

# CONTROLS

**34-V1082-V1084**  
**SPEEDLOADER**  
**Digital Automatic Universal Tester**



**MANUALE DI ISTRUZIONI**  
**INSTRUCTION**



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This instruction manual is an integral part of the machine and should be read before using the machine and be safely kept for future reference.

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The proper use of this machine must be strictly adhered to, any other use must be considered as incorrect. The manufacturer cannot be held responsible for damage caused by incorrect use of the machine. The machine must not be tampered with for any reason. In case of tampering, the manufacturer declines any responsibility of functioning and safety of the machine.

This Manual is published by **CONTROLS**.

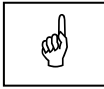
**CONTROLS** reserves the right to update its manuals without notification in order to correct possible typing errors, mistakes, updating of information and/or updating of programs and/or accessories.

Such changes will be inserted in the latest edition of the current manual.

This present version of the manual. Printed in Italy

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# 1. INTRODUCTION

**NOTE:**

The present manual is updated for the product it is sold with in order to grant an adequate reference in operating and maintaining the equipment.

The manual may not reflect changes to the product not impacting service operations.

The **SPEEDLOADER** tester is a machine used for road testing lab. The CBR and Marshall tests, Indirect Tensile tests, Quick Triaxial tests, Unconfined and Uniaxial soil tests, and all tests that can be performed under displacement control are all possible with the 50 kN capacity and the fully variable test speed of 0.2 to 51 mm/min. To meet the needs of either the field or the central laboratory, the machine can be fitted with analogical or digital load/displacement measurement systems as well as dedicated accessories.

The rigid two-column structure of the SPEEDLOADER tester includes an upper cross beam that can be adjusted in height. The load jack, DC motor, and controls are integrated into a base cabinet with a unique design. The machine's processor, with a memory up to 300 tests, gathers and processes test data.

The user can control the test speed with the new Automatic Variable Speed 50 kN Load Frame, which is easily adjustable and displayed on the digital display. Furthermore, the test stroke can be predefined at the start of the test with an automatic stop, preventing overloading of the device and the test subject and ensuring operator safety. This significant element also allows the operator to calibrate the machine's speed using micrometric adjustments. The lower platen's motion direction is also showcased on the display. Two operating leds—one for machine switched on and the other for travel direction—and an emergency button also are installed on the front panel.

**Main features:**

The firmware provide the digital speed control and a number of important test functions as follows:

- Closed loop speed control
- CBR and MARSHALL test speed can be selected by default.
- Other testing speeds (Custom) between 0.2 and 51 mm/min, can be easily set.
- Selection of maximum platen displacement.
- The automatic stop of the machine avoids machine and specimen overloading, thus assuring operator safety.
- Rapid approach function, to reduce the testing time.
- Rapid platen return to speed up the platen base return at the end of the test.
- Speed calibration function by firmware. The test speed is originally factory calibrated using a polynomial interpolation. A test point is provided to verify the speed with a standard tachometer.
- Emergency stop button as required by the CE prescriptions.

The following models are available:

**34-V1082**

SPEEDLOADER compression testing machine with digital control panel, motorized ram, two-column structure and adjustable crossbeam.

220-240V/50-60Hz/1Ph

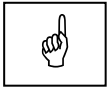
**34-V1084**

SPEEDLOADER compression testing machine with digital control panel, motorized ram, two-column structure and adjustable crossbeam.

110V/60Hz/1Ph

Please read this manual thoroughly before you start using the equipment

## 1.1 Icons appearing in the manual



This icon indicates a **NOTE**; please read thoroughly the items marked by this picture.



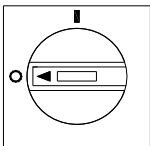




This icon indicates a **WARNING message**; the items marked by this icon refer to the safety aspects of the operator and/or of the service engineer.

## 1.2 Manual revision history

Revision/Date	Change description
Rev. 1 28/02/2023	Manual release

## 1.3 Symbols used

In this manual and on the equipment itself, apart from the symbols indicated on the control panel, the following icons are also used:

Symbol	Description
	Mains switch: O = device not connected to the mains line I = device connected to the mains line
	Emergency button
	Dangerous voltage
	Hand injury
	Conformity to the CE Directive

## 1.4 Intended use and improper use

The equipment SPEEDLOADER can only be used for the execution of the tests CBR, Marshall, Quick Triaxial, Unconfined, Splitting Tensile, and any other static test to be carried out under speed control (admitted speed range 0,2 – 51mm/min) and with a maximum capacity of 50kN, using the relevant accessories supplied by CONTROLS, according to the following International Standards:

- ASTM D1559
- ASTM D5581
- AASHTO T245
- EN 12697-12
- EN 12697-23
- EN 12697-34
- AASHTO T193
- NF P98-251-1/4
- ASTM D6927
- ASTM D1883
- BS 1377:4
- BS 598:107
- EN 13286-47
- UNI 10009
- NF P94-078
- DIN 1996
- CNR 30
- CNR 34

The unit is designed to be operated by one operator that has to install the necessary accessories, load-unload the sample and start the test. During normal operation the working area of the equipment is its front part where the operator's controls are located.

The operator is responsible for switching on the device, carrying out the operations for which the device was designed and manufactured, switching off the device at the end of the test or in the case of an emergency.

The operator must be trained on the correct use of the device and the relative safety aspects of its use.

The device should be used following the procedures described in this manual.

Never use the device for reasons other than those for which it was designed and manufactured. Any other use of the device is to be considered improper, not foreseen and hence dangerous.

CONTROLS will not be responsible for improper use of the instrument.

## 1.5 Safety information

---

**WARNING:**

Please read this chapter thoroughly.

---

CONTROLS designs and builds its devices complying with the related safety requirements; furthermore it supplies all information necessary for correct use and the warnings related to use of the equipment.

**CONTROLS will not to be held responsible for:**

- use of the equipment different than the intended use,
- damages to the unit, to the operator, caused both by installation and maintenance procedures different than those described in this manual supplied with the unit, and by wrong operations,
- mechanical and/or electrical modifications performed during and after the installation, different than those described in this manual

The unit is not designed to be used in an explosive atmosphere.

Installation and any technical intervention must only be performed by qualified technicians authorized by CONTROLS.

Only authorised personnel can remove the covers and/or have access to the components under voltage.

During normal use, if the operator detects irregularities or damages, he/she should immediately inform the authorized technical personnel.

Maintenance and service activities can only be performed by skilled authorized technical personnel that have been properly trained on the residual risks of the equipment.

It is responsibility of the purchaser to make sure that the operators have been properly instructed concerning the safety issues and the residual risks related to the equipment.



The machine is equipped with the following devices to limit the residual risks in using it:

- Emergency button that allows stopping the motor when dangerous conditions are encountered.



*Fig. 1-1*

- Access panels to internal devices fixed with screws.

The following table lists those parts of the equipment that may present some residual risks for the safety of the personnel if the instructions provided in this manual are not duly followed

<b>Personnel</b>	<b>Area with residual risks</b>
Operator	Area near the sample and relevant accessories; keep hands away to avoid crushing.
Technical personnel	Above listed areas
	Areas around compartments closed by removable panels
	Areas around compartments that contain electrical parts For continued fire protection, replace fuses with same type and rating. Also, in case of failure, components may only be replaced by using original spare parts. It is in the responsibility of the purchaser to ensure that fire prevention policies are properly implemented according to the CE provisions.
Personnel responsible of transportation and moving of the equipment	Raising and moving of the equipment from the wooden crate must be performed by people properly trained and equipped with suitable personal protection devices (e.g. gloves, helmet, etc.). Failure to follow the instructions above may endanger the personnel involved.

**Here follows a list of all WARNINGS present in the manual; please see relevant chapters for full details on each related safety issue.**



**WARNING:**

When operating with the covers open/removed and the unit is attached to the mains line, care must be taken as high voltage is present in some parts of the unit (e.g. electrical panel). Only authorized and qualified service technicians are allowed to open /remove covers.



**WARNING:**

All safety devices must be functional at all times. Damaged protective covers or devices must be replaced immediately. When safety components are replaced, the protective devices are to be properly attached and tested. Any manipulation of the safety devices endangers the operating personnel.



**WARNING:**

Raising and moving of the equipment must be performed by people properly trained and equipped with suitable personal protection devices (e.g. gloves, helmet, etc.). Failure to follow the instructions above may endanger the personnel involved.



**WARNING:**

The wooden crate is high; be careful in balancing while raising it.



**WARNING:**

If the instructions to remove the equipment from the shipping box are not carefully followed, damages to the equipment cabinet may result. This will void the warranty terms of the equipment.

#



**WARNING:**

Do not stand under suspended loads

**WARNING:**

Considering the weight of the equipment and the footprint (see chapter 2.2), check the maximum allowed floor load before installation.

---

**WARNING:**

If the equipment is brought from a cold environment into a heated room, condensation on and in the unit can constitute a danger and lead to malfunctioning of the unit when started. Wait to connect and operate the unit until it is at room temperature.

---

**WARNING:**

The general grounding must comply with the rules in force; a wrong quality of the grounding could be dangerous for the operator's safety and cause bad function of the electrical devices.

---

**WARNING:**

Covers/doors can only be removed/opened by maintenance people, by using relevant tools/keys. These tools and keys are for use by maintenance personnel only. Never leave the tools and keys attached to the unit as this may endanger operator safety.

After performing maintenance/repair, make sure that all covers/doors are properly closed and locked.

---

**WARNING:**

The functions of the **HIDDEN MENU** are reserved to CONTROLS authorized technical personnel. Do not access these functions unless specifically instructed/authorized by CONTROLS. CONTROLS will not be held responsible for damage caused to good or persons due to unauthorized use of these functions.

---

**WARNING:**

The **TRAVEL LIMIT** is not a safety function. Do not rely on it for the safety of the operator and/or to prevent damages to the accessories used during the tests.

---

**WARNING:**

Failing to perform the recommended maintenance actions or maintenance performed by unauthorized people can void the warranty. CONTROLS will not be responsible for maintenance and service actions performed by unauthorized people.

---

**WARNING:**

Before opening/removing the covers, disconnect the mains supply to the device and wait at least 5 minutes.

---

**WARNING:**

For continued fire protection, replace fuses with same type and rating. Also, in case of failure, components may only be replaced by using original spare parts. It is in the responsibility of the purchaser to ensure that fire prevention policies are properly implemented according to the CE provisions.

---



**WARNING:**

Avoid pouring water, even accidentally, or other liquids into the device, as this could cause short circuits. Before cleaning the device, disconnect it from the mains line.



**WARNING:**

Refer to qualified service organization authorized by CONTROLS to carry out the maintenance actions described in the chapter "Authorized service engineer maintenance action". CONTROLS has not to be held responsible for damages to the equipment and/or injuries to personnel in case the above is not strictly followed.



**WARNING:**

The upper movement of the platen is not monitored and limited by a limit switch. It is therefore responsibility of the operator to make sure the platen position will not exceed the allowed upper limit. CONTROLS will not be considered responsible for damages to the equipment resulting for improper use.



**WARNING:**

The **RESET** functions of the **HIDDEN MENU** is reserved to CONTROLS authorized technical personnel. Do not access this function unless specifically instructed/authorized by CONTROLS. CONTROLS will not be held responsible for damage caused to good or persons due to unauthorized use of these functions.



**WARNING:**

For continued fire protection, replace fuses with same type and rating. Also, in case of failure, components may only be replaced by using original spare parts.

## 1.6 Environmental risks and disposal



### INFORMATION TO THE OWNER OF THE EQUIPMENT

The above symbol, when attached to the equipment or to the relevant packaging, indicates that the product must be disposed of separately from other rubbish at the end of its useful life.

Therefore, at the end of its useful life, the owner should dispose of the product in a suitable collection point for electrical and electronic products provided by the local authorities.

The correct disposal of this product and the subsequent treatment encourages the manufacture of products using re-cycled materials and limits the environmental impact of the product caused by improper disposal.

Improper disposal of the product is subject to penalties as foreseen by the local regulations.

## 1.7 Identification plate

The identification plate is located on the rear panel of the equipment, near the socket of the power cable.



## 1.8 CE declaration

This page shows a copy of the CE declaration. The original is supplied with the equipment as a separate document.

<b>DECLARATION OF CONFORMITY</b> <b>DICHIARAZIONE DI CONFORMITÀ</b> <small>Directive 2006/42/CE, Annex II, sub A) - Direttiva 2006/42/CE, Allegato II, parte A)</small>		
<small>Manufacturer Fabbricante</small>	<b>CONTROLS S.P.A.</b>	
<small>Address Indirizzo</small>	Via Salvo D'Acquisto 2/4 20060 Liscate, (MI) Italy	
<b>Herewith declares that the machine</b> <i>Dichiara che la macchina</i>		
<small>Model Modello</small>	<b>34-V1082</b>	
<small>Serial number Matricola</small>	23000319	
<small>Description Descrizione</small>	Macchina di compressione SPEED LOADER con pannello di controllo digitale, attuatore motorizzato, struttura a due colonne e traversa mobile.	
is in conformity with the provisions of the following EC directives: è conforme a quanto previsto dalle seguenti direttive CE:		
2006/42/CE (Machinery Directive) (Direttiva Macchine)		
2014/35/UE (Low Voltage Directive) (Direttiva Bassa Tensione)		
2014/30/UE (Electromagnetic Compatibility Directive) (Direttiva Compatibilità Elettromagnetica)		
<small>Date of issue Data di emissione</small>	<small>Technical Director - Person authorized to compile the technical file Direttore tecnico - Persona autorizzata alla compilazione del fascicolo tecn</small>	Nicola Lezzerini 
19 January 2023		
<small>CONTROLS S.p.A. Via Salvo D'Acquisto 2/4, 20060 Liscate (MI) Tel. +39- 02921841 fax +39- 0292103333 e-mail: controls@controls.it www.controls.it</small>		

## 2. DESCRIPTION

Refer to the following figures for main components identification.

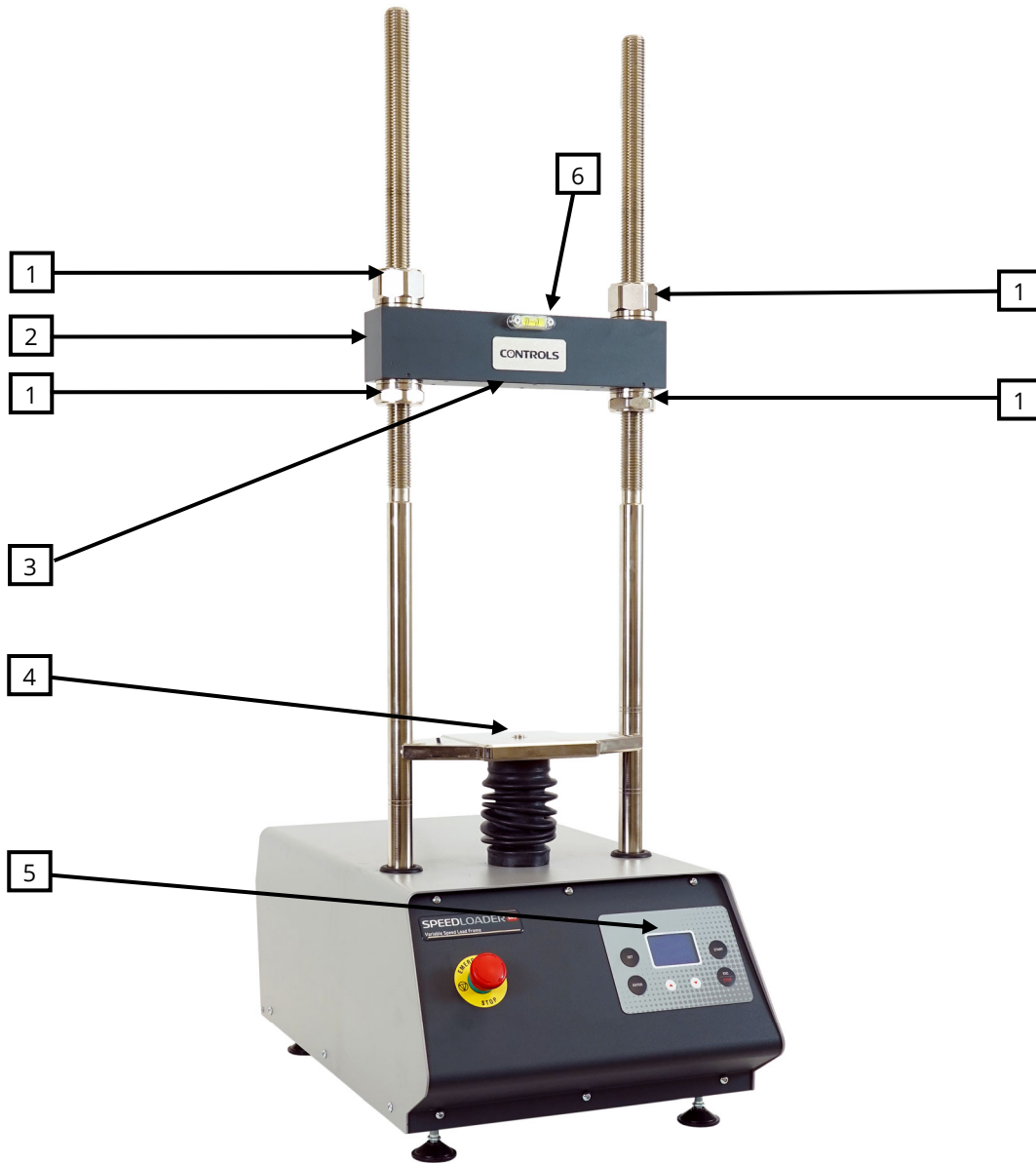


Fig. 2-1

Ref.	Description
1	Upper and lower locknuts to adjust the height of the crossbeam
2	Upper crossbeam
3	Accessories attachment point
4	Lower crossbeam
5	Keyboard with Display
6	Spirit Level

## 2.1 Commands and controls

This chapter describes the commands and controls of the equipment.

