

FUTURE TECHNOLOGIES

Since 1995 Made in Italy

FTTM
Future Technologies

VACUUM & CHARGING UNITS

YOUR NEEDS, OUR PRIORITY
EXCEPTIONAL CARE, EVERY TIME



ftonweb.com





PRODUCTS OVERVIEW

SOLUTIONS & APPLICATIONS

MONITORING & SERVICES

FT



TM

FT S.r.l. Future Technologies

Vacuum and Fluid Charge Masters

Future Technologies S.r.l. is the ideal partner for
Vacuum and Refrigerant treatment in the
Refrigeration and Air Conditioning Industry.

 Since 1995 , Made in Italy



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Company Profile

Future Technologies S.r.l. (FT) was founded in 1995, based on more than twenty years of professional skills of its associates and managers in vacuum technology, filling of refrigerants, brake fluid circuits, industrial automation, data processing and communications.

The FT headquarters and new production 500 sqm facility is located in Castel del Piano, in Tuscany close to Siena and Florence.

FT is the ideal partner for the handling of Vacuum and Refrigerant gases in the refrigerant Industry. All the equipment is made in-house and our services are conducted from our headquarters. Our company offers high level of customization thanks to its continuous research and development that leads to improvements in the specific application requested by the customer.

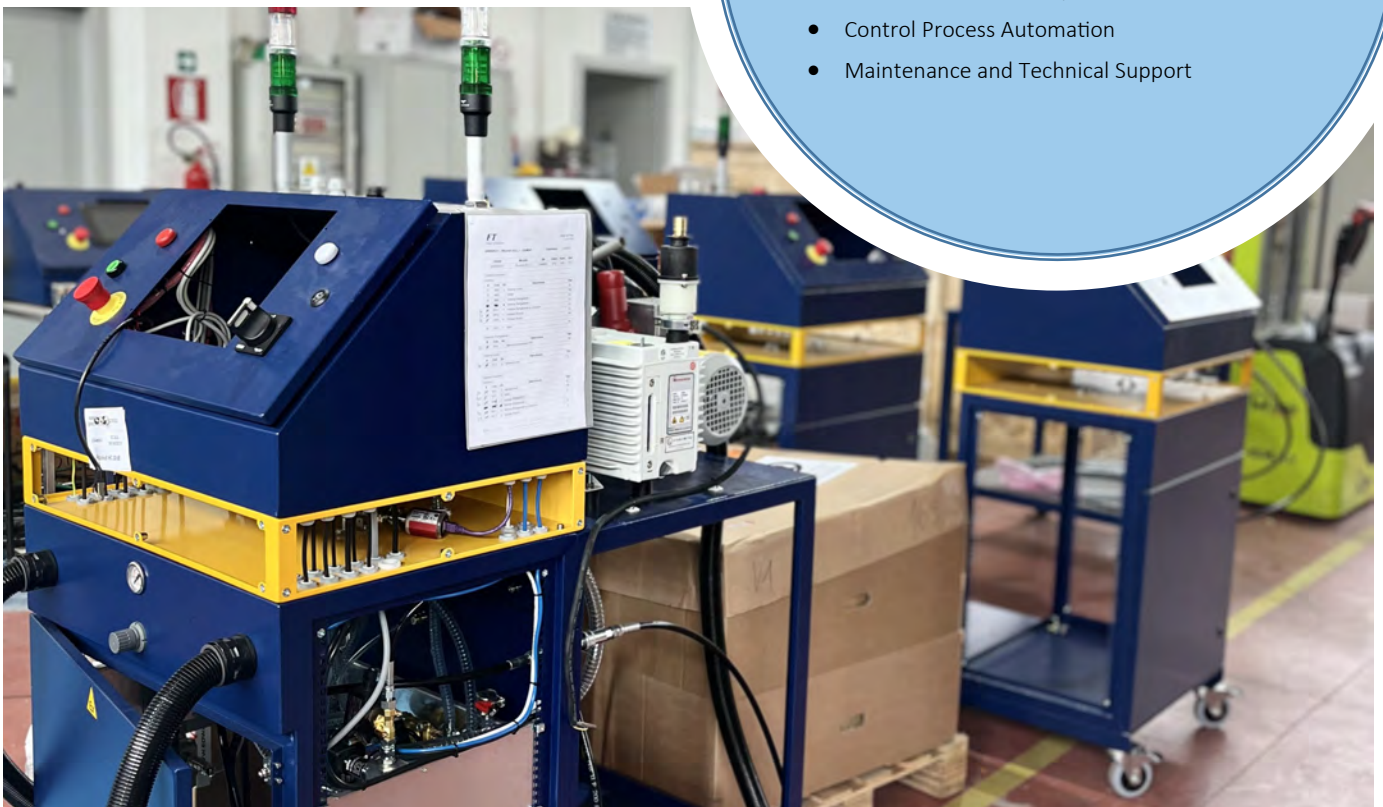
Thousands of FT equipment work 24 hours per day, 365 days per year all around the world, with high reliability, performance and high quality production.

FT's specialized technicians are always ready to travel to every part of the world to support our customers.

Our goal is always to improve the production lines of our customers in an efficient way.

Our key words

- Refrigerant Pump and Charging machines
- Ecological and Hydrocarbons Refrigerant treatment
- Design and integration of production lines
- Installation and start up
- Control Process Automation
- Maintenance and Technical Support



Product Overview

- Refrigerant charging Automatic Stations
- Refrigerant transfer pumps
- Preliminary evacuation Automatic units
- High pressure Fluids Automatic Charging Stations
- Tight tests Stations with tracer gas
- Charging Units for leak detection
- Refrigerant recovery devices
- Electric Safety test equipment
- Functional test equipment
- Ultrasonic Tube Sealing
- All-In-One Tight Test and Refrigerant Charging Stations

Main applications

- Domestic refrigerators and freezers
- Professional refrigerators
- Refrigerators/food sales point
- Refrigerating units for transport
- Machinery for ice cream
- Chillers
- Dehydrating systems
- Domestic air conditioning/heat pumps
- Car/truck air conditioning systems
- Centralised air conditioning stations

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

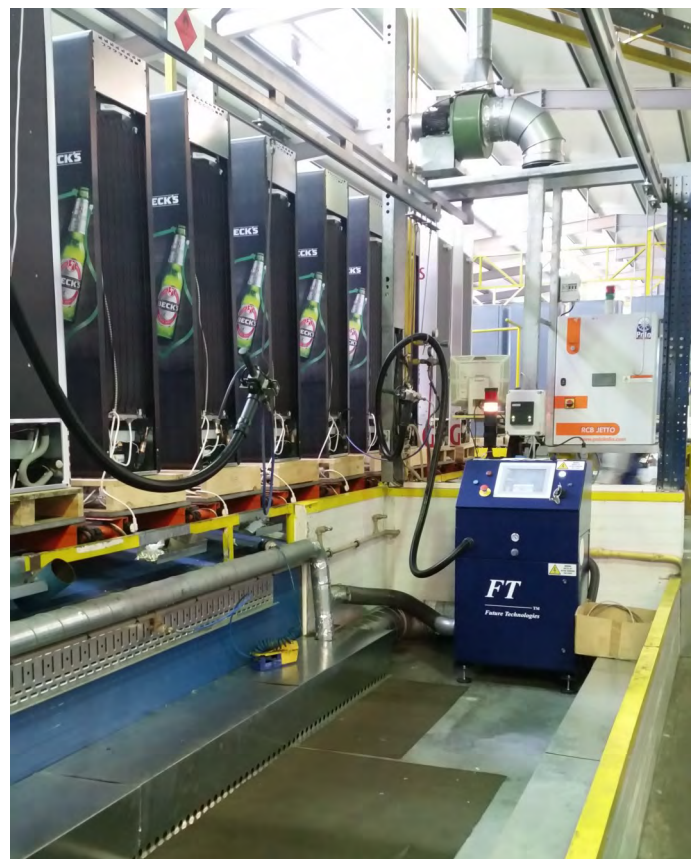
Electrical and functional test

Ultrasonic tube sealers














IPCS & IPCS PLUS











Main Activities

- Line engineering and integration
- Production and assembling
- Customer pre-sale engineering
- Commissioning and start-up
- Technical support and maintenance
- Training basic and specialized level
- Special customization on request
- Continuous Research & Development
- Quality production procedures



