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**EASI-TWIN
TYPE EASI-TWIN MONITORING
USER'S GUIDE**

Manufacturer and customer service:

1 -CUBE s.r.o.

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1. Range of the supply

Easi-Twin- monitoring.....1 pcs

Optional accessories:

Test cell.....2 pcs

Sample holder.....2 pcs

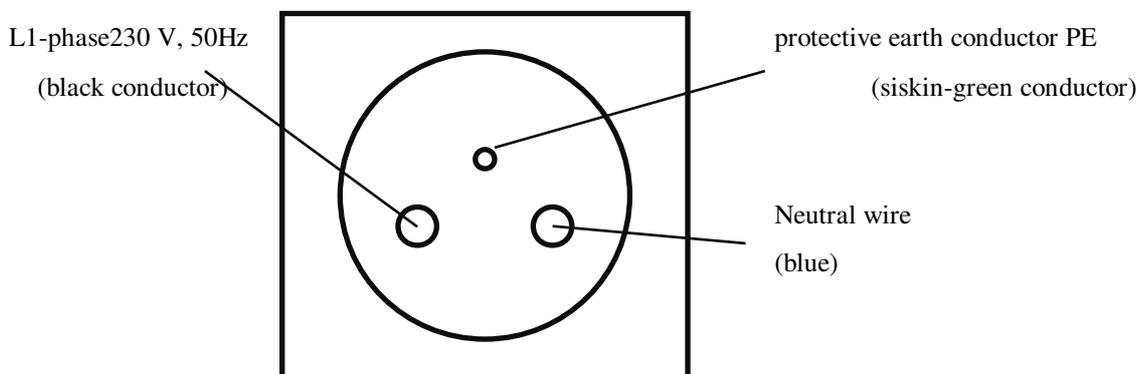
Cable RS232..... 1 pc

CD with software for transfer of the temperatures into PC.....1 pc

2. Installation - putting the device into operation

Easy Twin is determined only for work in laboratories which is the ordinary place for laboratory tests. Easy Twin must be located in the horizontal position (for proper operation of the apparatus). Plug the Easy Twin with the help of a standardized single-phase plug into el.socket. Before plugging in the technician has to check the condition of the el.circuit that will be used for the Easy Twin operation. If the result of the el.circuit inspection is positive, the Easy Twin can be plugged in.

Plug wiring (front view):



3. Safety recommendations

Easi-Twin may be operated only by person who became completely acquainted with its function within the framework of the training, or who became thoroughly acquainted with the user's guide of this device. Easy Twin must be plugged in with the help of a standardized plug into single-phase el.socket with a circuit breaker. Before plugging in the technician has to check the condition of the el.circuit that will be used for the Easy Twin operation. If the result of the el.circuit inspection is positive, the Easy Twin can be plugged in. There is main switch on the back pannel of the Easy Twin with the positions: ON-1, OFF-0. In case of danger switch off the Main Switch and eventually disconnect feed el.cord out of the socket. Taken measures depend at the discretion of the personnel in the light of the danger.

Warning! It is hazardous for anyone except for the producer and authorized service company to repair the apparatus.

4. Technical data

Electric data:

- voltage system TN-S 1+PE+N
- voltage 230V/50 Hz
- protection IP 20
- the equipment can be used in neutral medium
- the equipment output 250 W
- circuit breaker–2.5 A fusible cut out
- plugging in el. network: with the help of flexible cord LYS 3x1
- averaged plug and socket outlet protected with circuit breaker

Adjustable data:

- temperature range: (+20-69⁰C) with the help of membrane keyboard and display
- temperature accuracy adjustment: 0.01⁰C
- time of the test duration: (from 1 min to 65 535 min)
- time accuracy adjustment: 1 min

Accuracy:

- temperature accuracy measurement: +_ 0.1⁰C, - temperature accuracy regulation: +_ 0.2⁰C

Data represented on LCD display

- instantaneous temperature in the heating blocks
- time since the beginning of test
- communication of the instrument with the personnel during parameters adjustment and calibration

Signalization:

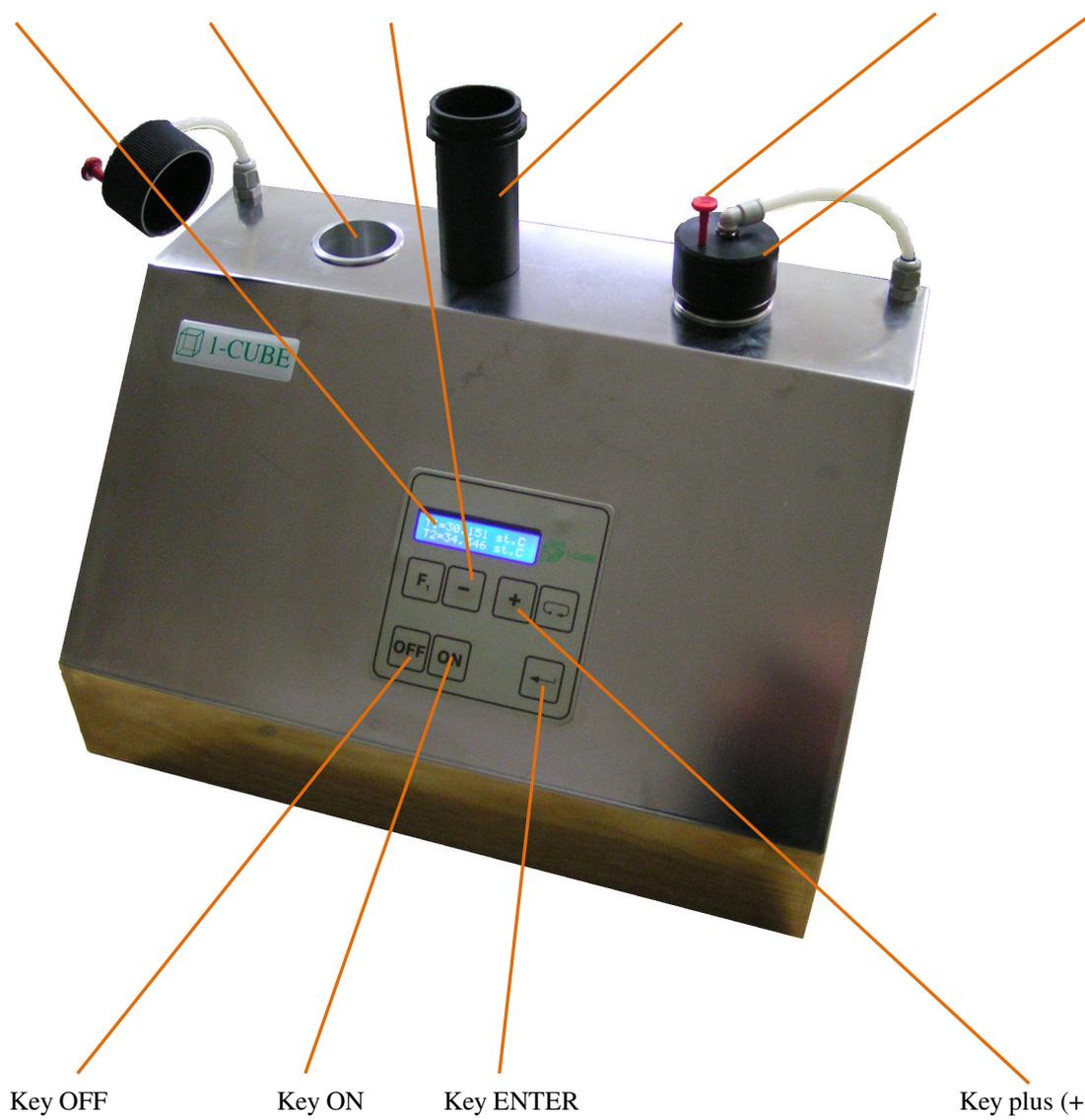
- acoustic alarm

5.0 Operating instructions

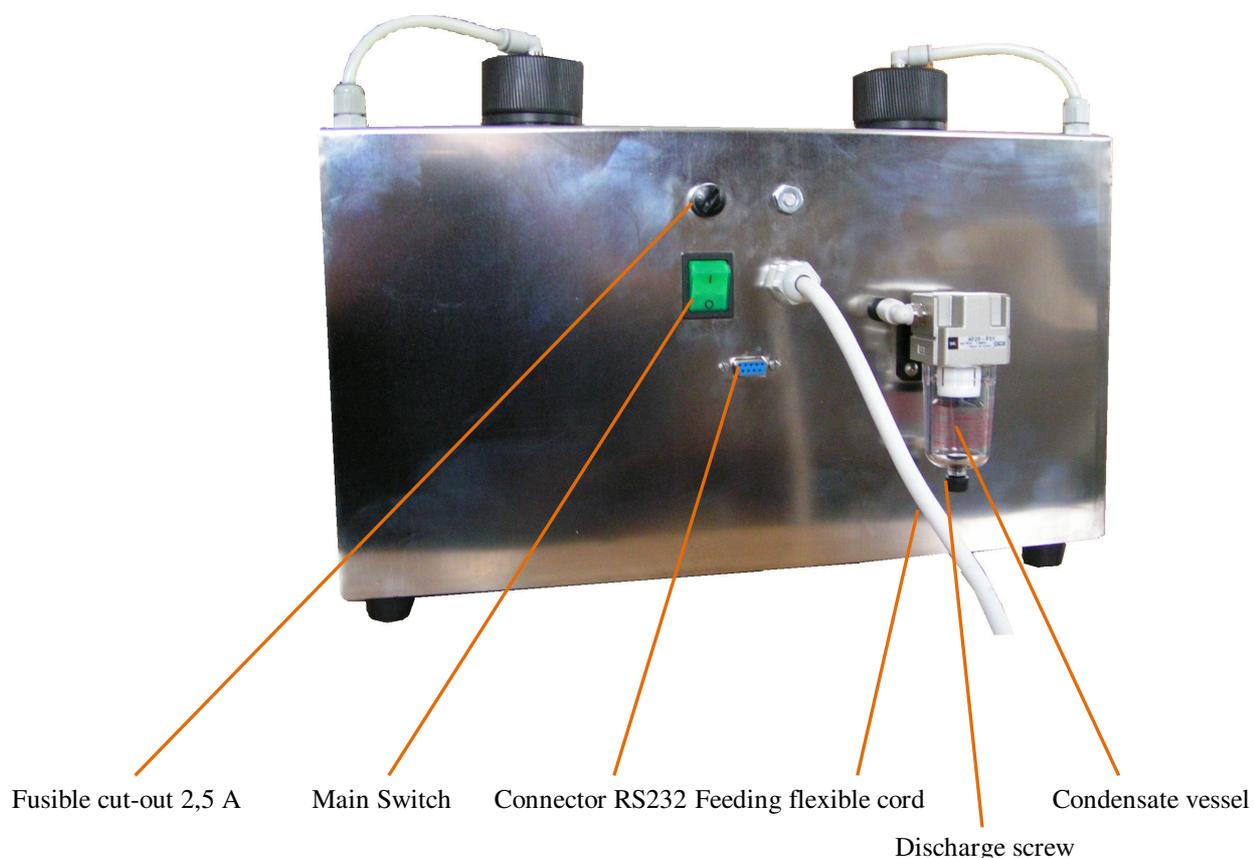
First switch on the Main Switch located on the back panel of the equipment. There is single-chip processor used to operate the equipment. The algorithm is saved in the programme. Program is controlled with the help of 7 keys of the membrane keyboard which is located on the front panel of the equipment. The report about the operating condition can be observed on the 2 lines of the display.

Display and keyboard scheme – front panel:

Display Heating block Key MINUS (-) Test cell Red Plug Lid



Scheme – back pannel:



After switching on the equipment there is 1-CUBE name which disappears after a while and the basic text appears on the display (example):

T1=22.19 deg. C

T2=22.12 deg.C

There is current temperature in heating block No. 1 (left heating block regarding from the front) on the first line and current temperature in heating block No. 2 (right heating block regarding from the front) on the second line.

Once the work is finished switch off the Main Switch.

5.1 Adjustment of the required temperature or time:

The required temperature or time in both heating blocks are adjusted by pressing keys plus + (to increase the value) or minus – (to decrease the value). First the required value is changed of hundredths of degree or 1 minute after ten changes (ten presses of key), the required value is changed of tenths of degree or 10 minutes after other ten changes (ten presses of key) the required value is changed of degrees or 100 minutes etc.

