Ergo

l'intelligenza al servizio del clima
GENERAL INFORMATION

USER MANUAL EDITED BY GALLETTI SPA

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ERGO: ONE SYSTEM, SO MANY ADVANTAGES

The Ergo solution is a product of Galletti’s longtime experience in developing dedicated technologies for air conditioning. It was created in response to the need to manage air conditioning systems in a simple manner and to make all individual system components intelligent with the aim of reducing consumption.

- Specifically designed for
- Hotels
- Holiday flats
- Offices
- Institutions

Ergo is a new system for managing air conditioning equipment. It comprises a software program, microprocessor controllers for the indoor units and, where requested, a chiller or heat pump.

Ergo by Galletti aims to meet the needs of owners, building designers and installers by offering a control strategy which adapts chiller and indoor unit operation to actual thermal load requirements. This means:

- energy savings in the production of chilled water
- simplicity of installation
- reduction in operating costs
- user friendliness
- advanced system monitoring capabilities
- centralised system management.

The software analyses the operating conditions of indoor units on a real-time basis in order to determine the actual instantaneous thermal load of each user, an essential prerequisite for implementing an adjustment strategy that minimises operating costs while enabling the system to work in the best possible conditions.

Ergo by Galletti can manage up to 126 room interiors, up to 16 different zones, maintaining the temperature demanded by users while satisfying global system requirements.

It only air conditions occupied rooms, which means significant energy savings, and simultaneously controls the water chiller or heat pump.

SOFTWARE INSTALLATION

The time has come to install the ERGO software in your PC!

1. Place the ERGO CD in the CD-ROM drive of your PC
2. First close any other applications currently in use.
3. From “My Computer”, select the “SETUP” file on the CD-ROM. Double click with the left mouse button to launch the installation program
4. Follow the instructions on the screen.

After installation has been completed, the application will be able to work correctly.

When starting up the system for the first time, you will have to correctly configure the software and obtain the software license number, according to the characteristics of the air conditioning system and indoor units. To configure the system, carefully read the section below.

QUICK STARTUP

PROGRAM CONFIGURATION

Two access modes (Administrator and Guest) provide access to data acquisition functions and functions for managing the air conditioning system, unit by unit, right up to the water chiller.

During system configuration the “Administrator” mode must be used (password: admin) in order to access all of the functions.

The “Guest” mode (password: guest) does not permit access to the following menus/functions:

- System characteristics
- Indoor unit configuration
- Summer programming
- Winter programming
- Debug indoor unit
- Debug Chiller

As regards indoor unit configuration (“controller” icon below the traffic lights) only the following can be changed:

- ON - OFF - STOP - ECON for the individual controller and general functions of the synoptic panel

MINIMUM SYSTEM REQUIREMENTS

- Intel Pentium 2 or higher. 233 MHz or faster.
- 32 Megabytes of RAM.
- Windows 98 (or later).
- Monitor with 256 colours (or more), 800x600 or higher
- RS232 COMMUNICATION PORT (standard RS232-RS485 converter)

If only a USB COMMUNICATION PORT is available, a special USB-RS485 converter must be used.
**Obtaining the License**

When the program is first launched, the following window will appear:

By clicking the “next” arrow, you can launch the program in the DEMO version, which enables operation for a limited period of time (10 minutes – renewable) for purposes of demonstration only.

To enable the “unlimited” operating mode you must obtain a user license from Galletti S.p.A. The license number must be entered when the program is run for the first time.

To obtain a user license, send the serial number to Galletti S.p.A., at e-mail address ergo@galletti.it.

After receiving a user license, launch the program again and enter the number in the field provided. From this point on you will no longer be prompted to enter the license number when you start up the program. Keep the number in any case.

**Changing the Password**

The passwords associated with the Administrator and Guest user names can be changed (once the program has been accessed) simply by clicking the “padlock” icon in the bottom right corner of the main page.

⚠️ Keep the passwords in a safe place. When a new password is introduced the previous one will be disabled. If you forget the new password, you will no longer be able to access the program and the program itself will have to be reinstalled. Contact the manufacturer if you encounter any problems.

