INDEX

THERMOTRONICS

REFRIGERATING CYCLES

The simulator allows the study, the performing of experiments and the troubleshooting for the following systems:

- Refrigerating cycle with liquefactible gas evaporation / compression;
- Refrigerating cycle with absorption/diffusion.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

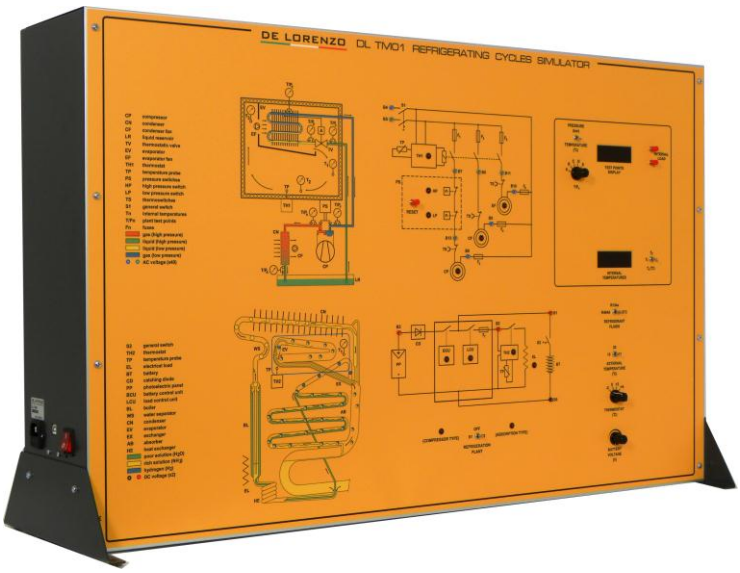
The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The refrigerating cycle with liquefactible gas evaporation /compression is composed of the following main elements:

- Hermetic compressor;
- Ventilated condenser;
- Tank for the liquid;
- Automatic thermostatic valve;
- Ventilated evaporator;
- Regulation thermostat;
- Safety pressure switch;
- Refrigerating fluid temperature/pressure test-points;
- Possibility to test the main alternative refrigerating fluids, such as:
  - R-125 alternative to R-502
  - R-134a alternative to R-11 and R-12
  - R-407C alternative to R-22

The temperature absorption/diffusion refrigerating cycle, based on a solution of water-ammonia with inert gas (hydrogen), is composed of the following main elements:

- Aggregate consisting of boiler, water separator, condenser, evaporator, exchanger, absorber;
- Electrical resistance for the boiler heating;
- Regulation thermostat for electrical resistance insertion;
- Solar power system composed of photovoltaic panels, block diode, battery, for the conversion of solar energy into electrical power and subsequent storage in the battery;
- Electronic device for insertion/disconnection of photo- voltaic panels, on the basis of the battery loading status;
- Possibility to simulate the various operating situations on the basis of the battery loading status, the temperatures and the regulations.



DL TM01

THERMOTRONICS

DOMESTIC REFRIGERATING SYSTEMS

The simulator allows the study, the performing of experiments and the troubleshooting for the following systems:

- Single temperature domestic refrigerator;
- Two temperatures domestic refrigerator;
- Domestic freezer.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The single temperature domestic refrigerator is composed of the following main elements:

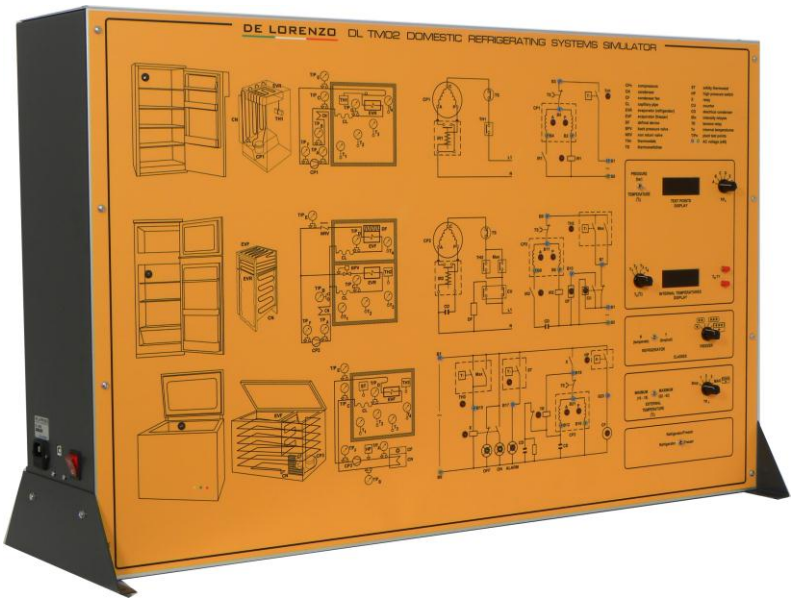
- Hermetic compressor with thermal protection and intensity relay without starting condenser;
- Static condenser;
- Capillary pipe for refrigerating fluid expansion;
- Natural air circulation static evaporator;
- Regulation thermostat;
- Refrigerating fluid temperature/pressure test-points
- Possibility to simulate and test both the version for temperate climate and the version for tropical climate.

The two temperatures domestic refrigerator is composed of the following main elements:

- Hermetic compressor with thermal protection and intensity relay with starting condenser;
- Static condenser;
- Capillary pipe for refrigerating fluid expansion;
- Natural air circulation static evaporator for refrigerator;
- Constant pressure valve;
- Natural air circulation static evaporator and electrical defrosting resistance, for freezer;
- Double regulation thermostat for refrigerator/freezer;
- Refrigerating fluid temperature/pressure test-points;
- Possibility to simulate and test both the 1, 2 and 3 star freezer and the 4 star freezer;
- Possibility to simulate and test both the version for temperate climate and the version for tropical climate.

The domestic freezer is composed of the following main elements:

- Hermetic compressor with thermal protection and power relay with starting condenser;
- Forced air cooled condenser;
- Capillary pipe for refrigerating fluid expansion;
- Static evaporator;
- Regulation thermostat;
- Refrigerating fluid temperature/pressure test-points;
- Warning light for normal operating conditions and alarm conditions.



