



TECHNICAL BOOK
[INSTALLATION,SET UP,MAINTENANCE]

TELEPOOL

Professional



ver b_05 del 03/2008
Telepool ver 2.5



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GENERAL CLAUSES

Although the maximum care has been set in the elaboration of this document, ENGINEERING CORPORATION cannot guarantee the exactness of all the information here contained and it cannot be held responsible neither of the errors that this could involve, neither of the damages that could result from the use or from the application of it. The material products, the software and the services introduced in this document can be updated in as for characteristics of presentation, of operation, the firm ENGINEERING CORPORATION reserves him the right of possible changes without warning.

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AUTHORISED TECHNICAL ASSISTANCE CENTERS

ENGINEERING CORPORATION SRL

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GENERALITY

INFORMATION ON THE MANUAL

This document contains information of reserved ownership.
They can be subject to changes and updating without warning.

Chronology of press:

Before edition: Telepool Professional For version b December 0.1 th 2006

Second edition: Telepool Professional For version b September 0.2 th 2007

Third edition: Telepool Professional For version b December 0.3 th 2007

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The manual present is integral part of the tool.

During the first installation of the instrument, the operator has to effectuate an accurate control of the content of the manual with the purpose to verify the integrity and the completeness of it.

In the case it resulted ruined, incomplete or inadequate, please contacted the firm ENGINEERING CORPORATION srl to quickly replace the non-conforming manual.

The official versions of the manual, of which the firm ENGINEERING CORPORATION srl is directly responsible, they are those in Italian language. The firm ENGINEERING CORPORATION srl is not taken on any responsibility in comparison to possible translations in different languages performed by distributors or same consumers.

The observance of the operational procedures and the instructions, described in the manual present it is an essential requisite for the correct operation of the instrument and to guarantee the safety of the operator.

The manual must be reads in all of its parts, in front of the instrument as phase necessary to the use, so that results clear the formalities of operation, the commands, the connections to the peripheral equipments and the precautions for a correct and sure use.

The manual of use has to be preserved, entire and legible in all of its parts, in a sure place and at the same accessible time quickly from the operator during the operations of installation, use and/or revision of the installation.

CONVENTIONS

The present "user manual" uses the following conventions :



NOTE

The notes contain important information to put in evidence in comparison to the rest of the text. They generally contains useful informations to the operator to perform in correct way and to optimize the operational procedures of the instrument.



ADVERTISING

The advertising message appear in the manual before procedures or of operations that must be observe for avoiding the to verify him of possible losses of data or damages to the equipments.



ATTENTION

The messages of attention appear in the manual in correspondence of the description of procedures or operations that, if you perform in non correct way, could cause damages to the operator.

DECLARATION OF RESPONSIBILITY OF THE MANUFACTURER

ENGINEERING CORPORATION srl is considered responsible to the effects of the safety, reliability and performances of the instrument only if used in the respect of the followings conditions:

" Settings, changes or reparations must be effected from personal qualified and expressly authorized by the firm ENGINEERING CORPORATION srl.

" The opening of the instrument and the access to its inside parts must only be effected from personal qualified for the maintenance and on purpose authorized by the firm ENGINEERING CORPORATION srl.

" The environment in which the instrument is used has to be conforming to the safety prescriptions.

" The electric plant of the environment must be realizes according to the norms and perfectly efficient.

" The practicable substitutions of parts of the instrument and accessories must have effected with others of the same type and having the same characteristics.

" The use and the maintenance of the instrument and the relative accessories must be effected in conformity to the instructions described in the manual present.

" The manual present must have maintained entire and legible in all of its parts.

LIMITS OF USE AND PRECAUTIONS FOR THE SAFETY

With the purpose to guarantee the safety of the operator to a correct operation of the instrument it is necessary to operate in the admitted limits, and to adopt all the precautions following you list:

ATTENTION



Verify before the use that all the safety requisite are satisfied.
The instrument must not have fed or connected to other instruments up to when safety conditions are not satisfied.

ELECTRIC SAFETY

ATTENTION



All the present connections on the controller are isolated from the earth environment (non isolated mass).
Don't connect none of these connections to the mass.

With the purpose to guarantee conditions of maximum safety for the operator it recommends him to follow all the indications listed in the manual present.

- Supply the instrument exclusively through its own adapter.
- **replace immediately the damaged parts.** Cables, connectors, accessories or other parts of the instrument that resulted damaged or not working correctly must be immediately replaced. Contact in such case the nearest center of technical support authorized
- **use only accessories and peripheral specified by the firm ENGINEERING CORPORATION srl.** To guarantee all the safety requisite is necessary to use exclusively accessories specified in this manual which has been made a will in combination with the instrument.
- The use of accessories and materials of consumption of other producers or not specifically pointed out by the firm ENGINEERING CORPORATION srl it doesn't guarantee the safety and the correct operation of the instrument.
- Use exclusively peripheral conforming to the norms of his/her own category of affiliation.
- **replace immediately damaged parts.** Cables, connectors, accessories or other parts of the instrument that resulted damaged or not working correctly must be immediately replaced.
- Contact in such case the nearest center of technical support authorized
- **use only accessories and peripheral specified by the firm ENGINEERING CORPORATION srl.** To guarantee all the safety requisite is necessary to exclusively use the accessories specified in this manual which are in combination with the instrument.

SAFETY OF THE OPERATIONAL ENVIRONMENT

The panel of the controller and the containing box the electronic part and of connection of the hydraulic remote, are protected against the entry of liquids. Please avoid to use the instrument in environments where is present the risk of dripping, spray or immersion.

Instuments in which liquids are accidentally penetrated must immediately be cleaned and checked from personal qualified authorized.

Use the instrument within the environmental limits of temperature, damp and pressure specified. The tool is built to operate in the followings environmental conditions:

temperature environment +5°C / +45°C

relative damp 5% / 95% RH - Not Condensed

ATTENTION



The plant of watertreatment in which the system is inserted has to be realized in the respect of the functional requisite imposed by the current Law.

The hydraulic part must perfectly be inserts in the plant, paying particular attention to the hydraulic lacing, both in entrance than in exit.

This won't have any obstructions except those preview from the project.

The plant must be maintained operational in the full respect of the foreseen rules safety.

The parameters set on the command of the Controller of analyses must be conform to the current law.

The signals of damage of the controller must be put in a place constantly under control of the operator.

The missed respect of oneof these conditions can force the "logic" of the controller to operate potentially in dangerous way for the consumers of the service.

We recommend therefore to operators of service and/or maintenance to operate with the maximum scrupulousness, signalling at the right moment any removal of the safety parameters, this to avoid conditions potentially dangerous.

Since the considerations don't reenter in the possibility of control from part of the product in object, the builder is not considered responsible of the possible damages that such malfunctions can produce to people and/or things.