Main Directional References

ActronAir	www.actronair.com	
Ariston Thermo Group	www.aristongroup.com	
Arneg S.p.A	www.arneg.it	
Atlas Copco Group	www.atlascopco.com	
Culligan Italiana S.p.A	www.culligan.it	
Daikin	www.daikin.it	
Denso	www.denso.com	
Epta S.p.A	www.eptarefrigeration.com	
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Frigomeccanica S.r.l. S.r.l.	www.frigomeccanica.com	
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Whirlpool EMEA	www.whirlpool.it	

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum and charging unit

Vacuum and Charging Unit *iTeide TT*

- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transport
- Ice-cream machines
- Dehumidifiers
- Chillers and centralized air conditioning stations (only refrigerant charging)
- Industrial refrigeration (only refrigerant charging)
- Electrical cabinet coolers
- Domestic air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT coolers
- Compressed air driers
- Condensing units

Vacuum and Charging Unit *iRockall Jr*

- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transport
- Ice-cream machines
- Dehumidifiers
- Electrical cabinet coolers
- Domestic air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT coolers
- Compressed air driers
- Condensing units

Vacuum and Charging Unit *iRockall*

- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transport
- Ice-cream machines
- Dehumidifiers
- Centralized Conditioning stations and refrigerators
- Electrical cabinet coolers
- Domestic air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT coolers
- Compressed air driers
- Condensing units

Vacuum and Charging Unit *iRockall HS*

- Domestic refrigerators and deep freezers
- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transport
- Ice-cream machines
- Dehumidifiers
- Big Chillers and centralized air conditioning stations
- Industrial refrigeration
- Electrical cabinet coolers
- Domestic air conditioners
- Car, bus, truck, tractors air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT cooler
- Compressed air driers
- Condensing units

Vacuum and Refrigerant Charging

The FT Vacuum and Refrigerants Charging Units represent an essential reference for the production of any industrial or domestic devices that work with refrigerant gases in the cold industry market .

Vacuum and Refrigerants charging Units are designed to meet the highest standards of quality and performance required from modern industry.

The main function of the vacuum and charging unit is to create and control a vacuum inside the refrigeration circuits , and then charge the refrigerant according with the design requirements of the constructor. For this process the FT Vacuum and Refrigerant charging Units perform automatic and configurable functions that are fully integrated with the production automation of the customer's Industry, leading to a significant contribution to its quality.

FT is able to create customized solutions for customers and satisfy any requests of personalization.

The FT Units are continuously updated in design according to the international guidelines on the refrigerant gases used. Therefore, they are ready to be used with modern and future refrigerants so to fulfil a wide range of processes during the entire life of the unit.

Customers who use the FT Vacuum and Refrigerants charging Units, have the ability to integrate relevant information for each cycle on their tools in order to have accurate reports for each work process.

All FT Vacuum and Refrigerants charging Units are equipped with touch panel controls operated by modern operating systems that enable an intelligent display of the processing cycles, a fast reporting tool directly downloadable from remote PCs, production lines and a telecare post sale services.



Vacuum and charging unit

iTeide TT

Charge

Table top smart refrigerant charging unit

iTeide TT is a Table Top system for the evacuation* and injection of refrigerant fluids . It has been designed to be reliable, easily portable and suitable to work with any cooling fluid of normal use (HCFC and HFC refrigerants , including R410A and R452A).

iTeideTT is available, on request, with an integrated printer to record results and performances of the completed cycles. It is also available with data collection transferring functions over TCP/IP Protocol to enable statistic analysis of the reports.

Other features:

- High flexibility
- Ready for the most common A1 Class refrigerants
- Electromagnetic Head Injector control PLUVIO
- Safe to use in the working area

* Optional vacuum pump not provided with the unit. For vacuum pump delivery please contact FT sales Service

iTeide TT



Touch screen machine Controller



Injectors PLUVIO V2/V3



Vacuum and Charging Unit *iTeide TT*

- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transportation
- Ice-cream machines
- Dehumidifiers
- Chillers and centralized air conditioning stations (only refrigerant charging)
- Industrial refrigeration (only refrigerant charging)
- Electrical cabinet coolers
- Domestic air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT coolers
- Compressed air driers
- Condensing units

iTeide TT Technical Characteristics

Injectors/Type	1/PLUVIO
Injector length	2,5 m
Refrigerant metering systems	1
Charging capacity	up to 10 kg
Charging speed	up to 10 g/s (25 g/s with RTP and accumulator)
Charging accuracy	< 200 g: ±1 g > 200 g: ±0,5%
Heating belt	Available as optional
Injector connection	¼" Hansen F (ISO 7241B)
Connection to the refrigerant supply line	¼" Hansen M (ISO 7241B)
Connection to the external vacuum pump	DN16KF
Pirani vacuum sensor	Integrated
On-board alarms	3 light alarms (green/white/red)
Acoustic alarm	Integrated, activable via software
Programmable work cycles	1000
Connection to external PC	Ethernet
Control unit	TS690
Working temperature	5 °C .. 45 °C
Power Supply	110/220 V – 50/60 Hz – Single Phase
Dimensions (L x W x H)	560 x 420 x 300 mm
Weight	~20 kg

Optional features and devices

3/8" Hansen Female PLUVIO Injector
RTP and Accumulator for 35 g/s charging speed
Heating Belt 400W RHP20
Refrigerant tank connection kit
Vacuum connection kits
Charging-only functions on request
Automatic working cycle selection performed by barcode reader
Remote Printer

* FT software department develops customized software on request

Vacuum and charging unit

iRockall

Charge

Vacuum

Vacuum and Refrigerant Charging Unit for medium productivity

iRockall is a modular evacuation and charging station Unit for HFC and HCFC refrigerants.

iRockall is ideal for medium/high throughput production lines of domestic and commercial refrigerators/freezers, air conditioners, heat pumps, liquid coolers where high amounts of refrigerant need to be charged. The unit can be supplied up to four different refrigerant.