When you open the program the main page will appear on the screen, as shown in the figure below:
TIP FOR THE USER:

If you are Installing the software for the first time, carefully read the next two sections (“SYSTEM CHARACTERISTICS” and “INDOOR UNIT CONFIGURATION”). Then follow the steps described below. Double click the “INDOOR UNIT CONFIGURATION” button to open the following page:

![Indoor Unit Configuration](image)

Pressing the button in the bottom left corner will launch an automatic scan of the indoor units composing the network. This procedure is necessary to check whether all of the indoor units are actually connected and respond to interrogation by the program.

The program will ask for confirmation before starting the scan procedure. Thereafter progress will be displayed as shown in the figure below:

![Scanning Procedure](image)

The scanning procedure may take a few minutes. On completion of the scan, the system should indicate a number of indoor units matching the number actually connected to the data bus.

At this point the system will be ready to start reading data and managing controllers in the “basic” mode. To complete the setup procedure you must customise the configuration of each indoor unit, checking that the network address and description correspond to the data in the “installation and service log book”, which must be filled out during installation of the controllers.

Once the controller configuration table has been completed, you can move on to the system characteristics.

*Double click the “SYSTEM CHARACTERISTICS” button to open the following WINDOW:*

*Fill in all active fields and select the desired operating mode (cooling or heating) for the indoor units. Enable chiller supervision (where applicable) and the adaptive function (if desired).*

If you have successfully completed all of the above steps, the number of indoor units indicated at the top right will correspond to the number detected during the scanning procedure and the number of indoor units actually hooked up to the system.

On completing the configuration procedure, go back to the main page and start the data acquisition process by clicking the traffic light.

Throughout the software the following convention is used: the “SUN” and “SNOWFLAKE” symbols always refer to the operating mode of the indoor units and chiller. Thus the sun symbol corresponds to heating or hot water production, whereas the “snowflake” symbol corresponds to cooling or chilled water production.

### ICONS ON THE MAIN PAGE

**FOR A DESCRIPTION OF FUNCTIONS SEE RELEVANT SECTIONS**

- **The “CONTROLLER” icon** opens a window from where you can set the general configuration of the indoor units making up the system. See section on “INDOOR CONFIGURATION”

- **The “GLOBE” icon** opens a window from where you can configure the entire system (type of installation, presence of valves, operating limits, etc.). See section on “SYSTEM CHARACTERISTICS”

- **The “WINTER” and “SUMMER” icons** enable you to program the temperature setpoints (according to time of day and day of the week) for the summer or winter operating modes. See section on “SUMMER PROGRAMMING – WINTER PROGRAMMING”

- **The “GRAPHs” icon** allows you to display graphs showing time trends of the most significant system parameters. See section on “SYSTEM GRAPHS”

- **The “CONTROLLER” icon** alongside the “reference indoor unit” menu provides access to a menu for setting the custom configuration of each individual indoor unit. See section on “EDITING THE INDOOR UNIT CONFIGURATION”

- **The “PADLOCK” icon** identifies the level of authorisation of the user who has logged on. In particular: an open padlock indicates that the user has logged on as “Administrator” and can thus have full access to all program and system configuration functions. A closed padlock signifies that the user has logged on as “Guest” and will therefore be permitted limited access to program functions. This is the typical level of a user who is not authorised to change system configurations. The same icon provides access to a menu for changing the password.
From this menu you can set the main system characteristics. This procedure must be carried out when installing the program.

- The “Chiller present” field (Y/N) enables or disable the supervisor functions for reading and controlling the chiller. If the system does not include a chiller that may be interfaced with the supervision system, select option “N”.

- The “Min Air T Setpoint” and “Max Air T Setpoint” fields represent, respectively, the minimum and maximum value that the user can transmit to the controllers governed by the program.

- The “Max Δ T Setpoint” is the maximum amount (+/-) by which the indoor unit may deviate from the temperature setpoint transmitted by the supervisor to each controller. For example a max ΔT of 4 °C means that the user may “locally” correct the setpoint transmitted by the supervisor by up to + or -4°C.

- The fields “Chiller water setpoint” and “HP water setpoint” represent, respectively, the temperature setpoints for the chiller in the cooling mode and the heat pump in the heating mode. These values are basically equivalent to the nominal operating values, which the software program will correct by computing an “adaptive correction”.

