Automatic Compression Machine
CE400

Impact Test Equipment Ltd
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User Guide
User Guide
User Guide

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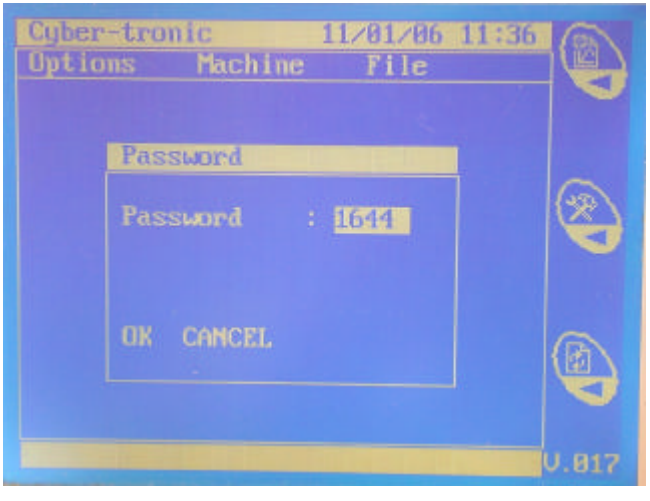
IMPORTANT NOTE

- AS SOON AS YOU SWITCH ON THE MACHINE THE SECURITY CODE WINDOW WILL BE SHOWN, PLEASE ENTER THE CODE 1644.



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EEC CONFORMITY DECLARATION (FOR EEC COUNTRIES ONLY)

CHAPTER 1	GENERAL INFORMATION

1.1 GENERAL FEATURES

- **THIS MANUAL IS ADDRESSED TO:** the carrier, the installer, the user, the maintenance operator, and the scrapping operator.
- Please read it carefully because it informs you about the operating of the machine in safety conditions.
- This manual has to be considered a part of the product and concerns only the machine it is delivered with.
- Keep the manual in order during the whole life of the appliance to consult it for any needs.
- In case of sale, the manual and its enclosures should be given together with the machine.
- The manufacturer assumes no liability for any damages caused by a misuse of the machine.
- The manufacturer has the right to modify this technical literature as well as the machines this refers to without any previous notice.
- Messages meaning:

ATTENTION	It shows the procedures that can damage seriously the machine if they are not followed carefully

DANGER	It shows the procedures that can be dangerous to the operator if they are not followed carefully

1.2 IDENTIFICATION

MANUFACTURER IDENTIFICATION: See the cover page
MACHINE IDENTIFICATION: See the plate on the machine where the complete identification data and the electrical features are to be found.

1.3 APPLICATIONS

DANGER	The machine is according to the 89/392/EEC standard if it is utilised for test on concrete specimens that do not explode during the breaking. On the contrary, it is necessary to use the proper safety device that can be supplied on request. The manufacturer assumes no liability for any damages caused by the non-compliance of these “Safety and Operating instructions”.

The compression machines to which this manual is referred have been developed for compression tests on mortar specimens according to the standards.
The equipment is made for aim, which it has been conceived for. Any other uses are not allowed

ATTENTION	The instructions given in this operating manual are only made for the right use of the appliance. To carry out the test in the right way, the user must refer to the specific standards in force for the test itself.

1.4 STRUCTURE OF THE MACHINE

Two main parts from the appliance:
A frame complete with: a hydraulic jack which allows the application of the load to the specimen through an oil pressure circuit. Two hardened plates that transmit the strength of the hydraulic jack to the specimen. A seat ball assembly that allows the right distribution of the load on the specimen.
An automatic servo-controlled control cabinet that reads the load through a pressure transducer installed on the compression machine. The control cabinet is composed by an electric motor, a hydraulic unit and an electronic control measuring unit.

Do not hesitate to get in touch with the manufacturer or with the dealer for any further information.

CHAPTER 2	SAFETY INFORMATION

2.1 GENERAL SAFETY STANDARDS

- **The use, lifting, installation, maintenance and scrapping of the machine are allowed only to qualified staff.** Qualified staffs are composed by people who are authorised by the safety responsible to do any activities due to their experience and acknowledgement of the operating of the machine and of the standards, rules and actions. The user must be carefully taught about the operating of the machine to avoid any misuse of it and about the safety devices, which the machine could be eventually equipped with. The safety devices will have to be kept always assembled and to be daily checked. The manufacturer offer training and assumes no liability for any damages due to a misuse of the machine by an unskilled staff.
- The manufacturer recommends following carefully the instructions and procedures of the operating manual and the safety standards concerning the safety devices and the general rules of the work environment.
- Verify the accordance of the machine to the standards in force in the State where the machine has to be installed.
- The operating manual must be carefully read by the safety responsible, by the operators and maintenance engineers. It must always be kept near the machine in order to be able to read it any times it will be necessary.
- Any tampering or modifications of the machine (electric, mechanical etc.) that are not allowed by a written agreement of the manufacturer must be considered as not permitted and the manufacturer will not accept to be charged for any damages.
- The removal or the tampering of the safety devices will be an infringement to the EEC Safety Standards. The manufacturer assumes no liability for any damages.
- The machine has to be installed in places safe from fire and explosions.
- We do recommend using only original spare parts and accessories; on the contrary the manufacturer assumes no liability.
- Be careful that any dangerous situations won't happen during the working; stop immediately the machine in the event that it will not work properly and ask the manufacturer or the Authorised Service Staff of the dealer at once.

The manufacturer assumes no liability for any damages to people, things and animals caused by the non-compliance of the above instructions or to a lack in the use of the personal foreseen safety means (see laws against accidents in force).

2.2 SAFETY DEVICES

MEANING: Safety devices are all the safety measures which consist of the use of specific technical equipment (guards, cages etc.) to protect the operator from any danger that couldn't be avoided when the appliance was planned.

DANGER	The removal of the safety devices or any tampering of the machine could cause risks to the operator or to any other people.

The manufacturer assumes no liability for any damage to people, things and animals caused by the tampering of safety devices

- **FIX AND MOVABLE SAFETY DEVICES**
  The compression machine is available in two models:
  Without safety guards only suitable for tests on specimens which do not explode during the breakage. **With safety guards** for any kind of specimens.
  Ensure that the supplied load frame is suitable to the nature of specimens to be tested. If you have any doubt it is absolutely necessary to install the special safety kit- to be ordered separately. The Manufacturer assumes no liability for any damages to people, animal or things due to the non-compliance of above instructions.

- **PASSIVE SAFETY DEVICES**
  For passive safety devices are meant all those devices avoiding or reducing the risks for the operators. These devices don't require any active and aware intervention to be operated.

The Servo-unit is equipped with an automatic switch for the motor protection.
In the event that this disposal is activated, follow the procedure in chapter 8 to reset normal working Conditions.

2.3 DANGEROUS PARTS AND RESIDUAL RISK

The dangerous place is the space inside and around the machine where the operator could be wounded or damaged.
During some procedures the operator could face some risk of danger
The risks can be eliminated following carefully the procedures written in this manual and using suitable safety devices.

ATTENTION	In case the Manufacturer does not do the machine installation, employ only skilled operators particularly trained for the lifting of heavy machinery.

GENERAL INFO.

- **Before starting the standard use of the equipment, ensure that all the components are in good working conditions check there are no defective or damaged parts. If necessary repair or replace any damaged part.**
- Pay attention to the risk of electric shocks both for direct or indirect contact, due to unforeseen failure to the electric system.
- Do not subject the equipment to violent shocks.
- Do not expose the equipment to fire, extreme temperature or weld splatters.
- Avoid corrosive substances to come in touch with the equipment.
- Never wash the appliance using water sprays.

DURING THE USE

- In order to grant the max. safety levels for the operator, it is recommended not to touch any moving components during the test execution and always use the proper safety means
- During the test execution always pay attention to the possibility of hands, fingers or body squeezing and to the possible fall down of components on the operator's feet.
- **Do not wear large clothes, ties, watches, rings or others that could entangle into the moving parts of the appliance.**

LIFTING

- During the lifting take care that the machine is conveniently held and secured and that it cannot slide.
- Do not stand in a direct line with the application of force. Do not allow people entrance under loads that are no conveniently supported by mechanical means.

RISK OR DANGER	FORESEEN SAFETY MEASURE
FINGER OR HANDS SQUEEZE	REINFORCED GLOVES - OVERALL

The manufacturer assumes no liability for any damages to people and things due to a lack of observance of the instructions and the use of the safety devices. (See laws against the accidents in force)

2.4 NOISE

The indicated levels of noise are not necessarily safety levels for the operator.
The exposure levels of the operator are obviously related to the emission levels of the appliance, but other factors influence the exposure levels as the time of exposure, the environment, and other appliances installed near to the appliance etc.
The exposure levels permit to value the damages that could be caused by the noise.

Acoustical pressure level equivalent Laeq at 1 mt. distance	**59** dB(A)
Acoustical power emitted by the appliance **LWA**	**64** dB(A)
Standard above data are referred	**EN ISO 3746**

DANGER	The continuous use of the machine together with other noisy appliances could cause a high level of exposure to the noise. If the daily exposure of the operator is equal or higher than 85 dB(A), Safety Devices as headphone are suggested to be worn. If the daily exposure is equal or higher than 90 dB(A), the use of the Safety Device is compulsory. For further information consult the standards of the country where the machine has been installed.

