



# Enjoy the show in comfort

*20 years of experience with over 1,000 Theatres and Multiplex Cinema served make Clivet Spa experts for comfort and energy saving in Movie Theatres with their air conditioning systems fully automated and supervised by Movicon™ for constant indoor comfort control*

Founded in Feltre in 1989, Clivet Spa is one of the most important companies in Europe for designing, producing and distributing high efficiency and environment friendly air conditioning and air treatment systems, based on the heat pump technology with the geothermal concept. Within twenty years of activity, the company has been able to engineer a project that is capable of sustaining comfort and wellbeing to the individual and surrounding environment. One solid and

distinct presence at European level developed upon 20 years of experienced in the sector of heat pump cycling systems run on yearly cycles, oriented at offering total comfort and energy saving within buildings for living, working and spending leisure time in. The highly efficient and specialized Clivet systems have been awarded by becoming one of the leading companies operating on home ground (Shopping Centers, Outlets, Multiplex Cinemas, office buildings, hospitals, factories

etc.) with continuous focus on lowering management costs. Their success is demonstrated by installing Clivet systems in over 10,000,000 square meters of shopping centers and more than 1,000 movie theatres in the last 10 years in cooperation with important business groups such as McDonald's, Bennet, Auchan, McArthurGlen, IKEA, NH Hotels, Warner Village, UCI Cinemas, Ferrari and Microsoft.

The Clivet production site covers 50,000 m<sup>2</sup> ground area housing several production units. Over 900 professionals work on this production site and overseas sales offices in England, Spain, Germany, Holland, United Arab Emirates, Russia and India. All contribute to achieving one unique objective: sustainable comfort in the civil, industrial and residential sectors.

The Research and Development department

rely on a team of over 50 project design engineers fully dedicated to developing innovative solutions, using top level design engineering and simulation systems. One example is the four test labs, built between 2007 and 2010, where the units are put through tough test runs to verify and monitor their performances. Fully aware that each building has its own particular requirements in connection with the use in which the units are designated for, Clivet has gone beyond the product concept and developed complete and advanced systems tailor-made to suit various applications. These systems are capable of ensuring luxury comfort, efficient project development and installation time optimization. At the same time these systems have been designed with the environment in mind based on heat pump technology (geothermal concept). In this way this type of

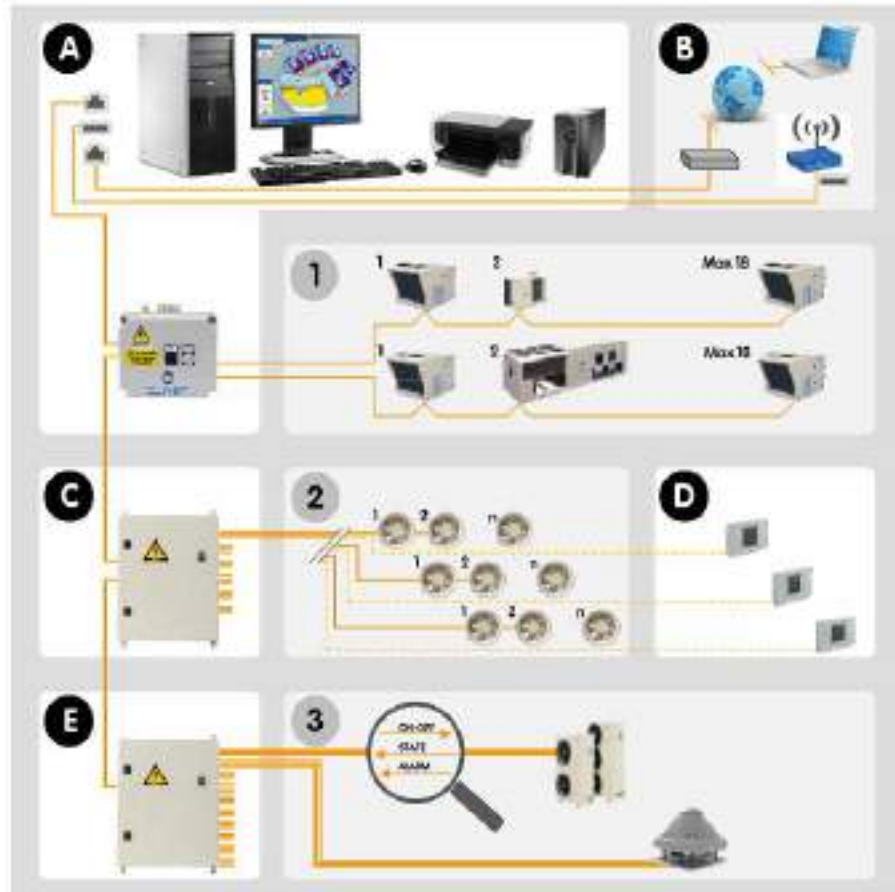
system is capable of providing comfort all year round while guaranteeing a save of 30 to 60% in primary energy and a 50% reduction in CO<sub>2</sub> emissions. Plus it also uses renewable energy sources instead of fossil fuels used by conventional solutions.



