efficiency in water circulating system

To set:

*Working Mode*

To setup and configure this function see page 1

### What does it mean bleed ?

A method for controlling the amount and concentration of make-up water and chemicals introduced into the recirculating water of a cooling tower system. A float operated make-up valve controls the addition of make-up water to the tower. As make-up water is added to the tower a vacuum is produced at an injector valve which draws chemicals from a chemical holding tank into the make-up water, thereby allowing precise control of the chemical concentration in the make-up liquid. Further, a bleed valve is provided which is responsive to the vacuum produced at the injector valve and bleeds a portion of the recirculating water to waste.

To set:

*Setpoint*
*Dead band*
*Time Limit*

To setup and configure this function see page 1

### What is a biocide ?

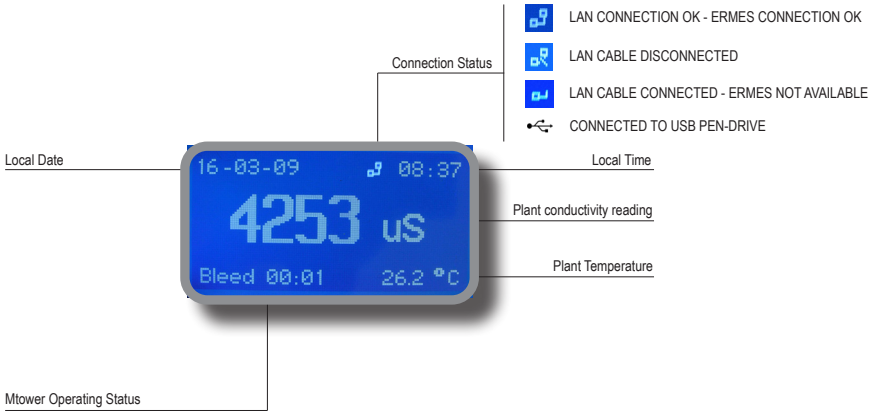
A biocide is a chemical substance capable of killing living organisms, usually in a selective way. They prevent the fouling of cooling tower water. Cooling tower users frequently apply biocides to the circulating cooling water to control growth of microorganisms, algae, and macroorganisms. Another very important reason for using biocides in cooling towers is to prevent the growth of Legionella, including species that cause legionellosis or Legionnaires’ disease, most notably L. pneumophila. “Mtower” can be set to perform also a pre-biocide (biocide activator or pre biocide treatment) activity.

To set:

*Pre-bleed*
*Pre-biocide*
*Biocide*
*Lockout*
*Week*

To setup and configure this function see page 1

# “Mtower” main screen.



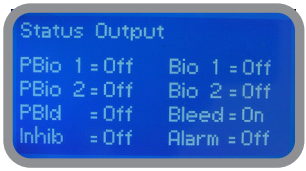

Mtower main display shows more information about plant proper functioning. By rotating wheel clockwise the instrument will show: “Status Output”, “Status Totalizer”, “Status Level”, “Status Alarm”, “Status Biocide”.
See next page for in-depth explanation.

## Mtower Operating Status Message.

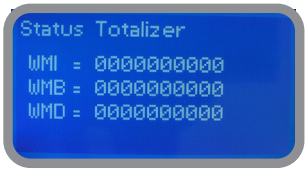
| ***Mtower Status message*** | ***Message Explanation*** | ***Action Required*** |
|---|---|---|
| “INHIBITOR” | INHIBITOR mode in progress.<br>Ouput 2-E-N active<br>**Corrosion inhibitor dosage in progress.** | No action required. |
| “BLEED hh:mm” | BLEED hh:mm mode in progress.<br>Output 1-E-N active<br>**Restoring conductivity.** | No action required. |
| “PRE BLEED” | PRE BLEED mode in progress.<br>Output 1-E-N active<br>**Water discharge before dosing biocide.** | No action required. |
| “PRE BIOCIDE 1 or 2” | PRE BIOCIDE 1 or 2 in progress<br>Output 5-E-N or 6-E-N active<br>**Biocide activator dosage in progress.** | No action required. |
| “BIOCIDE 1 or 2” | BIOCIDE 1 or 2 in progress<br>Output 3-E-N or 4-E-N active<br>**Killing dangerous organism in progress.** | No action required. |
| “LOCKOUT 1 or 2” | LOCKOUT 1 or 2 in progress<br>Output 1-E-N disabled<br>**Bleed mode locked after biocide dosage.** | No action required. |
| “ALARM” | ALARM<br>Output 10-11-12 active (see contact mode) | Check alarm by rotating wheel in main screen until to show “Status Alarm”<br>Once alarm status is fixed the instrument will resume interrputed activities. |
| “BLEED TIMEOUT” | Pre-bleed activity time exceeded | Check biocide 1 or 2 menu |

# “Mtower” status screen.

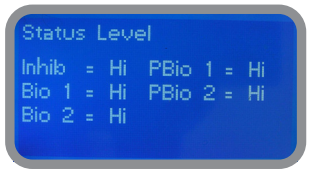
From main screen rotate wheel clockwise until main logo appears then rotate counter-clockwise (one click - one menu) for more information about instrument functioning. For more information rotate the wheel clockwise. The instrument will show: “Status Output”, “Status Totalizer”, “Status Level”, “Status Alarm”, “Status Biocide” and “Log Entry”.




***Status Output***
**PBio 1 or 2** : Pre Biocide 1 or 2 status
**Bio 1 or 2** : Biocide 1 or 2 status
**PBld**: Pre Bleed status
**Inhib**: Inhibitor status
**Bleed:** Output status
**Alarm:** Output status



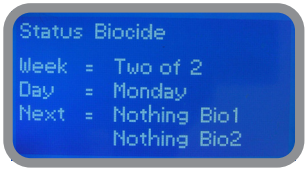

***Status Totalizer (1unit = 1lt)***
**WMI:** Main water input totalizer
**WMB:** Bleed water input totalizer
**WMD:** Plant water totalizer (“delta” between WMI and WMB)




***Status Level***
**PBio 1 or 2** : Pre Biocide 1 or 2 tank level
**Bio 1 or 2** : Biocide 1 or 2 tank level
**Inhib**: Inhibitor tank level
***HI:*** *High /* ***LO:*** *Low*

***Status Alarm***
**uS HI:** HIGH Conductivity Alarm
**uS LO:** LOW Conductivity Alarm
**BLD T:** Bleed Timeout Alarm
***Flow:*** *Flow Alarm*
*NO: there isn't flow, alarm active*
*YES: there is flow, alarm off*

***Status Biocide***
**Week:** Week number
**Day:** dosing day
**Next:** Next dosing activity




***Service Menu***

Connection Code for ERMES (through USB cable)
Connection Code for ERMES (through LAN cable)

***Log Entry***
Activities log

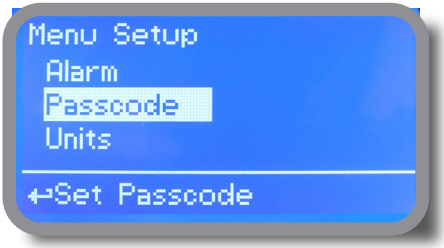
# “Mtower” basic settings.