After first pressing the key + or – the following text appears on the display:

Set up temper.1

+040.00

Temperature in degrees Celsius is set with the help of keys plus + (to increase the value) or minus – (to decrease the value) in the heating block No.1. After setting the required temperature press the key OFF and in that way the adjusted temperature is saved in the memory and the following text appears on the display:

Set up time 1

00010

Time in minutes is set with the help of keys plus + (to increase the value) or minus – (to decrease the value) in the heating block No.1. After setting the required time press the key **OFF** and in that way the adjusted time is saved in the memory and the following text appears on the display:

Set up temper.2

+040.00

Temperature in degrees Celsius is set with the help of keys plus + (to increase the value) or minus – (to decrease the value) in the heating block No.2. After setting the required temperature press the key **OFF** and in that way the adjusted temperature is saved in the memory and the following text appears on the display:

Set up time 2

00010

Time in minutes is set with the help of keys plus + (to increase the value) or minus – (to decrease the value) in the heating block No.2. After setting the required time press the key **OFF** and in that way the adjusted time is saved in the memory and basic text appears on the display again(example):

T1=22.19 deg.C

T2=22.12 deg.C

Note. The following values are preadjusted for both heating blocks: temperature 40.0 degrees C and time 10 minutes. If these values do not satisfy your demands, you have to change them as described above.

5.2 Temperature Regulation:

After pressing the key **ON** the temperature regulation is started and the following text is displayed (example):

min1:0.1 T1=22.7

min2:0.1 T2=21.4

During the process the following information are automatically displayed on the display.

1. line:

Information about time given in minutes from the moment of ON key press and current temperature in heating block no:1.

2. line:

Information about time given in minutes from the moment of ON key press and current temperature in heating block no:2.

After reaching the required temperature (pre-adjusted 40 degrees Celsius) the acoustic signalization will sound and indicates that the required temperature has been reached in the corresponding heating block and the prepared sample can be put in. Once the sample is put in and the lid of the corresponding heating block is inserted, the acoustic signalization is switched off by pressing the key ON and the membrane suction-pump (creating underpressure in the heating block) is automatically tied-up and at the same time after this step the time is automatically set to zero. Now the sample reaches the required the temperature on underpressure. After the lapse of the defined time (preadjusted time is 10 minutes) the acoustic signalization will sound and the the membrane suction-pump is automatically switched off. After pressing the key ENTER the acoustic signalization is stopped (attention – unlike the beginning when the acoustic signalization is switched off after pressing the key ON). Now the lid can be remove and the sample can be taken out from the corresponding heating block. The lid is equipped with the red plug to make the lid disengagement easier. Once the red plug is remove the underpressure in the heating block is automatically set to zero and the lid can be remove easily. After underpressure zeroing put the red plug in again into the opening of the lid.

NOTICE: It is forbidden to remove the red plug of the lid or the lid itself when the underpressure is created (the membrane suction-pump run) !

Even after pressing the key ENTER the temperature in the heating block is still maintained at the adjusted value (preadjusted value-40.00° C) and the heating block is ready for another immediate insertion of the sample. Before another sample insertion it is necessary to finish the previous measurement by pressing the key **OFF** and to start new measurement by pressing the key **ON**. After pressing the key **OFF** the temperature regulation (warming) itself of the both heating blocks is finished. After pressing the key OFF the following text is displayed (example):

T1=22.19 deg. C

T2=22.12 deg.C

NOTE: Both heating blocks work independently from each other. If you want to run only the first heating block, adjust the required temperature in the heating block No. 2 on very low value – for example 5 d. Celsius (lower than the surrounding temperature) which prevents the heating of the second heating block.

5.3 SAMPLE PREPARATION:

To test the germinative capacity of grain a staining process is used. This utilises a solution of tetrazolium salt. 2-(4-iodophenyl)-3-(4-nitrophenyl)-5-phenyltetrazolium chloride is made into a 0.33% solution, i.e. 1 g in 300 ml distilled water.

This salt is sensitive to enzymes which are present in living embryo tissue and which reduce the salt to a red dye. If the tissue is dead there are no enzymes present and no red formation is produced.

The stain test is performed on grains which have been cut in half longitudinally to expose embryo tissue to the staining agent.

During the test the half corns are immersed in the tetrazolium solution for approximately 10-15 minutes at a temperature

of 40°C and under vacuum to ensure that the staining agent penetrates the tissue.

To obtain the acrospire profile, a solution of copper sulphate is used.

