CONTROLS

50-C8422; C8423; C8424
C8422/C; C8423/C; C8424/C

Multifunctional Control Console

INSTRUCTION MANUAL

Warning

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.
CONTROLS *reserves all rights of this manual, no part or whole can be copied without the written permission of* ***CONTROLS*** *.*

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 damages 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.

Spare parts please refere to the following drawings of this instruction manual.
How to order spare parts:
Find the proper part on the drawing in the following pages, take note of the code on the part list and inform ***CONTROLS*** *After Sales Services.*
Otherwise mark the spare part on the drawing and fax the page to ***CONTROLS*** *After Sales Services.*

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

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1. INTRODUCTION

The MCC servo-hydraulic command system for construction material test frames features high performance, easy use, flexibility, accuracy and quick set up and is composed of the parts described below.

General Characteristics

Power rating: 750 W
Voltage: C8422: 230 V, 50Hz, 1 ph
C8423: 220 V, 60Hz, 1 ph
C8424: 110 V, 60Hz, 1 ph
C8422/C: 230 V, 50Hz, 1 ph (Supplied without computer)
C8423/C: 220 V, 60Hz, 1 ph (Supplied without computer)
C8424/C: 110 V, 60Hz, 1 ph (Supplied without computer)

Note: The versionS C8422/C - C8423/C - C8424/C are supplied without computer and printer and are equipped with 2 hydraulic ports only (2 more outputs can be ordered and need to be factory installed). For version C8422/C, Make reference to chapter 15 of the present manual to install and setup the software.

Dimensions: 470x410x1000 mm (l x d x h)
Weight: 120 kg

Hydraulic group
Designed by CONTROLS and particularly suited for the typical applications of MCC, that is tests on construction materials guaranteeing high performance and constant oil temperature.

Main technical characteristic

- maximum working pressure: 700 bar
- maximum oildelivery: 3 l/min at low pressure phase and 1 l/min at high pressure phase
- 2 hydraulic ports for connection to various test frames (not for simultaneous operation, 4 when C7022/UP2 is supplied)
- servo-valve for oil delivery control
- forced ventilation oil cooling system
- 2 ON / OFF valves with electronic control, 4 when C7022/UP2 is supplied

Hardware e on-board software (firmware)

2. MAIN TECHNICAL CHARACTERISTICS

- Hardware using latest technology and SMD components
- Siemens 16 bit processor
- 128 KB RAM system memory
- 512 KB RAM memory for test files
- 512 KB ROM memory
- System clock/calendar
- Eight analogical channels for connection of various types of sensor, both single ended and dual ended, with resolution of up 132000 div. per channel.
- Selectable transducer voltage, for each channel, from 0,5 to 10 Vdc.
- Serial output RS232 with 115,200 baud rate.
- Analogical output for control of oil delivery with resolution of 32,000 div.
- Relay output to pilot pump motor and electro-valves.
- Digital inputs to manage alarm signals.
- Graphic display with 320 X 240 pixels resolution.
- 22 key alpha-numeric keyboard.

The eight input channels have the following standard configuration:
- 4 for load sensors (load cells or pressure transducers)
- 4 for deformation transducers

The configuration can be altered by the user to specific needs (except the 4 channels for load sensors which are fixed).

Electrical characteristics of channel conditioners:
- feed from 0.5 to 10V dc calibrated via firmware
- input single / dual ended with automatic recognition
- input signal from -2.5 to +2.5 V dc
- zero and gain calibrated via software

Data acquisition syncronized on all channels

Diagnostic system to highlight any malfunction of the system including low oil level and dirty oil filter.

Storage of various calibration curves for immediate connection of various sensors.

System description
MCC 8 can be controlled via a PC for both traditional and advanced tests.
Alternatively traditional tests only can be made via the keyboard and displayed without the use of a PC.

3. MAIN FUNCTIONS

On-board software (firmware)

In the local mode (i.e. without the use of a PC) the interface with the user is via a high resolution graphical display and a 22 key keyboard, of which six are interactive with specific icons present on each display screen.
The main characteristics of the firmware are as follows:
- Execution of test in local mode without PC:
- Control of all the functions of the console of the MCC . The entire test performances is automatic; the management of the loading is via an optimized P.I. Feed Forward a logharithm closed loop control system.
- High speed bi-directional communication with PC via a RS 232 serial port for eventual remote control of the machine.
- Electrical calibration of the 8 channels via the software with adjustment of zero, gain, resolution and acquisition frequency. Independent transducer feed voltage control for each channel.
- Calibration of the 8 channels in engineering units, via linearity functions which allow optimisation of readings over the whole test range. To this aim the user can freely divide the measurement range in various steps (up to 10).
- System clock/calendar
- Diagnostics menu to manage alarm signals.

4. INITIAL INSTALLATION AND CONNECTIONS

4.1 The display of MCC is situated above the hydraulic unit. It should be adjusted to allow optimum vision. It can be rotated and inclines as required.

4.2 Connect the mains cable of the machine, checking beforehand that the local mains supply corresponds to that shown on the i.d. label on the machine which is situated near the main switch.

4.3 Connect the load sensor of test frame 1 to input Ch 1 (channel 1), frame 2 to Ch 2 and so on. Likewise connect the auxiliary transducers to channels 5 to 8.
Connect the 25 pole connection cable to the “I/O” port.
Connect the 6 pole mains cable in the appropriate socket.

4.4 Conveniently place the PC so it is possible to view the monitor and the display of the machine at the same time. Connect the serial cable supplied with the PC to the RS232 port of the unit.

4.5 When all the connections have been made turn on the machine via the main switch on the right hand side of the console (next to the mains cable).
ATTENTION: make sure that the red emergency stop button is not inserted. To release it turn it clockwise.

Description of keys:
- Arrow keys: allow navigation through the menu to reach desired function.
- Alpha-numeric keyboard: allows input of data when required.
- ENTER key: has function of confirmation / start
- ESCAPE key: has function of non confirmation / stop
- Function keys: functions change depending on the menu in use. The function is represented by an icon shown at the bottom of the display.

5. USE THE MACHINE IN LOCAL MODE (ON-BOARD SOFTWARE)

When the unit is switched on the display will show the CONTROLS logo and after approx. 45 seconds the unit is operative.

The display will now show the main menu from which it is possible to access the various functions of the machine. Each function is represented by an icon. Use the arrow keys to highlight the desired function and confirm with ENTER.

The available selections are:

Perform test: this is the menu used to make a test in local mode. it allows channel selection and type of test, accepts sample data and automatically performs the test without the use of the PC.

Options: this menu allows selection of language, activation of the buzzer and access to a few funcions for setting of the channels.

Remote: activates the communication between the unit and the PC for remote control of the system via the PC.

Calibration: this menu gives access to the calibration functions for each channel (in engineering units) and to use the machine with manual control.

Date / Time: this menu is used to input the time and date.

Diagnostics: this menu allows checking of the alarm signals and the status of the system (oil filter, oil level, oil temperature, general emergency).

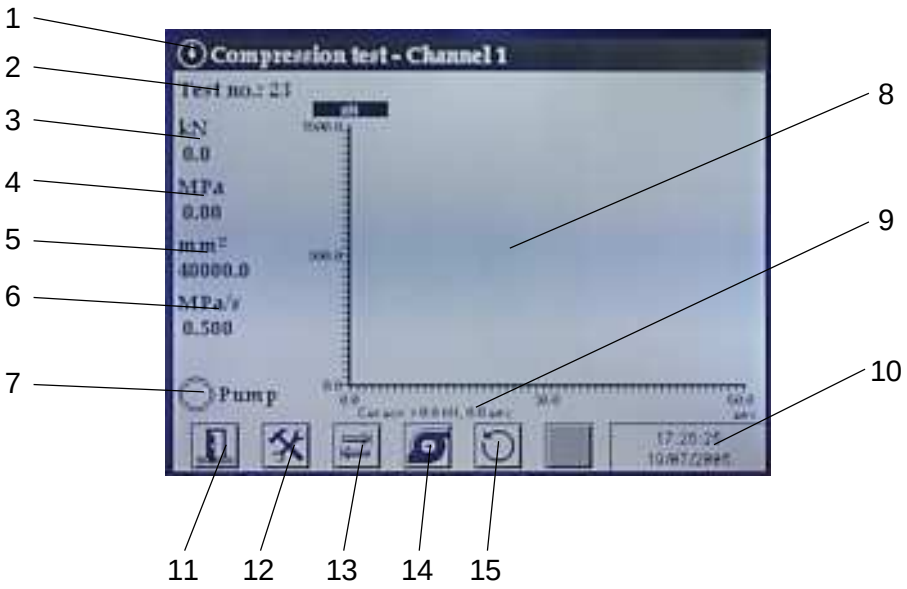
Imput ADC: allows access for setting the 8 channels of the unit. It is possible to calibrate, zero, gain and transducer feed voltage for each channel.

Information: shows an information window indicating the version of the installed firmware.

6. PERFORM TEST

6.1 This menu is only used for tests to failure under load control conditions without the use of the PC. All the operations are made via the display nad keyboard of the machine. When you access the menu you are requested to indicate the channel to be used (from those available) which corresponds to the relative test frame.
Once the channel has been selected the type of test can be selected; the available options are: compression, flexure and indirect tension. these are all failure tests which end when the sample has failed.

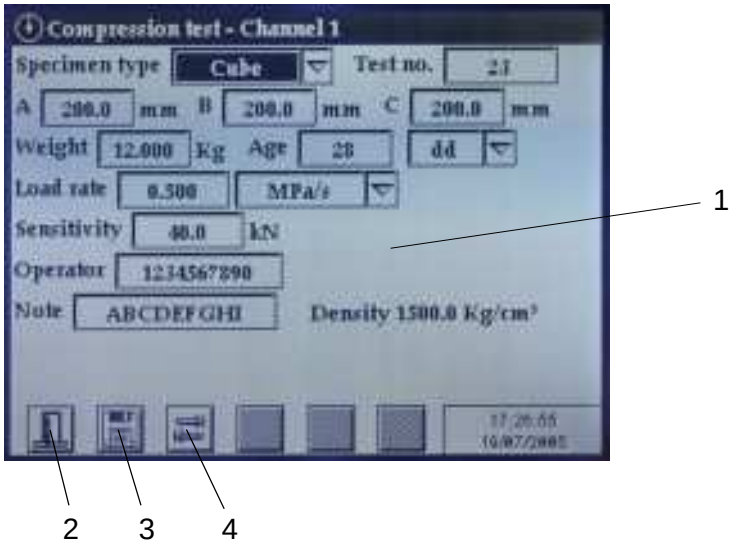
6.2 The screen of the perform test phase is as follows:



screen description:
1 - type of test and selected channel
2 - test number
3 - peak load
4 - peak tension
5 - sample surface area
6 - load rate
7 - status of hydraulic pump
8 - load / time graph
9 - co-ordinates of cursore
10 - time and date
11 - exit menu (function key)
12 - access command to test settings and sample description (function key)
13 - TAB command to move cursore between the various functions (function key)
14 - start / stop pump command (function key)
15 - start test command (function key)

6.2.1 Before moving on we describe the input data menu in more detail. the correct input of the test parameters is important to ensure the correct testing and results, in that the firmware uses these data to run the test and calculate results.

Access the test settings using the function key (F2). The following screen will appear:



screen description:
1 - area for data
2 - exit menu command (function key)
3 - save command (function key)
4 - TAB command to mave to the various fields on the display (function key)

The active setting is that shown in negative (clear characters on black back ground). Using the TAB (F3) key you can pass from one setting to another. To alter the setting press ENTER and input new value as follows:
- In windows with pre-defined selections (e.g. type of sample) use the vertical arrow keys to make selection and confirm with ENTER.
- In numerical fields (e.g. dimensions) input the required value using keys 0 to 9. Use ESCAPE to cancel, the horizontal arrow keys to move the cursore right on left. Confirm entry with ENTER.
- In alpha-numericla fields (e.g. note) input the characters using keys 0 to 9. By pressing one key more than once each of the characters related to that key will be shown; this function remain active for 2 seconds from the last time the key is pushed. Use ESCAPE to cancel and the horizontal arrow keys to move the cursore right and left. Confirm you entry with ENTER.

6.2.2 For compression tests the following parameters are requested:
- Sample type: with selection between cube, cylinder, block and other.
- Dimension of sample, expressed in mm; this is a numerical value and must be input correctly:

  - Cube: side **a**, side **b**, side **c**. The area of the cube is automatically calculated by the formula: area = **a** x **b**.
  - Cylinder: diameter **d**, height **h**. The area of the cylinder is automatically calculated by the formula: area = $(\mathbf{d}/2)^2 \times \pi$.
  - Block: side **d**, side **b**, side **l**. The area of the block is automatically calculated by the formula: area = **d** x **b**.
  - Other: The area is inserted directly (or equivalent area).

- Sample weight. This is a descriptive parameter and does not influence the test itself.
- Sample Age with selection between hours and days. This is a descriptive parameter and does not influence the test itself.
- Load rate. This is a numerical value which indicates the speed of load application applied to the sample during the test; the correct load rate must be inserted.
- Measurement units of load rate.
- Peak sensitivity. This value, expressed in engineering units, in the value corresponding at a decrease in load at which the MCC8, during a terst, should consider the sample as failed and end the test. Recommended values are: 15 to 30 kN for compression tests on concrete, 1 to 3 kN for compression tests on cement. As a general rule this value should be proportional to the expected failure load and in anycase below it.
- Operator. This is a alpha-numerical descriptive field with 10 characters.
- Note. This is a alpha-numerical descriptive field with 10 characters.

6.2.3 For flexure tests the following parameters are requested:
- Sample type, with selection between, beam, kerb, slab and other
- Dimensions of sample, expressed in mm; this is a numerical value and must be inserted correctly:

  - For beams, kerbs and slabs the display requests the input of the base of the sample **b**, the height **h**, the length **l**. The values **b** and **h**, together with the distance between the lower bearers and the type of loading (central or bouble upper bearers) are used to automatically calculate the equivalent area of the sample.
  - Other: the area (or equivalent area) is inserted directly.

- Sample weight. This is a descriptive parameter and does not influence the test itself.
- Sample Age with selection between hours and days. This is a descriptive parameter and does not influence the test itself.
- Load rate. This is a numerical value which indicates the speed of load application applied to the sample during the test; the correct load rate must be inserted.
- Measurements units of load rate. Given that only load rate control is available, this can be expressed (thus selected) as load / time (N/s) or stress / time (MPa/s)
- Numbers of bearers, with selection between 1 and 2. this refers to the number of upper load bearers being used.
- Distance between bearers. This is a numerical value of the distance between the lower bearers expressed in mm.
- Peak sensitivity. This value, expressed in engineering units, in the value corresponding at a decrease in load at which the MCC8, during a terst, should consider the sample as failed and end the test. Recommended values are: 15 to 30 kN for compression tests on concrete, 1 to 3 kN for compression tests on cement. As a general rule this value should be proportional to the expected failure load and in anycase below it.
- Operator. This is a alpha-numerical descriptive field with 10 characters.
- Note. This is a alpha-numerical descriptive field with 10 characters.

6.2.4 For indirect tensile tests operate in the same way as for compression tests (see 6.2.2) bearing in mind that the area is calculated with the formula: Area = L x H (length x height in mm).

6.2.5 When all the inputs have been made, exit by pressing F2 (Save). Press F1 to exit without saving the new parameters. IMPORTANT: The set parameters are saved even if the machine is switched off. Therefore, to perform another test with the same parameters, these do not need to be re-set even if the machine is switched off and on again.

6.3 Perform Test
This is done in the Perform test screen.

6.3.1 Switch on the pump via the F4 key; the pump is turned on and the pump indicator is shown on the display. If the pump does not activate check that the red emergency stop button is not inserted.
The pump should always be left running for consecutive tests. In this way the hydraulic oil contained in the tank will reach and be maintained at the ideal temperature. Therefore, we recommend to activate the pump a few minutes (at least 5) before the first test if it has been inactive for a long period of time.

