

# INSTRUCTIONS

## MANUAL

### HIGH PERFORMANCE ULTRASONIC TESTER

**Model: T-C372N**



File No.: TEST- V2.3-EN

Publication Date: Sept 30 2021

Print Date: Oct 5, 2021

INSTRUCTIONS MANUAL  
**"HIGH PERFORMANCE" ULTRASONIC TESTER**

DO NOT ATTEMPT TO OPERATE THIS EQUIPMENT BEFORE READING AND COMPREHENDING THE MANUAL IN ALL ITS PARTS

USERS

- MACHINE MANUFACTURERS
- DRAUGHTSMEN
- OPERATORS
- MAINTENANCE WORKERS
- ANY OTHERS



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## Chapter 1 GENERAL INFORMATION

### 1.01 WARNINGS

The manufacturer does not accept any responsibility for direct or indirect damage to people, things or animals and use of the appliance in different conditions from those foreseen.

The manufacturer reserves the right to make changes to the documentary information or to the appliance without advance notice.

Check the machine responds to the standards in force in the state in which it has been installed.

All operations necessary for maintaining machine efficiency before and throughout use are the operator's responsibility

Carefully read the entire manual before operating the machine.

It is vital to know the information and limitations contained in this manual for correct machine use by the operator.

Interventions are only permitted if the operator is accordingly competent and trained.

The operator must be knowledgeable about machine operations and mechanisms.

The purchaser must ensure that operators are trained and aware of all the information and clarifications in the supplied documentation.

Even with such certainty the operator or user must be informed and therefore aware of potential risks when operating the machine.

Safety, reliability and optimum performance is guaranteed when using original parts.

Any tampering or modifying of the appliance (electrical, mechanical or other) which has not been previously authorised in writing by the manufacturer is considered abusive and disclaims the constructor from any responsibility for any resulting damage.

All necessary operations to maintain the efficiency of the machine before and throughout use are the responsibility of the user.

### 1.02 WARNING AND DANGER INDICATIONS - SIGNS

The machine has been designed and constructed according to the current norms and consequently with mechanical and electrical safety devices designed to protect the operator or user from possible physical damage. Residual risks during use or in some intervention procedures on the device are however present. Such risks can be reduced by carefully following manual procedures, using the suggested individual protection devices and respecting the legal and safety norms in force.

This manual includes "Warning" and "Danger" indications in relevant chapters. These indications are shown with the words "Danger" or "Warning" in bold font and uppercase to make them highly visible.



**ATTENTION**

indicates that machine damage could be caused should indications be ignored



**DANGER**

indicates that machine damage and/or injury to the worker could be caused should indications be ignored.

"**DANGEROUS ZONE**" indicates any zone inside or in the proximity of the appliance in which a person is exposed to the risk of injury or damage to health.

### 1.03 AIM OF THE INSTRUCTIONS MANUAL

This manual has been edited with the aim of providing all machine operators with all the necessary information on installation, use and maintenance from production to scrapping in as comprehensive and clear manner as possible.

All the procedures useful for any foreseeable emergency situations have been listed by the manufacturer and can be verified during use.

Operators, for whom this manual has been written, due to their competence must give instructions or operate the machine themselves.

The instructions manual must be carefully consulted by laboratory or site safety managers, equipment operators and any internal and external maintenance workers.

The manual is integral to the product and refers to this appliance only.

The manual must be safeguarded and always kept near the equipment so that it can be easily consulted whenever necessary.

**IMPORTANT:** The manual does not substitute the experience and technical training of the worker but must be considered a guide for carrying out its functions.

Furthermore all the norms and rules the operator should be aware of or consult for correct use of the machine and/or test performance can be found in the manual.

This responsibility is entrusted to the installer and Laboratory or Site Manager where the machine is installed.

The Constructor is available to provide further information.

#### **1.04 MODIFICATIONS AND ENCLOSURES OF THE INSTRUCTIONS MANUAL**

This manual reflects the state at the time of the launch of the machine on its market. If any modifications, improvements or adjustments have been made since machine supply the Manufacturer does not have to intervene on the marketed machine and will not consider the machine or the manual deficient or inadequate.

#### **1.06 MACHINE IDENTIFICATION DATA**

MODEL: C372N

PRODUCTION DATA: see EC declaration

INSTRUCTIONS MANUAL CODE: C372N.M01.EN.04

#### **1.07 EC STAMP**

SEE EC DECLARATION

#### **1.08 USAGE**

Used to detect faults, space, cracks, fissures, etc inside concrete structures (rocks or other materials) and to monitor the stress due to environmental factors.

It provides information about the concrete homogeneity, creating ultrasonic impulses which are transmitted to the product; the machine is also used to:

- measure the time required for the signal to pass from a transmitting sound probe through the chosen test material to a receiving sensor.
- The speed calculation of the ultrasound impulse through the material (given the distance between the sound probes)
- The distance calculation between the two sound probes (given the speed of the impulse through the chosen test material)
- The calculation of the Young module (given the distance between the sound probes, the density and the cutting speed of the test material)
- The compression resistance calculation (distance between the sound probes and the compression index of the material to test). You can get the index of compression of the material under test connecting this ultrasonic tester to a digital rebound test hammer mod. C386N
- The crack depth calculation (distance between the sound probes and the ultrasounds in the material to test)
- The zero calibration (subtracting the impulse travelling time)
- Calibration of a defined time value

Appropriate uses: as described in the usage  
Inappropriate uses: anything NOT outlined in the usage

This appliance is for the exclusive use which it has been conceived for.

Any other use is considered improper and therefore negligent.

Machine use is allowed only in places free from danger of explosion or fire.

During operation check for conditions of danger.

Immediately stop the machine should it be working irregularly, and consult the authorised dealer's Sales Service department.

It is the Client's responsibility to verify at the time of installation and use that no conditions of use arise which are different to those indicated.

Refer to the Constructor when in doubt.

**1.09 OPERATORS**

	<b>WARNING DANGER</b>	<p>The use, transportation, installation, maintenance, demolition and disposal of the appliance are only permitted to “QUALIFIED PERSONNEL”.</p> <p>This manual is exclusively aimed at “QUALIFIED PERSONNEL” and contains the necessary information for machine use.</p>
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“QUALIFIED PERSONNEL” means people who, due to their training, experience and education, as well as knowledge of the relevant standards, limitations and measures, have been authorised by the “PLANT SAFETY MANAGER” to carry out any necessary activity and are able to recognise and avoid any possible danger.