Characteristics

- Compact and light-weight
- Charging capacity: up to 10 kg
- Charging speed: up to 10 g/s with heating belt
- High charging accuracy: 0,5% of the charged amount
- Digital refrigerant metering system
- Available with integrated Refrigerant transfer Pump equipped with volumetric metering system (/B option)
- Built-in vacuum pump (17 m³/h @ 50 Hz, different on request)
- Interactive Colour Touchscreen
- Data Collection Application over TCP/IP protocol
- Up to 1000 programmable work cycles
- Microprocessor controlled
- Built in according to the European Machinery Directive, Safety standards CE marked

iRockall



Touch screen machine Controller



Injectors PLUVIO V2/
V3/V4 e MFIL



Vacuum and Charging Unit *iRockall*

- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transportation
- Ice-cream machines
- Dehumidifiers
- Centralized Conditioning stations and refrigerators
- Electrical cabinet coolers
- Domestic air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT coolers
- Compressed air driers
- Condensing units

iRockall Technical Characteristics	
Injectors/Type	PLUVIO
Injector length	3,5 m
Refrigerant metering systems	1 2
Charging capacity	up to 100 kg
Charging speed	up to 35 g/s
Charging accuracy	< 200 g: ±1 g > 200 g: ±0,5%
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Refrigerants	HFC, HCFC
Working compressed air	6÷7 bar not lubricated
On-board alarms	3 light alarms (green/white/red) on column
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	17 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Power Supply	400 V @ 50 Hz – 3ph + GND
Dimensions (L x W x H)	850 x 600 x 1400 mm
Weight	~130 kg

Optional features and devices
HS version with extra charging speed up to 90 g/s
Up to four different refrigerant dosing system (UNO/DUE/TRE/QUATTRO)
Heating Belt
Only Vacuum Heads with 1/4" Hansen or 1/4" SAE Schrader connections
On Board RTP kit including suction line, protection filter, 3 l accumulator
Additional vacuum-only Injector Head
Injector extension Length
Injector with 1/4" SAE Auto connector
Injector with 1/4" Schrader connector
Injector with 3/8" Hansen connector
Automatic working cycle selection performed by bar code reader
Remote \Printer

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum and charging unit

iRockall-B

Charge

Vacuum

Vacuum and Refrigerant Charging Unit for medium productivity

iRockall-B is a modular evacuation and charging station Unit for HFC and HCFC refrigerants.

iRockall-B is ideal for medium throughput production lines of domestic and commercial refrigerators/freezers, air conditioners, heat pumps, liquid coolers where small amount of refrigerant need to be charged. The unit can be supplied up to four different refrigerant.

Characteristics

- Compact and light-weight
- Charging capacity: up to 10 kg
- Charging speed: up to 10 g/s with RTP on board
- High charging accuracy: 0,5% of the charged amount
- Digital refrigerant metering system
- Integrated Refrigerant transfer Pump equipped with volumetric metering system
- Built-in vacuum pump (17 m³/h @ 50 Hz, different on request)
- Interactive Colour Touchscreen
- Data Collection Application over TCP/IP protocol
- Up to 1000 programmable work cycles
- Microprocessor controlled
- Built in according to the European Machinery Directive, Safety standards CE marked

iRockall -B



Touch screen machine Controller



Injectors PLUVIO V2/
V3/V4 e MFIL



Vacuum and Charging Unit *iRockall-B*

- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transportation
- Ice-cream machines
- Dehumidifiers
- Centralized Conditioning stations and refrigerators
- Electrical cabinet coolers
- Domestic air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT coolers
- Compressed air driers
- Condensing units

iRockall-B Technical Characteristics	
Injectors/Type	PLUVIO
Injector length	3,5 m
Refrigerant metering systems	1 2
Charging capacity	up to 100 kg
Charging speed	up to 15 g/s
Charging accuracy	< 200 g: ±1 g > 200 g: ±1 g
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Refrigerants	HFC, HCFC
Working compressed air	6÷7 bar not lubricated
On-board alarms	3 light alarms (green/white/red) on column
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	17 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Power Supply	400 V @ 50 Hz – 3ph + GND
Dimensions (L x W x H)	850 x 600 x 1400 mm
Weight	~130 kg

Optional features and devices
Up to four different refrigerant dosing system (UNO-B/DUE-B/TRE-B/QUATTRO-B)
Heating Belt
Additional vacuum-only Injector Head
Injector extension Length
Injector with 1/4" SAE Auto connector
Injector with 1/4" Schrader connector
Injector with 3/8" Hansen connector
Automatic working cycle selection performed by bar code reader
Printer

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum and charging unit

iRockall - M

Charge

Vacuum

Vacuum and Refrigerant Charging Unit with mass flow meter

iRockall -M is a modular evacuation and charging station Unit for HFC and HCFC refrigerants.

iRockall-M is ideal for medium/high throughput production lines of domestic and commercial refrigerators/freezers, air conditioners, heat pumps, liquid coolers where high amounts of refrigerant need to be charged. The unit can be supplied up to four different refrigerant.

Characteristics

- Compact and light-weight
- Charging capacity: up to 100 kg
- Charging speed: up to 50 g/s
- High charging accuracy: 0,5% of the charged amount

- Digital refrigerant mass metering system
- Available with integrated Refrigerant transfer Pump
- Built-in vacuum pump (17 m³/h @ 50 Hz, different on request)
- Interactive Colour Touchscreen
- Data Collection Application over TCP/IP protocol
- Up to 1000 programmable work cycles
- Microprocessor controlled
- Built in according to the European Machinery Directive, Safety standards CE marked
- standards CE marked

iRockall - M



Touch screen machine Controller



Injectors PLUVIO V4



Vacuum and Charging Unit *iRockall-M*

- Domestic refrigerators and deep freezers
- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Automatic food and beverage dispenser machines
- Refrigerating units for transportation
- Ice-cream machines
- Dehumidifiers
- Big Chillers and centralized air conditioning stations
- Industrial refrigeration
- Electrical cabinet coolers
- Domestic air conditioners
- Car, bus, truck, tractors air conditioners
- Refrigerators and air conditioners for boats or caravans
- IT cooler
- Compressed air driers
- Condensing units

iRockall-M Technical Characteristics	
Injectors/Type	PLUVIO
Injector length	3,5 m
Refrigerant metering systems	1
Charging capacity	Up to 100 kg
Charging speed	Up to 130 g/s (260 g/s on HS Version)
Charging accuracy	< 200 g: ±1 g > 200 g: ±0,5%
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Working compressed air	6 ÷ 7 bar - filtered - not lubricated
On-board alarms	3 light alarms (green/white/red) on column
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	17 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Power Supply	400 V @ 50 Hz – 3ph + GND
Dimensions (L x W x H)	850 x 600 x 1400 mm
Weight	~150 kg

Optional features and devices
HS version with extra charging speed up to 150 g/s
Up to four different refrigerant dosing system (UNO-M/DUE-M/TRE-M/QUATTRO-M)
Additional light and acoustic alarm
Injector with 3/8" Hansen connector
Injector Length extension
Injector with 1/4" SAE Auto connector
Injector with 1/4" Schrader connector
Additional vacuum-only Injector Head
Automatic working cycle selection performed by bar code reader
Printer