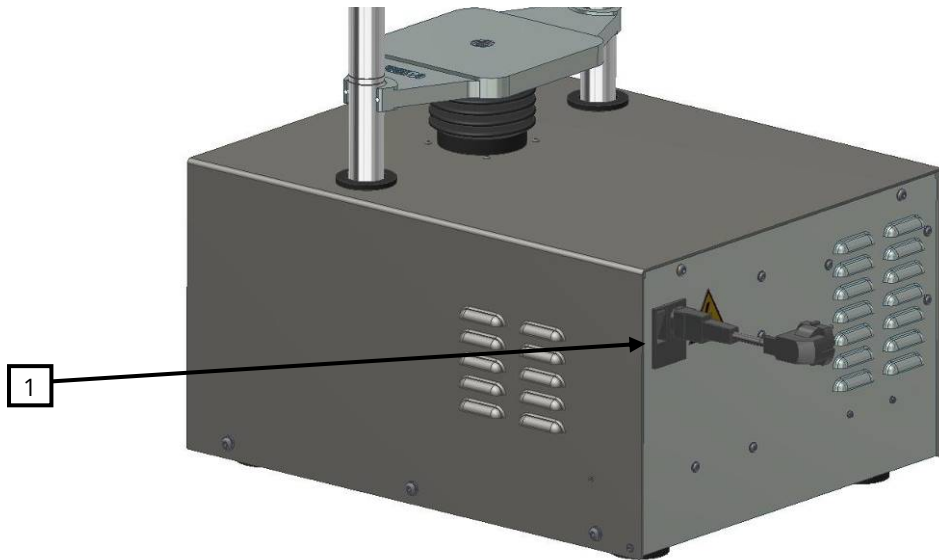


Fig. 2-2



Fig. 2-3

Ref.	Description
1	Mains switch (on rear panel)
2	Keyboard with Display
3	Emergency button

**2.1.1 Control unit**

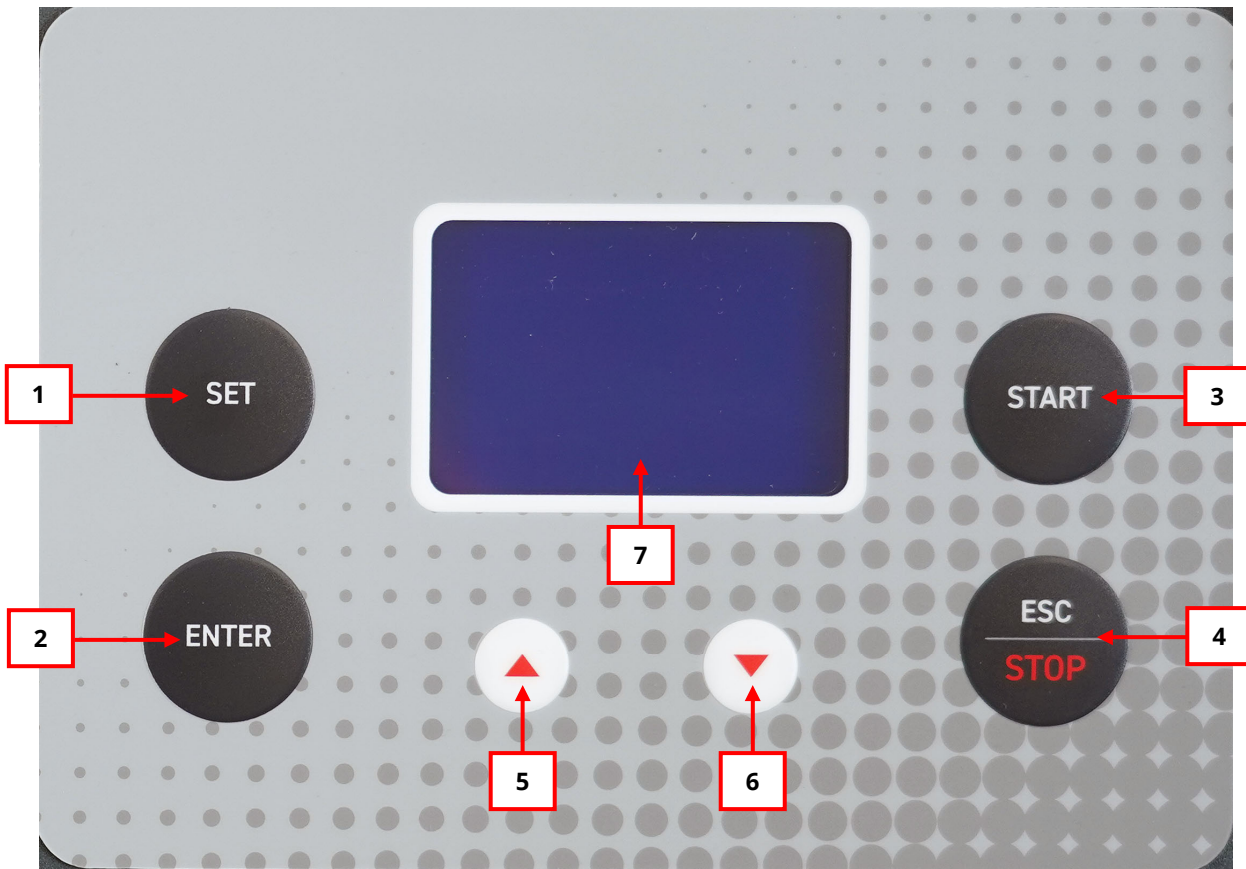


Fig. 2-4

Rif.	Description
1	<b>SET</b> button - used to go to PREVIOUS screen or digit
2	<b>ENTER</b> button - used to go to NEXT screen or digit
3	<b>START</b> button - used to start the current test
4	<b>ESC/STOP</b> button - used to stop the current test or exit test screen
5	<b>UP</b> button - used to raise the selected number or digit by 1
6	<b>DOWN</b> button - used to lower the selected number or digit by 1
7	<b>DISPLAY</b>



## 2.2 Technical specifications

Main characteristics	
Product	<b>SPEEDLOADER</b> Digital Automatic Universal Tester for Displacement Controlled Tests
Manufacturer	CONTROLS Liscate (MI) Italy
Product code 230VAC/50-60Hz/1 Ph version	<b>34-V1082</b>
Product code 110VAC/60Hz/1 Ph version	<b>34-V1084</b>
Max. capacity	50 kN
Test speed	Adjustable from 0.2 mm/min to 51 mm/min
Horizontal daylight	270 mm
Vertical daylight	730 mm
Max. piston travel	100 mm
Single-phase line voltage	110 VAC/220VAC/230 VAC +6%, -10%
Frequency	50/60 Hz
Power DC motor	750 W
Method of power entry	Power cable with plug
Net weight (machine only, without accessories, approx.)	89 Kg
Overall dimensions (W x D x H)	425 x 670 x 1265 mm

Environmental conditions	
Operating temperature	+ 10 ÷ + 40°C
Operating humidity	≤ 50%RH @ 40°C

### 3. INSTALLATION

The instructions indicated in this chapter enable you to perform a correct installation and interfacing in order to grant a regular operation of the equipment. Included are initial inspection procedure, power requirements and instructions for installing the unit.

The information in this chapter is intended for authorized service-trained personnel.

CONTROLS can supply the assistance and the necessary technical advice for pre-installation, all the pre-installation phases are at the purchaser's charge and must be performed complying with the indications given below.

**WARNING:**

When operating with the covers open/removed and the unit is attached to the mains line, care must be taken as high voltage is present in some parts of the unit (e.g. electrical panel). Only authorized and qualified service technicians are allowed to open /remove covers.

---

**WARNING:**

All safety devices must be functional at all times. Damaged protective covers or devices must be replaced immediately. When safety components are replaced, the protective devices are to be properly attached and tested. Any manipulation of the safety devices endangers the operating personnel.

---

### 3.1 Shipment

The equipment is normally shipped in a wooden crate having the following dimensions and gross weight depending on the model:

Model	Gross weight	Overall dimensions (W x D x H)	Minimum fork lift length
V1082 – V1084	209 Kg	680 x 780 x 1400 mm	1200 mm

Use a proper fork lift with minimum fork length as above indicated to raise and move the wooden crate (see figure below).



Fig. 3-1



**WARNING:**

Raising and moving of the equipment must be performed by people properly trained and equipped with suitable personal protection devices (e.g. gloves, helmet, etc.). Failure to follow the instructions above may endanger the personnel involved.



**WARNING:**

The wooden crate is high; be careful in balancing while raising it.

---

## 3.2 Unpacking and inspection

The unit was carefully checked both mechanically and electrically before shipment; it should be inspected for any damage that may have occurred in transit.

**NOTE:**

If the shipping container or packaging material is damaged, it should be kept until the unit has been mechanically and electrically checked.

If there is mechanical damage and/or the contents are incomplete (see the shipping list), please notify the local CONTROLS representative.

If the shipping container is damaged or shows sign of stress, notify the carrier as well as the CONTROLS representative. Save the shipping material for carrier's inspection. Also take some pictures.

---

Here follows the procedure for the unpacking of the equipment.

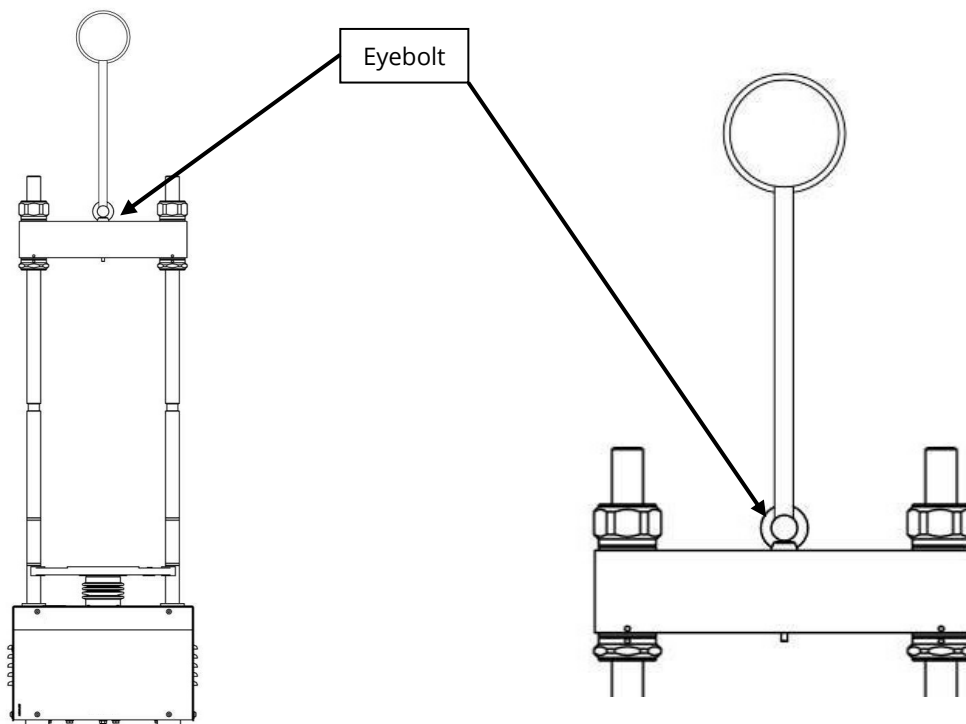
### 3.2.1 How to remove the equipment from the shipping crate

The following table shows the net weight of the different models of the equipment:

Model	Net weight (machine only, without accessories)
V1082 - V1084	89 Kg approx.

Follow the instructions below to remove it from the shipping crate:

1. Inspect shipping crate (see NOTES above);
2. Open the shipping crate;
3. Cut and remove vacuum bag (if present) to expose the equipment;
4. The equipment must only be lifted up by the eyebolt screwed in on the top of the machine. Do not lift it by any other part to avoid damaging the equipment.



**WARNING:**

If the instructions to remove the equipment from the shipping box are not carefully followed, damages to the equipment cabinet may result. This will void the warranty terms of the equipment.

#



**WARNING:**

Raising and moving of the equipment must be performed by people properly trained and equipped with suitable personal protection devices (e.g. gloves, helmet, etc.). Failure to follow the instructions above may endanger the personnel involved.



**WARNING:**

Do not stand under suspended loads

5. Before powering on the unit, check for loose connections of cables inside the equipment.

### 3.3 Positioning of the unit and space requirements

**WARNING:**

Considering the weight of the equipment and the footprint (see chapter 2.2), check the maximum allowed floor load before installation.

---

The unit has to be placed on a bench that can withstand its weight and the weight of the relevant accessories. The height of the bench has to assure proper positioning for a correct use of the equipment.

The area around the equipment must be kept free from obstacles and from substances that may cause sliding of the personnel.

It is responsibility of the purchaser to provide an installation place with adequate lighting.

Parts used to build the machine and electrical/electronics component are fire-proof. It is anyway the responsibility of the owner of the equipment to make sure that the installation place is equipped with proper fire extinguishing systems and that the operators have been instructed on the relevant procedures.

Use a proper mean to bring the unit to the installation place.

Once placed on the bench, use a spirit level to check that the machine is properly levelled otherwise this may influence the proper alignment of the machine with respect to the sample accessories.

Leave a some free space on the rear of the equipment in order to allow the access to the rear panel (mains switch and mains cable).

For service/maintenance purposes, removal of the equipment panels may also be required. Make sure this is be possible, e.g. moving temporary the equipment away from the rear wall.

The unit requires adequate air circulation around it to assure proper cooling of the internal devices.

**WARNING:**

If the equipment is brought from a cold environment into a heated room, condensation on and in the unit can constitute a danger and lead to malfunctioning of the unit when started. Wait to connect and operate the unit until it is at room temperature.

---

### 3.4 Electrical requirements

The next table shows the electrical specifications of the equipment:

Parameter	Model code V1082	Model code V1084
Mono phase voltage	230VAC +6%, -10%	110VAC +6%, -10%
Frequency	50-60Hz	60Hz
Maximum power	750 W	750 W

The equipment shall be connected to a proper earth system, the efficiency of which shall be checked by qualified personnel. Earth shall be via the power cable, as specified above.



**WARNING:**

The general grounding must comply with the rules in force; a wrong quality of the grounding could be dangerous for the operator's safety and cause bad function of the electrical devices.

The power supply line shall be equipped with a safety device (breaker and ground fault switch) properly sized with respect to the electrical specifications provided above.

### 3.5 Connections

All connections have to be made on the rear panel of the equipment as described below:

- Connect the power cord to the machine;
- Connect the plug of the power cord to a suitable single-phase socket/panel ;
- Connect the loadcell to the relevant port CH1;
- If present, connect the external displacement transducer to the relevant port CH2;

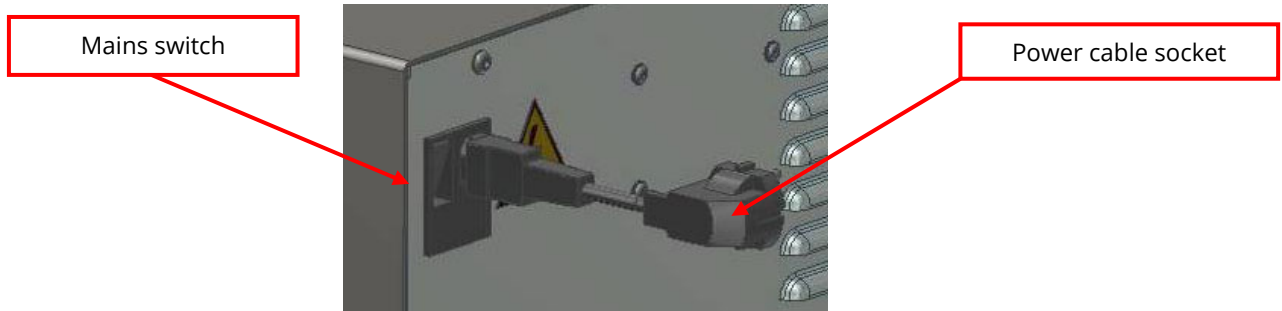


Fig. 3-2 Power cord socket with line fuse and mains switch on rear panel



Fig. 3-3 Connection panel on the right hand side

Ref.	Description
1	Channel for loadcell (CH1)
2	Channel for displacement transducer (CH2)
3	RS232 serial port (115200 baud rate) for PC connection

Refer to chapter 4.5 to turn the equipment ON



---

## 4. USE OF THE EQUIPMENT

This chapter describes the different equipment setup for the execution of the more common tests and the equipment commands (operator's interface).

Description of test steps is provided by the relevant Standards.

Additional tests, referring to Standards different than the ones herewith listed and requiring additional accessories, can be performed (refer to CONTROLS for further details).

**WARNING:**

All safety devices must be functional at all times. Damaged protective covers or devices must be replaced immediately. When safety components are replaced, the protective devices are to be properly attached and tested. Any manipulation of the safety devices endangers the operating personnel.

**WARNING:**

Covers/doors can only be removed/opened by maintenance people, by using relevant tools/keys. These tools and keys are for use by maintenance personnel only. Never leave the tools and keys attached to the unit as this may endanger operator safety.

After performing maintenance/repair, make sure that all covers/doors are properly closed and locked.

---

## 4.1 Preliminary operations

1. Adjustment of the upper cross-beam. Loosen the upper locknuts and turn simultaneously the lower locknuts ensuring that the same number of turns is applied to both locknuts and checking proper leveling of the crossbeam using a spirit level;
2. Align the lower locknuts;
3. Lock the cross-beam by tightening the upper locknuts.