CHAPTER 3 INSTALLATION

DANGER	Consult the Chapter **DANGEROUS PARTS AND RESIDUAL RISKS before** proceeding

3.1 LIFTING

The operating instructions must be respected during the moving of the appliance and particularly in the following phases:

- The lifting and the storing
- The first installation
- The further installations

The machine is usually packed in a wooden case that allows the easy moving of it. The machine must be moved by a forklift truck suitable for the weight indicated on the plate on the machine.
If the wooden package is not used, the machine must be moved by a forklift truck suitable for the weight indicated on the plate on the machine; the forks have to be inserted under the upper compression plate.
Belt the machine to the forks before lifting it and pay attention that it is perfectly balanced.

ATTENTION	The moving of the packing with lifting systems must be made with caution and respecting the indications given on the packing itself. **Pay attention to avoid impacts and turnovers of the packing.**

ATTENTION	Protect the machine from the atmospheric agents. Water and humidity could oxidise it, damaging it seriously.

3.2 UNPACKING

After removing the package, check that any parts of the machine are not damaged. In case of doubt, **DO NOT USE THE MACHINE** and ask the manufacturer.

DANGER	The materials used for the package (plastic, polystyrene, screws, nails, wood etc.) have to be kept far from children. They must be thrown away in a proper collection centre.

ATTENTION	Pay attention to avoid impacts and turnovers

ATTENTION	Before throwing away the package, pay attention that any accessory, manuals, documents, spare parts are not inside.

3.3 INSTALLATION

The machine has to be placed in an environment suitable for the aim it has been conceived for (laboratory protected by any atmospheric agents). Skilled operator must do the installation.

ALLOWED TEMPERATURE	From +5°C to +40°C
ALLOWED HUMIDITY	From 30% to 95%
O.S.L. MAX. HEIGHT	1000 m

GENERAL WARNINGS

- The machine must be installed so that it is free from each side in order to be able to carry out easily the maintenance operations
- No authorised people and no dangerous objects must be near the machine.
- The machine should be moved by a forklift truck suitable for its weight. The forks are to be inserted under the upper compression plate. Secure the machine to the forks and ensure it is perfectly balanced before lifting.
- It is suggested to place the machine on a concrete base 35 - 40 cm, so that the loading reading device (gauge or digital display) is at a suitable height for the operator. The main working position is in front of the machine.

3.4 HYDRAULIC CONNECTIONS

The hydraulic pump is connected to the appliance through two connectors:

1. Connection for oil flow to the pump. For this connection, fitted to the hydraulic cylinder of the machine, you must use a pipe suitable to stand pressures up to 650 bars. Through this connection the Compressione machine is supplied with oil coming from the pump. Max oil pressure reachable by this nit is of 650 bars; max oil quantity for this unit is of 5 litres.
2. Connection for oil back flow to the pump: This connection must be linked to the hydraulic cylinder of the compression machine by means of a pipe having a diameter as big as possible and not being too long. This connection let the oil return from the hydraulic cylinder to the pump in case the maximum travel has been reached.

3.5 CHECK OF THE OIL LEVEL AND DRAIN

The machine is delivered with about 20 litres of oil in the tank.
The proper level of the oil is when it reaches the middle of the round window, when the piston is in the low position.
Verify the right level and eventually add oil **HYDRUS OIL H146.**

ATTENTION	Do not mix oils of different types. In the event that you cannot find the suggested one, replace it completely

Before using the machine for the first time or after a period of setting aside, it is necessary to bleed, following the here- under procedure:

- Read the manual and prepare the machine to be started.
- Unloose the stop nut of the transducer to the pipe.
- Start the hydraulic unit so that the oil comes out from the above mentioned stop nut.
- Screw the stop nut when the oil that comes out has no air bubbles.

3.6 SECURITY MICRO-SWITCH CONNECTION

The console is foreseen in order to receive the signal of a security micro-switch eventually positioned on the machine safety guards. According to the micro-switch signals, the electronic digital display will stop the motor (when connected) or will allow its working.
The micro-switch has to be connected to the contact 21 and 22 of the terminal board XT1 in the electronic card IC1 (see enclosed electric lay out) The electronic card is delivered with a.m. contacts 21 e 22 closed by a bridge. The opening of this contacts prevents motor starting and activate the display alarm.

3.7 TRANSDUCER CONNECTION

The Servo-unit can receive both the signal coming from a pressure transducer or from a load cell. For a better use of the features of the analogic-digital converter present on the card, the transducers and the load cells have to be extensometric bridge type with a 3 mV/V accuracy (when transducers with an accuracy between 2 and 3 mV/V are used the resolution won't be optimal).
The connected transducer or load cell receive a feeding of 10 V d.c..
The connection is made through a connector SUB-D tank type 9 poles male (for the connection drawing see electric lay out here enclosed).

3.8 CONNECTION TO CENTRONIC PRINTER

The PRINTER connector placed on the back of the digital unit gives the possibility to connect directly the unit with an external printer.
The printer must be in CENTRONICS standard with A4 vertical format.
To have a proper working of the connected printer, pls. consult carefully the instruction manual of the printer in order to arrange a proper setting.
To make the auto-test, start the printer keeping pushed the button FEED.

3.10 RS 232 CONNECTION

See the chapter "TRANSMISSION PROTOCOL" in this manual.

3.11 ELECTRIC CONNECTIONS

DANGER	Skilled operators must arrange the electric connections.

DANGER	Before connecting, see the attached electric diagram and the plate on the machine for the information about the voltage, the frequency, etc.

DANGER	Connect the ground by the terminal PE (yellow-green) before making any other connections.

DANGER	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 ± 10 % of the nominal one
- Frequency: ± 1 % of the nominal one in a continuous way ± 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 tension unbalance 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 e 500 µs and a peak value not higher than 200 % of the real value of the nominal tension.
- The electric feeding must not be interrupted or zeroed for more than 3 ms. 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**.**

Chapter 4 MACHINE FEATURES

4.1 DIMENSIONS AND MASS

LENGTH	*	WIDTH	*	HEIGHT	*	MASS	See plate

* May vary depending on the models.

4.2 CALIBRATION

The machine is tested and calibrated at the factory using a device that is periodically checked by National Institutes.
Copy of this internal calibration certificate is enclosed to this manual.

WARNING	The actual standards foresee the checking of the calibration after each moving of the machine. After installing it and setting it at work, a checking of the calibration must be done by a national institute before carrying out official tests.

Chapter 5 OPERATOR' S INTERFACE

5.1 CONTROLS AND MESSAGES

ENCLOSURE B

A1	MAIN SWITCH
A2	OIL'S POURING PLUG
A3	OIL LEVEL INDICATOR
A4	OIL'S DRAINING PLUG
A5	PIPE CONNECTION FOR OIL BACK FLOW

A6	PIPE CONNECTION FOR OIL FLOW
A7	DIGITAL UNIT
A8	PRINTER
A9	RAM POSITION INDICATOR
A10	VALVE TO EXCLUDE THE SECOND TRANSDUCER (only for model C098-01)

A1 MAIN SWITCH

It allows switching on and off the Servo-unit. By using it you also turn off the motors of the testing machine that are connected to the digital unit.

A2 PLUG FOR POURING OIL

It allows introducing the oil in the tank.

A3 OIL LEVEL INDICATOR

It allows checking the level of the oil inside the tank.

A4 OIL'S DRAINING PLUG

It allows emptying the tank.

ATTENTION	The old oil drained from the tank should not be thrown away but delivered to the special collection centres.

A5 PIPE CONNECTION FOR OIL BACK FLOW

It allows connecting the hydraulic pump to the hydraulic cylinder of the compression machine: the connection must be made with a pipe having a diameter as big as possible and being as short as possible and it allows the return of oil from the cylinder to the pump in case the maximum travel of the piston has been reached.

A6 PIPE CONNECTION FOR OIL FLOW

It allows connecting the hydraulic pump to the cylinder of the compression machine: the connection made by means of a high pressure pipe (keeping up to 650 bars) allows the flow of oil put in pressure from the pump reaching the compression machine.

A7 DIGITAL UNIT

It allows taking the test results and has other functions (see the chapter describing it).

A8	PRINTER (optional)

It allows printing the test result. Thanks to the unit software it is possible to choose the values to be printed.

A9	RAM POSITION INDICATOR

It allows verifying the position of the piston referred to its max. stroke.

ATTENTION	Never overcome the max. point shown.

ENCLOSURE C – GENERAL VIEW OF THE CONTROL PANEL

C2	BUTTON-PAPER OUTLET
C3	PAPER OUTLET
C4	DISPLAY
C5	MEMBRANE PUSHBUTTON
C6	SELECTOR

C7	CH1 PORT
C8	CH2 PORT
C9	CH3 PORT
C10	RS232 PORT
C11	PRINTER PORT

The paper printed comes out from here..

C4	DISPLAY

This is the graphic display visualising the different windows of the Servo-unit software

C5	MEMBRANE PUSHBUTTON

This the operator interface composed by four multi-function push buttons. Following the menu on the screen the four pushbuttons have a different function that will change. The display shows an icon that indicates immediately and easily the function of each single button.

C6	PRINT PUSHBUTTON

It allows setting the printing unit.

C7	CH1 PORT

This channel is used to connect one appliance to the digital unit

C8	CH2 PORT

This channel is used to connect one appliance to the digital unit.

C10	RS232 PORT

The unit can be connected to a PC for the transmission of the files through this port.

