THERMOSTATIC BATH   BT DIGIT
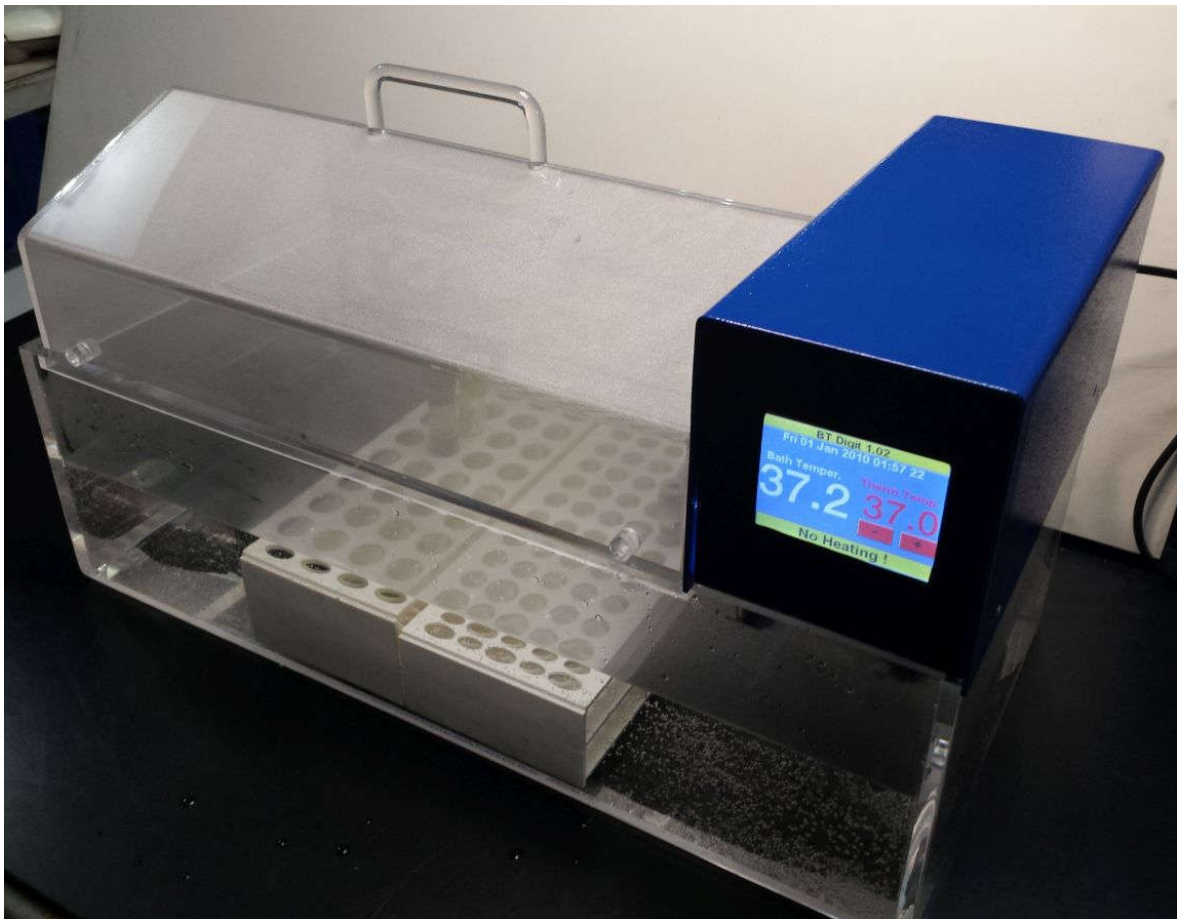
USER'S MANUAL

MINIVOLT Instruments S.r.l.
00158 Roma (I) – Via Di Pietralata, 204/A

SUMMARY   PAG.

The thermostatic bath BT DIGIT is well suited to thermostatate sample tubes with diameter from 12 up to 17 mm dipped in a tank water. Sample tubes are housed in three racks that are dipped in the thermostatated water. Two racks are well suited to house 16mm diameters sample tubes and one rack is well suited to house 10-12mm diameter sample tubes.