The manufacturer recommends that the instructions, procedures and recommendations in this manual and the work safety legislation in force be scrupulously adhered to, even with the use of appropriate protection devices (whether individual or part of the machine).

Knowledge and respect of the instructions, safety warnings and danger in this manual are all necessary for installation, operation, management and machine maintenance with a minimal risk.

The “PLANT SAFETY MANAGER” has the following responsibilities and duties:

- To know the machine functions, its commands, safety and protection devices, possible dangers of use and all the information in this manual in detail. This knowledge can only be gleaned from detailed reading of this manual.
- To know the safety legislation in force in detail in order to operate the machine
- To recognise the “QUALIFIED PERSONNEL” for transportation, handling, installation, use, maintenance, disposal, etc.
- Correctly train and educate the “QUALIFIED PERSONNEL” before allowing them access to the machine. The personnel must also be exhaustively trained with regards to the machine’s protection devices.
- Ensure the machine’s safety devices are not tampered with or removed and are checked on a daily basis. Provide the operator appropriate individual protection devices according to the laws in force.
- The constructor is available for clarification, assistance and training and declines all responsibility for damage to things or people resulting from improper, incorrect and negligent use by untrained personnel.

**1.10 STORAGE**

	<b>ATTENTION</b>	<p>The appliance must be stored and conserved in the original packaging and in a closed environment, protected from atmospheric agents with a minimum temperature of -15°C, and a maximum of +60°C and a maximum humidity of 70%.</p>
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**1.11 PACKAGING REMOVAL**

	<b>WARNING</b>	<p>Handle the instrument with care in order to avoid irreversible damages. Do not turn upside-down, must be protected against rain and water. Do not superimpose, must be protected against shocks and accidental overheating both the packaging and the instrument itself.</p>
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Transportation and displacement should happen avoiding hits and shocks as much as possible, avoiding also other goods to be placed above, atmospherical agents such as ice, heat as well as any other potentially dangerous condition for the instrument, people and things.

Transportation and displacement should be done by qualified people able to guarantee a safety and suitable handling of the goods.

	<b>DANGER</b>	<p>In case would not be possible to comply the here above specified safety procedures, do not proceed in moving the instruments but ask the manufacturer.</p>
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## 1.12 PACKAGING REMOVAL

After removing the packaging check the machine is complete and that there are no visibly damaged parts. DO NOT USE THE MACHINE and refer to the constructor when in doubt.



### DANGER

The components used for packaging (plastic bags, polystyrene, nails, screws, wood, etc) must be kept out of reach of children, as they are sources of danger. These components should be placed in the appropriate containers.



### WARNING

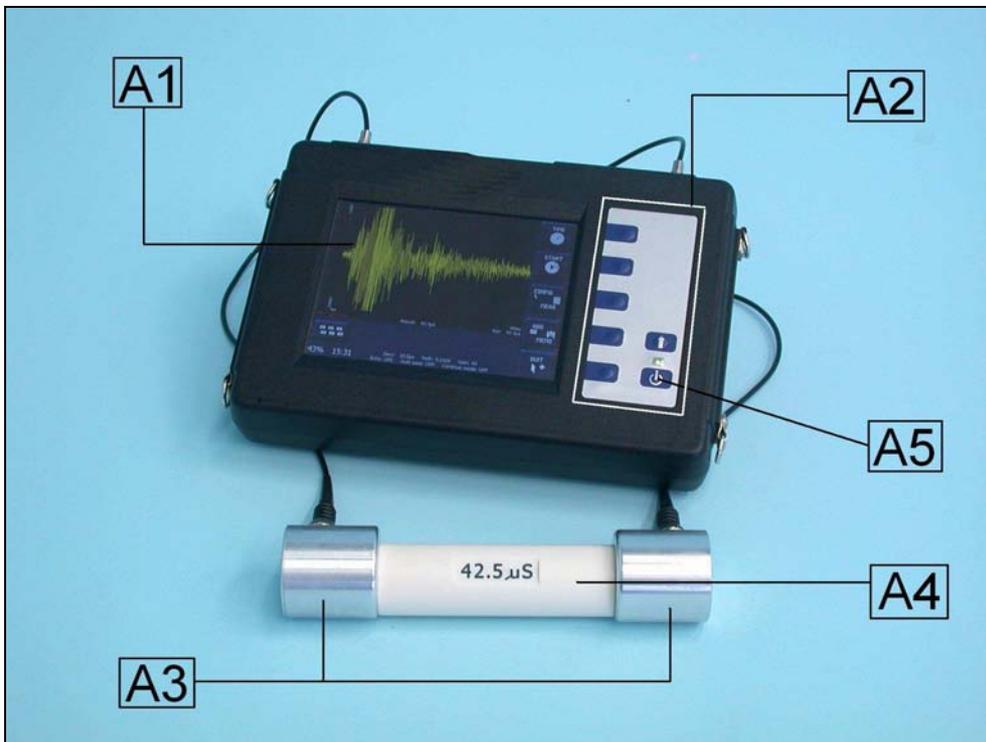
In order to avoid bumps and overturn adopt the normal and logical precautions.

## Chapter 2 TECHNICAL CHARACTERISTICS

### 2.01 GENERAL MACHINE DESCRIPTION

The complete machine is composed of:

- Touch-screen colour terminal with LCD 640x480 pixel visual display **(A1)** complete with internal 64 MB flash memory and a membrane keyboard next to the screen **(A2)**
- 220V/24V external power supplier and battery charger
- Li-Ion 11.1V, 3A/h battery pack
- two 55kHz piezometric sound probes **(A3)** and connecting wires.
- Calibration cylinder **(A4)**
- contact paste for piezometric sound probes
- Strong, shockproof machine and accessories carrying case