6.3.2 Place the sample into the test frame. To start the test press F5, the load piston will begin to move and at the same time the display will show "test running" and zero the readings. Once the sample comes into contact with the load paltens / bearers, the set load rate is applied and the readings on the display are up-dated in real time during the test. The management of the test is made by the closed loop system which ensures the correct load rate is applied as per the set value. The display will show any deviation between the real load rate and set load rate with the following symbols:

= = = : The real load rate corresponds to the set value ± 1%
= = : The real load rate corresponds to the set value ± 3%
= : The real load rate corresponds to the set value ± 10%
– : The real load rate corresponds to the set value – 10…15%
– –: The real load rate corresponds to the set value – 15….25%
– – –: The real load rate corresponds to the set value – oltre 25%
+ : The real load rate corresponds to the set value + 10…15%
+ + : The real load rate corresponds to the set value + 15….25%
+ + + : The real load rate corresponds to the set value + oltre 25%

In this way the accuracy of the machines load application can be readily assessed. In normal conditions the machine can maintain the load rate at +/- 1% of set rate. Exceptions can occur during the initial and final parts of the test when repetitive fine adjustments are needed in accordance with the behaviour of the sample. In this case the display may aloso show “+” o “-“.
During the test the load / time graph is updated in real time.

6.3.4 When the sample fails the display will show "test over" automatically load will no longer be applied, the oil will be released and the load piston will return to its original position ready for the next test.
ATTENTION: to maually interrupt a test press the ESCAPE key or alternatively press the F4 key which switches off the pump. For emergency stoopage press the red emergency button on the right hand side of the console.

6.3.5 At the end of the test the maximum load and stress values remain on the display.

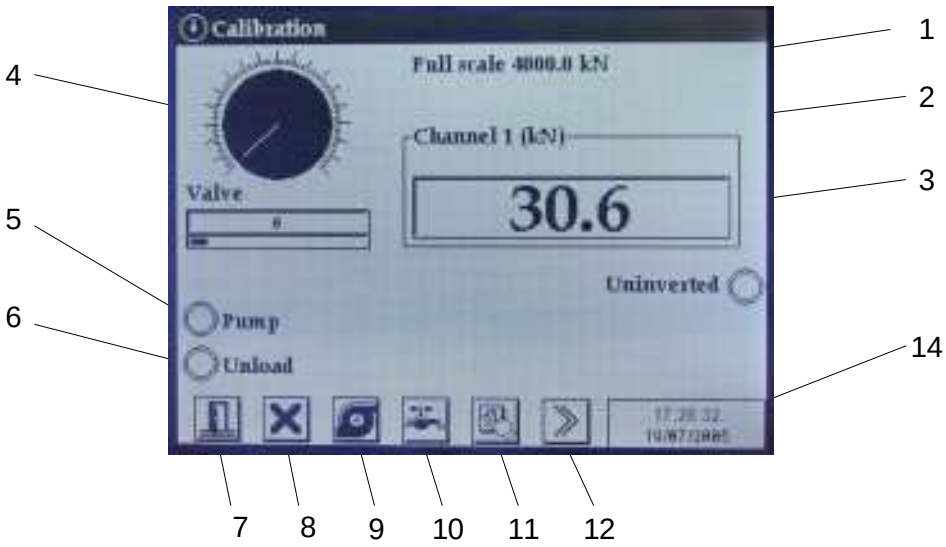
6.3.6 To perform the next test, if necessary, repeat the input test settings and then proceed as from point 6.3.2.

6.4 Actions on the load / time graph
The graph is automatically created and up dated during the test. The axis scales are also automatically up-dated. At the end of the test it is possible to adjust the axis scales and also to move the cursore along the curve.
To alter the axis scale use the horizontal arrow keys. Press F3 to select axis X or Y.
To move the cursore along the curve use the vertical arrow keys. The cursore will move by one point with each press of the key or continuously if the key is kept pressed. Below the graph the co-ordinates of load and time will be shown corresponding to the actual position of the cursore on the curve.

6.5 To exit the perform test menu and return to the main menu simply press F1 for those consecutive times.

7. CALIBRATION

The calibration menu is mainly dedicated to the calibration of the 8 channels in engineering units. It allow the test frame/s to be used manually for precise calibration. The screen is as follows:



Screen description:
1 - Full scale of selected frame
2 - Selected channel and measuring units
3 - Load value
4 - Virtual potentiometer control of proportional valve
5 - Status of hydraulic pump
6 - Status of hydraulic circuit
7 - Exit menu command (function key F1)
8 - Command for calibration reading save (function key F2)
9 - Pump start/stop command (function key F3)
10 - Load/unload command (function key F4)
11 - Zero load reading command (function key F5)
12 - Command to access other functions (function key F6)
13 - Indicator of inversion of readings sign
14 - Date and time
other functions:
- Return to previous function(function key F1)
- Access calibration functions (function key F2)
- Invert readings sign (function key F3)

We describe the procedure to follow to check the calibration and manually control the machine, exclusively for channels 1 to 4 configured with the pressure/load transducer of up to a maximum of 4 connected test frames.

1. Press F3 to activate the pump. Ensure that the red emergency stop button is not inserted otherwise the pump will not start. We recommend that the pump is left running until the oil has reached its ideal working temperautre and during the whole procedure of checking the calibration.

2. Position the reference load sensor in the test frame leaving a minimum free daylight (5 - 10 mm). Ensure that the load sensor and eventual distance pieces are perfectly centered with respect with the load platens.

3. Press F4 to begin loading the hydraulic circuit. The load piston of the test frame will move until the reference load cell and test platens come into contact and a small initial load value is stabilized which is know as the pre-load. While the free daylight is closing, before the reference load cell comes into contact with the load platen, we recommend that the display is zeroed by pressing F5 so as to eliminate the weight of the load piston and any friction of the same from the subsequent calibration operations.

4. Once the machine is at its pre-load stage, the load can be increased via the command for opening the proportional valve. Use the arrow keys as follows:

   - Arrow Up to increase the opening of the valve and increase the load
   - Arrow Down to increase the opening of the valve and decrease the load
   - Arrow Right to increase the speed of load increase
   - Arrow left to decrease the speed of load decrease

   Initially press the Arrow right key several times to obtain a rapid increase of the speed of opening of the valve with the arrow up key. increase the opening valve up till over 1500 - 2000 div. when the load starts to increase we recommend that the increase of speed of load increase is lowered so as not to lose control over the machine.

5. Increase the load to the desired level with careful control over the load increase command keys. The load value is shown in real time on the display. Via the vertical arrow keys the load may be increased, held constant or decreased as required. Always be careful never to exceed the maximum load value of reference load cell being used.
   Attention: when the full scale value of the test frame is use is reached, a safety control intervenes to prevent any further increase in load and hydraulic pressure; the display will show the message "over load".

6. Once the full load has been reached, the exit muwst be re-positioned to zero before pressing the unload command. Therefore press and keep pressed the Arrow down key until the exit indicator shows zero. Await until the load reaches its pre-load value and the press F4 unload key so as the load piston returns to its rests position.
   Attention: we recommend not to press the unload command if the exit value is different from zero so as to avoid shocks in the hydraulic circuit.

7. Repeat the process re-start from point 3.

   To check the calibration of channel 5 to 8, you must have suitable reference instruments campatible with the size of measurements (displacements, deformation, tension, pressure etc.). It is not necessary to use the pump for these calibrations.

System Calibration and linearity function

To adjust the calibration of a channel, if this is outside accepted levels, the linearity function (key F2 of added functions) is used. This function allows the operator to compensate for eventual errors of linearity of any given channel. The measurement field of the channel can be divided in up to 10 steps and set different proportional calibration co-efficients for each step. The software then select the correct co-efficients and computes a calibration curve. This allows extreme accuracy over the whole measurement range.

ATTENTION: this menu should only be accessed when the calibration needs to be changed. Do not enter this menu for any other reason.

ATTENTION: before entering the linearity menu you must read and fully understand the procedure described below. In case of doubt or for any help contact our service department. Controls will not be responsible for any damage caused to the machine, others and persons due to incorrest calibration settings.

If the readings from a channel are sufficiently linear (error less than 1% in measurement range) and the measurement range is between 10-20% and 100% of the full scale.

If, however, there is a need for linearity at particularly low loads with respect to the measurement range (5% or less of full scale), or the readings are not sufficiently linear, it is recommended to use more calibration co-efficients, above all in corrispondance with the field with less linearity.

When this function is accessed the display will show the following screen:

ATTENTION: the values shown are for example only.

Calibration procedure

1 The first operation is to insert the values (steps) at which to read and calculate the calibration curve. You start at the lowest value and end with the highest. Press F2 and then confirm the cancellation of the previous calibration.

2 Now the display asks for the value referring to step 1. Press ENTER and input the new value. To insert a decimal point press key 1 twice. Confirm the input value with ENTER. Now the value for the next step can be input (if required). Place the cursore on the next step (down arrow) and make the input. Repeat this for each step as required. At the end press F1 to return to the previous screen.

3 For the calibration of channels 1 to 4 proceed as follows:

3.1 To read and save the real load values corresponding to the input steps it is necessary to load the machine with a reference load cell in position. Follow the instructions given in the previous chapter regarding the use of the machine in the manual mode.

3.2 Start the pump and start loading taking care to zero the display during the approach phase. Then load the machine up to the firast input step, which is the real load (given from the reference load cell) corresponds to the input step value press F2 ONCE ONLY to save the reading. Repeat this operation for the remaining input steps (if any).

3.3 In case of an error in saving, press ENTER to cancel the last saved reading.

3.4 At the end of the procedure, when all the values have been saved, the message "procedure Over" will appear. Release the pressure, stop the pump and save the calibration by pressing F2.
It is now possible to check the new calibration by comparison with the reference load cell.

4 To calibrate channels 4 to 8 operate in a similar way as described at point 3 without using the commands to activate the pump. Naturally you must have suitable reference instruments to calibrate the sensors being used.

Inversion of channel

Using F3 of the added functions 

the readings sense of the transducer can be inverted. This function is used with linear transducer used in exxtension (i.e. zero = transducer completely compressed).

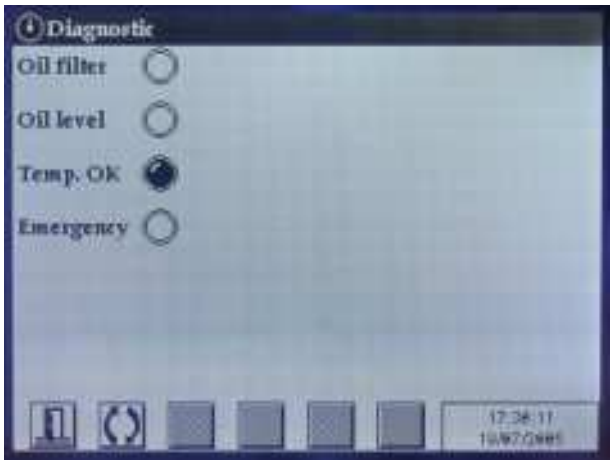
8. DATE AND TIME

This menu is used to set MCC 8 system clock and date..

Press F3 to pass from one parameter to another. Press “ENTER” to select a parameter, then input the value usong the arrow keys or numerical keys.
Upon completion save by pressing F1.

9. DIAGNOSTICS

The diagnostics menu allows examination of the alarm sensors which control the oil filter, oil level and emergency button. Furthermore it gives an indication on the reaching of the ideal working oil temperature (this is not an allarm).
The screen is as follows:



When one of the sensors reads an alarm, the corresponding led is lit. To zero the alarms press F2.

ATTENTION: when the red emergency button is pressed and then released the alarm should be reset from this menu. Otherwise it is not possible to activate the hydraulic pump.

10. SETTING OF ADC

This menu allows the setting and adjustment of the base parameters of the machine, in particular the hardware calibration of the 8 channels and the feed voltage for each channel. It also allows the total formation of the machine memory with the resultant cancellation of all the information and settings of the memory.
We recommend that only qualified experts having the required knowledge and information use this menu.

ATTENTION: this menu should only be accessed when the system settings are to be changed; do not enter for any other reasons.

ATTENTION: Controls will not be responsible for any problems caused by incorrect system settings.

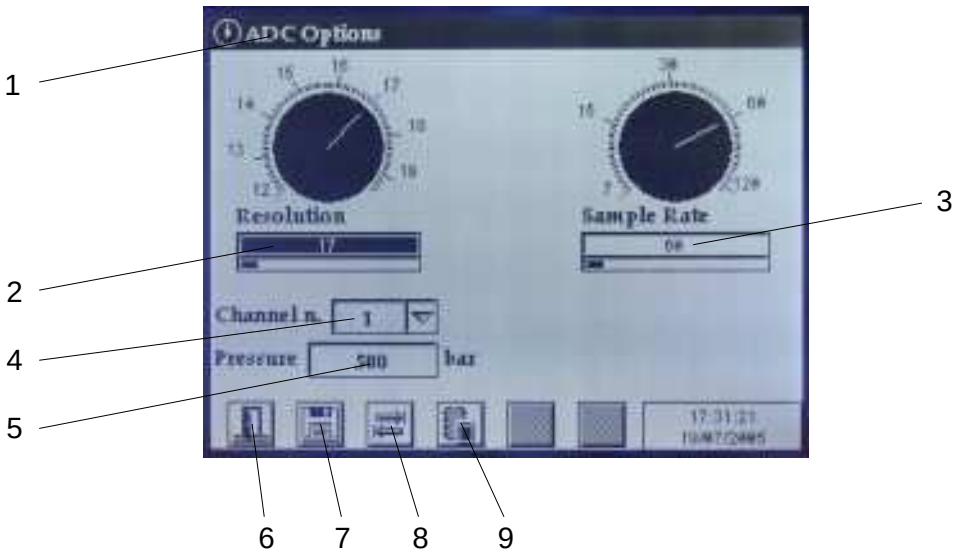
ATTENTION: password is requested to access this menu.

The menu presents three selections:
- ADC options: allows setting of resolution an acquisition speed of the channels.
- Input ADC convertor: allows the adjustment, for each channel, of the zero and the gain so as to take optimum advantage of the resolution.
- Vexc regulation: callows input of the feed voltage for each channel.

Use the arrow keys to select the desired menu and confirm with ENTER.

10.1 ADC options.

The display will show the following screen



1 - Menu title
2 - Resolution indicator
3 - Acquisition frequency indicator
4 - Channel selection
5 - Setting of hydraaulic pressure
6 - Exit menu command (function key F1)
7 - Save command (function key F2)
8 - Select command (function key F3)
9 - Total memory cancellation command (function key F4)

10.1.1 The upper part of the display shows the settings relative eight channels.
The resoultion, expressed in bit, is to 19 set. It expresses the number of divisions in which the reading scale is divided.

The correspondance between bit and divisions is shown in the following table.

The acquisition frequency, expressed in hertz (processing cycles per second) is set at 60.

bit	divisions
12	4096
13	8192
14	16384
15	32768
16	65536
17	131072
18	262144
19	524288

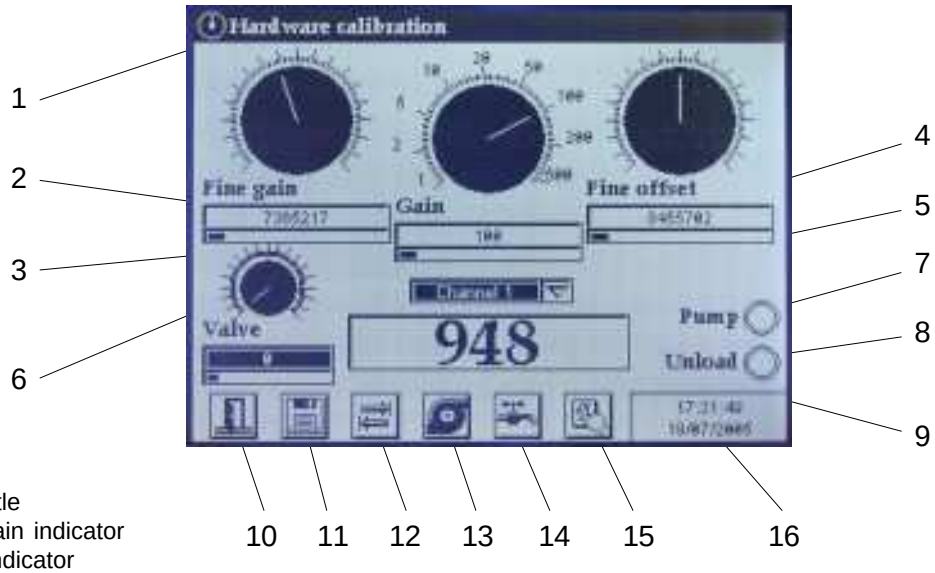
The factory setting foresees resolution of 131072 divisions and an acquisition frequency of 60 Hz.