INFORMATION ON THE RECYCLING MATERIAL

ENGINEERING CORPORATION srl, in accord to the specific European directives, is addressed to improvement the project and the production procedures of its own systems , with the purpose to reduce at best the negative impact on the environment concerning the management of componets spare parts, material of consumption, packaging and instrument worklife.

Packaging are conceived and produced to permit the reemploy or the recovery, included the recycling, of the most greater part of the materials and to reduce at best the quantity of refusals or residual to carry off. To guarantee a correct environmental impact the instrument has been projected with the maximum circuit miniaturization as possible, with the least possible differentiation of the materials and component, with a selection of substances that guarantee the maximum recyclablility and the maximum re-use of the parts and a disposal without ecological risks.

The instrument is built to guarantee the easy separation or replace of the materials containing polluting substances in comparison to the others, particularly during the operations of maintenance and substitution of the parts.

ATTENTION



The recycling of the packaging, of the materials of consumption and of the instrument at the end of the worklife, must be effected in accord to the corrent laws of the country in which the instrument is used.

DECLARATION of CONFORMITY

EC STATEMENT OF COMPLIANCE

**Fabbricante: Engineering Corporation srl***(Producer)***Indirizzo: Via Allende, 14 – 41051 Castelnuovo Rangone (MO) ITALY***(address)*

Declairs that the equipment :

*Hereby states that the device known as:***MODELLO: Telepool Professional (analyser multiparameter)***(Model)*

E' conforme alle seguenti direttive CE: 73/23CE, 89/336CE, 92/31CE, 93/68CE,
come modificate e recepite dalla legislatura italiana.

*The machinery meets the requirements set bu the folloqng EEC Directives:**Directives 73/23CE, 89/336CE, 92/31CE, 93/68CE, as amended and implemended under italian law*

Sono state applicate le seguenti Norme Nazionali, che traspongono le Norme Armonizzate CE :

*The following national standards and technical specifications, conforming to EEC Harmonized Regulations, were followed:***EN 61000-6-4 (2002/10), EN 61000-6-2 (2002/02), EN 55011 (1999/05) CEI EN 61000-3-2 (2002/04), CEI EN 61000-3-3 (1977/06), EN 61010-1 (2001/11)**

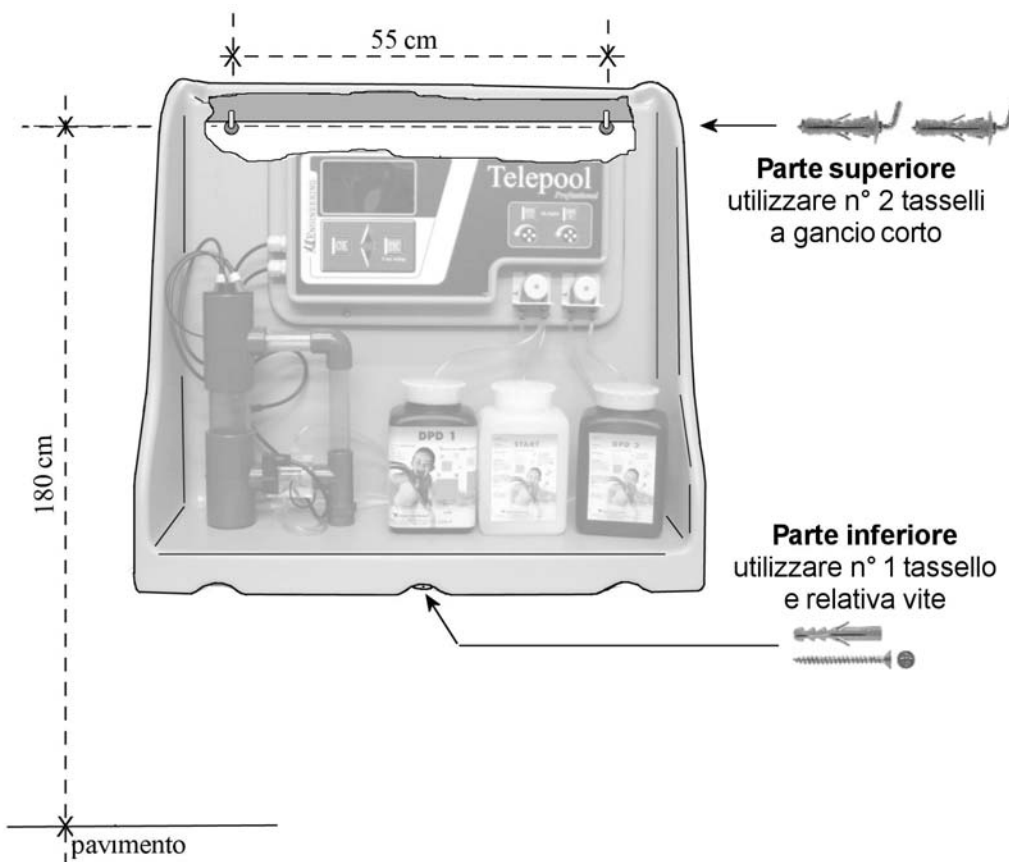
Castelnuovo Rangone 20/01/2006

ENGINEERING CORPORATION S.r.l.

L' amministratore
Barani Dr. Corrado
(Responsabile Tecnico ENGINEERING Corporation srl)

Barani Dr Corrado

TELEPOOL INSTALLATION MANUAL

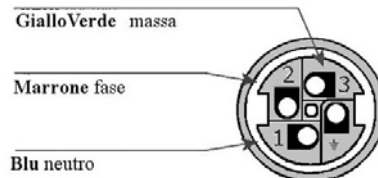


- The wall has to be well smooth to allow the perfect adhesion of the various parts of the equipment.
- There hasn't to be water or possible spray coming from closed zones.
- Use, as power supply, a tension among 85-265Vac-50/60Hz without interference. Avoid absolutely reconstructed connection, for example, with the aid of transformers where the supply goes feeding other systems over the controller (even inductive type) because it can create spike of tension also of 1000 Volts that once radiated can be hardly eliminated.
- The electric feeding line must be provided of opportune ground fault interrupter, in the respect of the good norms of installation; in every case it always well to verify the goodness of the ground connection
- The controller must be installed to the wall making attention that there is enough space for the passage of the wires and to look at the display of visualization data.

Lacing to the electric line:

Assuring that the feeding as respects what already told on the previous paragraph, connect the electric line using the supplied special cable.