**Basic settings are:** PASSCODEs, Time & Date, International Units.
**Standard settings are:** Probes calibration and operating modes (bleed - inhibitor - biocide).
**Advanced settings are**: Flow meter, Alarm and Option menu.

**All these three settings must be set in order to properly operate the instrument.**

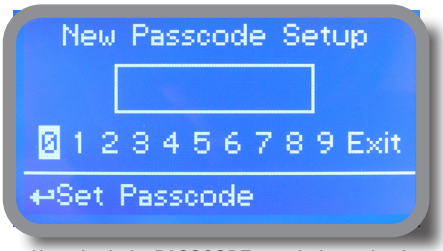
## PASSCODE for “Setup” and “Probe” menu access.

To grant access into “Setup” menu  press the wheel from main screen, choose “Setup” and enter the PASSCODE. If this is the first time here then the  PASSCODE is 0000 (factory preset). Press wheel 5 times to grant access. Otherwise press the wheel 1 time and enter the PASSCODE. Numbers can be selected by rotating the wheel.




To set a new PASSCODE choose “PASSCODE ” from “Setup” menu and enter a four numbers code. Click on “EXIT” and choose “YES” to save request.  The new PASSCODE is now ready.

**To change default PASSCODE for “PROBE” menu, repeat procedure once into that submenu.**




**Note: both the PASSCODEs are independent!**

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**Lost PASSCODE ?**
Please dont’ forget the PASSCODE (if changed). In the unfortunate event, please call your local distributor for unlocking procedure. There is no way for you to recover lost PASSCODE.

## Time & Date setup.

To grant access into “Setup” menu  press the wheel from main screen, choose “Setup” and enter the PASSCODE. Move on “CLOCK” and press the wheel.

To end procedure move cursor on “EXIT” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

**WARNING: when programming instrument (BIOCIDE) check into STATUS menu that DATE is correct, otherwise dosing accuracy could be affected. In this case set the correct date and reset instrument (default settings)**.

## Units setup.

To grant access into “Setup” menu  press the wheel from main screen, choose “Setup” and enter the PASSCODE. Move on “UNITS” and press the wheel.

Once into submenu press wheel twice on “UNITS” and rotate to choose between “US” unit standard or “IS” international unit standard. See table for differences.

| EUROPE IS (International Standard) | USA |
|---|---|
| Date (DD/MM/YY) | Date (MM/DD/YY) |
| Time 24h | Time AM / PM |
| °C Celsius | °F Farhenheit |
| Liters | Gallons |

To change conductivity reading scale from uS to PPM move wheel on “MEASURE UNIT” and press it twice.

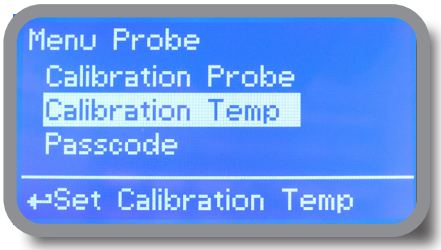
To end procedure move cursor on “EXIT” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

# “Mtower” standard settings.

**Standard settings are:** Probes calibration and operating modes (bleed - inhibitor - biocide).

## PASSCODE for “Probe” menu access.

To grant access into “Probe” menu  press the wheel from main screen, choose “Setup” and enter the PASSCODE. If this is the first time here then the  PASSCODE is 0000 (factory preset). Press wheel 5 times to grant access. Otherwise press the wheel 1 time and enter the PASSCODE. Numbers can be selected by rotating the wheel.




## “Calibration Probe” menu.

“Calibration Probe” menu includes conductivity calibration , temperature compensation and manual or automatic temperature compensation.

**Available on CDIND module only:** Before to begin calibration choose the probe’s scale using FS option (Full Scale)

**Conductivity calibration procedure involves a zero calibration (P1)  and a 2nd calibration point (P2) that requires a buffer solution with value near working range. Furthermore TE (Temperature) and CA (Automatic Compensation) must be set. Note: This procedure assumes that instrument is correctly installed and configured, connected to a working probe. Calibrate using plant’s temperature otherwise unattended results might occur.**

**P1 & P2**

During this procedure probe must be dry and clean and not installed in plant. Move wheel on “P1” then press wheel, move cursor on “OK” and press wheel again. Move wheel on “P2” then press wheel to enter into second point calibration submenu. Prepare buffer solution and dip probe’s sensor on it. Wait until reading value is stable and according to buffer solution value move wheel until it is the same on display (“uS default” field). End procedure moving cursor on “OK”

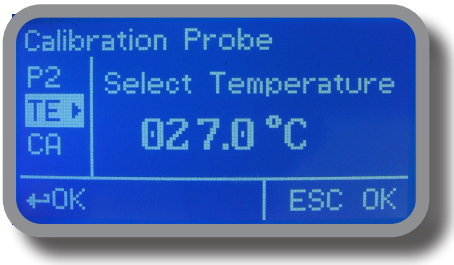
**TE & CA**

Conductivity measurements are temperature dependent. The degree to which temperature affects conductivity varies from solution to solution and can be calculated using the following formula: **C25 = C / {1+[a/100(t-25)]}**
where: C25 = solution conductivity at 25°C, C = conductivity at operating temperature, a = temperature coefficient of solution %/°C.

| Probe read value (uS or ppm) | Alpha (a) | Temperature (°C / °F) | Displayed Value (us or ppm) |
|---|---|---|---|
| 5227 | 1.2 | 35°C / 95°F | 4934 |
| 4524 | 3.5 | 27°C / 80.6°F | 4228 |
| 3924 | 2.1 | 40°C / 104°F | 2984 |

Samples alphas (a) are listed in the table above. To determine that “a” of other solutions, simply measure conductivity at a range of temperatures and graph the change in conductivity versus the change in temperature.

“MTOWER” has either fixed or adjustable automatic temperature compensation referenced to a standard temperature of 25°C. For **manual temperature compensation** move cursor on “TE”, press wheel and adjust manual temperature compensation.



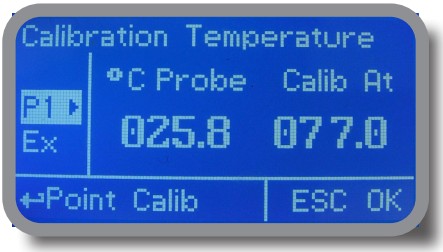

Move cursor on “OK” and press wheel again. Move cursor on “CA”, press wheel and choose DISABLE for manual temperature compensation.

Otherwise for **automatic temperature compensation** choose “ENABLE” and see “COEFF TEMP” in “OPTIONS” menu to set % Alpha value.