10.1.2 The lower part of the display shows the settings of the hydraulic pressure and maximum load of the frames connected to channel 1 to 4. this is a fundamental parameter to ensure the correct working of control system which manages the test performance.
To set or alter the data simply select the channel field using the F3 key and activate by pressing ENTER and then select the required channel. Input the pressure in the pressure field (in bar) which corresponds to the maximum load capacity of the test frame connected to that channel.

10.1.3 The function key F4 is used for the complete formating of the system memory of MCC ; this function causes the loss of all data and settings and thus requires the complete re-setting of the system parameters including the calibration. As such it should only be made with approval from Controls Service Department. This procedure is normally used when the firmware of the system is up-dated.
ATTENTION: Controls wil not be responsible for any damage or problems caused by incorrect system settings.

10.2 Setting of ADC Convertor

The display will show the following screen:



1 - Main title
2 - Fine gain indicator
3 - Gain indicator
4 - Zero indicator
5 - Channel selection
6 - Virtual potentiometer control of proportional valve
7 - Status of hydraulic pump
8 - Status of hydraulic circuit
9 - Reading in divisions of selected channel

10 - Exit menu command (function key F1)
11 - Save command (function key F2)
12 - Select command (function key F3)
13 - Start/Stop hydraulic pump command (function key F4)
14 - Load/Unload command (function key F5)
15 - Zero load command (function key F6)
16 - Date and Time

This menu allows the calibration of the zero and the gain for each channel. The aim is to make correspond with the complete exertion of the transducer/sensor a numericla variation, expressed in divisions, between a few unit (at rest) and 97/98% of the maximum (at full scale), so as to take full advantage of the available resolution.

If a channel is to be calibrated for the first time, follow the procedure described below. Remember you will need a reference sensor compatable with the measurement to be made (displacement, deformation, tension, pressure etc.).
ATTENTION: thew following instructs refer to a factory setting of the resolution at 17 bit = 131,072 divisions.

1 – Select the channel to be calibrated. Press ENTER to show the menu scroll and then use the vertical arrow keys to select the required selection and confirm with ENTER.
2 – Select the gain based on the type of transducer. See the following table:

Transducer type	**Gain**	Feed voltage (Vdc)
Strain gauge load	100	10
Pressure	100	10
Strain gauges (with 82-P0070/1)	100	2
Potentiometric linear	1	2.5
LVDT (e.g. P0331/XX)	1	5
Magneto resistive type (e.g. C0222/F)	1	3
Clip - on - Gauge UB-5A	100	2

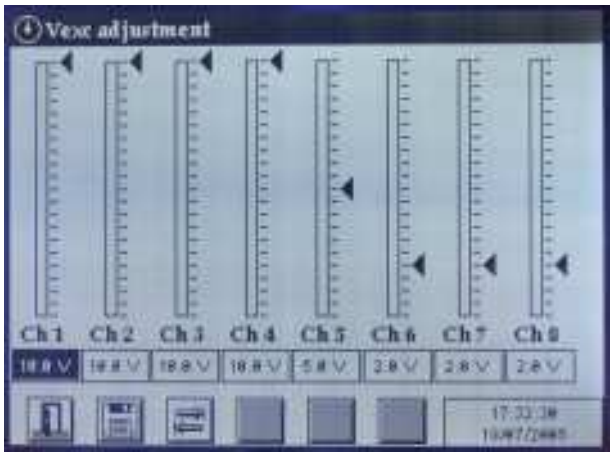
For transducers not mentioned in the table please contact out Service Department.

3 – Select Fine Zero and adjust to obtain an indication of about 2000 divisions. For this use the arrow keys as follows:
- Arrow UP to increase the value
- Arrow DOWN to decrease the value
- Aroow RIGHT to increase the speed of increase of value
- Arrow LEFT to decrease the speed of increase of value

4 – Apply an exertion corresponding to approx. 50% of the full scale. In the case of channels 1 to 4 the hydraulic pump of the machine can be used via the commands shown on the screen, for instructions on their use see the section relative to calibration.
5 – When the transducer is at 50% of its full scale, adjust the fine gain to show a value of about 64000 divisions.
6 – Re-position the transducer to its rest position and then repeat again from point 3 for at 2 or 3 times until no further adjustments are necessary.
7 – Apply an exertion equivalent to the full scale of the transducer, checking that it does not exceed 127000 - 128000 divisions. If it does the fine gain must be further adjusted.
8 – Upon completion save the set values by pressing F2 (if not the new values will be lost).
9 – Press F1 to return to the previous screen.

10.3 Vexc regulation

The display will show the following screen:



This menu allows the setting of feed voltage to the transducer for each channel. Remember that the feed voltage must correspond to that indicated on the transducer/sensor; if not instability may be witnessed and at worse breakage of the sensor.

For transducers normally supplied by controls please refer to the following table:

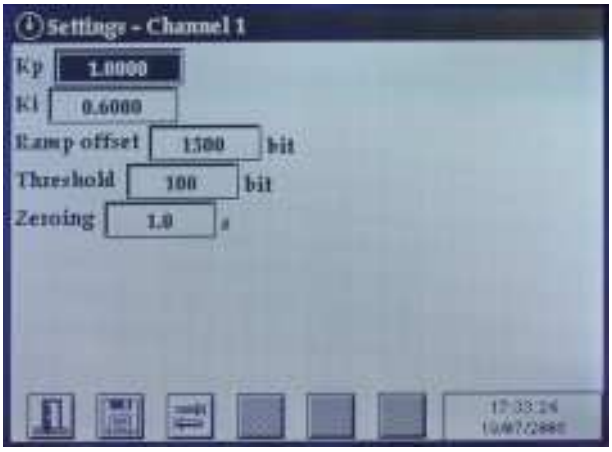
Transducer type	**Gain**	Feed voltage (Vdc)
Strain gauge load	100	10
Pressure	100	10
Strain gauges (with 82-P0070/1)	100	2
Potentiometric linear	1	2.5
LVDT (e.g. P0331/XX)	1	5
Magneto resistive type (e.g. C0222/F)	1	3
Clip - on - Gauge UB-5A	100	2

To adjust the settings, select the channel with function key F3, then increase or decrease the feed voltage of the selected channel using the vertical arrow keys. The input is in steps of 0.5 Vdc. Upon completion press F2 to save and F1 to exit.

11. OPTIONS

11.1 This menu allows the input of the following functions:
- Language, with selection between Italian, English, French or Spanish.
- Buzzer; when this is active, the pressing of each key is accompained by a "beep" sound.

11.2 The F4 key allows access to an advanced menu for input of channel function parameters.
The display is as follows:



ATTENTION: this menu should only be accessed when the system settings are to be changed; do not enter for any other reasons.
ATTENTION: Controls will not be responsible for any problems caused by incorrect system settings.
ATTENTION: password is requested to access this menu.

The current parameters for each channel are shown: full scale, measuring unit and number of decimal places. If they need to be changed (i.e. for first use of a channel or change of transducer) it is possible to move around the screen with the F3 and arrow keys. Press ENTER to access the selected parameter, then use the arrow keys to input the new value.

11.3 By selecting channel 1 ... 4 it is possible to access another menu, for the input of the function parameters of the connected test frames. These parameters are used by the console to manage the P.I. feed forward control only and exclusively when used in the local mode and may differ from those used in the remote mode.

The parameters are as follows:

- Kp: proportional feedback constant. this is the parameters which proportionally amplifies the small errors between read and theoretical values (both negative and positive sign) measured by the machine step by step so as to consequently change the oil feed (increase to decrease). It normally has a value between 1 and 2 depending upon the type of test frame.
- Ki: integral feedback constant. This parameter has the functionto consider the immediate history of the test, that is what has just happened before the current time. It allows amplification the integral sum of differences (errors) between the theoretical curve and the real curve so as to cancel constant errors (that is those of allows the same sign) that cannot be cancelled by the proportional feedback constant alone. It normally has a value between 0.2 and 0.5 depending upon the type of test frame.
- Ramp offset: expressed in bit, this parameter determines the times delay of the start of the load ramp at the start of a test. its value is normally between 1000 and 2000 bit, the optimum value for each machine is factory set and normally does not need to be changed. In general terms by decreasing the value a delay is induced in the start of load increase; by increasing the value a quicker start is given, with consequental increase of the initial pre-load.
- Threshold: this parameter, expressed in bit allows the control system to identify the pre-load at the start of the test. Its value is normally between 50 and 200 bit.
- Zero: this parameter, expressed in seconds, allows the zeroing of the load reading during the rapid approach phase before the test starts. It's function is to eliminate false load readings due to eventual friction of the load piston and weight of the piston itself. Normally it is set between 0.5 and 2 seconds.

Once the parameters have been set, save with F2 before returning to the previous menu.

12. INFORMATION

By activating this function the display opens a window showing the version number of the installed software. Press any key to return to the main menu.

13. REMOTE CONTROL MODE

To use the remote mode the supplied PC must be connected and the command software started. Refer to the software instruction manual.

14. PC and software

Main technical characteristics

Latest generation PC and printer

Software package for determination of elastic modulus under compression. Main characteristics.

The program runs in MS Windows®. It allows the remote control of the command console (MCC) and the automatic determination of elastic modulus under compression. The main characteristics of the software are as follows:
- Remote control of the system
- Automatic testing with user definable load steps and/or cycles
- Manages the graphical and numerical display of read data from the machine (load and deformation)
- Allows elastic modulus determination as per all the main international standards
- Allows print out of test results and graphs
- Language selection between English, Italian, French and Spanish plus an extra language which can be user set by introducing the translation of the existing text
- Download and upload of the calibration settings for each channel

Saving, printing and recall of test reports including the possibility to convert the data in DOC, XLS and TXT format.

The minimum PC requirements are as follows:

NOTE: PC and printer are supplied with the machine.

- Processor with clock 1GHz or better
- At least 200 MByte of free space on hard disc
- 512 Mbyte RAM memory
- CD – ROM port
- 1 free RS232 serial port (RS232-USB converters may require specific setup; refer to the documentation provided by the supplier of the converter)
- Windows XP, or higher version.

Installation of the program

The software does not need to be installed since the machine is supplied with a PC with the software factory installed. A copy of the software is also supplied on a CD to be used should it become necessary to re-install the software.
Only in this case **follow the instructions below:**
Insert the CD in the CD port. After a few seconds the installation program starts automatically. If this does not occur open the file D:\SETUP.EXE (where D:\ indicates the CD port).
Next follow the instructions as they appear on the screen and confirm the selections presented. Upon completion of the installation the program crates a new file named “E-Module” in the group of programs. The program is also shown on the program bar.
Restart the PC before entering the program for the first time.

Initial connections

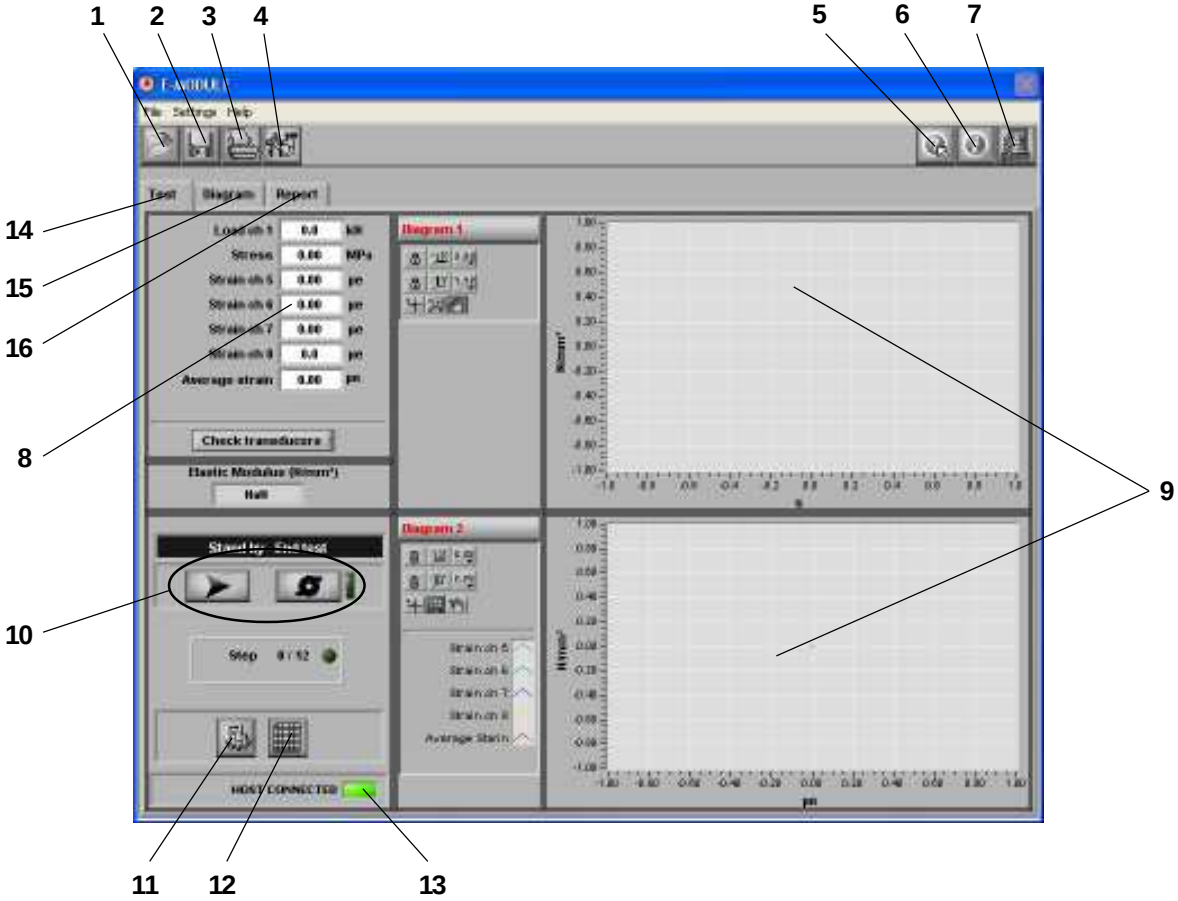
Connect the RS232 serial port of the MCC to the serial COM port of the PC using the cable supplied as standard. If a PC different to the one supplied with the machine is used, which does not have a RS232 serial port, it is possible to connect to a USB port using a RS232/USB converter available from computer stores. Controls does not supply this type of converter. For version /C, please make reference to chapter 15 to install and configure the programs.

Starting the program

Before starting the program make sure that the command console is switched off.
To start the program select “E-Module” via the start program key. Await a few seconds for the main menu to appear. When the main menu appears the console can be switched on. Wait for approximately 45 seconds until the message “HOST CONNECTED**”** appears on the screen. This indicates the correct connection between the console and the PC; the former sends to the PC all the data relative to the configuration of the system (channel settings, calibration and parameters).
It is also possible, when necessary, to activate the connection manually by selecting the icon “REMOTE” on the display of the console.

If the connection cannot be made, check the connection of the serial port and the input in the “general settings”.

Upon starting the program the following screen appears:



The functions available on this screen are:
1) Command to recall saved tests from the archive
2) Command to save last test made
3) Command to print, to print the test report and graph of the current test
4) Access to the system parameters:
   - General settings
   - Test settings
   - Settings for test steps
   - Calibration functions
5) Command for access to the on line instruction manual
6) Display of program information
7) Exit command
8) Channel readings
9) Diagrams to display readings in graphical format and relative tables
10) Key for console control
11) Key for rapid access to test parameters
12) Key for rapid access to test steps parameters
13) Indicator of active serial connection
14) Display of current page
15) Full screen display of graphs
16) Display of description page to form test report

The software allows the remote control of all the system functions, monitoring in real time of the test, reading and graphical and numerical representation of the readings of channels being used, saving readings and report printing.