Connector for 220V ac

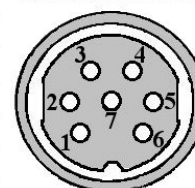


Connector Exit Signals



- 1 Comune _____
- 2 S1 Cloro _____
- 3 S2 Cloro _____
- 4 S4 Declorazione _____
- 5 S3 pH _____
- 6 non connesso _____
- 7 Allarme _____

connettore Femmina



lato collegamenti

Serial Connector



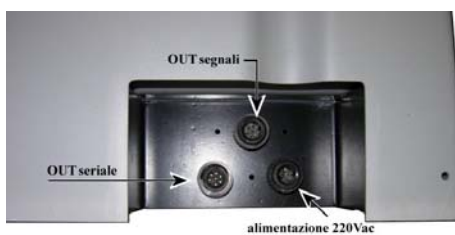
- 1 + ABL Set Point _____
- 2 + V _____
- 3 A _____
- 4 B _____
- 5 GND _____
- 6 - ABL Set Point _____
- 7 non connesso _____

connettore Maschio

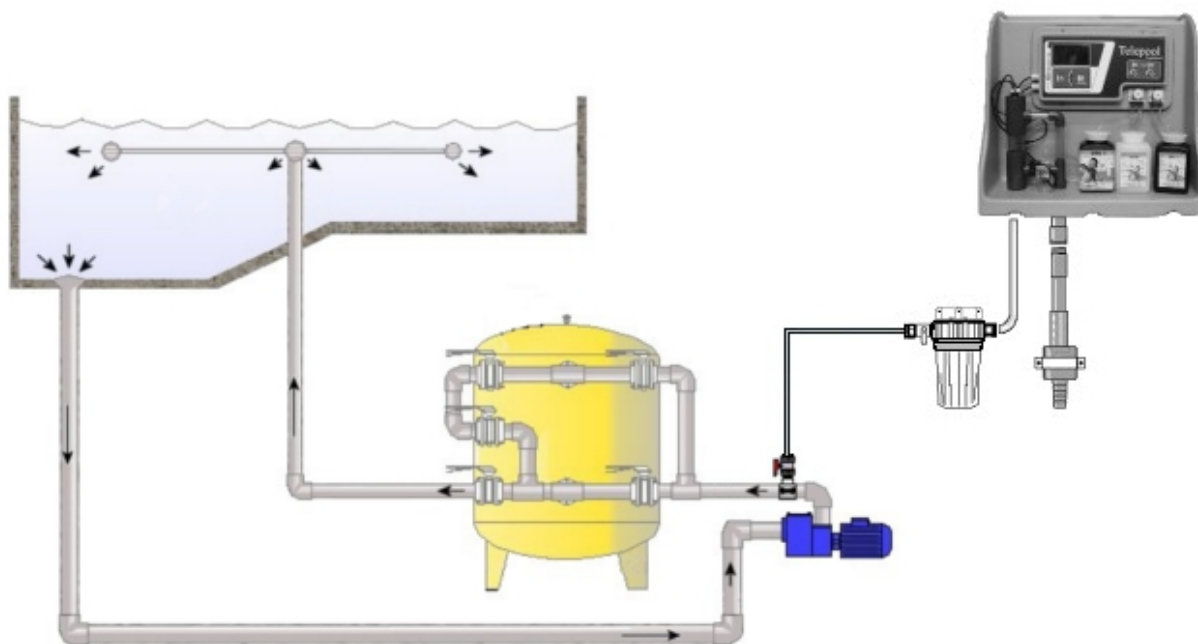
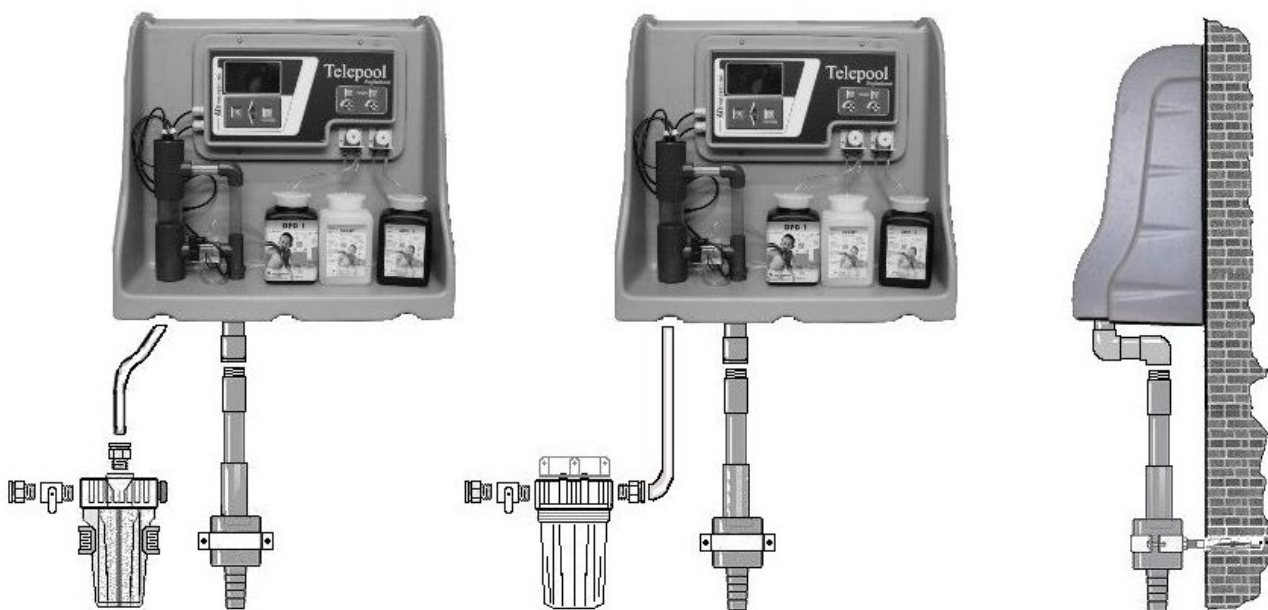


lato collegamenti

Connectors Position



Water Lacings:



HYDRAULIC PART CHARACTERISTIC

Water Lacing	Rapid Connection for 8x10mm tubing
Discharge	For sample discharge
Temperature of the water sample	from 15°C to 40 °C
Working Temperature	from 10°C to 45 °C

EQUIPMENT CHARACTERISTICS:**TECHNICAL MEASURE CHARACTERISTICS****FREE CHLORINE**

Type of measure	Fotometric Monoray
Pick of absorption	515nm
Metodic used	Colorimetric with DPD
Projector	Green Led with narrow emission
Sensor	Silicon Fotosensor
Range of measure	00.00 – 5.00 ppm for free chlorine
Resolution	+/- 0.01 ppm free chlorine
Precision	+/- 2% F.s.
repeatability	98%
Set-Point	Nr. 3 with relais exit: Nr. 2 in exchange and Nr.1 ON/OFF (charge max 1A 230Vac resistive, with varistors of suppression disturbs)

COMBINE CHLORINE (optional)