To end procedure move cursor on “EXIT” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

## “Calibration Temp” menu.

To calibrate probe’s temperature enter into “Calibration Temp” menu. A professional thermometer is required to obtain a reliable calibration. From “Menu Calibration” choose “Temp probe”.



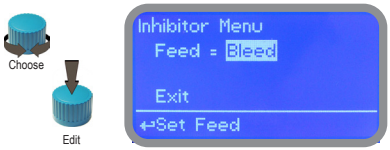

**Note: This procedure assumes that instrument is correctly installed and configured, connected to a working probe. Calibrate using plant’s temperature otherwise unattended results might occur.**

Using an external thermometer read actual temperature and edit related field “Calib. at”. Confirm by pressing wheel

To end procedure move cursor on “EXIT” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

## “Inhibitor” menu.

Inhibitor function can operate in 5 feeding modes. Press wheel and rotate to choose most suitable mode.
“WM PPM” submenu can be edited within “L/h” or “cc/st”.

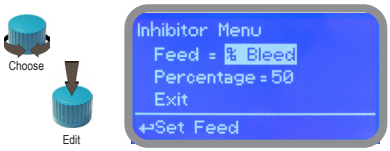



Affected I/O on board: 2-E-N

**Feed & Bleed**.

Once Bleed mode has been set, the operating time for feeding procedure will be the same as for bleeding. Before setting this mode first configure “Bleed Menu” from “Men Setup”.

No further options need to be set.

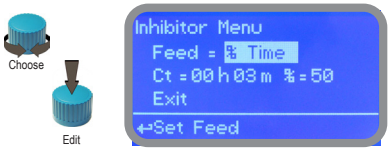



Affected I/O on board: 2-E-N

**Feed & % Bleed**.

Once Bleed mode has been set, the operating time for feeding procedure will be a percentage of total time needed for bleeding.Before setting this mode first configure “Bleed Menu” from “Menu Setup”.

Set percentage time.

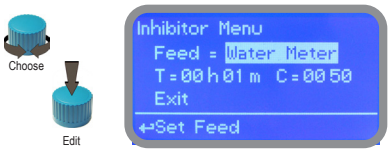



Affected I/O on board: 2-E-N

**Feed & % Time.**

The operating time for feeding procedure will be a percentage (%) of cycle time (Ct).

E.g.: Ct= 1h 00m and %=50.
Inhibitor activity: 0h 30m.

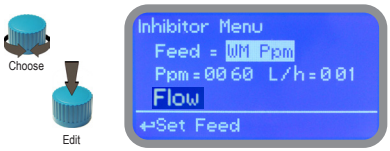



Affected I/O on board: 2-E-N and WMI (Makeup)

**Feed & Water Meter (WMI).**

The operating time for feeding procedure will be active for a time (T) every (C) water meter pulses. Before setting this mode first configure “Flow meter menu” from “Men Setup”.

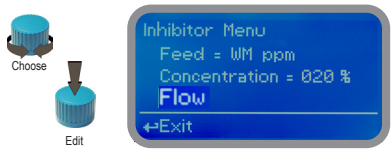
E.g.: T= 00h 30m and C=0050.
Inhibitor activity: 30min every 50 pulses from water meter (WMI)




Affected I/O on board: 2-E-N and WMI (Makeup) and IS

**Feed & WM Ppm (WMI).**

The operating time for feeding procedure will be active to keep product concentration (Ppm) based on pump’s flow (L/h liters per hour, setpoint output) and Water Meter counter with a minium of 10 seconds activity. Furthermore pump’s capacity can be edited into cc per stroke (cc/st, proportional output) using ppm to set strokes needed to dose. Otherwise manual concentration value (%) can be set (rotate wheel). Before setting this mode first connect IS pump to the instrument and configure “Flow meter menu” from “Menu Setup”.




Affected I/O on board: 2-E-N and WMI (Makeup) and IS

**Flow.** “NO”: even if there isn’t flow the inhibitor pump will continue to operate. “STOP” the inhibitor pump will stop during a no flow occurrenc .

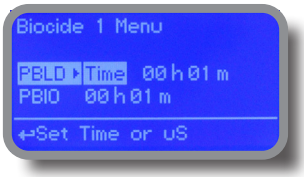
## “Biocide 1” and “Biocide 2” menu.

Usually two types of chemicals (e.g.: oxidizer + non-oxidizer) are used to obtain best results in killing dangerous microorganisms. Use “Biocide 1” and “Biocide 2” menus to configure these tasks. Parameters to set are the same for both menus.

**Parameters to set are:**

Pre-bleed **(PBLD)**: Timered or conductivity (uS/PPM) setpoint for bleed valve activity. 1-E-N on mainboard.

Time mode




Bleed valve is open for set time

Setpoint mode (conductivity probe reading)

Bleed valve is open if probe’s conductivity read value exceed set value

Pre-biocide **(PBIO)**: This option set Pre-biocide (1 or 2) output active for set time.
Pre-biocide is generally used for biocide-activator chemicals.
Pre-biocide 1 will activate 5-E-N output. Pre-biocide 2 will activate 6-E-N output.

Lockout **(LCK)**: This option lock (keep closed) bleed valve for set time at the end of biocide activity.

Week **(WK)**:
Day **(DAY)**: This option set events repeatability on daily or weekly basis for set amount of time (see page 22).

E.g.: 00 01 @ 01:00 (hh mm @ hh mm)

Biocide activity will start every Tuesday for 1 minute at 01:00 AM*

**NOTES:**

1) Activity execution order for selected options is:
*1st Pre-bleed*
*2nd Pre-biocide*
*3rd Biocide*
*4th Lockout*

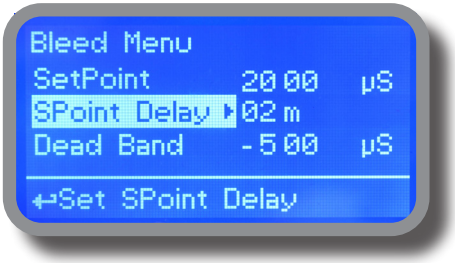
2) Pre-bleed option in conductivity mode has a time limit that can be set from “BLEED” menu. If conductivity value can’t be restored within a time then the bleed valve will be closed and an alarm generated (“Bleed Timeout”).

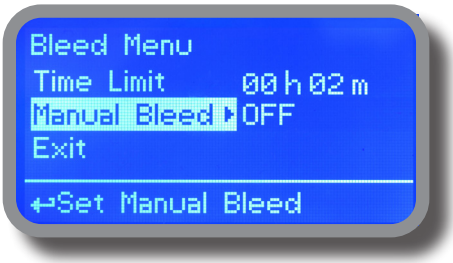
3) Set 00h 00m to disable single option

4) *Execution time, for selected options, will begin calculating total events time and it will begin prior biocide time activity. (see “WK” option for starting time).