## 2.02 DIMENSION AND WEIGHT

LENGTH	400mm
WIDTH	300mm
HEIGHT	180 mm
WEIGHT	3kg

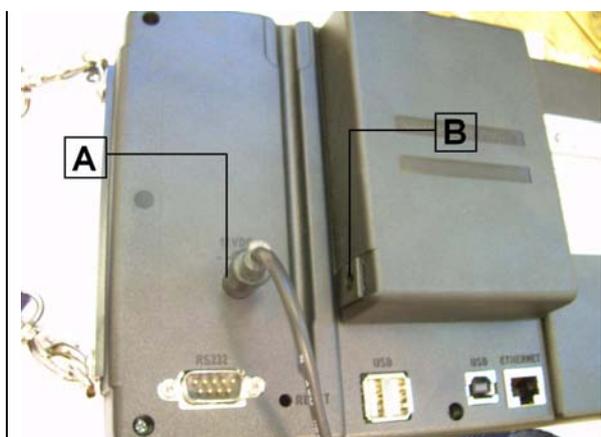
## 2.03 ELECTRICAL SUPPLY

BATTERY CHARGER	Input => 100 ÷ 240VAC, 50/60Hz Output => 14.4VDC, 1.04A
BATTERY	Li-Ion 11.1V, 3A/h

### HOW TO RECHARGE THE TESTER:

The battery of the instrument can be recharged:

1. Plug the jack in the power outlet **A**: an icon will show the status of charging on the display.
2. Plug the jack in the power outlet **B**: the instrument does not notify the status of charging. This feature is useful in case of more batteries to be charged separately from the instrument.



**N.B.:** Check the correct connection of the power supplier jack by pushing it into the power outlet and by checking the visualization of the recharge icon on the display.

## 2.04 NOISE

## Chapter 3 GENERAL SAFETY STANDARDS

### 3.01 GENERAL STANDARDS

To ensure the safety of machine operators:

- Any tampering with the appliance not pre-emptively authorised by the manufacturer exempts the manufacturer from any responsibility for damage caused by or to it.
- The removal or tampering with safety devices entails a violation of the safety standards.
- Machine use is only allowed in areas where there is no risk of explosions or fires.
- Only the original fittings can be used. The use of unoriginal fittings exonerates the manufacturer from all responsibility.
- Check the appliance is in ideal working conditions and that its parts are not worn or faulty before Carry out all necessary maintenance
- Do not wear loose clothing, ties, chains or anything else which could become caught in the frame or other moving parts of the appliance.
- Be aware of the danger of electrical shocks from direct or indirect contact due to unforeseen electrical faults.
- Do not subject the appliance to violent impact.
- Do not expose the appliance to fire, welding sparks or extreme temperatures.
- Do not bring the appliance into contact with corrosive substances.
- Do not wash the appliance with jets of water.
- Check the workspace around the machine is clear from potentially dangerous objects.
- The machine operator must wear appropriate work clothing such as protective glasses, gloves and mask in order to avoid damage from, for example, harmful dust projection. Wear a lower back support when lifting heavy parts. There should be no hanging objects such as bracelets or otherwise, long hair should be protected with relevant precautions, shoes must be appropriate for the type of operation to be carried out.

## DURING USE

When operating check there are no conditions of danger. Immediately stop the machine when it is functioning irregularly. Contact the authorised Sales Service department.

- For the operator's safety do not touch any part of the appliance when testing and use the appropriate individual protection devices in order to keep the operator safe.

### 3.02 MACHINE SAFETY DEVICES AND PROTECTION

DEFINITION: Protections are all the safety measures that consist of the use of specific technical means (repairs, safety devices) to protect people from dangers which cannot be limited reasonably in design.

The machine has no safety devices as there are no risks for the operator during the normal use.

## Chapter 4 INSTALLATION INSTRUCTIONS

### 4.01 LOCATION

The equipment must be placed in an ideal position and environment for the use it has been conceived for; the ultrasound instrument has been designed for use, either inside a laboratory or outside in open-air environments.

<b>ALLOWED TEMPERATURE</b> From +5°C to +40°C	<b>ALLOWED RELATIVE HUMIDITY:</b> From 30% to 70%	<b>MAXIMUM HEIGHT OVER SEA LEVEL:</b> 1000 m
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### GENERAL ADVICE

- The machine must be installed in an area which allows ease of access to all parts so that maintenance may be carried out.
- Unauthorised people and objects which could be potential sources of danger must not be permitted in the area surrounding the machine.
- Do not position the equipment near instruments or appliances which could produce vibrations.

### 4.02 HANDLING AND MOVEMENT

These instructions are applicable to the machine assemblers.

Ensure the equipment is correctly supported at the lifting point and that the machine does not slip.

Do not remain in direct line with the application of force and do not allow personnel where there are loads that cannot be adequately supported by mechanical means.

### 4.03 ASSEMBLING PROCEDURE

After the calibration (chapter "USAGE") and before testing, assemble the equipment in the following way:

- Connect the two provided wires to the appropriate RX and TX bayonet couplings (fast connectors) to the probes and to the machine as well.
- Activate the machine by pushing the ON/OFF switch and verify that the display turns on.
- Spread a thin layer of Vaseline on both sides of the sound probes (**A3**) (aluminium metal cylinders) and rub the two sound probes attached to the calibration cylinder **A4** in order to avoid the creation of air bubbles and cracks between the sides of the probes and of the sample.
- Start the test

## 4.04 ELECTRICAL CONNECTION



**DANGER**

Wiring of the electrical system must be carried out by qualified personnel. Before wiring consult the electric plan linked to the instructions manual and the registration plate on the machine for information regarding supply, frequency and nominal current.

Connect the earthing system via the PE terminal (yellow-green) before any other connection.

Apply a knife switch at the top of the connecting cable of the machine to the power system.

The knife switch must be combined with a safety device against the overload with a differential switch (safety switch).

The technical features of the safety device must be in accordance with the standards in force in the country where the machine has been installed.

### ELECTRIC TOLERANCES:

- Real voltage  $\pm 10\%$  of the nominal one
- Frequency:  $\pm 1\%$  of the nominal one in a continuous way  
 $\pm 2\%$  of the nominal one for a short period
- The harmonic distortion of the sum from the second to the fifth harmonics not more than 10% of the total voltage as a real value between the conductors. A further distortion of 2% is accepted for the sum from the sixth to the thirtieth harmonics of the real total value between the conductors.
- With reference to the voltage imbalance of the three-phase voltage, the inverted sequence component and the zero sequence component must not be more than 2% of the direct sequence component of the voltage.
- The voltage pulses must not last more than 1,5 ms with an up/down time between 500 ms and 500 ms and a peak value not higher than 200% of the real value of the nominal tension.
- The electric supply must not be interrupted or zeroed for more than 3 ms at any time. Between two interruptions it must not take more than 1 s.
- The interruptions must not overcome 20% of the tension peak for more than one cycle. Between two interruptions it must not take more than 1 s.