Type of measure	Fotometric monoray
Pick of absorption	515nm
Metodic used	Colorimetric with DPD
Range of measure	00.00 – 5.00 ppm free chlorine
Resolution	+/- 0.01 ppm free chlorine
Precision	+/- 2% F.s.
repeatability	98%

PH

Type of measure	Potenziometric
Range of measure	00.00 ÷ 14.00 pH
Resolution	± 0.01 pH
Precision	± 0.2% F.s.
repeatability	98%
Entry Impedance	> 10 GOhm
Polarization	< 1 pA
Set-Point	Nr. 1 with exit relay in exchange (charge max 1A 230Vac resistive, with varistors of disturbs suppression)

O.R.P. (REDOX POTENTIAL)

Type of measure	Potenziometric
Range of measure	± 1000 mV
Resolution	± 1 mV
Precision	± 0.2% F.s.
repeatability	98%
Entry Impedance	> 10 GOhm
Polarizzation	< 1 pA
Set-Point	Nr. 2 Logic

CONDUCTIVITY

Type of measure	Conductimetric
Sensor	Probe with Stainless Steel electrods
Range of measure	0 – 2000 μ S
Resolution	1 μ S
Precision	\pm 2% F.s.
repeatability	98%
Compensation of temperature	Automatic
TEMPERATURE	
Type of measure	Termoresistence
Sensor	Probe NTC 100K@ 25
Range of measure	0.0 – 50.0 $^{\circ}$ C
Resolution	\pm 0.1 $^{\circ}$ C
Precision	\pm 2% F.s.
repeatability	98%

HARDWARE CHARACTERISTICS

Cell of measure	Open Light plexiglas protection IP67
Washing Electrovalve	membrane of acid separation
Display	backlighted LCD 128 x 240 pixel
Keyboard	Nr. 6 membrane function button
CPU	μ Processor 8 bit 8Mhz - 128KB Flash – 8KB Ram – 8KB EEprom
Achive Memory	Flash 512KB seriale
Date	Clock Calendar with Backup Battery clock Frequence of 32,768 Khz
serial Interface	RS485 galvanic Separation
Dosing Relais	Nr. 2 In Exchange for Free Chlorine measure (Cloration) Nr. 1 ON/OFF for Free Chlorine measure (Decloration) Nr. 1 in exchangenfor pH measure (charge max 1A 230Vac resistive, with varistors of disturbs suppression)
Alarm relais	Nr. 1 of exchange(Comulative for all the alarm) (charge max 1A 230Vac resistive, with varistors of disturbs suppression)
Qualification Dosing	Nr. 1 Active Digital Entry
Connections	Fast multipolar Connectors with IP67protection Nr.1 – 3+PE Male Alimentation Nr.1 – 6+PE Male Relais Exit Nr.1 – 6+PE Female Digital Entry + Serial Host
Alimentation	85-265Vac 50/60 Hz
Absorbption	Max 15 VA
Protection Degree	IP65
Container	700x650x300 mm (LxHxP)
Weight	10Kg

SOFTWARE CHARACTERISTICS

<i>Safety</i>	<p>CE Respect and equipment regulations . Safety concerning:</p> <ul style="list-style-type: none"> - Feeding Anomalies external and internal - Equipment Measures - Wrong Calibrations - Equipment Damage
<i>Alarms available</i>	<p>RUNScreen with the last 13 alarms shown, available in each moments. Each alarms is shown on the display and will activate the ralais of alarm. Created Alarms:</p> <ul style="list-style-type: none"> - Lack of analysys water - Dirty Cell - Broken Cell - Burnt projector - Lack of Reagent - Timeout Chlorine - Timeout pH - Error 21
<i>Visualizzazione</i>	<p>The use of a graphic display (240x128) allows a intuitive and immediate graphic representation of the measures, of alarm icons and main menu, so to let the management and the equipment regulation Easy and fast to each operator.</p>
<i>Archive</i>	<p>Internal Data logger on Flash memory. Memorisation of all the analogic measures (<i>Free Chlorine, Combine Chlorine, pH, Redox, Conductivity and Temperature</i>) with changeable recording step from 1 to 60 minutes</p>
<i>Graphics</i>	<p>Possibility to watch directly on the instrument the graphic of all the measures, Choosing step of time of 2, 6 or 24 hours.</p>
<i>Password</i>	<p>Instrument Setup protected with password to avoid damage from un authorised person.</p>
<i>Language</i>	<p>Choose from: Italian (default), English, French, Spanish, German</p>
<i>Protocol</i>	<p>MOD BUS RTU with dedicated functions to download the archive.</p>

SOFTWARE DESCRIPTION TELEPOOL VER. 2.5

RUN SCREEN DESCRIPTION:

	<p>VISUALISATION OF:</p> <ul style="list-style-type: none"> ➤ Free chlorine measure ➤ Combine chlorine measure (Optional) ➤ pH measure ➤ Rx measure ➤ Conductivity measure ➤ Temperature measure ➤ Analysys phases ➤ Exit Relais Status ➤ System Date / Hour ➤ Graphics Alarms for lack of reagent, Time Out Cl2 and pH, Data Logger Full ➤ Analysys phase Chlorine Methodic
	<p>VISUALISATION OF:</p> <ul style="list-style-type: none"> ➤ Last 13 created alarmi ➤ Analysys phase Chlorine Methodic
<p>BREAKPOINT 01/01/05 10:00</p> <p>FASE 1 01:00</p> <p>FASE 2 02:00</p> <p>FASE 3 01:00</p> <p>Cl₂ 0.00 ppm Rx max 900 mV</p>	<p>VISUALIZZAZIONE DI:</p> <ul style="list-style-type: none"> ➤ Last / State phase of Breakpoint ➤ Minimum Value of reached chlorine on phase 3 ➤ Maximum Pick of reached ORP ➤ Date / Hour last Breakpoint <p>If the breakpoint Phase is not activated the shown data refer to last made phase of breakpoint.</p>
<h3>Visualised ICONS</h3>	
	<p>Timeout Chlorine Section</p>
	<p>Finished Reagent o Peristeltic tube broken</p>
	<p>Timeout pH section</p>
	<p>System Mistake Please Contact Assistance</p>
	<p>Fatal Error Equipment Blocked Contact Assistance!!</p>
	<p>Alarm Relais active</p>
	<p>Archive Memory full</p>

FUNCTION BUTTON:

	<ul style="list-style-type: none"> - Confirm data - at the switch on, kept pushed allows to enter the “contrast” function <i>(notified with 3 beep)</i>
	<ul style="list-style-type: none"> - Erase the made change - kept pushed for more than 3 seconds you enter the Setup
	<ul style="list-style-type: none"> - Increase Value - Modify Setup
	<ul style="list-style-type: none"> - Decrease Value - Modify Setup
	<ul style="list-style-type: none"> - At the switch on, kept pushed at the same time you enter the function of UP-grade SW <i>(notify by 1 beep)</i>
	<ul style="list-style-type: none"> - Forced switch on of peristaltic pump Free Chlorine
	<ul style="list-style-type: none"> - Forced switch on of peristaltic pump Combine Chlorine <i>(optional)</i>





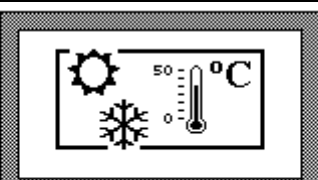
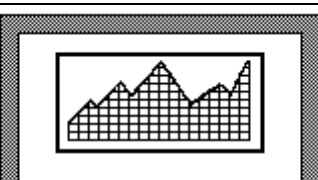
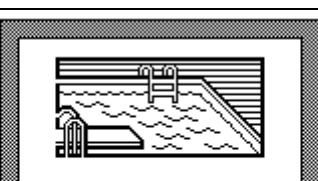
Keeping pushed for more than 3 seconds the ESC button you can enter the instrument setup, putting the first 4 letters password.