### The P-MATIC System

P-Matic MULTIPLEX CLIMA Edition is a solution specialized for centralized air conditioning system management in multiplex cinemas, designed and engineered by Clivet and based on modern, open and expandable technologies. This system consists of a centralized supervision system based on the Movicon 11 Scada technology, which integrates perfectly with the Clivet rooftop air conditioning units. Full access to each unit's working status, controls and parameters is guaranteed. P-Matic can also be used for managing air conditioners and the switching on/off of any other device connected to the system. It is very intuitive to use and has been designed using the Movicon 11 supervision platform functionalities. An extensive study carried out on intuitiveness and usability showed that choosing three-dimensional graphics for representing building structures with connected air conditioning units proved the most intelligent alternative. Due to the system's simplicity of use even the the-not-so expert user can interact with the functioning of the, program them accordingly and to control operating status and alarms.

The programming of the entire managerial system along with controlling each unit's operating status and maintenance checks can be done directly from the Control Room or by remote control, using the network feature. The centralized control system fully supports remote client and Web architecture for remote access using Web

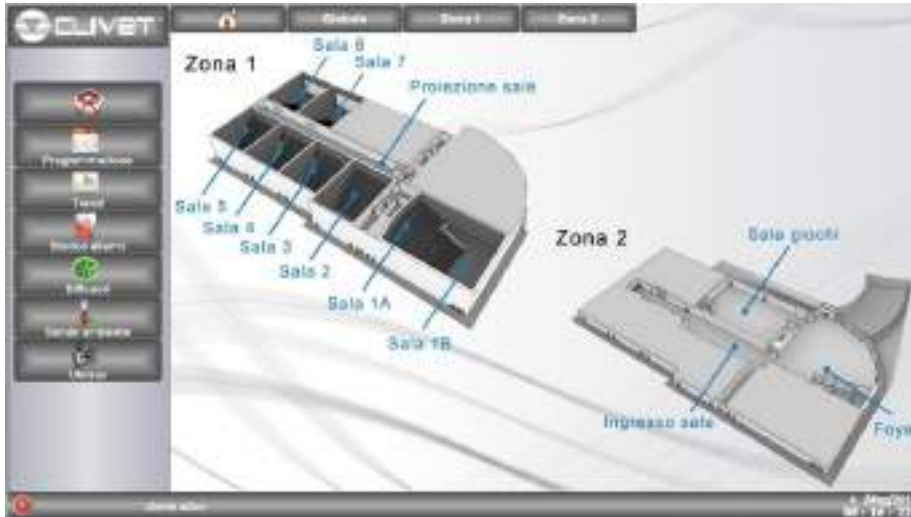


- A. Supervision composed of PC, Monitor, Printer and UPS. Centralized air conditioning system. The communication control panel established communication between the workstation and the Clivet rooftop units.
- B. Remote Client. Allows remote access to the supervision system using ADSL or local LAN network. The remote alarms are transmitted via modem or ADSL.
- C. Air conditioner ventilation Fan Control Panel: air conditioners can be adjusted to 3 different positions or set to modulate mode in combination with local temperature sensors.
- D. Temperature sensors: detect local air temperatures in the vicinity of each modular air conditioner unit to regulate air flow direction.
- E. Control Panel for managing other components: other components can be managed by using push button commands (ON/OFF), alarm status.
  1. Controlled Clivet units (ranging up to 36 Clivet rooftops from the CSNX-XHE, CSRT-XHE, CSRN-XHE, CKT-XHE e CKN-XHE series). Communication is managed using two RS485 serial lines. Each serial line can connect up to 18 Clivet rooftops.
  2. Air conditioning ventilation fans: Each rooftop unit can be assigned up to 3 groups of diffusers adjustable to 3 positions or self adjusting. Each panel can manage up to 6 rooftop units. The maximum number of panels allowed is 6 therefore 108 groups of diffusers can be controlled.
  3. Other components: Automatic control of components such as extraction ventilators, split conditioners, illumination and other, using push button commands (ON/OFF), alarm status.

browsers. P-Matic is the result based on choosing avant-garde components to guarantee maximum reliability. It includes a security system which provides a password and users management involving Log On authentication procedures, a data backup program and an UPS, uninterruptible power supply PC connection.