General settings

When access is made to this menu the following screen appears

The menu allows the input of the following parameters:

- Setting of RS232 serial port, with selection of serial port to use for bi-directional communication between the console and the PC. The baud rate which indicates the speed of transmission is set at 115000 bit/sec. and cannot be changed.
- Language setting, with selection between English, Italian, French and Spanish and “My Language”. The latter can be set by user by translating the various text.
- Setting of password, to protect against unauthorised access to the advanced functions of the program (e.g. calibration). By default no password is inserted. Click on “New” to insert or alter the password.
- Input of interval between readings, this allows the choice of updating of the graphs during the test. The lowest allowed value is 0.1 sec. Corresponding to 10 readings per second. A value between 1 and 2 sec. Is recommended so as to avoid very large test files.

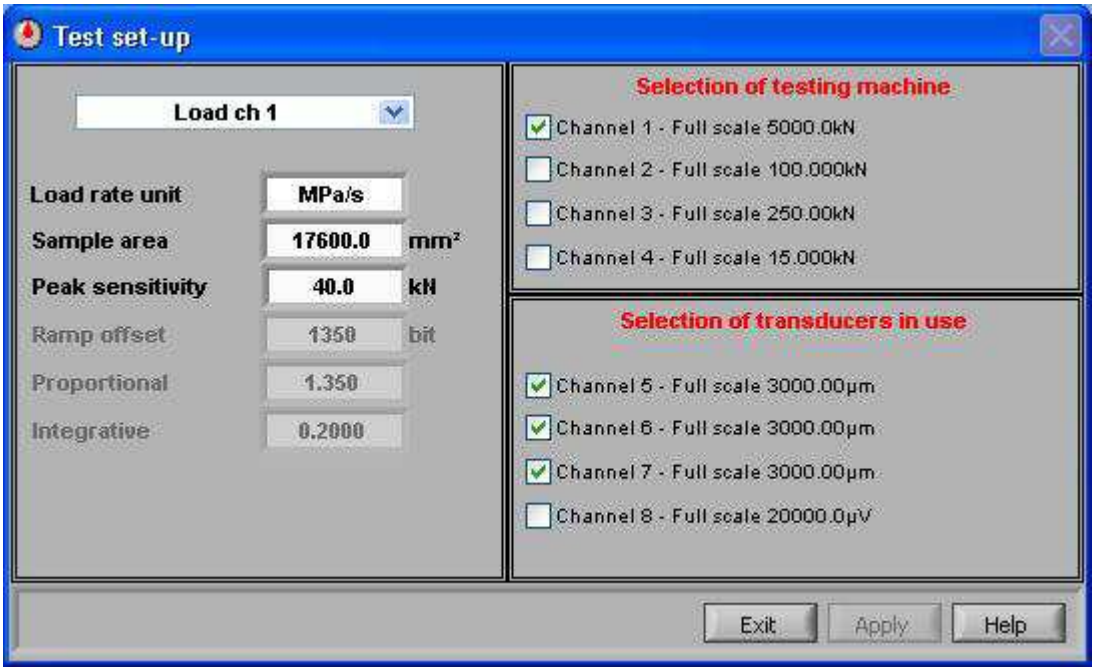
Activation of save “report file”, this allows saving of read data during the test in three different formats: DOC (format Microsoft Word), TXT (format text, ASCII), XLS (format Microsoft Excel).

Before leaving this menu inputs and alterations must be saved in order to render them operative.

PERFORM TEST

Test settings

The preliminary operation to be made before a test is to select and set the channels to be used.
Open the “test settings” window and the following screen appear.



ATTENTION: the values inserted in the fields of the above are for example only, for the correct settings carefully follow the instructions below.

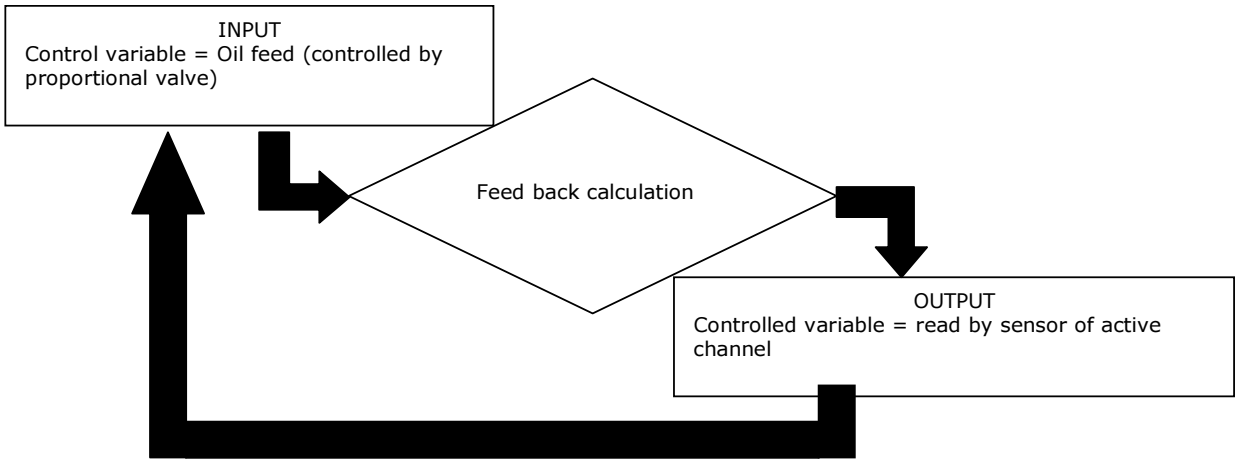
The upper right hand side of the screen shows the frames connected to the system (channel 1…4). To select a frame simply click on the corresponding square; the symbol “v” will appear. The selected frame will automatically be used for the test and the readings from the corresponding channel will be read during the test, whilst the three remaining channels will not be considered.

The lower right hand part of the screen shows the current configuration of channels 5…8 (full scale and measuring units). It is possible to select the channels that will be used during the test to measure deformations.

Once the channels have been selected a few parameters must be set.

For the channel relative to the test frame only (channel 1…4

- Measurement unit: of the load rate, either MPa/s or N/s
- Sample area: this area is used in the calculation of the specific load resistance (Mpa) and therefore the correct value must be entered in order to achieve correct results.
- Ramp offset: is a parameter expressed in bit that allows the movement of axis of the time start on the load ramp at the beginning of the test. Its value is typically between 1000 and 2000 bit and is optimised before despatch of the machine and normally does not require any further adjustment. As a general rule by decreasing the value a delay is induced in the loading; increasing the value the start of loading is anticipated with a consequent increase in the initial pre-load.
- Coefficients of proportional and integrated feed back to control the P.I. Feed Forward loop:
  The Kp and Ki constants are two fundamental parameters used by the software in the mathematical calculation of the servo-control. In brief, the system servo-control is explained as follows: each time a particular load ramp is requested, the machine is required to ensure that certain variables (named output or controlled variables) follow a certain path by acting appropriately on other variables (named input or control variables). The relationship between control variables and controlled variables is a mathematical model that matches each controlled variable corresponding with a control variable. Conversely, when the control variable assumes the value of the controlled variable it coincides with the start value. For Controls hydraulic servo-control consoles (MCC), this logic can be summarised by the following diagram:



Thanks to the feed back calculation when the machine is asked to perform a particular load ramp the oil feed is controlled and continually corrected (60 times per second for MCC and up to 120 times per second for Advantest 9) so as to best follow that load ramp.
The accuracy of the control and hence respect of the requested load ramp depends upon a series of factors; the soundness of the feed back calculation, the overall speed of the system (data acquisition, processing and consequent intervention, etc.), the type of test, the type of test frame and the type of sensor being used. Thus it is possible to intervene on the system (by Controls) to optimise the performance, and on the type of test (by user) to make sure there are no critical problems, it is also possible to adjust the parameters of the retro-control calculation to optimise the performance for a particular test procedure.
The feed back calculation is Proportional Integrated (P.I.) Feed Forward and thus there are two parameters that can be freely set to vary the performance.

Proportional constant k_p. Is used to proportional amplify the small errors between real values and theoretical values (both positive and negative) measured step by step by the machine and consequently vary the oil feed (increase or decrease) so as to better follow the theoretical load ramp. Thus, in practice, it is the error that pilots the performance of the machine. If the real speed is higher than the theoretical one the oil feed needs to be reduced and vice versa. When the error has a given sign (positive or negative) for a few consecutive readings, the consequent corrections will be of the same sign; when the sign of the error changes, the successive corrections will be of the opposite sign.
Therefore the curve of the real load ramp is always close to the theoretical one, moving slightly above and below it in a cyclic manner. The amplitude of these oscillations can be reduced by adjusting the k_p constant. Indeed by amplifying the current error proportionally the reaction of the machine is quicker than if the error is not amplified and the change of sign occurs quicker. Theoretically by increasing k_p to the infinitive the real curve and the theoretical curve would be superimposed, however above a certain threshold dependant on the type of test set up, by amplifying the error further, instead of achieving greater accuracy resonant oscillations and instability are produced.

Integrated constant k_i. Is used to take into consideration the history of the test, that is the moment immediately prior to the current moment. It allows the proportional amplification of sum of the integrals of the differences (errors) that were present instant by instant between the theoretical and real curve cancelling an error that remains constant and of the same sign which cannot be cancelled by k_p alone. Also in this case there is a maximum threshold value which should not be passed.
ATTENTION: The input and optimisation of these constants is factory made and, normally do not need to be changed by the user. Typical values of kp are between 1 and 3, whilst ki between 0.2 and 0.8. For more information contact Controls service department.

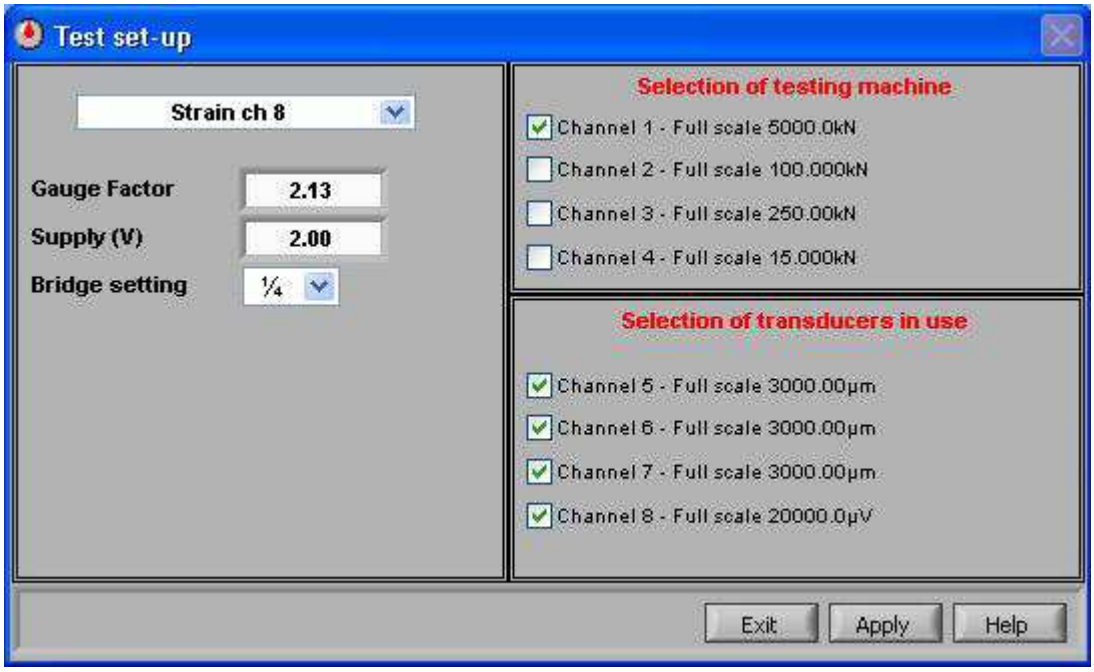
For those channels used to measure deformations (5….8) the following settings are available.

When using strain gauges to measure deformation

- **Gauge factor:** gauge factor (k) indicated on the package of the strain gauge. This conversion factor is used by the software to convert the electrical signal from the strain gauge to a deformation in microepsilon. It is given by the manufacturer of the strain gauge.

- **V Supply:** is the supply voltage of the bridge. This parameter is input automatically by the system following the settings of the channel calibration (see chapter Calibration).

- **Bridge configuration:** this parameter indicates the type of bridge of the strain gauge, the selection is ¼ bridge (with use of bridge compensation device 82-P0070/1) or ½ bridge.



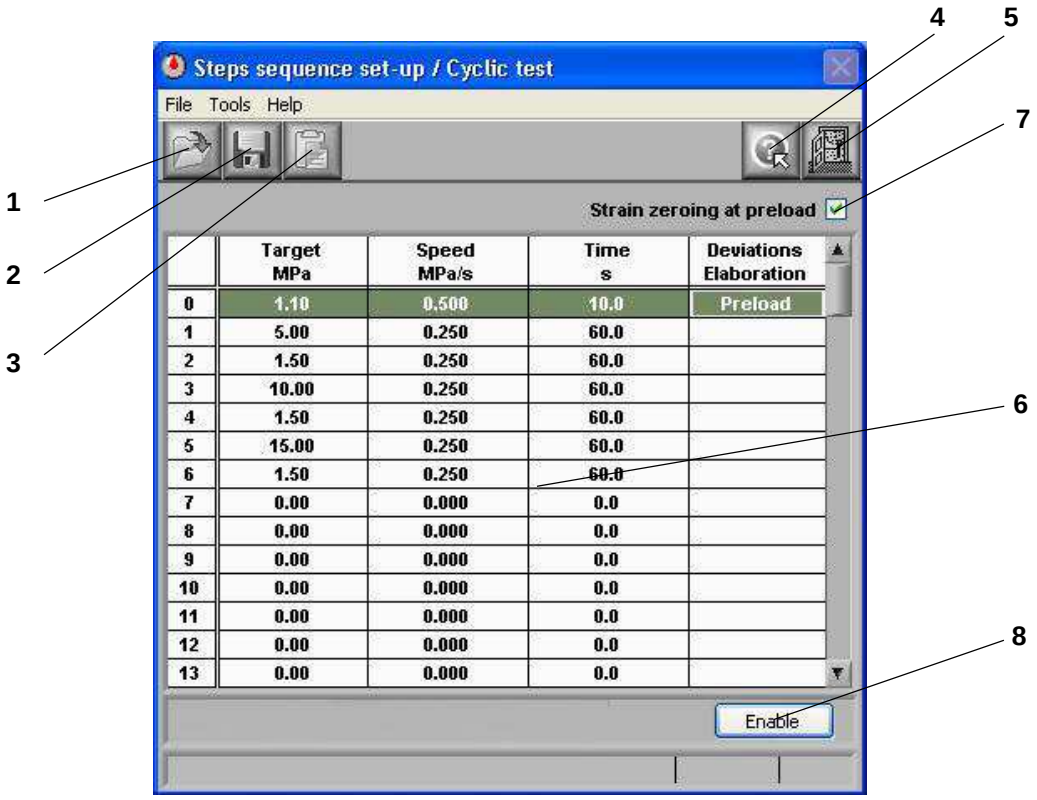
If using the compressometer C0222/F or equivalent transducers:

- **Base measurement (mm):** this is expressed in mm and is the distance between the two reference points of the compressometer. This parameter is used by the software to display the deformation directly (in microepsilon) even though making the readings in mm.

At the end of this procedure click on “Apply” before exiting the menu. If you do not click on “Apply” a confirmation message will appear.

Setting of steps which make up a test.

A test for the determination of the elastic modulus is made by the application of a load on a sample suitably fitted with sensors which allow the measurement of its deformation during the test. These loads are made in a number of steps which can be increasing or decreasing at a given rate, or held constant for a given time.
To set these steps, open the “set steps” window. The following screen will appear:



The following commands are available:
1) Open previously saved table
2) Save with name current table
3) Create new table
4) Help
5) Exit this window
6) Data zone
7) Command to automatically zero deformation readings when pre-load value is reached
8) Command to activate processing of deviations in the selected step

To create a new table overwrite the new data on the existing ones; it is also possible to cancel all existing data beforehand (“New table” command).