- The Adaptive Function (correction of the chiller setpoint –both in the cooling and heating modes – computed on the basis of real thermal load conditions) can be enabled or disabled by selecting “Y” or “N” in the relevant field. If the “Y” option is selected, it can take on the maximum value specified in the “Max Rge. AF” field (in °C). If the adaptive function is enabled, a “smile” symbol will appear inside the “Chiller” box on the main page.

- The Basket icon allows access to the “Historical Cleanliness” on-screen view, by this means it is possible to cancel the files of the data acquired (reducing the space occupied on the hard disk), until the selected date. The cancellation on-screen view of the “historic” is shown in the following picture:

The “SNOWFLAKE” and “SUN” icons you can simultaneously switch over all the indoor units into the cooling or heating mode (respectively). The changeover has the same effect as entering a “C” or “H” in the “Mode” column of the indoor unit configuration file (see section on “INDOOR UNIT CONFIGURATION”).

From the indoor unit configuration menu it is possible to define a “custom” operating mode for each of the indoor units (or rather, for each Micronet controller). The parameters specified are the following:

- **Address**: this is the network address of each indoor unit (defined by the position of the “address” dipswitches on the Micronet controller – see installation manual code FC66001435). To be avoided are the addresses 0 (reserved for the ModBus) and 127 (reserved for the Master in the Small solution).

- **Description**: for each address you can enter an associated description, which permits rapid identification of the indoor unit and its location.

- **Mode**: operating mode (Cooling or Heating)

- **Enabling**: the level of enabling ("Loc", "RA", "RB" or "RC"). For further details about the characteristics of each level of remote control, see table A1.

- **Summer t. setpoint**: this is the temperature setpoint that the supervisor will transmit to the relevant controller at the specified address during operation in the cooling mode. The custom setpoint has priority over the system setpoint, which is specified in the summer programming table (in other words it overrides the 24h / 7 day system programming for the cooling mode).

- **Winter t. setpoint**: this is the temperature setpoint that the supervisor will transmit to the relevant controller during operation in the heating mode. The custom setpoint has priority over the system setpoint specified in the winter programming table.

- **Δ T. setpoint**: this is the maximum amount (+/-) by which each indoor unit may deviate from the temperature setpoint transmitted by the supervisor to each controller. In this case as well, the “custom” value will have priority over the “system characteristics.”
The number indicates which “Zone” the terminal unit will be assigned. Once the terminal unit is assigned to its proper zone, it will be switched ON or switched OFF depending on the timetable defined in the “Zone manager” menu. To access the Zone Manager area, activate the summer/winter timetable menu and then click on the “zone manager icon”, as shown in the picture below:

Zone manager Icon

Remote Off: the presence of a “Y” (yes) in this field indicates that the indoor unit has been set OFF remotely. In such a case, from the user’s standpoint, all functions of the unit will be disabled until the remote OFF status is switched (with an “N” in the relevant field). The OFF status may also be activated by an EXT contact (see MicroNet installation manual code FC66001435).

Economy Function: setting the economy function will have the effect of changing the setpoint (increase of 4°C in the cooling mode, decrease of 3°C in the heating mode). There are 2 ways to activate the Economy function for a indoor unit: via the software (by placing a “Y” in the field of the corresponding column or from the “EDIT INDOOR UNIT CONFIGURATION” panel) or via a remote contact (see MicroNet installation manual code FC66001435). Both methods have the same effect in changing the operating temperature setpoint.