5.4 TEST PROCEDURES

- Extract seed holder.
- Fill test cell with 45 ml of the salt solution.
- Place test cell into heating block of the instrument. Switch on the instrument and start the temperature regulation with ON key.
- Place cut corns into sample holder
- Once the acoustic alarm is on (indicating that the temperature in the heating block has reached the required value) lower the sample holder gently into the test cell in the corresponding heating block switch off the acoustic signalization by pressing the key ON and start the test itself. At the same time put the lid with inserted red plug on the test cell
- On completion of test (after the lapse of the defined time) the acoustic signalization will sound, stop it by pressing the key ENTER
- Remove the lid (remove the red plug from the lid momentarily for easier lid lifting and insert it back immediately again).
- Gently remove the test cell from the corresponding heating block avoiding any spillage or discharge
- Remove sample holder from test cell and inspect corns for evidence of staining
- Ensure both test cell and heating block are clean before the next test

5.5 Calibration and regulation parameters adjustment:

Method Calibration:

It is described how to calibrate the temperature sensors and adjust the regulation parameters in this paragraph. It is matter of service that the common user does not need to know and does not have to be acquainted with.

It is necessary to check the temperature measurement accuracy with the help of etalon every six months. If the temperature of the bath does not correspond to the temperature measured with the etalon it is necessary to recalibrate the temperature sensors. The temperature sensor is calibrated only if it is really necessary because the equipment is optimally calibrated by manufacturer.

Calibration Procedure:

It is necessary to calibrate two temperatures for the right measurement of the instrument. The lower temperature (about 20 degrees Celsius) and the upper temperature (about 45 degrees Celsius).

Calibration of the lower temperature 20 degrees Celsius (points 1) :

First fill both heating blocks with distilled water. Further check if the temperature in the both rating blocks is about 20 degrees Celsius and if it is not like, it is necessary to reach the temperature of 20 degrees Celsius, once the temperature is approximately reached, follow the following procedure.

1) Press the keys **OFF** and **ENTER** together at the same time and you will get into the section of calibration and adjustment of regulation parameters

Note: Points 2) - 6) to be applied to heating block No. 1.

- 2) There is text „dig.val.temp.1“ on the first line and the digital value appears on the second line momentarily. Write down the digital value.
- 3) There is text „ T1 point 1 – dig.“ on the first line and the value on the second line. Overwrite the value with the help of keys + (increase) or – (decrease) to put the digital value that you have written down before. Press the key „OFF“ to set the required value.
- 4) There is text „ T1 point 1 – temp.“ on the first line now and the value on the second line. Overwrite the value with the help of keys + (increase) or – (decrease) to put the value that you have measured before with the etalon in the water of the heating block No.1. Press the key „OFF“ to set the required value.
- 5) There is text „T1 point 2 – dig.“ on the first line now and the value on the second line. Do not set the point 2 at this moment therefore press the key „OFF“.
- 6) There is text „T1 point 2 – temp.“ on the first line now and the value on the second line. Do not set the point 2 at this moment therefore press the key „OFF“.

Note: Points 7) - 12) do no relate to calibration but to adjustment of regulation parameters which are common for both heating blocks.

- 7) There is text „HYSTER1_0=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER1_0** at this moment therefore press the key „OFF“.
- 8) There is text „HYSTER1_100=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER1_100** at this moment therefore press the key „OFF“.
- 9) There is text „HYSTER2_0=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER2_0** at this moment therefore press the key „OFF“.
- 10) There is text „HYSTER2_100=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER2_100** at this moment therefore press the key „OFF“.
- 11) There is text „HYSTER3_0=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER3_0** at this moment therefore press the key „OFF“.
- 12) There is text „HYSTER3_100=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER3_100** at this moment therefore press the key „OFF“.

Note: Points 13) - 17) to be applied to heating block No. 2.

- 13) There is text „dig.val. temp 2“ on the first line and the digital value appears on the second line momentarily. Write down the digital value.
- 14) There is text „ T2 point 1 – dig.“ on the first line and the value on the second line. Overwrite the value with the

help of keys + (increase) or – (decrease) to put the digital value that you have written down before. Press the key „OFF“ to set the required value.

- 15) There is text „ T2 point 1 – temp.“ on the first line and the value on the second line Overwrite the value with the help of keys + (increase) or – (decrease) to put the value that you have measured before with the etalon in the water of the heating block No.2. Press the key „OFF“ to set the required value
- 16) There is text „T2 point 2 – dig.=“ on the first line now and the value on the second line. Do not set the point 2 at this moment therefore press the key „OFF“.
- 17) There is text „T2 point 2 – temp.“ on the first line now and the value on the second line. Do not set the point 2 at this moment therefore press the key „OFF“.