With the arrows you can slide the voices of the menu.

With the button you can select the highlighted voice, after with the arrows you can change the value or the set point.

Pushing again you can confirm the desired setup, otherwise pushing you cancel the modify.

MAIN MENU :

1		1.0 CHLORINE SECTION 1.1 THRESHOLDS 1.2 BREAKPOINT 1.3 CALIBRATION 1.4 ANALYSYS SETUP
2		2.0 pH SECTION 2.1 THRESHOLDS 2.2 CALIBRATION
3		3.0 ORP SECTION 3.1 THRESHOLD 3.2 CALIBRATION
4		4.0 CONDUCTIVITY 4.1 THRESHOLD 4.2 CALIBRATION
5		5.0 TEMPERATURE 5.1 OFFSET
6		6.0 SHOW DATA 6.1 SHOW 6.2 INTERVAL 6.3 DATA
7		7.0 COMMON DATA 7.1 SYSTEM DATA 7.2 ALARM 7.3 ARCHIVE 7.4 PASSWORD MODIFY

8		8.0 SERVICE 8.1 RELAIS 8.2 ENTRY 8.3 INFO
9		9.0 EXIT

DESCRIPTION MENU:

1.0 CHLORINE SECTION

In this Menu you can set all the parameters concerning the measure, the dosing and the calibration of Free Chlorine and Combine Chlorine (*optional*).

1.1 Thresholds

S1 Cloration	0.00 ppm
S2 Cloration	0.00 ppm
S4 Decloration	5.00 ppm
Alarm Timeout	0 min

S1 CHLORINATION: → RELAIS S1 OFF → RELAIS S1 ON

Setup Parameter of the first threshold of Chlorination. Hysteresis fixed at ± 0.1ppm. The value of S1 must be inferior or equal to the threshold of S2. It cannot have a superior value to the threshold S2.

Logic: if the value of the chlorine goes down under S1, the Relay S1 will be closed until the value of the chlorine won't overcome the threshold of S1.

S2 CHLORINATION: → RELAIS S2 OFF → RELAIS S2 ON

Setup Parameter of the second threshold of Chlorination. Fixed hysteresis to ± 0.1ppm. The value of S2 must be greater or equal to the threshold of S1. It cannot have inferior value to the S1 threshold.

Logic: if the value of the chlorine is inferior to S2, the Relay S2 will be closed and remained closed until the value of the chlorine will not exceed the threshold of S2.

S4 DE-CHLORINATION: → RELÈ S4 OFF → RELÈ S4 ON

Setup Parameter of the De-chlorination threshold. Fixed hysteresis to ± 0.1ppm. The value of S4 must be greater or equal to the threshold of S2. It cannot have inferior value to the S2 threshold. This SECURITY allows to avoid the contemporaneously dosage of Chlorination and De-chlorination incompatible products.

Logic: if the value of the chlorine is greater than the value of S4, the Relay S4 will be closed and remained closed until the value of the chlorine will not come down under the threshold of S4.

TIMEOUT ALARM:

Security Parameter concerning the dosage of the "Chlorine Section". If set up to 0 min, the function is disabled. If whichever of the three Chlorine threshold (S1, S2 or S4) remains active for a greater time of the set up time, the instrument will stop all the dosages and activate the alarm Relay.

On the monitor will appear:

This alarm will be able to re-enter automatically; the instrument will carry out the analysis of the values, when the Chlorine value will deactivate the Timeout threshold, the dosages will resume their normal operation and the Relay of the alarm will be deactivated.

This security Parameter allows the instrument to control the dosage conducted externally and the reliability of the chlorine measures.

1.2 BREAKPOINT

State	Disabled
Rx end chlorine	700 mV
Chlorination	00:00 HH:MM
Waiting	00:00 HH:MM
De-chlorination	00:00 HH:MM
Start	00:00 HH:MM
Finish	00:00 HH:MM

The Breakpoint function can be periodically used to carry out a shock treatment of the pool water in order to eliminate most of the organic substances present in the water, therefore, reducing the combined chlorine value.

The Breakpoint function is constituted by three phases: the first one is the “Chlorination”, the second one is the “Waiting” and the last one is “De-chlorination”.

The timing for the three phases are set as following:

Software 2.2: from a minimum of 30 minutes to a maximum of 120 minutes (2h), at 15 minutes steps.

Software 2.3: from a minimum of 5 minutes to a maximum of 120 minutes (2h), at 5 minutes steps.

The Start and Finish time are the hours when the Breakpoint must start and finish, and can be set from 00:00 to 23:59, at 1 minute steps.

The end of the Breakpoint depends on the duration of the “Chlorination”, “Waiting” and “De-chlorination”. Usually stops before the “Finish” time. Therefore, the “Finish” time set indicates a maximum limit after which the Breakpoint stops.

Phase of “Chlorination”: the instrument will activate the Relays S1 and S2 for the duration of the set time. When the chlorination starts the machine will memorize the finishing time. This security system allows precisely stopping the chlorination phase at the set time even in case of prolonged blackouts.

Phase of “Waiting”: the instrument will deactivate the S1 and S2 Relays for the set time and won't do any analysis. This phase allows to the dosed chlorine to react in the water.

Phase of “De-chlorination”: the instrument will activate the S4 Relay. When the Redox potential value decreases under the threshold the machine will activate the chlorine measurement. From this moment all the results will be filtrated through an algorithm that will determine the reliability and trend. Once ensured the reliability of the chlorine measurement, if the chlorine value decrease under the S4 threshold, the Breakpoint phase will terminate and on the screen will appear the icon.

On the contrary, if the reliability of the measurements won't be ensured and/or the chlorine value will not decrease under the S4 threshold within the “De-chlorination” set time, the Breakpoint will stop.