DL TM02

THERMOTRONICS

REFRIGERATING UNIT FOR FOOD DISTRIBUTION

The simulator allows the study, the performing of experiments and the troubleshooting for the following systems:

- Natural air circulation cabinet;
- Forced circulation 5-level refrigerated cabinet;
- Island for frozen food;
- Mixed cold cabinet.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The natural air circulation cabinet is composed of the following main elements:

- Hermetic compressor with thermal protection and intensity relay;
- Static condenser;
- Automatic thermostatic valve;
- Natural air circulation static evaporator;
- Regulation thermostat;
- Refrigerating fluid temperature/pressure test-points;
- Possibility to check the level of the temperature inside the cabinet;

The 5-level refrigerated cabinet is composed of the following main elements:

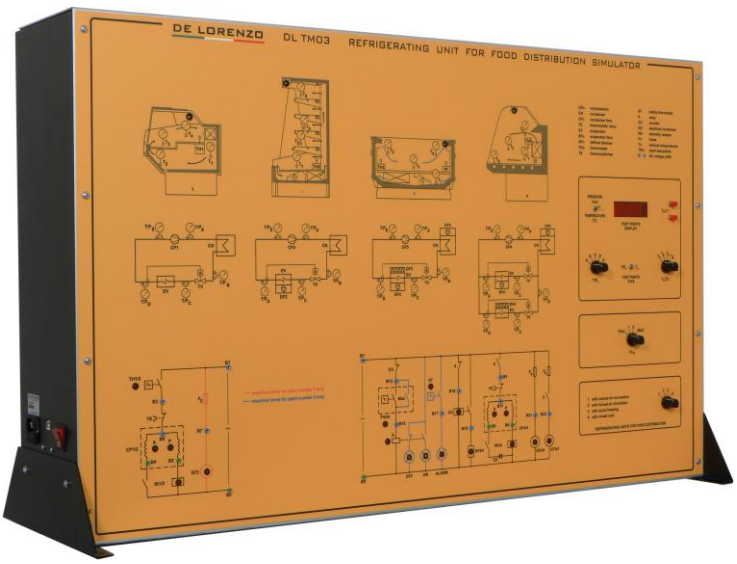
- Hermetic compressor with thermal protection and intensity relay;
- Static condenser;.
- Automatic thermostatic valve;
- Forced air circulation static evaporator;
- Regulation thermostat;
- Refrigerating fluid temperature/pressure test-points;
- Possibility to check the level of the temperature inside the cabinet;

The island for frozen food is composed of the following main elements:

- Hermetic compressor with thermal protection and intensity relay with starting condenser;
- Forced air cooling condenser;
- Automatic thermostatic valve;
- Forced air circulation static evaporator;
- Regulation thermostat;
- Defrosting resistor controlled by a counting device;
- Refrigerating fluid temperature/pressure test-points;
- Possibility to check the level of the temperature inside the cabinet.

The mixed cold cabinet is composed of the following main elements :

- Hermetic compressor with thermal protection and intensity relay with starting condenser;
- Forced air cooling condenser;
- Two automatic thermostatic valves;
- Forced air circulation evaporator and coil evaporator for the top;
- Regulation thermostat;
- Defrosting resistance, for the coil evaporator, controlled by a counting device;
- Refrigerating fluid temperature/pressure test-points;
- Possibility to check the level of the temperature inside the cabinet.



DL TM03

THERMOTRONICS

INDUSTRIAL COLD STORE

The simulator allows the study, the performing of experiments and the troubleshooting for the following systems:

- Positive temperature store for food refrigeration and preservation;
- Cold store for the preservation of frozen food.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

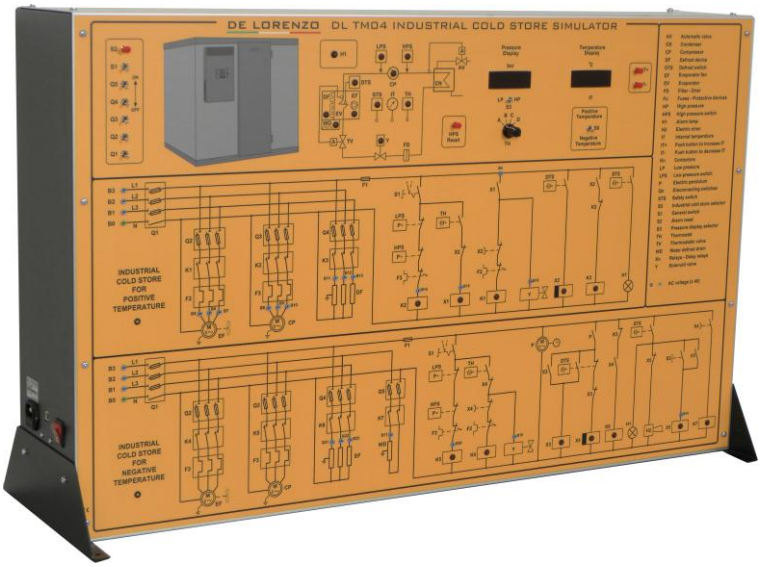
The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The positive temperature store for food refrigeration and preservation is composed of the following main elements:

- Three-phase motor compressor group;
- Waste water condenser;
- Automatic thermostatic valve;
- Forced convection evaporator operated by a three-phase motor;
- Electro valve for the liquid;
- Defrosting resistance battery;
- Regulation thermostat;
- Defrosting thermostat;
- Safety thermostat;
- Low pressure switch;
- High pressure switch.

The cold store for the preservation of frozen food is composed of the following main elements:

- Three-phase motor compressor group;
- Water condenser, supplied by a water thermostatic valve;
- Automatic thermostatic valve;
- Forced convection air refrigerator evaporator (three- phase fan);
- Electro valve for the liquid;
- Defrosting resistance battery;
- Discharge and dripping resistance;
- Motorized pendulum for defrosting control;
- Visual and sound alarm device;
- Regulation thermostat;
- Defrosting thermostat;
- Safety thermostat;
- Low pressure switch;
- High pressure switch.



DL TM04

THERMOTRONICS

INDUSTRIAL REFRIGERATING SYSTEMS

Two-side simulator for the study of several industrial refrigerators and cold stores for food cooling and freezing.

- SIDE A simulates four types of industrial refrigerators: island for frozen food, natural air circulation cabinets, mixed cooling cabinets and 5 levels forced circulation cabinets.
  The components that are studied in the above systems include: hermetic compressor, evaporator, thermostat, temperature/ pressure measurement test-points, etc.