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

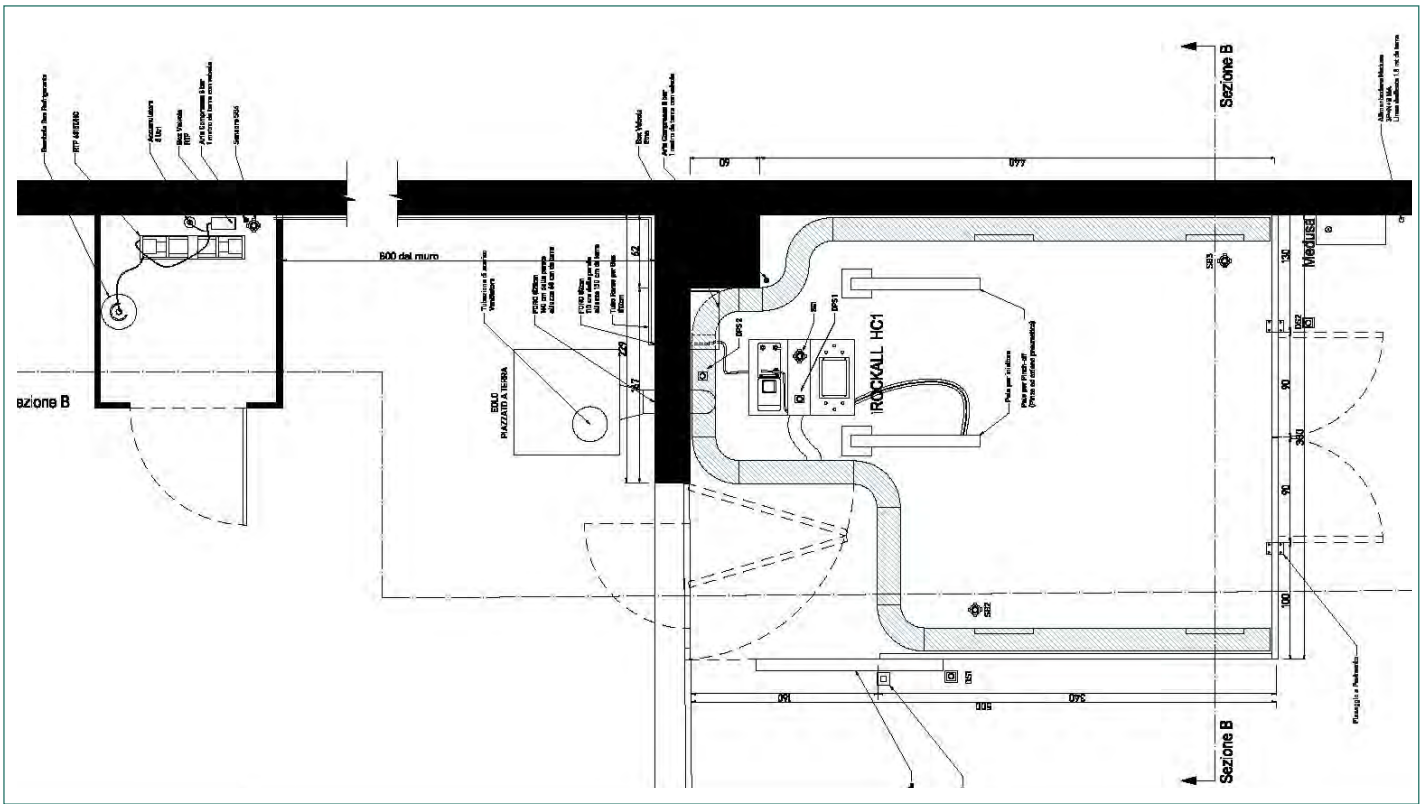
Preliminary evacuation

Electrical and functional test

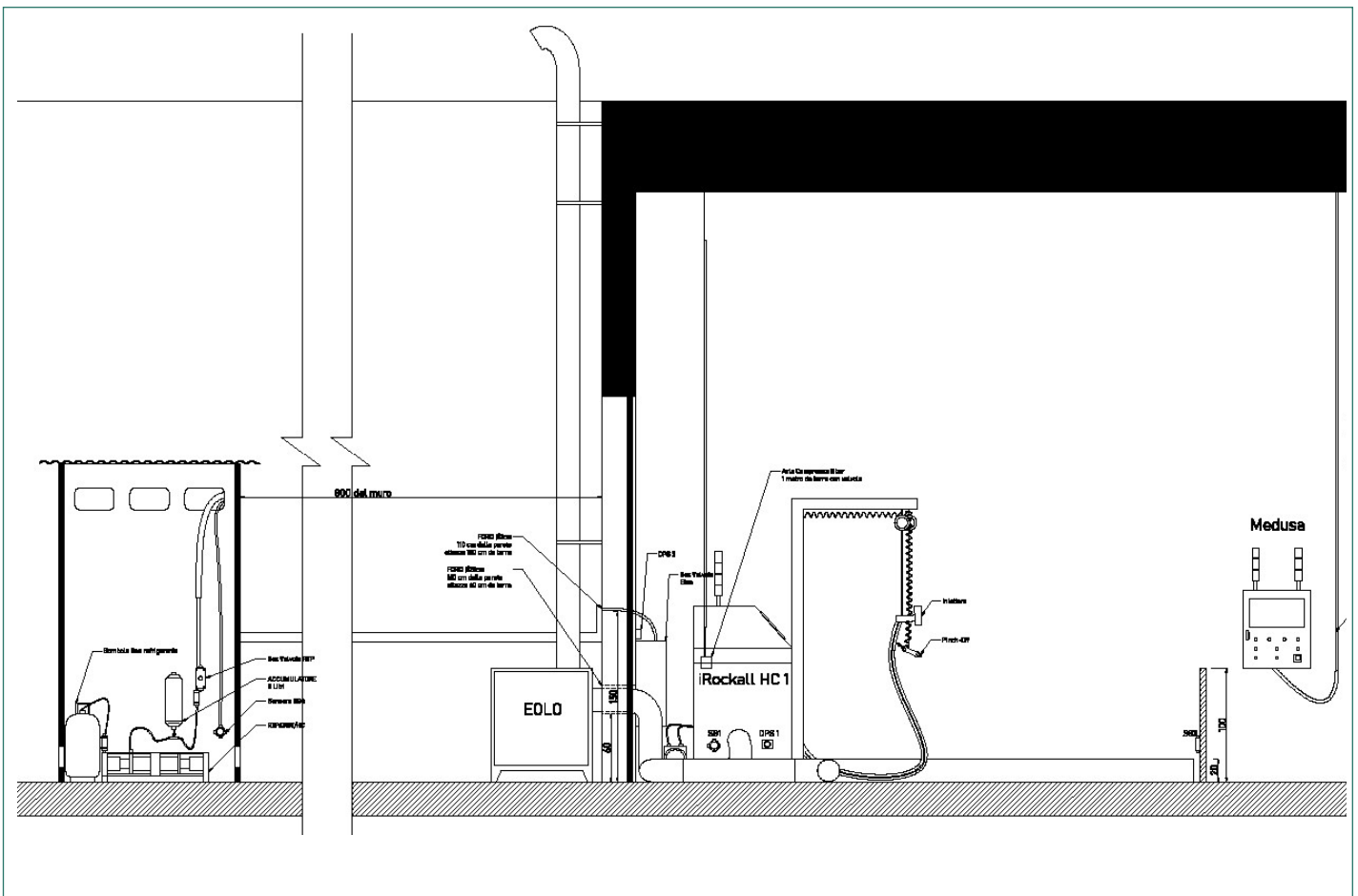
Ultrasonic tube sealers

IPCS & IPCS PLUS

HC Refrigerants treatment Systems



Technical drawings for a charging area





HC Refrigerants treatment Systems

Potential Flammable Gases HC, A2, A2L and A3 (HC)

The interest and the application for Hydrocarbons (HC) refrigerants is growing more and more, especially now that the impact of some refrigerants on global warming has acquired an important role in the industry of refrigeration and air conditioning.

Ecological natural refrigerants such as the A2, A2L and A3 are now all available as mature technologies for most applications. It is widely recognized that these refrigerants classes are excellent in terms of performance, but also have negatives features for the environment because of their flammability.

FT srl is sensitive to the subject of the design of systems for the industrial treatment of flammable refrigerants and has developed over the years a

range of products and projects dedicated exclusively to the treatment of this class of Refrigerants. This range of products has been designed by following suitable criteria for safety in the workplace for potentially explosive environments in which they are taken as a source of explosion due to involuntary refrigerant leaks during the manufacturing processes of refrigerators.

FT srl builds specialized secure systems for testing, evacuation and charging flammable refrigerants in the circuits, providing appropriate working areas equipped with auxiliary forced extraction systems and gas leak monitoring sensors to safeguard the safety of the operators, according to existing rules on the prevention of possible explosion.