C11	PRINTER PORT

The printer port positioned on the back of the electronic digital unit gives the possibility to connect a printer positioned outside. The printer must be Centronics standard with A4 vertical format.
In order to have a proper working of the printer, we recommend checking carefully the instruction manual of the printer in order in order to set it properly.

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Chapter 6 SOFTWARE DESCRIPTION

6.1 GENERAL INFORMATION

The appliance-operator interface consists of a graphic display (C4), five multifunction keys (C5) and a selector (C6).

The functions of every key vary according to the phase of the programme and are specified by the icon adjacent to the actual key. Activation of the indicated functions by the individual icons takes place by pressing the adjacent key.
Using the selector various data can be selected modified and confirmed. Turn the selector to the data to be set, press and turn to modify, and press once again to confirm the new setting.

6.2 MAIN MENU

When the junction box is switched on the following window will appear:

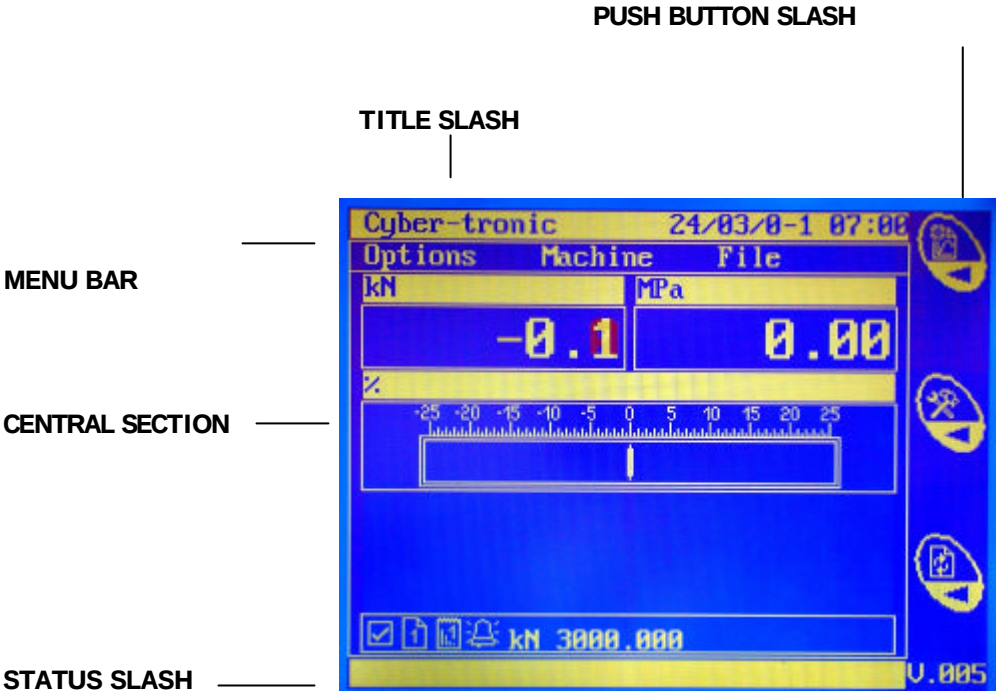


FIGURE 1

The main window is sub-divided into five sections:

1. **Title slash**: Displays the date and time.
2. **Central section**: displays the instantaneous load value and the unitary load after compression test.
3. **Status slash**: the following icons will appear:

- : indicates the active channel has been calibrated
- : indicates configuration 1 is active
- : indicates the analogical channel 1 is active
- : indicates the load alarm is active
- : indicates the load alarm is inactive
- **3000.000 KN** indicates the maximum limit of the channel.

4. **Push button slash**: the following keys are displayed which are necessary for the user to carry out the main functions of the machine:

- : Allows the access to the parameters of the test to be carried out
- : Activates the pre-heating phase.
- : Allows changing the configuration.

5. **Menu slash:** the menus that change the machine and test parameters are displayed here.

6.3 SEMIAUTOMATIC TEST EXECUTION

Proceed as follows to carry out a test:

1. Once the digital unit has been switched on the following figure will appear:

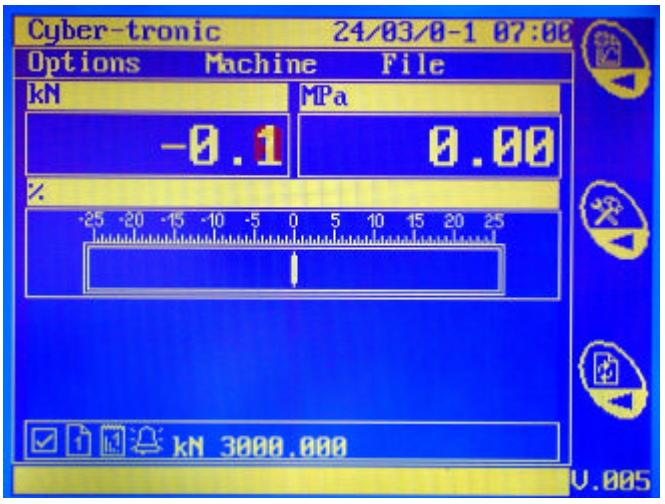


FIGURE 2

2. Select the desired configuration with this key in order to carry out a test.

3. The dialogue window shown in this figure will appear when this key is pressed:

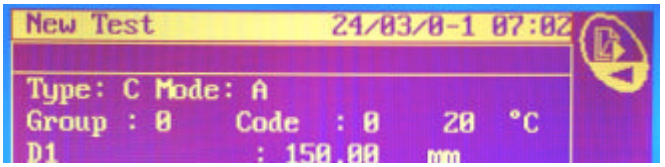


FIGURE 3

4. Using the C6 selector, go to 'Type', then press and select the test type to be carried out (Compression 'C', Flexion 'F' e Splitting test 'B'). In order to select semiautomatic mode, position the selector on "mode" S.

   Using this key  the saved samples in the sample file can be scrolled through and selected.

   N.B.: When selection is made from the samples archive always remember to insert at least the load gradient. This will remain saved along with the other settings, even for the following tests (if carried out correctly).

5. Insert the relevant data for the test to be carried out using the C6 selector (turn to position, press and turn to modify, press to confirm).

6. By pressing  , the following dialogue window will appear:

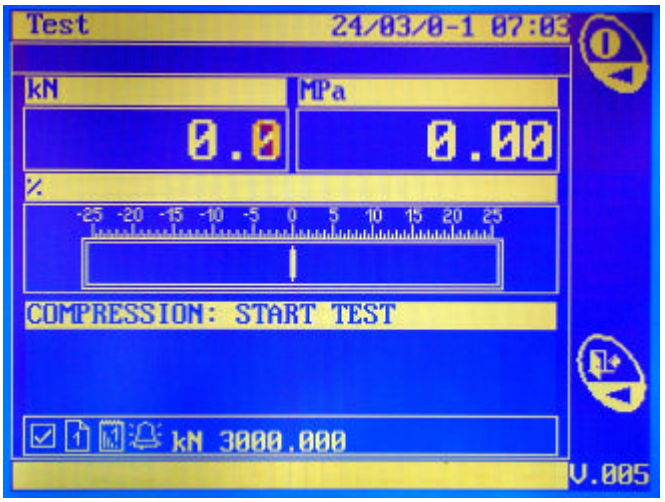


FIGURE 4

N.B.: In the central section the test type being carried out will be displayed.

7. Press this key  to switch on the motor. The piston will go up following the high speed until the specimen gets in touch with the upper compression plate. Just before the specimen touches the upper plate, the system makes the automatic tare.

8. The operator will have to act on the selector C6, in order to increase (turning it clockwise) or decrease (turning it counter-clockwise) the load application: The bar pace rate indicator, placed in the central part of the display, visualises in real time the % error of the load application.

9. The user can read the instant load on the display showing the applied load. Once the specimen has been broken the pressure of the oil is released and the display shows the maximum load reached during the test and the specific strength resulting from the ratio with the selected specimen surface (see the following figure):

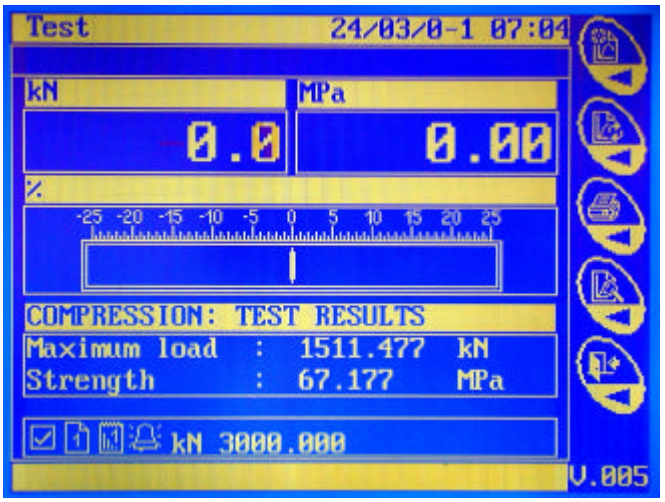


FIGURE 5

10. Press this key  to see the graph for the test carried out.
11. Press this key  to repeat the previously carried-out test without modifying the relative test data.
12. Press this key  to print the test results.
13. Press this key  to repeat the test and to possibly modify the data.

N.B.	Up to 300 tests can be saved in the junction box file.