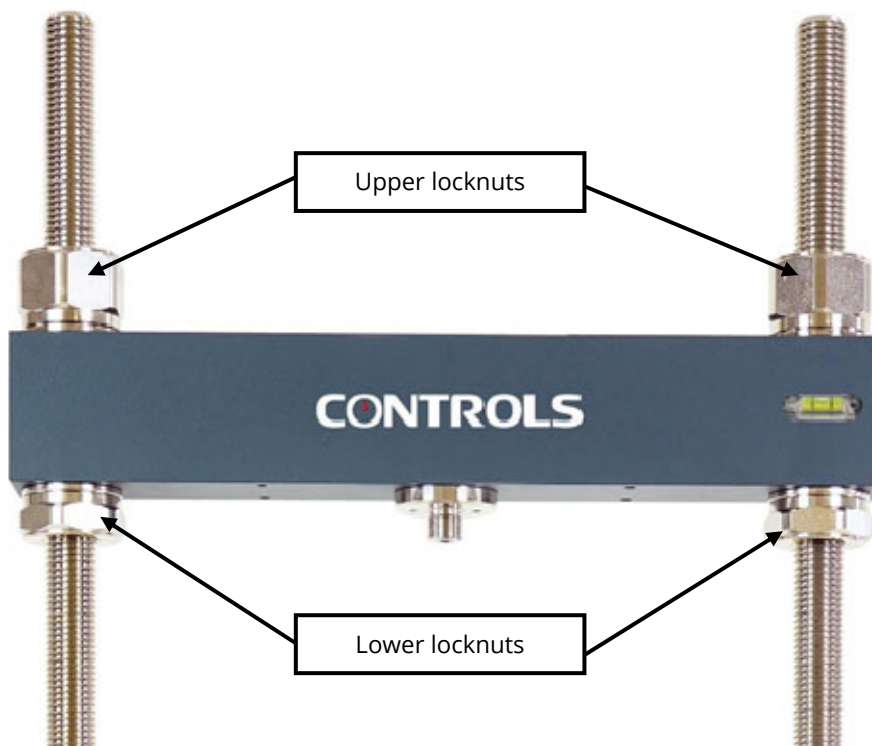


Fig. 4-1

## 4.2 Setup for Marshall test

Set up below described complies to the Standards EN12697-34, ASTM D1559, ASTM D6927.  
For **DIGIMAX TOUCH** readout unit please refer to the relevant documentation.

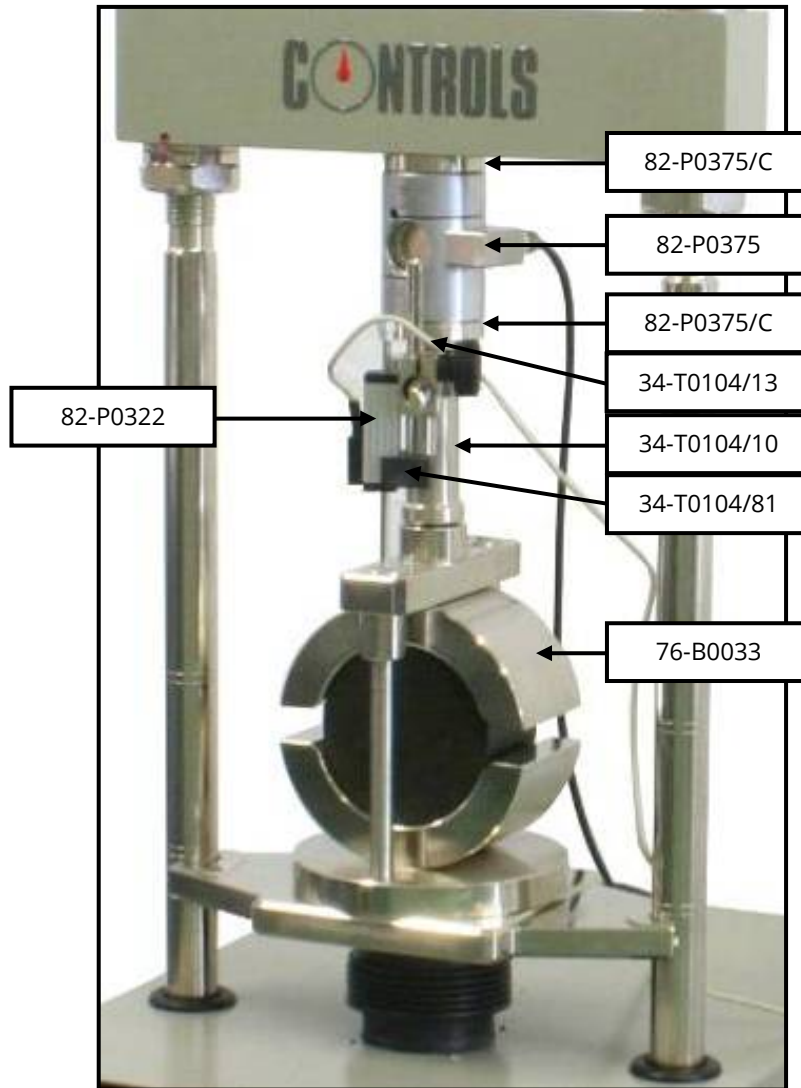


Fig. 4-2

1. Prepare the loadcell code P0375 with the 2 adapters P0375/C;

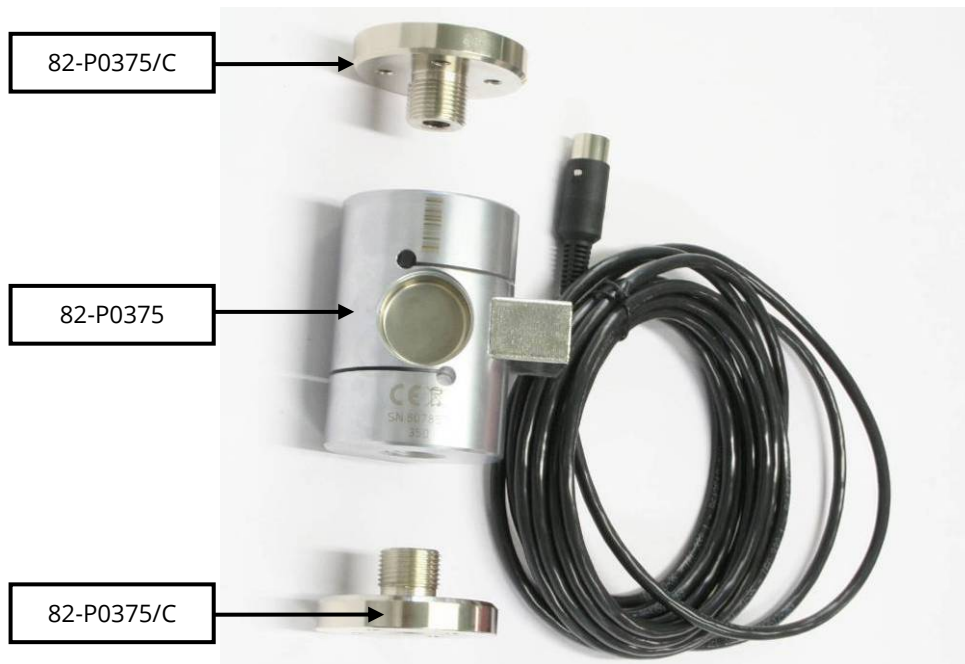


Fig. 4-3

2. Install the loadcell previously prepared to the upper beam by means of the relevant fixing screws;

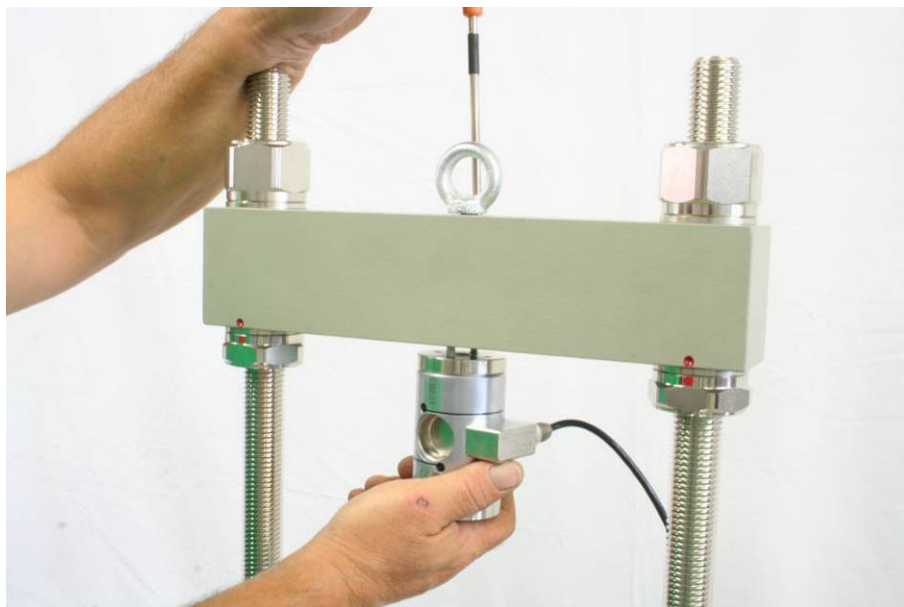


Fig. 4-4

3. Assemble the compression device code T0104/10 and relevant adapter code T0104/13;

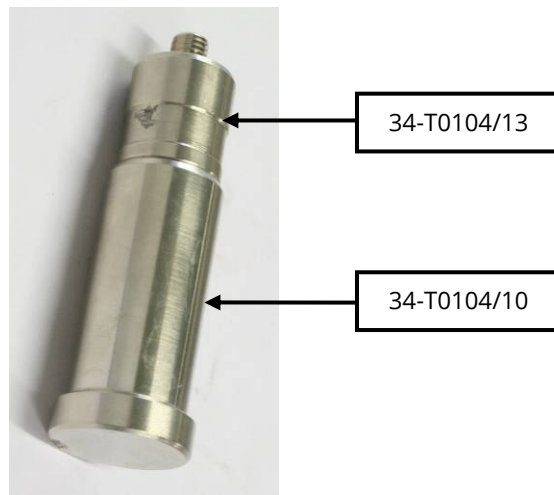


Fig. 4-5

4. Fit the compression device previously assembly into the adjustable transducer holder code T0104/81;

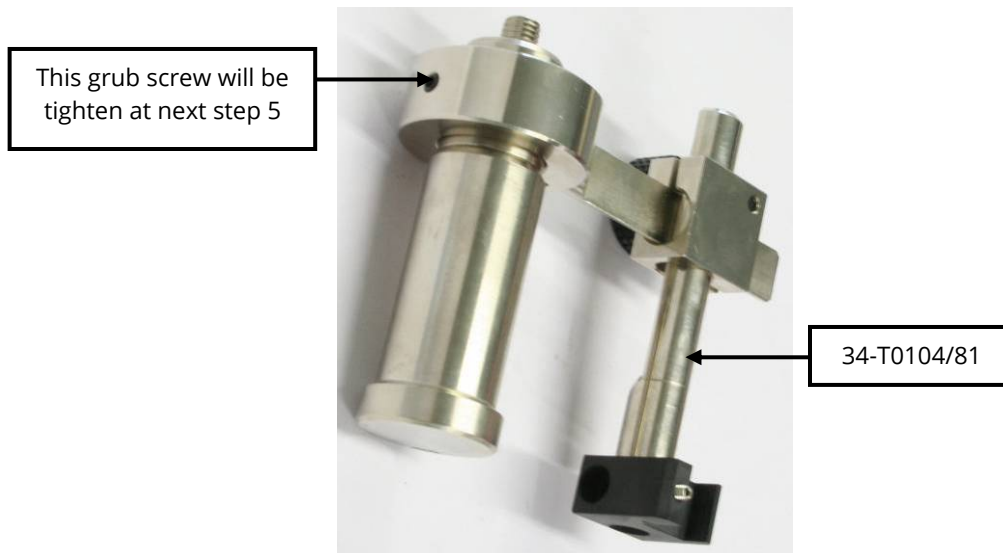


Fig. 4-6

5. Screw in the compression device plus transducer holder, install the displacement transducer P0322 (tighten the relevant fixing grub screw) and place the stability mould B0033 on the **SPEEDLOADER** lower platen centering it by means of the centering screw; then adjust the position of the displacement transducer in order its stem touches the upper bar of the stability mould and tighten the grub screw shown in previous Fig. 4-6;

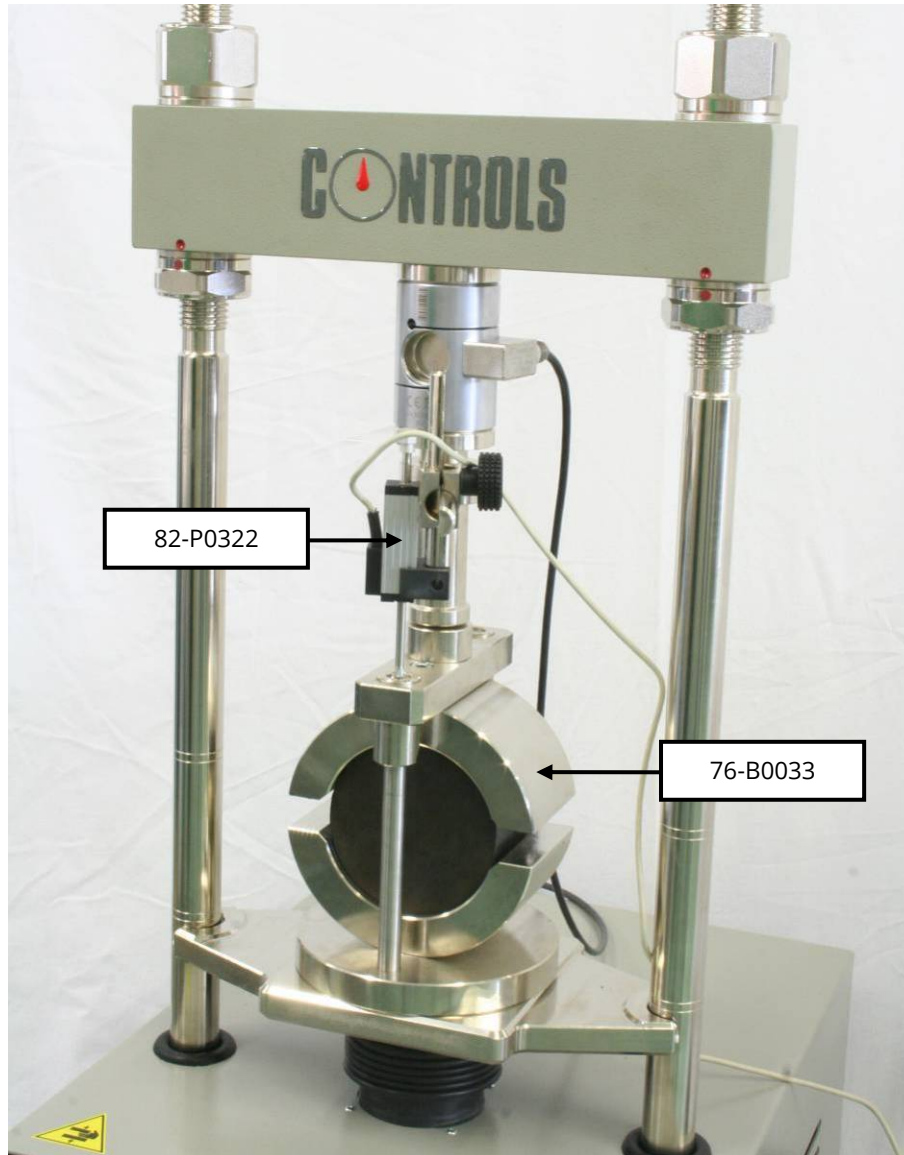


Fig. 4-7

6. Connect the transducer connectors to the **machine** socket as follows:
  - a. CH1: Load cell
  - b. CH2: Displacement transducer;

### 4.3 Setup for digital CBR test

Set up below described complies to the Standards EN13286-47, ASTM D1883, AASHTO T193.