Water temperature is controlled via thermostatic group. This thermostatic group heats and mix water to allows an uniform distribution of temperature in all tank. On the touch screen of the LCD of thermostatic group it is possible to set the requested temperature of the bath. A drop stop cover allows to condense the evaporate water and the user does not refill water in the bath.

1.2   INSTALLATION

Remove the package from the box. In the box there is the thermostatic group, the plastic tank, the drop stop cover and the rack for the sample tubes.

Remove, from the box, the Perspex made tank, the cover, and three sample racks: Two racks have 5X10 housing with 17.5mm diam holes. One rack has 5X8 housing with 13.5mm diam. holes.

Remove also, from the box, the thermostatic group.

Place the tank on a plane table. Insert racks in the tank. Make attention at the orientation of the racks. The short side of the rack must be inserted in the long side of the tank.

Insert thermostatic group on the short side of the tank.

Make attention that the two black made plastic bases are inserted inside the tank. If it is difficult to insert these two plastic bases in the tank, it is possible to trim its position moving them after unscrew the two fixing screws situated at the bottom of thermostatic group.

Refill the tank with distilled water till the inox made heating element is full immersed in the water. The water level must be able to cover the heating element. It is better to use tap water mixed with antifreeze in quantities as described in antifreeze instructions because pure water is highly corrosive. If tap water is used, after a short time, the heating element will be covered of limestone. Put in the top of the tank the plastic made Perspex drop stop cover.

Avoid direct sunlight on the instrument. Connect the power supply cable to the connection located on the bak side of the heating group. If should it be difficult to connect the cable to the device check the direction of the cable. Plug the other end of the cable into a 220V ac socket.

Turn on the device by pressing the button located on the rear of the instrument above the cable connection. The temperature of the water will increase till the the temperature will be equal to the setttled temperature.

2.1   GENERAL DESCRIPTION

The core of the Thermostatic Bath BT Digit is an LCD Module with touch screen. All the command and the calibration are made using the touch screen of this module.
Turn on the instrument with the main switch located in the rear of the instrument.
After the power up time, on the LCD, will appear the following main screen.
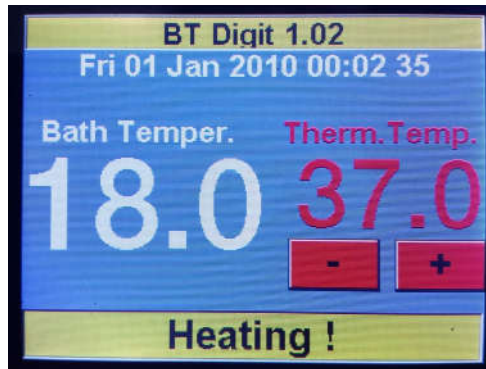
This screen shows the water bath temperature (Withe coloured) The Thermostatate temperature (Red coloured). On the bottom banner (Yellow coloured) is shown the status of the instrument.
On the picture the thermostatating temperature (37.0°C) is more high than the real temperature (18.0°C) so the instrument is heating the water.
To change the thermostatating temperature, push the button + to increase and the button – to decrease the temperature. The temperature range is from 18.0°C to 99.0°C. Take care that the plastic tank can work, at least, at 60.0°C. If you want to work at 56.0°C continuoslly, please use a glass made tank.
In the upper banner is shown the name of the instrument and the software release.

3.1   OPERATION MODE

The water level in the tank must be enough to cover round part of heating element and half of the.
Turn on Instrument with switch located on the rear side of thermostating group near power supply cable. Led display now shows water temperature. Displayed temperature is between 18.0 and 99.9 degrees. Minimum temperature is room temperature, maximum temperature is about 50.0°C because plastic made tank is not well suited for high temperature. If user want to use our BT Digit thermostatic bath at temperature over 50.0°C it is necessary use a glass made tank.
Left side digit of display shows thermostatation status:
 If the upper horizontal segment is on, water temperature goes up, (heating element is on).
If the lower horizontal segment is off, water temperature is coming down, (heating element is off).

To clean the tank use only non aggressive cleaning soap. To remove limestone from heating element, use an antilimestone product and rinse with water before insert thermostatic group in the tank.

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4.1   CALIBRATION

When the user turns on the instrument, the LCD shows, for a few seconds, the following figure.