The icon will appear on the screen and the instrument will wait the operator's confirmation before terminate the Breakpoint phase and restart the chlorine analysis. Anyway, the instrument will terminate the Breakpoint phase when reached the “Finish” time or if it doesn't receive the operator's confirmation. Then will start the chlorine analysis again.

STATE: Flashing: Breakpoint Phase active

Software step used to activate or deactivate the Breakpoint Phase. In order to modify the Breakpoint Parameters the status must be on “Deactivated”.

Attention: Activate the Breakpoint function only when anybody is in the pool!!!

Setting “ENABLED”: the Breakpoint phase will be activate as soon as you return to RUN MODE and the “Start” time is reached. If the Breakpoint phase is active and you set “DISABLED” it will be permanently cancelled.

When the machine enters the RUN MODE (switching on the instrument or exiting the setup) will start the Breakpoint phase if the “Start” time has been passed but not the “Finishing” time calculated as follow:
 $T_START_THRESHOLD = T_FINISH - (T_PHASE1 + T_PHASE2 + T_PHASE3)$. If the “Finish” time is reached the Breakpoint will be permanently cancelled.

If the set “Start” time is higher than the “Finish” time, the machine assumes that the “Finish” time is for the next day. For example: Start = 23:00 and Finish = 03:00, the Breakpoint starts at 23:00 today and finishes the tomorrow at 03:00.

The instrument won’t allow to set up a duration (between “Start” and “Finish”) inferior to the sum of the durations set for the three phases.

RX END CHLORINE:

Threshold of Redox potential, in which the first phase of chlorination terminates in any case. The phase of Chlorination can finish either at the expiring of the time set up on Chlorination or at the attainment of the Redox threshold set up here.

CHLORINATION:

First Phase of the Breakpoint in which the S1 and S2 Relays are switched ON for the maximum time set up.

Attention: The phase of Chlorination can finish before the set up time, if the Redox threshold previously set up is reached!!

WAITING:

Second Phase of the Breakpoint in which the S1 and S2 Relays are switched OFF for the set up time.

DE-CHLORINATION:

Third Phase of the Breakpoint in which the S4 Relay is switched ON and the de-chlorination is monitored. Here a maximum time for the de-chlorination is set up. Exceeded this time the 3° phase terminates showing an anomaly on the display and the instrument attends confirmation from the operator in order to re-enter in the normal operation.

EXECUTION OF THE BREAKPOINT:

Every time “ENABLED” is selected, the execution of the phase of Breakpoint, in compliance with the value of the parameters, is enabled.

Entering in RUN MODE once the “Start” time is reached, the blinking icon appears. On display 2 it is possible to visualize the Breakpoint state (see the following example)

```

BREAKPOINT      26/02/07 23:30
PHASE 1
[                ] 00:30
PHASE 2
[                ] 00:60
PHASE 3
[                ] 00:30

Cl2 #.##          Rxmax ###mV
    
```

The example shows the Breakpoint starting time set up at 23:30; the duration of phases 1, 2, 3 are respectively 30, 60, 30 minutes.

At the bottom of the display it appears the value of the measured Cl2 and the highest value of the Redox. Supposing that the “finish” time has been set up at 02:30 (that means the Breakpoint must terminate, in any case, the 27/02/07 at 02:30), the maximum limit time in which the phase of Breakpoint could be started will be:
 $T_START_LIMITE = T_FINISH - 120 \text{ min} == 00:30$ on the 27/02/07.

Supposing that the Telepool is momentarily OFF (phase 1 hasn’t begun yet) and it is switched ON (entering in RUN mode) on the 27/02/07 at 00:10; since this time is inferior to T_INIZIO_LIMITE the Breakpoint starts immediately with the phase 1.

Phase 1

The Relay S1 and S2 are active. The following outline represents display 2 during the 1st phase.

```

BREAKPOINT      27/02/07 00:10
PHASE 1
->[ *****          ] 00:30
PHASE 2
 [                   ] 00:60
PHASE 3
 [                   ] 00:30

Cl2 #.##          Rxmax ###mV
    
```

On the right top corner the start time of phase 1 is showed. The blinking arrow “- >” indicates that the C+ dosage is active. The Chlorine measurement will be executed according to set up step.

The Phase 1 terminates if the Redox reaches the threshold of <Rx end chlorine> or if the time of Chlorination is exceeded. The bar graph indicates the effective dosage in phase 1 in analogical mode.

2) Phase 2

The Relays S1, S2 and S4 are deactivated. The blinking arrow “- >” indicates that this phase is active. The Cl2 measurements are executed according to the set up step. Phase 2 terminates when the T_FASE2 time is over.

3) Phase 3

The Relay S4 is activated. The following outline represents display 2 during the 3rd phase.

```

BREAKPOINT      27/02/07 00:10
PHASE 1
 [ *****          ] 00:30
PHASE 2
 [ *****          ] 00:60
PHASE 3
->[ *****          ] 00:30

Cl2 #.##          Rxmax ###mV
    
```

The blinking arrow “- >” indicates that the dosage C- is active. The Cl2 measurements are continuously executed (the set up step is not considered). Phase 3 has two possible ways of execution.

The duration of the phase of De-chlorination is proportional to the effective time of dosage of the chlorination phase. The logic is:

T_DOS1_EFF is the effective time of dosage executed in phase of Chlorination

$$k = T_DOS1_EFF / T_PHASE1$$

Subsequently, the time $T = k * T_PHASE3$ is calculated and T is estimated.

If T is inferior to 15 minutes, a C- dosage is executed within a time T, on the contrary, the dosage is executed based on the Cl2 measure and the threshold S4.

In this second case the Cl2 measures are considered. When a sequence of 5 not increasing measures is found, and all of them higher than 0.30 ppm, the free chlorine measure is considered valid. Then the Cl2 measured is compared to the threshold S4. As soon as the chlorine decreases under the S4 threshold the phase of De-chlorination terminates.

When the Breakpoint phase finishes, it automatically enter in “DESABLED” and won’t be executed again until the setup is re-enabled.




On the screen appears the picture of the last executed Breakpoint.

The Cl₂ value on the bottom indicates the value of the last measure executed during the Breakpoint. The Redox value, also at the bottom of the screen, indicates the highest level reached during the Breakpoint.

1.2 Calibration

This phase is the function of alignment of the Free Chlorine to a fixed value. The instrument, after having asked confirmation to proceed with the calibration, will carry out a Free Chlorine analysis. At the of analysis two values will appear on the display:

- Free Chlorine Value with the K factor of reference (K_factor = 4,25)
- Free Chlorine Value with the K factor of the analysis .

Using the arrows   it will be possible to modify the second value of free chlorine and once set up click on  to confirm.

Usually, the two values are closed to each other within a range. If this is not the case, we recommend verifying the correct kinetics of the instrument before confirming the new calibration, in order to avoid anomalous calibrations. In any case, the Telepool Professional will check the K factor every time a Free chlorine calibration is executed. The instrument will give an error and won't execute the calibration if the K factor equals values exceeding the parameters set up.