LEVELS OF AUTONOMY OF INDOOR UNITS IN THE ERGO SYSTEM

<table>
<thead>
<tr>
<th>Level</th>
<th>Remote control</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>REMOTE A</td>
<td>Maximum freedom: the operating mode is set via the software, but all other functions are accessible from the local control panel, including speed and temperature selection. All operating parameters are read by the system.</td>
<td></td>
</tr>
<tr>
<td>REMOTE B</td>
<td>Some degree of freedom: the user can choose the fan speed and adjust the temperature set via the software by the amount given by “Δ T. setpoint”. The operating mode is automatically set by the supervisor program.</td>
<td></td>
</tr>
<tr>
<td>REMOTE C</td>
<td>Locked: No function can be set from the local control panel, which is completely governed by the software.</td>
<td></td>
</tr>
<tr>
<td>LOCAL</td>
<td>All functions may be accessed from the local control panel, including speed and temperature selection and setting of the cooling or heating mode. All operating parameters are in any case read by the system.</td>
<td></td>
</tr>
</tbody>
</table>

By pressing the button in the bottom left corner you can run an automatic scan of the indoor units composing the network. This procedure enables you to verify whether all of the indoor units are actually connected and respond to interrogation by the program.

The program will ask for confirmation before starting the scan procedure. Thereafter progress will be displayed as shown in the figure below:

Reading terminal Nr 3

The scan procedure erases and rewriting the indoor unit configuration file. Therefore it is recommended to run a scan only when starting up for the first time or if serious problems occur in the system configuration.

SYSTEM DATA OF PAST 10’

The “System Data” window provides an overview picture of the working conditions across the system in the last 10 minutes of monitoring. The data shown in this window are highly useful for assessing system performance as a whole; in particular, the comfort index reflects the system’s ability to satisfy user demands by maintaining the desired level of comfort in the programmed working conditions. The following data are displayed:

- Avg. air T. setpoint: this is the average value of the “local” setpoints of each indoor unit. As a rule, each indoor unit receives the setpoint from the supervisor. By means of the temperature selector on the unit controller the user may correct the supervisor setpoint (within the range of adjustment allowed), thus determining the actual local working setpoint.
- Avg. Δ T. setpoint: this represents the average value of the corrections made to the supervisor setpoint, computed on the basis of data from all indoor units except for those which are OFF.
- Avg. ON time: expressed as a percentage and computed as the average ON time of all indoor units that have not been switched OFF; it tells you for what fraction of time the unit’s fan has been running. It measures the actual demands for “air conditioning” placed on the indoor units.
- Avg. air temperature: this is average value of the air temperatures measured by the sensors installed on the indoor units or inside the wall-mounted controllers. Unless there are strong local deviations, it provides a fairly good overall indication of the working conditions across the system.
- Prevalent speed: this is average fan speed of the indoor units that are not switched OFF; for calculation purposes, the minimum speed is represented by 1 and the maximum speed by 3.
- Comfort index: (system average) Fraction (%) of time during which the values read by the air temperature sensors installed on the indoor units remain within a set interval, whose midpoint coincides with the unit’s respective temperature setpoint (range of ±1°C). This parameter as well is computed as the average of all units not switched OFF. It is an indication of the system’s ability to maintain ambient conditions (air temperature) within a so-called “comfort range”, which each user defines, based on his or her preferences, around the local setpoint (set by the supervisor and locally corrected by the user).

Prevalent speed is expressed with 1 decimal digit to show whether the system is moving toward more or less demanding working conditions in relation to increases (or decreases) in the thermal load.
**REFERENCE INDOOR UNIT**

The ECONOMY symbol appears next to the “Local T. setpoint” field. The economy mode overrides other settings, switching the indoor unit into the REMOTE C status at minimum speed; \( \Delta \) setpoint = 0 and the local setpoint = supervisor setpoint adjusted for economy (-4 °C in cooling mode and – 3 °C in heating mode).

The OFF symbol appears next to the “Status” field.

- **Address**: clicking the arrow next to this field will open a list enabling you to select any of the system indoor units and view its associated operating parameters.
- **Summer/Winter**: this field shows the current operating mode of the selected indoor unit: SUM means summer, so the unit is working in the cooling mode. The opposite applies for WIN.
- **Status**: this field shows the indoor unit status; if it is ON, it means that the fan is running; if it is on STDBY the unit is working but the fan is not running, either because the temperature in the room is close to the setpoint or because operation is not enabled.
- **Selector**: it shows the position of the speed selector switch. The selector position may not correspond to the actual operating speed, depending on the type of configuration selected (see Micronet manual); for example, if a cooling mode valve is used and the controller is on standby, an override function will switch the speed to minimum when the valve is closed, regardless of the speed selected by the user.
- **Remote Level**: it shows the remote control status of the indoor unit (LOC, RA, RB or RC), according to the descriptions given in table A1 of the section on “indoor unit configuration”.
- **Fan speed**: it shows the actual unit fan speed, according to the output that is physically energised. Generally speaking, it may differ from the value set with the selector switch for the reasons described above.
- **Ambient Temp.**: the temperature inside the room measured by the air temperature sensor (installed on the indoor unit or inside the wall-mounted controller)
- **Local T. setpoint**: it represents the “local” setpoint determined by the user, who can correct the supervisor setpoint by adjusting the temperature selector.
- **Supervisor T. setpoint**: this is the temperature setpoint transmitted by the supervisor to the controller corresponding to the address selected from the drop-down list at the top of the window.