Classification of Flammable Gases

Type	Refrigerants	Safety class	PED Group
HFC	R32, R143a	A2L	1
HFO	R1234yf,	A2L	1
	R1234ze	A2L	2
Azeotrope blends	R510A ,R511A	A3	1
	R516A	A2L	Not defined
Zeotrope blend	R430A ,R431A, R432A, R433A, R433C, R435A, R436A, R436B, R441A , R443A	A3	1
	R444A, R444B, R445A, R446A, R447A, R451A , R451B,	A2L	1
	R447B, R452B, R454A, R454B, R454C, R455A, R457A, R459A, R459B, R467A, R468A	A2L	Not defined
Hydrocarbons	R170, R290, R600, R600a, R1150, R1270	A3	1
Natural (inorganic)	R702	A3	Not defined

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Inletors

Refrigerant transfer pump

Pressure test units leak detectors

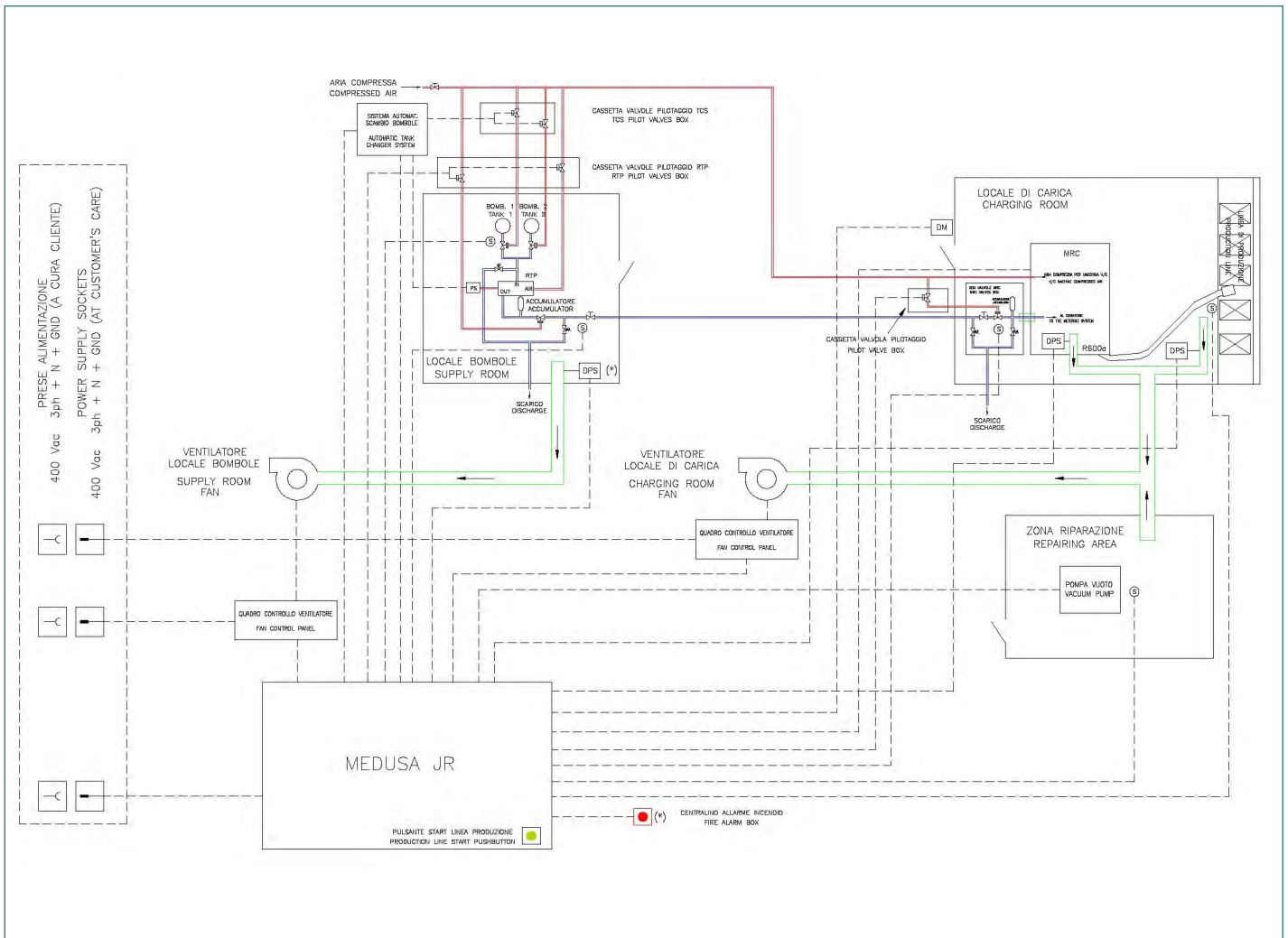
Preliminary evacuation

Electrical and functional test

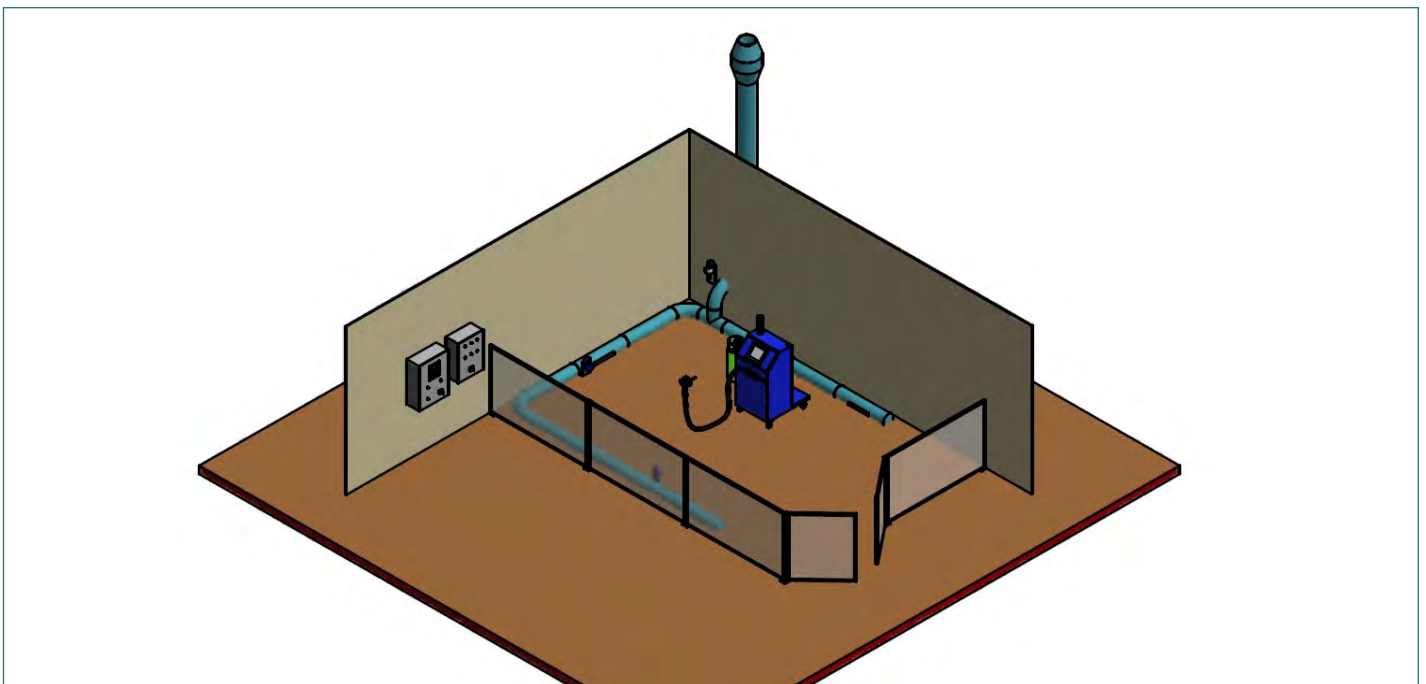
Ultrasonic tube sealers

IPCS & IPCS PLUS

HC Refrigerants treatment Systems



Full layout example of a FT HC systems installation





Description of a typical FT HC Refrigerants treatment System

The equipment for the vacuum and the charge of HC refrigerants are designed according to ATEX Directive 99/ 92/ EC, inside a proper workspace for refrigeration units to be loaded with flammable gas. Within the area flames or wells are not allowed, and smoking is prohibited. The area is delimited by walls and ventilation ducts. For security reasons, sources of potential danger to the fire ignition should be placed not less than 2-3 meters from the perimeter of the work area.