The manufacturer assumes no liability for any damages to people, things and animals caused by the non-compliance of the above instructions

## Chapter 5 MAN-COMMAND INTERFACE

The interaction with the instrument is possible through the membrane keyboard or the touch-screen interface display.

### LCD Display

The appliance information and commands are displayed on a 640x480 pixel (VGA) LCD colour display.

### Membrane keyboard

The membrane keyboard is composed of 7 buttons and is to the right of the display. The buttons function as follows:

- A button to turn the system on/off (**A5**)
- five buttons represented by a specific symbol drawn next to the button having variable functions depending by the context in which the operator is working way to activate the function itself) depending on the context in which the user operates. Each of these buttons beside the main function has an alternative function.
- A button to activate the alternative function (**SHIFT**), that can be used for the functions represented by a double sign, as the below one:



Use the membrane keyboard as in the example below:

1. push the single function button to activate the main function (**graphic addition**).
2. keep pushing the **SHIFT** button and push the function button at the same time to activate the alternative function (**graphic storage**)

**NOTE / WARNING:** Keeping pushed the **SHIFT** button for about 2 seconds, the led will turn off and the double function modality will reverse itself (in this case just push the button for the **graphic storage** function; hold down the **SHIFT** button and press the button for the **graphic addition** function). The double function modality reversal can be deactivated with the same procedure used to invert it.

**Virtual input panel**

The virtual input panel is displayed on the following screen.

Input Panel																
Esc	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	Home	End	Prop	
`	1	2	3	4	5	6	7	8	9	0	-	=	BS			
Tab	q	w	e	r	t	y	u	i	o	p	[	]	\			
Caps Lock	a	s	d	f	g	h	j	k	l	;	'		return			
Shift	z	x	c	v	b	n	m	,	.	/	up		pgup			
Ctrl	win	Alt							ins	del	lt	dn	rt	pgdn		

Activation takes place automatically when the operator ‘touches’ a text box or manually, when the opposite button is pushed on the visual display. The automatic deactivation is possible when the operator closes a text box or when the correct button on the visual display is pushed.

The button for the activation/deactivation of a virtual entry is present in each visual display and is represented by the following:



**5.01 FUNCTION MODES**

The machine allows calculation functions and automatic elaborations, but it can only be manually activated by the operator.

**5.02 SCLEROMETRIC DATA ACQUISITION**

The standard machine is capable of acquiring and calculating the data from rebound concrete tests. This data can be obtained in:

**a) manual mode:** the operator has a traditional mechanical rebound test hammer and manually inserts the ultra sound values obtained into the ultrasonic tester.

**b) automatic mode:** the operator has a Matest mod. C386N digital rebound test hammer directly connected to the ultrasonic tester with the provided connecting wire. The detected values measured by the digital rebound test hammer are automatically sent to the ultrasonic tester.

## Chapter 6 MACHINE REGULATION AND TUNING

### 6.01 MACHINE CALIBRATION – METERS – INDICATORS

The machine is checked in the factory, using sample equipment periodically checked by officially recognised institutes. These checks cannot guarantee that the machine, meters and indicators will provide accurate values and results conforming to the standards in force in the countries the machine has been installed and used in.

Normally such norms envisage calibration check after every movement. In order to obtain correct values and results it is therefore VITAL that the operator, once the machine has been installed and set up and before official tests, has an officially recognised body check the machine characteristics, its calibration and results/values reliability.

The manufacturer is exempt from all responsibility in the case of direct and indirect damage from use of the machine without official approval by the relevant bodies.

To calibrate the zero or to set the reference, see chapter "OPERATOR INTERFACE".

### 6.02 CALIBRATION CHECK

**These operations, if executed for the first time, must be personally carried on by qualified personnel with the support of a qualified operator (Standard EN 292-2 art.5.5 1d).**

The machine is sold pre-calibrated; however before starting any test, check the calibration by following the procedure below:

1. Connect the two provided wires to the correct RX and TX bayonet couplings (fast connectors) to the probes as well as to the machine
2. Activate the machine by pushing the ON/OFF switch and verify that the screen turns on
3. Spread a thin layer of Vaseline on both sides of the sound probes (A3) (aluminium metal cylinders) and rub the two sound probes attached to the calibration cylinder A4 in order to avoid the creation of air bubbles and cracks between the sides of the probes and of the sample.
4. Compare the value visualized on the display with that of the cylindrical sample, if it's not the same, use a screwdriver to reset the machine reset button in order to obtain the same conformity.

For the testing procedure, it's necessary to repeat the operations previously described at the point "calibration check" and to execute the specialized biographies for the ultrasound test, or the Standard EN12504-4 BS1881-203 ASTM C597 UNI9524 NFP18-418 UNE83308.

NOTE: Repeat the calibration operations each time a sound probe needs to be replaced.

## Chapter 7 IN FUNCTION - USE



**WARNING  
DANGER**

Before setting the machine in motion it is essential that the Operator and Safety Manager have read the Instructions Manual and understood all parts of the machine and activities linked to it (Risks, Dangers, Functionality, Operation, Protections, Commands, etc.)

### 7.01 SWITCHING ON THE EQUIPMENT

To switch on the appliance KEEP THE ON/OFF KEY PRESSED FOR APPROXIMATELY 3 SECONDS.

