# USER MANUAL

## NC7311

CE


## DIGITROLL 7000

CONTROLLI

ISO 9000

# INDEX

# 1. PREFACE

NC7311 Control Unit, in connection with NR Controllers, can be used in the centralised systems for the regulation of room temperature.

# 2. OPERATION

NC7311 Control Unit operates by assigning to the controllers one of the four possible operation modes corresponding to different system operation requirements.

- COMFORT mode (NM) with set point programmable by the Control Unit.
- UNOCCUPIED mode (RC), which can be reset by acting on the room sensor, with a set point of ± 3.5K (depending on SUMMER or WINTER operation) with respect to the COMFORT mode.
- UNOCCUPIED mode (RF), not modifiable manually, with the same set point of the (RC) UNOCCUPIED mode.
- ANTI-FROST mode (AF) with set point at 8°C.

The modes vary according to daily and weekly schedules, holiday and vacation periods and manual overrides activated by the operator.
The set point of NM, RF and RC modes may be modified for WINTER-SUMMER condition actions in order to compensate the outside temperature detected by the sensor.
For an easier operation, answering to the real needs of the system, it is possible to subdivide the controllers into groups (up to four) each corresponding to a specific area.
Controllers belonging to the same group operate with the same time schedules, modes, operation and calibration set point values, as further described.
Controllers may be assigned to a group following their belonging to a homogeneous plant zone: this does not imply any modification in the existing connections.

When required, the controllers may be considered as “SINGLE”. It is possible to assign to each one of these controllers, certain operation parameters, allowing an independent management of specific premises.
Setting operations are carried out on the Control Unit; thus, cyclically, it supplies data to all the programmed controllers.

**Setting the operation parameters for every group.**
For every group (up to four) it is possible to set:

- Controllers belonging to the group.
- COMFORT mode set point.
- Dead zone between heating and cooling action.
- The actuator stroke timing of C Channel (Hot).
- The actuator stroke timing of F Channel (Cool).
- (P or P+I) regulation timing.
- The proportional band for the two channels (C and F).
- Integration time for the two channels (C and F).
- Start point and authority for winter/summer compensation.
- Cooling qualification for RC and RF modes.
- Weekly and daily schedules.
- Holiday and vacation period’s modes.
- Overrides in pre-set modes.

**Setting operation parameters for SINGLE controllers**
For each SINGLE controller have to be set individually the same parameters of the groups, excluding weekly and daily schedules, holidays and vacation periods. In the latter case, the controllers use the parameters of the group they belong to.

**Actuator stroke timing**
For a correct indication of the actuator position, each controller, driving a bi-directional actuator, requires the real value of the actuator stroke timing.
Therefore, the operator is asked to input a value between 0 and 100 corresponding to 0-480 seconds of stroke timing, only for those controllers driving bi-directional actuators

**Data display**

It is possible to check the operation and eventually modify the parameters set using the function keys and the data display (4 lines – 20 rows) placed on the front panel.
All data are available by browsing the various Menu-like organised pages.
Besides all programmed data, for each controller it is possible to display:

- The group each controller belongs to.
- Single controller status.
- The value of the controlled size (with a precision of ± 0,5 K at 21 °C).
- The value of the actual set point (including compensation and local re-calibration).
- Operation mode.
- Opening percentage of heating and cooling actuators.

Moreover, the control unit processes data from the controllers and allows the display of the following data:

- Minimum detected room temperature.
- Maximum detected room temperature.
- Average detected room temperature.
- Percentage of the controllers operating in COMFORT mode (NM).
- Percentage of the controllers operating in UNOCCUPIED mode (RC + RF).
- Percentage of the controllers operating in ANTI-FROST mode (AF).
- Average position of heating and cooling actuators.

**Weekly schedules**

It is possible to create up to 5 different time schedules with a maximum of 6 mode changeovers.
To each controller group can be assigned, for each day of the week, either one of the 5 time schedules or one of the operation modes mentioned above.
Therefore, a specific weekly schedule can be generated for each controller group.

**Holidays and vacation periods (yearly programme)**

To each group it is possible to set up to 10 public holidays and 5 vacation periods assigning one of the following modes unoccupied (RF+RC), anti-frost (AF), and comfort (NM).
This implies the creation of a “yearly programme” which substitutes the time schedules during the set periods.

**Manual control (override)**

In some cases (i.e. meetings, steady conditions of premises vacation) may be necessary to edit the assigned time schedules.
For this purpose a manual override, of one or more groups, and of one or more single controllers, has been pre-set, allowing a choice between the four (NM, RC, RF and AF) available modes.

There are two types of override:

- Temporary: at midnight the control is re-assigned to the time schedules.
- Permanent: the group or the single controllers follow the mode assigned until the automatic control is set anew.

On the control unit the operating status (manual or automatic) of each group is constantly displayed.
Manual indication is activated also for single controllers, in case at least one of them finds itself in the manual status.

**Priority**

The operating priorities the control unit follows are:

1. "Permanent" group override.
2. “Temporary" and "Permanent" override of the single (privileged) controllers.
3. "Temporary" group override.
4. Vacation period programme.
5. Holiday programme.
6. Weekly schedule.

**Summer/winter changeover**

The control unit is provided with 4 inputs in order to set summer/winter operation for each group.
**The open contact corresponds to winter set up.**

**Cooling and heating qualifications**

The control unit is provided with an input (two terminals), so as to inhibit the cooling action for the whole system (closed contact = cooling inhibited), and with four inputs (five terminals) inhibiting the heating action in each group
When the actions are inhibited, the corresponding actuators are closed independently from the set mode.

**Storage of programmed data**

Programme data are stored on a memory (TimeKeeper) and remain the same even if the power supply is absent.

**Connection with controllers**

Instructions and information between the control unit and the controllers are exchanged through an intelligent two-lead polarized "BUS" connection.
The RS485 serial communication type is particularly indicated for its

characteristics of high immunity to interferences and since it allows long connections with a large number of devices.
The overall time elapsing between call and reply is of approximately 0,4 seconds. Each controller is recognised by the control unit through an “address card” which has to be installed in the controller itself before powering it.
Progressive numbers from 1 to 160 label the cards. The cards are supplied in packages identified by the model NS 71...74.

For the latter controllers the following parameters cannot be programmed:

- Heating and cooling actuators stroke timings.
- Control type.
- Proportional band.
- Integration time.

A Dip Switch (Dip 4 of Sw1) gives the opportunity to activate the above mentioned options and it becomes necessary in case the system presents, on the same BUS, both old and new generation controllers.

**Connection with supervisor.**

Each control unit is able to communicate with different supervision systems through either RS232 (standard) or RS485 (optional) serial ports.
Since each monitoring system is equipped with its special communication protocol, the control unit will have to be assembled with a dedicated programme memory.

**MANUFACTURING CHARACTERISTICS**

The product is composed of the control unit itself and of a shock-resistant thermoplastic mounting kit that contains the terminal boards and allows an easy wall mounting.

The cables enter the case from the bottom through five cable sleeves protected by removable plastic plugs; it is possible to insert PG 13,5 compression glands.
The display and the keys are protected by a front panel and by an elastic film.