**CHILLER**

The “Chiller” window displays the following parameters:

- **Chiller Setpoint**: this is the temperature setpoint (referring to the temperature of water returning from users, at the inlet of the Chiller/HP) that has been set in the “System Characteristics” window for the item “Chiller Water Setpoint” or “HP Water Setpoint”. This value (except where an adaptive correction is calculated) is transmitted by the supervisor to the Chiller/HP.
- **Outlet Temp.**: this is the temperature of the water produced by the Chiller/HP.
- **Return Temp.**: this is the temperature of water returning from users, measured at the Chiller/HP inlet.
- **Adaptive Correction**: correction of the chiller setpoint - both in the cooling and heat pump modes - computed on the basis of actual thermal load conditions. The adaptive correction, always calculated by the software, may be enabled/disabled from the “System Characteristics” window. If the system is working in the cooling mode, the adaptive correction is added to the “chiller setpoint” to derive an “Adjusted T. setpoint” that will govern chiller operation. If, on the other hand, the system is working in the heating mode, the adaptive correction will be subtracted from the “chiller setpoint” to derive an “Adjusted T. setpoint” that will govern heat pump operation.

**Water Temp**: this is the water temperature measured by the relevant sensor.

**Heating mode valve (HE)**: it shows the status of the Heating mode valve (4-pipe systems) or heating element (which corresponds to the same contact of the micronet controller); the status may be ON (valve open and hot water in the coil) or OFF (valve closed and consequent bypass of water)

**Cooling mode valve**: shows the status of the Cooling mode valve (2 and 4-pipe systems); the status may be ON (valve open, cold water in the coil) or OFF (valve closed and consequent bypass of water).

**ON Time**: expressed as a percentage and computed for the individual indoor unit selected; it tells you for what fraction of time the indoor unit fan has been running. It measures the actual demand for “air conditioning” placed on that particular unit among all those hooked up to the system. This value may vary, even significantly, from the average system value.

**Comfort index**: (local, computed for the individual indoor unit) this is the fraction (%) of time during which the value read by the air temperature sensor remains within a set interval, whose midpoint coincides with the local setpoint (range of ±1°C). Computed locally, it is an indication of the selected unit’s ability to maintain ambient conditions (air temperature) within a so-called “comfort range” defined around the local setpoint. As in the previous case, this value may vary significantly from the average system value.

**Chiller Setpoint**: this is the temperature setpoint (referring to the temperature of water returning from users, at the inlet of the Chiller/HP) that has been set in the “System Characteristics” window for the item “Chiller Water Setpoint” or “HP Water Setpoint”. This value (except where an adaptive correction is calculated) is transmitted by the supervisor to the Chiller/HP.

**Outlet Temp.**: this is the temperature of the water produced by the Chiller/HP.

**Return Temp.**: this is the temperature of water returning from users, measured at the Chiller/HP inlet.

**Adaptive Correction**: correction of the chiller setpoint - both in the cooling and heat pump modes - computed on the basis of actual thermal load conditions. The adaptive correction, always calculated by the software, may be enabled/disabled from the “System Characteristics” window. If the system is working in the cooling mode, the adaptive correction is added to the “chiller setpoint” to derive an “Adjusted T. setpoint” that will govern chiller operation. If, on the other hand, the system is working in the heating mode, the adaptive correction will be subtracted from the “chiller setpoint” to derive an “Adjusted T. setpoint” that will govern heat pump operation.