If during this time the user push the touch screen, the BtDigit program enter in the setting mode and a figure like this shown below, appears on the LCD:
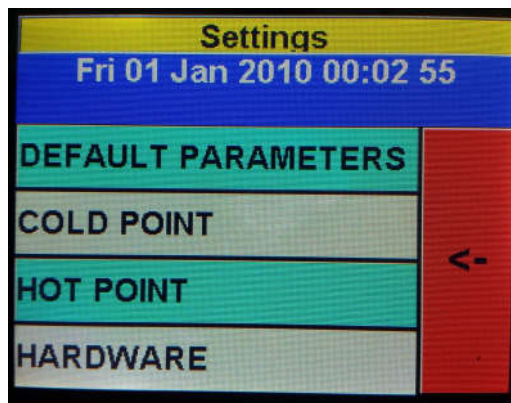
Where there is shown a menu choice with horizontal decision banners and an arrow on the red field. If the user push the lcd where are the writing, the program enter in the described menu. If the user push the arrow, the program escape from this menu and returns on the main menu.

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Default Parameters:

If the user enter in the default parameters, a figure as the described below, appears on the LCD:
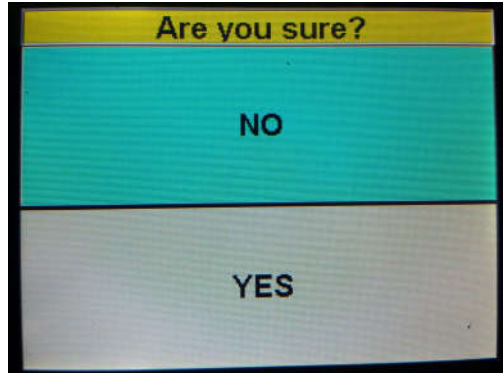
If the user push YES, the default calibration points will be loaded and the last calibration will be lost. If the user push NO, the standard calibration will not loaded (nothing happens) and the program will enter in the main menu figure.

Cold Point Calibration.

To calculate the right temperature, a calibration is needed. The hardware as a solid state sensor that convert the temperature in Volts. Volts are read from the microcontroller through an ADC that convert these volts in points. The range of the ADC is 0-4096 points.
To convert these points in temperature, a calibration must be applied. The type of calibration used is linear type: If you draft this calibration line on a XY plane where on the X coordinates there are the ADC points and on the Y coordinates there are the degrees of the temperature, for every ADC point on the X axis will correspond an Y point. This point is the calculated temperature.
To align the calibration line to have a right correspondence between the ADC points on the X and the temperature degrees on the Y, the user must choose two known points: one point with low values of the ADC (X axis) and the Temperature (Y axis) and another point with high values of the ADC and the temperature. The first point is called Cold point, the second point is called Hot point. Remember that with two points, only one line can be draft.
So, after this teorical discussion, when you enter in the menu of the cold point calibration, you must have the water of the bath at the lower temperature possible (usually the room temperature).

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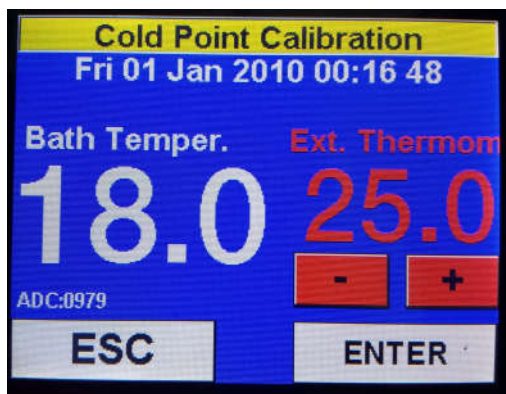
The lowest temperature for the software is 18°C. Now Immerse a thermometer in the wather bath, wait a few minutes that the temperature is stabilized, read this temperature (now is 19.5°C) and insert the value in Ext. Thermom. Using the buttons + and - . When the ext Thermom value is settled, push the enter button to move in hot point temperature menu. If the user push the Esc button, nothing happens and the program goes to the main menu figure using the old temperature calibration.