- SIDE B simulates two types of industrial cold stores: positive temperature store for food refrigeration and preservation and cold store for the preservation of frozen food.
  The components that are studied in the above systems include: three-phase compressor, evaporator, thermostats, defrosting resistance, pressure switches, measurement test-points, etc.

The panel is complete with CAI software.

Side A **DL TM32** **Side B**

THERMOTRONICS

INTRODUCTION TO THE AIR CONDITIONING SYSTEMS

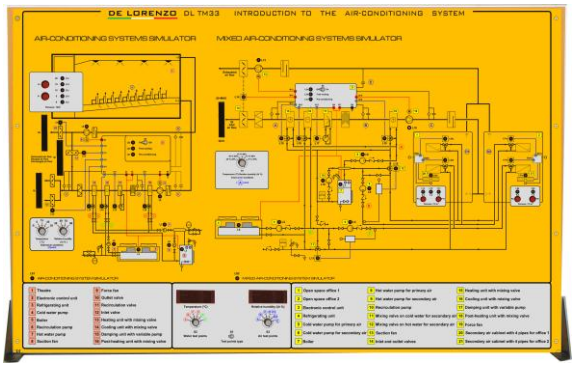
Two-side simulator for the study of different air-conditioning systems.

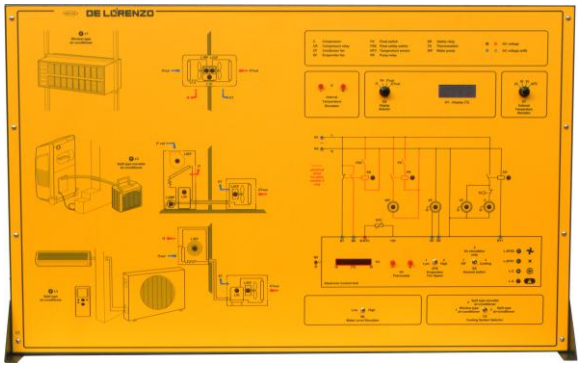
- SIDE A simulates two types of systems: the mixed (air-water) air-conditioning systems and the systems that are used for the air-conditioning of a show hall (theatres, cinemas, etc.) where the ambient parameters change due to the presence of many people.

- SIDE B simulates the domestic air-conditioning systems: the window single block air-conditioner, the portable air-conditioner and the fixed, split type air-conditioner.

Through the study of the above systems it is possible to understand the operation of: compressors, condensers and evaporators, fan speed selectors, temperature probes for internal and external air, switches, thermostats, air-processing units with heating, cooling and humidifying devices, outlet and recirculation valves, temperature/humidity probes, boilers and refrigerating units for the production of hot and cold fluids, electronic units for data recording of temperature and humidity and for the adjustment of the actuators, pumps, etc.

The panel is complete with CAI software.





Side A **DL TM33** **Side B**

THERMOTRONICS

AIR-CONDITIONING SYSTEM

The simulator allows the study, the testing and the troubleshooting for the following system:

- Full air, single duct, constant capacity air-conditioning system, for single zone with regulation on the heating, cooling and post-heating batteries.

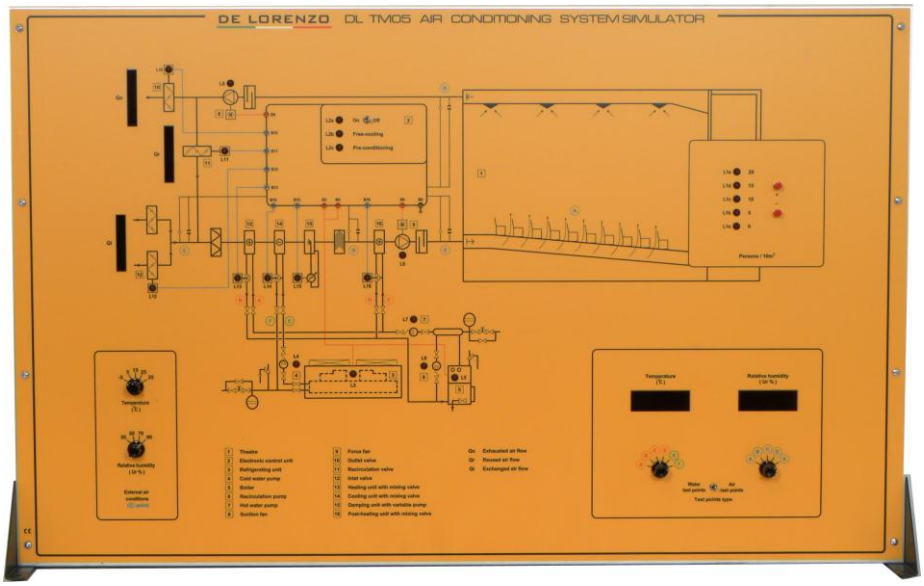
These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The full air, single duct, constant capacity air-conditioning system, for single zone with regulation on the heating, cooling and post-heating batteries is composed of the following main elements:

- Air treatment unit (ATU) complete with heating, cooling, humidifying and post-heating batteries;
- Air duct, complete with inlet fan, recovery fan, motorized shutter for ejecting, mixing and renewing the treated air;
- Boiler and refrigerating unit for the production of the hot and of the cool fluid to be used in the ATU batteries;
- Electronic station for data recording concerning temperature and humidity and for the subsequent adjustment and opening of the actuators and devices for the air-conditioning;
- Ambient to be air-conditioned composed of a show hall (theatre, cinema), provided with system for air delivery from the bottom and its recovery from the top;
- Possibility to simulate the external temperature and humidity conditions;
- Possibility to simulate the crowding of the hall and, consequently, the relevant thermal and sensitive loads;
- Possibility to display the percentages of the ejected, recycled and renewed air;
- Possibility to display the temperature and the humidity of the treated air, in various points of the system;
- Possibility to display the temperatures of the hot and cool fluid on the batteries of the ATU.



DL TM05

MIXED AIR-CONDITIONING SYSTEM

The simulator allows the study, the performing of experiments and the troubleshooting for the following system:

- Mixed air-water conditioning system, with four-duct air convectors.