## “Bleed” menu.

A method for controlling the amount and concentration of make-up water and chemicals introduced into the recirculating water of a cooling tower system. A float operated make-up valve controls the addition of make-up water to the tower. As make-up water is added to the tower a vacuum is produced at an injector valve which draws chemicals from a chemical holding tank into the make-up water, thereby allowing precise control of the chemical concentration in the make-up liquid. Further, a bleed valve is provided which is responsive to the vacuum produced at the injector valve and bleeds a portion of the recirculating water to waste. From “Menu Setup” choose “Bleed” and configure the following pa ameters:

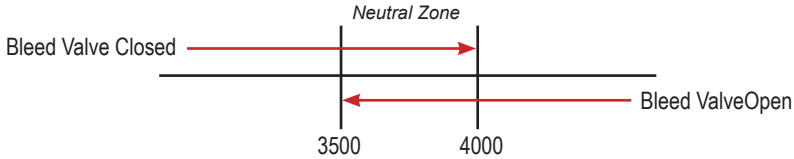



**Setpoint:** target value for conductivity.
**Setpoint delay:** waiting time after setpoint target has been reached

**Dead Band:** “Mtower” opens bleed valve when reaching setpoint and it leaves valve opens until conductivity value reaches dead band set value. Choose “-“ before Dead Band value to invert bleed valve working mode.

E.g.: Setpoint is 4000 uS and Dead Band is 500 uS




**Time Limit:** this option set a time limit within restoring conductivity value. Outreaching this time the “Mtower” will close bleed valve and generate an alarm.

**Manual Bleed:** this option manually operates bleed valve for set time. Valve operation begins immediately after wheel is pressed to confirm working time

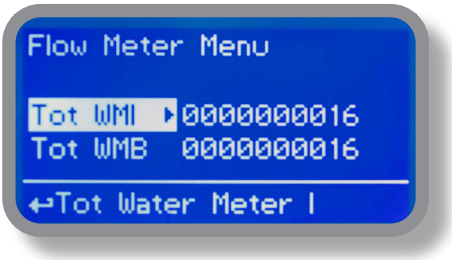
To end procedure move cursor on “EXIT” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

# “Mtower” advanced settings.

**Advanced settings are**: Flow meter, Alarm and Option menu.

## “Flow meter” menu.

This menu allows to configure: totalizer for water meter input , totalizer for water meter bleed, working mode and counters reset.

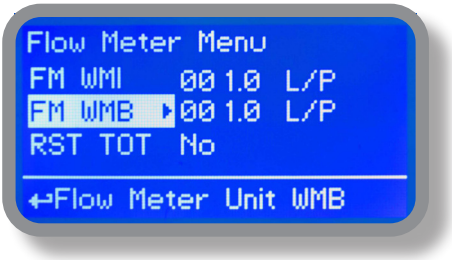



**WMI:** Main water input totalizer (not editable)

**WMB:** Bleed water input totalizer (not editable)

**FM WMx:** L/P (liters per pulses) or P/L (pulses per liters)

FM WMI (pulse sender water meter input)
FM WMB (pulse sender water meter bleed)

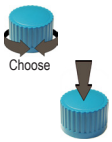



**RST TOT** : reset both WMI and WMB counters

To end procedure move cursor on “EXIT” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

## “Alarm” menu.

This menu allows to enable / disable / set all system alarms and related outputs.




**WM1:** Alarm for pulse sender water meter input
**WM2:** Alarm for pulse sender water meter bleed

**STOP: set time since block** (0:00) activation delay
**NO:** option disabled

**CF:** Concentration factor (ratio between input water and waste water)

**OFF:** option disabled
**Ratio:** WMI / WMB ratio
**Delay:** activation delay
**Tolerance value (%)**

**LOC:** “LOW CONDUCTIVITY” alarm.

**OFF:** alarm disabled
**ABS:** (absolute) alarm on set value*
**TRK:** (track) alarm on bleed setpoint minus track value*
**STOP/NO***
**Track alarm (TRK) e.g.:**
*Bleed setpoint is set to 4000 and track alarm is set to 1000.*
*Alarm will switch on at 3000.*

**HIC:** “HIGH CONDUCTIVITY” alarm.

**OFF:** alarm disabled
**ABS:** (absolute) alarm on set value*
**TRK:** (track) alarm on bleed setpoint minus track value*
**STOP/NO***
**Track alarm (TRK) e.g.:**
*Bleed setpoint is set to 4000 and track alarm is set to 1000.*
*Alarm will switch on at 5000 (4000+1000).*

**CLS:** Chemicals level alarm.
**STOP:** low chemical tank level alarm is generated and related output disabled
**NO:** option disabled

**NFW:** flow sensor alar
**STOP:** no flow alarm generated
**NO:** option disabled

**OUT AL:** Alarm contact activation
**EN:** Alarm contact enabled
**DIS:** Alarm contact disabled

**BLT:** Bleed timeout happens when time limit is reached (see bleed menu)
**NO:** option disabled, alarm message is shown
**STOP:** the controller stops bleeding procedure and alarm message is shown

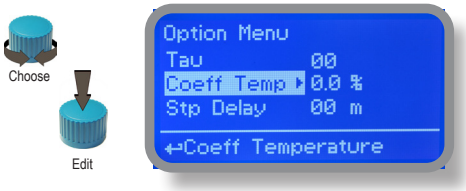
*Alarm contact (10-11-12) enabled, all outputs disabled.

* ON ALL CHANNELS THE ALARM (HI / LOW) CAN BE ENABLED TO SHOW A MESSAGE AND DISABLE OUTPUTS (“STOP”) OR JUST DISPLAY A MESSAGE (“NO”)

To end procedure move cursor on “EXIT” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

## “Options” menu.

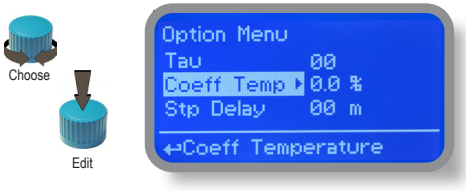
Press wheel and rotate to choose.




**TAU:** if probes reading values are displayed too fast increase TAU value to stabilize them. Default value is 03. Maximum value is 30.

**Coeff Temp:** Temperature compensation. Minimum value is 0% (disabled), maximum value is 5%. See page 15 for more info.

**Startup Delay:** Startup time delay at instrument startup (power on). Minimum value is 0m (disabled), maximum value is 99minutes.



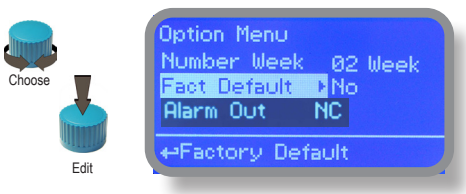

**FLOW:** Flow contact (34-35-36) working mode.
Set to “NORMAL” for Normally Open (N.O.) contact type.
Set to “REVERSE” for Normally closed (N.C.) contact type.
Set to “DISABLED” to disable contact.