6.4 AUTOMATIC TEST EXECUTION

Proceed as follows to carry out an automatic test:

1. Once the digital unit has been switched on the following figure will appear:

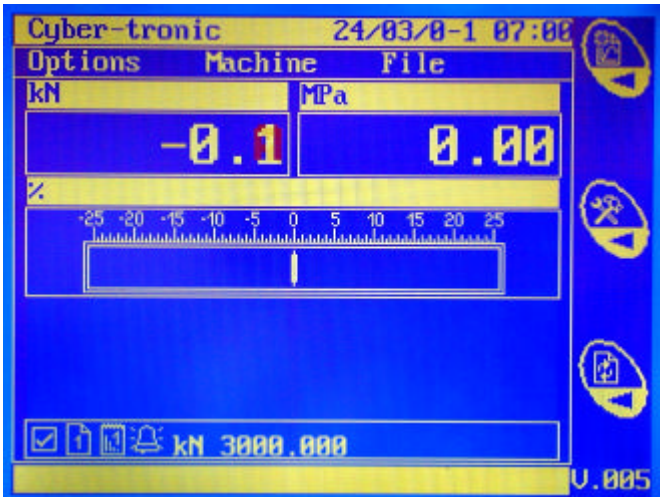


FIGURE 6

2. Select the desired configuration with this key  in order to carry out a test.

3. The dialogue window shown in this figure will appear when this key  is pressed:

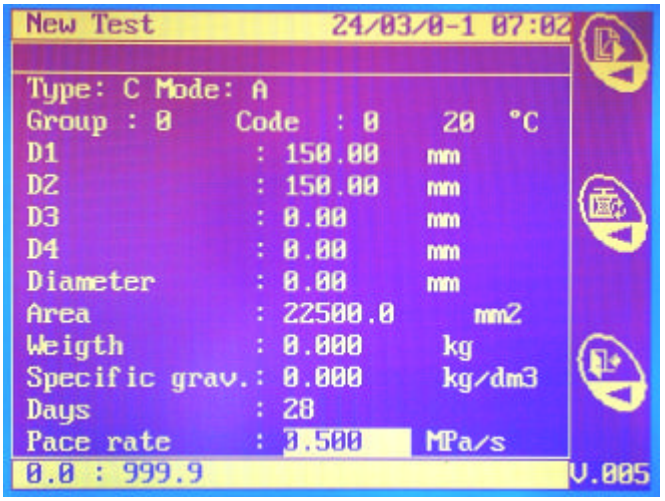


FIGURE 7

4. Using the C6 selector, go to 'Type', then press and select the test type to be carried out (Compression 'C', Flexion 'F' e Splitting test 'B'). In order to select automatic mode, position the selector on "mode" A.

Using this key  the saved samples in the sample file can be scrolled through and selected.

N.B.: When selection is made from the samples archive always remember to insert at least the load gradient. This will remain saved along with the other settings, even for the following tests (if carried out correctly).

5. Insert the relevant data for the test to be carried out using the C6 selector (turn to position, press and turn to modify, press to confirm).

6. By pressing  , the following dialogue window will appear:

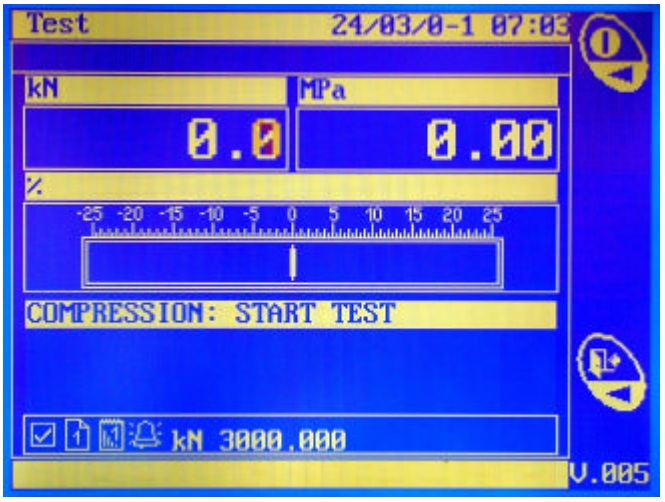


FIGURE 8

N.B.: In the central section the test type being carried out will be displayed.

7. To start the cycle or the automatic test, push on the button  . The piston will go up following the high speed until the specimen gets in touch with the upper compression plate; starting from this point the system will keep the pace rate set by the user. The bar pace rate indicator, placed in the central part of the display, visualises in real time the % error of the load application.

8. Once the specimen has been broken the pressure of the oil is released and the display shows the maximum load reached during the test and the specific strength resulting from the ratio with the selected specimen surface (see following figure):

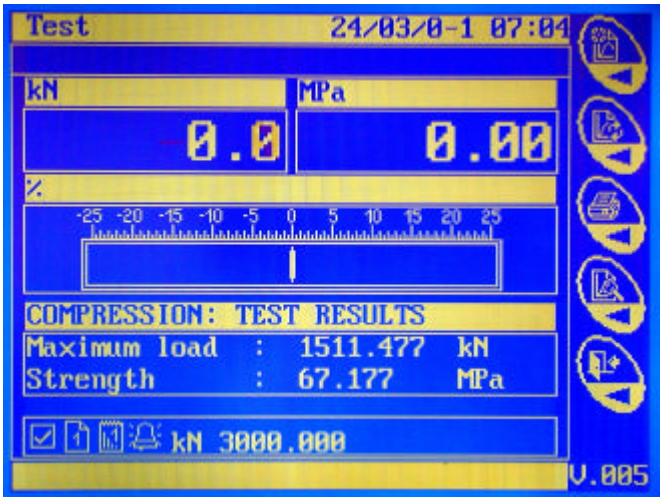


FIGURE 9

9. Press this key  to see the graph for the test carried out.
10. Press this key  to repeat the previously carried-out test without modifying the relative test data.
11. Press this key  to print the test results.
12. Press this key  to repeat the test and to possibly modify the data.

N.B.	Up to 300 tests can be saved in the junction box file.

6.5 CALIBRATION 1

Proceed as follows to carry out a right calibration:

N.B.	The right device is necessary in order to carry out calibration.

1. In the dialogue window in the main menu, go to 'OPTIONS', select the desired calibration and press the C6 selector.

2. The following dialogue window will appear:

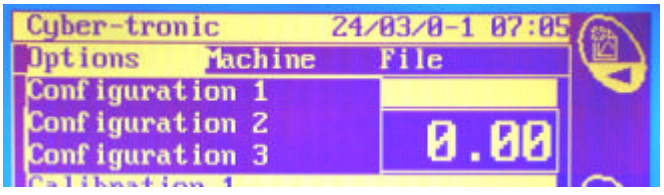
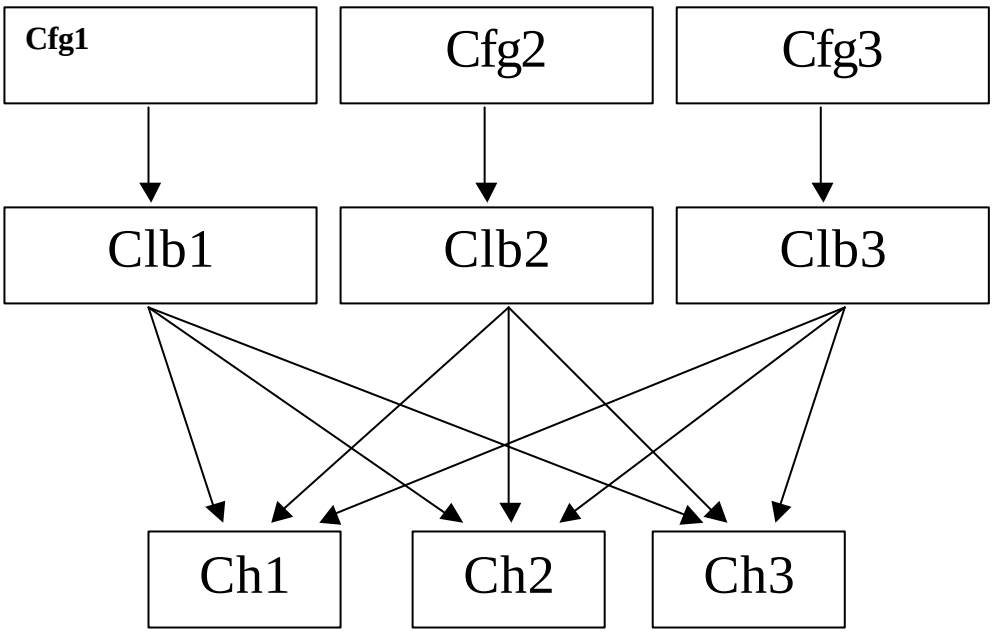


FIGURE 10

3. Turn the C6 selector and go to the channel to be calibrated (1, 2, 3). Channel choice is independent from the configuration and calibration type, or to be more precise any channel can be selected. The user can set up to a maximum of three configurations. For every configuration the user can decide upon which analogical channel to refer to:



4. Press the selector to confirm. The dialogue window will appear:

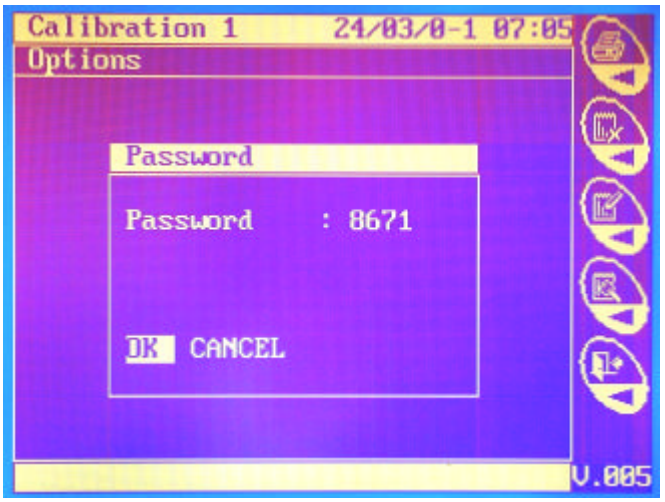


FIGURE 11

1. Enter the password 8671 using the C6 selector. Go to 'OK' and confirm by pressing the C6 selector. The dialogue window will appear:

FIGURE 12

The following keys will be displayed in the dialogue window:

-  Print the calibration chart (incorporated printer).
-  Delete the calibration carried out (for calibration deletion enter the password 8671).
-  Verify the load of the calibrated channel.
-  Calibrates the channel.
-  Exit the calibration menu and confirms the settings.