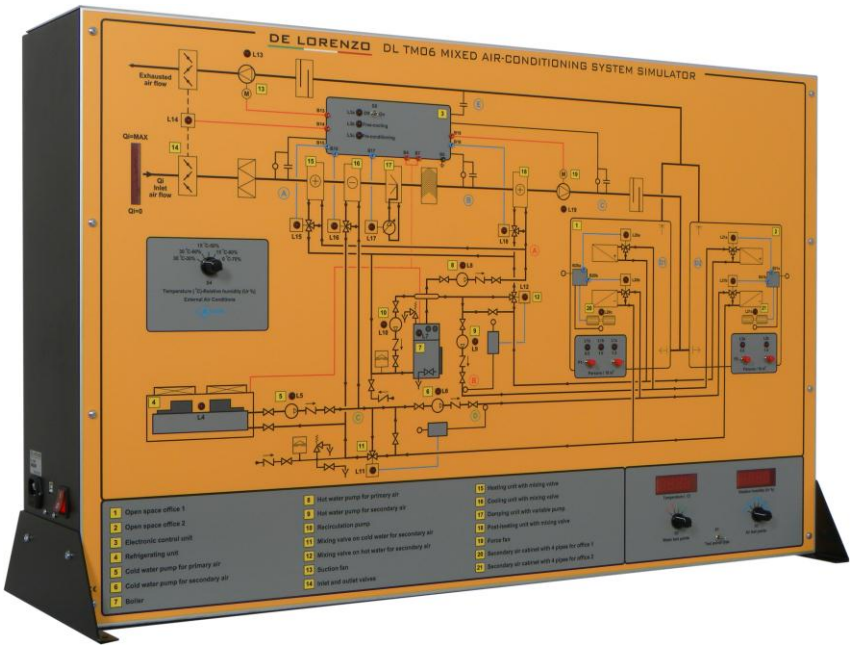
These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The mixed air-water conditioning system, with four-duct air convectors is composed of the following main elements:

- Air treatment unit (ATU) complete with heating, coo- ling, humidifying and post-heating batteries;
- Air duct, with delivery fan, ejection fan, motorized shutter for treated air ejection and treated air renewal;
- Boiler and refrigerating unit for the production of the hot and of the cool fluid to be used in the ATU batteries and in the four-duct air convectors;
- Electronic station for data recording concerning temperature and humidity and for the subsequent adjustment and opening of the actuators and air-conditioning devices;
- Environment to be air-conditioned composed of offices, provided with four-duct air convectors, system for air delivery and for its recovery;
- Possibility to simulate the external temperature and humidity conditions;
- Possibility to simulate the crowding of the offices and, consequently, the relevant thermal and sensitive loads;
- Possibility to display the percentages of the renewed air;
- Possibility to display the temperature and the humidity of the treated air, in various points of the system;
- Possibility to display the temperatures of the hot and cool fluid supplying the batteries.



DL TM06

THERMOTRONICS

DOMESTIC AIR-CONDITIONING SYSTEM

The simulator allows the study, the testing and the troubleshooting for the following systems:

- window single block air-conditioner;
- portable air-conditioner, split type;
- fixed air-conditioner, split type

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The PC constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The window single block air-conditioner consists of the following main elements:

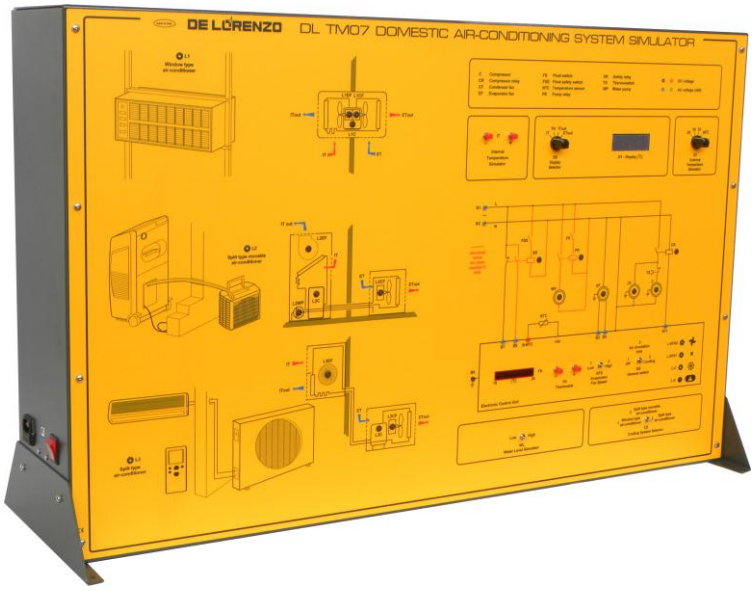
- single-phase motor compressor;
- condenser and evaporator with ventilation through only one single-phase electric motor;
- capillary pipe;
- regulation thermostat;
- fan speed selector;
- main switch;
- switch for compressor insertion;
- possibility to simulate the internal and external temperature;
- possibility to display the temperature values of the treated air.

The portable air-conditioner, split type, consists of the following main elements:

- single-phase motor compressor;
- condenser with ventilation through single-phase electric motor;
- evaporator with ventilation through single-phase electric motor;
- capillary pipe;
- regulation thermostat;
- fan speed internal selector;
- main switch;
- switch for compressor insertion;
- single-phase motor-driven pump for condensate evacuation;
- possibility to simulate the internal and external temperature;
- possibility to display the temperature values of the treated air.

The fixed air-conditioner, split type consists of the following main elements:

- single-phase motor compressor;
- condenser with ventilation through single-phase electric motor;
- evaporator with ventilation through single-phase electric motor;
- capillary pipe;
- regulation thermostat;
- fan speed internal selector;
- main switch;
- switch for compressor insertion;
- possibility to simulate the internal and external temperature;
- possibility to display the temperature values of the treated air.