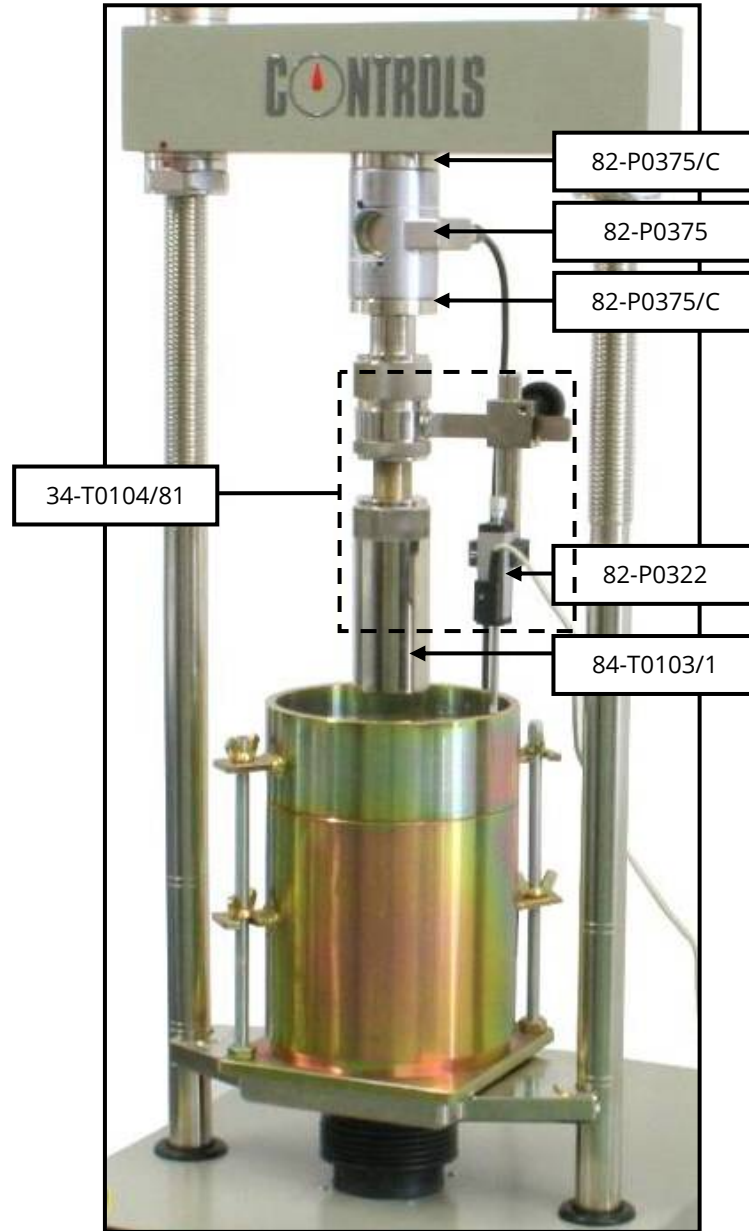


Fig. 4-8

1. Prepare the loadcell code P0375 with the 2 adapters P0375/C;

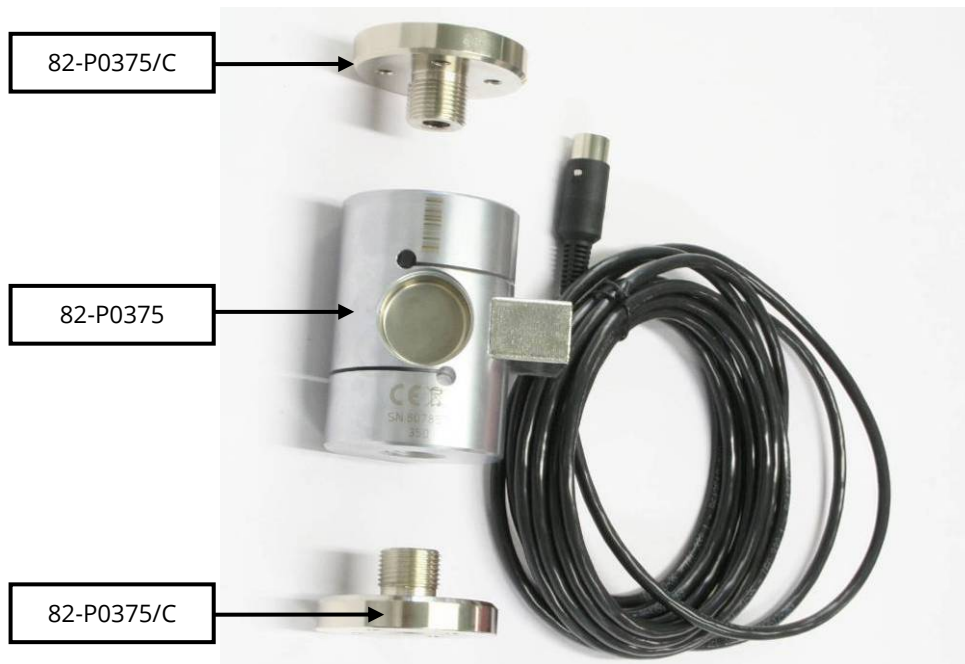


Fig. 4-9

2. Install the loadcell previously prepared to the upper beam by means of the relevant fixing screws;

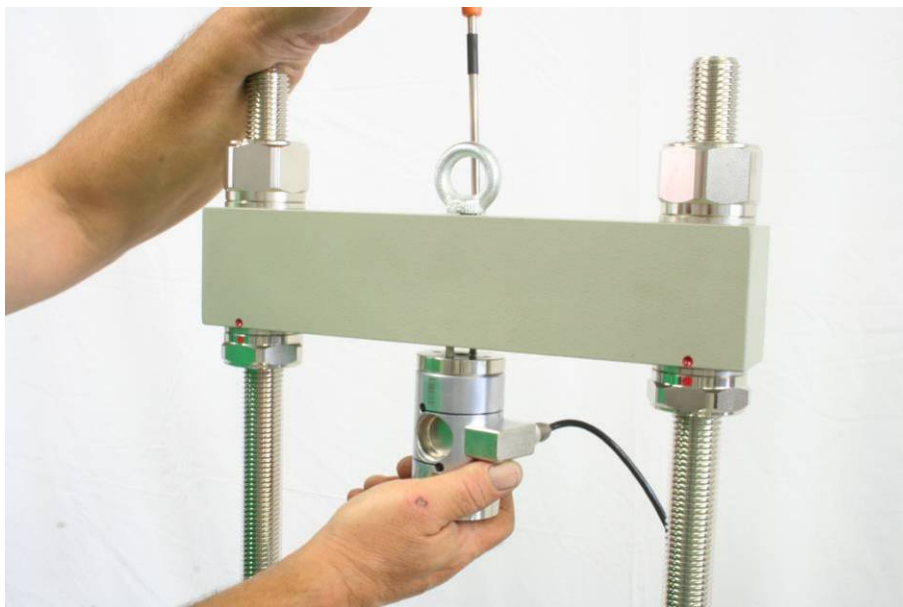


Fig. 4-10



3. Assemble the compression device T0103/1 with the transducer holder T0104/81;

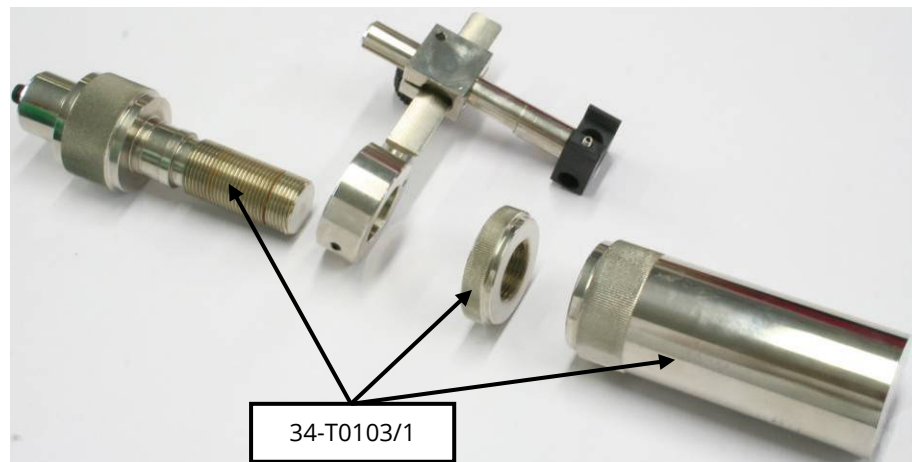


Fig. 4-11

4. Screw in the compression device plus transducer holder, install the displacement transducer P0322 (tighten the relevant fixing grub screw) and place the mould T0090 on the **SPEEDLOADER** lower platen centering it by means of the centering screw; then adjust the position of the displacement transducer in order its stem touches the upper edge of the mould;

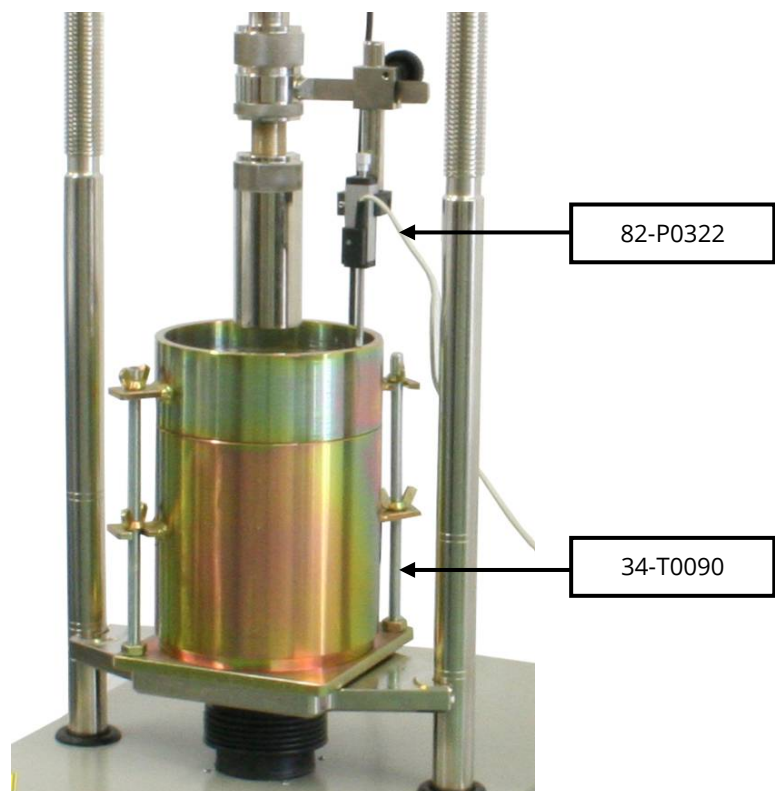
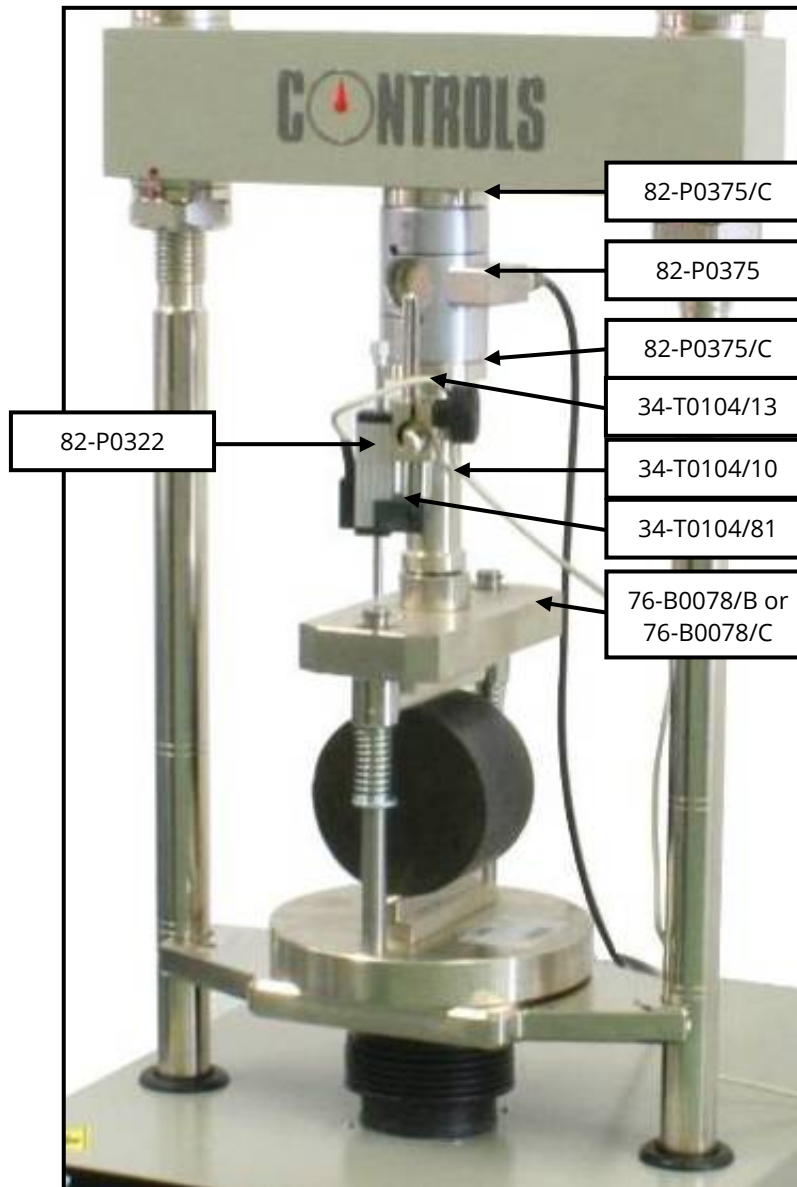


Fig. 4-12

5. Connect the transducer connectors to the socket lateral panel as follows:
  - c. CH1: Load cell
  - d. CH2: Displacement transducer;

### 4.4 Setup for indirect tensile test

Set up below described complies to the Standards EN12697-12, EN12697-23, AASHTO T283.



1. Prepare the loadcell code P0375 with the 2 adapters P0375/C;

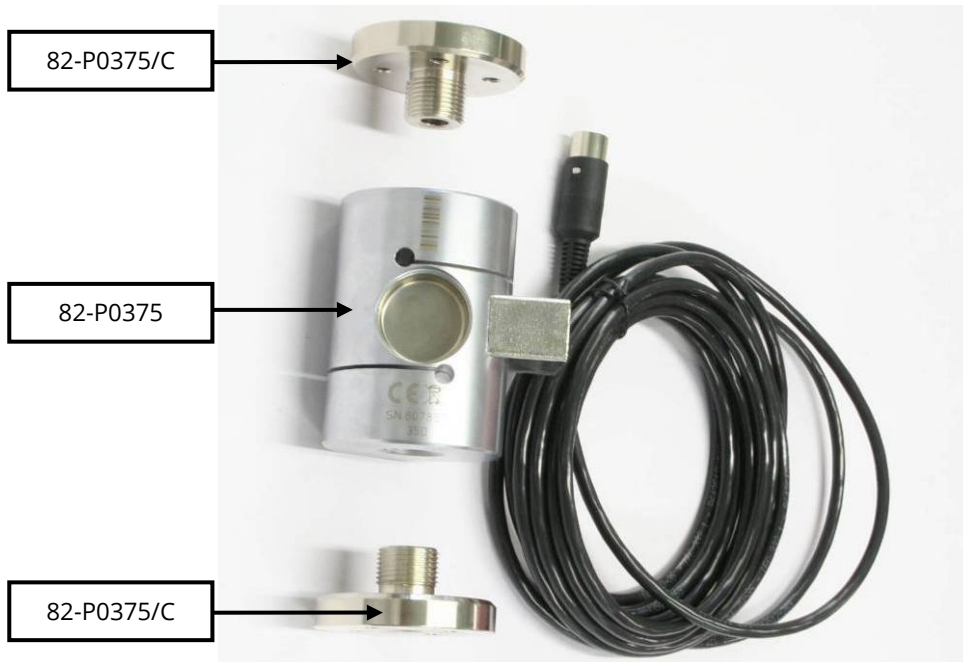


Fig. 4-14

2. Install the loadcell previously prepared to the upper beam by means of the relevant fixing screws;

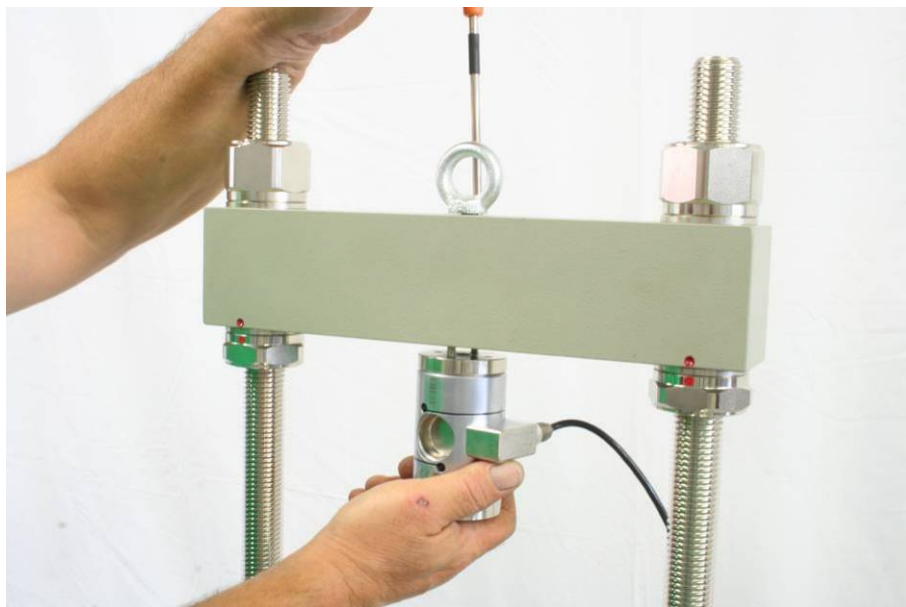


Fig. 4-15

3. Assemble the compression device code T0104/10 and relevant adapter code T0104/13;

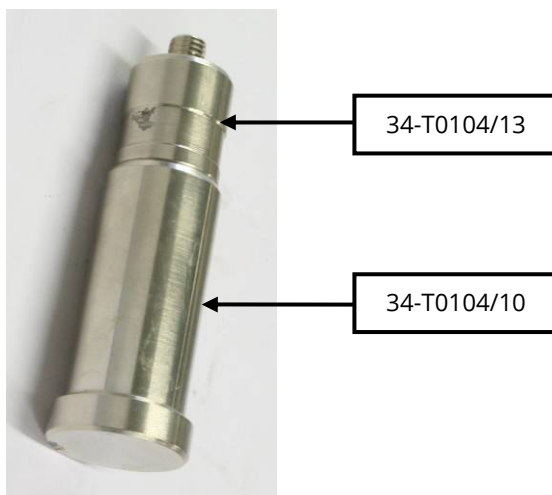


Fig. 4-16

4. Fit the compression device previously assembly into the adjustable transducer holder code T0104/81;

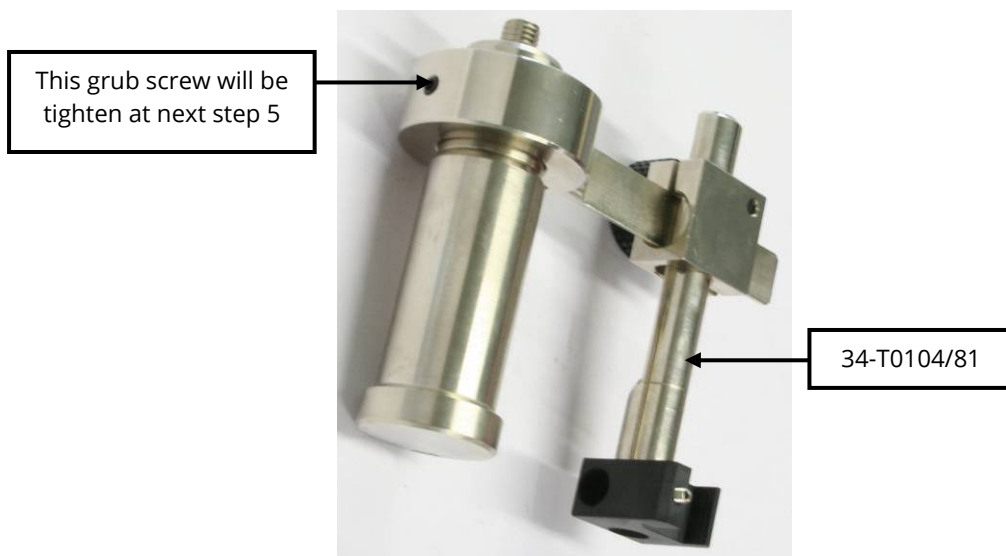


Fig. 4-17

5. Screw in the compression device plus transducer holder, install the displacement transducer P0322 (tighten the relevant fixing grub screw) and place the indirect tensile jig 76-B0078/B (or B0078/C) on the **SPEEDLOADER** lower platen centering it by means of the centering screw; then adjust the position of the displacement transducer in order its stem touches the upper bar of the stability mould and tighten the grub screw shown in previous Fig. 4-17;