**Adjusted T. Setpoint**: this is the nominal temperature setpoint (which will vary according to whether the system is cooling or heating), adjusted on the basis of the adaptive correction computed by the program. If the AF is disabled from the “System Characteristics” window, the Adjusted T. Setpoint will be equal to the Chiller Setpoint. The relation between the two parameters in question is defined as:

\[ \text{Adjusted T. Setpoint} = \text{Chiller Setpoint} \pm \text{Adaptive Correction} \]
Chiller ON time: expressed as a percentage and computed for the Chiller/HP connected to the supervision software; it tells you for what fraction of time the compressor has been running, in relation to the total period monitored. The value is updated at every reading.

INDICATOR ICONS

- Alarm "BELL" on red background: It indicates the presence of a general alarm for the Chiller/HP. Further information about the type of alarm that has been triggered may be obtained by clicking the "Chiller" icon, which opens the "Debug Chiller" window. For more details see the section below.

- "SNOWFLAKE" and "SUN" icons: they indicate whether the chiller/HP is working in the cooling or heating mode respectively.

- The "TRAFFIC LIGHT" shows the chiller and compressor status: A green light means that the compressor is running. A yellow light means that the compressor is on standby. A red light means that the chiller has been set OFF from the keyboard (no operating mode is enabled).

- "SMILE" icon: It indicates that the adaptive function has been enabled and the chiller setpoint is undergoing correction according to the formula: Adjusted T.Setpoint = Chiller Setpoint ± Adaptive Correction

- "CHILLER" icon: it opens the "debug chiller" window (to check for errors). For a description of debug functions see the section below.

- "CAUTION" message: It indicates that the chiller has failed to respond to interrogation by the supervisor and thus there is no communication on the data bus from or toward the chiller. If the "offline" warning lights up, it will be necessary to check the chiller power supply. If the power is on, check the continuity of the serial cable used for the network connection.

DEBUG CHILLER

The "Debug Chiller" page enables you to directly view the operating parameters of the water chiller or heat pump. In general the following parameters are displayed:

- Values read by sensors (water outlet and return temperature, condensation temperature, etc.)
- Status of alarms
- Compressor status
- Nominal and real operating setpoints

From here you can also perform the following operations:

- Shut down the unit (chiller on standby - no operating mode selected); the icon will become active only after the software has run at least one complete scan of the parameters.
- Switch on the unit in the cooling mode (On-board controller in cooling mode - compressor start-up if the inlet water temperature exceeds the setpoint, unless specific times have been programmed); the icon will become active only after the software has run at least one complete scan of the parameters.
- Switch on the unit in the heating mode (On-board controller in heating mode - compressor start-up if the inlet water temperature falls below the setpoint, unless specific times have been programmed); the icon will become active only after the software has run at least one complete scan of the parameters.

When the "Debug Chiller" window is open, the program runs a continuous scan of the controller for real-time updating of the values of the variables read by the supervisor. For this reason, before closing the window to exit, you will have to deactivate the reading function by clicking the relevant button. Otherwise the message shown here at the side will appear.
EDITING THE INDOOR UNIT CONFIGURATION

There is a specific menu for setting the custom configuration of each individual indoor unit. From this window you can select one of the system indoor units (from the drop-down list at the top) and set its respective level of remote control and the operating modes permitted by each level. Essentially you can:

- Set the operating mode
- Set the cooling and heating temperature setpoints
- Select the Δ T setpoint (maximum amount by which the local temperature setting may be adjusted, upward or downward, directly from the indoor unit) in the cooling and heating modes
- Choose the fan speed, set it on AUTO or switch on the unit heating element, where present.

CHOOSING THE LEVEL OF “REMOTE CONTROL”

Inside the “Mode” box you can select the level of remote control to be applied for the selected indoor unit. Depending on the level selected, the program will automatically enable the editable parameters: in sequence, the “Winter/Summer” option (selection of operating mode), “Temperature Settings” (selection of T Setpoint and Δ T Setpoint) and finally “Speed Selector” (selection of operating speed). We shall again briefly describe the meaning of the different levels of remote control. For further details refer to page 6.