Hot Point Calibration

If in the past menu the user pushed Enter, the software goes in Hot point calibration, and a figure like the above, appears on the LCD:
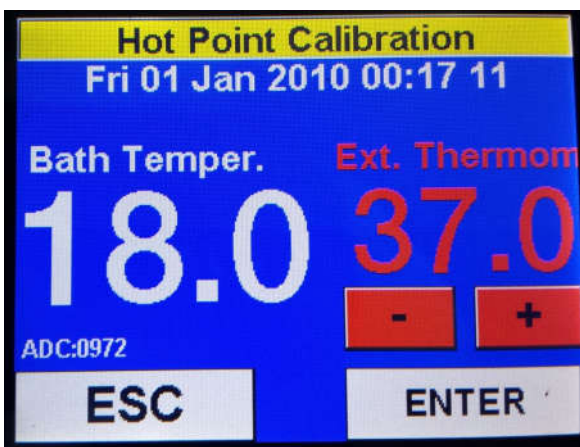

Now the user must wait till the temperature goes to the thermostatation temperature settled in the main menu. Wait till the value is stabilized. This can be done reading the value of the ADC: In the figure this value is: "ADC:0972". Read the temperature of the external thermometer (now is 36.3°C). Insert this value in Ext. Thermom using the buttons + and -. If the value is correct, the user can push Enter button. If the two calibration points are right, the program accept the calibration and the program goes in the main menu. If the user push the Esc button, the program goes to the main menu without change the calibration curve.

Hardware

If during the power up the user push the screen, the program goes in Settings Menu with the above figure:

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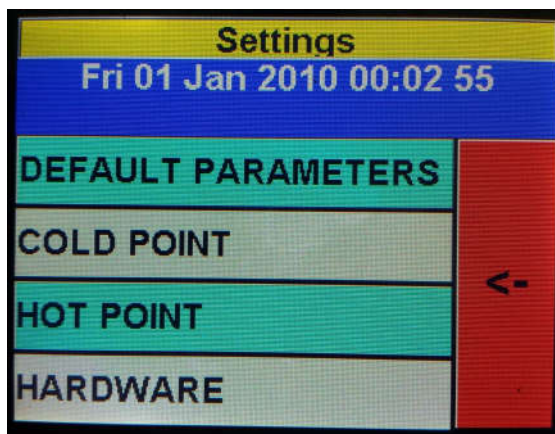
If in this menu the user push Hardware button, a figure like the above, appears on the LCD:
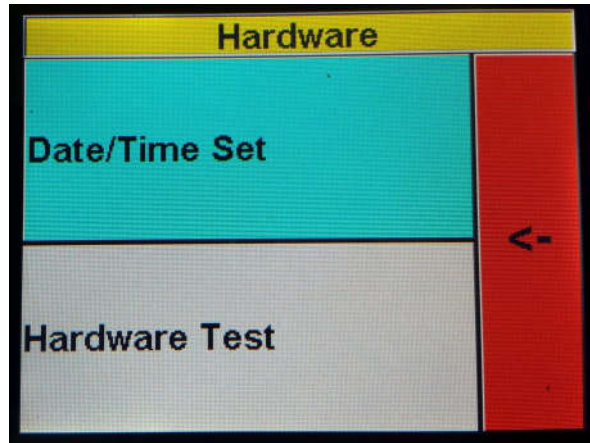
Here it is possible to change the date and the time or verify the functions of the hardware components

If the user push "Date/Time Set" button, a figure like the above, appears on the LCD:

Here it is possible to insert the date and the time: On the upper banner is shown, from left to right, the two digit of the year "YY" the two digit of the day "DD" the two digit of the month "MM" The hours "HH and the minutes "MI"

Insert first the year using the number of the keyboard. The new values appear on the upper banner. If the user input a wrong number or the debounce of the touch screen input doubled values, tha user can cancel the input values using the left arrow. The Fun button is not active.