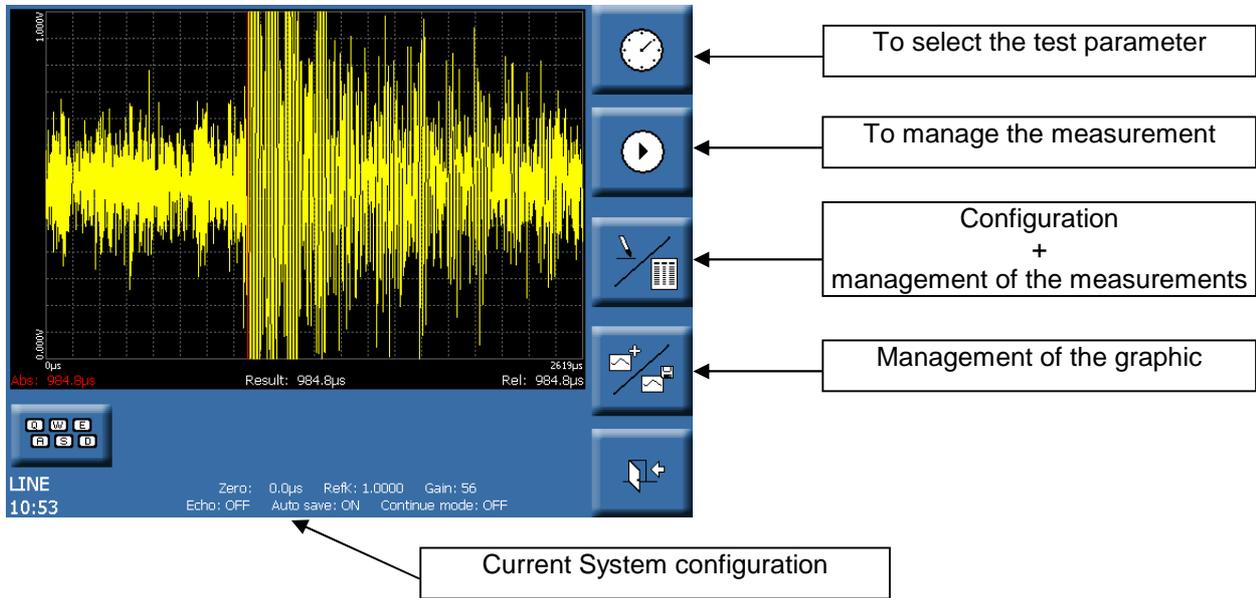
### 7.02 EQUIPPING

Operate as described in the chapter "ASSEMBLING PROCEDURE"

**7.03 OPERATOR INTERFACE**

**7.03.1 USE**

The main screen appears when the appliance is switched on (here below an example of what will appear after a measurement).



The data present in the display area are:

- Bottom left the value **Abs [µs]** → absolute flight time read by the appliance.
- Bottom right the value **Rel [µs]** → relative flight time calculated as  $tFlightR = (tFlightA - Zero) * RefK$  (inactive echo) or as  $tFlightR = (tFlightA - Zero) * RefK / 2$  (active echo).
- Bottom centre the calculated value according to the selected size.
- At the centre the current **Graph** → read by the appliance.

*N.B.: **tFlightA**, **tFlightR**, **calculated value** and **Graph** are not present if a measurement session has not been activated since the appliance has been switched on.*

**Acquisition measure mode**

In order for the system to recognize a measurement as valid, (to allow memorization), that value must be repetitive (three consecutive readings must have the same value which can't be more than a microsecond difference between the maximum and the minimum reading)

**How to select the size to visualize and how to define the calculation parameters.**

1. Make sure there are no active measurement sessions.
2. Push the measurement selection button until the desired size is visualized:

- a)  flight time
- b)  length
- c)  speed
- d)  Young module
- e)  compression resistance
- f)  crack depth

3. Define the requested parameters considering the value limits described below.

SIZE	PARAMETER	MINIMUM PARAMETER VALUE	MAXIMUM PARAMETER VALUE
Speed [m/s]	Length [cm]	1	5000
Length [m]	Speed [m/s]	0.1	1000000
Young's Module [Pa]	Shear Speed [m/s]	0.1	1000000
	Density [kg/m <sup>3</sup> ]	1	5000
	Length [cm]	1	5000
Compression resistance [N/mm <sup>2</sup> ]	Compression index	1	500
	Length [cm]	1	5000
Crack depth [m]	Speed [m/s]	0.1	1000000
	Length [cm]	1	5000

N.B.: The selected sizes are calculated as follows:

1. Length [m] = Speed [m/s] \* tFlightR [μs] / 1000000
2. Speed [m/s] = Length [m] \* 1000000 / tFlightR [μs]
3. Young's Module [N/m<sup>2</sup>] = Density [kg/m<sup>3</sup>] \* (Shear Speed [m/s])<sup>2</sup> \* 3 \* [(Length [m] \* 1000000 / tFlightR [μs])<sup>2</sup> - 4 \* (Shear Speed [m/s])<sup>2</sup>] / (Length [m] \* 1000000 / tFlightR [μs])<sup>2</sup> - (Shear Speed [m/s])<sup>2</sup>
4. Compression resistance [N/mm<sup>2</sup>] = ((Length [m] \* 1000000 / tFlightR [μs])<sup>0.80840</sup>) \* (Compression index<sup>1.88148</sup>) / 25000
5. Crack depth [m] = Length [m] / 2 \* SQRT(((tFlightR[μs])<sup>2</sup>) / ((Length [m] \* 1000000 / Speed[m/s])<sup>2</sup>) - 1)

### Managing a measurement session:

1. Check the acquisition parameter (**Gain**) is correct (configuration display)
2. Check the **Echo**, **Autosave** and **ContinueMode** parameters are correct (configuration display)
3. Check the calibration parameters (**Zero** and **RefK**) are correct (configuration display)
4. Select the size for visualization and define the calculation parameters.



5. Push the measurement session activation button
6. Position the ultrasound heads according to the desired measurement positions..



NOTE: if the **ContinueMode** is active, the measurement session continues until the deactivation button is pushed; or it will automatically end when the first repetitive valid measurement is acquired.

NOTE: If the **AutoSave** is active, each repetitive valid measurement will be automatically saved; otherwise the user can



save the first valid measurement (when the system detects it as repetitive) pushing the Memo button.

NOTE: the system buffer can save a limit of 240 measurements; when that limit is reached, the buffer deactivates the storage function.

### Saving graphs:

1. Activate a measuring session and wait for the selected graph to show.
2. Deactivate the measuring session



3. Press the **memo** button (alternative function) to save the graph.

N.B.: The graph file can be saved in two distinct formats: select **PLT** format for a binary file which can be re-read by the application, the **TXT** format for an ASCII file which can be read by text editor or can be imported to an excel spreadsheet.