## TECHNICAL CHARACTERISTICS

| | |
|---|---|
| Power supply | 24 V~ ±10% |
| Consumption | 5 VA |
| Terminal board | screw-type for 2.5 $mm^2$ max. cross section wires |
| Cable sleeves | 5 holes for PG 13,5 compression glands |
| Protection degree | IP 40 |
| Room temperature (Working) | T50 |
| Room temperature (Storage) | -20T70 |
| Weight | 1.2 Kg. max |
| Microprocessor | INTEL 80c32 |
| Memory | (EPROM) 64 Kbytes |
| Data memory (RAM with integrated buffer) | 32 Kbytes |

*Measure inputs*

| | |
|---|---|
| Outside temperature | -20...+40°C |
| Digital inputs | SPST connection |

*Communication with controllers*

| | |
|---|---|
| Interface | RS 485 |
| Speed | 1200 baud |
| Cables | Polarized twisted double cables with min. 0,3 $mm^2$ cross section |

*Connection with printer*

| | |
|---|---|
| Interface | EIA RS 232 |
| Max. length | 15 m |
| Speed | 1200 baud |

*Connection with supervisor system:*

| | |
|---|---|
| Interface | EIA RS232 |
| | EIA RS485 (optional) |
| Max. length | 15 m with RS232 |
| | 150 m with RS485 |

The product conforms to EMC 89/336 directive with reference to the below mentioned standards:

| | |
|---|---|
| EN50081-1 | for emission |
| EN50081-1 | for immunity |

## POSSIBLE COMBINATIONS AND CONNECTIONS

The control unit can be used with every type of NR7000 controllers, with SBE type outside temperature sensor and with supervision system.
As far as the connection with supervision system is concerned, please contact our Technical Assistance.
Consumption data and power supply and communication criteria are available on the DIGITROLL 7000 leaflet.

## INSTALLATION AND START-UP

Installation

NC7311 control unit is suitable for wall and rack mounting (through a kit of connecting clamps).
Perform wiring in compliance with the outside connection diagram and with the existing rules.
It is important to check if the BUS connections are correct in order to ensure communication between the control unit and the controllers: in case of faulty connections, the controllers will operate stand alone, as if the control unit were not installed.

Start-up

The control unit allows editing the operating programmes and parameters in accordance with the different system requirements. For an easier start-up stage is available a set of default data which can be used in every moment by pressing two keys; in order to set exact date and time as described in the leaflet attached to the controller.

ATTENTION:

It is necessary to terminate the Communication Bus at the two most distant devices (controller/unit).
For NR controllers it is necessary to open the controller cap and close the JP1 jumper.
For the Unit it is necessary to insert in parallel a 121 Ohm 1/4 W Resistance between the Bus terminals (RT1 and RT2).

In case of replacement of a NC7111 unit (conveyed waves bus) with an NC7311 (RS485 bus ) it is necessary to insert the DG7ROUT2 repeater and to place the jumper 2 of SW1 in OFF position in order to configure it for old-type protocol management.

## DEFAULT DATA AND RELATED MODIFICATION RANGES

| Description | Range | Pre-program. value |
|---|---|---|
| NR. of controllers. | 1...160 | 100 |
| Existing groups | 1...4 | 1 |
| Single controllers | 0...160 | 0 |
| RC/RF cooling qualification | Yes/No | No |
| Set point in NM mode | 11...29°C | 21°C |
| Dead zone | 0...6k | 3K |
| C channel actuator stroke | 0...100% | 34% |
| F channel actuator stroke | 0...100% | 34% |
| Control type | P / P+I | P |
| C channel proportional band | 0,8.... 7,2 | 4.0°C |
| F channel proportional band | 0,8.... 7,2 | 4.0°C |
| C channel integration time | 1... 30 | 5 S. |
| F channel integration time | 1... 30 | 5 S. |
| Summer comp. start point | 20...35°C | 27°C |
| Authority comp. | 0...99% | 40% |
| Winter comp. start point | 0...20°C | 5°C |
| Authority compensation | 0...99% | 60% |

There are four default time schedules :

| Schedule 1 | | Schedule 2 | | Schedule 3 | | Schedule 4 | |
|---|---|---|---|---|---|---|---|
| time | mode | time | mode | time | mode | time | mode |
| 7:30 | NM | 6:00 | NM | 6:00 | RC | 7:00 | NM |
| 12:30 | RC | 12:00 | RC | 7:30 | NM | 12.00 | RC |
| 14:00 | NM | 13:00 | NM | 12:00 | RC | 13:00 | RF |
| 17:00 | RC | 17:00 | RC | 13:30 | NM | | |
| 19:00 | AF | 21:00 | RF | 17:30 | RC | | |
| ---- | | ---- | | 19:00 | AF | | |

Minimum interval 10 minutes: resolution 10 minutes.

Weekly schedule:

| *MON* | *TUE* | *WED* | *THU* | *FRI* | *SAT* | *SUN* |
|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 1 | 1 |

All controllers are set in Automatic Control

**SELF AND SYSTEM TESTS**

The control unit is equipped with self-test functions:

- Clock misfunctioning.
- Data memory misfunctioning.
- Outside sensor misfunctioning.

In presence of one of the former anomalies, the communication with the controllers is interrupted; the latter, after 10 minutes have elapsed, pass to stand-alone operation with set point at 20 °C.

Moreover, there are system diagnostic functions:

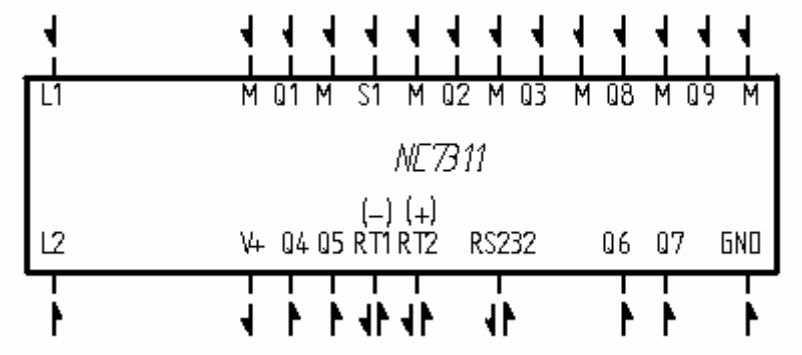
- Misfunctioning of one or more controllers.
- Damaged serial bus.

When even if only one of the above-mentioned conditions occurs, an intermittent red signal, on the control unit front panel, is activated: by pushing the TEST key it is possible to detect the specific cause of misfunctioning.

☞ **THE OUTSIDE SENSOR MISFUNCTIONING IS DISPLAYED IN THE "CONTROLLER STATUS PAGE" BY TYPING "---" INSTEAD OF THE TEMPERATURE VALUE DISPLAY.**

It is, moreover, possible to display the status of the digital inputs (S/W qualifications and changeovers) in order to check the correctness of the related connections.