Insert the data of the steps, up to 100; the step number zero is used for the pre-load, that is the test start point different from zero. The program prevents the input of a values too low in relationship to the full scale of the selected test frame.
For each step the table requires the input of the following parameters:
- “Target”, corresponding to the load to be reached. It is expressed in kN or Mpa depending on the selection made in the Test Settings menu.
- “Speed” to reach the target load, expressed in N/s or Mpa/s.
- “Time” to maintain target load once reached. This parameter allows a slight pause before the next step. The minimum allowed value is 0.1 second.
- Activation of processing of the accumulative deviations using the “Activate” command in the lower right hand window. For full details of this processing see chapter "**Graph percentage deviation / Time**s".

At the end of data input the current table can be saved (Save command) in a file with extension **tbl** and name defined by the user.
It is also possible to repeat the set steps cyclically to perform a cyclic test. Activate the “Repeat cycle” function and input the number of times the table of steps is to be repeated.

Start and performing test

After making all the settings, operate in the main menu to start and control the test.
To make a test follow the procedure below:

1. Start the pump by clicking on 

   ATTENTION: if the pump does not start check that the red emergency stop button on the right hand side of the console is not pushed down.

   The pump must be kept running during consecutive tests. In this way the hydraulic oil in the circuit reaches and is maintained at its optimum temperature. Therefore we recommend that the pump is switched on a few minutes before testing is begun if the machine has not been used for some time (more than 1 hour).

   When the pump is on a green led comes on to the right of the command.

2. Place the prepared sample (with deformation transducers) in the test frame with a limited free vertical span (recommended 5 – 10 mm). The smaller the free vertical span, the better the test performance because less oil is present in the circuit.

3. Check, if necessary, the correct working of the transducers connected to channel 5…8.

   Click on 

   The following window is shown

   It is possible to check the readings of the channels and/or balance the connected bridge/s; each P0070/1 has a trimmer to adjust the zero which can be moved using a small screw driver. We recommend that the zero is set so that, at the beginning of the test, the reading is about 5 – 10 %.
   Upon completion close this window to continue.

4. Click on start test command

    The message “Rapid approach” is shown. The ram of the test frame is activated. During the rapid approach the channels are automatically zeroed and the system awaits for the sample to come into contact with the upper platen.

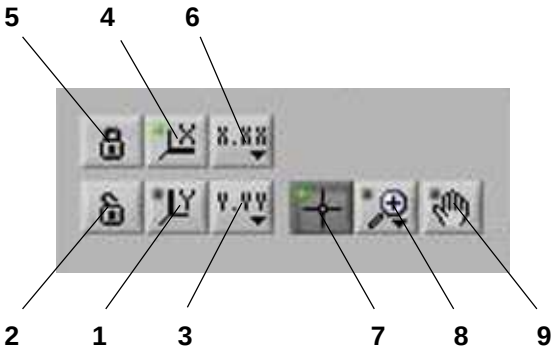
5. After contact the message “Test running” appears and the test begins. After a few moments the machine reaches the set pre-load value and, if requested, zeros the readings of channels 5…8. Next the load steps set in the table are performed. The channel readings are up dated and displayed in real time in the relative windows.

6. The graphs are also updated; it is possible to pass from one graph to another using the graph tools without interfering with the running of the test. For details of use of the graphs see chapter "**Use the graphs**".

7. The test will stop upon completion of the set steps or by pressing STOP  .

Use of the graphs

The E-Module software gives two graphs on the main screen: specific load/time above, specific load/deformations below. A few commands and options are available to optimise the axis scales, to zoom, etc.



1. Command for auto-scale of Y axis. By clicking on this command the scale of the Y axis is automatically set in relation to the readings made.

2. Command for automatic auto-scale of Y axis. Clicking on this command activates or dis-activates the auto-scale function (lock open or closed).

3. Options to personalise Y axis. By clicking on this command a menu appears which allows the modification of the format, the accuracy and the type of scale.

4. Command for auto-scale of X axis. By clicking on this command the scale of the X axis is automatically set in relation to the readings made.

5. Command for automatic auto-scale of X axis. Clicking on this command activates or dis-activates the auto-scale function (lock open or closed).

6. Options to personalise X axis. By clicking on this command a menu appears which allows the modification of the format, the accuracy and the type of scale.

7. Functions to activate for eventual positioning and/or movement of the cursors.

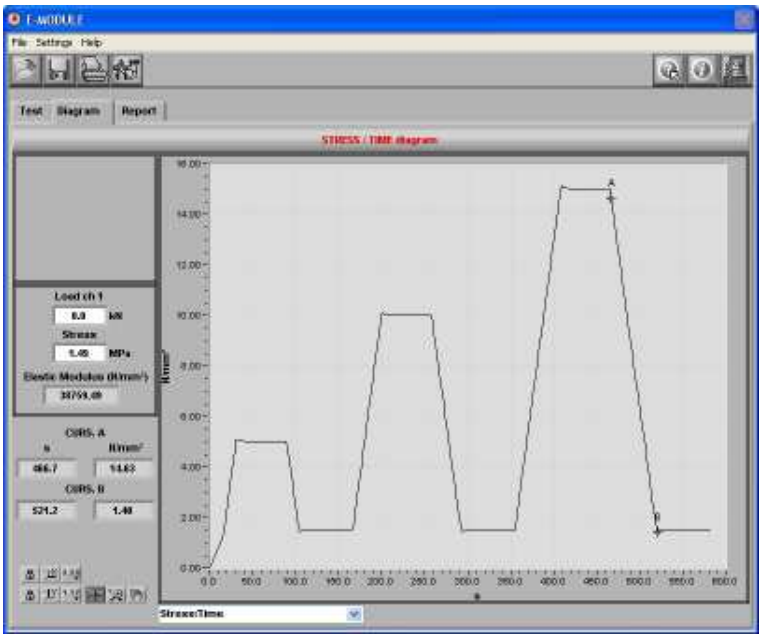
8. ZOOM function. Clicking on this command opens a menu with the following functions:
   1) Selection of a window which is enlarged so as to occupy the dimensions of the entire graph. To select a window position the arrow on the point of the graph to be zoomed, keep the mouse button pressed and move the mouse to outline the window. The zoom is made as soon as the mouse button is released.
   2) Is similar to function 1 but only allows horizontal zooming.
   3) Is similar to function 1 but only allows vertical zooming.
   4) By activating this function and then clicking on any point of the graph a zoom out effect is made.
   5) This function is the opposite to function 4.
   6) Clicking on this function gives simultaneous auto-scale of both axis.

9. By activating this function (the hand) it is possible to move the graph. Keep the mouse button pressed and move the mouse so as to move the graph to the desired position.
   It is also possible to alter the axis scales by simply clicking on the full scale and inputting the desired values.
   All these functions can be used both during and after the test and on graphs recalled from the memory.

DIAGRAM screen

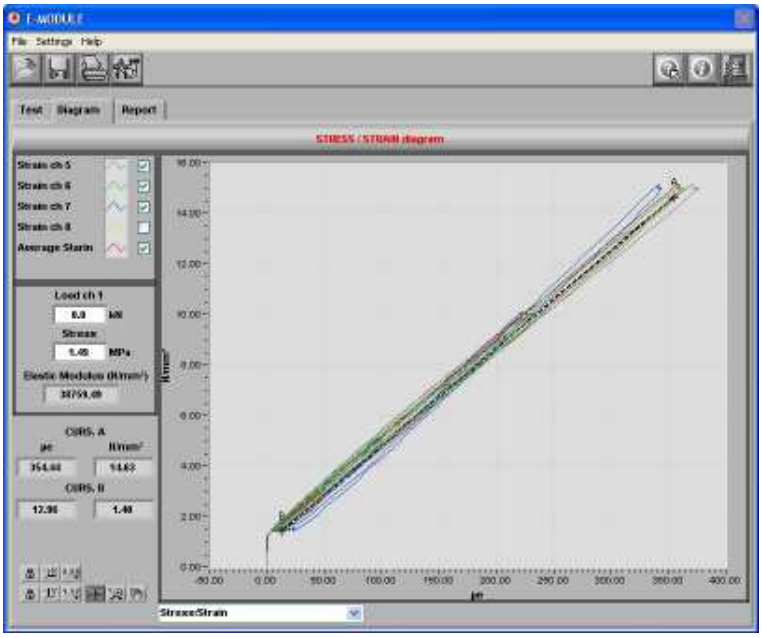
Recall the DIAGRAM screen to display the graphs on full screen. Three different graphs can be displayed:
- Specific load/Time
- Specific load/Deformations
- Percentage deviations/Time

Graph Specific load/time



This is the same graph present on the main screen of the program; in addition it allows the positioning of two cursors to allow the calculation of the elastic modulus.
To position the cursor move them with the mouse; the co-ordinates are shown in the relative box to the left of the graph. The corresponding value of the elastic modulus in shown in N/mm².

Graph Specific load/Deformations



This is the same graph present on the main screen of the program; in addition it allows the positioning of two cursors to allow the calculation of the elastic modulus as per the previous graph.
To position the cursor move them with the mouse; the co-ordinates are shown in the relative box to the left of the graph. The corresponding value of the elastic modulus in shown in N/mm².
The upper left hand box allows the selection of the channels to show on the graph. Each channel is identified by a different colour. The red colour identifies the average value of deformations.

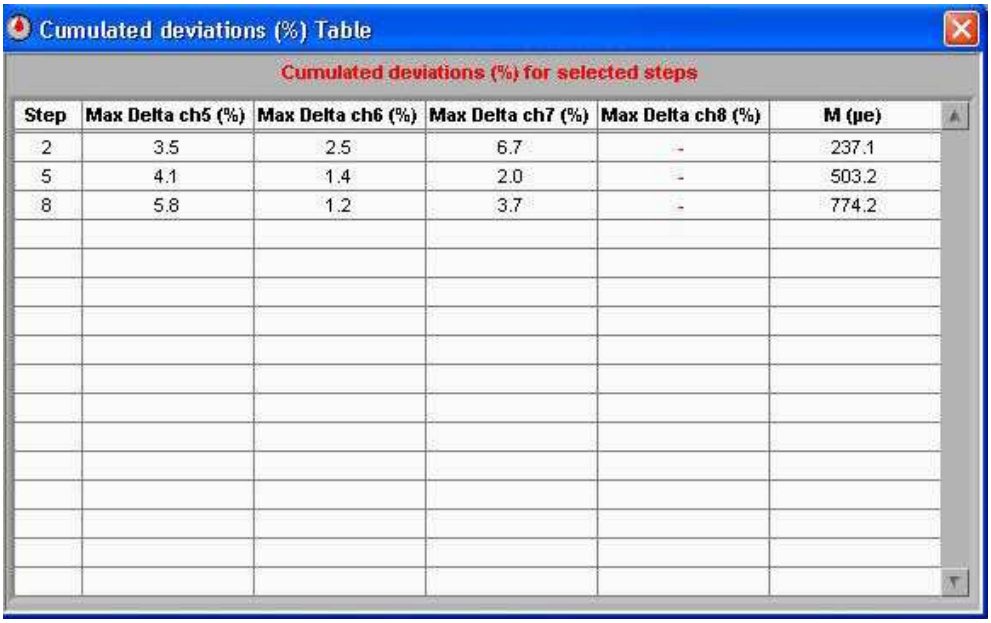
Graph percentage deviations/Time

This graph is particularly important and useful since it allows the real time monitoring of the percentage deviation of the reading of each deformation sensor with respect to the average deformation. International Test Standards require this type of control and indicate the maximum permissible error. This limit can be selected (Ref. %) so as to allow its display on the graph (with white background instead of grey).
The graph background also shows the Specific load/Time graph so the user can immediately identify the status of the current test.

The lower right hand key (table deviations) allows the display of a table showing the accumulative percentage deviations of the selected step (see chapter "**Setting of steps which make up a test**"). This function allows accumulative monitoring (that is in a predetermined time) of the deformations in the step of stable load application as requested by the major test standards. The table shows the processed results for each channel, referring to the selected steps. The results which remain within the preset error limit are shown in black, whilst those outside the limit are shown in red.

The following pictures show some examples of the table of settings and the corresponding table of the accumulative deviations.

ATTENTION: This is only an example. The values shown do not necessarily reflect a real test.



Step	Max Delta ch5 (%)	Max Delta ch6 (%)	Max Delta ch7 (%)	Max Delta ch8 (%)	M (με)
2	3.5	2.5	6.7	-	237.1
5	4.1	1.4	2.0	-	503.2
8	5.8	1.2	3.7	-	774.2

The second table displays the processed results of the accumulative percentage deviations in step 2, 5 and 8 which were activated in the previous table.

Input of descriptive data
Recall the "REPORT" screen to access the page which allows the input of the descriptive and administrative data which will subsequently be saved and printed with the read data.

SAVE command
This command is used to save the data and descriptions of the last test made in a file *.emd which will then be accessible only through the E-Module program.
Simultaneously, if this option is activated, it is also saved in XLS, or DOC, or TXT format.

OPEN command
Used to access previously saved files *.emd. The display will show the read data and descriptions.

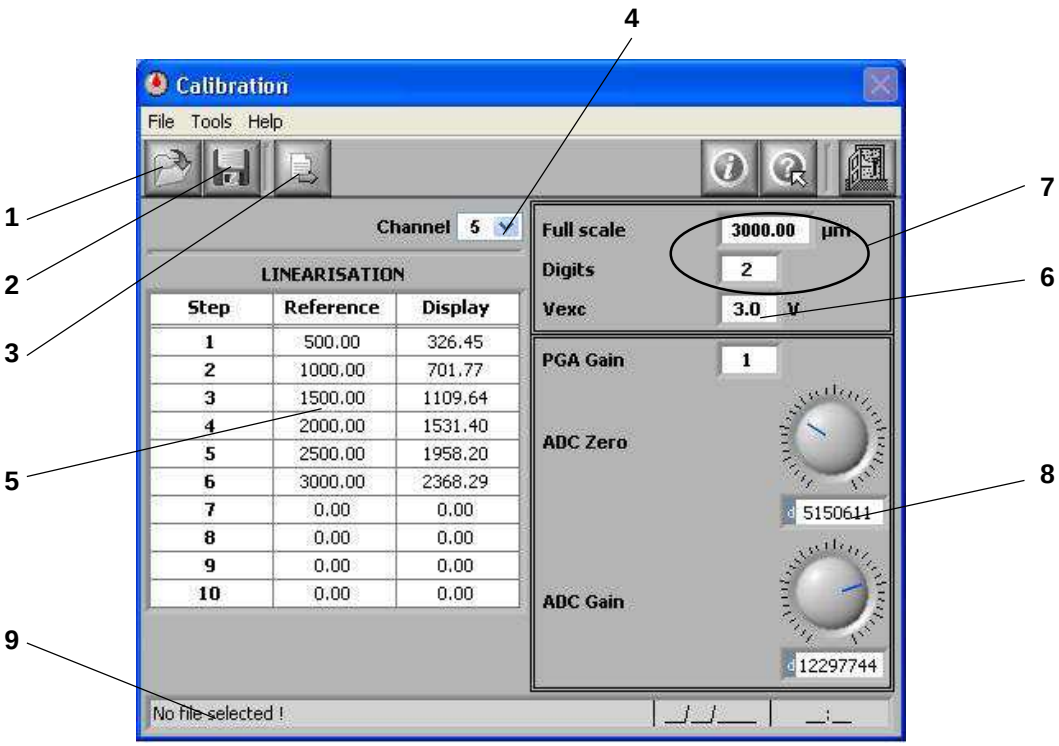
PRINT command
It is possible to print the following elements:
- Test report, comprising the descriptive and administrative data as well as the test results.
- Graphs of the main screen.
- Graph of the deviations and relative table of the test results.

Before activating the print process ensure that the printer is connected and on line.

CALIBRATION

This menu allows the display of all the calibration settings of the console channels and create back up files to allow re-calibration of the channels when this is necessary. Please remember that in order to make calibration one must work directly from the control panel of the machine in local mode. See chapter **7. Calibration** for full details.
To access the calibration menu a password must be entered.
By default a password is not entered. To set the password see chapter "**General settings**".
ATTENTION: this menu should only be accessed for calibration needs, do not enter this menu for any other reasons.
ATTENTION: Before accessing this menu carefully read the instructions given below. Controls will not be responsible for any inconvenience caused by incorrect calibration.