**OUT CURRENT:** mA current output configuration.
Set to 4/20 mA for 4 (setpoint low) and 20 (setpoint high) mode.
Set to 0/20 mA for 0 (setpoint low) and 20 (setpoint high) mode.

**Cd mA High and Cd mA Low** are related to maximum and minimum **conductivity** value for “mA output 1”.

**Temp mA HI and Temp mA Low** are related to maximum and minimum **temperature** value for “mA output 2”.

**NUMBER WEEK:** Set weeks number for “Biocide 1” and “Biocide 2” working mode. See page 18 for more info.




**FACT. DEFAULT:** it reverts instrument to factory settings including PASSCODE (“0000”).

**ALARM OUT:** working mode for alarm output contact N.O. (normally open) or N.C. (normally closed)

**IF ALARM:** set this option to DISABLE if mA outputs must be disabled during an alarm event or ENABLE to let mA outputs enabled during an alarm event.

**IWM:** set the meter input for the Inhibitor WM ppm or Inhibitor WM mode (WM1 or WM2 or both).

## “Manual” menu.

This menu allows to manually operate all outputs for a choosen time once back to main menu. For proper operation make sure that the option into “Output Manager” menu has been set to “Manual” mode.

**Options are:**

**OUTPUT MANAGER -> Auto / Manual / Stop**

**AUTO = Normal operation**
**MANUAL = Active the output for a set time going back to main screen.**
**Once time is expired the instruments returns to AUTO mode.**
**STOP = outputs, levels, inputs disabled.**

**Outputs available are:**

***OUT BLEED***
This option manually operate “bleed valve” on 1-E-N blocks.

***OUT INHIB***
This option manually operate “inhibitor” output on 2-E-N blocks.

***OUT PRE-BIO 1***
This option manually operate “pre-biocide 1” output on 5-E-N blocks.

***OUT PRE-BIO 2***
This option manually operate “pre-biocide 2” output on 6-E-N blocks.

***OUT BIO 1***
This option manually operate “biocide 1” output on 3-E-N blocks.

***OUT BIO 2***
This option manually operate “biocide 2” output on 4-E-N blocks.

***OUT ALARM***
This option manually operate “general alarm output” output on 10-11-12 blocks.

***OUT mA 1***
This option manually operate “mA output 1” output on 13-14 blocks.

***OUT mA 2***
This option manually operate “mA output 2” output on 13-15 blocks.

***OUT BIO DISP.***
This option manually operate “Biodispersant” output on 9-10 blocks.

**Move wheel on “EXIT” to return to “Menu setup” and automatically revert outputs to their original status.**

## “RS485” menu.

Prior to install the instrument into an RS485 local system a unique ID NUMBER (from 1 to 30) and ID NAME (station name) must be set. Rotate wheel and edit fields. If ID number has already assigned an error message will follow after ID Check (move cursor on CHECK and press wheel). In this event try using another number.

## “GSM” menu.

Instrument may remotely send SMS alarm messages using its own modem (sold as option). It can be configured as follows:

**SMS1 / SMS2 /SMS3.**
Using the wheel enter a mobile phone that will receive alert SMS messages if something wrong occurrs. SMS number must be set using local number format. For example : 3391349134 will send an SMS message to mobile phone.
Log level (and SMS frequency alert) may be set using options in “ACTIVE MSG” within “GSM menu”.

MSG Flow (Flow)
MSG Bio 1 e 2 (Biocide)
MSG PreBio 1 e 2 (Pre-biocide)
MSG Inhib (Inhibitor)
MSG HI uS
MSG Lo uS
MSG Bld T (Bleed)

**- TO AVOID UNDESIRED MESSAGES USE CAREFULLY LOG SETUP -**

**- WARNING: THIS FUNCTION COULD NOT BE FREE OF CHARGE. DEPENDING ON YOUR OPERATOR CONTRACT IT COULD GENERATE PAYING SMS TRAFFIC !**

## “TCP/IP” menu.

The instrument can be remotely operated using a standard ethernet connection (sold as option). A static or dynamic IP address and a CAT5 ethernet cable is required. According to your network capacity connection speed is 10/100Mbps. To obtain a valid IP address and subnet mask contact your net administrator. Enter parameters and move cursor on “SAVE” to store parameters then move on “OK” and press wheel to save and activate configuration.

Based on your network configuration choose to obtain network parameters automatically (DYNAMIC) or manually (STATIC).

**See “ERMES Communication Software” manual for proper PC software configuration.**

---

**What is a static IP address/dynamic IP address?**

A static IP address is a number (in the form of a dotted quad) that is assigned to a computer by an Internet service provider (ISP) to be its permanent address on the Internet. Computers use IP addresses to locate and talk to each other on the Internet, much the same way people use phone numbers to locate and talk to one another on the telephone. When you want to visit whatis.com, your computer asks a domain name system (DNS) server (think telephone information operator) for the correct dotted quad number (think phone number) for whatis.com and your computer uses the answer it receives to connect to the whatis.com server.
It would be simple if every computer that connects to the Internet could have its own static IP number, but when the Internet was first conceived, the architects didn’t foresee the need for an unlimited number of I addresses. Consequently, there are not enough IP numbers to go around. To get around that problem, many Internet service providers limit the number of static IP addresses they allocate, and economize on the remaining number of IP addresses they possess by temporarily assigning an IP address to a requesting Dynamic Host Configuration Protocol (DHCP) computer from a pool of I addresses. The temporary IP address is called a dynamic IP address.

Requesting DHCP computers receive a dynamic IP address (think temporary phone number) for the duration of that Internet session or for some other specified amount of time. Once the user disconnects from the Internet, their dynamic I address goes back into the IP address pool so it can be assigned to another user. Even if the user reconnects immediately, odds are they will not be assigned the same IP address from the pool. To keep our telephone telephone analogy going, using a dynamic IP address is similar to using a pay phone. Unless there is a reason to receive a call, the user does not care what number he or she is calling from.

There are times, however, when users who connect to the Internet using dynamic IP wish to allow other computers to locate them. Perhaps they want to use CU-SeeMe or use a VoIP application to make long distance phone calls using their IP connection. In that case, they would need a static IP address. The user has two choices; they can contact their ISP and request a static IP address, or they can use a dynamic DNS service. Either choice will probably involve an additional monthly fee.

Using a dynamic DNS service works as if there was an old-fashioned telephone message service at your computer’s disposal. When a user registers with a DNS service and connects to the Internet with a dynamic IP address, the user’s computer contacts the DNS service and lets them know what IP address it has been assigned from the pool; the service works with the DNS server to forward the correct address to the requesting DHCP computer. (Think of calling the message service and saying “Hi. I can be reached at 435.44.32.111 right now. Please tell anyone who tries to reach me to call that number.) Using a dynamic DNS service to arrange for computers to find you even though you are using a dynamic I address is the next-best thing to having a static IP.