### Continuous controlled climate

Wellness in terms of temperature, humidity



Clivet system's 'P-Matic' screen page, based on the Movicon 11 technology

and air quality for the spectators in the foyer is one of the essential features that make spectators willingly go to the cinema. P-Matic manages control set points in each supervised zone as well as in each unit. It purifies air in the auditorium at the end of each film showing and allows air conditioning to work in custom night mode to save on energy. Air distribution can also be managed from the supervisor using different logic: fixed position or automatic wing adaption ventilation fans. Units can be programmed to work on a yearly cycle basis and each unit can be controlled with top precision to improve unit performance zone by zone. Benefits in terms of operation costs derive from providing thermal energy or cooling only where and when needed, gaining a greater advantage in saving on energy and quick return of investments.

The Clivet rooftop units have perfectly integrated with the Movicon supervision system in terms of functions and parameter settings and together lay the foundations for achieving energy optimization. Considering that cinema staff on the whole are not usually air conditioning specialists, the P-Matic system has been designed for easy interaction without disturbing the normal running of the cinema.

Navigating the P-Matic supervision screens is extremely intuitive and easy with building and air conditioning unit represented in tridimensional graphics. Managing alarms locally or by remote control and scheduling maintenance interventions are indispensable to ensure that these systems work continuously and perfectly. Even the not-so-expert user can interact and program units to work as required and check the status of alarms

displayed as animated graphics on screen.

Clivet's choice of using the Movicon software platform for its systems was influenced by Movicon's simplicity- of- use and great deployment flexibility. These characteristics enabled Clivet to use just the one software platform for all tertiary and industrial air conditioning systems implemented with PC use.

Clivet offers the residential building sector a yearly pump heating cycle application that uses solar energy to guarantee complete comfort all year round using one single system operated by Android. The Android platform was chosen for this application because it is the most commonly used end-user and open source usable in all portable devices such as mobile phones and tablets. Quick to use it is can also be integrated with smart home systems.



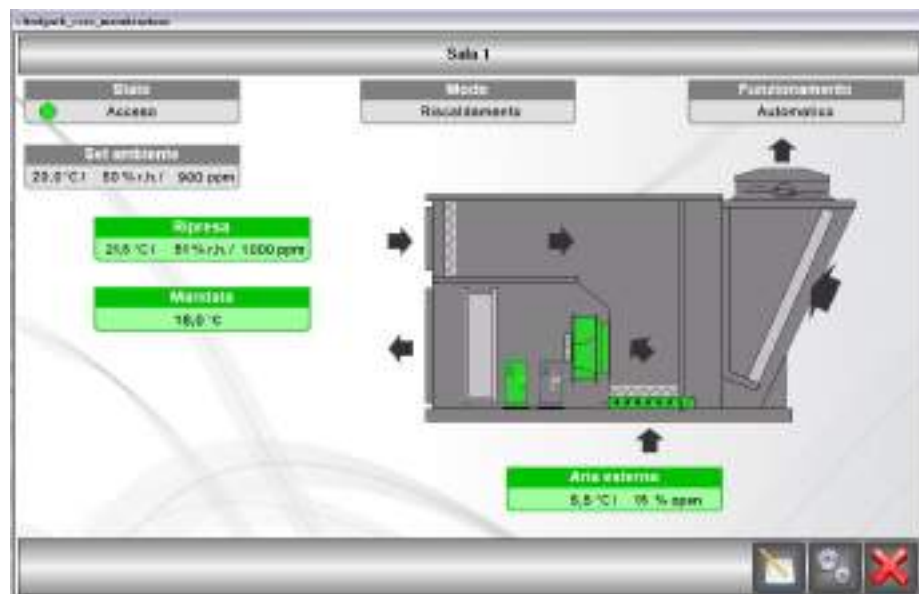
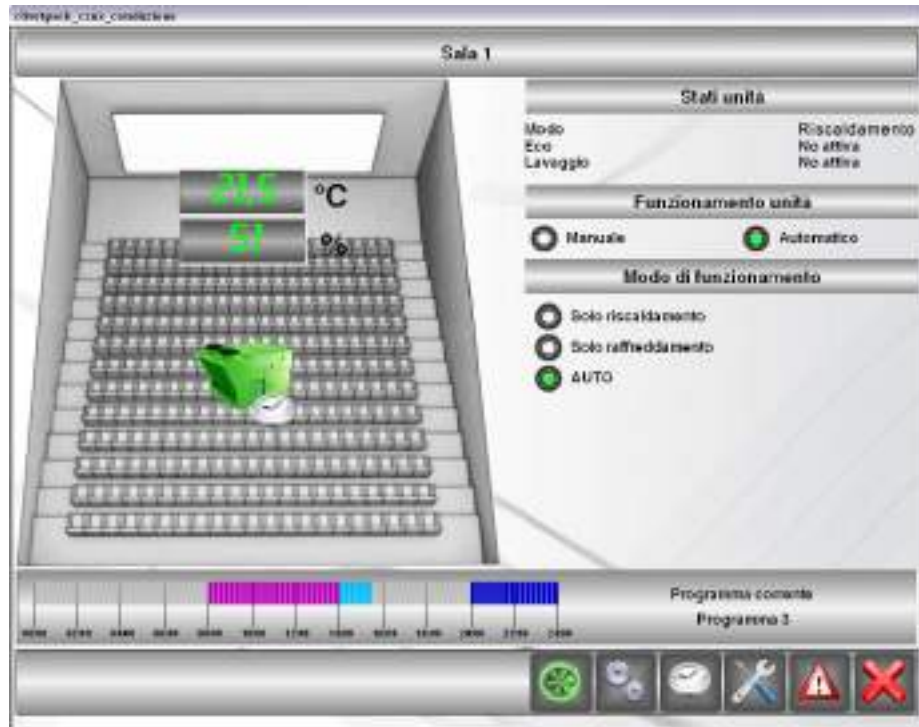
**Application example:  
CINESTAR AVENUE MALL Novi  
Zagreb, Croatia (Multiplex  
Cinema with 9 theatres)**