## TERMINAL BOARD

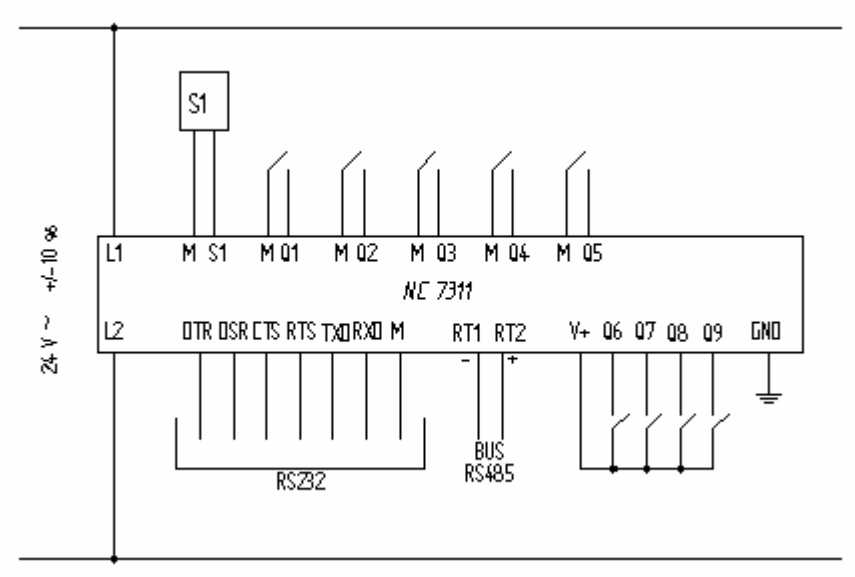



N3096

*LEGEND*

| | |
|---|---|
| L1 | 24 V~ power supply |
| L2 | " |
| GND | Earth |
| M | Ground common input |
| V+ | Common V+ input |
| S1 | Outside sensor |
| Q1 | Digital input |
| Q2 | Digital input |
| Q3 | Digital input |
| Q4 | Digital input |
| Q5 | Digital input |
| Q6 | Digital input |
| Q7 | Digital input |
| Q8 | Digital input |
| Q9 | Digital input |
| RT (-) | Communication BUS |
| RT (+) | RS 485 |
| RS232 | Serial communication BUS |

## EXTERNAL CONNECTIONS DIAGRAM

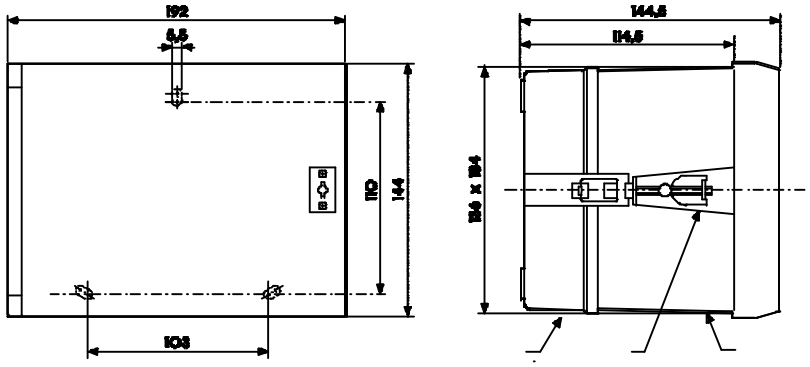



N3095

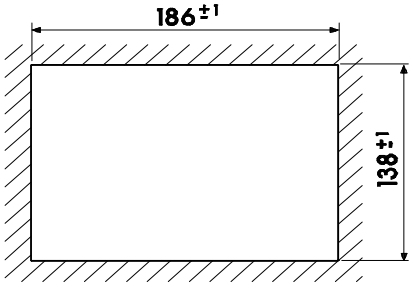
*LEGEND*

| | |
|---|---|
| S1 | SBE external sensor |
| Q3 | Cooling qualification |
| Q4 | Heating qualification .Group 1 |
| Q5 | Heating qualification .Group 2 |
| Q6 | Heating qualification .Group 3 |
| Q7 | Heating qualification .Group 4 |
| Q8 | S/W changeover Group 1 |
| Q9 | S/W changeover Group 2 |
| Q1 | S/W changeover Group 3 |
| Q2 | S/W changeover Group 4 |
| RS 485 | Connection towards controllers |
| RS 232 | Serial connection |

## OVERALL DIMENSIONS




## FRONT PANEL DRILLING



# 3. OPERATION MODES

## 3.1. READER'S PROFILE

- An "expert" reader may need to read only paragraph 3.3 where user interface architecture, page browsing modalities, data display and programming are described.
- To an operator who, for the first time, uses digital devices it is advisable, after reading carefully paragraph 3.2, to read also paragraph 3.3, where it is described, step-by-step, the operation sequence in order to display and/or programme each datum.

## 3.2. FEW HINTS ON OPERATION SEQUENCE

NC7311 user interface is composed of an alphanumeric display and seven function keys.

All the information can be reached through a browsing of the tree-organised pages and, therefore, detectable by menu pages.

Pressing the suitable keys it is possible to display and/or programme one or more data in the various pages.

### 3.2.1. Browsing

When the apparel is in normal operating conditions, the display shows the following page defined as controller status page".

```
Mo 13 Jan '97 17:55
Out Temp   + 22.5^C
Gr1 Gr2 Gr3 Gr4 Sng
A-H A-H A-H A-H  M
```

The key MENU selects the MENU page which allows to access, accordingly to the selected line, other pages so as to get information and to perform settings related to the connected controllers.

```
+       MENU
 CONTROLLERS
 TIME SCHEDULE
 CONTROLLERS STATE
```

```
-       MENU

 MAN/AUTO CONTROL
 AVERAGE VALUES
```

At the top left of each page, except the first one, there are "**+**" or "**-**" signs.

"**+**" sign indicates there is a page under the one displayed.

If the cursor is positioned on the former sign, by pressing the ENTER key the following page is displayed.

Similarly the sign "**-**" indicates there is an upper level page, therefore, by pressing the ENTER key the upper-level page is displayed.

Whichever page is displayed, after 3 minutes without pushing any key the controller passes back to the status page ".

### 3.2.2. Data display

To view data belonging to a specific controller, it is sufficient to enter the page containing the chosen data.

Use the key to go near the "Gr" or "Sn" string, when possible.

Use ▲ or ▼ keys to alternate Group (Gr) or Single (Sn) controller data display.

Use the key to go after the "Gr" or Sn" strings.

Use ▲ or ▼ keys to select a group or a programmed controller.

## 3.2.3. Programming

To programme a controller data it is sufficient to enter the page containing the chosen data.

Press PROG Key to start the programming session.

The related red signal will start blinking.

Use key to go to the data fields

Use ▲ or ▼ keys to set the required value.

Press the key ENTER to confirm the set data.

Press the key PROG to end the programming session.

The related red signal will cease to blink.

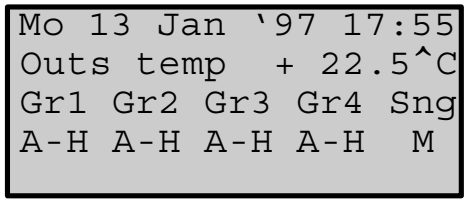
☞ **Press the key ENTER to confirm the programming of all data appearing in the page. Therefore, it is advisable, before giving confirmation, to check that only the chosen data have actually been modified.**

# 3.3. DISPLAYING AND PROGRAMMING

In this chapter are described the necessary operations to display and/or set all the operating data of the controllers connected to NC7311 control unit.

## 3.3.1. Display and setting of “controller status page”

This page is displayed after the system start-up, when whichever page is displayed for more than 3 minutes without acting on it and through page browsing.