If the user push "ESC" the date and time is not changed and the program goes on the settings menu. If the user push ENT button, the new values are stored and will appear on the upper figure of the main menu.
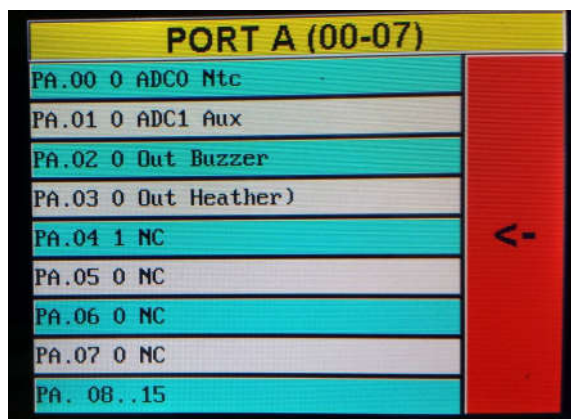
Hardware test

If in the Hardware figure the user push Harware test button, the program enter in the following menu:

Here it is possible to test the used ports That are Port A and Port B:
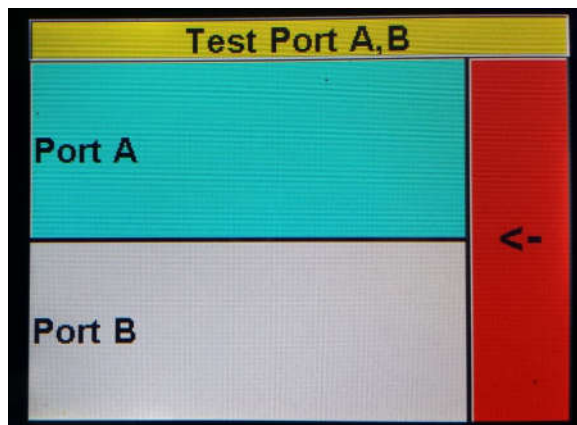
Pushing Port A:

Here are shown the port used by the hardware:
PA0: input ADC of the temperature sensor
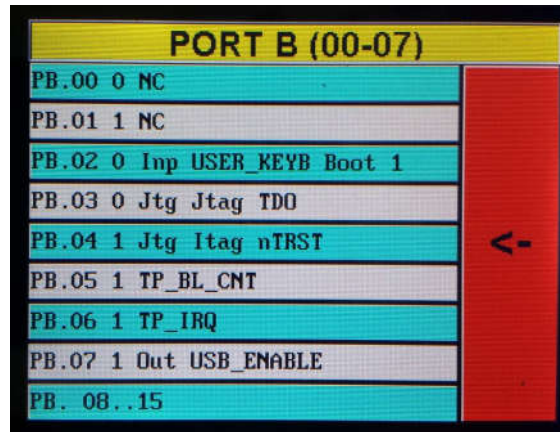PA1: auxiliary ADC not used in this instrument
PA2: Out Buzzer
PA3: Out Heather
If the user push the button PA2 or PA3, can change the status of the port from 0 to 1.
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This can be useful to test the hardware.
If the user push the arrow button with red background color, the user goes to the menu shown before.

Here there are shown the Port B elements that don't contain ports used by this hardware configuration but only reserved for the system.

ADC:
If the user in the Test Hardware menu push the button ADC, a figure like the above is shown on the LCD:
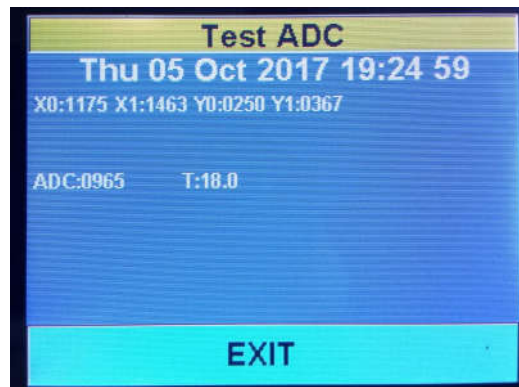

Here are shown the two calibration points(X0, Y0) and (X1, Y1) The instant value of the ADC and the corresponding Calculate temperature. X0 is the ADC value of the cold point, X1 is the ADC value of the hot point. Y0 is the temperature of the cold point, Y1 is the temperature of the hot point.
To have a good calibration, the cold calibration point must be under 25°C and the hot point must be more close as possible to the working temperature (usually 37°C).