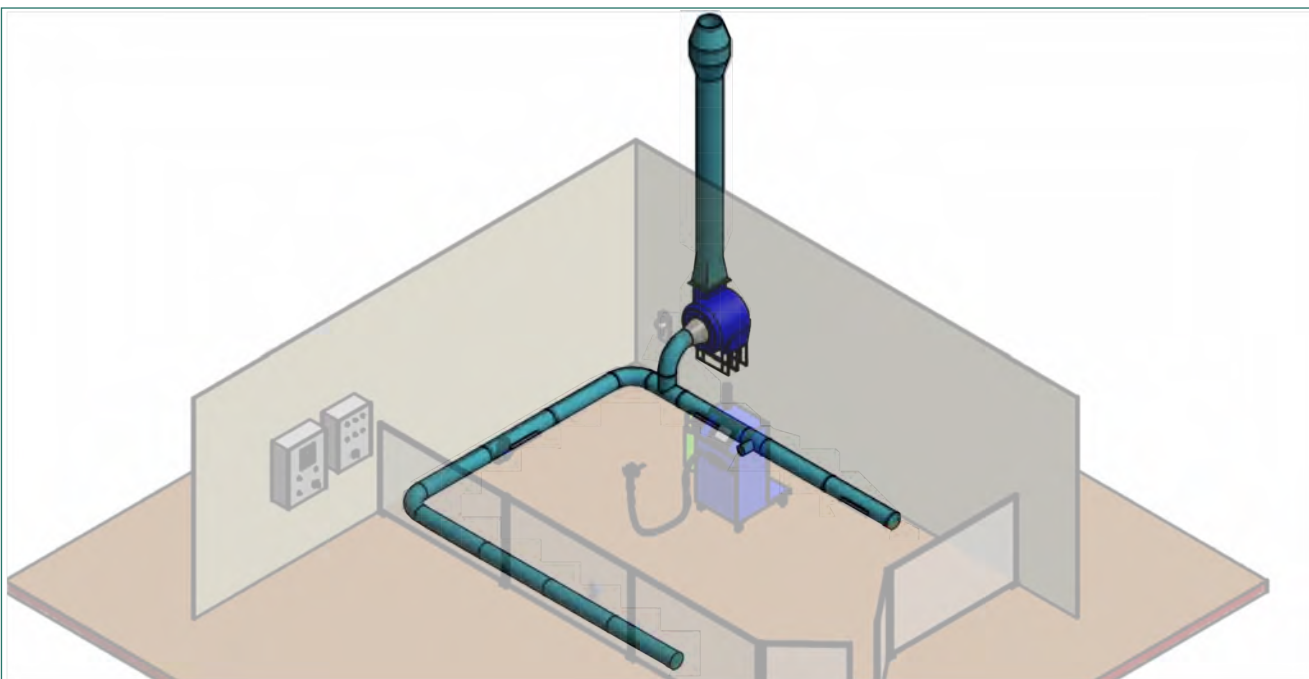
Usually a limited working area is provided by an enclosure in which, the cooling units to be processed are moved inside through a sliding door. The same door is the access point to the work area for the authorized staff. The door can be controlled by timer controlled microswitches. The size of the charging area is approximately 20 m² and is enclosed by 1 m high fireproof panels, which are

also supplied by FT srl.

On the internal perimeter of the working area, an extraction system is installed, which provides the necessary air exchange, so as to keep under control the concentration of hazardous gas. The HC vacuum and charging machine, with one / two injectors, is placed Inside of this work space.

The refrigerant tank in use, can be installed inside a different area and it can deliver the refrigerant to the charging station by means of a Refrigerant Transfer Pump systems (RTP). The devices to check the environmental safety are installed in the vicinity of the outer walls of the charging area, while the ventilation unit with variable speed is located on the perimeter wall of the plant, in correspondence of the charging area.

Ventilation layout example of a FT HC systems installation



Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

HC Refrigerants handling Systems

FT System components for HC refrigerants handling

FT srl can supply a full and customizable components package that composes a full HC system.

Every FT srl component system follows the Electrical security normative (EN60529, EN60204-1), Hydraulic mechanics and working places safety normative.

FT srl component systems are delivered with relevant test certification and user manual that describes all the necessities steps to follow in order

to work with high performance and safe conditions during use and maintenance. Each component system has been designed according to standardized production and testing procedures.

In this section follows a short description of the functional characteristic of every FT srl component systems. For more details please refer to the relevant technical table.

Example of a FT HC systems installation

iRockall HC (Vacuum and flammable refrigerant charging system)

1

Air ducts for Eolo (Extraction system)

3

Medusa (Monitoring and Gas Extracting System)

2

Non flammable panels

4





Vacuum and Charging Machine (iRockall HC)

iRockall HC performs the vacuum formation, a preliminary test leaks and, Refrigerant charge (in liquid status) on the circuits. The HC machine is designed to work inside a potential dangerous area classified as zone 2, according to the CEI EN 60079-10 normative.

iRockall HC is provided with a unique cabinet internally divided in two different volumes: *The Electrical Unit* and *the Hydraulic Unit*, that are separated by an *Intermediate Empty Space*.

Electrical Unit - Contains all the electrical components such as the power supply and safety relays to limit possible current shortcuts conditions. The electrical unit is also equipped with a door microswitch in order to cut the power supply of the unit when the door is open.

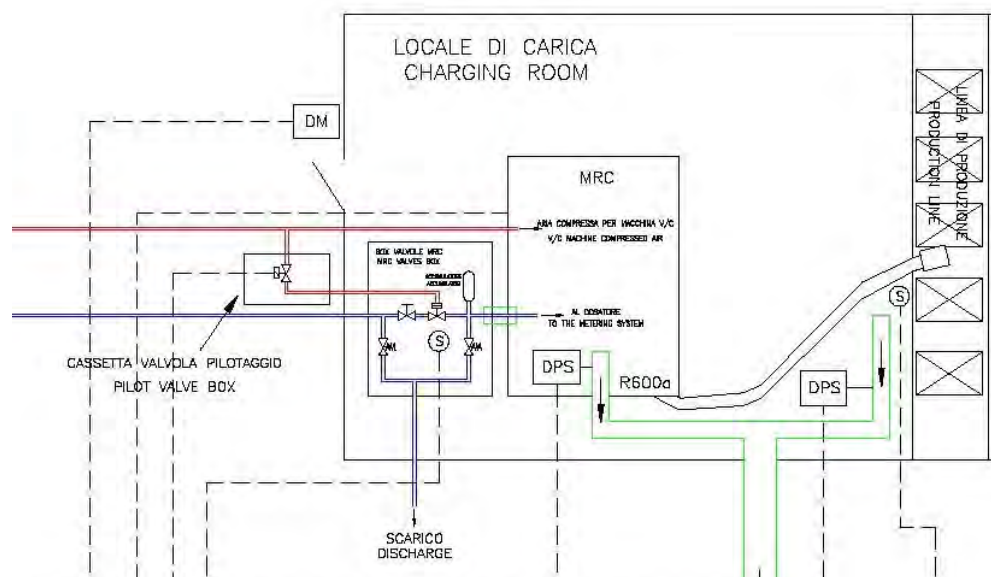
Intermediate Empty space - This component separates the electrical unit from the hydraulic unit. This gap ensures perfect insulation between the two subunits.