DL TM07

HEAT PUMP AIR-CONDITIONING SYSTEM

The simulator allows the study, the performing of experiments and the troubleshooting for the following system:

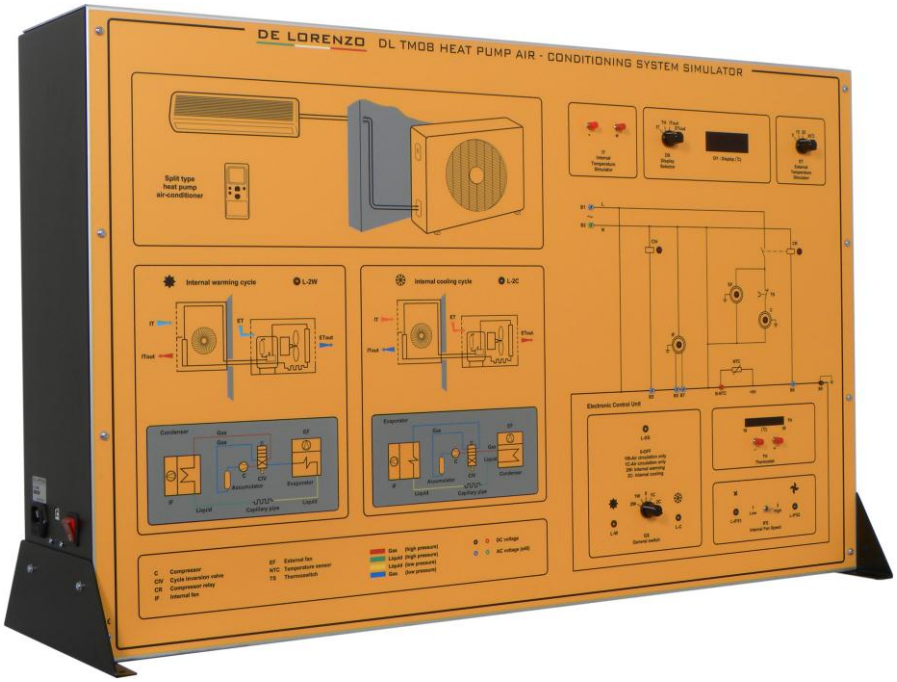
- Fixed air-conditioner, split type, with air-air heating pump, for cooling and heating the ambient.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.
It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The PC constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The fixed air-conditioner, split type, with air-air heating pump, for cooling and heating the ambient is composed of the following main elements:

- Single-phase motor compressor;
- Condenser/evaporator with ventilation through single-phase electric motor;
- Evaporator/condenser with ventilation through single- phase electric motor ;
- Two expansion thermostatic valves;
- Two single-direction valves for by-pass circuits;
- Monostable electro valve for inversion of the refrigerating cycle;
- Liquid tank;
- Regulation thermostat;
- Internal fan speed selector;
- Main switch;
- Cooling/heating selector;
- Possibility to simulate the internal and external temperatures;
- Possibility to display the temperature values of the treated air.



DL TM08

THERMOTRONICS

AIR-CONDITIONING FOR AUTOMOBILES

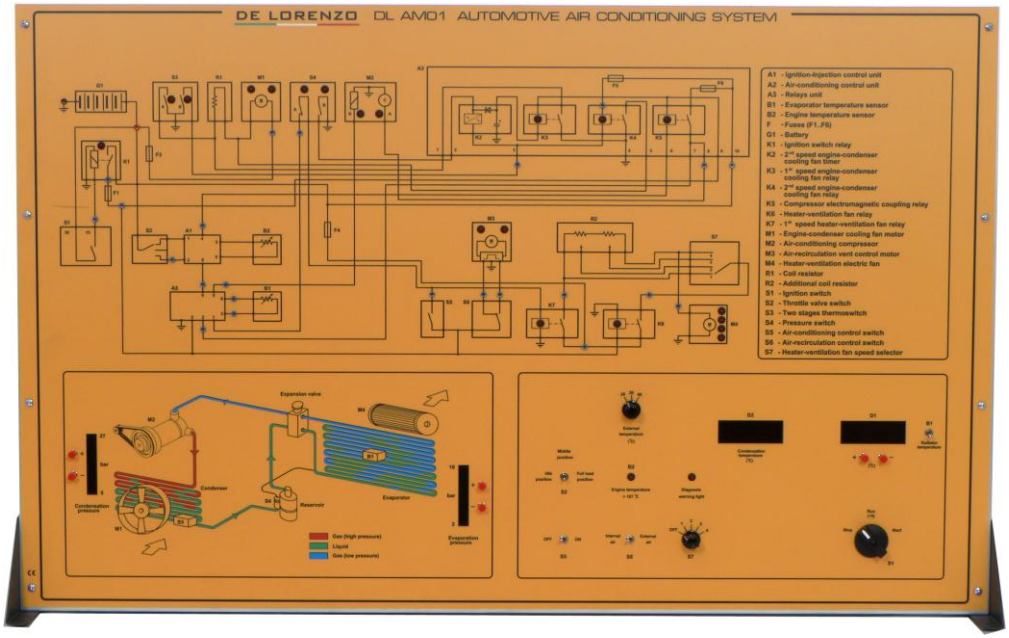
To cool the external air refrigerating compressor based systems are exclusively used.

The compressor, activated by the engine, compresses the refrigerant which consequently warms up; in the condenser the working fluid is cooled until it reaches the liquid phase.
The cooling is obtained by giving heat to the exterior in the zone around the compressor.
The cooled fluid expands in the expansion valve and in the evaporator and is transformed to gas.
The heat necessary for such transformation is subtracted from the entering cool air.

The simulator analyzes all the phases of the refrigeration cycle.

In particular:

- Relations between temperature and pressure in the refrigerant
- Operation of the compressor
- Operation of the condenser
- Pressure switches
- Temperature regulation.



DL AM01

THERMOTRONICS

HEATING SYSTEM

The simulator allows the study, the performing of experiments and the troubleshooting for the following systems:

- Central heating system;
- Heating system with distributed regulation;
- Zone heating system.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The central heating system is composed of the following main elements:

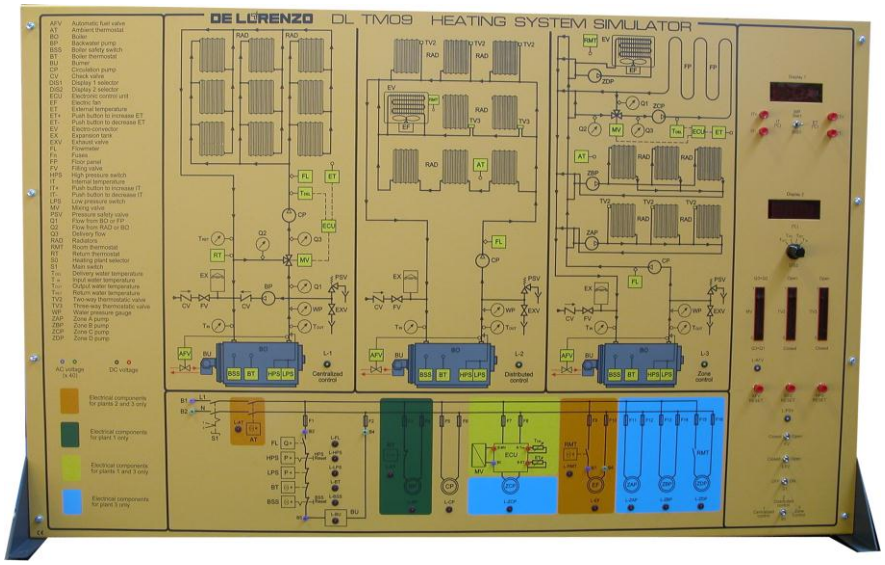
- Liquid or gas heat generator;
- Forced circulation circuit, two pipes, with closed expansion tank and inverse return;
- Electronic central regulation of the delivery temperature, on the basis of the external temperature, trough three- way mixing valve;
- Re-circulation anti-condensate pump;
- Boiler regulation thermostat and block thermostat;
- Block pressure switch and safety valve;
- Fuel interception valve.

The heating system with distributed regulation is composed of the following main elements:

- Gas heat generator;
- Forced circulation circuit, single pipe, with closed expansion tank and inverse return;
- Regulation distributed on each user
- Two-way thermostatic valve;
- Three-way thermostatic valves;
- ON/OFF thermostats
- Boiler regulation thermostat and block thermostat
- Block pressure switch and safety valve;
- Fuel interception valve.

The zone heating system is composed of the following main elements:

- Gas heat generator;
- Forced circulation circuit, zone type, with closed expansion tank and direct return;
- Zone A: single-pipe system;
- Zone B: two-pipe system
- Zone C: floor system;
- Zone D: air convection system;
- Regulation with ambient thermostats for zones A, B, D;
- Regulation with compensation of the delivery temperature, as a function of the external temperature, for system C;
- Boiler regulation thermostat and block thermostat;
- Block pressure switch and safety valve;
- Fuel interception valve.



DL TM09

THERMOTRONICS

SANITARY WATER PRODUCTION SYSTEM

The simulator allows the study, the performing of experiments and the troubleshooting for the following systems:

- Instantaneous geyser;
- Store electric water heater;
- Solar system for sanitary water production with boiler integration;
- Central system for heating and sanitary water production.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical/electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The instantaneous geyser is composed of the following main elements:

- Forced draught gas-fired wall boiler;
- Flame control device;
- Sanitary water regulation thermostat;
- Safety thermostat;
- Sanitary water flow meter;
- Smoke pressure switch;
- Modulating valve for gas capacity.

The store electric water heater is composed of the following main elements:

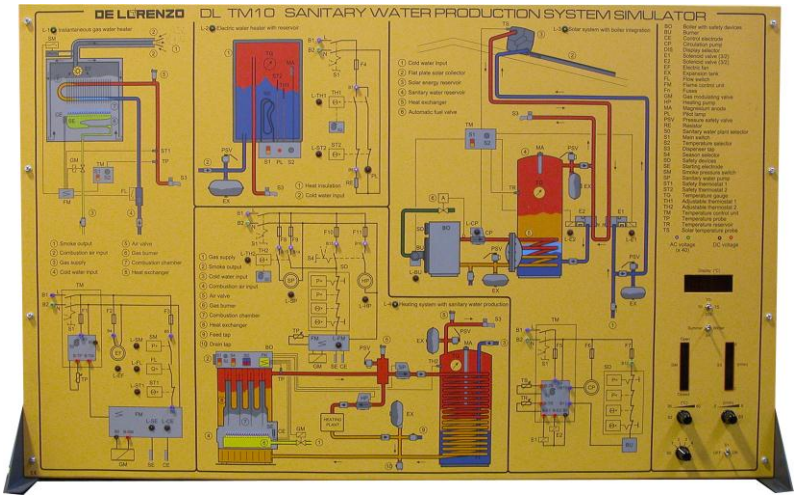
- Steel boiler with insulation;
- Electric resistance;
- Sanitary water regulation thermostat;
- Safety thermostat;
- Safety valves;
- Magnesium anode;
- Sanitary water thermometer;
- Pilot light for electric resistance insertion.

The solar system for sanitary water production with boiler integration is composed of the following main elements:

- Solar panel with natural circulation, with tank for sanitary water storage;
- Boiler and relevant gas burner;
- Safety and regulation devices for the boiler;
- Boiler for sanitary water storage;
- Boiler pump;
- Sanitary water regulation thermostat;
- Probe for boiler temperature and boiler sanitary water thermometer;
- Probe for stored sanitary water temperature through solar panels;
- Safety valve;
- Electrovalve for control of the following configurations:
- Sanitary water with heating through solar panel;
- Sanitary water with heating through solar panel with boiler integration;
- Sanitary water with heating through boiler.

The central system for heating and sanitary water production is composed of the following main elements:

- Gas boiler;
- Safety and regulation devices for the boiler;
- Flame control device;
- Modulating valve for gas capacity;
- Heating circulation pump;
- Expansion tank;
- Air exhaust valve;
- Boiler for sanitary water storage;
- Boiler pump;
- Sanitary water regulation thermostat;
- Probe for boiler temperature and boiler sanitary water thermometer;
- Safety valves;
- Magnesium anode.



DL TM10

THERMOTRONICS

PHOTOVOLTAIC AND THERMAL PANELS

The simulator allows the study, the performing of experiments and the troubleshooting for the following components and systems:

- Photovoltaic silicon single crystal cell, squared, side 135 mm;
- Two photovoltaic cells with series connection;
- Two photovoltaic cells with parallel connection;
- Panel composed of 36 photovoltaic cells with series connection;
- Thermal panel with liquid circulation.

These systems are reproduced on the panel, through a colour representation which allows a complete analysis of the fluid circuit, of its components and of the electrical / electronic circuit for control and regulation.

It is possible to simulate the behaviour of components and systems, on the basis of the operating conditions which can be monitored directly on the panel or through Personal Computer by teacher and students.

The Personal Computer constantly keeps under control the simulation in progress and displays its behaviour through analog and digital signals and meters; in this way the student, through measurements and tests, can go on with the troubleshooting.