The lower temperatures (points 1) are calibrated now

Calibration of the upper temperature 45 degrees Celsius (points 2) :

First check if the temperature in the both rating blocks is about 45 degrees Celsius and if it is not, it is necessary to reach the temperature of 20 degrees Celsius, once the temperature is approximately reached, follow the following procedure.

- 1) Press the keys **OFF** and **ENTER** together at the same time and you will get into the section of calibration and adjustment of regulation parameters

Note: Points 2) - 6) to be applied to heating block No. 1.

- 2) There is text „dig.val.temp.1“ on the first line and the digital value appears on the second line momentarily. Write down the digital value.
- 3) There is text „ T1 point 1 – dig.=“ on the first line and the value on the second line. Do not set the point 1 at this moment therefore press the key „OFF“.
- 4) There is text „ T1 point 1 – temp.“ on the first line now and the value on the second line. Do not set the point 1 at this moment therefore press the key „OFF“.
- 5) There is text „T1 point 2 – dig.=“ on the first line now and the value on the second line. Overwrite the value with the help of keys + (increase) or – (decrease) to put the digital value that you have written down before. Press the key „OFF“ to set the required value.
- 6) There is text „T1 point 2 – temp.“ on the first line now and the value on the second line. Overwrite the value with the help of keys + (increase) or – (decrease) to put the value that you have measured before with the etalon in the water of the heating block No.1. Press the key „OFF“ to set the required value.

Note: Points 7) - 12) do no relate to calibration but to adjustment of regulation parameters which are common for both heating blocks.

- 7) There is text „HYSTER1_0=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER1_0** at this moment therefore press the key „OFF“.
- 8) There is text „HYSTER1_100=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER1_100** at this moment therefore press the key „OFF“.
- 9) There is text „HYSTER2_0=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER2_0** at this moment therefore press the key „OFF“.
- 10) There is text „HYSTER2_100=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER2_100** at this moment therefore press the key „OFF“.
- 11) There is text „HYSTER3_0=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER3_0** at this moment therefore press the key „OFF“.
- 12) There is text „HYSTER3_100=“ on the first line now and the value on the second line. Do not set the hysteresis **HYSTER3_100** at this moment therefore press the key „OFF“.

Note: Points 13) - 17) to be applied to heating block No. 2.

- 13) There is text „dig val.temp. 2“ on the first line and the digital value appears on the second line momentarily. Write down the digital value.
- 14) There is text „ T2 point 1 – dig.=“ on the first line and the value on the second line. Do not set the point 1 at this moment therefore press the key „OFF“.
- 15) There is text „ T2 point 1 – temp.“ on the first line and the value on the second line Do not set the point 1 at this moment therefore press the key „OFF“.

- 16) There is text „T2 point 2 – dig.=“ on the first line now and the value on the second line. Overwrite the value with the help of keys + (increase) or – (decrease) to put the digital value that you have written down before. Press the key „OFF“ to set the required value.
- 17) There is text „T2 point 2 – temp.“ on the first line now and the value on the second line. Overwrite the value with the help of keys + (increase) or – (decrease) to put the value that you have measured before with the etalon in the water of the heating block No.2. Press the key „OFF“ to set the required value

The upper temperatures (points 2) and temperature sensors in both heating blocks are calibrated now. Suck the distilled water from the heating blocks and dry them with the clout.

Hysteris ajustement for the most precise regulation:

The complex regulating algorithm is used to reach the required temperature. There are 3 hysteresis bands used and the heating output is regulated according to them. Their amplitude changes linearly versus temperature and cooling aggregate closing. Use the following procedure to adjust the hysteresis.