CineStar Avenue Mall is located in a shopping mall and is one of the main entertainment attractions in the capital city of Croatia. This cinema offers modern digital projection systems to more than 1,900 spectators and more that 500 seats in the adjacent restaurants, cafes and bars.

The Blitz-CineStar is the first chain of multicomplex cinemas in Croatia. With years of experience as major Croatian Blitz Film and Video distributors, they joined together with the German CineStar operators to provide the Croatian public the best services in terms of comfort, technology and film viewing. Today it has a chain of multiplex cinemas with an overall total of 74 auditoriums providing over 14,000 seats.

**The Challenge**

The second multiplex Blitz-CineStar in Zagabria wanted to realize its ambitious plan to expand the group as the most modern, attractive and technologically advanced cinema chain in the whole of Croatia. It was adamant to ensure that spectators got maximum comfort all year round especially in the cold winter climate conditions of Croatia’s capital city. Air also had to be purified and treated according the stringent hygiene standards covering the public sector. In addition, they were faced with two challenges to overcome certain constraints. The first challenge was represented by an overload variability that occurred with overcrowded closed in spaces



*L'interfaccia utente del sistema di supervisione e controllo consente una facile gestione e programmazione del sistema di climatizzazione.*

such as cinema auditoriums. To remedy this problem it was necessary to engineer an air conditioning system for the entire building and provide electric power for the central heating and cooling systems as well. Appropriate adjustments needed to be implemented to ensure that the different system components worked autonomously as required. At the same time, a way needed to

be found to improve energy efficiency to allow reductions in energy consumptions and managerial costs. It was apparent by the architectural plans that space and structural layout available for implementing such technological systems were insufficient to satisfy all these demands at the same time. The second challenge came from the complexity of the building layout and tight deadlines which placed more emphasize on trust in their planning skills and ability to delivery on time.

### The solution

The CineStar Avenue Mall has also deployed the Clivet Multiplex Solution for centralizing air conditioning systems. Their mono block reversible heat pump rooftop units are compact and capable of working at very low temperatures. Each auditorium has been installed with a unit specialized for maintaining ideal air conditioning when becoming very crowded. These machines are capable of treating a greater amount of external fresh air than any generic commercial rooftop application, where the number of people per unit area is usually less than 80%.

The Units also include electronically controlled fans for constant air flow. They have highly efficient thermodynamic energy recovery on expelled air and gas reheating to control humidity in hot air climates and during hot seasons to recover heat condensation otherwise exposed of externally. Even local venues, such as bars, shops and restaurants, use rooftop air conditioning units with

cooling/refrigeration circuits and reversible heat pumps that are more specific for less crowded places.