It includes the following information:

- Date and time.
- Outside temperature.
- Operation type (Auto / Man ) of the 4 groups.
- Summer/Winter operation type of the 4 groups.
- Operation type (Auto / Man ) for single regulators.
- Press the key PROG. The related red signal will start blinking.

- The blinking cursor will place itself near the day of the week indication.
- Push the key  until the cursor is before the datum, which has to be modified.
- Press the key  or  until the required value appears.
- Repeat the operation to edit all the other data.
- Press the key  .
- Push the key  .: The related red signal will stop blinking.

☞ **If it is set a date which is not suitable to the selected month, after pressing the key  will appear, next to the number, the "?" sign with the cursor blinking on it. Therefore, it is necessary to correct the error and push the  key. If the error has been cancelled the "?" sign will disappear and all data will be accepted.**

☞ **The programming manages leap year but not summer time.**

The operator has the possibility to decide, for each group, if the controllers have to operate in summer or winter mode.

Opening or closing the corresponding digital inputs effects this setting.

## 3.3.2. Displaying and setting of the controller grouping

The control unit has a base of 100 programmed controllers assigned to group 1. If the number of controllers of the system is inferior, it is necessary to cancel the exceeding ones by assigning them to the fictitious group C.

Vice versa, it is necessary to programme the rest of them.

- Recall the MENU page through the key . 


```
+       MENU'
 CONTROLLERS
 TIME SCHEDULE
 CONTROLLERS STATE
```

- Push the key  until the cursor is placed near the word "controllers"".
- Push the key 

.

The following page will be displayed:

```
-     CONTROLLERS

 ASSIGNEMENT CONTR
 PARAMETERS CONTR
```

- Push the key  until the cursor is near the corresponding line "ASSIGNEMENT CONTR".
- Push the key 

.

The following page will be displayed:

```
-ASSIGNEMENT CONTR
```

```
Reg N.    Gr    Sng
 100      1      S
```

### 3.3.2.1. Selection of a group controller

- Press the key PROG. The related red signal will start blinking.
- Press the key ◄► until the cursor is under the word “REG N.”.
- Press the key ▲ or ▼ until he number of the chosen controller appears.
- Press the key ◄► until the cursor is under the word “Gr”.
- Press the key ▲ or ▼ until the group number, chosen for the controller, is displayed.
- Press the key ◄► until the cursor is under the word “Sn”.
- Press the key ▲ or ▼ until the sign “-” appears.
- Press the key ENTER .
- Repeat the operation for all the controllers to be programmed.
- Press the key PROG. The related red sign will stop blinking.

### 3.3.2.2. Selection of a single privileged controller

- Press the key PROG .The related red sign will start blinking.
- Press the key until the cursor is under the word “REG N.”.
- Press the key ▲ ▼ until the number of the controller, which has to be inserted, appears.
- Press the key until the cursor is under the word “Gr”.
- Press the key ▲ or ▼ until the number of the group, to which the controller has to belong, is displayed.
- Press the key until the cursor is under the word “Sn”.
- Press the key ▲ or ▼ until the letter “S” appears.
- Press the key ENTER .
- Repeat the operation for all the controllers, which have to be programmed.
- Press the key PROG .The related red sign will stop blinking.

## 3.3.3. Displaying and setting of regulation parameters for single or group controllers

Three pages are available to set data belonging to a single or group controller.

☞ **Some data are not significant for the former NR70XX series controllers, since they provide the management of extra parameters, which cannot be edited**

- Recall the MENU page through the key. 


```
+       MENU'
 CONTROLLERS
 TIME SCHEDULE
 CONTROLLERS STATE
```

- Press the key  until the cursor is under the word "CONTROLLERS"".
- Press the key. 


The following page will be displayed:

```
-     CONTROLLERS

 ASSIGNEMENT CONTR
 PARAMETERS CONTR
```

- Press the key  until the cursor is placed under the word "PARAMETERS CONTR".
- Press the key 

.

The following page will be displayed:

```
+  PARAMETERS CONTR
 Gr:   1  S
 Set:21.0 ^C Dz:3 K
 %Stroke: C  34 F  34
```

The informations contained are:

- Set point.
- Dead zone.
- Heating actuator stroke percentage (for NR70XX controllers it represents both heating and cooling).
- Cooling actuator stroke percentage (significant for NR71XX and NR72XX controllers).

- Press the key  until the cursor is placed near the symbol “+”.
- Press the key 

.

The following page will be displayed:

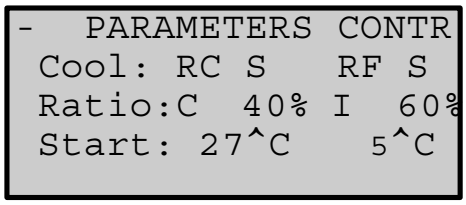
```
+  PARAMETERS CONTR
 Control: P
 T. Intg: C  5 F  5
 Xp: C 4.0  F 4.0
```

The informations contained are:

- P or P+I regulation type (significant for NR71XX and NR72XX controllers).
- Integration time for heating and cooling (significant for NR71XX and NR72XX controllers).
- Proportional band of heating and cooling (significant for NR71XX and NR72XX controllers).

- Press the key  until the cursor is placed near the symbol “+”.
- Press the key  .

The following page will be displayed:




The informations contained are:

- Cooling qualification in RC mode.
- Cooling qualification in RF mode.
- Summer compensation (Authority and threshold)
- Winter compensation (Authority and threshold).

The first page of regulation parameters allows the selection of a controller:

- Press the key PROG .The related red sign will start blinking.

☞ **At first set data for each group.**

- Press the key ◄►▲▼ until the cursor is placed near “Gr.”.
- Press the key ▲ or ▼ to select a group (Gr) or a single (Sn) controller.
- Press the key ◄►▲▼ to place the cursor near “Gr.” or “Sn” in order to select the number of the group or the single controller.
- Press the key ▲ or ▼ to select the number of the chosen group or single controller .
- Press the key ◄►▲▼ to place the cursor near the datum, which has to be modified.
- Press the key ▲ or ▼ until the required value is displayed.
- Repeat the operation for all the data, which have to be edited.
- Press the key ENTER .

The cursor will be placed at the top left of the display, over the “+” symbol.

- Press the key ENTER again to pass to the **second page** of regulation parameters.
- Press the key to place the cursor near the datum, which has to be modified.
- Press the key ▲ or ▼ until the required value is displayed.
- Repeat the operation for all the data, which have to be edited.
- Press the key ENTER .

The cursor will be placed at the top left of the display, over the "+" symbol.

- Press the key ENTER again to pass to the **third page** of regulation parameters.
- Press the key to place the cursor near the datum, which has to be modified .
- Press the key ▲ or ▼ until the required value is displayed.
- Repeat the operation for all the data, which have to be edited.
- Press the key ENTER .

The cursor will be placed at the top left of the display, over the "+" symbol.

- Press the key ENTER to return to the **first page.**
- Press the key PROG . The related red signal will stop blinking .

☞ **Perform the above-mentioned operations for all the four groups and all the single programmed controllers.**

- Press the key MENU to exit the setting of regulation parameters.