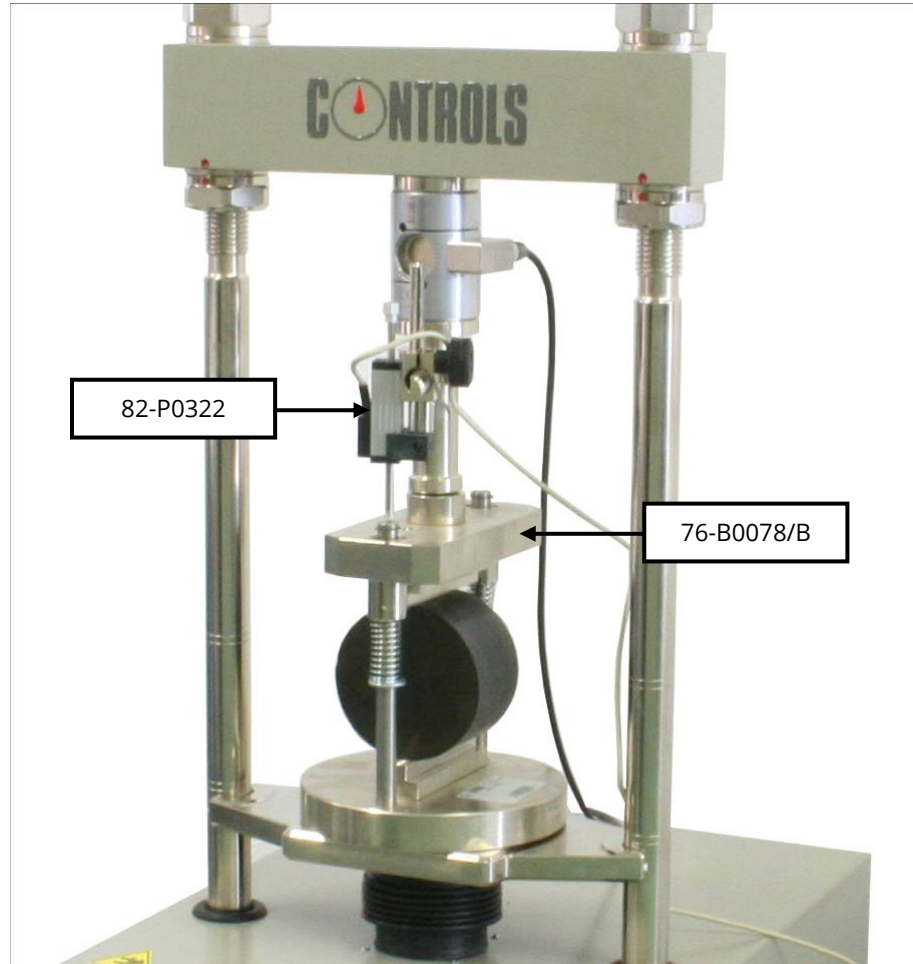


Fig. 4-18

6. Connect the transducer connectors to the socket on lateral panel as follows:
  - a. CH1: Load cell
  - b. CH2: Displacement transducer;

## 4.5 Turning ON and using the equipment

1. Make sure the **EMERGENCY BUTTON** is not pressed otherwise release it by turning clockwise;
2. Turn the equipment ON by pressing the mains switch located on the rear panel of the equipment, near the power cord socket;

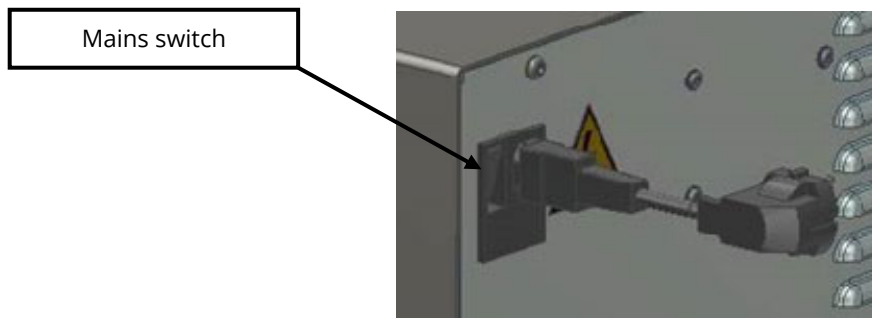


Fig. 4-19

## 4.6 Commands and controls of the control unit

This chapter describes the commands and controls of the equipment.

Use the following buttons to operate the unit:

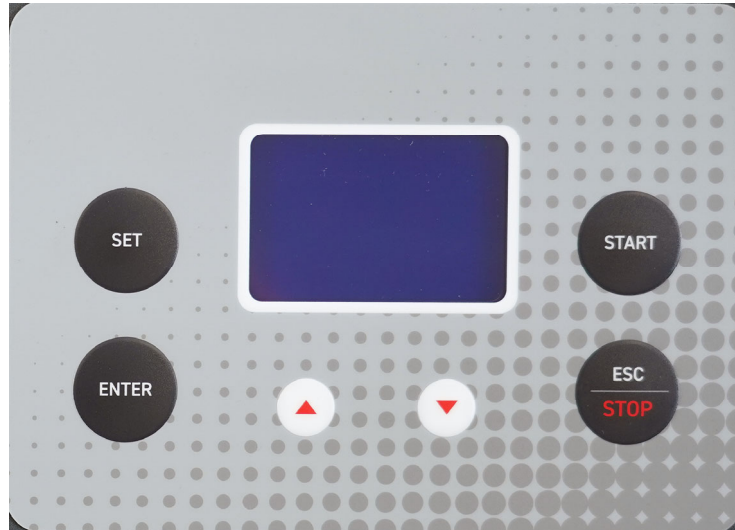
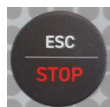


Fig. 4-20



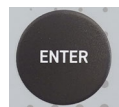
- During the operating phases act as **STOP** and **ESCAPE** on the different menus;



- Command to start motor and test;



- While setting the machine parameters, it moves the pointer;
- Within the **TEST EXECUTION** menu, it allows accessing to the test settings. It is used when you start the test and to zero set the reading. When the test is complete it allows opening a final pop-up;



- Command to confirm access on the different menus during the operating phases;

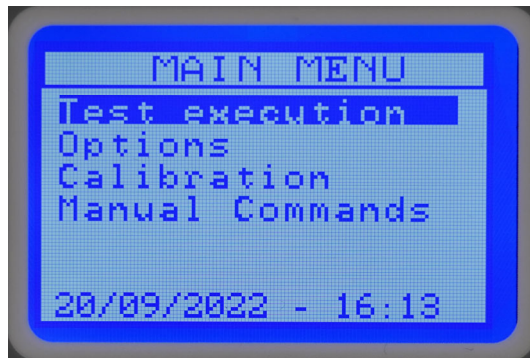


- While setting the machine, increases/decreases the selected figure;
- Within the **MANUAL COMMANDS**; increases/decreases the speed of the motor.

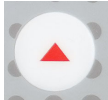


## 4.7 Operator's interface description

Turn ON the instrument by mains switch. The display shows a screen with CONTROLS logo then a screen with machine name and firmware version.

Afterwards the **MAIN MENU** is presented.

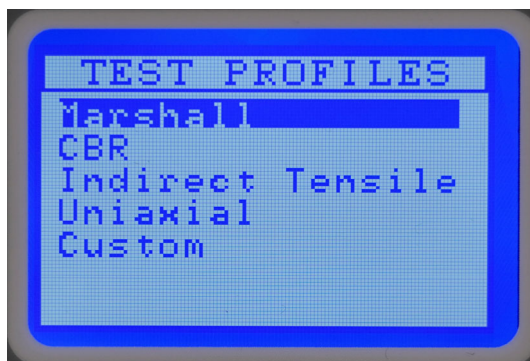



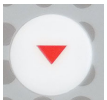
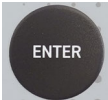
The **MAIN MENU** will be displayed at this point, with the relevant options described in the next chapters.

Press buttons   to select the desired option and  to confirm.

### 4.7.1 TEST EXECUTION menu

Once the **TEST EXECUTION** menu is entered the following screen is shown on the display.

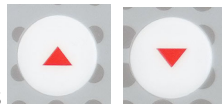
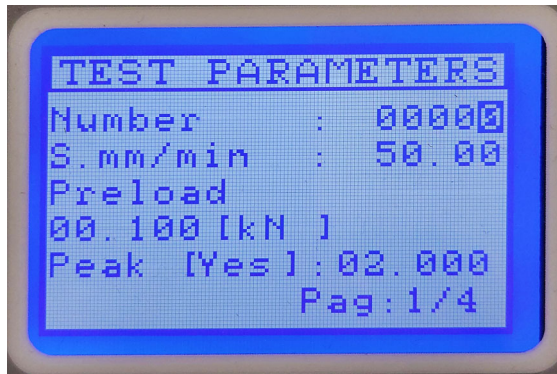


Press buttons   to select the desired option and  to confirm.



### 4.7.1.1 TEST PARAMETERS menu

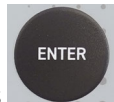
Before performing a test, here it is possible to set the followings data:



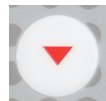
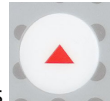
Press buttons



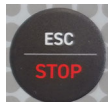
to move to the next previous digit to set. Once the first parameter has been



completely set, press



To set the unit press buttons then to confirm and proceed with the setting of all parameters in the screen.



Once set, press button to return to the **TEST EXECUTION** menu.

<b>TEST NUMBER.</b>	Enter the ID number related to the test. Each time a test is finished it is automatically increased by 1.
<b>SPEED (V.)</b>	Set here the test speed according to the type of test performed. It is possible to select also <b>MANUAL</b> option. By selecting this mode, the operator can change the speed in real time during the test using the UP and DOWN ARROW keys. In this way, it is possible to manually control the motor speed, from 0 to 100%. In this mode, the test speed control is totally manual and therefore the algorithm of feedback with PID control is not active. The PEAK control is active instead.
<b>PEAK</b>	<p>The peak sensitivity value, expressed in engineering units, is a value corresponding to a decrease in load upon which the instrument, during a test, considers the sample as failed and hence stops the data acquisition and the motor. The instrument records the maximum force displayed when the test is completed.</p> <p>The suggested values are 10 to 30 kN for compression tests on concrete, 1 to 3 kN for flexure tests on concrete or compression tests on cement, 0.1 to 0.3 kN for flexure test on cement. As a general rule the value must be proportional to the failure load and lower than the failure load otherwise the machine will not stop automatically upon sample failure.</p> <p>Alternatively, it is possible to set the sensitivity in %, compared to the maximum load value reached during the test. Otherwise, it is possible to disable the function, but in this case the machine will not stop at break point, forcing the user to press the <b>STOP</b> button;</p>
<b>TYPE OF TEST</b>	It is possible to choose between: Compression, Flexure, Indirect Tensile.
<b>TYPE OF SPECIMEN</b>	It is possible to choose between: Cube, Cylinder, Block, Pav. Block, Beam 3, Beam 4, Kerb, Customized.
<b>AREA</b>	Value in mm <sup>2</sup> or inch <sup>2</sup>
<b>DATA TO ENTER</b>	See next tables.

- Test type selectable among:
  - **COMPRESSION**
  - **FLEXURE**
  - **INDIRECT TENSILE**
  
- Type of sample selectable among:
  - For **COMPRESSION** test:
    - **CUBE**
    - **CYLINDER**
    - **BLOCK**
    - **CUSTOMIZED;**
  - For **FLEXURE** test:
    - **BEAM 3 (3 POINTS)**
    - **BEAM 4 (4 POINTS)**
    - **KERB**
    - **CUSTOMIZED;**
  - For **INDIRECT TENSILE** tests:
    - **CUBE**
    - **CYLINDER**
    - **PAV BLOCK**
    - **CUSTOMIZED**
  
- **SAMPLE DIMENSIONS (A, B):** size of the sample
  
- **AREA:** is calculated automatically and cannot be modified unless **CUSTOMIZED** and **KERB (FLEXURE TEST)** types of sample is selected;
  
- **TEST SPEED (V.):** this is the load gradient to be applied during the test. The units can be selected between MPa/s and N/s (or kg/cm<sup>2</sup>\*s and kg/s, psi/s and lbf/s); See table in **SETTINGS menu** (chapter 4.7.2.2).

It is possible to select also **MANUAL** option. By selecting this mode, the operator can change the speed in real time during the test using the UP and DOWN ARROW keys. In this way, it is possible to manually control the motor speed, from 0 to 100%. In this mode, the test speed control is totally manual and therefore the algorithm of feedback with PID control is not active. The PEAK control is active instead.
  
- **PEAK** (Peak sensitivity): The peak sensitivity value, expressed in engineering units, is a value corresponding to a decrease in load upon which the instrument, during a test, considers the sample as failed and hence stops the data acquisition. The instrument records the maximum force displayed when the test is completed. The suggested values are 10 to 30 kN for compression tests on concrete, 1 to 3 kN for flexure tests on concrete or compression tests on cement, 0.1 to 0.3 kN for flexure test on cement. As a general rule the value must be proportional to the failure load and lower than the failure load otherwise the machine will not stop automatically upon sample failure. Alternatively, it is possible to set the sensitivity in %, compared to the maximum load value reached during the test. Otherwise, it is possible to disable the function, but in this case the machine will not stop at break point, forcing the user to press the **STOP** button;

Formulas used for **COMPRESSION** test:

COMPRESSION ON CUBES AND CYLINDERS	
<b># Data to enter by the operator:</b>	
<b>cylinders</b>	<b>cubes, prisms</b>
d diameter	a side
h height	b side
V test speed	c side
<b># Data measured by the machine:</b>	
P load	
<b># Results:</b>	
$\sigma = P/A$	
Where:	
$A = \pi \cdot (d/2)^2$ cylinder	
$A = a \cdot b$ cube, prism	
COMPRESSION OTHER	
<b># Data to enter by the operator:</b>	
A area	
V test speed	
<b># Data measured by the machine:</b>	
P load	
<b># Results:</b>	
$\sigma = P/A$	
COMPRESSION BLOCKS EN 772-1	
<b># Data to enter by the operator:</b>	
a side	
b side	
V test speed	
k1 shape factor	
k2 conditioning factor	
<b># Data measured by the machine:</b>	
P load	
<b># Results:</b>	
$\sigma = P/A \cdot k1 \cdot k2$	
Where:	
$A = a \cdot b$	
COMPRESSION ELEMENT EN 1917	
<b># Data to enter by the operator:</b>	
L element length	
V test speed	
k correction factor	
<b># Data measured by the machine:</b>	
P load	
<b># Results:</b>	
$f = P \cdot k / L$	

Formulas used for **FLEXURE** tests:

**FLEXURE ON BEAMS EN 12390-5, ASTM C78, C293 and FLAGSTONE EN 1339**

**# Data to enter by the operator:**

- b width
- h height
- l length
- L distance between supports
- V test speed

**# Data measured by the machine:**

- P load

**# Results:**

$$\sigma = P/A$$

Where:

$$A = \frac{2 \cdot b \cdot h^2}{3 \cdot L} \text{ flexure on 3 points}$$

$$A = \frac{b \cdot h^2}{L} \text{ flexure on 4 points}$$

**FLEXURE OTHER**

**# Data to enter by the operator:**

- A area
- V test speed

**# Data measured by the machine:**

- P load

**# Results:**

$$\sigma = P/A$$

**FLEXURE ON KERBS EN 1340**

**# Data to enter by the operator:**

- V test speed

$$A = \frac{4 \cdot ITOT}{L \cdot YB}$$

Where:

$$YB = [L1 \cdot HTOT \cdot HTOT / 2 + H1 \cdot L2 \cdot H1 / 2 + H2 \cdot L2 / 2 \cdot (H1 + H2 / 3)] / [L1 \cdot HTOT + H1 \cdot L2 + L2 \cdot H2 / 2]$$

$$I_1 = (L1 \cdot HTOT^3) / 12 + HTOT \cdot L1 \cdot (HTOT / 2 - YB)^2$$

$$I_2 = (L2 \cdot H1^3) / 12 + H1 \cdot L2 \cdot (H1 / 2 - YB)^2$$

$$I_3 = (L2 \cdot H2^3) / 36 + L2 \cdot H2 / 2 \cdot (H2 / 3 + H1 - YB)^2$$

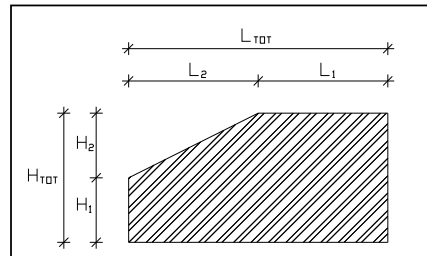
$$ITOT = I_1 + I_2 + I_3$$

**# Data measured by the machine:**

- P load

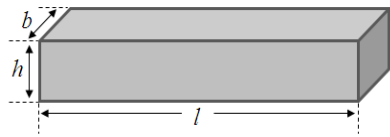
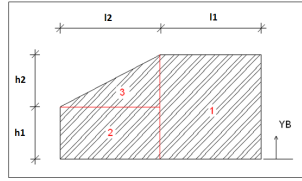
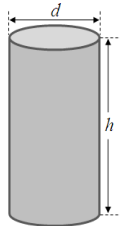
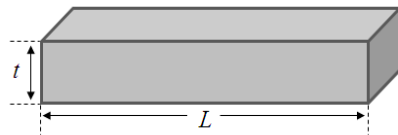
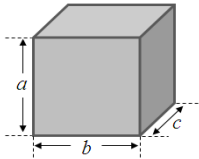
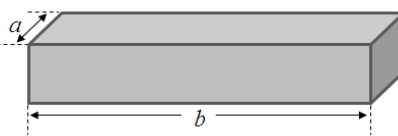
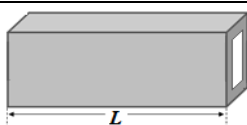
**# Results:**

$$\sigma = P/A$$



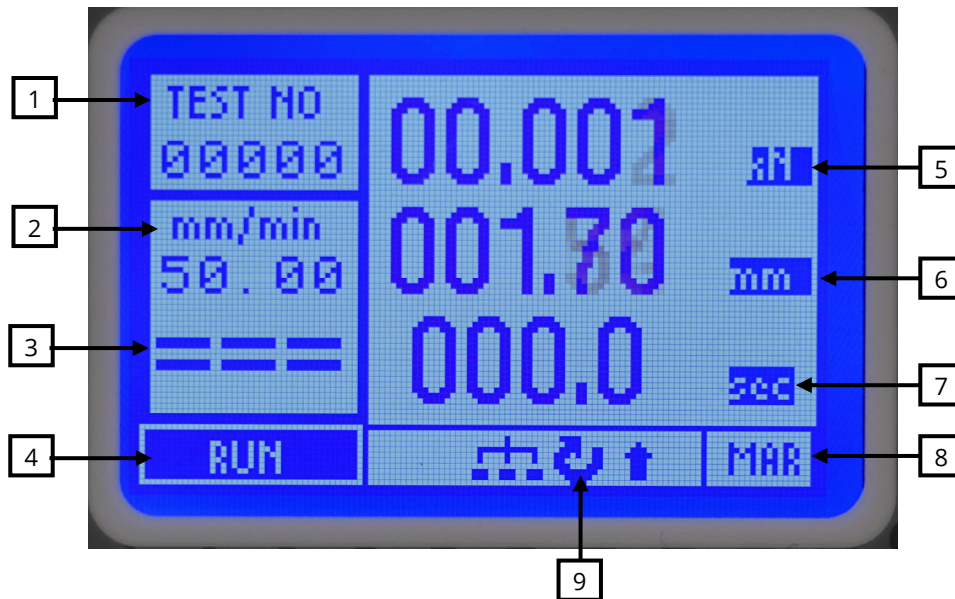
Formulas used for **INDIRECT TENSILE** tests:

INDIRECT TENSILE ON CYLINDERS, PAVERS, PRISMS, CUBES EN 12390-6, ASTM C496									
<p><b># Data to enter by the operator:</b></p> <table border="0"> <tr> <td><b>cilindri</b></td> <td><b>p.cubici, prismatici</b></td> </tr> <tr> <td>d diameter</td> <td>t thickness</td> </tr> <tr> <td>h heigth</td> <td>L length</td> </tr> <tr> <td>V test speed</td> <td></td> </tr> </table>		<b>cilindri</b>	<b>p.cubici, prismatici</b>	d diameter	t thickness	h heigth	L length	V test speed	
<b>cilindri</b>	<b>p.cubici, prismatici</b>								
d diameter	t thickness								
h heigth	L length								
V test speed									
<p><b># Data measured by the machine:</b></p> <p>P loas</p>									
<p><b># Results:</b></p> <p><math>\sigma = P/A</math></p> <p>Where:</p> $A = \frac{\pi * L * d}{2}$									
INDIRECT TENSILE OTHER									
<p><b># Data to enter by the operator:</b></p> <p>A area</p> <p>V test speed</p>									
<p><b># Data measured by the machine:</b></p> <p>P load</p>									
<p><b># Results:</b></p> <p><math>\sigma = P/A</math></p>									
INDIRECT TENSILE ON PAVING BLOCKS EN 1338									
<p><b># Data to enter by the operator:</b></p> <p>t thickness</p> <p>L length</p> <p>V test speed</p> <p>k correction factor for paving block (see EN 1338)</p>									
<p><b># Data measured by the machine:</b></p> <p>P load</p>									
<p><b># Results:</b></p> <p><math>\sigma = P/A</math></p> <p>Where:</p> $A = \frac{\pi * L * d}{2 * k}$									

Test type	Dimensions	Diagram	Area (A)
Flexural tests on beams	b, h, l		$A = \frac{2 \cdot b \cdot h^2}{3 \cdot L} \quad \text{3 points}$
Cement tests			$A = \frac{b \cdot h^2}{L} \quad \text{4 points}$ <p>where: L = distance between rollers</p>
Flexural tests on kerbs	h1, h2, l1, l2		$A = \frac{4 \cdot ITOT}{L \cdot YB}$ <p>where: ITOT and YB are calculated by the software. L = distance between rollers</p>
Indirect Tensile tests on concrete	d, h		$A = \frac{\pi \cdot h \cdot d}{2}$
Compression tests on concrete			$A = \pi \cdot (d/2)^2$
Indirect tensile tests on block pavers	t, L		$A = \frac{\pi \cdot L \cdot t}{2 \cdot k1}$ <p>where: k1 = form factor</p>
Compression tests on concrete	a, b, c		$A = a \cdot b$
Compression tests on blocks	a, b		$A = a \cdot b$ $\sigma = \frac{P}{A} \cdot k1 \cdot k2$ <p>where: σ = strain P = load k1 = form factor k2 = conditioning factor</p>
Compression tests on elements	L		N/A


**4.7.1.2 START TEST menu**

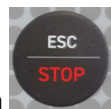
This is the main testing screen where all the test data are displayed:

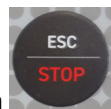


Ref	Description
1	ID number test
2	Test speed
3	Symbols for speed trend indicator
4	Test status
5	Current load
6	Displacement
7	Test time
8	Type of test
9	Connection activated between the control unit and the inverter, Motor rotation and crosshead direction



If you want to zero set all the values, press  button.



Press button  to return to the **TEST EXECUTION** menu.

Please refer to chapter to perform a test.



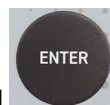
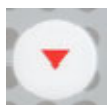
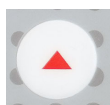
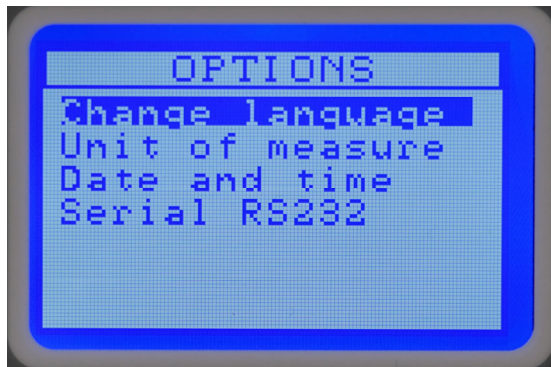
During the test the display will be updated in real time to show the applied load and displacement. It also shows a speed trend indicator with graphical symbols of the variation of actual loading rate with respect to the theoretical load rate input as a test parameter.


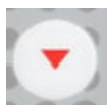
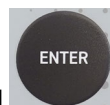
The symbols have the following meanings:

- === Actual load rate corresponds with theoretical displacement rate  $\pm 1\%$
- = Actual load rate = theoretical displacement rate  $\pm 1...10\%$
- Actual load rate = theoretical displacement rate - 10%
- Actual load rate = theoretical displacement rate - 10...25%
- Actual load rate = theoretical displacement rate by more than - 25%
- + Actual load rate = theoretical displacement rate + 10...15%
- ++ Actual load rate = theoretical displacement rate + 15...25%
- +++ Actual load rate = theoretical displacement rate by more than + 25%.

## 4.7.2 **OPTIONS** menu

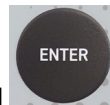
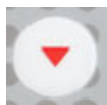
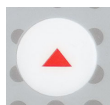
It allows you to select the following general settings:

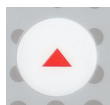
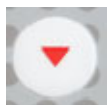
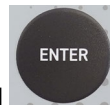


Press buttons   to select the desired option and  to confirm.

### 4.7.2.1 **CHANGE LANGUAGE** menu

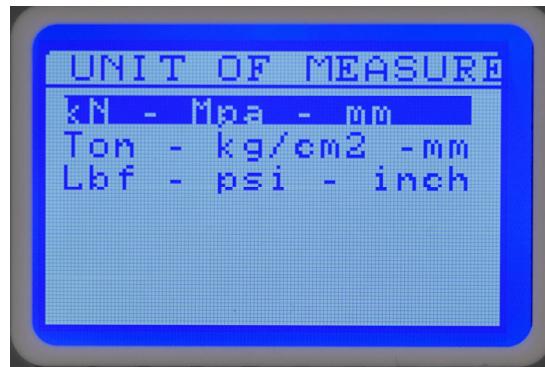
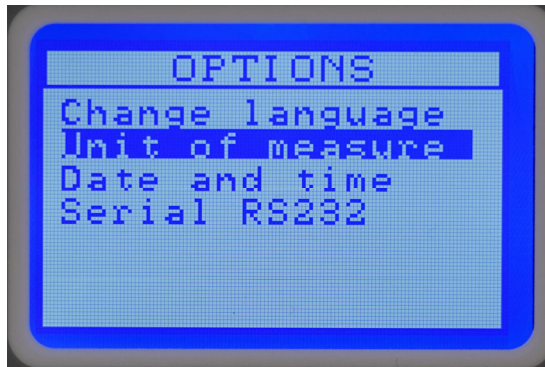
Here it is possible to select the desired language among the ones available:



Press buttons   to select the desired option and  to confirm. The language used on the display will change immediately and the system will return to the **OPTIONS** menu.

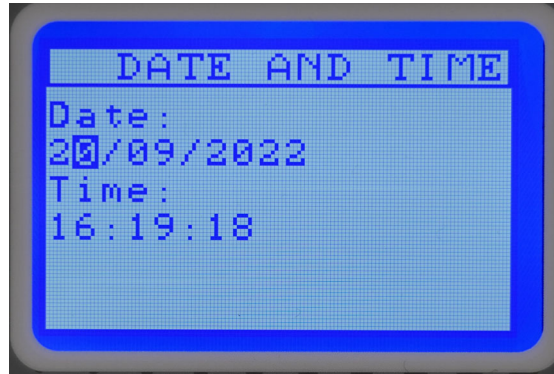
**4.7.2.2 SETTINGS menu**

The following items can be set.

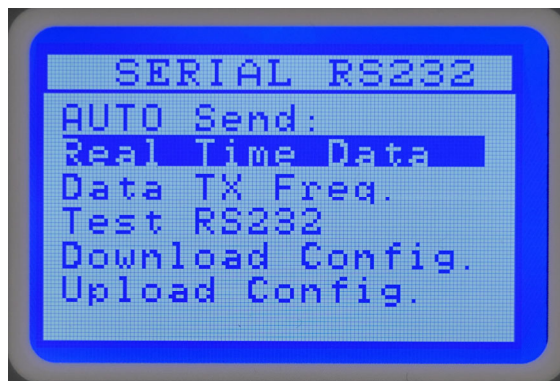


**MEASURE UNIT:** set the measure unit of load. In the following table are explained all the corresponding units for each load:

TYPE	LOAD	STRESS	LENGTH	AREA
KN+mm	KN	MPa	mm	mm <sup>2</sup>
lbf+inch	lbf	psi	inch	inch <sup>2</sup>
Ton+mm	Ton	Kg/cm <sup>2</sup>	mm	mm <sup>2</sup>



**DATA / TIME:** It is possible to set data and time.



**SERIAL RS232:** Options for the RS232 communication can be changed in this menu:

**AUTO-SEND:** Set to **End Test Report**

- At the end of the test, report is sent automatically.

Set to **Report + Data**

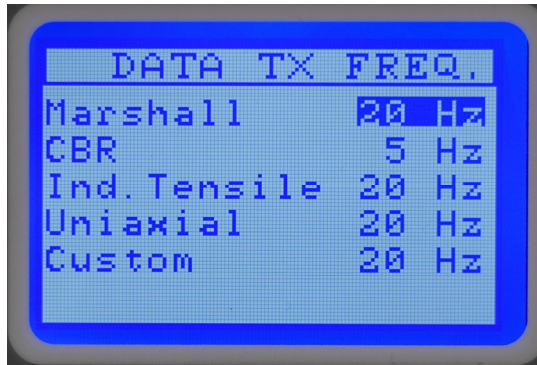
- At the end of the test, report is sent automatically.
- The Control unit sends data to the PC (e.g. Hyper Terminal) software during the test (Real time, Load, Displacement).

Set to **Real time Data**

- The Control unit sends data to the PC (e.g. Hyper Terminal) software during the test (Real time, Load, Displacement).

Set to **OFF**

- The Control unit does not send data to the PC software (e.g. Hyper Terminal) during the test.
- At the end of the test, no data is sent automatically.
- At the end of the test, if the user press SET button and after DOWN button, the control unit send to the PC software (e.g. Hyper Terminal) a data report of the test.



**DATA TX FREQ:** set sampling rate of data during the test for each test profile

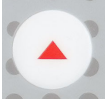
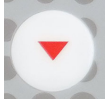
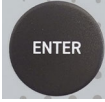
**TEST RS232:** it is possible to test RS232 communication by sending data to PC software (e.g. Hyper Terminal)





**DOWNLOAD CONFIG:** is possible to download all test profiles parameters, calibration tables and PID parameters to PC software (e.g. Hyper Terminal)



**UPLOAD CONFIG:** is possible to upload all test profiles parameters, calibration table and PID parameters from PC software (e.g. Hyper Terminal)

To move between the options use buttons   , then press  to confirm.

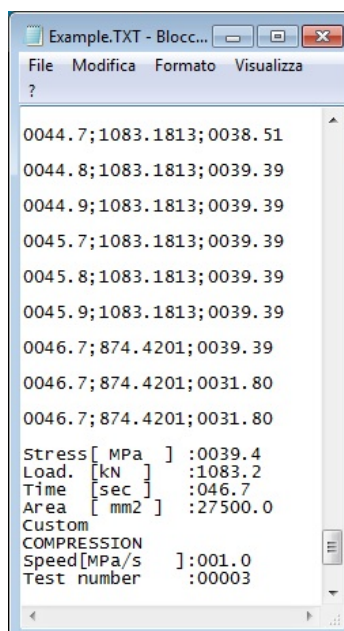
On **AUTO-SEND** mode options, which is the first one, use the button  to change mode, then press  to return to the **OPTIONS** menu.

### 4.7.3 RS232 serial port

The SPEEDLOADER System is fitted with a RS232 Serial Port dedicated to connection to a PC.

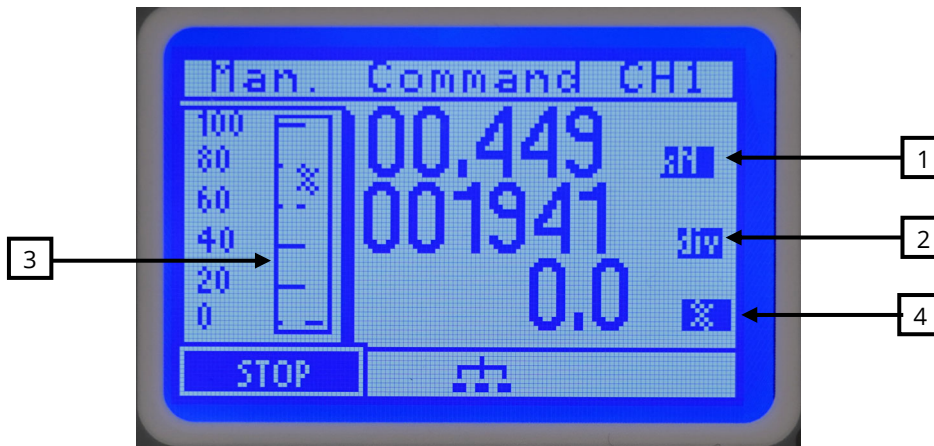
- The RS232 Serial port transmits with the following settings: 9600 baud, 8 data bit, 1 Stop bit, no parity. All fields transmitted are ended with CR and LF. The data transmission protocol is compatible with software Hyper Terminal (present in MS Windows®) can be used for data acquisition only.
- Use of Hyper Terminal
  - We recommend that firstly the operator reads the Microsoft instruction manual regarding this program. To access the Hyper Terminal click on "Start" and then "Programs", then "Accessories" and finally "Communications". Select the Hyper Terminal folder and activate Import. If this program is not installed consult your PC supplier in merit.
  - If prompted, do not select the installation of a modem. Give a name to the connection.
  - After this, upon the request of "Connect to..." select the com port used for the connection to the SPEEDLOADER. Select between COM1, COM2... COMX (where X is number of RS232 Serial ports available on P.C.) and confirm.
  - Input the settings as follows: 115200 bit per second, 8 data bit, no parity, 1 stop bit, no parity. Once these have been confirmed the input screen will disappear.
  - Now the blank "Hyper Terminal" screen will appear. The PC is now ready to receive data via the selected serial port. Any received data is displayed but is in no way filed.
  - To file the data it is necessary to activate the "Capture text" key. Select the transfer command and then catch. Now select the folder and name in which you wish to store the data in arrival; the file will take the extension TXT (text file) and will subsequently be assessable from any text editing file (Word, Notepad, Wordpad, Excel etc.).
  - Click on "Start" to begin registration of data. From this moment all the data received through the serial port are stored in the selected file in the sequence in which it arrives.
  - To end the registration click on "Transfer", then on "Capture text" and finally "End". All the received data is now stored in text form in the newly created file.