The calibration menu presents the following screen:



1) Open command to access the calibration file
2) Save command to memorize the current calibration
3) Send command to send current calibration to the console of Advantest 9
4) Channel selection
5) Calibration table of selected channel
6) Feed voltage of the channel
7) Full scale, measurement unit and decimal places
8) Calibration zero and gain
9) File name, if selected

For each channel it is possible to display all the set parameters. These are sent to the command console when the serial connection is activated.

A back-up of the current calibration of each channel can be made. This is recommended and should be done each time calibration is made or updated. Use the Save command.

To display and eventually access the saved calibration of a selected channel use the Open command. Remember that on the same channels (channels 5 to 8) various transducers can be calibrated, each calibration must be saved independently so as to create a database of calibrations. When required, it is suffice to recall the required calibration. To do this use the Send command, the current selected calibration of the selected channel is thus sent to the console.
ATTENTION: this operation should only be made to re-configure the channel to use a different transducer.

15. INSTALLING AND CONFIGURING THE SOFTWARE

15.1 Software module for general tests. Main characteristics.

The program is written to operate in MS Windows®. It allows the remote control of the MCC console.
The main characteristics of the software are:

- perform remote control of system; manages the graphical and numerical display of acquired readings, including overlaying of different diagrams with the same axis (e.g. three deformation curves with same time axis).
- perform tests made of cycles or steps set by user.
- allows real time variation of all the function parameters during a test, including change of channel and/or control variable.
- allows print-out of test report.
- language selection between English, Italian, French or Spanish plus another language which can be input by the user by editing the input text.
- Download and upload of calibration settings for each channel.
- Save, print and recall of test reports, including the possibility to convert the data in DOC, XLS, TXT format.

The minimum requirements of the PC are:

- processor with clock equal or above 1 GHz
- at least 200 MByte of free space on hard disk
- 512 MByte RAM memory
- CD - ROM
- 1 free RS232 serial port (RS232-USB converters may require specific setup; refer to the documentation provided by the supplier of the converter)
- Windows XP, or higher version.

NOTE: PC and printer are not supplied with the equipment and must be sourced locally.

15.2 INSTALLING THE PROGRAMS FOR THE USE OF THE EQUIPMENT

The computer required to run the MCC version /C, is not provided and must be sourced locally (see the specifications previously provided). Please make reference to chapter 15 to install and configure the programs.

To run the equipment, it is necessary to install on the PC the following three programs:

- Datamanager
- E-Module

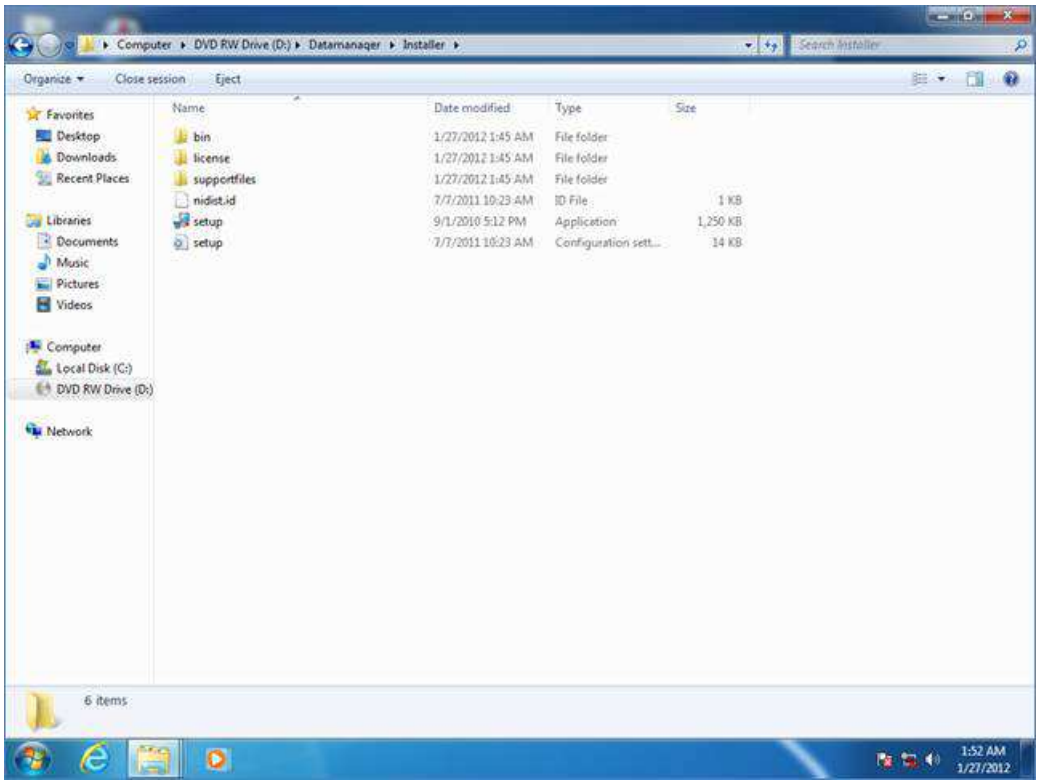
These programs are provided with 2 separate CD-ROMs as follows:

- CD-ROM containing the programs (named “INSTALLER”)
- CD-ROM containing the configuration files (named “CONFIGURATION FILES”).

These program must be installed on the PC by the user following the procedure here after indicated, in the given order (e.g. if they are installed in a different order than indicated, the machine will not work).

15.2.1 INSTALLING THE PROGRAM “DATAMANAGER “(1st PROGRAM TO INSTALL)

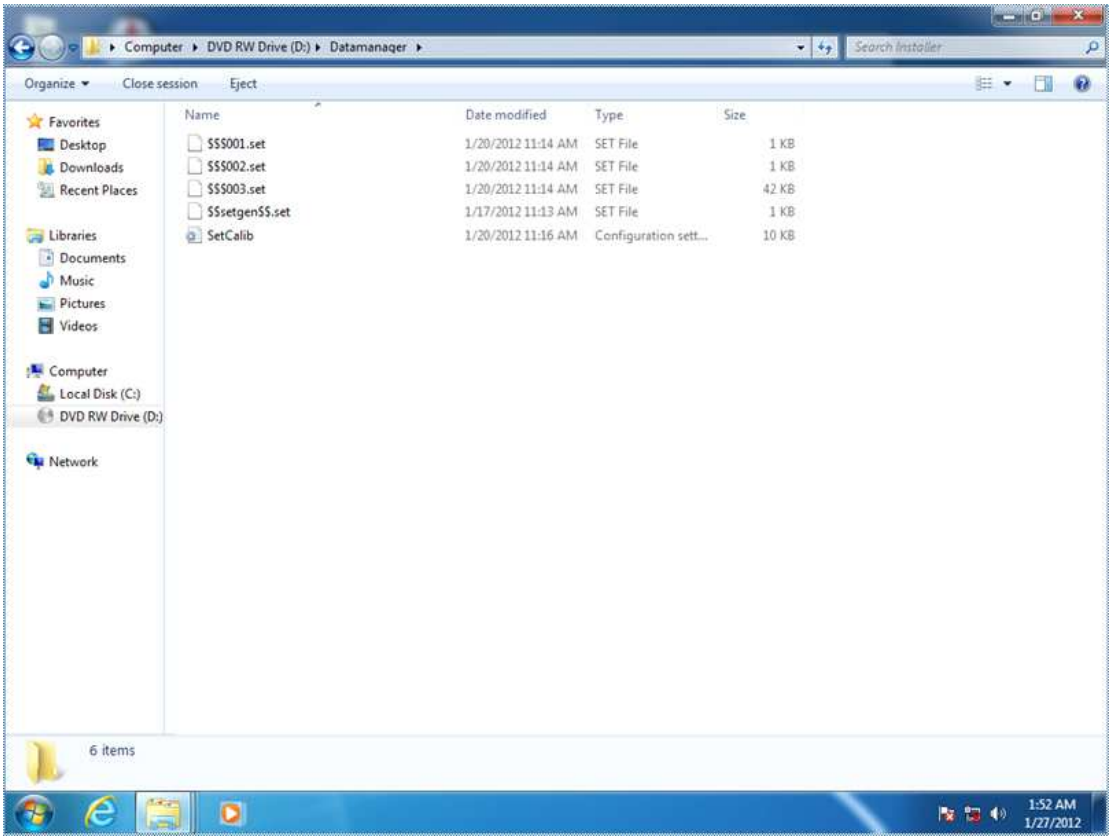
Installing the program
Insert the CD – ROM “INSTALLER” into the drive.
Access the folder D:\Datamanager\Installer.



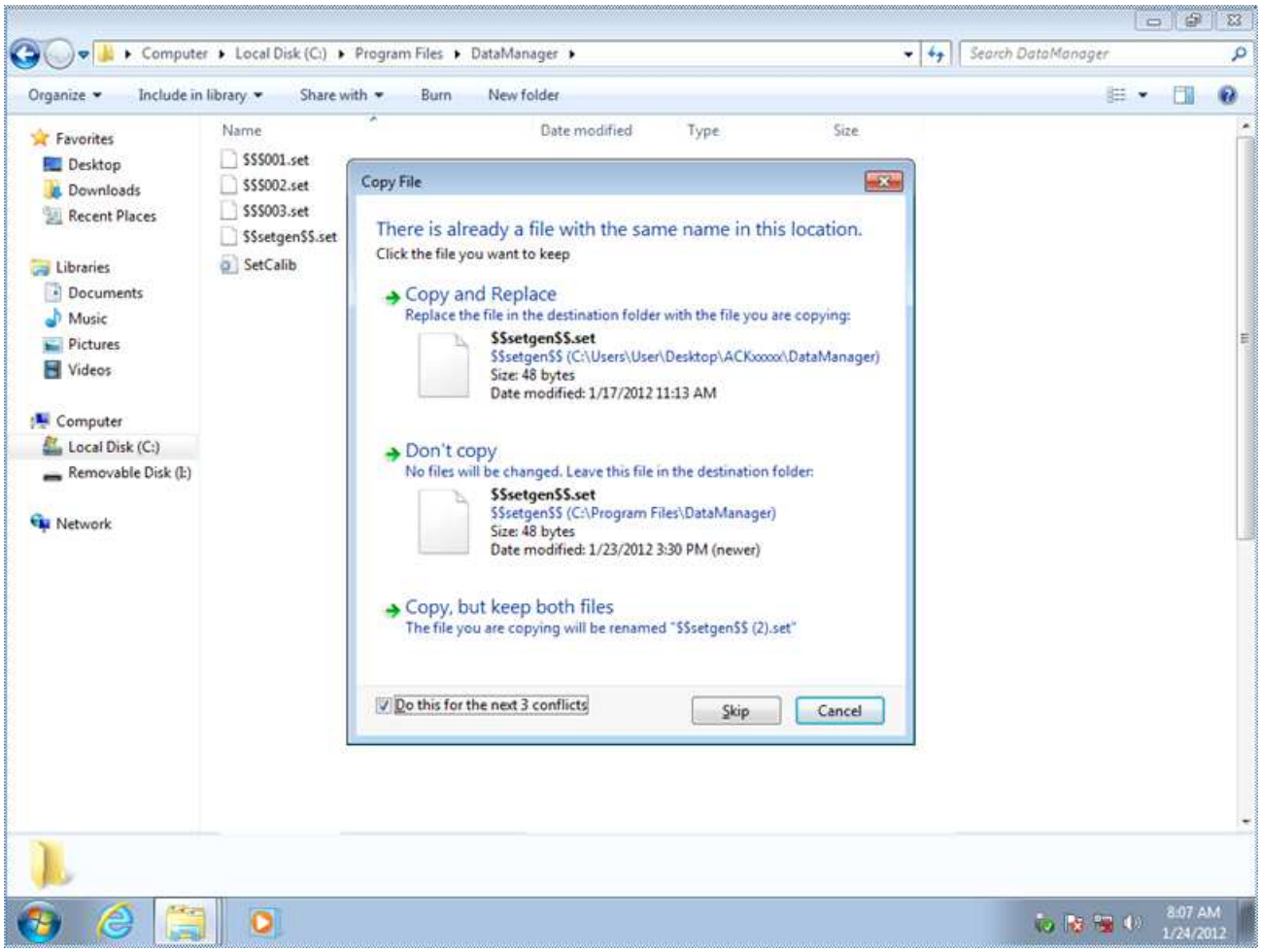
Click on “Setup”.
Follow the instructions given on the screen and press on “Next”.
In case it does not appear as default, select the folder C:\Program Files\Datamanager and proceed by pressing “Next”.

Wait until the end of the installation process.
Re-start the PC.

Configuring the program
Insert the CD – ROM “CONFIGURATION FILES” into the drive.
Access the folder D:\Datamanager, select all files present and press “Copy”.



Access the folder C:\Program Files\Datamanager and paste the files previously copied overwriting the existing ones.

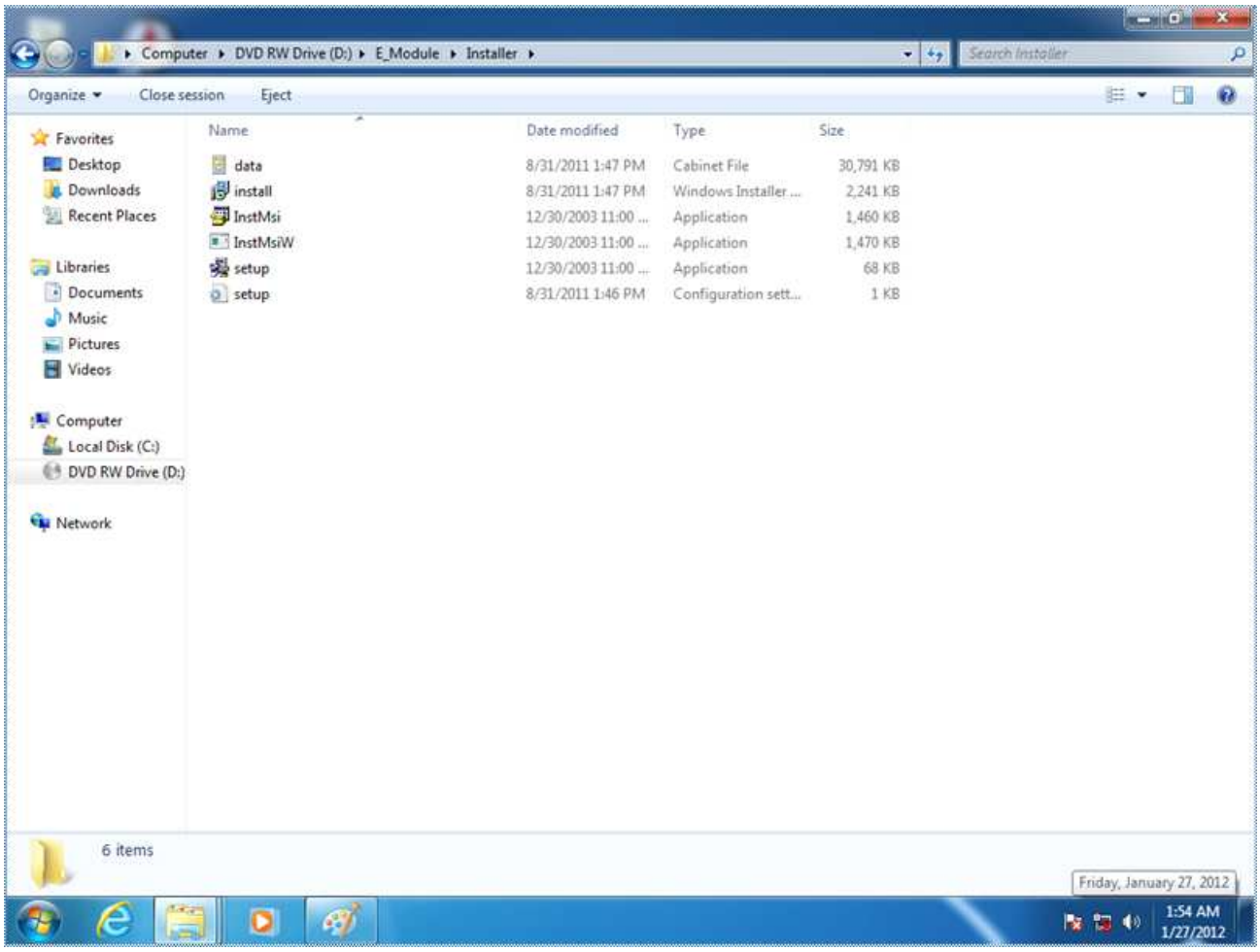


15.2.2 INSTALLING THE PROGRAM “E MODULE” (2nd PROGRAM TO INSTALL)

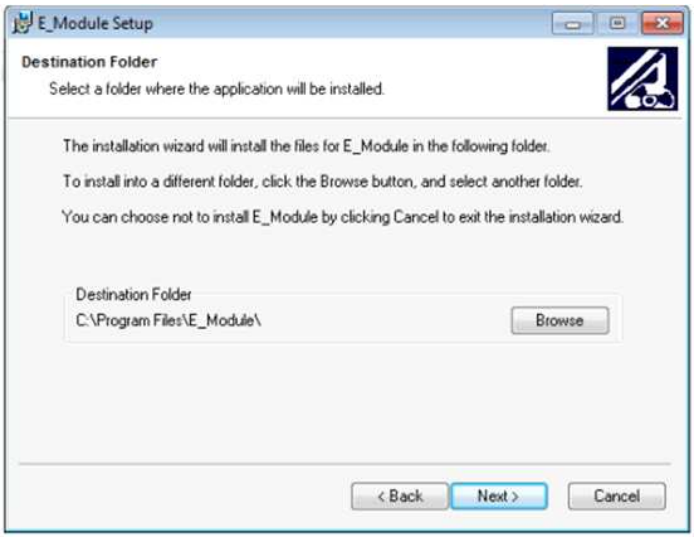
Installing the program

Insert the CD – ROM “INSTALLER” into the drive.