☞ **Once a controller has been considered, and, therefore, programmed, as single (Sng) its parameters are not influenced anymore by the parameters of the group it belongs to.**

## 3.3.4. Displaying and setting of time schedules

The control unit operates following a yearly calendar, which can be obtained through the steps below:

- Setting of daily schedules (max 5).
- Setting of the weekly schedule by assigning to each day of the week a daily chosen programme or a fixed mode.
- Setting of vacation periods and holidays with the related operating modes.

### 3.3.4.1. Daily schedules

- Recall the MENU by pressing the key 

.


- Press the key  until the cursor is placed near the line "TIME SCHEDULE".
- Press the key 

.

The following page will be displayed:

```
-  TIME SCHEDULE
 DAY PROGRAM
 WEEK PROGRAM
 HOLIDAY/VACATION
```

- Press the key  until the cursor is placed near the line “DAY PROGRAM”.
- Press the key  .

The following page will be displayed:

```
- DAY PROG  N: 1
 NM 07:30   RC 12:30
 NM 14:00   RC 17:00
 AF 19:00   --   :
```

The informations contained are:

- Hour values (max 6) during which mode changeovers occur.
- Mode type assigned to each hour changeover.

The setting of the mode “**--**” cancels all the possible following changeovers appearing on the page.

It is possible to set up to five different time schedules.
To do this it is necessary to:

- Press the key until the cursor is placed near the letter “N:” of the daily schedule.
- Press the key  or  until the number of programme, which has to be edited, appears.
- Press the key  . The related red signal will start blinking.
- Press the key  until the cursor is placed near the datum, which has to be modified.
- Press the key  or  until the required value appears.
- Repeat the operation for all the data, which have to be edited.
- Press the key  .

The former operation sequence has to be repeated for each of the required time schedules.

- Press the key  . The related red signal will stop blinking.

To exit the daily schedule setting act as follows:

- Press the key  until the cursor is placed near the symbol “+”.
- Press the key  .

☞ **If, in the setting of a daily schedule, an hour will result inferior or equal to the one which precedes, by pressing the key ENTER the sign "?" will appear near the error, with the cursor blinking on it.**

Therefore, it is necessary to:

- Press the key ▲ or ▼ to correct the set time.
- Press the key ENTER again: if the error has been corrected the "**?**" sign will disappear and the new data will be accepted.

### 3.3.4.2. Weekly schedules

- Recall the MENU page by pressing the key 

.

```
+      MENU'
CONTROLLERS
TIME SCHEDULE
CONTROLLERS STATE
```

- Press the key  until the cursor is placed near the line “TIME SCHEDULE”.
- Press the key 

.

The following page will be displayed:

```
-  TIME SCHEDULE
 DAY PROGRAM
 WEEK PROGRAM
 HOLIDAY/VACATION
```

- Press the key  until the cursor is placed near the line “WEEK PROGRAM”.
- Press the key 

.

The following page will be displayed:

```
- WEEK PROG  Gr: X

Mo Tu We Th Fr Sa Su
 1  1  1  1  1  1  1
```

The informations contained are:

- Number of the group the weekly schedule is associated with.
- The days of the week.
- The daily schedule or the mode type (valid for 24 hours) associated to each day.

These are data, which can be set by the operator in the following way:

- Press the key  until the cursor is placed near the line “Gr:” indicating the number of the group.
- Press the key  or  until the number of the group to be displayed or modified appears.
- Press the key  . The related red signal will start blinking.
- Press the key  until the cursor is placed near the datum, which has to be modified.
- Press the key  or  until the required value appears.
- Repeat the operation for all the data, which have to be edited.
- Press the key  .

The former sequence has to be repeated for all the used groups.

- Press the key  The related red signal will stop blinking.

To exit the weekly schedule page act as follows:

- Press the key  until the cursor is placed near the symbol “+”.

- Press the key .

### 3.3.4.3. Vacation and holiday schedules

For each group it is possible to set up to 5 vacation periods and 10 holidays.

#### 3.3.4.3.1. Holidays

- Recall the MENU page pressing the key 

.

```
+       MENU'
 CONTROLLERS
 TIME SCHEDULE
 CONTROLLERS STATE
```

- Press the key  until the cursor is placed near the line "TIME SCHEDULE".
- Press the key 

.

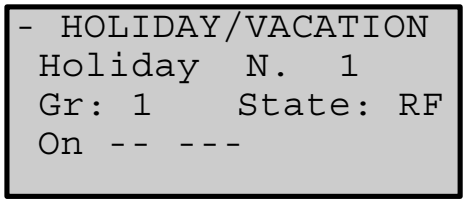
The following page will be displayed:

```
-  TIME SCHEDULE
 DAY PROGRAM
 WEEK PROGRAM
 HOLIDAY/VACATION
```

- Press the key  until the cursor is placed near the line "HOLIDAY/VACATION".
- Press the key 

.

The following page will be displayed:




The informations it contains are:

- Holiday number (max 10).
- Number of the group the holiday is associated with.
- Mode assigned to the holiday.
- Day in which the holiday occurs.

To display other holidays it is necessary to :

- Press the key  until the cursor is placed near the line “Holiday””.
- Press the key   to select one of the 10 holidays related to the set group (Gr.).

To programme one or more holidays it is necessary to recall the holiday page:

- Press the key PROG.. The related red signal will start blinking.
- Press the key until the cursor is placed near the datum, which has to be modified.
- Press the key or until the required value appears.
- Repeat the operation for all the data, which have to be edited.
- Press the key ENTER.

The former sequence has to be repeated for each of the groups used.

- Press the key PROG. The related red signal will stop blinking.

To exit the weekly schedule setting act as follows:

- Press the key until the cursor is placed near the symbol “+”.
- Press the key ENTER.

☞ **The selection of 0 day will cancel the set holiday: the sign ”--” will appear on the place of day and month**

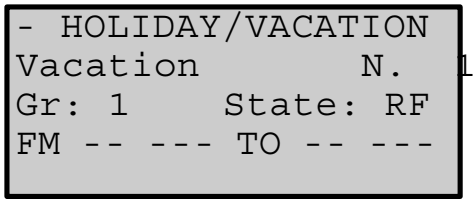
☞ **A test is made on the month of February taking into consideration the leap year: in case of error the sign ”?”, with the cursor blinking on it, will appear.**

Therefore, it is necessary to :

- Press the key ▲ or ▼ to correct the set time.
- Press again the key ENTER : if the error has been cancelled the sign “?” will disappear and new data will be accepted

### 3.3.4.3.2. Vacations

- Recall the vacation page.
- Press the key so as to place the cursor near the line “Holiday”.
- Press the key or to select the following page:




The informations contained are:

- Vacation number (max 5).
- Number of the group the vacation is associated with.
- Mode assigned to the vacation period.
- First day (FM) of the vacation itself.
- Last day (TO) of the vacation itself.

To display other vacation periods it is necessary to:

- Press the key so as to place the cursor near the line “Vacation’”.
- Press the key or to select one of the 5 vacation periods related to the set group (Gr.).

To programme one or more vacation periods it is necessary to recall the vacation page:

- Press the key PROG.. The related red signal will start blinking.
- Press the key until the cursor is placed near the datum, which has to be modified.
- Press the key ▲ or ▼ until the required value appears.
- Repeat the operation for all the data, which have to be edited.
- Press the key ENTER.