Hydraulic Unit - It is generally composed of:

- Refrigerant supply line
- Refrigerant pipes
- Refrigerant metering system (Volumetric or by RTP automatic dosator)
- Injector refrigerant line
- Pneumatic vacuum pump for internal vacuum of the injector.
- Sensor to detect refrigerant leaks
- Sensor to detect internal forced ventilation

All components for each line of refrigerant charge are connected by quick couplings types, Hansen or Faster, which simplify the replacement procedure of every component, making the process easier and safer. Each line is also controlled by two normally closed valves, one on the injector and the other on the refrigerant metering system, which limits the amount of refrigerant lost, in case of leakage or malfunction of the sealing devices.

Charging Room Layout



HC Refrigerants treatment Systems

Medusa Monitoring System

The **monitoring system Medusa** represents the central control and command of the entire plant for the handling of refrigerant gases. It is composed by an electrical panel with an electronic control unit and gas concentration detection sensors which are installed inside the charging area. One of the sensors is installed directly inside the Vacuum and Charging Unit. The Medusa system provides control to a forced ventilation system (see EOLO system) so to enhance the airflow rate in the presence of dangerous concentrations.

The Medusa system controls the power supply for the Vacuum and Charging unit and the related Refrigerant Transfer pumps which is connected to the delivery line. The power supply is regulated in real time according to the continuous monitoring of the refrigerant concentration detected from the sensors and the ventilation level detected from related differential pressure switches installed on the ventilation circuit of charging area.

The system also alerts the operators and supplies additional ventilation when the gas concentration reaches 15% of the Lower Flammability. The system will cut power to the vacuum and charge system, putting it in a stand-by mode, if the con-

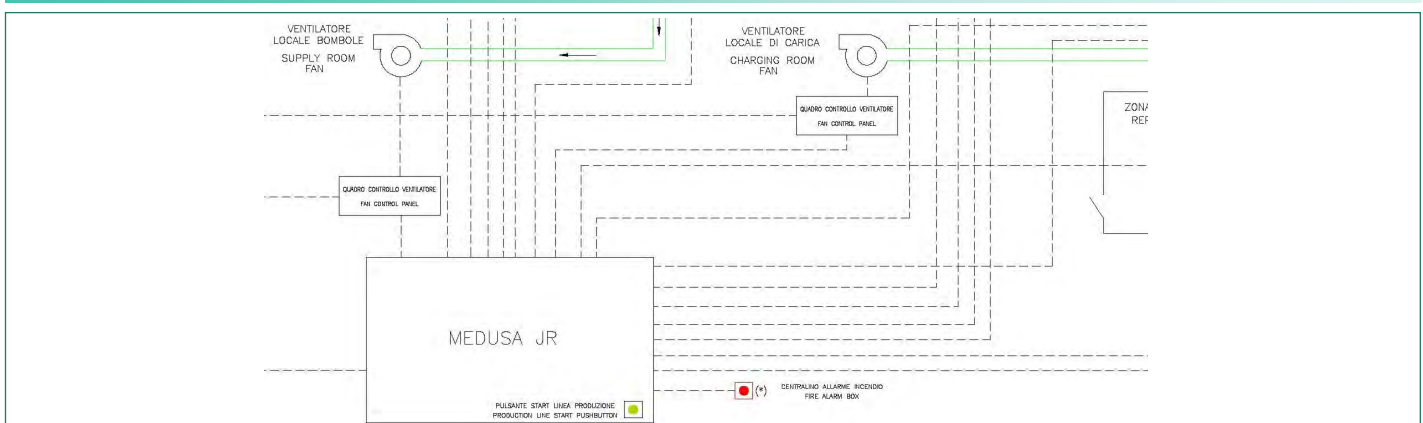
centration exceeds 30% of the Lower Flammability. The warning sound and lighting is available with remote columns to signal the operators to leave the working area. In the presence of fire in the charging area the operator must activate the fire prevention device to totally disconnect the whole charging plant .

After the level of concentration has decreased below the threshold value, the system must be manually reset by the operator.

Medusa is also supplied with:

- Box_VALV_ETNA placed in the charging area, each box is equipped with a valve
- Pneumatically operated barrier with related pilot valve, manual valve, safety valve and accumulator
- Safety valves for the refrigerant lines.
- Box_VALV_SR placed in the supply room, with sectioning valves controlled manually or by a solenoid, to stop the delivery of refrigerant in case of need.
- Fire alarm box, placed in proximity of the two doors of the storage box
- Differential pressure switch for continuous efficiency check of the forced ventilation
- Column indicating abnormal concentration of hazardous gas
- Door/fan Alarm indicators

Medusa Monitoring System Layout





Extraction System Eolo

Eolo extraction system consists of a sound-proof / multispeed fan in Ex execution, with rate capacity up to more than 3500 m³/h, controlled by smart inverter.

The control system is regulated by a special electrical panel, interfaced with the Medusa monitoring system and with the charging unit iRockall HC.

The ventilation delivered by the Eolo system is routed in a pipe appropriately sized according to the factory layout. If the ventilation system stops working (broken fan motor, accidental clogging ducts etc...), the Medusa system activates a procedure for shutting down of the refrigerant pumping systems and the refrigerant charging machine as it no longer guarantees safety.

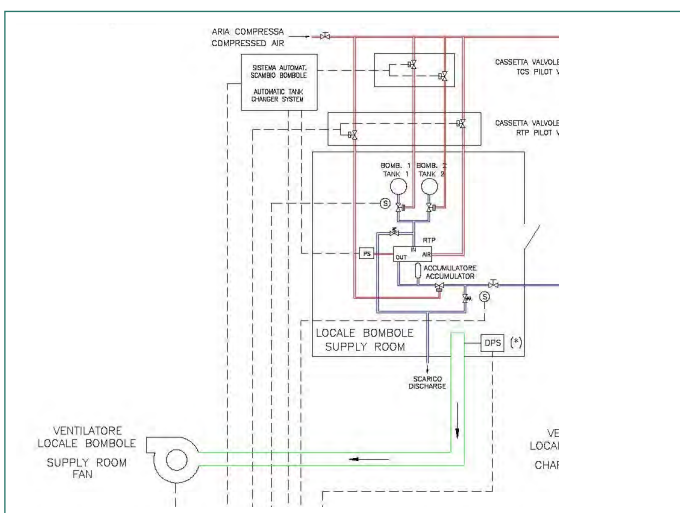
The control of the operation takes place by means of differential pressure switches connected to the Medusa system that is set to detect the presence of airflow in the potentially more critical

ventilation areas.

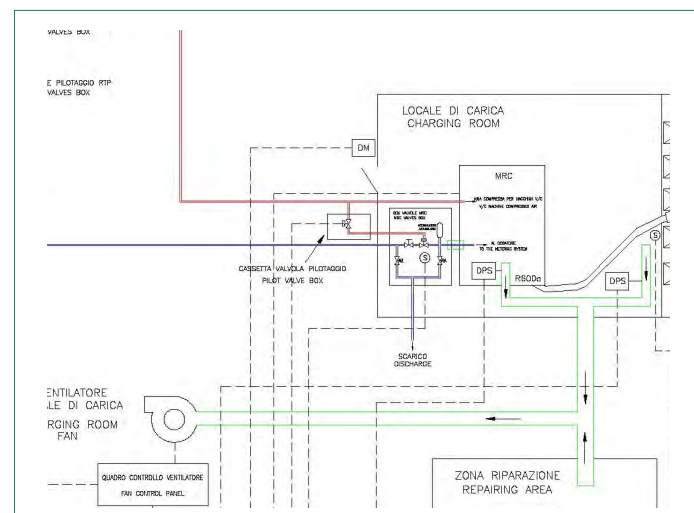
Operational Constraints of the Eolo System:

- The fan must always be in operation at the lower operating speed, when the machines are in operation, so as to maintain a continuous change of air in the working area
- the ventilation flow rate is set to the maximum speed when one or more sensors detect a gas concentration greater than 15% of the Lower Flammability.
- The fan continues to run at full capacity even when, exceeded the threshold of 30% of the Lower Flammability, the power to the charging unit is cut and an emergency situation is signalled.