Access the folder D:\E_Module\Installer.

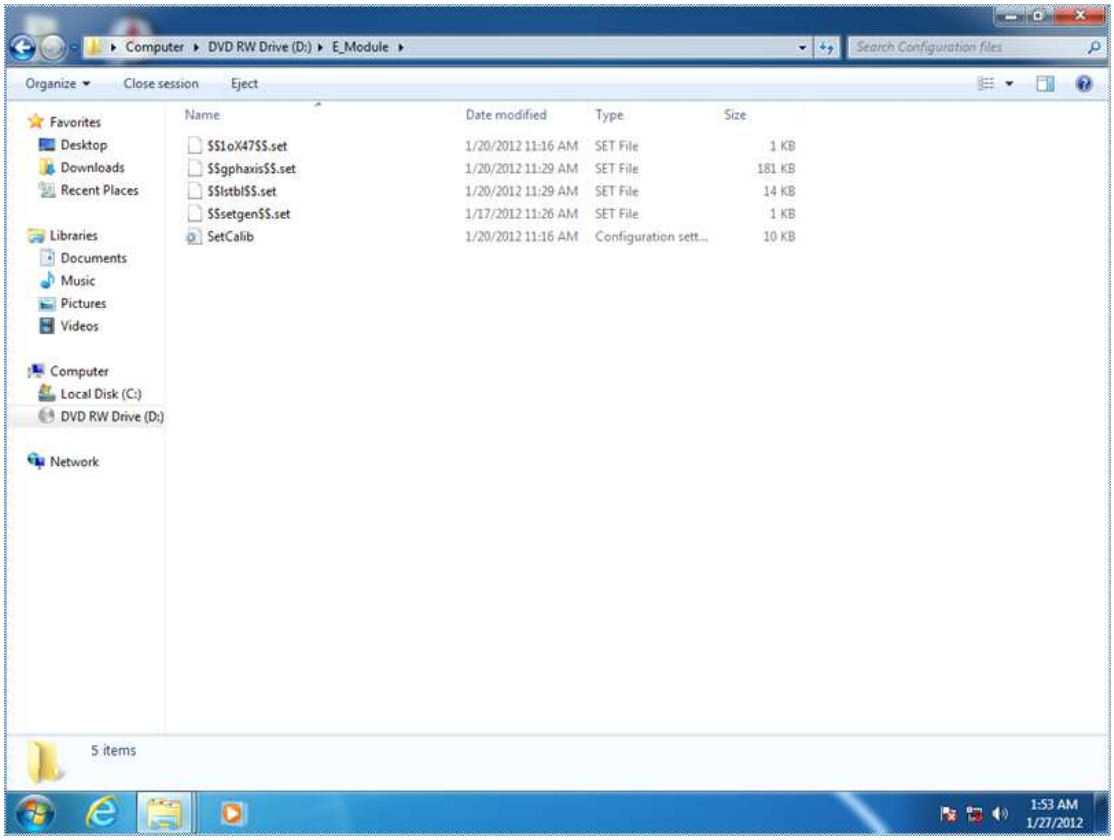


Click on “Setup”.
Follow the instructions given on the screen and click on “Next”.
If it does not appear as default, select the folder C:\Program Files\ E_Module and proceed by pressing “Next”.

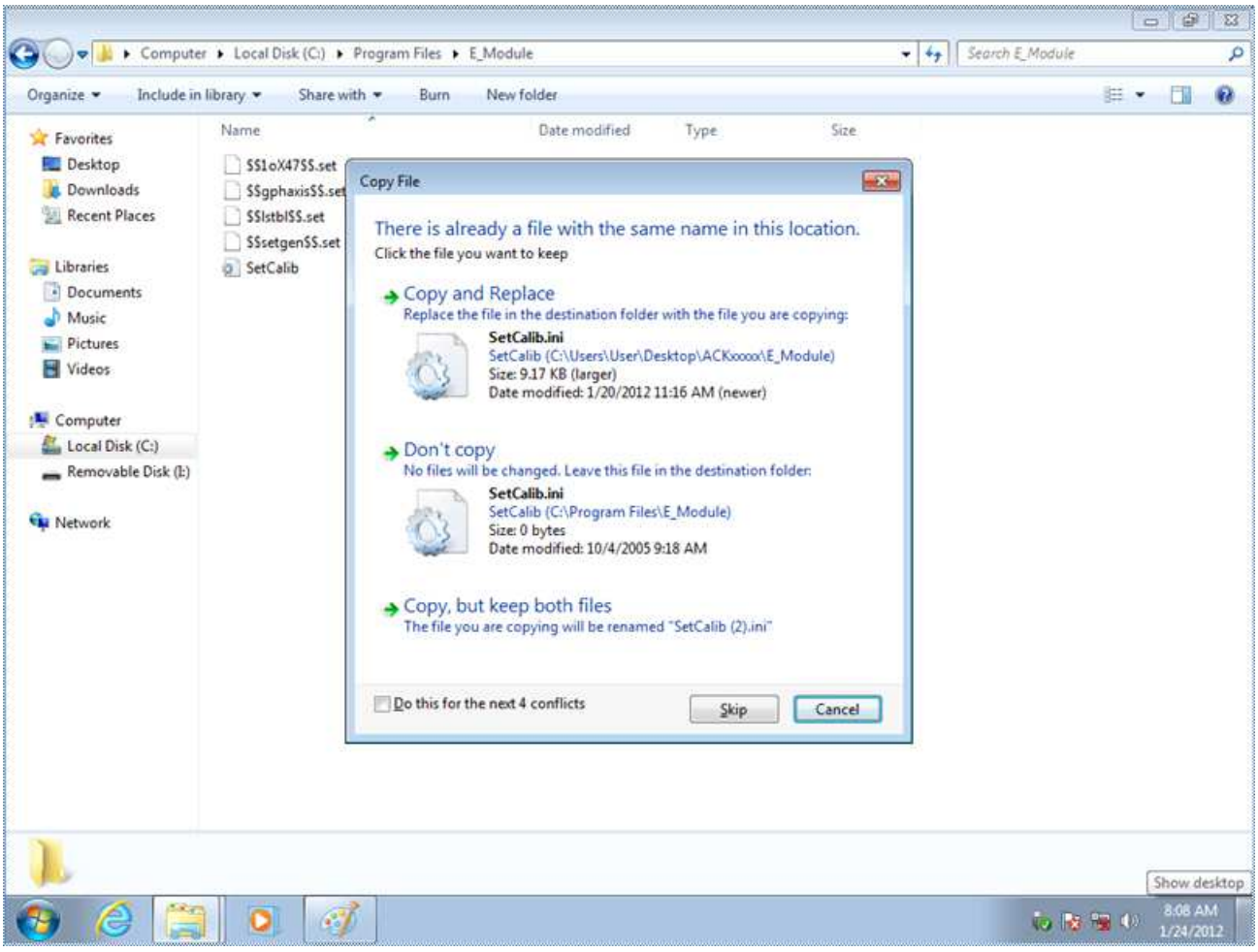


Wait until the end of the installation process.
Re-start the PC.

Configuring the program
Insert the CD – ROM “CONFIGURATION FILES” into the drive.
Access the folder D:\E_Module, select all present files and press “Copy”.



Access the folder C:\Program Files\E_Module and paste all files previously copied overwriting the existing ones.



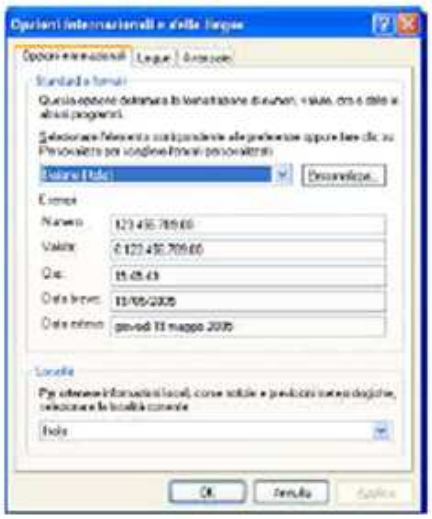
15.2.3 CONNECTION OF THE SERIAL PORT

Connect the serial port RS232 of the MCC consolle to the serial port of the PC, using a standard 9-pin, male-female, pin-to-pin serial cable. If the PC does not have a serial port, it is possible to use a RS232-USB converter to be sourced locally (Not all models of RS232-USB converter may be compatible, please refer to the relevant supplier for information on its set up) .

15.2.4 SETTING OF THE NUMERICAL FORMAT

The DataManager uses the point symbol as a decimal separator. To check its correct setting in the PC operative system proceed as follows:

- Access the “control panel” of Windows® (Start, Settings, Control panel)
- Access “international settings and language”. The following window will appear:



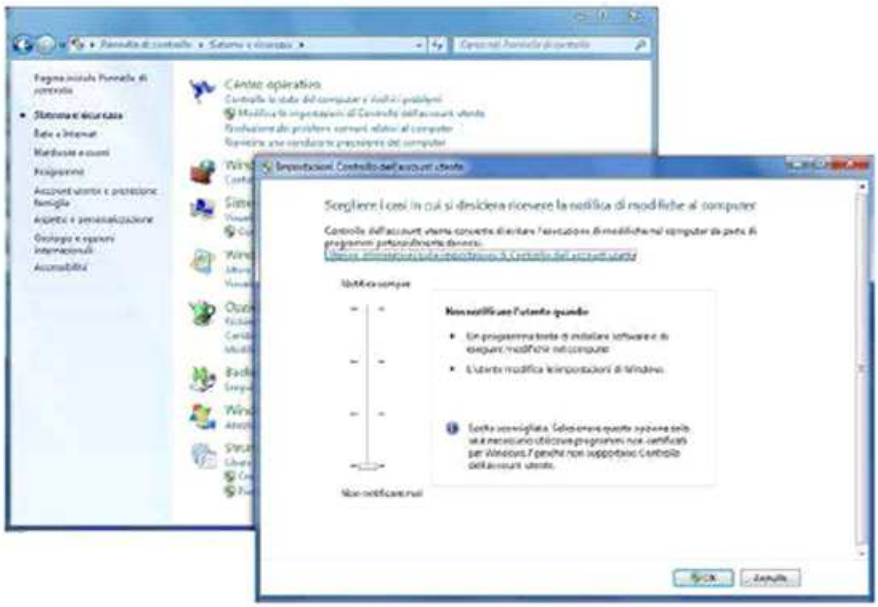
- access the “personalization” sector. The following window will appear:

The window shows the correct settings. Note that the decimal separator is a point and that the symbol for regrouping of digits is given by an empty space.
Check the settings and modify as needed, Click on “Apply” if modifications are made before exiting by clicking on “OK”.

15.2.5 USER ACCOUNT CONTROL SETTINGS

If the computer is equipped with the WINDOWS 7 operating system, set it as follows:

- From CONTROL PANEL select the option SYSTEM AND SECURITY then CHANGE USER ACCOUNT CONTROL SETTING;

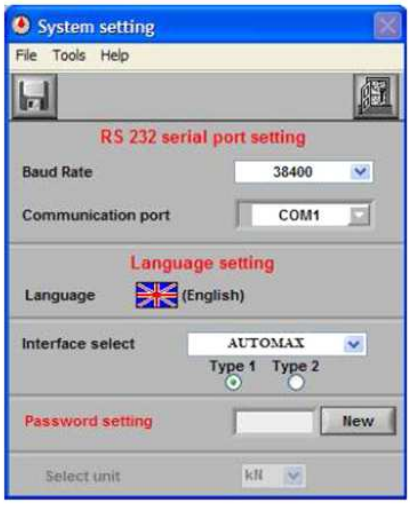


- Set the level to NEVER NOTIFY;
- Re-start the computer.

15.2.6 CHECKING OF THE SERIAL PORT SETTINGS

Run the programs DATAMANAGER then E-MODULE. For each program access the menu “System settings” via the button  . The following window will appear on the screen (different depending on the program run):

DATAMANAGER PROGRAM



E-MODULE PROGRAM

On both programs, check that the BAUDRATE is set to 115200. If different, set it as requested (the program MCC).

Then select the communication port according to the one used. In case of doubt, refer to the documentation of the computer.

15.2.7 SETTING OF THE ACQUISITION SYSTEM (ONLY FOR DATAMANAGER PROGRAM)

Always inside the “System settings” menu, check that for the DATAMANAGER program, the INTERFACE SELECT option is set to MCC. In case it is different, access "Interface select" function. A password is requested. Digit "controls", then confirm, and then select MCC.

Upon completion save the settings (“save”  key), and then return to the main menu (“esc”  key).

15.2.8 ENERGY SAVE OPTIONS

To avoid breaking of the communication between the MCC consolle and PC, set the Energy saving options to disable the computer to enter the screen saver and stand-by status modes (via the CONTROL PANEL of the operating system in use, refer to the documentation of the computer).