Calibration can be carried out in two different ways:

- ***Manual calibration A:***

1. Using the C6 selector, got to 'OPTIONS'. Press and select 'STANDARD STEPS'. Press once again and the following will appear:

FIGURE 13

2. Confirm with OK. The calibration gaps (previously set in configuration) will then be automatically entered.
3. For repetition or selection of one calibration gap, using the C6 selector go to the number adjacent to the word 'STEP'. Press to modify and press again to confirm.

4. Using the C6 selector go to 'OPTIONS'. Press and select 'STANDARD POINTS'. Press once again and the following will appear:

FIGURE 14

5. Confirm with OK. The calibration points will be automatically entered in correspondence to the previously inserted steps.
6. For repetition or selection of one calibration point go to the number adjacent to the word 'POINT' using the C6 selector. Press to modify then press again to confirm.

- ***Manual calibration B:***

  Manually insert the relevant points for the corresponding calibration steps (see the enclosed calibration certificate).

- ***Automatic calibration:***

1. Place a load cell between the compression platens.
2. Press  to switch on the motor and start the calibration procedures. The piston will go up at the high speed until the load cell gets in touch with the upper compression plate. Before the load cell touches the upper plate, the system makes the automatic zeroing of the channel. Zero the instrument used to read the load cell loads.
3. Act on the B8 switch (to increase turn the selector clockwise, to decrease turn the selector counter-clockwise) in order to have the load applied on the load cell on a value perfectly equal to the load indicated in the loads column (kN) relative to the first step. **ATTENTION**: to have a fine setting, turn the selector slowly; to have a speed setting turn the selector speedily.
4. Once the value has been reached, act on the button  to store the points read by the transducer.

5. Proceed in the same way for the following steps.

14. Press  to return to the previous window.

15. Press  and the following dialogue window will appear:

FIGURE 15

7. Push the button  to start the motor and start the checking procedure. The piston will go up at the high speed until the load cell gets in touch with the upper compression plate. Before the load cell touches the upper plate, the system makes the automatic zeroing of the channel. Zero the instrument used to read the load cell loads.
8. Act on the B3 switch (to increase turn the selector clockwise, to decrease turn the selector counter-clockwise). Proceed with the checking.

9. Press  to switch off the motor. Press the key  to confirm the channel check and return to the previous dialogue window.

6.6 CALIBRATION 2

In order to carry out calibration 2 refer to the instructions for calibration 1.

6.7 CALIBRATION 3

In order to carry out calibration 3 refer to the instructions for calibration 1.

6.8 CONFIGURATION

Proceed in the following way to carry out configurations:

1. In the dialogue window of the main menu select ‘OPTIONS’ from the menu bar by turning and pressing the C6 selector.
2. The following dialogue window will appear:

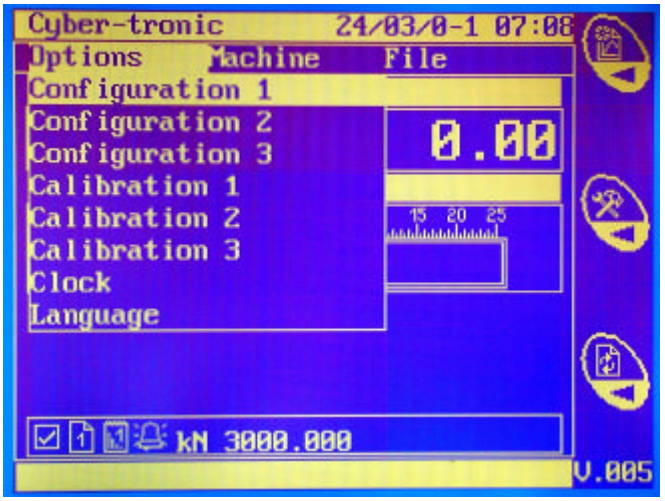


FIGURE 16

3. By turning the C6 selector position it on the desired configuration (Conf. 1, conf. 2 or conf.3). Press the selector to confirm. The following dialogue window will appear:

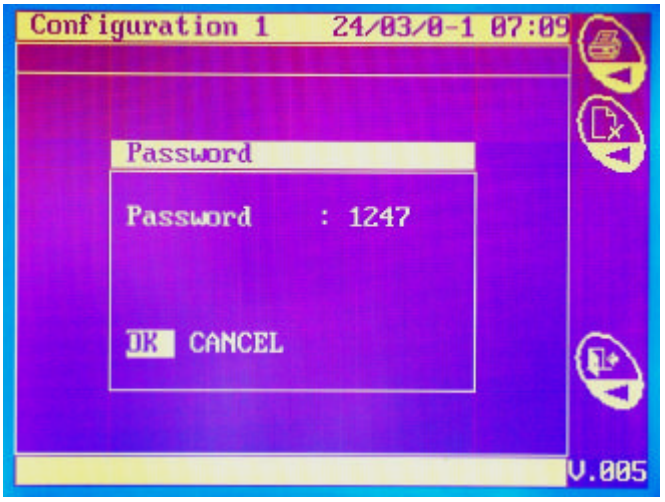


FIGURE 17

4. Enter the password 1247 with the C8 selector. Go to 'OK' and press the selector to confirm. The following dialogue window will appear:

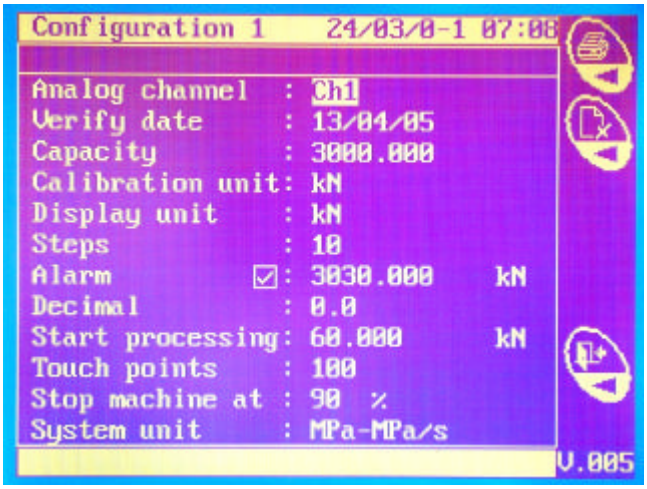


FIGURE 18

5. In this window it is possible to:

- Select the analogical channel
- Set the test date
- Set the maximum limit
- Set the calibration measuring unit
- Set the system measuring unit
- Set the number of steps for calibration
- Activate or de-activate the maximum limit alarm with a relative value
- Set the number of decimals
- Set a value to be used as a threshold for the start of data processing
- Set a value which will be used as a threshold for the start of load gradient regulation
- Set the percentage of the end of the test. The percentage set will define a load value (calculated as a percentage of the maximum load reached during the test), which, when reached, the motor will halt thus avoiding sample crumbling.

N.B.: The set value influences the determination of the end of the test. Setting a low value (80% - 90%) guarantees the load fluctuations throughout test execution are not interpreted as possible sample breakage. Contrarily low values have as a consequence a greater sample chipping with the consequent inconvenience for the operator when removing the broken sample.

A value of around 100% will cause minimal sample chipping but as a consequence load fluctuations throughout the test can be interpreted as sample breakage with a resulting end of test!

The set default value allows correct test execution in normal conditions. In the case of testing certain samples where behaviour under load is such that correct results reading is not possible, the set value should be modified, temporarily searching for the optimum value.

- Set the test-measuring unit (unitary load and pace rate).

In the dialogue window the following keys are displayed:

-  Prints the parameters displayed in configuration
-  Deletes the parameters
-  Exits the configuration menu and confirms the settings.

6.9 TEST ARCHIVE

This function allows access to test data. Proceed in the following way to archive data:

1. From the dialogue window of the main menu, turn the C6 selector and select 'ARCHIVE' from the menu bar.
2. The following dialogue window will appear:

FIGURE 19

3. By turning the C6 selector position and click on the desired test archive (Compression "C", Flexion "F" and Brazilian "B"). Click to confirm. The following dialogue window will appear:

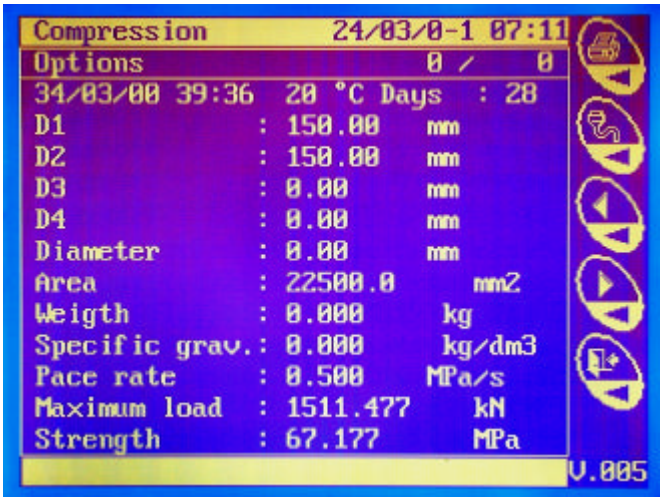


FIGURE 20

In the dialogue window the following keys will appear:

-  : Prints the shown test (incorporated printer).
-  : Displays the previous test.