## “GPRS” menu.

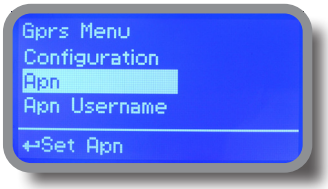
Instrument can be remotely operated using an embedded standard GPRS modem (sold as option). In order to activate this service please ensure that the following steps are correctly completed:

- Make certain the antenna location is not shielded by metal objects or near sources of electrical ‘noise’.

- Make certain the distance from the antenna to the “Instrument” unit is within cable length.

- Do not route the cable where it could be pinched in doors, windows etc.

- Ensure that SIM into “Instrument” modem is correctly inserted, activated and within operator range.



Instrument can be set for automatic configuration (Configuration option set to “Automatic”) or manually (Configurati option set to “Manual”) based on your SIM data access parameters. For manual configuration option enter APN (access point name) and SIM phone number. Move wheel on “OK” to save and move on “ESC” to go back to main menu.

**Don’t forget to enter SIM CODE into PIN NUMBER menu to unlock SIM.**

**WARNING: THIS FUNCTION COULD NOT BE FREE OF CHARGE. DEPENDING ON YOUR OPERATOR CONTRACT IT COULD GENERATE PAYING DATA TRAFFIC !**

## “Email” menu.

If Ethernet module or GPRS module is installed (sold as option) the instrument can be configured to send email alarm messages up to two recipients. Click on “Email 1” or “Email 2” and enter email address.

Access point name (APN) identifies an I packet data network (PDN), that a mobile data user wants to communicate with. In addition to identifying a PDN, an APN may also be used to define the type of service, (eg connection to wireless application protocol ( AP) server, multimedia messaging service (MMS)), that is provided by the PDN. APN is used in 3GPP data access networks, eg general packet radio service (GPRS), evolved packet core (EPC).

## “LOG” menu.

This function records instrument acitvity (date, hour, temperature, uS, totalizer I/O, alarms, outputs). It starts for selected frequency period (every) at requested time (time).

Set ACTIVE to “enabled” to activate log recording.

TIME: recording start time (time format 23h e 59min)

EVERY: recording frequency (time format 23h e 59min)

REPORT: email sending interval Hourly,Daily,Weekly,Monthly,Disabled. (File format is .csv)

OUTPUT: yes / no for outputs log recording

Note: advanced log control (graph, printing, comparison tables, event filtering, etc) is available through “ERMES Communication Software” for PC.

**See “ERMES Communication Software” manual for proper PC software configuration.**

**SET DATE & TIME BEFORE TO ENABLE LOG. IF NOT POWERED FOR ABOUT 30 DAYS THE INSTRUMENT WILL LOSE DATE/TIME**

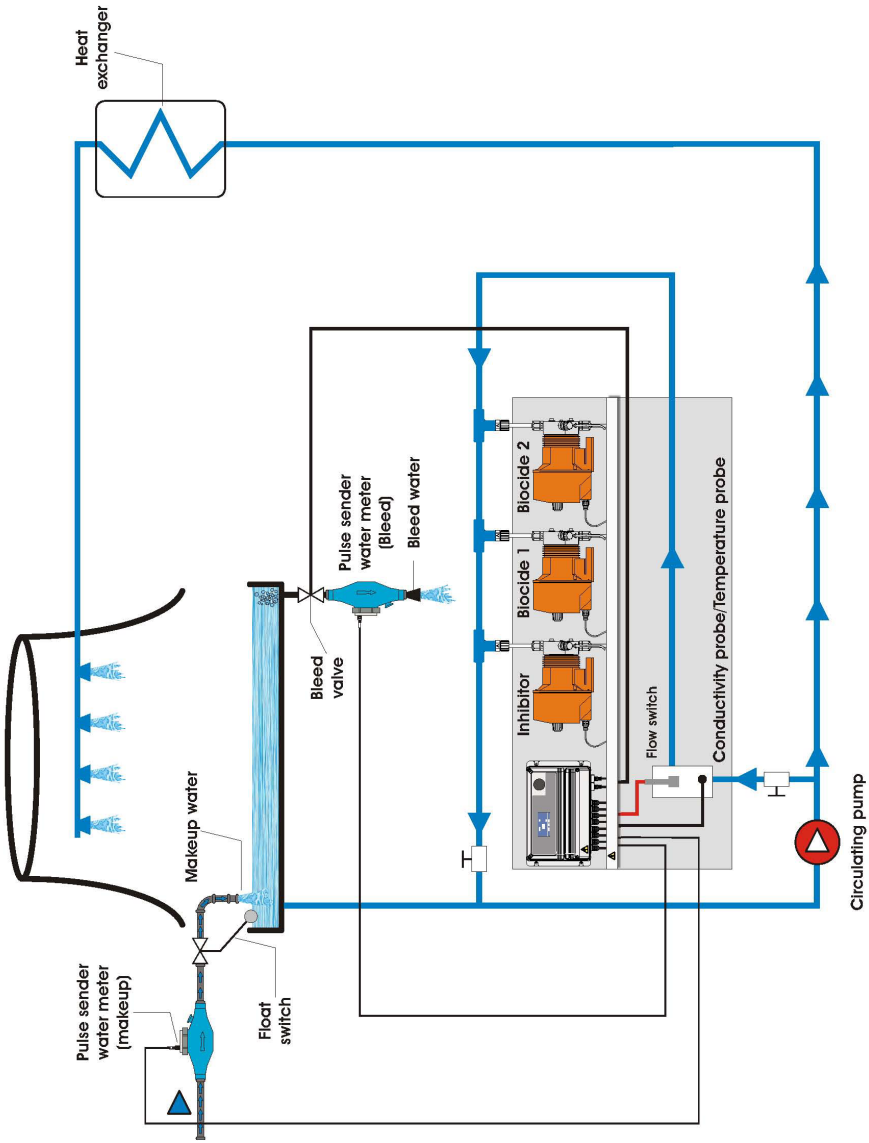
## “Service”

This “view only” menu shows probes reading live and instrument ID for USB LOG connection (if device’s connected). Press “ESC” to exit.

Connection Code for ERMES (through USB cable)

Connection Code for ERMES (through LAN cable)

# Appendix A - Installation draw.



# Appendix B - MDCD Probe Connection.

Located in **upperside of mainboard** there are four connectors that can be used to install probe modules. Modules come pre-installed upon request. Identify installed modules to correctly connect probes.

**MDCD**

Connect probe as follows:

Block n.1 : n/a
Block n.2 : Power IN (probe)
Block n.3 : Signal OUT (probe)

For versions PT / NTC connect the remaining wires on the main board in the temperature input

# Appendix B - MDIND Probe Connection.

How to connect **inductive conductivity probe** (8 wires cable).