ENTER

The former sequence has to be repeated for each one of the groups used.

Press the key PROG. The related red signal will stop blinking.

To exit the weekly schedule page, act as follows:

- Press the key so as to place the cursor near the symbol “+”.
- Press the key ENTER .

☞ **The selection of 0 day will cancel the set vacation: the sign ”--” will appear on the place of the day and month in which the vacation period begins and ends.**

☞ **A test is made on the month of February, taking into consideration the leap year, and on the date of the vacation end which has to be subsequent to the one of the beginning: in case of error the sign "?", with the cursor blinking on it, will appear.**

Therefore, it is necessary to :

- Press the key ▲ or ▼ to correct the set time.
- Press again the key ENTER : if the error has been cancelled the sign "?" will disappear and new data will be accepted

## 3.3.5. Displaying and setting of the controllers regulation parameters

When a system is initialised, it can be useful to impose a specific mode to one or more group and/or one or more single controllers in order to perform extensive tests on the system different constituting elements.

- Recall the MENU page by pressing the key 

.

```
+       MENU'
 CONTROLLERS
 TIME SCHEDULE
 CONTROLLERS STATE
```

- Press the key  so as to place the cursor near the symbol "+".
- Press the key 

.

The following page will be displayed:

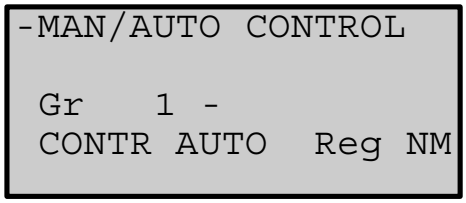
```
-       MENU

 MAN/AUTO CONTROL
 AVERAGE VALUES
```

- Press the key  so as to place the cursor near the line "MAN/AUTO CONTROL".
- Press the key 

.

The following page will be displayed:




The informations it contains are:

- Number of the group or single controller the control type is provided for.
- Control type.
- Mode type.

### 3.3.5.1. AUTOmatic operation setting

AUTOmatic operation puts the regulators under the control of time changeovers imposed by time schedules.

- Recall the page “MAN/AUTO CONTROL”.
- Press the key so as to place the cursor near the line marked with “Gr:” indicating the group number.
- Press the key or to select the setting for group (“Gr”) or single (“Sn”) programmed controllers.
- Press the key so as to place the cursor near the line marked with either “Gr”, indicating the group number or “Sn”, indicating the number of the single programmed controller.

- Press the key ▲ or ▼ so as to display the number of the group or of the single programmed controller it is provided to display or modify.
- Press the key PROG . The related red signal will start blinking.
- Press the key ◄► so as to place the cursor after the word “CONTR”.
- Press the key ▲ or ▼ until the word “AUTO” is displayed.
- Press the key ENTER.
- Press the key PROG. The related red signal will stop blinking.

The former sequence should be repeated for all used groups and single programmed controllers.

To exit the control type page:

- Press the key ◄► so as to place the cursor near the symbol “+”.
- Press the key ENTER.

☞ **When AUTOmatic operation is set, there is no need to set the mode since the latter is determined by time schedules.**

### 3.3.5.2. PERManent manual operation setting

It is possible to alter the sequence of the mode changeovers provided through the time schedules, by overriding permanently the controllers in a chosen mode.

- Recall the “MAN/AUTO CONTROL” page.
- Press the key so as to place the cursor near the line marked with “Gr.” indicating the group number.
- Press the key or to select the setting for group (“Gr”) or single (“Sn”) programmed controllers.
- Press the key so as to place the cursor near the line marked with either “Gr”, indicating the group number or “Sn”, indicating the number of the single programmed controller.
- Press the key or so as to display the number of the group or of the single programmed controller, which has to be modified.
- Press the key PROG. The related red signal will start to blink.
- Press the key so as to place the cursor after the word “CONTR”.
- Press the key or until the word “PERM” appears.
- Press the key so as to place the cursor after the word “Reg”.
- Press the key or until the acronym of the required mode appears.
- Press the key ENTER .

- Press the key PROG. The related red signal will stop blinking.

The former operation sequence has to be repeated for each group used and single controller.

To exit the control type setting, act as follows:

- Press the key so as to place the cursor near the symbol “+”.
- Press the key ENTER .

### 3.3.5.3. TEMPorary manual operation setting

It is possible to alter the sequence of time changeover modes overriding the controllers in a chosen mode, which will be activated until 24:00 of the current day. At the end of the day in which this operation type has been selected, the controller will begin again operating following the set programmes.

- Recall the “MAN/AUTO CONTROL” page.
- Press the key so as to place the cursor near the line marked with “Gr:” indicating the group number.
- Press the key or to select the setting for group (“Gr”) or single (“Sn”) programmed controllers.

- Press the key so as to place the cursor near the line marked with either “Gr”, indicating the group number or “Sn”, indicating the number of the single programmed controller.
- Press the key or so as to display the number of the group or of the single programmed controller, which has to be modified.
- Press the key PROG. The related red signal will start to blink.
- Press the key so as to place the cursor after the word “CONTR”.
- Press the key or until the word “TEMP” appears.
- Press the key so as to place the cursor after the word “Reg”.
- Press the key or until the acronym of the required mode appears.
- Press the key ENTER .
- Press the key PROG. The related red signal will stop blinking.

.

The former operation sequence has to be repeated for each group used and single programmed controller.

To exit the control type setting, act as follows:

- Press the key so as to place the cursor near the symbol “+”.
- Press the key ENTER .

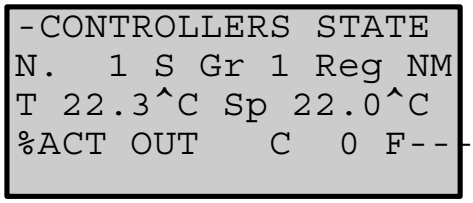
## 3.3.6. Displaying of work parameters of each controller

It is a display-only page in which it is possible to view, in every moment, data belonging to the previously programmed controllers.

- Recall the MENU page by pressing the key MENU .


- Press the key so as to place the cursor near “CONTROLLERS STATE”.
- Press the key ENTER .

The following page will be displayed:




The informations it contains are:

- Controller number.
- Group it belongs to or if it is a single controller.
- Room temperature.
- Actual set point (including the effects of compensation and remote re-calibration).
- Operating mode.
- Actuators opening percentage (-- in one of the two output channels it indicates that the controller is of 2-pipes type).

☞ **If the programmed controller fails to communicate with the control unit in the data fields will appear "X" symbols.**

- Press the key so as to place the cursor after the letter "N:" indicating the programmed controller number.
- Press the key ▲ or ▼ so as to display the number of the programmed controller whose data display is required.

To exit the display of the controllers' set point, act as follows:

- Press the key so as to place the cursor near the symbol "-".
- Press the key ENTER.

## 3.3.7. Displaying of the operation parameters averages

It is possible to display in every moment the averages of the values coming from each controller group or from the whole system.

- Recall the MENU page by pressing the key . MENU

```
+       MENU'
 CONTROLLERS
 TIME SCHEDULE
 CONTROLLERS STATE
```

- Press the key so as to place the cursor near the symbol "+".
- Press the key ENTER.