-  : Displays the following test.
-  : Exits the archive and returns to the main screen.
-  : Captures data from the archive onto the PC.

4. To delete the test turn the C6 selector, go to 'OPTIONS' and click. The following dialogue window will appear:

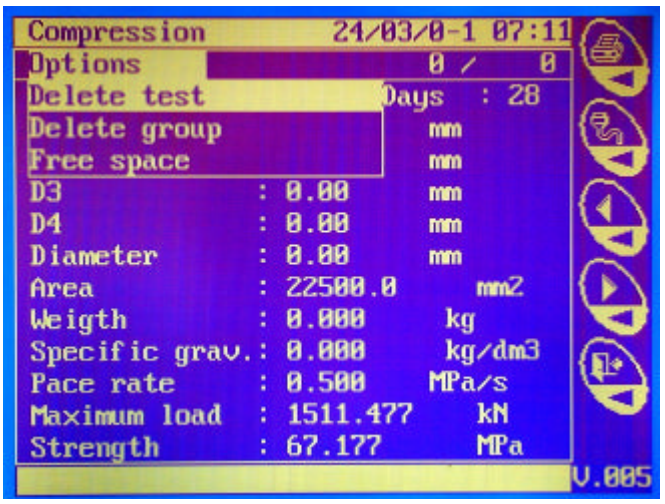


FIGURE 16

5. Using the C6 selector, select single test deletion or group test deletion. Selecting the third option can see the available space.

6.9.1	**TRANSMISSION PROTOCOL FOR THE TRANSFER OF TESTS FROM THE ARCHIVE TO THE PC**

BAUD	9600
PARITY	NO
BIT DATA	8
BIT STOP	1

COMPRESSION TEST

"$C group code data d1 d2 d3 d4 diameter area gradient maxload unitaryload"

"$C gggg cccc dddddddddddddddd dddddddd dddddddd dddddddd dddddddd dddddddd aaaaaaaaaa gggggggg ccccccccccc rrrrrrrrrr"

FLEXURAL TEST

"$F group code data d1 d2 d3 d4 diameter area gradient maxload unitaryload "

"$F gggg cccc dddddddddddddddd dddddddd dddddddd dddddddd dddddddd dddddddd aaaaaaaaaa gggggggg cccccccccc rrrrrrrrrr"

SPLITTING TEST

"$B group code data d1 d2 d3 d4 diameter area gradient maxload unitaryload"

"$B gggg cccc dddddddddddddddd dddddddd dddddddd dddddddd dddddddd dddddddd aaaaaaaaaa gggggggg cccccccccc rrrrrrrrrr"

6.9.2	TYPOLOGY OF TEST AND RELATIVE RESULTS

COMPRESSION TEST

EN 12390-3 / UNI 6132

CUBE SPECIMEN:	CYLINDER SPECIMEN :
D1 = SIDE 1 D2 = SIDE 2 D3 = NOT AVAILABLE D4 = HEIGHT DIAMETER = NOT AVAILABLE BREAKING AREA (BREAKING SECTION) = SIDE 1*SIDE 2 UNITARY LOAD = Fm/AREA WEIGHT = AVAILABLE SPECIFIC WEIGHT = AVAIALABLE (automatically calculated after having inserted or modified the field WEIGHT)	D1 = NOT AVAILABLE D2 = NOT AVAILABLE D3 = NOT AVAILABLE D4 = HEIGHT DIAMETER = DIAMETER BRAKING AREA (BREAKING SECTION) = (DIAMETER/2)²*p UNITARY LOAD = Fm/AREA WEIGHT = AVAIALBLE SPECIFIC WEIGHT = AVAIALABLE (automatically calculated after having inserted or modified the field WEIGHT)

FLEXURAL TEST

EN 12390-5 / UNI 6133

PRISMATIC SPECIMEN:
D1 = A (WIDHTNESS) D2 = B (HEIGHT) D3 = C (DISTANCE BETWEEN LOWER ROLLERS) D4 = D (DISTANCE BETWEEN UPPER ROLLERS) (D3 has to be more than D4) DIAMETER = NOT AVAILABLE BREAKING AREA = A*B UNITARY LOAD = 3/2*Fm*(C-D)/(A*B²) WEIGHT = AVAILABLE SPECIFIC WEIGHT = AVAILABLE

SPLITTING TEST

EN 12390-6 / UNI 6135 / EN 1338

CUBE SPECIMEN:	CYLINDER SPECIMEN :
D1 = LENGHT D2 = THICKNESS D3 = NOT AVAILABLE D4 = K (CORRECTION FACTOR = 1.3-30*(0.18-D2/1000)²) DIAMETER = NOT AVAILABLE BREAKING AREA = D1*D2 (AUTOMATIC) UNITARY LOAD = 0.637*K*Fm/AREA WEIGHT = AVAILABLE SPECIFIC WEIGHT = AVAILABLE	D1 = H (HEIGHT) D2 = NOT AVAILABLE D3 = NOT AVAILABLE D4 = NOT AVAILABLE DIAMETER = DIAMETER BREAKING AREA = p*H*DIAMETRO UNITARY LOAD = 2/p*Fm/(H*DIAMETER) WEIGHT = AVAILABLE SPECIFIC WEIGHT = AVAIALABLE (automatically calculated after having inserted or modified the field WEIGHT)

6.10 SAMPLE ARCHIVE

Proceed as follows to access the sample archive:

1. Turn the B8 selector to 'ARCHIVE' and click to confirm. The following screen will appear:

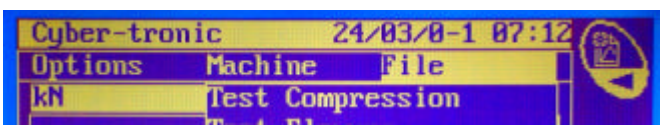


FIGURE 22

2. Select the desired sample archive by pressing the C6 selector. The following screen will appear:

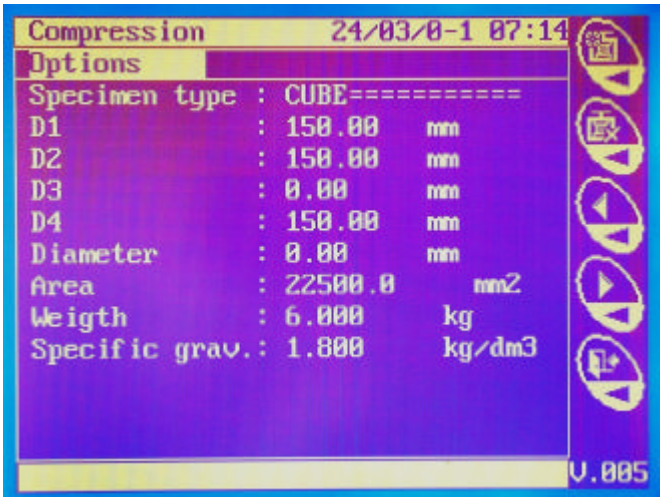


FIGURE 23

In the dialogue window the following keys will appear:

-  Creates a new sample
-  Deletes the sample
-  Scrolls through the previous samples
-  Scrolls through the following samples

-  Returns to the previous window

3. To create a sample click  . Scroll and modify by turning and then pressing the C6 selector.
4. Go to 'OPTIONS' and press the C6 selector. The following window will appear where data for any sample can be printed, or see the available space in the sample archive:

FIGURE 24

6.12 LANGUAGE, CLOCK AND DATE SET UP

With this function the language, date and time of the junction box can be set. Proceed in the following way to configure the clock:

1. From the main dialogue window turn the C6 selector and select 'OPTIONS'.

2. The following dialogue window will appear:

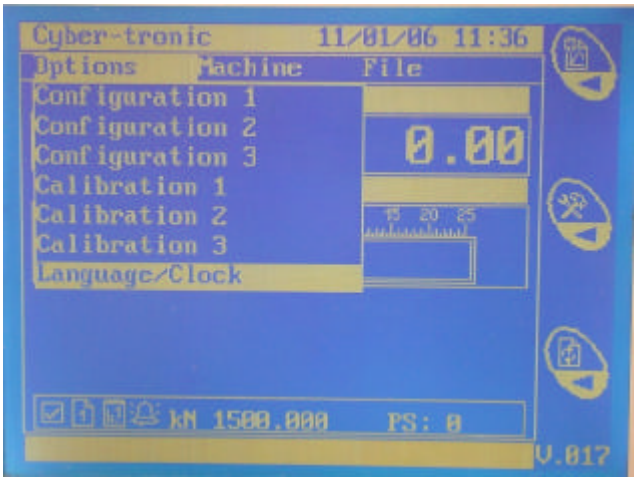


FIGURE 25

3. Select "LANGAUGE, DATE AND TIME". The following dialogue window will appear:

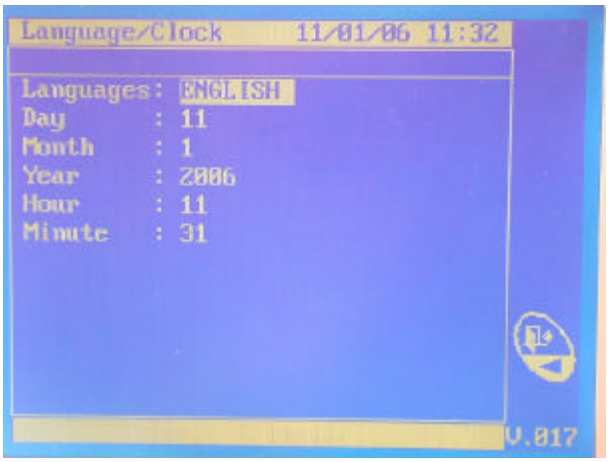


FIGURE 26

4. With the C6 selector, select and insert the data required. Press  to return to the previous window and save the settings by clicking OK.