Conductivity probe connections with internal or external PT100

**MDIND**

Block n.1 : GND
Block n.2 : GND
Block n.3 : SIGNAL
Block n.4 : POWER

Connect the wires for **external PT100** to the terminal board of the main board as follows:

Block n. 50 : green
Block n. 51 : pink / orange
Block n. 52 : white
Block n. 53 : yellow

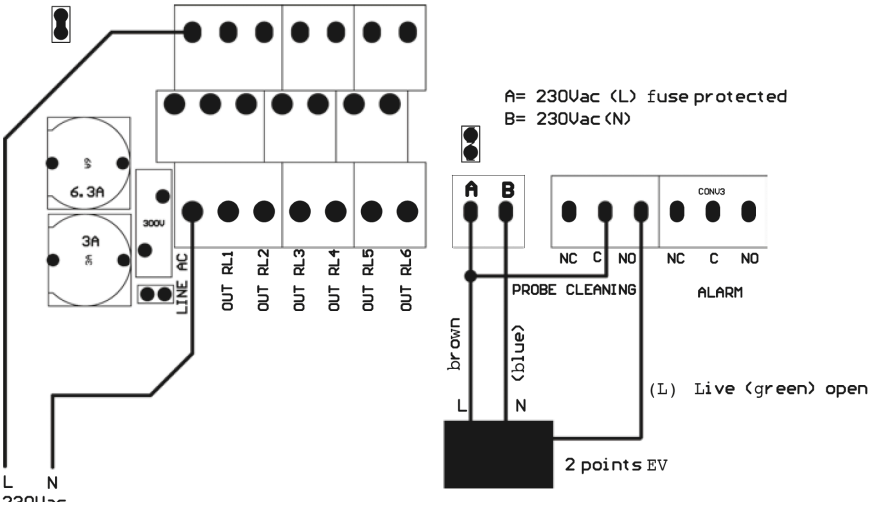
**MDECDSIND**

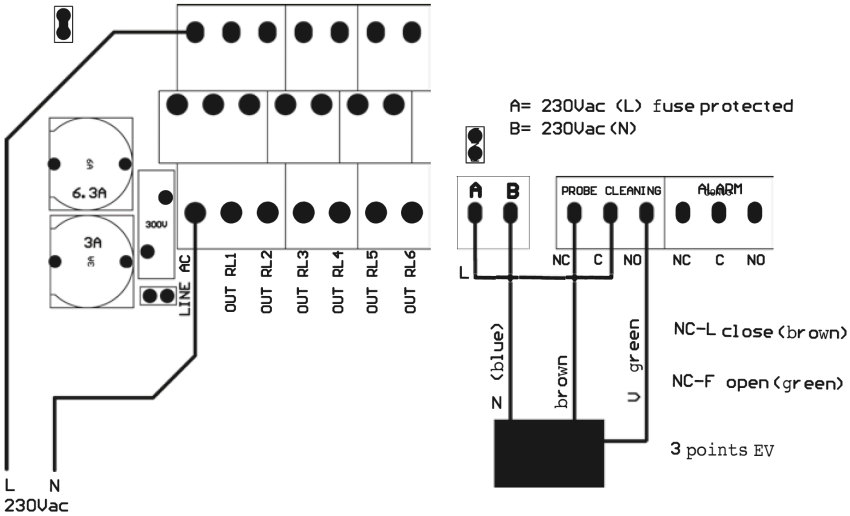
Block n.1 : GND
Block n.2 : SIGNAL
Block n.3 : POWER

Connect the wires for **internal PT100** to the terminal board of the main board as follows:

Blocks n. 50 + 51: white
Blocks n. 52 + 53: green

# Appendix C - Motorized valve connection

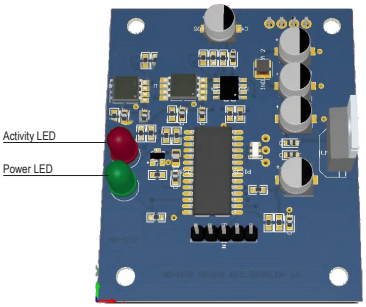


# Appendix Communication HARDWARE - "LOG USB" Module

Located under mainboard cover there is a four pins connector that can be used to install "USB data log module" or "SMS module". Modules come pre-installed upon request and may appear different as shown (different configurations).

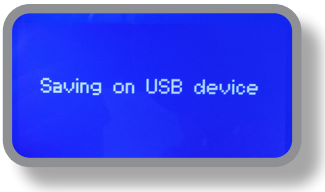
"USB data log module" records instrument activities. These information can be permanently stored into a standard USB pendrive. Pendrive can be connected to a PC using "ERMES" web **www.ermes-server.com** to review and print instrument's activities. **To obtain reliable results with this feature please set instrument ID and NAME from "RS485 Setup" menu and activate log recording from "LOG SETUP" menu.**



Standard USB pendrive
(not included)

Insert USB pendrive here
(right side of instrument)
After usage put back USB cap

**HOW TO RECORD INSTRUMENT'S ACTIVITIES INTO USB PENDRIVE ?**
Insert USB pendrive into USB connector (located on the right side of instrument). Instrument will save data log on USB pendrive.




**HOW TO REVIEW INSTRUMENT'S ACTIVITIES RECORDED INTO USB PENDRIVE ?**
It's necessary to connect to web "ERMES" **www.ermes-server.com** to review USB pendrive info on a PC.

## Addendum to board installation

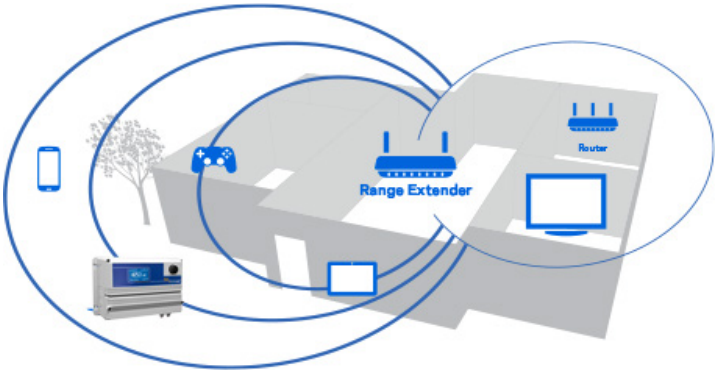
The instrument MTower can control the power supply (230VAC) metering pumps type constant for example KCL PLUS or TCL, in automatic and manual mode, to access the manual dosing is necessary to enter the PW, enter the menu and select the manual pump.

Otherwise you can use a pump series AMSMF, KMSMF or TMSMF always with the power supply connected to the network and enable the pump by connecting the outputs (24VDC 5mA max) 1 (-), 2 (+) Biocide1; 3 (-) , 4 (+) Biocide 2; 5 (-), 6 (+) Prebiocide 1; 7 (-), 8 (+) Prebiocide second input of the stand by the related metering pump.
In the menu of the pump must be activated standby mode NC
For manual dosing is sufficient to press the small button on.