When the Hyper Terminal function is closed the operator is asked whether or not to save the session. If the session is saved it will not be necessary to repeat the settings described in previous points but simply to recall the previous name.

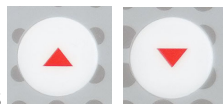


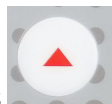
### 4.7.4 **MANUAL COMMANDS** menu

The **MANUAL COMMANDS** menu allows you to display the load values and the motor handling.



Press **ENTER** button during the manual calibration to split the speed motor in half.



Press buttons   to increase or decrease the speed.

The following items are displayed on the screen:

1. **LOAD** in kN (resolution depends on the full-scale of the machine);
2. **LOAD** in engineering unit (div.);
3. **BAR-GRAPH** (%) that shows the absolute value referred to the full-scale of the channel;
4. % Speed Motor Control (0 ... .100).



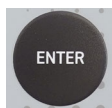
### 4.7.5 **CALIBRATION** menu

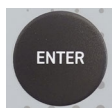
The following table allows to associate each value of load with its value in div. The calibration table is protected by a password and cannot be accessed unless specific authorization has been obtained by CONTROLS technical personnel. Insert the password "00101" to unlock this screen.



**WARNING:**

Access to the **CALIBRATION** menu is allowed to CONTROLS authorized technical personnel only. CONTROLS will not be responsible for any damage caused by improper setting of these parameters and/or unauthorized access to these menus. Warranty will be void if this menu is used by unauthorized personnel.



Press the  button to confirm the password: the following screen will appear.

Load	Div.
1 : 00.000	+001326
2 : 05.000	+008170
3 : 20.000	+028687
4 : 50.000	+069885
5 : 00.000	+000000
6 : 00.000	+000000

Figure displayed are a table with: **LOAD values** (kN) in left column and the relative **DIV. values** in right column. It is possible to modify these values.

## 4.8 Carry out a test

The present chapter provides a quick guide for the execution of a test. Full details on the various screens and options accessed are provided in chapter 4.7.

**WARNING:**

Be careful and use proper personal protection devices (e.g. gloves, protective shoes) while loading/unloading samples from the test frame, due to the sample weight and sharp surfaces.

---

**WARNING:**

Be careful and use proper personal protection devices (e.g. gloves, protective shoes) while handling distance pieces and platens of the frame due to their weight.

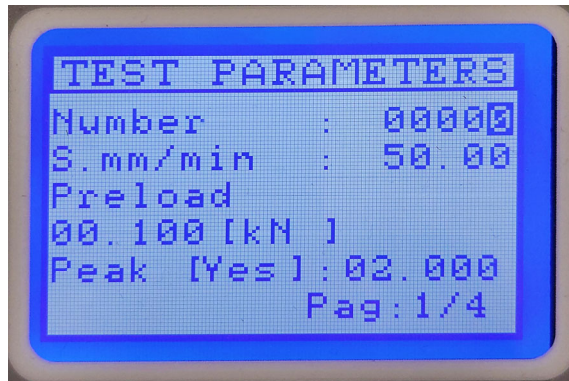
---

Before starting any test check that:


- The test frame is free from residual of previous sample and that the surfaces of the platen are clean;


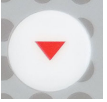

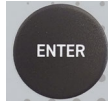
### 4.8.1 Setting the **TEST PARAMETERS**

Access the **TEST EXECUTION** menu then the **TEST PARAMETERS** menu.

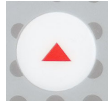


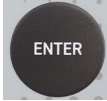


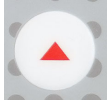


1. Set the **TEST No.** that will be associated to the test. Increase or decrease the number



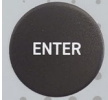
using the buttons   then press  to select the next digit to modify. Press  to confirm and move to the next line;


2. Select the the **TEST SPEED (S.)** by using the buttons   to set the value and  to select the next digit to modify. Press  to confirm and move to the line below.

3. Set the **PEAK** value. The peak sensitivity value, expressed in engineering units, is a value corresponding to a decrease in load upon which the instrument, during a test, considers the sample as failed and hence stops the data acquisition. The instrument records the maximum force displayed when the test in completed.

Increase or decrease the digit by using the buttons   then press  to select the next one to modify. Once done, press  to confirm and move to the line below.

4. With   buttons select the type of test that you want to perform (compression/flexure/ind. tensile). Once done, press  to confirm and move to the line below.

5. Select the type of specimen with   buttons. Once done, press  to confirm and move to the line below.

6. When all the parameters are set, press  to exit from this menu.

Access now the menu **START TEST**.

### 4.8.2 Testing a sample

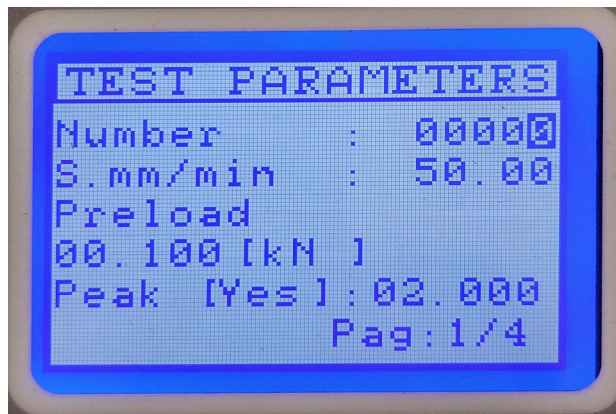
1. Switch ON the machine and wait 15 minutes warm up time;
2. From the main menu select the **TEST EXECUTION** option;



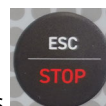
3. Select the test to be performed;



4. **TEST PARAMETERS** screen will show;

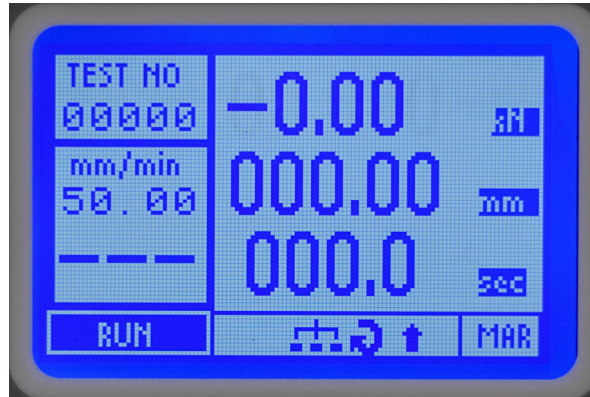


5. Set the test parameters;



6. When all the parameters are set, press  enter to exit from this menu.

7. The system enters the **TEST RUN** screen;



8. When ready, press **START** button to start the test;
9. The display constantly updates the values of load and displacement in real time and shows the set displacement rate in the lower left hand corner, whilst the actual applied load rate is also shown on the display.

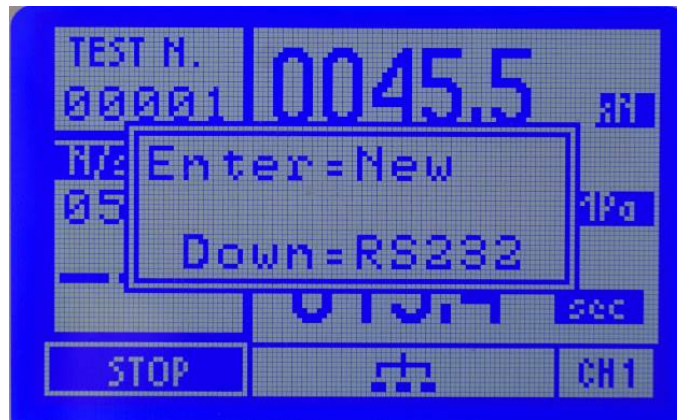
During the execution of the test, the display of deviation of actual load rate from the theoretical load rate shows a series of symbols as described below:

- === Actual load rate corresponds with theoretical load rate  $\pm 1\%$
- = Actual displacement rate = theoretical load rate  $\pm 1...10\%$
- Actual displacement rate = theoretical load rate - 10%
- Actual displacement rate = theoretical load rate - 10...25%
- Actual displacement rate = theoretical load rate by more than - 25%
- + Actual displacement rate = theoretical load rate + 10...15%
- ++ Actual displacement rate = theoretical load rate + 15...25%
- +++ Actual displacement rate = theoretical load rate by more than + 25%.

Upon sample failure the display shows the values of maximum load and resistance.

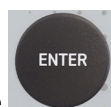
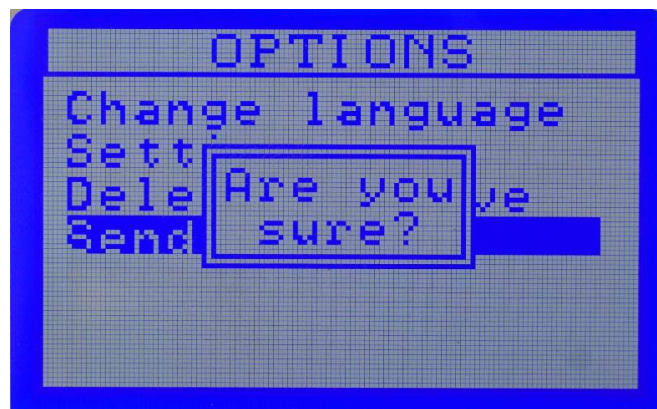
The motor will stop when the system reaches the point where the **PEAK** parameter intervenes.

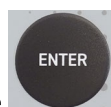
10. Use the up and down keys to allow the crosshead to return to its rest position;
11. At the end of the test if the operator presses **SET** button the following pop up appears. It is possible to press **ENTER** button to restart and create a new test (increasing **TEST N.** +1) or **DOWN** arrow to send the current test to the PC through RS232.



In case the **AUTO-SAVE** option is NOT activated, a third option "Set=Save" appears and it is used to save the test in the archive by pressing the SET button.

12. In every moment it is possible to select **SEND ARCHIVE** in **OPTIONS** menu to send all the data saved in the control unit to a PC via the RS232 serial port.



Confirmation is required, via the  button.

### 4.9 Stopping the cycle via the Emergency button

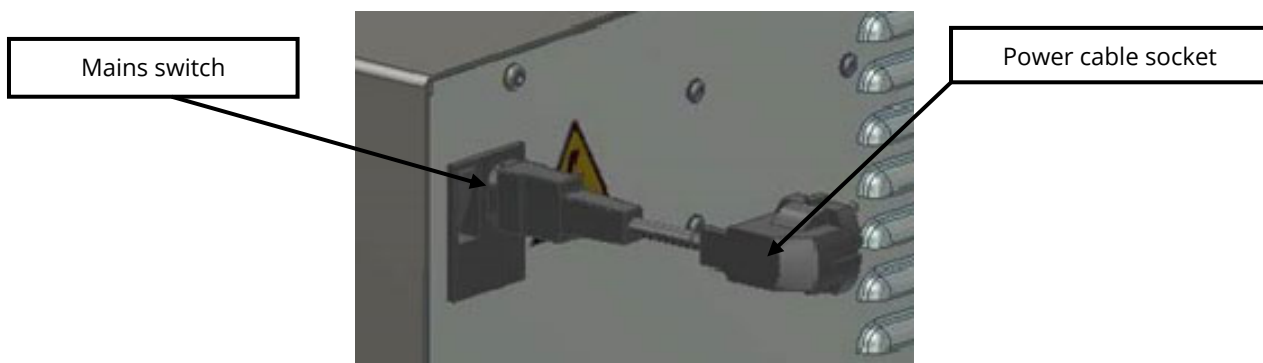
In case dangerous conditions are encountered during the execution of a test cycle, it is possible to stop the machine by pressing the **EMERGENCY BUTTON** located on the front panel of the equipment.



Releasing the emergency button (turn it clockwise) will bring the unit back to the start up condition (**MAIN MENU** shown on the display).

### 4.10 Switching off the unit

At the end of the working session switch the unit OFF via the mains switch located on the rear panel of the equipment.





## 5. MAINTENANCE

As with all electrical equipment, this unit must be used correctly and maintenance and inspections must be performed at regular intervals. Such precautions will guarantee the safe and efficient functioning of the equipment.

Periodic maintenance consists of inspections made directly by the test operator and/or by the authorized service personnel.

Maintenance to the equipment is responsibility of the purchaser and must be performed as stated by this chapter.

Failing to perform the recommended maintenance actions or maintenance performed by unauthorized people can void the warranty.

**WARNING:**

Failing to perform the recommended maintenance actions or maintenance performed by unauthorized people can void the warranty.

CONTROLS will not be responsible for maintenance and service actions performed by unauthorized people.

---

**WARNING:**

Before opening/removing the covers, disconnect the mains supply to the device and wait at least 5 minutes.

---

**WARNING:**

All safety devices must be functional at all times. Damaged protective covers or devices must be replaced immediately. When safety components are replaced, the protective devices are to be properly attached and tested. Any manipulation of the safety devices endangers the operating personnel.

---

**WARNING:**

Covers/doors can only be removed/opened by maintenance people, by using relevant tools/keys. These tools and keys are for the use of maintenance people only. Never leave them attached to the unit as this may endanger operator safety.

After performing maintenance/repair, make sure that all covers/doors are properly closed and locked.

---

**WARNING:**

For continued fire protection, replace fuses with same type and rating. Also, in case of failure, components may only be replaced by using original spare parts. It is in the responsibility of the purchaser to ensure that fire prevention policies are properly implemented according to the CE provisions.

---

**WARNING:**

Avoid pouring water, even accidentally, or other liquids into the device, as this could cause short circuits. Before cleaning the device, disconnect it from the mains line.

---

## 5.1 Operator’s preventive maintenance

The inspections made directly by the operator are the following:

Action	Who	When
Check to ensure that there is no external damage to the equipment, which could jeopardise the safety of use	Operator	Before every working session
Clean the equipment from the sample debris	Operator	At the end of each working session
General inspection	Operator	Weekly
Check status of the emergency button	Operator	Weekly
Check status and functioning of the operator's command	Operator	Weekly
Check that all labels and rating plates are intact and properly attached	Operator	Monthly

## 5.2 Authorized service engineer maintenance actions

In addition to the maintenance actions performed by the operator, the performance of the equipment is checked and, if necessary corrected, during the maintenance activities performed by the authorized service engineer, in accordance with the indications provided in the present manual.

The following table lists the maintenance actions and the relevant timing:

Action	Who	When
Greasing of the ram	Authorized service engineer	Every 300 cycles or six months
Status of the internal and external cables wear and tear and fastenings	Authorized service engineer	Yearly
Grounding of all the accessible conductive parts	Authorized service engineer	Yearly



**WARNING:**

Refer to qualified service organization authorized by CONTROLS to carry out the maintenance actions described in the chapter “Authorized service engineer maintenance action”. CONTROLS has not to be held responsible for damages to the equipment and/or injuries to personnel in case the above is not strictly followed.

### 5.2.1 Greasing of the ram screw

1. Ensure that the machine is switched OFF and that the mains cable has been disconnected;
2. Remove any test accessories from the ram crossbeam (breaking head, CBR moulds etc.);
3. Unscrew the fixing bolt of the ram cross-beam;



*Fig. 5-1*

4. Remove the cross-beam;



*Fig. 5-2*

5. Remove the bellow from its lower fixing ring;



*Fig. 5-3*

6. By rotating the plate anti-clockwise, unscrew the thread until it is almost completely extracted;
7. With a small brush spread the grease on the thread starting at the bottom and working upwards (use grease type "KLUBER - Kluberpaste 46MR 401);



*Fig. 5-4*

8. Rotate the plate clockwise so as to insert it in the mother thread for a few centimetres and direct the blocking pin of the plate;
9. Replace the bellow on the lower holding ring;
10. Remount the ram cross-beam on the plate. Pay attention that the blocking pin of the plate inserts itself into the respective hole in the cross-beam;
11. Tighten the fixing bolt of the cross-beam;
12. Connect the machine to the mains and switch ON the machine so as to return the ram to its lowest position and that the grease is distributed over the whole thread.

## 5.2.2 Manual movement of the crosshead

To verify the load calibration, the accessory supplied with the machine should be used; this, through a handwheel, allows the ram to be moved manually or maintain a load constant with sufficient precision.

This operation is necessary to calibrate the force measurement.

1. Remove the black cap found on the right hand side of the base cabinet and insert the handwheel until it is fully inserted;
- 2.

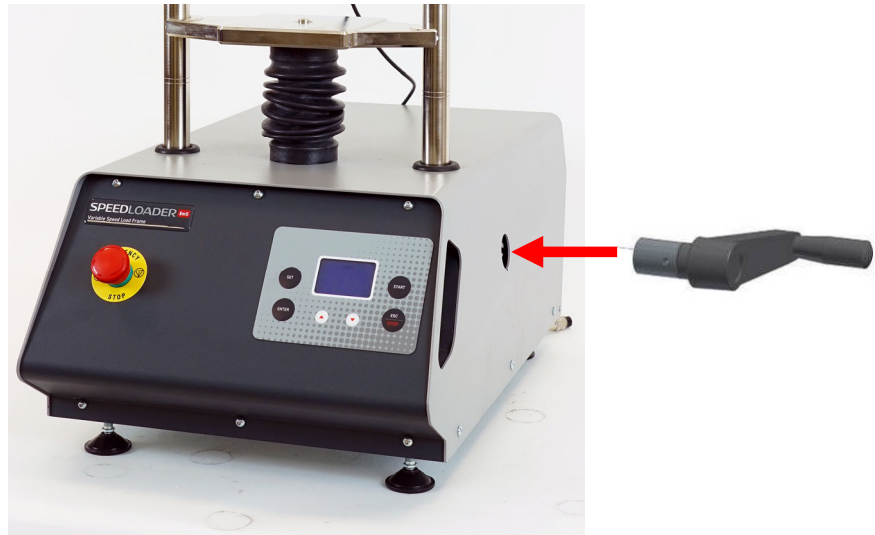


Fig. 5-5



**WARNING:**

When the handwheel is inserted, a microswitch is automatically activated which prevents the motor running.