At the bottom of the window you will find the following icons:

- Remote OFF: this means override of the indoor unit controller, which is switched into the Remote C status. The ON/OFF selector is switched to OFF (via the software), regardless of its actual position on the local controller. The software system will override the physical position of the selector. A “Y” will be shown in the Remote OFF column of the Indoor Configuration table.

- Remote ON: the software writes an “N” in the Remote OFF column of the Indoor Configuration table. As a result, the indoor unit will resume operation according to the configuration set in the table (level of remote control, setpoints, etc...).

- Disable indoor: if the indoor unit is disabled the software will stop interrogating the unit in question. This is especially useful in cases where one of the indoor units is faulty or an interruption has occurred in the modbus network. The unit that fails to respond is excluded so that it will not slow down the supervisor program, which will continue working with the units that respond correctly.

- Economy: setting the economy function will have the effect of changing the temperature setpoint (increase of 4°C in the cooling mode, decrease of 3°C in the heating mode).

SAVE CHANGE: in order for each of the previously described operations to be implemented, all changes made must be saved. This is achieved by clicking the “diskette” icon.

System synoptic panel: the “House” icon enables you to view the system synoptic panel, which provides a concise overview of the operating status of all indoor units and permits operations to be carried out simultaneously for all units.

The synoptic panel is illustrated in the figure below.

From here you can carry out the following operations, which will simultaneously affect all of the indoor units in the system:

- Shut down units (remote OFF command from supervisor)
- Switch on units (remote ON command from supervisor)
- Switch units into economy mode (remote command from supervisor)
- Disable units (remote command from supervisor)

The “Cleaver” icon indicates that the indoor is not responding to the supervisor’s call, due to an interruption in the communication network (as if the network cable had been in fact cut).
SUMMER - WINTER PROGRAMMING

From the main menu you can program a weekly timer with different temperature settings for each hour and for every day of the week. The programming will be applied to the whole system.

The general temperature setpoint for each indoor unit can be changed from the “Indoor unit Configuration” menu. The “custom” settings of each indoor unit will have precedence over the system daily/weekly programming.

ZONE MANAGER

Supervision software ERGO, allows to manage all the units an their subdivision in different homogeneous “Zones”, each one characterized by a peculiar timetable (ON or OFF for all the units inside the Zone). Each “Zone” (up to 16 different, in the standard release of the supervision software) is managed by a programming table user friendly and very “easy to use”. The “Zone Manager” menu is accessed via “Winter - Summer” timetable windows, simply clicking on the icon below:

Following that way, the windows shown below is activated:

Scroll menu on the upper left side of the windows, allows to select one of the 16 different zones managed by the supervision software. A brief description, to make easy the identification of each zone, can be edited in the frame that is left beside. For each hour of the day, and for each day of the week, is possible to define when the terminal units assigned to that zone, must be switched ON or switched OFF. This can be done, simply activating or deactivating each green box, by clicking on it.

Once the Zone Programming is defined, any changes must be saved, by clicking on the relevant icon:

SYSTEM GRAPHS

By clicking the “Graphs” icon you can view graphs showing time trends of several important system parameters:

- **Air T setpoint**: the graph shows the trend in the average air temperature setpoint (average of the setpoints of each indoor unit) established by the supervisor. The graph represents an average, measured over time, between the values in the daily/weekly programming table and custom setpoints (defined for each indoor unit in the configuration table).

- **Comfort index**: the trend in the system comfort index (which measures the system’s ability to maintain ambient conditions within the “comfort range” defined by each user, based on his or her preferences, around the local setpoint) makes it possible to identify and locate any peak thermal loads resulting in an overall unsatisfactory response of the system.

- **Average ON time of the indoor units**: as in the previous case, the graph shows how long the unit fans had to run on average in order to maintain ambient conditions within the comfort range. The time is expressed as a percentage.

- **Prevalent speed of fans**: this is the average fan speed of all indoor units not switched OFF. For purposes of calculation the minimum speed is 1 and the maximum 3. Together with the trend in the comfort index and the average ON time, this statistic makes it possible to locate and analyse any critical situations in which the system has trouble meeting instantaneous thermal load requirements.