Firmware upgrade:

It is possible to change the program of the instrument using an USB port and a Computer Windows based. To set the controller in the input mode, the user must push the Firmware upgrade button:

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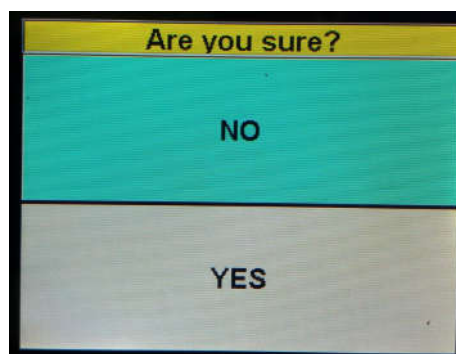
If the user push the YES button, the controller of the instrument switch to boot mode to accept the new sotware. To perform this programmation the user must load on the computer the programming software (STM32 Loader) , connect the controller via USB to the computer, Load, on the computer, the new release of the software. When the programming is ended, the system will reset and will enter in the new program.

4.2 MANTINANCE

Control water bath temperature with external thermometer every six months. Be sure that external thermometer is precise: sometime mercury thermometer are not enough precise to calibrate the instrument. If thermostatated temperature is 37.0°C, the operator can use, as external thermometer, a fever thermometer.

Do not open cover of heating group, there are no trim or regulation inside.

WARNING:
INSIDE HEATING GROUP SOME ELEMENTS WORKS AT 220Vac

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for
1950

TECHNICAL DATA

INSTRUMENT: **Water Bath BT Digit**

CODE: **5DP**

HS CODE: **85161080**

POWER SUPPLY: **220V (±10%) – 50Hz 620W**

DIMENSIONS: **(width x length x height) 25x50x34cm.**

WEIGHT: **9Kg**

OPERATION: **Inox made heater controlled by an electronic thermostat to hold the temperature of the tubes in a range between room temperature and 50-60 degrees**

TEMPERATURE CONTROL: **Electronic thermostat based on a microcomputer with LCD display that shows the bath temperature and the set temperature**

HOUSINGS: **Two tube holders of 50 seats each for 13mm tubes and one tube holder with 40 seats for the 18mm tubes**

TANK: **Acrilic made 8mm thikness with a drop stop cover**

DISPLAY: **Colour LCD 3.2" with touch screen**

CONTROL: **Adjustment of the set temperature with buttons on the LCD driven by the touch screen**

TARATURE: **With external termometer and an apposite window on the LCD**

CONFORMITY': **Standards CEI EN 61010/1 RULES 89/336EEC CE Mark**

Manufactured by:
MINIVOLT Instruments S.r.l.
Via Di Pietralata, 204/A
00158 Roma ITALY

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DICHIARAZIONE di CONFORMITA'
DECLARATION of CONFORMITY

$C\epsilon$

Nome del fabbricante:
Manufacturer:

Minivolt Instruments S.r.l.

Indirizzo:
Address:

Via di Pietralata 204/A
00158 ROMA

Nazione:
Country:

ITALIA

Il sottoscritto, in qualità di fabbricante, dichiara che l'apparecchio
The under written , as manufacturer, declares that the instrument defined here below

Denominazione apparecchio: **BAGNOMARIA DIGITALE**
Description: **THERMOSTATIC BATH**

Modello: **BT DIGIT**
Model:

Numero di serie: **Da   700   A   750**
Serial number: **From 700   To   750**

Anno di fabbricazione: **2019**
Manufacture year:

E' conforme alle seguenti **Direttive-Norme**:
It is in compliance with the following Rules:

89/336/CE	**EN55022**	
(Emissioni/Emission)		
89/336/CE	**EN 61326**	
(Immunità/Immunity)		
98/79/CE e 73/23/CE	**EN61010-2-101; EN61010-1**	**(Sicurezza/Safety)**