### Superimposing a saved graph on a read one

1. Activate a measuring session and wait for the selected graph to show.
2. Deactivate the measuring session.



3. Press the **Add** button (main function) to load a saved graph and superimpose it with the currently displayed one.



4. Press the **Del** button (main function) to remove the saved graph and keep the read one displayed.

**NOTE: TO PERMANENTLY SAVE THE DATA IT IS NECESSARY TO STORE IT ON A REMOVABLE DISK (PEN DRIVE OR SD CARD) OR ON THE FLASH MEMORY SYSTEM (INSIDE THE MACHINE) ACCESSIBLE THROUGH THE "FLASHDRIVE" FOLDER.**

### 7.03.2 SCLEROMETRIC DATA ACQUISITION

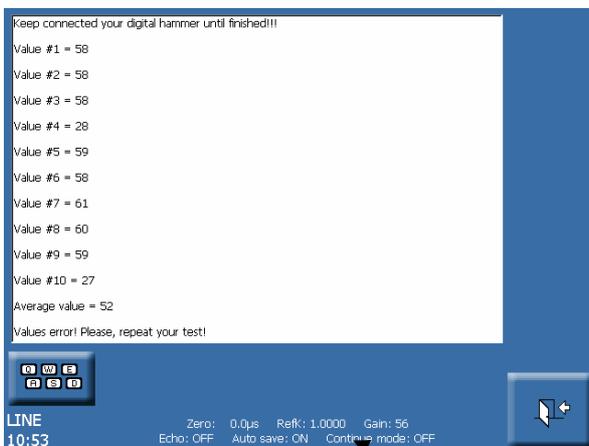
The sclerometric data entry/acquisition function can be activated from the main visual display by using the button represented below and can be visualized when the measurement to calculate/detect is relative to the compression resistance.



The screen allows the operator to calculate the correct sclerometric index to be used for the calculation of the compression strength by following the procedure below:

1. The acquisition of 10 values
2. The mean calculation of the 10 values
3. The calculation of the difference between each value in relation to the average

The acquisition is considered "incorrect" if more than 3 of the 10 values differ from the average by more than 6 units



Current System configuration

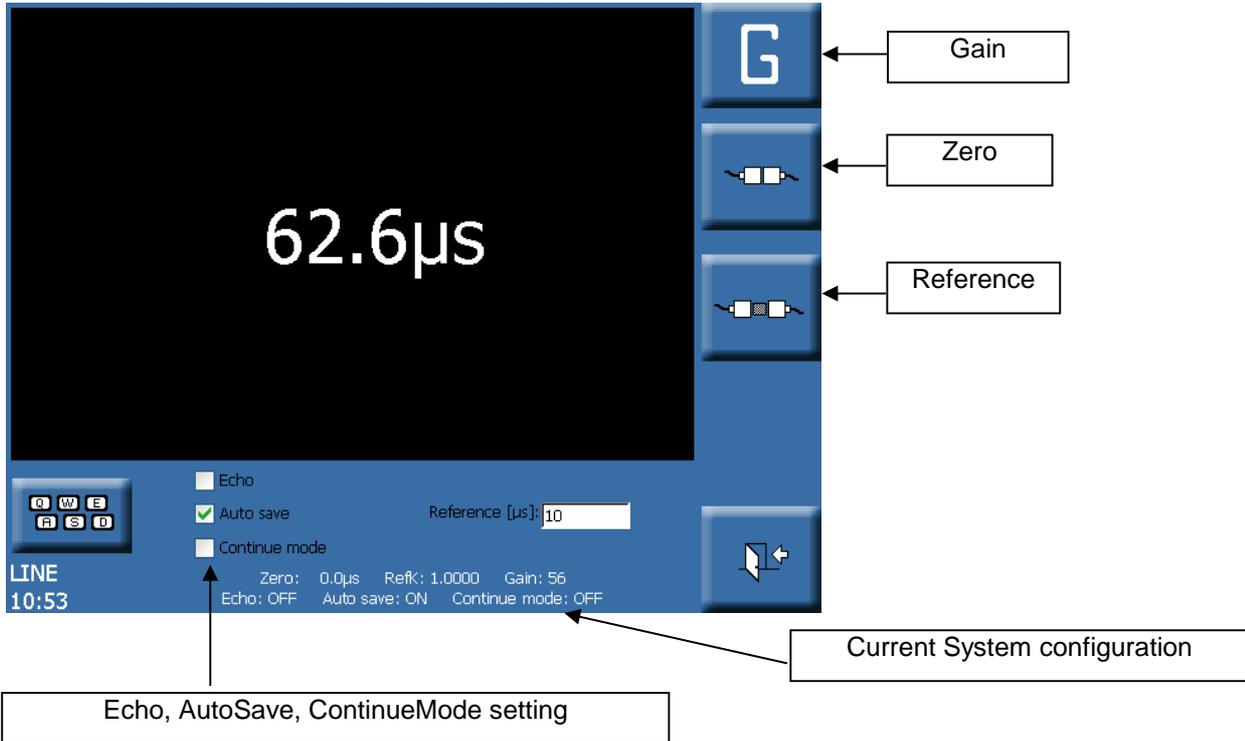
#### How to acquire sclerometric data:

1. Select the compression resistance calculation from the main screen.
2. Push the sclerometric data acquisition button
3. When requested, turn on and connect the digital sclerometer to the machine.
4. Carry out the 10 programmed measurements using the digital sclerometer.
5. If the readings are consistent with the described rules, the screen will automatically close; if not, an error notification will appear and a repetition of the test will be requested...
6. When the screen shuts down. (automatically at the end of the test, or manually of the user's request) disconnect the digital sclerometer.



This can be activated from the main screen by pressing the appropriate button  (main function) and it allows the operator to:

- Set the **Echo** and **AutoSave** and **ContinueMode** parameters.
- Set the **Gain** parameter.
- Calibrate the **Zero**. And the **RefK** reference



The screenshot shows the configuration interface. The main display area shows a large value of  $62.6\mu\text{s}$ . To the right of the display is a vertical toolbar with three buttons: a 'G' button, a 'Zero' button (with a piston icon), and a 'Reference' button (with a piston icon). Below the display, there are three checkboxes: 'Echo' (unchecked), 'Auto save' (checked), and 'Continue mode' (unchecked). To the right of these checkboxes is a text input field labeled 'Reference [µs]:' with the value '10'. At the bottom left, there is a 'LINE' indicator and a time '10:53'. At the bottom right, there is a 'Current System configuration' label pointing to the status bar. The status bar displays: 'Zero: 0.0µs Refk: 1.0000 Gain: 56', 'Echo: OFF Auto save: ON Continue mode: OFF'. A label 'Echo, AutoSave, ContinueMode setting' points to the checkboxes. A label 'Gain' points to the 'G' button. A label 'Zero' points to the 'Zero' button. A label 'Reference' points to the 'Reference' button.