3. Turn the handwheel clockwise to lift up the cross-beam so as to bring the reference load cell into contact with the load cell fitted to the machine. The display will show the load in real time. From this moment on it is possible to obtain the required loads to compare the value real from the machine with those of the reference load cell by manually turning the handwheel;
4. To return to zero load turn the handwheel in the opposite direction. In this way as many verification cycles as necessary can be made;
5. When the calibration has been finished, turn the handwheel to bring the load to zero, then extract the handwheel and replace the black cap.

### 5.2.3 Calibration verification



**WARNING:**

The **CALIBRATION** menu is reserved to the authorised service personnel and should only be entered when the calibration needs to be changed. CONTROLS will not be responsible for any damage caused by improper setting of these parameters. Warranty will be void if this menu is used by unauthorised personnel.

To verify the calibration, the unit should be left switched on for at least 15 minutes to allow the thermal equilibrium of the electronic components. Then proceed as follows:

1. Open the **MANUAL COMMANDS** menu;
2. Correctly place the reference instrument (e.g. load cell) between the compression platens of the test frame;
3. To move the crosshead, use the handwheel provided with the machine and fit it in the hole on the left side of the machine case (remove the plastic black cap to access it);

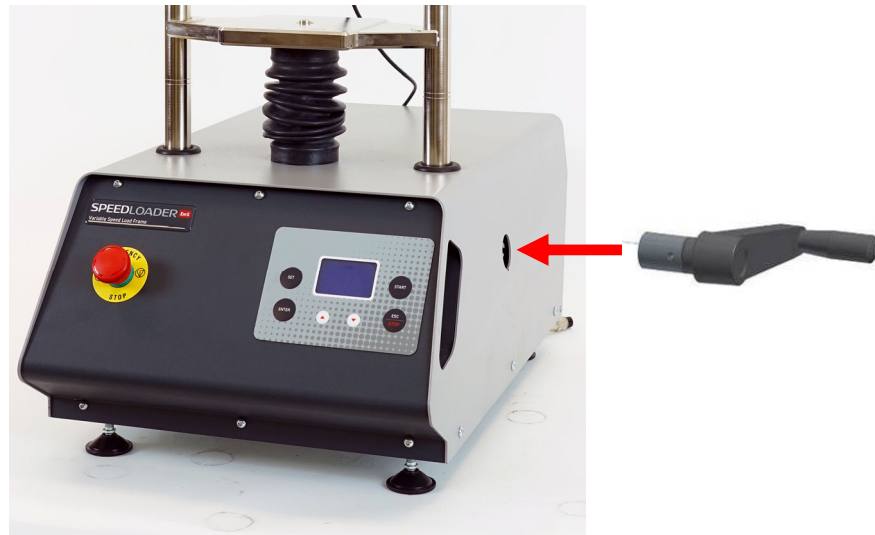


Fig. 5-6

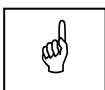


**WARNING:**

When the handwheel is inserted, a microswitch is automatically activated which prevents the motor running.

Turn the tool clockwise to lift up the cross-beam and anticlockwise to lower it as necessary;

4. Before the reference cell is subjected to any load, zero the reading by pressing the ZERO button;



**NOTE:**

Do not zero the load reading once the load cell has been subjected to loading.

5. Once the load cell is under load, a moderate speed should be used. By taking the load rate close to zero it is possible to stop the load increase and maintain an almost constant pressure. The value of the applied load is updated in real time on the display;

6. Make at least 3 load-unload cycles, arriving at the full scale of the load sensor connected to the **SPEEDLOADER**, so as to stabilize the signals. After this, proceed with the check and compare the values shown by the **SPEEDLOADER** with those of the reference load cell;
7. If the percentage deviation is higher than permitted tolerances, the unit should be re-calibrated by altering the calibration coefficient so as to obtain the best possible linearity. To do this the **CALIBRATION MENU** should be accessed. After this the verification process shall be repeated so as to check the new calibration.

## 5.2.4 Calibration



### WARNING:

The **CALIBRATION** menu is reserved to the authorised service personnel and should only be entered when the calibration needs to be changed. CONTROLS will not be responsible for any damage caused by improper setting of these parameters. Warranty will be void if this menu is used by unauthorised personnel.

Access to this function should be made after that the calibration verification has been carried out.

This menu allows the calibration to be adjusted so as to optimise the linearity of the system. The operator can divide the full scale of the testing unit in up to a maximum six user definable steps. The software then automatically foresees the interpolation of these steps so as to calculate the calibration curve of the unit over its complete range.



### WARNING:

The **CALIBRATION** menu should only be entered when the calibration needs to be changed. Do not enter into this menu for any other reason. Before entering the **CALIBRATION** menu it is vital to carefully read and understand the procedure described hereunder. If any doubts remain, contact CONTROLS service department for further clarification. CONTROLS will accept no responsibility for any inconvenience caused by wrongful calibration.

1. Access the **MANUAL COMMANDS** menu and select the channel to calibrate (the latter is only required if also the second channel has been activated into the system).
2. The calibration of the system is performed by loading the system to a number of known load steps (maximum 6 load steps, including the first step that is always 0) that are achieved by making reference to an external reference system (e.g. loadcell plus its match readout unit) and taking note of the bits reading on the display of the **SPEEDLOADER** at these load steps (see section 0 for all details). The applied load steps should remain within the calibrated measurement range of the test frame, normally from 10% or 20% up to 100% of the full scale.  
The recorded readings, that is the values displayed by the **SPEEDLOADER** at known reference loads, will be used for the calculation of the calibration coefficients.
3. Correctly place the reference instrument (e.g. load cell) between the compression platens of the test frame.
4. To move the crosshead, use a 6 mm T-shaped hexagonal wrench to engage the hexagonal head of the gearbox shaft that can be accessed through the hole on the left side of the machine case (remove the plastic black cap to access it);

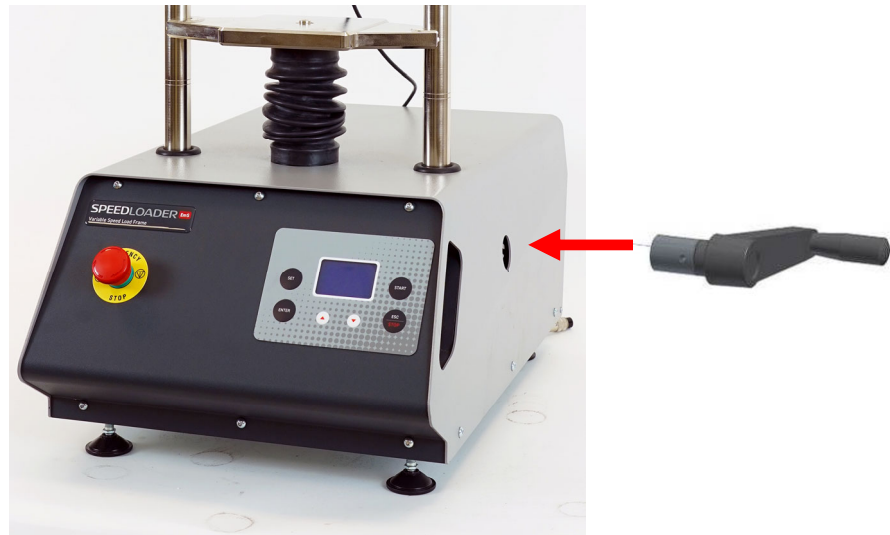


Fig. 5-7



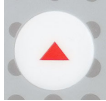



**WARNING:**

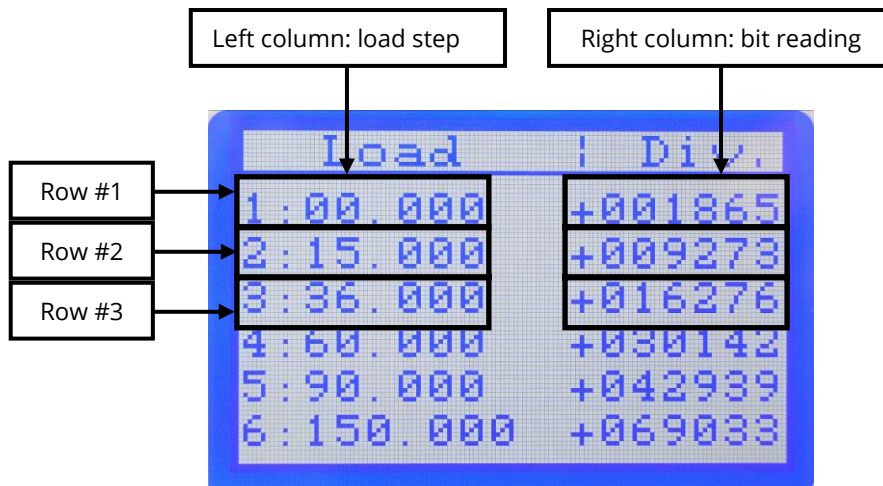
When the handwheel is inserted, a microswitch is automatically activated which prevents the motor running.

Turn the tool clockwise to lift up the cross-beam and anticlockwise to lower it as necessary;

5. Take note of the bit reading for the given load step.
6. Proceed with the other load steps and take note of the relevant bit readings.
7. After assessing the bit readings at the different load steps (previous step 2), access the **CALIBRATION** menu from the **MAIN MENU**, the system will require entering a password.

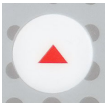
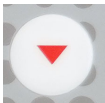

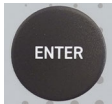


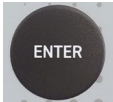
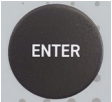
8. Enter the password **"00101"** by using the   buttons to increase/decrease the digits to change and the  button to select the next one. Confirm it by pressing the  button. The **EDIT CALIBRATION** menu for the selected channel will be displayed.



This screen is composed by a table with two columns and six rows (the second group of three rows is on a second display page). The figures on the left column are the load steps that have been previously achieved by reading on the external reference system while the figures on the right column are the corresponding bit readings previously noted.


9. Enter the first load step (typically 0) on the left column of the first row on the display

(use the   buttons to increase/decrease the digits to change and the  button to select the next one), then press the  button to access the figure on the right column on the display and enter the corresponding bit reading previously recorded.



10. Press again the  button to access the second row, left column, enter the load step, press the  button to access the right column row and enter the corresponding bit reading previously noted for this step.

- Proceed in this way until entering all the load steps and bit readings previously recorded.



At the end press the  button to complete the calibration procedure, the system will ask for a confirmation.



- Press the  button to accept the new calibration or the  button to exit without altering the existing calibration. The system will return to the **MAIN MENU**.
- Repeat the calibration verification to make sure the system is now behaving linearly within the required load range and tolerance.

## 6. DIAGNOSTICS

The present chapter provides information on the troubleshooting of the most common problems. It also includes some special programs that allows activating specific functions reserved to the CONTROLS authorized technical personnel.



**WARNING:**

Before opening/removing the covers, disconnect the mains supply to the device and wait at least 5 minute.



**WARNING:**

Covers/doors can only be removed/opened by maintenance people, by using relevant tools/keys. These tools and keys are for the use of maintenance people only. Never leave them attached to the unit as this may endanger operator safety. After performing maintenance/repair, make sure that all covers/doors are properly closed and locked.



**WARNING:**

All safety devices must be functional at all times. Damaged protective covers or devices must be replaced immediately. When safety components are replaced, the protective devices are to be properly attached and tested. Any manipulation of the safety devices endangers the operating personnel.



**WARNING:**

Refer to qualified service organization authorized by CONTROLS to carry out the service maintenance actions described in the chapter "Diagnostic and Troubleshooting". CONTROLS has not to be held responsible for damages to the equipment and/or injuries to personnel in case the above is not strictly followed.

## 6.1 System (Hidden) menus

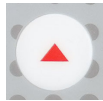
This menu allows setting a number of functioning parameters of the system and performing procedures reserved to CONTROLS authorized service organisation.



**WARNING:**

Access to the **HIDDEN menu** is allowed to CONTROLS authorized technical personnel only. CONTROLS will not be responsible for any damage caused by improper setting of these parameters and/or unauthorized access to these menus. Warranty will be void if this menu is used by unauthorized personnel.

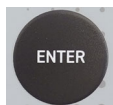
### 6.1.1 Hidden menu (Factory Menu)



1. Press button for 3 seconds when you switch on the machine.
2. Insert the password “00202”. The following screen appears:



3. Press buttons to move from one field to the next.



4. Press button to confirm.

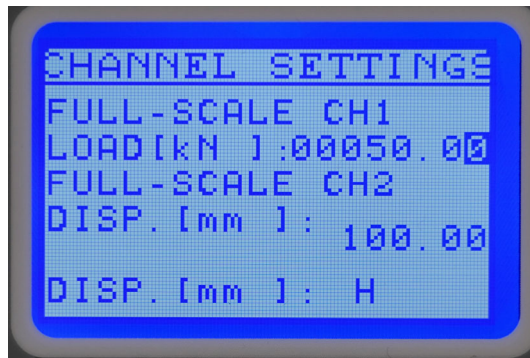


**ENABLE CHANNELS:** Set to **Enabled**

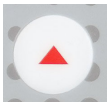
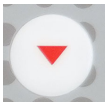

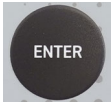
- the two analog channels are activated for LOAD and DISPLACEMENT measurement. The cross channel is enabled. The machine is therefore able to carry out the tests in fully automatic mode

Set to **Disabled**

- the two analog channels for measuring LOAD and DISPLACEMENT are disabled. However, the crosshead channel is enabled. The machine is therefore able to carry out the tests in semi-automatic mode

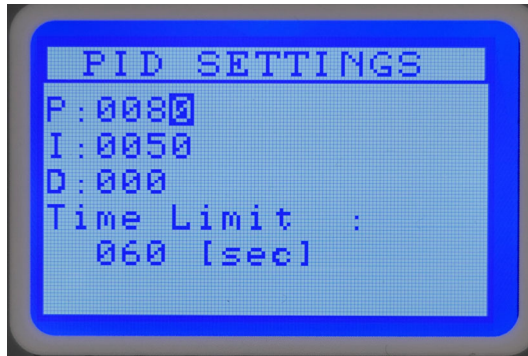


**CHANNEL SETTINGS:**

- Use the buttons   for modify scale value, then press  to select the next digit to modify. Press  to confirm and move to the next line;
- FULL-SCALE CH (kN, lbf or ton): max value in kN of CH1 or CH2 load sensor;
- DISP. [mm]:
  - set **H** to use standard Controls potentiometric displacement trasducer
  - set **L** to use other kinds of displacement trasducer not supplied by Controls (check with Controls Service)

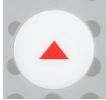
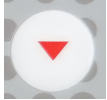


4. Press  to exit saving the settings.

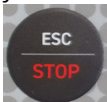
**SERIAL NUMBER: MENU ONLY FOR INTERNAL USE, DO NOT ATTEMPT TO ENTER**



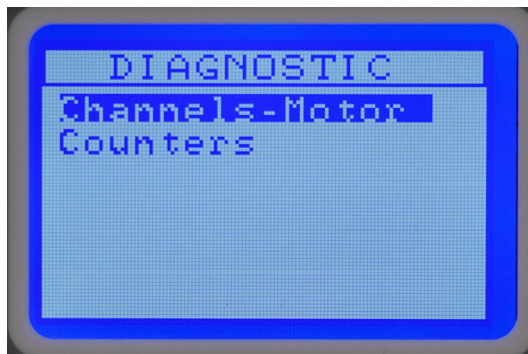
**PID SETTINGS:**

PID settings menu displays the closed loop control P, I and D coefficient values.

Use the buttons   for modify, then press  to select the next digit to modify. Press  to confirm and move to the next line;

Press  to exit saving the settings.

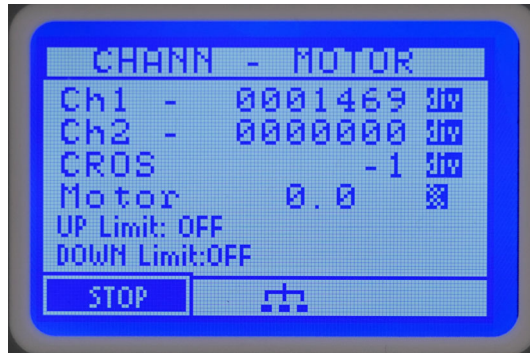
Time Limit the maximum time that can elapse between the start of an automatic test and the recognition of the preload. The default value is 60 seconds.



**DIAGNOSTIC:**

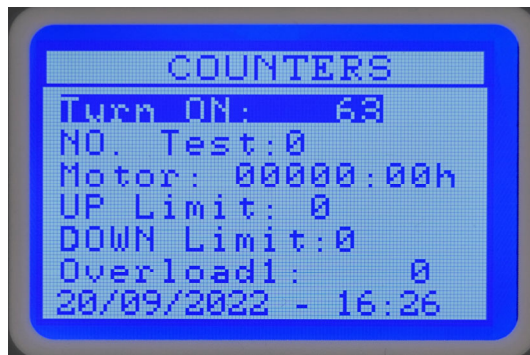
Diagnostic menu allows access to the following submenu:

- Channels / Motor
- Counters

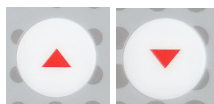


**CHANN - MOTOR:**

- **CH1:** value in div. unit of channel 1;
- **CH2:** value in div. unit of channel 2;
- **CROS:** value in div. unit of crosshead channel;
- **MOTOR:** value in % of motor speed;
- **UP LIMIT:** limit switch up status;
- **DOWN LIMIT:** limit switch down status.



**COUNTERS:**



Use the buttons to move between items.



**RESET MEMORY:**

This menu gives the possibility to reset certain areas of the EEPROM, or to reset the factory data.