- 1) Press the keys **OFF** and **ENTER** together
- 2) There is text „dig value of tem 1“ on the first line and the digital value appears on the second line momentarily.
- 3) There is text „ T1 point 1 - dig“ on the first line and the value on the second line. We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.
- 4) There is text „ T1 point 1 - temp“ on the first line now and the value on the second line We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.
- 5) There is text „T1 point 2 - dig“ on the first line now and the value on the second line We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.
- 6) There is text „T1 point 2 - temp“ on the first line now and the value on the second line. We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.
- 7) There is text „**HYSTER1_0=**“ on the first line now and the value on the second line. Set the required value of **HYSTER1_0=** with the help of keys + (increase) or – (decrease). Press the key „OFF“ to set the required value. The manufacturer has preadjusted the hysteresis **HYSTER1_0=** on value **005.00**.
- 8) There is text „**HYSTER1_100=**“ on the first line now and the value on the second line. Set the required value of **HYSTER1_100=** with the help of keys + (increase) or – (decrease). Press the key „OFF“ to set the required value. The manufacturer has preadjusted the hysteresis **HYSTER1_100=** on value **005.00**.
- 9) There is text „**HYSTER2_0=**“ on the first line now and the value on the second line. Set the required value of **HYSTER2_0=** with the help of keys + (increase) or – (decrease). Press the key „OFF“ to set the required value. The manufacturer has preadjusted the hysteresis **HYSTER2_0=** on value **04.00**.
- 10) There is text „**HYSTER2_100=**“ on the first line now and the value on the second line. Set the required value of **HYSTER2_100=** with the help of keys + (increase) or – (decrease). Press the key „OFF“ to set the required value. The manufacturer has preadjusted the hysteresis **HYSTER2_100=** on value **004.00**.
- 11) There is text „**HYSTER3_0=**“ on the first line now and the value on the second line. Set the required value of **HYSTER3_0=** with the help of keys + (increase) or – (decrease). Press the key „OFF“ to set the required value. The manufacturer has preadjusted the hysteresis **HYSTER3_0=** on value **000.60**.
- 12) There is text „**HYSTER3_100=**“ on the first line now and the value on the second line. Set the required value of **HYSTER3_100=** with the help of keys + (increase) or – (decrease). Press the key „OFF“ to set the required value. The manufacturer has preadjusted the hysteresis **HYSTER3_100=** on value **000.01**.

The hysteresis are calibrated now.

- 13) There is text „dig value of temp 2“ on the first line the digital value appears on the second line momentarily.
- 14) There is text „T2 point 1 - dig“ on the first line now and the value on the second line We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.
- 15) There is text „T2 point 1 - temp“ on the first line now and the value on the second line We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.
- 16) There is text „T2 point 2 - dig“ on the first line now and the value on the second line We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.
- 17) There is text „T2 point 1 - temp“ on the first line now and the value on the second line We do not calibrate the temperature sensor at this moment therefore press the key „OFF“.

6. Monitoring RS232

During temperature regulation of the Easy Twin the records of the temperature curves in PC are possible. Switch off the Easy Twin and connect the PC com1 port with the Easy Twin RS232 com port with the help of supplied communicating cable. Switch on the instrument and start the temperature regulation with ON key. Use any program which makes possible the RS232 communication to record the temperatures in PC. Program Hyperterminál (which is part of WINDOWS) or program Seriál Watcher (which is part of instrument supply) can be used. Note. It is necessary to adjust the program for ASCII signs reception. The temperatures are displayed in the following way in text file: the 1st column – temperatures in the heating block No.1, the 2nd column – temperatures in the heating block No.2.

7. Maintenance

In case that the heating block is dirty , clean and dry it with a dry clout. Avoid spilling over of any liquid onto the instrument. Any accidental spillage must be removed immediately. Throughout the Easy Twin operation water can appear in the condensate vessel located on back pannel of the instrument. The vessel is equipped with the black discharge screw. If there is water in the vessel, empty it by turning of the discharge screw. Once it is discharged stabilize the discharge screw.

8. Important warnings:

If the instrument is transported at temperature below freezing point, it is necessary to leave the instrument for about 2 hours at room temperature before you start to work with it.

The fuse is located on the back panel of the instrument. It is forbidden to replace the fuse by fuse with different value than the value indicated on the equipment.

Service:

For service contact the manufacturer: 1-CUBE, Hamry 3567, 580 01 Havl.Brod, Czech Rep.
tel. 00 420- 569 433 620
fax.00 420-569 422 144
1-cube@1-cube.com

NOTICE: It is forbidden for anyone except for the manufacturer or authorized company to repair the apparatus.

At the end of the apparatus life we recommend that it is according to corresponding waste categorization.

Take the metallic parts made of iron, brass, plastic elements and packing material to the separated collection as a secondary raw material. You can also order the apparatus liquidation at the above mentioned company that ensures the liquidation of the waste according to Waste Act.