1.3 Setup Analysis

Interval	0 min
Initial Wash	60 sec
Injection DPD1+2	1.0 sec
Reaction Cl ₂	30 sec
Step Cl comb	0
Injection DPD3	0.5 sec
Reaction Cl comb	20 sec

In this menu the timing of the Free and Combined Chlorine processes are set up. If tampered by unauthorised staff, these parameters may compromise the measures of the instrument. Therefore, we advise that qualified staff must execute any alterations of these parameters.

The parameters of the Setup Analysis are:

Interval:

Setting of the waiting time between each analysis. (Ex. Setting up 2min; it will execute an analysis every 5 minutes. 3minutes of analysis + 2 minutes waiting).

Initial Wash:

Setting of the cell Washing time at the beginning of the analysis expressed in seconds. Default: 60 seconds.

Injection DPD1+2:

Setting of the peristaltic spin time of the reagents dosage 1 and 2. Default: 1,0 second.

Cl₂ reaction:

Setting of the reaction time for the free chlorine measurement. Default: 30 seconds.

Step Cl Comb:

Step of Combined Chlorine analysis. Represents the number of Free Chlorine analysis that must be completed before carrying out a Combined Chlorine measurement.

If 0 is set up on the display, the instrument won't carry out any measurement of Combined Chlorine. Default 0. (The measurement of Combined Chlorine is optional)

Injection DPD3:

Setting of the peristaltic spin time of the reagent dosage 3. Default: 0,5 second. (The measurement of Combined Chlorine is optional)

Cl Reaction comb:

Setting of the reaction time for the Combined Chlorine measurement. Default: 20 second. (The measurement of Combined Chlorine is optional)

2.0 pH Section

In this section you will find all the parameters for pH measurement, dosage and calibration.

1.4 Threshold

Measured Product	ACIDIC
S3 Threshold	7.00
Timeout alarm	0 min
	ON
S3	_____
	OFF

MEASURED PRODUCT

Setting of the type of product used for the pH correction. The choice is between Basic or Acidic.

Setting up Acidic, the threshold will work in ascending way: if the pH value is higher than the S3 threshold, the instrument will activate the S3 relay and it will remain active until the value decreases under the S3 threshold.

Setting up Basic, the threshold will work in descending way: if the pH value is below the S3 threshold, the instrument will activate the S3 relay and it will remain active until the value overcomes the S3 threshold.

S3 THRESHOLD:

→ RELÈ S2 OFF

→ RELÈ S2 ON

Parameter of pH threshold setting. Hysteresis fixed at $\pm 0.05\text{pH}$.

Example: setting up the parameters as in the above display, the dosage will be carried out as follows: when the pH value exceeds 7.00pH, the dosage is activated and remains active until the value decrease under 6.90pH.

If as Measured Product has been set up Acid it will work as follows: if the pH value is higher than the S3 threshold, the instrument will activate the relay of S3 and it will remain active until the value decreases under the S3 threshold - 0.1pH.

If as Measured Product has been set up Basic it will work as follows: if the pH value of is smaller than the S3 threshold, the instrument will activate the relay of S3 and it will remain active until the value exceeds the threshold $S3 + 0.1\text{pH}$.

TIMEOUT ALARM:

Security parameter concerning the dosage of the "pH Section". If it is set up on 0 minute the function is deactivated.

If the pH threshold (S3) remains active for a period of time higher than the one set up, the instrument will stop all the dosages and will activate the alarm relay. On the screen will appear the icon.

This alarm re-enters automatically when the pH value will deactivate the threshold in Timeout. Once the alarm is re-entered the dosages will resume to their normal operation and the alarm relay will become deactivated.

This security parameter allows the instrument to control the correct operation of the dosing part controlled externally and also the reliability of the pH measure.

1.5 Calibration

Sample 1	7.00
sample 2	9.00

Calibration function of pH measure carried out on two points or a single point, using buffer solutions of known pH.
Two points Calibration:

Sample 1: pH Offset calibration - Calibration with buffer solution pH 7

Sample 2: pH Slope Calibration - Calibration with buffer solution pH 4 or pH 9. The choice between 4 and 9 depends on the working pH.

One point Calibration:

Sample 1: pH Offset calibration - Calibration with Solution of known pH.

The calibration to a point can be used in order to align the value of pH to a sample of the water to be analyzed.

2.0 REDOX SECTION

In this section you can find all the parameters concerning the Redox potential measurement and calibration.

2.1 Threshold

S5 Threshold	400 mV
--------------	--------

S5 Threshold:

Setting parameter of the logical Rx threshold.

The S5 threshold of Rx potential is used to deactivate the Chlorine measurements. If the Rx potential value is higher than the S5 threshold, the instrument will automatically deactivate the measurement of Chlorine and on the display will appear:



Subsequently, if the Redox value decreases below the S5 threshold the instrument automatically resumes the measurements of the Chlorine.

1.2 Calibration

Sample	425 mV
--------	--------

Calibration function of the Rx potential carried out on a single point with a solution of known voltage.

Sample: Rx Offset Calibration - Calibration with a solution of known voltage 475mV.

3.0 Conductivity

In this section you can find all the parameters concerning the conductivity measurement and calibration.

3.1 Threshold

Threshold	0 μ S
-----------	-----------

THRESHOLD:

Setting Parameter of logical Conductivity threshold related to the lack of analysis water. The threshold of the Conductivity is used to discover the lack of analysis water. If the threshold is set up on 0 μ S, the "Lack of Water" function is deactivated.

If the conductivity value decrease below the threshold set up, the instrument will switch on the alarm "Lack of Water" by activating the alarm Relay and will deactivate all the measurements and all the dosages.

When the water returns, the instrument will automatically resume the normal operation.

3.2 Calibration

Sample 1 (air)	0 μ S
Sample 2	800 μ S

Function of Conductivity calibration carried out on two points with salt Solutions of known conductivity.

Two points calibration:

Sample 1 (air): Offset calibration - put the probe in the air and accurately dry it

Sample 2: Gain calibration - Calibration with Salt Solution of known conductivity. The choice of the value of such solution will be decided based upon the value of the conductivity in which the probe will normally work.

4.0 TEMPERATURE

Temperature Offset setting.

4.1 Offset

Offset	0.0 °C
--------	--------


Parameter used to align the temperature reading to a know instrument.

5.0 VISUALIZE DATA



In this section you will be able to graphically examine, at fixed period of time, the trend of all the parameters measured by the instrument.


Visualize	>>>
Interval	2 h
Date	01/01/06

VISUALIZE:

By clicking on 

You enter the graphic visualizing according to the following parameters:

It is possible to scroll the measures achieve using the arrows:  

It is possible to change the visualized option by clicking on . The sequence is: free chlorine, combined chlorine, pH, Redox, conductivity and temperature.