To use the proportional output 9 (-), 10 (+) and 11 (-), 12 (+) is necessary to install a pump of the type AMSMF, KMSMF, TMSMF or VMSMF or a pump type AMSPLUS or KPlus, programmed in divided to 1.

# Appendix - WIFI Connection

Within Communication Menu choose "WIFI" to bring wireless sub-menu. Wait until desired wireless network appears, move wheel on it then click. Enter WEP / WPA / WPA2 password (if required) and wait until connection has been estabilished and WiFi signal strength appears. To obtain a reliable connection be sure to install the controller within WiFi range. See your router features and installation procedure for best results.



WiFi signal strength

# Appendix - MODBUS

Modbus is a serial communications protocol originally published by Modicon (now Schneider Electric) in 1979 for use with its programmable logic controllers (PLCs). Simple and robust, it has since become a de facto standard communication protocol, and it is now a commonly available means of connecting industrial electronic devices.

From main menu select SETUP then MODBUS to access the options. Set the communication speed according to the PLC system available. Set the ID assigning an UNIQUE address to avoid conflicts.

**In the OPTIONS menu the ERMES functionality must be set to NO to use the MODBUS protocol.**

# APPENDIX – BIODISPERSANT

The BIODISPERSANT menu allows the automatic dosing of the biodispersant product in the cooling circuit of the evaporative cooling tower to be configured and managed.

Setup → pw → inhibitor → biocide1 → biocide2 → bleed → biodisp → flow meter →

The biodispersant is a chemical product used to promote the dispersion of organic deposits and biofilm present on the surfaces of the system, improving the effectiveness of biocide treatments and helping to keep the hydraulic circuit clean. Dosing is performed proportionally to the volume of make-up water measured by the water meter connected to the instrument (WM-IN). Based on the configured parameters, the MTOWER CD automatically calculates the number of pulses required to control the dosing pump connected to the dedicated proportional output (terminals 9-10).

*Configuration Parameters*
Enable / Disable
Allows the automatic dosing of the biodispersant to be enabled or disabled.

*ppm (Desired Concentration)*
Allows the desired concentration of biodispersant in the make-up water to be set, expressed in ppm (parts per million). The configured value is used by the instrument to calculate the amount of product to be dosed according to the volume of water measured by the water meter.

*Setting range: 1 ÷ 9999 ppm.*
cc.st (Volume per Stroke)
Allows the volume of product delivered by the dosing pump for each stroke to be set, expressed in cubic centimetres per stroke (cc/st). This parameter must correspond to the actual amount delivered by the pump for each control pulse. The instrument uses this value to determine the number of pulses required to achieve the configured concentration.

*Setting range: 0.01 ÷ 99.99 cc/st.*
Conc (Product Concentration)
Allows the percentage concentration of the chemical product used to be set. This parameter indicates the concentration of the biodispersant product and allows the instrument to adjust the dosing according to the dilution of the product being used. A value of 100% indicates that the product is used at its reference concentration, without any further dilution.

*Dosing Operation*

When the function is enabled, the MTOWER CD receives the pulses generated by the make-up water meter and determines the amount of biodispersant to be injected into the circuit. The dosing calculation takes the following parameters into account:

1. Desired biodispersant concentration (ppm).
2. Volume of product delivered per pump stroke (cc/st).
3. Percentage concentration of the product used (Conc).
4. Volume of make-up water measured by the water meter.

Based on these values, the instrument generates the pulses required to control the dosing pump, maintaining a dosing rate proportional to the amount of water introduced into the system.

NOTE: Before enabling dosing, make sure that the make-up water meter is correctly configured and that the cc/st value corresponds to the actual volume delivered by the dosing pump. Incorrect parameter settings may result in insufficient or excessive dosing of the chemical product.

# INDEX.


**INTRODUCTION** page 3
The wheel page 3

**MAINBOARD CONNECTIONS** page 4
**COOLING TOWER BASIC KNOWLEDGE** page 6
**“MTOWER” BASIC TREATMENTS** page 8

“MTOWER” main screen page 9
“Mtower” operating status messages page 9

“MTOWER” status screen page 10

**“MTOWER” BASIC SETTINGS** page 11
PASSCODE setup page 11
Time & Date setup page 12
Unit setup page 13

**“MTOWER” STANDARD SETTINGS** page 14
PASSCODE setup page 14
“Calibration Probe” menu page 14
“P1” & “P2” page 14
“TE” & “CA” page 15
“Calibration Temp” menu page 16
“Inhibitor” menu page 17
“Biocide 1” and “Biocide 2” menu page 18
“Bleed” menu page 19

**“MTOWER” ADVANCED SETTINGS** page 20
“Flow meter” menu page 20
“Alarm” menu page 21
“Options” menu page 22
“Manual” menu page 23
“RS485” menu page 24
“GSM” menu page 24
“TCP/IP” menu page 25
“GPRS” menu page 26
“EMAIL” menu page 26
“LOG” menu page 27
“SERVICE” menu page 27

**APPENDIX A - INSTALLATION DRAW** page 28
**APPENDIX B - CONDUCTIVITY PROBE** page 29
**APPENDIX C - Connection to a motorized valve** page 30
**APPENDIX Communication “LOG USB”** page 32
**APPENDIX WIFI COMM.** page 33
**MODBUS** page 34

## PRECAUTIONS RELATING TO DIRECTIVES, REGULATIONS AND STANDARDS

### § CE/EU and UKCA marking

We guarantee that this product meets the essential requirements of the applicable Directives and Regulations based on the following specifications. Please carefully consider the following specifications for use of the product in European Union member countries and the United Kingdom.

**• CE/EU harmonized directives and standards**

**Directives**

DIRECTIVE 2014/35/EU
DIRECTIVE 2014/30/EU
DIRECTIVE 2011/65/EU
DELEGATED DIRECTIVE (EU) 2015/863

**Harmonized standards**

EN ISO 12100
EN IEC 61326-1
CEI EN 61010-1
EN IEC 63000

**• UKCA harmonized regulations and standards**

**Regulations**

2008 2016 No. 1091
2016 No. 1101
2012 No. 3032

**Harmonized standards**

BS EN ISO 12100
BS EN IEC 61326-1
BS EN 61010-1
BS EN IEC 63000

**Disposal of end-of-life equipment by users**

This symbol warns you not to dispose of the product with normal waste. Respect human health and the environment by giving the discarded equipment to a designated collection center for the recycling of electronic and electrical equipment. For more information visit the online site.

When dismantling a pump please separate material types and send them according to local recycling disposal requirements. We appreciate your efforts in supporting your local Recycle Environmental Program. Working together we'll form an active union to assure the world's invaluable resources are conserved.