15.2.9 PRODUCT REGISTRATION (TO CARRY OUT AFTER INSTALLING AND SETTING THE PROGRAMS)

Registration is required in order to use the programs. This avoids the use of unlicensed pirate copies of the program. If registration is not made the program will operate for 30 days from the initial installation after which access will be denied to the test menu.
To register the software asks CONTROLS After Sales Service for your registration code corresponding to the activation code of your PC. This is shown on the first line and must be communicated to CONTROLS when requesting the registration code.
Upon start up the following window appears:

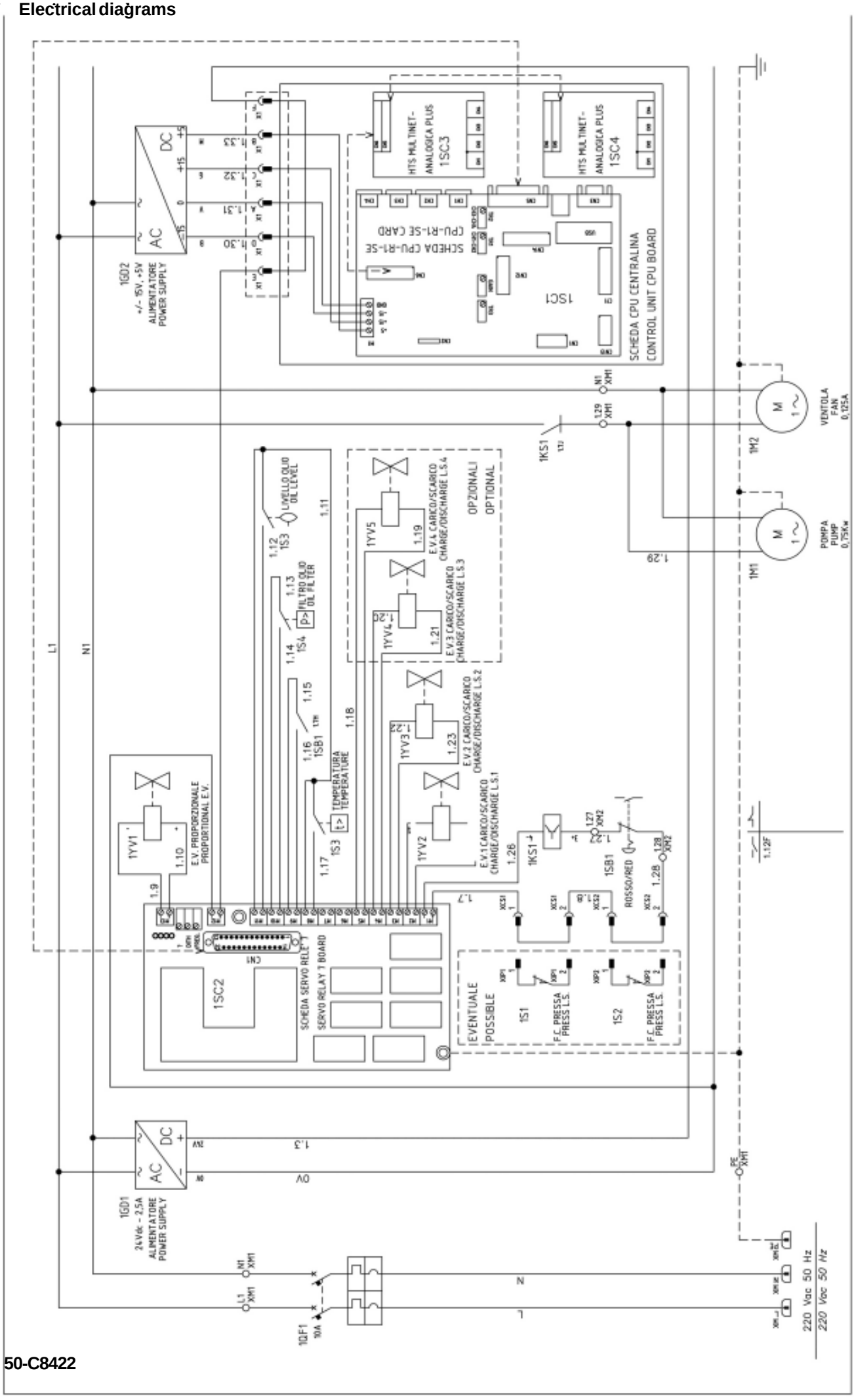
For example, in the screen above the activation code to communicate to CONTROLS is 272564530.
Attention: The activation code can be a positive or negative value, please ensure that this is also given.
You must give CONTROLS the activation code in order to register the software.
To access the software without registration press OK, to proceed with registration press Register after having input the correct registration code.
This screen also shows:
- The current function mode (e.g. Trial Mode that is a period with software not registered);
- Number of trial days still available.

IMPORTANT NOTE:
DO NOT CHANGE THE DATE ON THE COMPUTER WITH THE AIM OF BY-PASSING THE PROTECTION FUNCTION OF THE PROGRAM. THIS ACTION WILL CAUSE THE HANG UP OF THE SYSTEM AND WILL RENDER UNUSABLE THE PROGRAMS ON THE PRESENT PC (ALSO UNINSTALLING AND RE-INSTALLING THE PROGRAMS). IN CASE THIS IS DONE, THE ONLY POSSIBILITY TO RUN THE MENTIONED PROGRAMS IS TO INSTALL THEM ON ANOTHER COMPUTER.

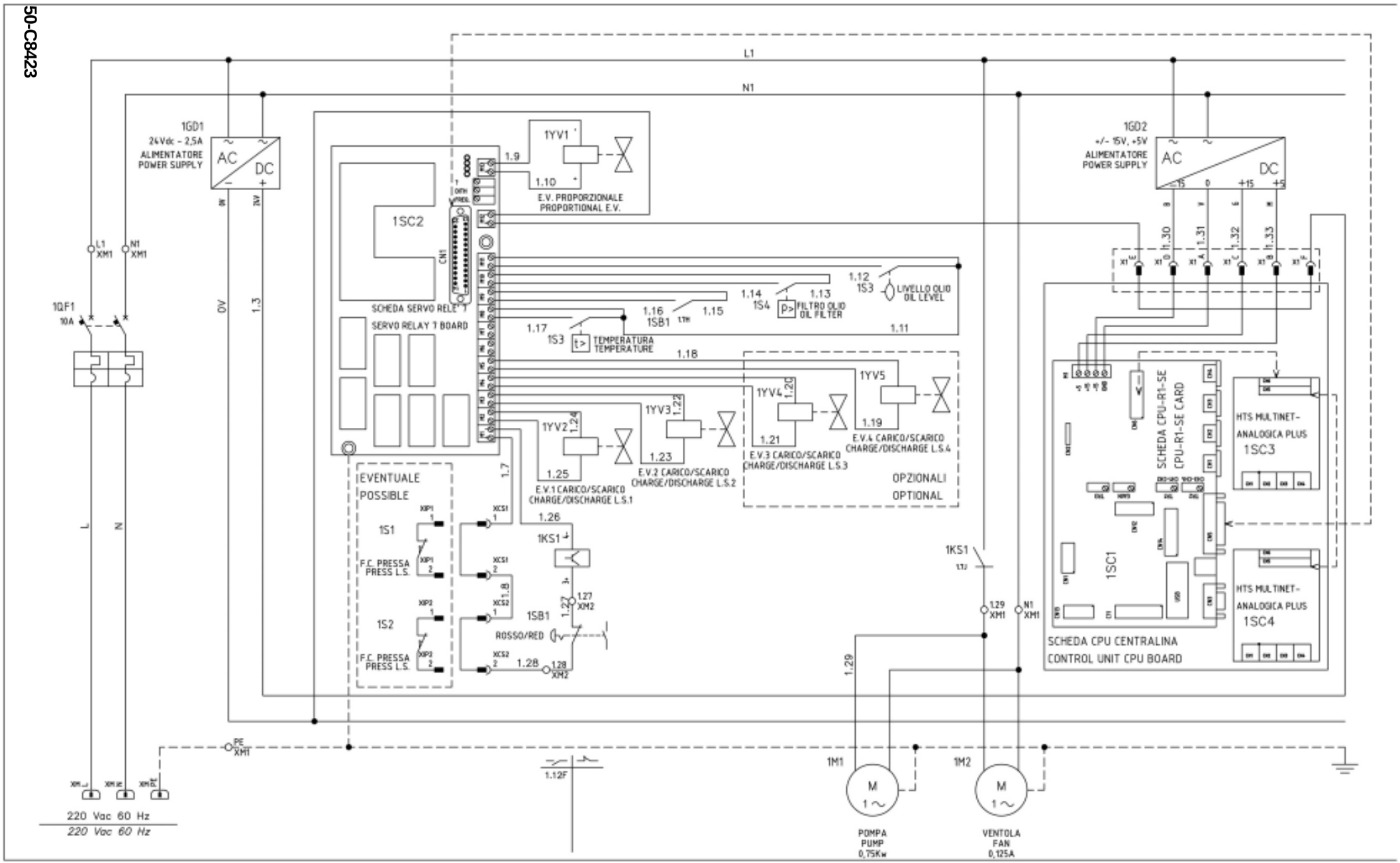
16. Operator's preventive maintenance

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 and dry platens, distance piece and ram from the sample debris	Operator	At the end of each working session
General inspection	Operator	Weekly
Check the status of the hydraulic tubes against leakages and damages	Operator	Weekly
Check status of the safety devices: max. pressure valve, piston over travel switch and relevant cable, front door and rear transparent guard, front door magnetic switch and relevant cable, emergency button	Operator	Weekly
Check the status of all interconnection cable (Es. Transducer, Loadcell, Serial to PC) etc.	Operator	Weekly
Check status and functioning of the operator’s command	Operator	Weekly
Check the level of the oil in the tank (see chapter 5.1.2)	Operator	Monthly
Check that all label and rating plates are intact and properly attached	Operator	Monthly

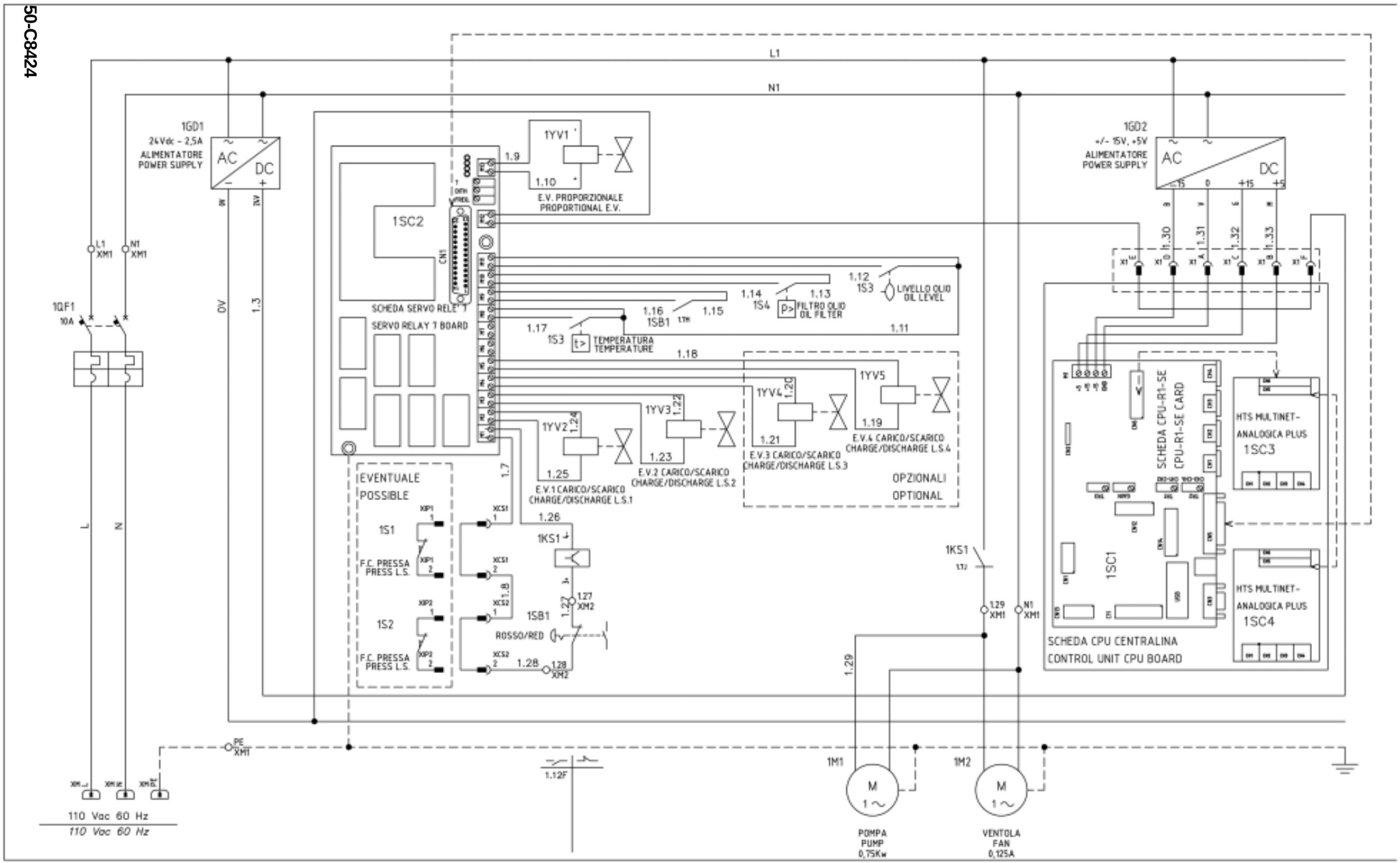
17.[illegible] Electrical diagrams



50-C8423


L1
N1
1GD1
24Vdc - 2,5A
ALIMENTATORE
POWER SUPPLY
AC
DC
1GD2
+/- 15V, +5V
ALIMENTATORE
POWER SUPPLY
1QF1
10A
L1 XM1
N1 XM1
0V
1.3
1SC2
SCHEDA SERVO RELE' T
SERVO RELAY T BOARD
1YV1
1.9
1.10
E.V. PROPORZIONALE
PROPORTIONAL E.V.
1.12
1S3
LIVELLO OLIO
OIL LEVEL
1.14
1S4
1.13
FILTRO OLIO
OIL FILTER
1.16
1SB1
1.15
1.17
1S3
TEMPERATURA
TEMPERATURE
1.11
1.18
1YV4
1.20
1.21
E.V.3 CARICO/SCARICO
CHARGE/DISCHARGE L.S.3
1YV5
1.19
E.V.4 CARICO/SCARICO
CHARGE/DISCHARGE L.S.4
1YV3
1.22
1.23
E.V.2 CARICO/SCARICO
CHARGE/DISCHARGE L.S.2
1YV2
1.24
1.25
E.V.1 CARICO/SCARICO
CHARGE/DISCHARGE L.S.1
OPZIONALI
OPTIONAL
EVENTUALE
POSSIBLE
1S1
F.C. PRESSA
PRESS L.S.
1S2
F.C. PRESSA
PRESS L.S.
1.7
1.26
1KS1
1.27
1SB1
ROSSO/RED
1.28
1.29
1.30
1.31
1.32
1.33
SCHEDA CPU-R1-SE
CPU-R1-SE CARD
1SC1
HTS MULTINET-
ANALOGICA PLUS
1SC3
HTS MULTINET-
ANALOGICA PLUS
1SC4
SCHEDA CPU CENTRALINA
CONTROL UNIT CPU BOARD
PE XM1
1.12F
1M1
1M2
M
POMPA
PUMP
0,75Kw
VENTOLA
FAN
0,125A
220 Vac 60 Hz
220 Vac 60 Hz

50-C8424


L1
N1
1GD1
24Vdc - 2,5A
ALIMENTATORE
POWER SUPPLY
AC
DC
1GD2
+/- 15V, +5V
ALIMENTATORE
POWER SUPPLY
1QF1
10A
1SC2
SCHEDA SERVO RELE' 1
SERVO RELAY 1 BOARD
1YV1
E.V. PROPORZIONALE
PROPORTIONAL E.V.
1S3
LIVELLO OLIO
OIL LEVEL
1S4
FILTRO OLIO
OIL FILTER
1SB1
TEMPERATURA
TEMPERATURE
1YV2
E.V.1 CARICO/SCARICO
CHARGE/DISCHARGE L.S.1
1YV3
E.V.2 CARICO/SCARICO
CHARGE/DISCHARGE L.S.2
1YV4
E.V.3 CARICO/SCARICO
CHARGE/DISCHARGE L.S.3
1YV5
E.V.4 CARICO/SCARICO
CHARGE/DISCHARGE L.S.4
OPZIONALI
OPTIONAL
EVENTUALE
POSSIBLE
1S1
F.C. PRESSA
PRESS L.S.
1S2
F.C. PRESSA
PRESS L.S.
1KS1
1SB1
ROSSO/RED
SCHEDA CPU-R1-SE
CPU-R1-SE CARD
HTS MULTINET-
ANALOGICA PLUS
1SC3
HTS MULTINET-
ANALOGICA PLUS
1SC4
1SC1
SCHEDA CPU CENTRALINA
CONTROL UNIT CPU BOARD
1M1
POMPA
PUMP
0,75Kw
1M2
VENTOLA
FAN
0,125A
110 Vac 60 Hz
110 Vac 60 Hz

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.
Please refer to the local laws and regulations for proper disposal of the product.

NOTE

NOTE

NOTE