The data shown in the display area are:

- In the centre the value **Abs [µs]** → the value of the absolute flight time read by the appliance.

#### Setting Gain parameter



Press the corresponding key  several times until the desired value is displayed.

#### Setting Echo, AutoSave and ContinueMode parameters

Press the corresponding key to activate/deactivate the function.

#### Calibrating Zero

1. Unite the two heads of the appliance.
2. Wait for the measure to stabilise.



3. Press the zero key  to set the calibration of the 0
4. Check setting has taken place by referring to the value shown in the lower part of the screen (current system configuration).

#### Setting Reference

1. Position the sample between the two heads of the appliance.
2. Wait for the displayed measure to stabilise.
3. Insert the theoretical value of the measure of the sample used



4. Press the **Refer** button  to set the calibration of the reference

Check the setting has taken place by referring to the value shown in the lower part of the screen (current system configuration).

**7.03.4 MEASUREMENT HANDLING**



This can be activated from the main screen by pressing the appropriate button (alternative function). It allows the operator to:

- Save the acquired data during one or more measurement sessions.
- Read a measurement file.
- Delete acquired data during one or more measurement sessions.
- Copy the acquired data during one or more measurement sessions to a WordPad session

The following figure shows the measurement management screen with filed data.

ID	Time	Length	Speed	Shear	Density	Young
6K	62.7µs	100.00mm	2.70Km/s			
5C	62.6µs	10.00mm				
4Y	62.7µs	10.00mm	10.00mm	100.00mm/s	1.00kg/m3	30.00MPa
3S	62.8µs	10.00mm	159.24 m/s			
2L	62.8µs	6.28µm	100.00mm/s			
1	62.6µs					

Customer: \_\_\_\_\_  
 Date: 9/5/2007  
 Note: \_\_\_\_\_

LINE 10:53  
 Zero: 0.0µs Ref: 1.0000 Gain: 56  
 Echo: OFF Auto save: ON Continue mode: OFF

**Interpreting filed measurements**

The following file has been obtained by activating the copy measurements function in **WordPad**. Such considerations regarding the format can be applied to either the displayed chart on the screen or the save measurements file in TXT format.

**ULTRASONIC RANGE METER**

Customer:  
 Date: 9/5/2007  
 Note:

ID	Time	Length	Speed	Shear	Density	Young	Index	Compr.	Crack
6K	62.5µs	100.00mm	2.70Km/s					67.96mm	
5S	47.0µs	100.00mm	2.13Km/s						
4L	47.2µs	3.12mm	66.00 m/s						
3	47.0µs								
2C	46.9µs	100.00mm				4.00	266.59mN/mm2		
1Y	46.8µs	100.00mm	2.82Km/s	2.30Mg/m3	97.82GPa				

1. **ID** (always present) → Progressive reading in decreasing order. Next to the progressive number a reading is shown which indicates the type of calculation carried out on the flight time
  - “K” for creep depth
  - “C” for compression resistance.
  - “Y” for Young’s module.

- “S” per speed.
- “L” per length.
- No suffix if there is no calculation.

2. **TIME** (always present) → Relative flight time.
3. **LENGTH** → Length.
4. **SPEED** → Speed.
5. **SHEAR** → Shear speed
6. **DENSITY** → Density.
7. **YOUNG** → Young module
8. **INDEX** → Compression Index.
9. **COMPR.** → Compression resistance.
- 10 **CRACK** → Crack depth

#### Saving acquired data during one or more measurement sessions

1. Ensure data has been saved during a measurement session.



2. Press the **Save As** button to save the measurements.

N.B.: The measurement file can be saved in two distinct formats: select **MSR** format for a binary file readable by the application, **TXT** format for an ASCII file readable by text editor or importable to an excel spreadsheet.

#### Reading a measurement file

1. Ensure there are no measurements displayed in the chart (empty file).



2. Press **Open** to load measurements saved on file.

#### Deleting acquired data during one or more measurement sessions

1. Ensure saving has been carried out during a measurement session.



2. Press **Delete All** to delete the measurements.
3. Press **YES** when confirmation is requested.

#### Copying acquired data during one or more measurement sessions in a WordPad session

1. Ensure data saving has been carried out during a measurement session.



2. Press the **WordPad** button to activate measurement display with the text editor.

N.B.: The appliance automatically formats the measurements and opens a file which the operator can directly manipulate from editor (any printing can be done on a USB-PCL printer).

**WARNING : TO PERMANENTLY SAVE THE DATA IT IS NECESSARY TO STORE IT ON A REMOVABLE DISK (PEN DRIVE OR SD CARD) OR ON THE SYSTEM FLASH MEMORY (INSIDE THE MACHINE) ACCESSIBLE THROUGH THE “FLASHDRIVE” FOLDER.**

### 7.04 SOFTWARE UPDATE

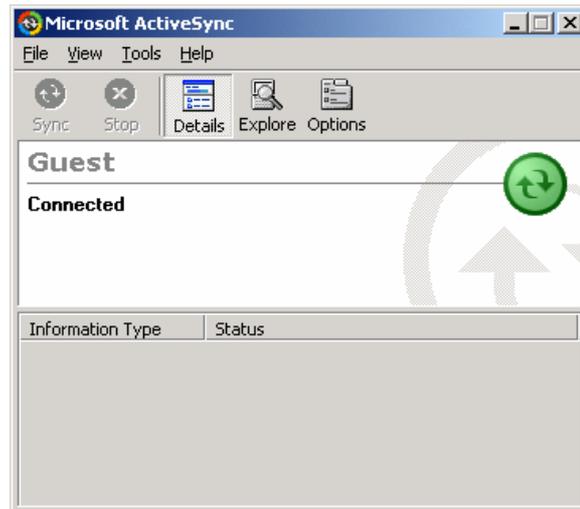
Software update can be done with pen-drive/AD-card or ActiveSync.