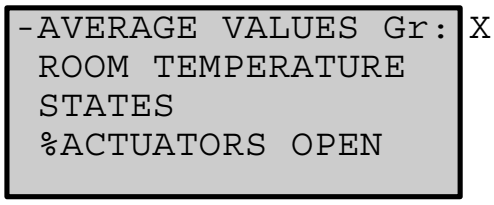
The following page will be displayed:

```
-       MENU

 MAN/AUTO CONTROL
 AVERAGE VALUES
```

- Press the key so as to place the cursor near the line "AVERAGE VALUES".
- Press the key ENTER.

The following page will be displayed:




The following page will be displayed:

- Number of the group whose average display is required.

The former is a menu page in which it is possible to display, for the group set, sub-pages containing the following information:

- Average room temperature.
- Mode average.
- Actuators opening percentage averages.

- Press the key so as to place the cursor near the acronym “Gr:” indicating the group number.
- Press the key or until the number of the group, whose average display is required, appears.

To exit the average display menu act as follows:

- Press the key  so as to place the cursor near the symbol "-".
- Press the key 

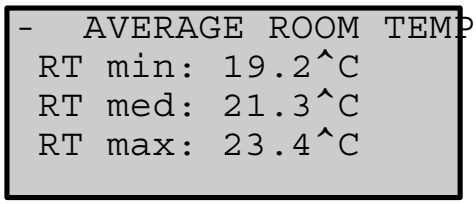
.

☞ **When the letter "T" appears as a group number, it means that the averages are referred to the whole system.**

### 3.3.7.1. Displaying of the room temperature averages

- Recall the page “AVERAGE VALUES”.
- Set the required group number.
- Press the key so as to place the cursor near the line “ROOM TEMPERATURE”.
- Press the key ENTER.

The following page will be displayed:




The following page will be displayed:

- Minimum room temperature .
- Average room temperature .
- Maximum room temperature .

To exit the display of the room temperature averages, act as follows :

- Press the key so as to place the cursor near the symbol “-”.
- Press the key ENTER .

### 3.3.7.2. Displaying of mode averages

- Recall the page “AVERAGE VALUES”.
- Set the required group number.
- Press the key so as to place the cursor near the line “STATES”.
- Press the key ENTER.

The following page will be displayed:

```
-   AVERAGE STATES
 NM      70 %
 RED     30 %
 AF       0 %
```

The informations it contains are:

- NM mode controllers percentage.
- UNOCCUPIED mode controllers percentage.
- AF mode controllers percentage.

To exit the mode averages display, act as follows:

- Press the key so as to place the cursor near the symbol “-”.
- Press the key ENTER.

### 3.3.7.3. Displaying of the actuators opening percentages averages

- Recall the page “AVERAGE VALUES”.
- Set the required group number.
- Press the key so as to place the cursor near the line “% ACTUATORS OPEN”.
- Press the key ENTER.

The following page will be displayed:

```
- AVERAGE ACT OPEN

 Cool    0 %
 Heat    25 %
```

The informations it contains are:

- Heating valves opening percentage.
- Cooling valves opening percentage.

To exit the mode averages display, act as follows:

- Press the key so as to place the cursor near the symbol “-”.
- Press the key ENTER.

# 4. DIAGNOSTICS

Consultation pages, which allow to have a general overlook of the situation, are available with the purpose to check anomalies or to test periodically the whole system.

- Press the key 

to select the related page. The led on the key will start blinking.

The following page will be displayed:

```
-  DIAGNOSTIC
SYSTEM
CONTROLLERS
CONSENS STATE
```

It is a page in which it is possible to display other sub-pages containing the following information:

- System test.
- Controller test.
- Status and authority.

To exit the diagnostics menu page, act as follows:

- Press the key  so as to place the cursor near the symbol “-”.
- Press the key 

.

# 4.1. SYSTEM DIAGNOSTICS

- Recall the page “DIAGNOSTIC””
- Press the key  so as to place the cursor near the word “SYSTEM”.
- Press the key  .

The following page will be displayed:

```
- DIAGNOSTIC SYSTEM
Clock            OK
Serial bus       OK
Data memory      OK
```

The informations it contains are:

- Clock status.
- Status of BUS for the communication with controllers
- Data and/or programme memory status.

To exit the system diagnostics display, act as follows:

- Press the key  so as to place the cursor near the symbol “-”.
- Press the key  .

# 4.2. CONTROLLER DIAGNOSTICS

- Recall the page “DIAGNOSTIC””
- Press the key so as to place the cursor near the word “CONTROLLERS”.
- Press the key ENTER.

The following page will be displayed:

```
- CONTROLLERS DIAG

Tot act cont:    50
Tot def cont:     0
```

The informations it contains are:

- Number of operating controllers.
- Number of misfunctioning controllers.

To exit the controller status display, act as follows:

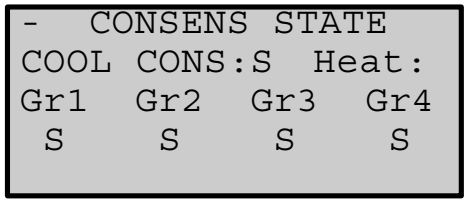
- Press the key so as to place the cursor near the symbol “-”.
- Press the key ENTER .

☞ **In order to know which controllers have anomalies, it is necessary to pass to the “CONTROLLERS STATE” page and press the keys ▲ or ▼ so as to display the controllers having the “XX” symbol instead of the value: this means that such controllers are misfunctioning.**

# 4.3. STATUS AND AUTHORITY DISPLAY

- Recall the page “DIAGNOSTIC””
- Press the key so as to place the cursor near the word “CONSENS STATE”.
- Press the key ENTER.

The following page will be displayed:




The informations it contains are:

- Cooling system qualification.
- Heating qualifications for each one of the four groups.

To exit the status and qualifications display, act as follows:

- Press the key so as to place the cursor near the symbol “-”.
- Press the key ENTER .

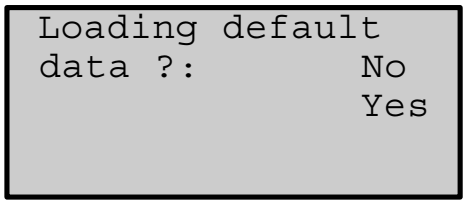
# 4.4. LOADING DEFAULT VALUES

The architecture, with which the programming sequences necessary to achieve a good operation of the controllers connected have been compiled, should not induce the operator to frequent setting errors. Moreover, in certain pages tests on the data set are present.
However, the operator could have the need to re-start from known conditions and, above all, to dispose of compatible to each other data, although they do not necessarily fit the environment in which the controllers operate.

To this purpose a dedicated function called “LOADING DEFAULT DATA” has been foreseen: it can be activated as follows:

- Press simultaneously the keys  .

The following page will be displayed:




- Press the key  so as to place the cursor near the selected item.

- Press the key ENTER.
- The command will be executed and then the system will return to the “Controllers status” page .

☞ **It is necessary to underline the fact that, if this operation is confirmed, default data are overwritten on the ones previously set, excluding date and time.**

# 4.5. DATA PRINT

With a printer connected to the serial port, only with the base version, it is possible, when the system is running, to print operating and diagnostic data.