The experimentation on the photovoltaic systems (described here under) is organized as follows:

- Possibility to simulate several values of the solar radiation intensity (W/m2);
- Possibility to simulate several values of the photovoltaic cells temperature;
- Possibility to change the electrical load of the above- mentioned photovoltaic systems;
- Detection of the characteristic voltage-current (V-I), supplied by the photovoltaic systems, as a function of solar radiation intensity and cells temperature;
- Detection of the characteristic voltage-power (V-P), supplied by the photovoltaic systems, as a function of solar radiation intensity and cells temperature;
- Evaluation of the conversion efficiency (radiating energy-electric power) of the photovoltaic systems.

The experimentation on the thermal panel with liquid circulation is organized as follows:

- Possibility to simulate several values of the solar radiation intensity (W/m2);
- Possibility to simulate several values of the temperature of the thermal-carrier liquid at the panel's entrance;
- Possibility to change the thermal-carrier liquid capacity through the thermal panel;
- Evaluation of the thermal-carrier liquid temperature at the panel's exit, as a function of the solar radiation intensity and of the entrance temperature;
- Evaluation of the conversion efficiency (radiating energy-electric power) of the thermal panel.

DL TM11

THERMOTRONICS

SOFTWARE

CAI SOFTWARE

DL NAV

Each panel is supplied complete with a Student Navigator software that allows students to perform their learning activities through a Personal Computer, without the need for any other documentation.
Moreover, the Student Navigator is provided with an interface to the Laboratory Management software DL Lab, to allow the realization of fully integrated training systems, where all the educational tasks are managed and controlled by the Teacher, through his own work station.

Features:

- theoretical subjects through PC with hyper textual navigation according to the standard World Wide Web Internet method
- practical training guided through PC, with test questions and computer control of the answers
- fault insertion from PC (or from remote teacher station) and troubleshooting operations with computer control of the answers
- use of the computer as a stand-alone work station or integrated in the computer network of the laboratory

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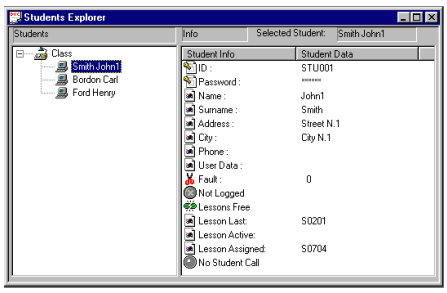
LABORATORY MANAGEMENT SOFTWARE



DL LAB

This application allows Teachers a complete management of all the activities inside the Laboratory:

- assignment of the lessons that the students must study
- monitoring of the activities of each student (in/out from the lessons, right or wrong answers, rating, etc.)
- direct communication with each student workstation (sending and receiving messages, fault insertion on the student workstations
- recording of all the students' activities in a database (Microsoft Access compatible) on the Teacher's workstation
- processing of the stored data for the control of the individual or group learning level

The DL LAB software offers a simple and effective user interface (similar to Explorer in Windows) that allows teacher to move among students, lessons, faults and results in the same way he is used to explore the computer resources.

Features:

- unlimited number of classes (one database for each class)
- unlimited number of students per class
- maximum number of work stations connected at the same time: 256
- 32 bit operating systems
- user interface similar to Windows Explorer
- control of the Students' access through Username and Pass- word
- assignment of the lessons to study, insertion of the faults, ac- cess control
- communication with the students and message exchange
- visualization of every activity performed by the students
- complete list of all the on-line lessons and faults
- results of each student in the last performed lesson: details relevant to each question, average rating, time
- results of class performance
- export of the results in ASCII format

THERMOTRONICS

AIR CONDITIONING TRAINER

The trainer is a heat pump split air conditioning system, which gives students advanced instructions on the components and operation of an air conditioning and refrigerating system. The trainer includes refrigerating, electrical control, fault insertion, and fault elimination systems.

It consists of: control panel, outdoor unit and indoor unit of an air-conditioning system, measuring instruments, AC power supply control unit, fault insertion unit and fault elimination unit, etc.

Features:

• It utilizes an actual refrigerating unit with the functions of refrigerating, heating, ventilating, dehumidifying, temperature and wind speed selection, timing, sleeping, etc.

• It integrates: refrigerating system, electrical control system, fault insertion system and fault elimination system, meeting the training requirements of an air conditioning and electrical control system.

• It clearly shows the inner components layout and refrigerating cycle system structure; it demonstrates the operating principle of a heat pump type air conditioner; it comes with AC voltmeter, AC ammeter, thermometer, vacuum pressure gauge, pilot lamps, and LED to show the system real-time status; the main control board is covered with a transparent board to facilitate observation; schematic diagram of control system and relative test points are available; sight glass in the pipeline is used to observe refrigerant status; HV pipeline is marked with red, while LV pipeline with blue, relative components are all labeled.

• It includes a connection area for electrical control circuit of outdoor unit to train students' hands-on ability.

• Fault insertion and suppression.

DL TMAC10

THERMOTRONICS

REFRIGERATION TRAINER

It consists of an air conditioning system, a refrigeration system, a control panel, a unit for detecting the pressure, a connection area, etc.

The air conditioning system is composed of:
Internal and external heat exchanger, compressor, 4-way valves, control valves, etc.

The refrigeration system is composed of:
Refrigerator compressor, condenser, evaporator, regulator, thermostat, 2-way 3-position filter valve, etc.

The control panel is composed of:
Single-phase ac power supply. AC voltmeter, range: 0 ~ 250V. AC ammeter, range: 0 ~ 10A. Two digit thermometer. Switch to control the main supply current. Block diagram of the air conditioning system and of the refrigeration system. Test points. Protection against overheating or overload of the compressor.