INTERVAL:

Interval of time for the visualisation of the data. Can be set every 2h, 6h or 24 h.

DATE:

Set up the starting date for the visualisation of the data.

6.0 DATA

In this section is possible to set up all the system parameters.

5.1 Clock

Day	11
Month	12
Year	2006
Hour	11
Minute	18

Day and hour set up.

5.2 System Data

Language	English
Address	1
Baud Rate	9600
Display	Normal
Contrast	45 %

Language:

Setting up of the language (Italian, English, French or Spanish)

Address:

Numeric address between 1 and 255, used for the instrument connection in BUS RS485.

Baud Rate:

Setting up of the speed of the serial communication host port with protocol MOD BUS RTU. It can be: 9600, 19200 or 38400.

Display:

Setting up of the visualisation mode of the display. It can be: Normal or Reversed.

Contrast:

Setting up of the display contrast, between 1 and 100%.

5.3 Alarm

The relay alarm is cumulative of all the errors. It will be possible to visualize the single errors by entering the RUN display with the last 13 alarms activated.

Logic	CLOSED
-------	--------

Setting up of the working logic for the alarm relay.

Setting up Closed: if the instrument is in alarm the alarm relay will be activated, instead if it is in normal operation it will be deactivated.

Setting up Opened: if the instrument is in alarm the alarm relay will be deactivated if it is in normal operation will be activated.

Important: Setting up Opened there will be the security to activate an alarm in case the instrument brakes down or switches off.

5.4 Archive

In this menu are set up all the parameters concerning the data storage. Considering that the archive can contain a maximum of 15000 recording, increasing the recording step will increase the number of data stored.

Step	3 min
Type	28 / 32

Used % 0 %
 Reset >>>>

STEP:

Period of time between each recording. During each recording the instrument memorizes: Date, Hour, and value of: free chlorine, combined chlorine, pH, redox; conductivity and temperature.

TYPE:

Memorisation mode. By setting this option it will use a circular storage. When the archive is full, the instrument will record on the oldest data.

By setting up → it will use a filling storage. When the archive is full, the instrument will stop the recording and it will appear on the display.

USED:


Percentage of used memory.

RESET:

This function allows to delete all the stored data.

5.5 Modify Password

New Password	[****]
--------------	----------


In this menu is possible to modify the system password. Once confirmed with , the new password will be memorized and from now on to enter the program you will need the new password.

7.0 SERVICE

This menu is used to manually verify external operator navigations and to verify the correct operation of the instrument. We advise the use of this function only by expert staff.

5.6 Relay


S1 (Cl+)	OFF
S2 (Cl+)	OFF
S3 (Ph)	OFF
S4 (Cl-)	OFF
ALARM	OFF

S1 (Cl+):  is possible to switch ON and OFF the Relay S1.

S2 (Cl+): 

Clicking repetitively on it is possible to switch ON and OFF the Relay S2.

S3 (pH):

Clicking repetitively on  it is possible to switch ON and OFF the relay S3.

S4 (Cl-):

Clicking repetitively on  it is possible to switch ON and OFF the Relay S4.

Alarm:

Clicking repetitively on  it is possible to switch ON and OFF the alarm Relay.

ATTENTION: The relays set up on ON, will stay this way until OFF is selected and the menu Relay exited.

5.7 ENTRIES

CELL	980
pH	712 mV
Redox	625 mV
Conductivity	1516 LSB
Temperature	25.8 °C
Dosages	ON
Com OK	

CELL:

The value indicates the state of the cell. In normal condition the value stays between 700 and 800. The lowest values indicate that the cell is getting dirty. With values below 250, the instrument activate the alarm "dirty cell".

pH:

Value expressed in mV and read by the pH probe.

REDOX:

Value expressed in mV and read by the Rx probe.

CONDUCTIVITY:

DIGIT value read by the conductivity probe.

TEMPERATURE:

Value of temperature read by the NTC probe without offset correction.

DOSAGES:

Digital entering state of the dosage.

ON indicates that the dosages are active

OFF indicates that the dosages are enactive.

COM OK:

Indicates if the connection of the hydraulic card.

5.8 Information

Val K Cl	4.25
pH-Gain	-57.14 mV
pH-Offset	0.10 mV
Rx-Offset	0 mV

Val k Cl:

K factor value used for the chlorine measurement. The default K factor is: 4.25.

pH-Gain:

Value expressed in mV of the pH probe. Ideal value - 57mV

pH-Offset:

Value expressed in mV of the pH probe offset. Ideal value 0mV


Rx-Offset:

Value expressed in mV of the Rx probe offset. Ideal value 0mV.

6 EXIT

before exiting the menu, the instrument will ask confirmation if save or not the data set up.

Clicking on  the data will be saved and you re-enter the RUN mode.

Clicking on  the data won't be saved and the instrument remains in SETUP.

TELEPOOL MAINTENANCE HANDBOOK

	CONTROL	POSSIBLE SINTOMS/GENERATED PROBLEM	CORRECTIVE ACTION	FREQUENCY OF CONTROL
ORDINARY	Verify the cleaning of the reaction cell.	Alarm	Pour into the cell a little amount of F21 Barchemicals using the lid and leave to work for at least 15 minutes with the circuit off. Then open the hydraulic circuit again.	Weekly
	Verify the electrodes cleaning	Misleading values reading	Immerse the probes in F21 Barchemicals for 5 minutes, then wash and dry with a cloth.	Monthly
	Verify the probes port cleaning	Misleading values reading	Pour 200ml of F21 Barchemicals into the probes container and leave to work for at least 15 minutes with the circuit off. Then open the hydraulic circuit again.	Monthly
	Verify the cleaning of the reagents connecting pipes	Misleading values reading	Check the reagents colouration. Clean the connections and replace the	Weekly

			reagents.	
Verify the lubrication of the peristaltic pump pipes	Removal of peristaltic pipes and misleading values reading		Lubricate with Vaseline	Monthly
Verify the reagents presence	Error		Integrate	Daily
Verify the reagents colouration: ideal colouration transparent	Misleading values reading		Replace the reagents if the colouration is not transparent and clean the peristaltic pumps pipes and the reaction cell.	Daily
Verify that the reagents get to the reaction cell through the manual activation of the peristaltic pumps.	Misleading values reading		Verify the presence of the reagents and that the connection pipes are complete and functional at the reagents transportation into the reaction cell. Eventually contact the assistance	Daily
Verify the presence of water in the reaction cell	Misleading values reading		Verify the presence of alarms. Reset and eventually contact assistance	Daily
Verify the connection between the electrode cable and the probe	Rx reading "0"		Adequately connect the cable	Problem detection
	pH reading "0"			Problem detection