6.13 ALARMS DESCRIPTION

The alarms, which can appear on the junction box screen, are as follows:

- **"Invalid password!"** The required password has not been entered correctly. Re-enter the correct password.

- **“Alarm”** The threshold set in configuration has been exceeded. For the machine to be able to automatically check every overload a channel alarm must be enabled by ticking off the relative check in the screen configuration.
- **“Change the configuration?”** To change the current configuration and pass to the next one the question must be confirmed.
- **“Denied command”** Every time an unqualified command is carried out this message is displayed.
- **“Delete?”** Before deleting a configuration, a sample, a test or other machine settings confirmation is requested. Press OK to confirm deletion or press cancel.
- **“Save?”** When exiting the screens confirmation or cancellation of changes is requested.
- **“Enter?”** In the calibration phase the gaps and the transducer points of 3mv/V can be automatically entered. Confirm for insertion to be carried out.
- **“Invalid calibration!”** If the calibration table is incorrect (for example if it contains two steps equal to zero, etc) this message is displayed.
- **“Empty archive”**
- **“Full archive!”**
- **“Invalid date!”**
- **“Invalid test!”** Recheck the current test settings. For the test to be valid it must be compatible with the current configuration.
- **“Check the field type!”** An automatic test cannot be carried out on a manual machine and vice versa.
- **“Invalid flexural data”** Check the bending data and in particular the measurement of the knives.
- **“Invalid Brazilian data”** Check the Brazilian data.
- **“Invalid area!”** Enter the sample area; a test cannot be carried out without having first entered the sample area.
- **“Invalid gradient!”** Enter the gradient; a test cannot be carried out without having first entered the gradient.

6.14 DATA ACQUISITION WITH PC

Using the RS232 connector, it is possible to connect the digital unit to a Personal Computer.
Loading a Load/Deformation program it is possible to control following functions: remote control, real time visualisation of the load and deformation procedures with print out of graphic, test results, management of the specimen file and test profiles.

Chapter 7 MAINTENANCE

DANGER	Consult **2.3 DANGEROUS PARTS AND RESIDUAL RISKS before** proceeding.

DANGER	All the maintenance operations must be carried out with the machine turned off and unplugged from the knife switch.

DANGER	Any kind of maintenance operations concerning the components of the machine and of the electric components, even those that may seem very simple, must be carried by skilled operators instructed about the purposes the machine is made for.

DANGER	Only original spare parts are allowed. The Manufacturer assumes no liability in the event that non –original parts are used.

7.1 ROUTINE MAINTENANCE

- In order to maintain good working of the machine for a long time, clean periodically all the parts and oil the parts that are not painted.
  Do not use solvents that may damage the painting and the parts made of synthetic materials.
- At the end of each working day, let the ram come up till the MAX point and clean carefully the edge of the piston and the upper part of the cylinder from any dust and deposit, paying attention not to let them fall down in the opening between the ram and the cylinder.
  Oil the upper part of the ram with hydraulic oil of the same kind as indicated in the point CHECK OF THE OIL LEVEL.
- Before the official annual check of the compression machine, disassemble the seat ball assembly, clean it carefully, oil it with the same type of oil used for the hydraulic circuit and assemble it again.
  WARNING: For the Foot-Meter compression machines see special instructions

7.2 PERIODICAL INSPECTIONS

PARTS TO INSPECT	CHECK OF THE OIL LEVEL INSIDE THE TANK
PROCEDURE	Verify that the oil level can be seen through the E indicator
FREQUENCY	100 WORKING HOURS

7.3 CALIBRATION

Proceed with a check of the calibration by officially recognised institutes following the standards in force.

7.4 SPECIAL MAINTENANCE

RESET OF THE AUTOMATIC MOTOR SAFETY SWITCH
Turn of the appliance.
Insulate the appliance from the main supply disconnecting the main cable.
Open the digital unit (taking away the PVC cover) and pay attention to the inside cables connecting the components fixed on the cover with the main card.
Push the key on the automatic switch marked by "**I**".
Close again the digital unit, connect the main cable, turn on the appliance and check its proper working.
If the automatic switch interrupted again the working of the motor, check the good working of the motor or get in touch with the after sale service.

In case of special maintenance operations (repairs, replacement of parts and any other operation not described in this manual) ask directly to the manufacturer.

7.5 SETTING OF THE FOOT-METER SEAT BALL ASSEMBLY OF COMPRESSION MACHINE

If the results of the stability test are not within the limits accepted by the Standards, it is necessary to carry out a new setting of the seat ball assembly:

- Disassemble the seat ball assembly from the head of the compression machine, by unscrewing the two nuts "A" and leaning it on the lower platen (put two wooden pieces between).

ATTENTION	Before unscrewing the nuts make sure that the seat ball assembly is supported so that it will not fall.

- Unscrew the three screws "C" of about half revolution.

- Unscrew the three small screws “M” of about two revolutions.

ATTENTION	To avoid an oil lost from these small screws, we recommend to disassemble them and to coat them with a Teflon tape.

- Unscrew the three “L” screws of about half revolutions.
- Tighten the three screws “C” but not too much, just bring them near.
- Adjust alternatively the screws “C” and “L” until you get a fluid movement of the seat ball assembly with the screws “C” well tightened. Also verify that the flange “D” is perfectly in parallel to the platen “H”. (NOTE: The screws “C” are used to block while the screws “L” have a contrast function). Fix the small screws “M” in order to block the screws “L” avoiding their unloosing in the time.
- Assemble the seat ball assembly on the machine paying attention to block the nuts “A”.
- Place the instruments for the stability check between the platens.
- Carry out a series of ten tests with the max load applicable to the compression machine, in order to let the seat ball assembly settle.
- Apply to the machine a load of 200 kN and take the values of the four bridges given by the instrument for the stability check.
- Move the platen round and repeat the a.m. procedure until the values of the four bridges given by instrument for the stability check are as close as possible.
- Mark the joint with the reference to the arrow on the upper bar of the compression machine.

Chapter 8 DIAGNOSIS

Some easy to solve and simple problems, which can happen during the working of the appliance, are introduced in this chapter.

ATTENTION	All maintenance, checking, control and repairing operations of each part of the machine or of the electric system, must be carried by skilled operators instructed about the purposes the machine is made for.

FAILURE	POSSIBLE CAUSE	CURE
After the switching on procedure (Main Switch A), the machine doesn’t start	No supply	Check the plugs.
	Failure to the motor	Contact the After Sale Service
	Failure to the electric system	Check if the wires and the connections of the electric circuit are interrupted.
	Fuses are broken	Replace the fuses with new fuses having the same capacity. The fuses are on the electronic card inside the electronic digital display
The piston doesn’t go up	Hydraulic circuit is opened	Close the load-unload handle B.
	Too low pace rate	Use the setting device C in the correct way.
The piston doesn’t go down	Hydraulic circuit is closed	Open the load-unload handle B
	Presence of dirty between the cylinder and the piston	Contact the After Sale Service

The motor stops in the middle of a test.	Motor overheating	Act on the automatic switch for motor protection; follow the instructions given in the chapter "SPECIAL MAINTENANCE" carefully.

Chapter 9 SCRAPPING

9.1 SETTING ASIDE

In case of setting aside for a long time it is necessary to disconnect the electric feeding.
Execute all the maintenance operations.
Oil the parts that are not varnished and cover the machine against the dust.

9.2 SCRAPPING

When the machine is not used anymore, it is recommended:

- Disconnecting the cable of the main supply
- Cover/destroy all the parts which may be dangerous as cutting, projecting or sharpened ones.
- Disassemble the machine and scrap it as per the actual laws.