Roma **21/01/2019**

MINIVOLT Instruments S.r.l.
Giorgio Fioravanti

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THERMOSTATIC BATH BT DIGIT Code 5DP
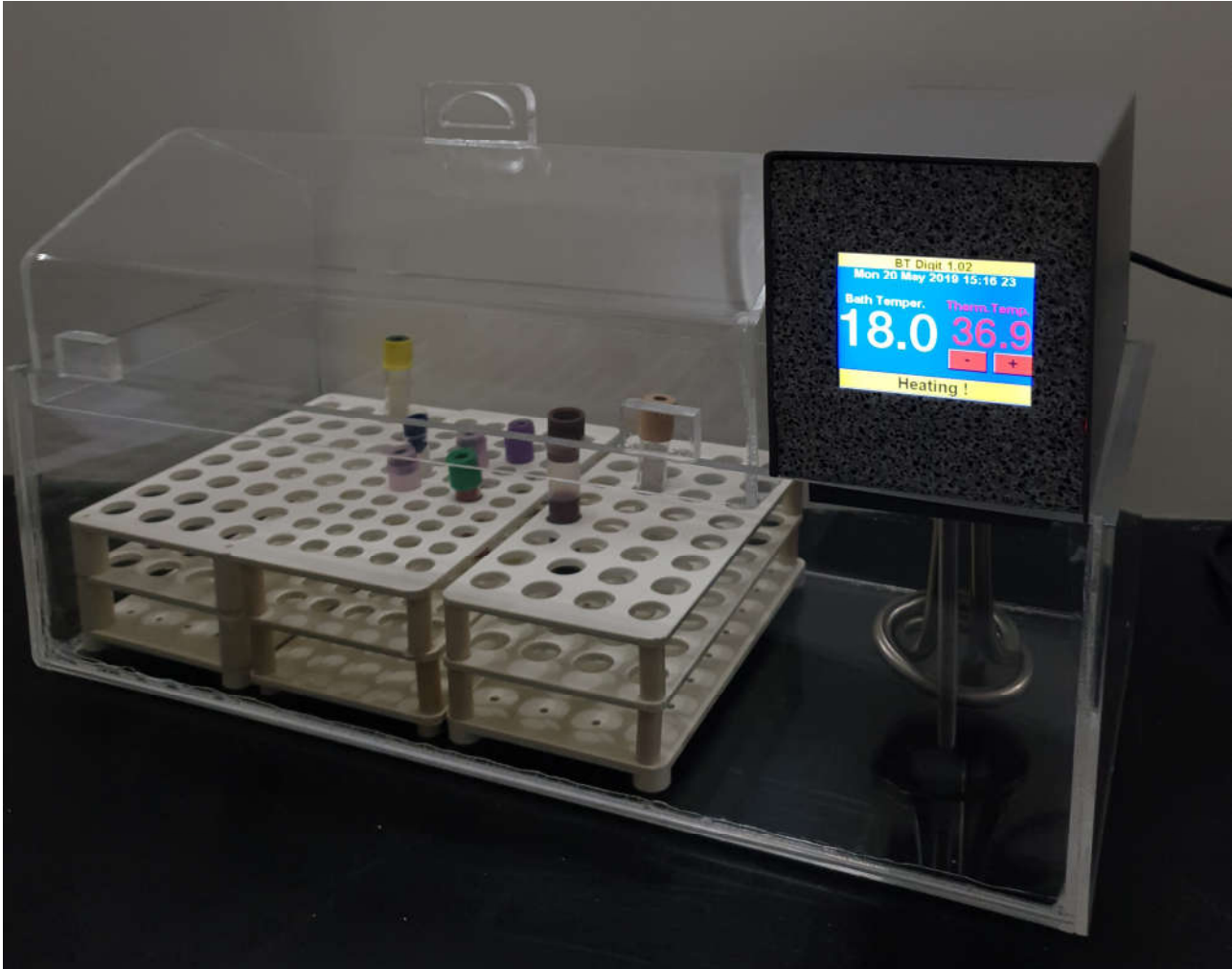
- BT DIGIT is a thermostatic bath specialized on serum analysis field.
- Acrilic 15 literes tank, dimensions 50X23X15h cm. Acrilic drop stop cover.
- Two test tubes holders with 32 seats (18mm ø) and one test tubes holder with 50 seats (13mm ø)
- 600W heating element, inox made, with coaxial mixer propeller.
- Microprocessor based, with LCD and touch screen, the working temperature is set on the screen and the calibration is made via software, in a very easy way. Manufactured in C E rding with   rules.
- Dry weight 9 Kg. Power supply 220V 50Hz 610VA.
- Entirely manufactured in Italy.

Dealer:

Manufacturer:

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