The whole system is controlled by the P-Matic Clivet centralized supervision system based on the Movicon 11 Scada platform, which displays information on comfort in the various indoor ambient, system and air conditioning unit status. Each unit can also be programmed automatically based on the conditions desired with prescheduled operating times.

### The results

The compactness of the Clivet Mutlplex air conditioning solution has made full use of the limited rooftop space available based on the roof's structure incidence averaging 250/m2. Since this is a specialized system, temperature, humidity and air quality controls are performed automatically throughout a yearly cycle to keep the desired conditions maintained in all the areas concerned. During the winter season the Clivet Multiplex Solution operates up to -12°C outdoor freezing conditions with 20°C indoor conditions with the aid of the auxiliary hot water battery provided for specific cases. From the managerial and environment point of view point, the combination of decentralization and high energy efficiency of the air conditioning units saves more than 40% on energy in respect to hydronic central heating systems. The industrialized construction of the units, which contain most of the system components within, has made onsite work quicker in assembling and testing within the agreed deadline and delivery times.



### **SEMPPLICITY AND VELOCITY WITH P-MATIC**

*The P-Matic supervision system implemented by the Clivet project engineers is simple and functional due to the Movicon 11 technology. All information and system operating functions can be accessed within a few simple mouse clicks.*

### **BUILDING GRAPHICS IN 3D**

The different building areas are displayed on screen in 3D where each area can be accessed directly.



### **FUNCTION NAVIGATION**

Different technical menus can be accessed to:

- Annually program units in the different areas.
- Display Trends reporting system behavior and performance in graphs and charts.
- Display historical alarm log and currently active alarms

### **SPECIFIC 3D GRAPHICS FOR EACH ZONE**

Each zone can be displayed showing current comfort status and activated function modes (automatic or manual)



### **CONTROL SCREEN PAGE FOR EACH ZONE**

The icon in the middle displays the comfort status associated to the Clivet unit. When more than one Clivet unit is being used in one zone, each unit will have its own icon. The following

fundamental information is displayed for each unit:

- Temperature / relative humidity / air quality in zone
- Temperature / relative humidity / set air quality
- Unit activation mode (Manual / Programmed)
- Yearly/daily scheduled programming Menu
- Operating Status (Comfort / Clean / Economical / Turned Off)
- Operating Status (Heating / Cooling / AUTO)
- Active alarms
- Motorized Ventilator Status (when present) divided by group

Set points and the above described functions can also be modified using this control screen page.

### **ANNUAL PROGRAMMING OF EACH UNIT**

For each day of the year the user can choose between:

- Manual
- Scheduled

The Scheduled mode provides up to 10 custom programs for each unit.



### **CUSTOMIZING 10 PROGRAMS FOR EACH UNIT**

The user can choose any one of the different operating modes available that can be activated at a minimum of 15 minute intervals. Each program number (e.g. Program 3) can correspond to a different status sequence for each unit.





**ENTIRE SYSTEM: DAILY AND ANNUAL PROGRAMMING**

The user can choose which program of use from the 10 available and already customized in the previous menus.

**GENERAL INFORMATION ON EACH UNIT**

A purposely designed table summarizes each unit's overall operating status data for clear and quick referral.

**GENERAL INFORMATION ON COMPONENT OPERATING STATUS**

When clicking on a component, such as a compressor or ventilator, the User will be able to view the operating status in two modes:

- 3D graphical animation mode
- Table mode to aid system diagnostics

**SECURE ACCESS FOR TECHNICAL MAINTENANCE**

The maintenance menu is protected by passwords to grant access to qualified maintenance technicians only. This will allow the maintenance technician to:

- display and modify the unit's parameters which determine how it works
- enter job description in registry or issue an electronic maintenance report.

**ACTIVE ALARM SITUATION IN UNIT**

Alarms are displayed at all navigation levels:

- local or global building level, using specific icons
- unit level, with detected anomaly and table showing control summary of monitored components
- summary level, with list of active alarms an historical of those already acknowledged, subdivided by severity and type. s

**ALARM HISTORICAL**

Alarms are recorded in the historical log for 180 days and divided by:

- Unit and alarm type
- Date and time of event
- Duration

**STANDARD TREND**

The principle variables such as Temperature, Humidity and Air Quality are saved and displayed for each zone. Each zone is automatically monitored every 10 minutes for the duration of 24 hours.

**ADVANCED TREND**

The User enabled with a password can choose to monitor further data on each unit's operating status, with a capacity of 128 variables in use in the whole system. Data is sampled automatically every 10 minutes for the duration of 60 days and



can be:

- On location visualization
- Exported in universal data interchange files for further processing