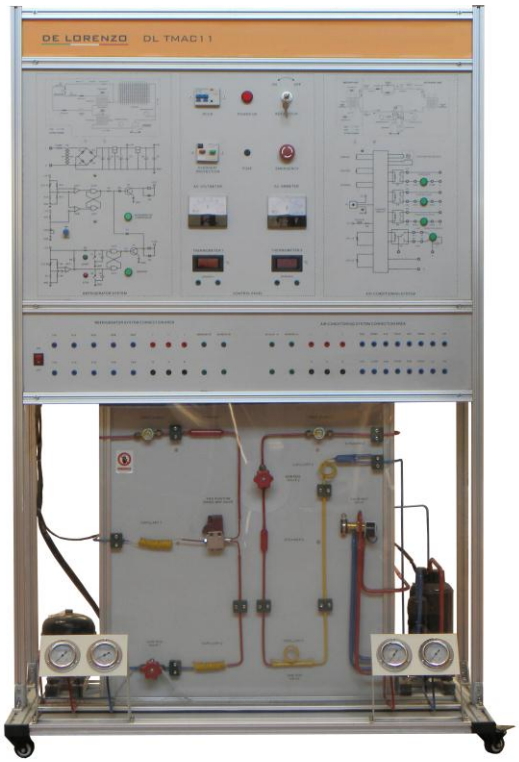
The detection of the pressure consists of:
Four vacuum manometers used to supervise the pressures in the air conditioning and refrigeration systems.
Range: -0.1 ~ 1.8MPa and - 0.1 ~ 3.8MPa.

Connection area:
For the control of the electric circuit of the air conditioning and refrigeration systems, for the training of the students.

SPECIFICATIONS

- Power supply: single-phase from mains.
- Ambient temperature: -10 °C ～ 40 °C, relative humidity <85%, altitude < 4000 m.
- Power: <1.5kVA.

Protection against overvoltage



DL TMAC11

THERMOTRONICS

SOLAR THERMAL ENERGY TRAINER

Didactic system for the theoretical and practical study of solar power facilities used to obtain hot water for sanitation, air conditioning and similar services.

The DL THERMO-A2 is a forced circulation system with a wide range of didactic applications. It incorporates six temperature probes available at four different points, and a solar irradiation sensor that is used to calculate energy. It allows the following teaching and learning activities:

- Identification of all components and how they are associated with its operation.
- Interpretation of the technical parameters of all components.
- Sizing criteria for ACS facilities, air conditioning, etc.
- Assembly and maintenance criteria for facilities.
- Interpretation of situational data supplied by the control.

The trainer is comprised of three operating units, as follows:

MAIN MODULE

Dimensions 1000 x 650 x 1650 mm., front panel with the block diagram of the system. It contains the components for the circulation, storage and control of the liquid in the primary and secondary circuits.

These components are placed vertically on a base, facilitating comfortable access to all parts for assembly and disassembly operations carried out during the practical sessions described in your handbook.

The front control panel is placed in the top part of the main module and it is composed of: block diagram of the system, electronic control centre with an LCD screen for the visualization of the data, situation lights. The hydraulic sockets for cold water inlet, hot sanitary water outlet, connection to the solar panel, etc., are located at the back of the module.

SOLAR PANEL

Real solar panel placed in a metal structure and connected to the main module through flexible pipes, provided with discharge, safety and filling valves. Alternatively (code DL THERMO-A1), it is possible to provide a simulated solar panel supplied by the mains to allow performing the practical exercises in a classroom.

CONVECTOR HEATER

As a means of applying the hot water produced, a convector heater is available for use. It is connected through flexible pipes. This component allows us to experiment with the effects of hot water obtained with this system. However, the system is sufficiently open to permit easy use with other applications, such as hot sanitary water supply, under-floor heating, etc.

The system is supplied complete with an experiment manual.

DL THERMO-A2

THERMOTRONICS

HOME GAS SUPPLY

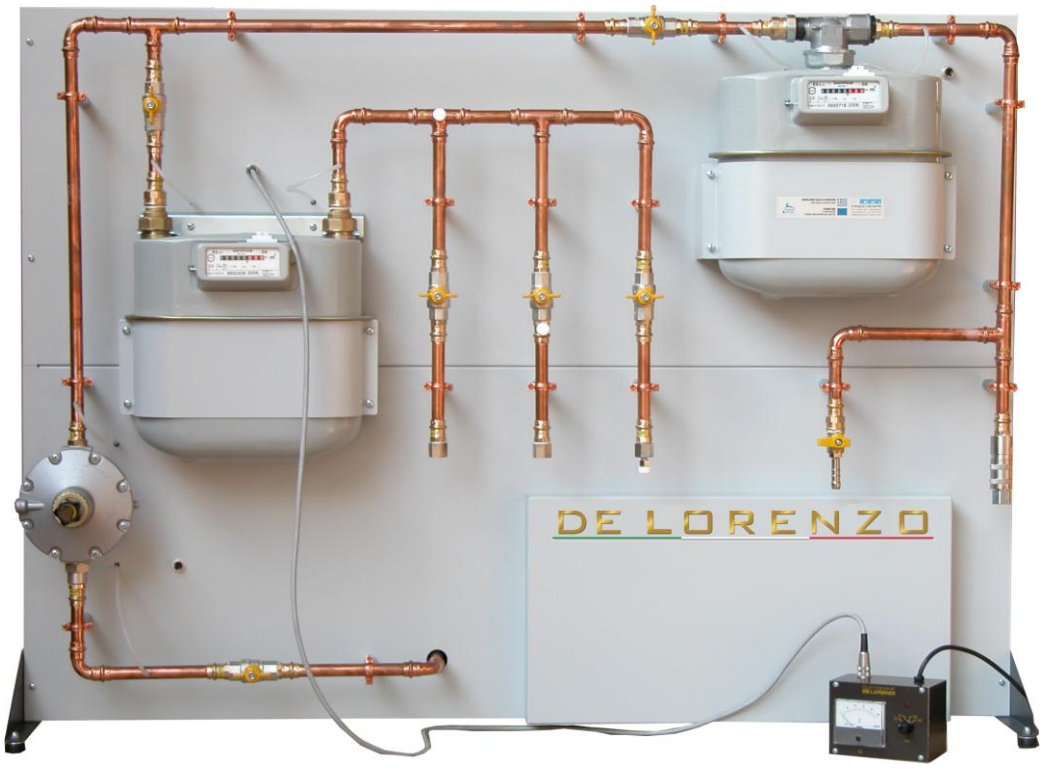
This simulator is composed of two pipe circuits of gas installation with industrial components, fitted with gas meters.

The pipe installations can be individually selected. The panel includes: air pressure controller, connection for gas meters, gas pressure controller, converter from one circuit to the other, various safety caps.

One circuit is considered the gas supply pipe, while the other simulates the various leaks in the gas line.

With this simulator it is possible to simulate/detect leaks and to practice on gas pipes, including testing in accordance to standard rules before and after the connection of the gas.

Complete with compressor and differential pressure meter.



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