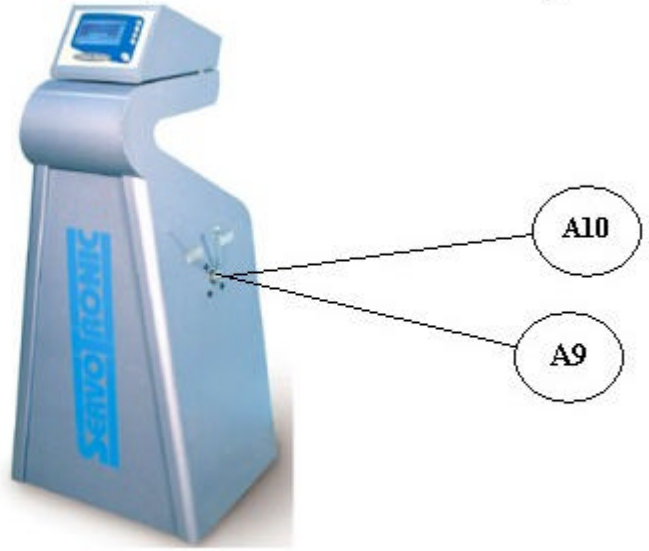
Recycling notice for the disposal of electrical and electronical devices

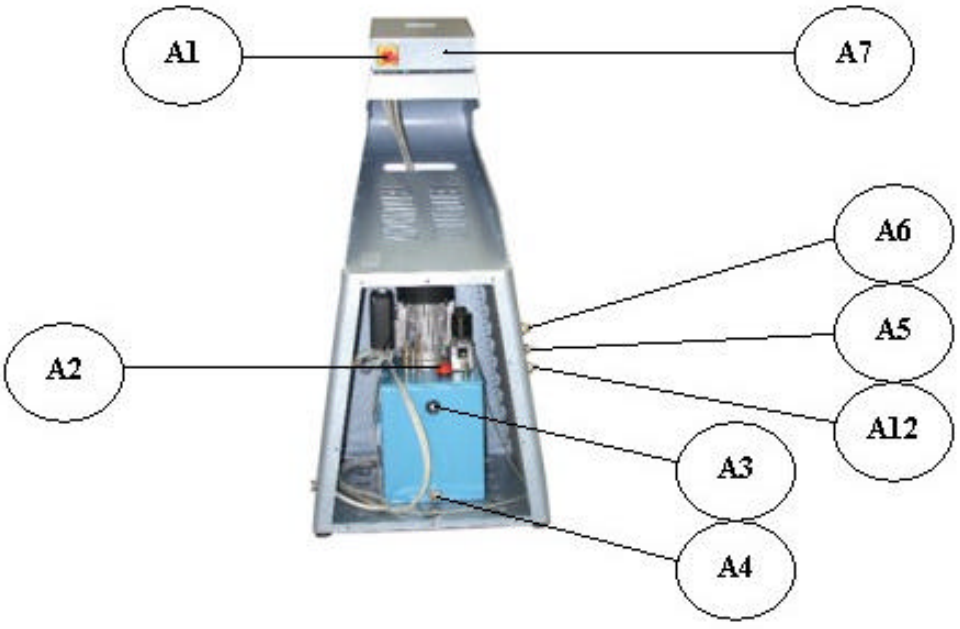
This symbol, placed on the device or on the package and/or on the documentation, suggest that the device shouldn't be dispose together with other home garbage at the end of its life cycle.
To avoid further environment, or health-care damages, caused by the unsuitable disposal of garbage, we kindly recommend the user to separate this device from other different types of garbages and to recycle it in a responsible way to avoid the arguable reuse of material resources.
Indeed users must take care at the disposal of the equipment that have to be discarded, taking them away to the next recycling site for the appropriate recycling treatment for electrical and electronical devices. Gathering and Recycling deplete devices allow the preservation of natural resources and grant for them the adequate treatment respecting health and environment.
For further information about your local recycling site please contact your local city hall or city waste treatment department. The developer, as producer of electrical and electronical devices, will provide to finance the recycling and treatment services for deplete devices that will come back through these recycling site, accordingly the local statement.

Capitolo 10 ENCLOSURE

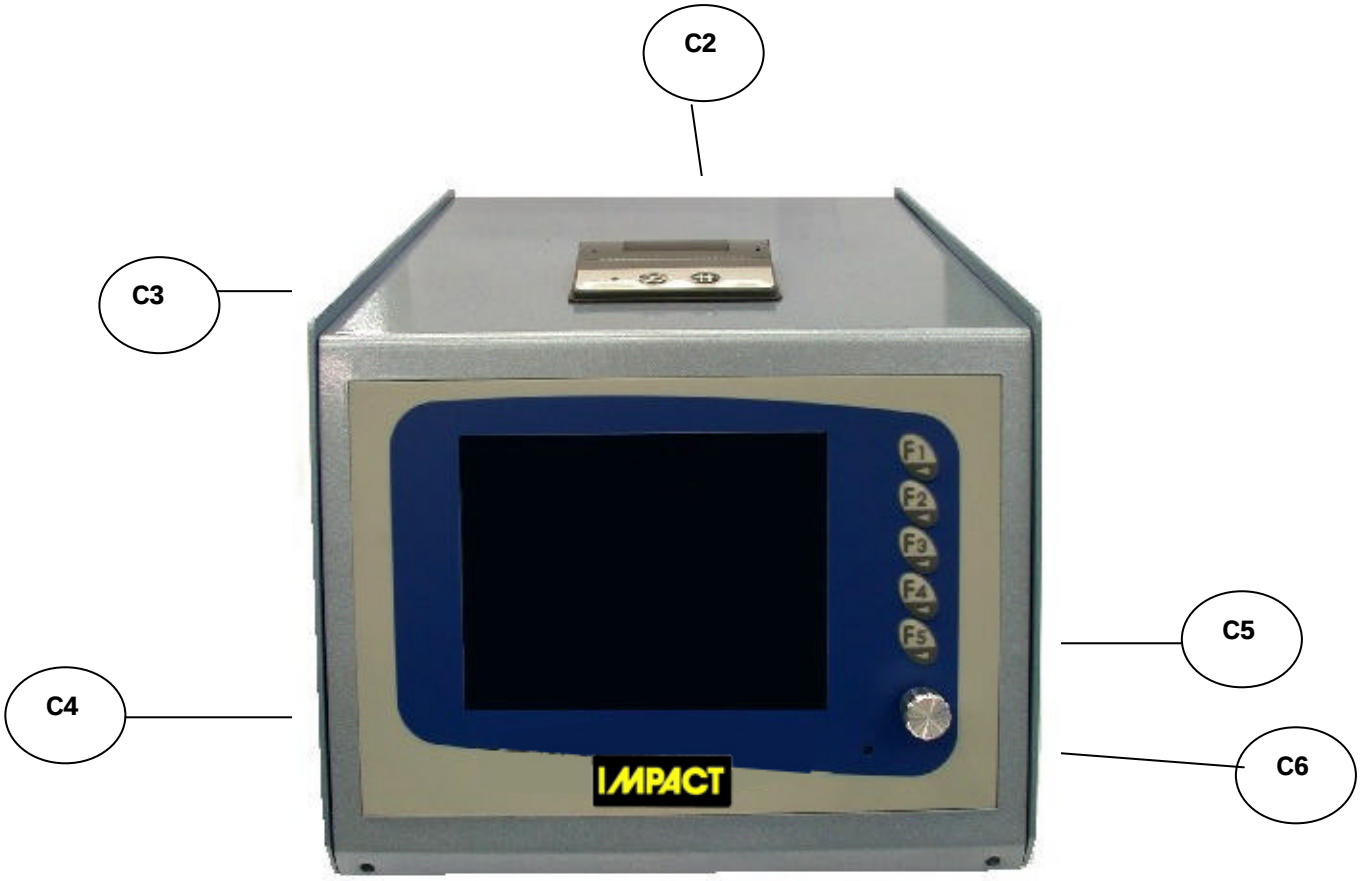
A GENERAL VIEW

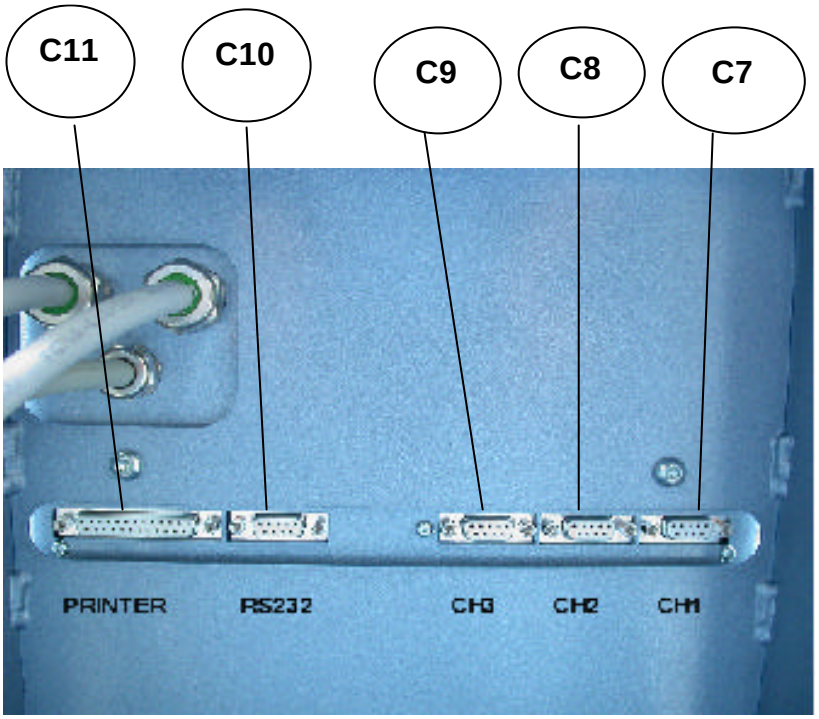
B	GENERAL VIEW OF THE DIGITAL UNIT





C	GENERAL VIEW OF THE DIGITAL UNIT


C2
C3
C4
C5
C6
F1
F2
F3
F4
F5
IMPACT


C11
C10
C9
C8
C7
PRINTER
RS232
CH3
CH2
CH1