In order to print it is necessary to:

- Press simultaneously the keys 

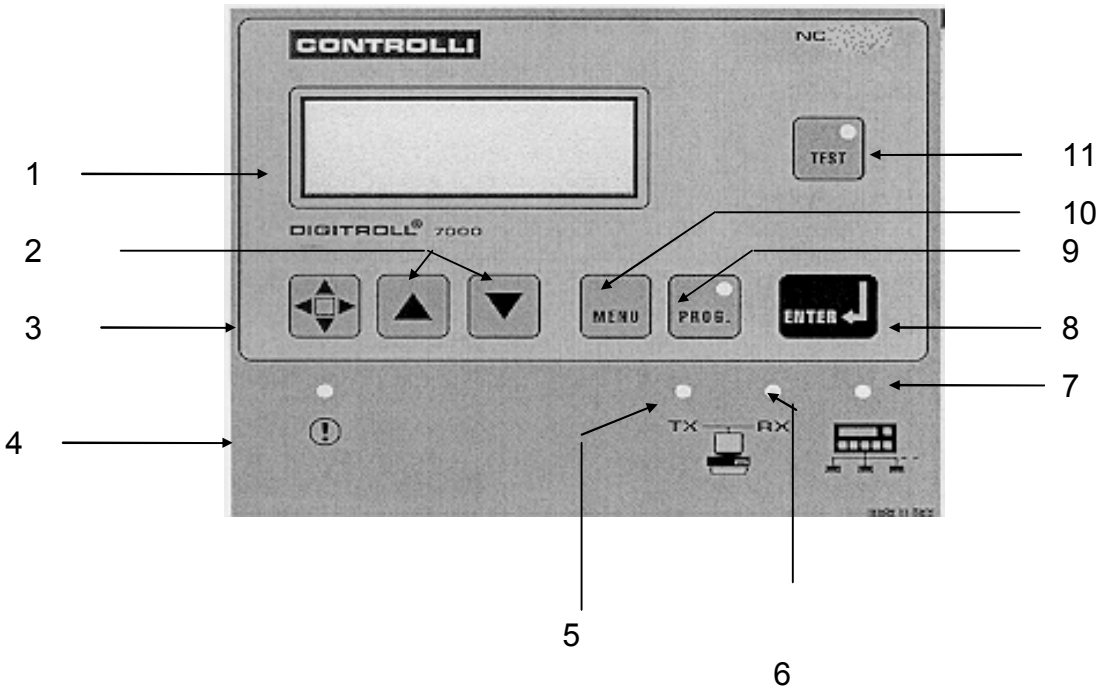
and 

.

The following data will be printed:

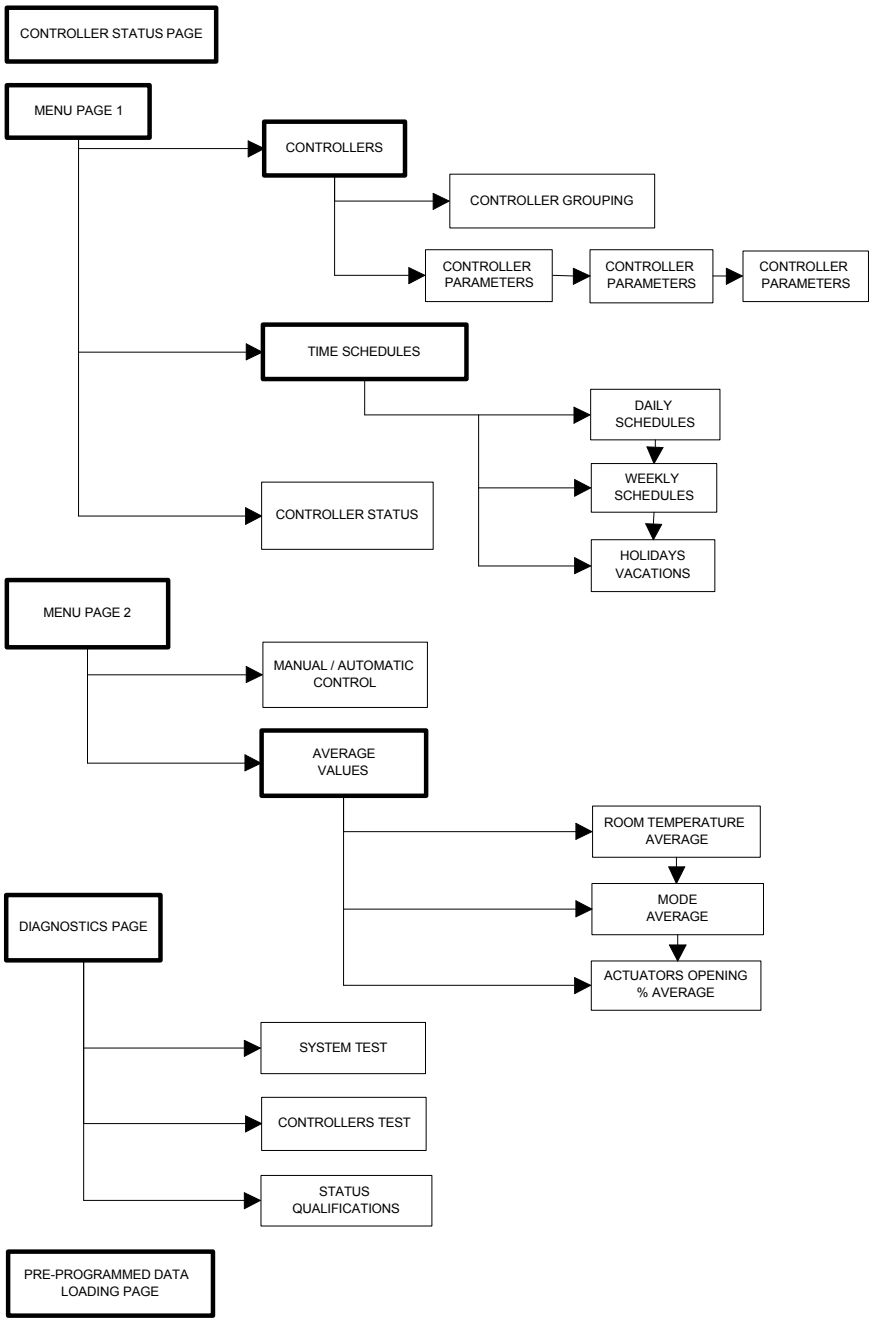
- Regulation parameters for each controller.
- Room temperature averages.
- Mode percentage averages.
- Actuators opening percentage averages.
- System diagnostics.

# 5. FRONT PANEL DESCRIPTION




1. 4 lines X 20 rows display
2. Edit keys
3. Shift key to move the cursor within a page
4. ANOMALY blinking led
5. Led indicating the “TX” transmission of a message on RS232 / RS485 serial line
6. Led indicating the “RX” reception of a message on RS232 / RS485 serial line
7. Led indicating the “TX” transmission of a message towards NR7XXX series controllers
8. Confirmation ENTER key
9. PROG with blinking led indicating programming activity
10. MENU key for page selection
11. TEST key with blinking led in case of testing activity

# 6. PAGE CONFIGURATION



# ANALYTICAL INDEX

## A



## B



## C



## D



## E



## F



## G

## H



## I



## K



## L



## M



## N

## O



## P



## R

## S



## T



## V



## W