- **Average air temperature**: this is the average value of the air temperatures measured by the sensors installed on the indoor units or inside the wall-mounted controllers. Unless there are strong local deviations, it will provide a fairly good overall indication of working conditions across the system.

- **Average setpoint correction**: it represents the trend in local adjustments to the temperature setpoint (Δ T setpoint). This statistic tells you in which direction (up or down) and to what extent users have corrected, on average, the supervisor setpoint to obtain an ambient temperature value satisfying
their personal comfort needs.

- **Chiller ON time**: expressed as a percentage and computed for the Chiller/HP connected to the supervision software, it represents the fraction of time during which the compressor was running, in relation to the total period monitored.

- **Water outlet temperature of the chiller**: it displays the pattern over time of the temperature of the water produced by the chiller and delivered to the indoor units.

- **Water return temperature of chiller**: it displays the pattern over time of the temperature of the water returning from the indoor units to the chiller, measured at the chiller inlet.

- **ADAPTIVE correction**: this shows the pattern over time in corrections to the chiller/HP setpoint computed by the supervision software according to actual thermal load conditions. This pattern allows you to identify the times of the day when thermal load requirements are lowest; at these times it will be possible to obtain an advantageous reduction in energy consumption.

### COMFORT INDEX

The definition is as follows:

Fraction (%) of time, within a given time window (TM = monitoring time), during which the values read by the air temperature sensors installed on the indoor units remain within a set interval, whose midpoint coincides with the sensors’ respective temperature setpoints (range of ±1°C).

From a mathematical point of view, whether calculated for an individual unit or for the whole system, it is an indication of the ability to maintain ambient conditions (air temperature) within a so-called “comfort range” defined around the setpoint (local or system).

From a graphic point of view we can make reference to 3 time intervals - t1, t2 and t3 - as intervals within which interior comfort is maintained.

#### TO FIND OUT MORE

The information in the paragraphs below provides greater insight into the operating logic of the software and the supervision capabilities it offers vis-à-vis the Micronet controller.

### ADAPTIVE FUNCTION

The basic definition of the ADAPTIVE SYSTEM is as follows:

“In general, a system which, by adapting its structure based on its own experience, seeks to improve its status or at least to maintain a status that may be deemed optimal given the correct environmental circumstances.”

The system comprising hydronic indoor units, chiller and ERGO supervision software may thus be considered an adaptive system, since in accordance with the above definition, it “seeks to improve its status or at least to that may be deemed optimal” based on its own experience and environmental conditions.

The system’s ability to adapt is based on continuous monitoring of the indoor units and chiller and, thanks to computer algorithms developed by Galletti SpA, manifests itself concretely through the Adaptive Function.

The Adaptive Function serves to correct the chiller setpoint (in both the cooling and heating modes) based on the actual thermal load conditions in which the indoor units are required to work.

The setpoint correction is simultaneously a function of:

- Prevalent speed: the higher the prevalent speed of the system, the smaller the correction that will made to the setpoint

- Comfort index: the higher the comfort index, the larger the correction that will made to the setpoint

- Average ON time: the higher the average ON time, the smaller the correction that will made to the setpoint

The range of adaptive correction is a system setting parameter and determines the maximum degree of correction that may be computed by the software in relation to the programmed setpoint.

The adaptive correction starts off from the project temperature setpoint and acts in such a way as to bring about an improvement in the efficiency of the cooling cycle.

The effect is especially notable during heat pump operation, where the action of the adaptive function indirectly modifies (reduces) the condensation pressure.

Numerical example:

**Term.1**: Local setpoint 27.5 °C (comfort range from 26.5 to 28.5 °C); conditions are maintained within the range for 45 out the 70 minutes monitored;

**Term.2**: Local setpoint 25.0 °C (comfort range from 24.0 to 26.0 °C); conditions are maintained within the range for 10 out of the 30 minutes monitored, the comfort index of each individual indoor unit is useful for monitoring any “local” anomalies.

If we calculate the index for the individual cases (units) in question, we obtain

\[
I.C.1 = 64.3 \% \text{ whereas } I.C.2 = 33.3 \%
\]

I.C.2 = 33.3 % indicates that there is likely to be a problem in the sizing and/or performance of indoor unit 2.