1. Close the terminal application.
2. Copy the update software from the PC to the pen-drive (or SD-card) and from the pen-drive (or SD-card) to the terminal (**My Computer\FlashDrive** folder) or connect with ActiveSync the PC to the appliance and copy the new application in the **My Computer\FlashDrive** folder.
3. Switch the terminal off.
4. The new software will be activated upon the next start-up.

#### 7.04.1 ACTIVE SYNC

The appliance is configured to be connected to a PC via a USB cable. These are the instructions for installation and initial use of such a function.

1. Download from the Microsoft site and install the last version of ActiveSync (use all the defaults; when the screen appears after installation press **CANCEL**).
2. Switch the terminal on and, when start-up has been completed, close the application
3. Connect the USB cable between the client port (the "square" one) of the terminal and a host port (the "rectangular" one) of the PC that ActiveSync has been installed on.
4. Wait for the periphery to be recognised.
5. When first connected manually launch ActiveSync and wait for connection to be completed – see the following screen).



6. Press **EXPLORE** to display the file system of the terminal.

#### 7.05 IMPORTANT NOTES

1. The system is able to monitor the battery status. If the voltage falls below the alarm threshold (40 % of charge) a message is displayed inviting the user to save and change/recharge the battery. If the voltage falls below a further threshold (30 % of charge), the terminal will automatically turn itself off. The battery voltage typically takes 20 minutes to pass from 40% to 30%. This time depends on the charge status of the battery and the temperature. It is vital that the operator, in the case of an alarm signal, quickly saves any unsaved measurements taken.
2. The suspend function (energy saver) can be activated by the operator. In such a case battery monitoring (and therefore automatic switching off) is disabled.
3. Before putting the instrument away ensure it has been switched off and the suspend function is inactive (energy saver) in order to avoid draining the battery.

#### 7.06 SWITCHING OFF

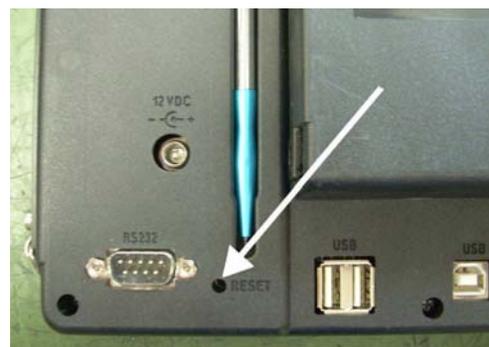
To turn off the machine keep pushed the OFF/ON BUTTON on the LCD DISPLAY for at least 3 seconds.

#### 7.07 EMERGENCY STOP

In the event of a breakdown, or if the instrument is not responding to commands from the keyboard; we recommend to use the command "reset" pressing the button on the back of the instrument (See picture on the side) with a thin and pointed object.

Pressing the button "reset" the appliance will return to the main screen (see chapter 7.03.1).

N.B.: all unsaved data will be lost.



<b>Chapter 8</b>	<b>MAINTENANCE</b>
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<b>8.01</b>	<b>ORDINARY MAINTENANCE</b>
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Execute the calibration check (chapter **USE**) each time a new test starts, and remember to always keep the 2 piezometric sound probes heads clean.

	<b>ATTENTION DANGER</b>	Do not perform maintenance – interventions on the machine which have not been quoted and described in this instructions manual without first contacting the manufacturer. Periodically clean all machine parts and oil the unpainted parts in order to preserve the machine and its efficiency. Avoid the use of solvents which damage paint and parts in synthetic material.
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<b>8.02</b>	<b>AUTHORISED MAINTENANCE CENTRES</b>
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For information on the nearest authorised help centre it is essential to contact the manufacturer.

<b>Chapter 9</b>	<b>SPARE PARTS</b>
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	<b>ATTENTION DANGER</b>	Only original spare parts can be used. Use of unoriginal spare parts exempts the manufacturer from all responsibility. Procedures for substitution of spare parts will be provided by the manufacturer along with the part. For spare parts contact the manufacturer's Sales Service department.
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<b>9.01</b>	<b>RECOMMENDED SPARE PARTS</b>
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For the ultrasonic tester it is possible to have the following spare parts:

- C370-02: transmitting and receiving sound probes (55KHz couple) can replace the piezometric sound probes (A3) provided with the machine
- C370-04: a pair of wires (each 3.5m long) to link the piezometric sound probes to the machine
- C370-07: a tub of paste applied to the surfaces of sound probes and the surface of the test subject to be examined.

<b>Chapter10</b>	<b>INACTIVITY</b>
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Ensure all machine parts are in safe working order before operating it again should the machine be inactive for a long period of time. When in doubt contact the Manufacturer.

As with all electronic equipment, when not in use this machine must not be stored in too cold or too damp condition, otherwise you run the risk of malfunction. Before and after usage we recommend to place the machine in an environment with a low humidity percentage and in a temperature not lower than 20°C.

<b>Chapter11</b>	<b>DECOMMISSIONING THE MACHINE</b>
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Should it be decided that the machine is to be no longer used, proceed as follows:

- Disconnect the electrical supply network by removing the connecting cable therefore making it unusable.
- Make the potential sources of danger harmless, such as sharp or protruding parts.
- Dismantle the machine, dividing it in equal parts and dispose the materials following the current regulations regarding the disposal of industrial waste.

#### Recycling notice for the disposal of electrical and electronic devices



This symbol, shown on the device or on the package and/or the documentation, suggests that the device should not be disposed together with other home garbage at the end of its life cycle.

To avoid further environment, or health-care damage, caused by the unsuitable disposal of garbage, the user should separate this device from other different types of garbage and recycle it in responsibly to avoid the reuse of material resources. Users must take care at the disposal of the equipment by taking it to the nearest recycling site for appropriate recycling treatment for electrical and electronic devices. Gathering and Recycling deplete devices allow the preservation of natural resources and grant them the adequate treatment by respecting health and environment.

For further information on your local recycling site please contact your local council or city waste treatment department. The developer, as producer of electrical and electronic devices, will provide to finance the recycling and treatment services for deplete devices that will come back through these recycling sites, according to the local statement.