Supply Room Ventilator Layout



Charging Room Ventilator Layout



Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Inletters

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

HC Refrigerants treatment Systems

Refrigerant Transfer Pump (RTP)

The **Refrigerant Transfer Pumps** are volumetric pumps with cylindric movement designed to pressurize and transfer the refrigerant in the liquid state. The RTP is driven by means of compressed air.

The pumps are installed close to a tank or storage systems from which they draw the refrigerant fluid thanks to the cylinders moved by compressed air and proper pneumatic valves. After that the fluid is compressed in liquid state and transferred to the refrigerant charging machine.

The RTP is connected to the refrigerant line by means of unidirectional valves that avoid the fluid return towards the pump. As all the Refrigerant fluids tend to increase their specific volume with temperature increases, some instances of uncontrolled pressure increase can appear due to the incompressibility of the fluid itself.

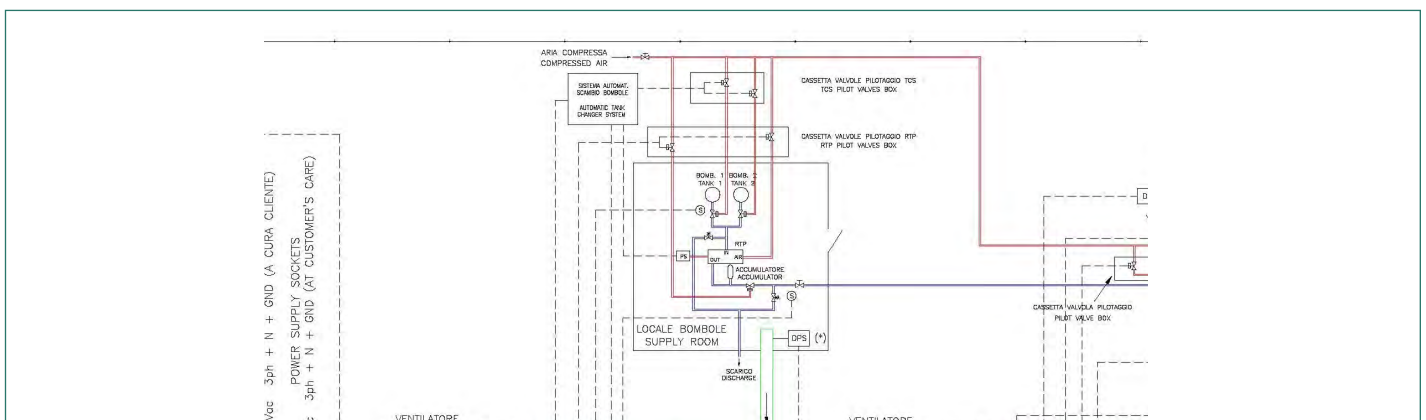
The RTPs have a safety valve set to 40 Bar that allows exhaust on the ventilation circuit eventual overpressure events on the refrigerant delivery line.



The device is integrated on iRockall HC /B.



Medusa Monitoring System Layout





Automatic Tank Changer System (TCS)

TCS system is used to automatically replace the supply of refrigerant gas to the transfer pump by switching from the empty tank to a full one. This system is activated when the RTP pump starts to repeat the extraction cycle at a frequency much higher than the normal conditions, which indicates the lack of refrigerant in the cylinder.

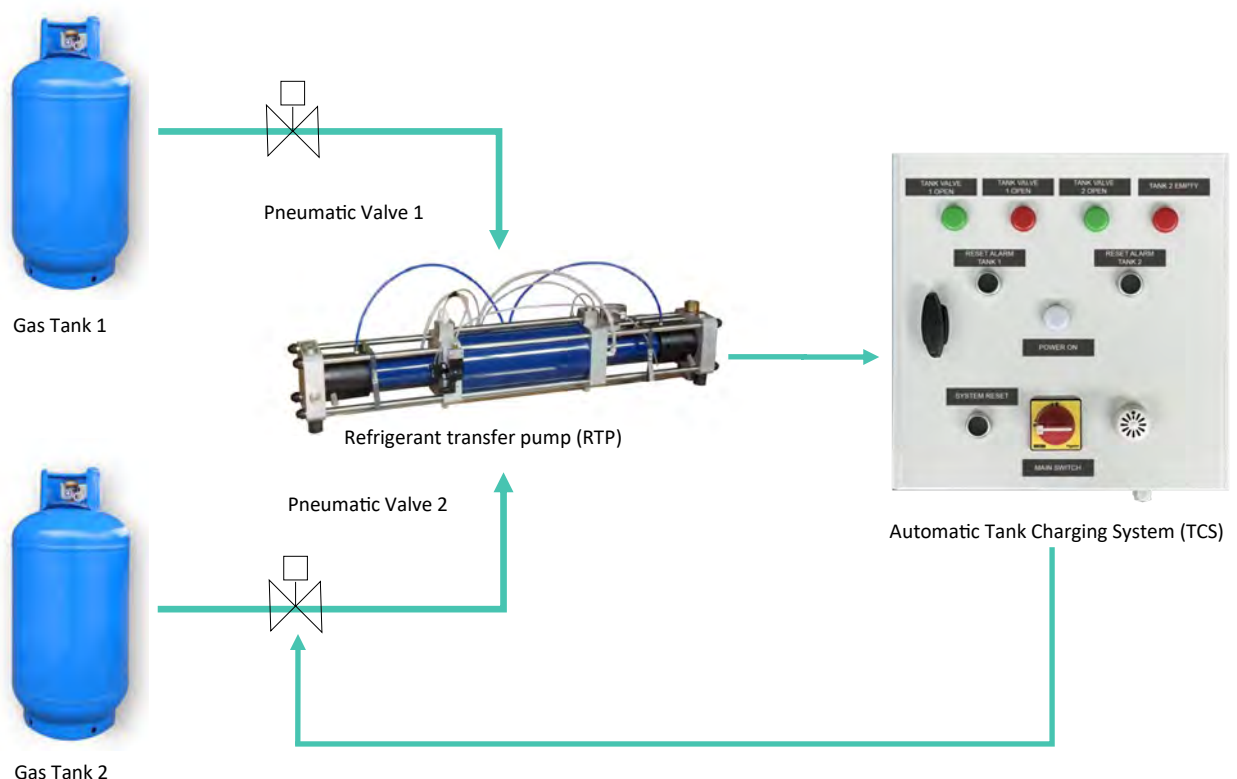
In this situation a sensor sends an electrical signal to the TCS which closes an electrical contact, also shown on the electronic control unit.

The TCS automatically emits an alarm sound when the current tank is about to become empty and must be replaced with a full tank. The alarm sound is also emitted with a red alarm light that can optionally be installed in a remote location.

As soon as the TCS detects an empty tank it will:

- close the pneumatic valve of the empty tank aspiration line and switch the suction line to the full tank by opening the related pneumatic valve
- signal the procedure to follow to restart the suction process from the full tank.

Charging Room Ventilator Layout



Vacuum and charging unit

iRockall HC

Charge

Vacuum

Vacuum and Flammable Refrigerant Charging Unit

iRockall HC is an evacuation and charging station for A2L, A2 A3 Class refrigerants and not flammable classes. It is easy to handle and has high charging accuracy. It is intended for medium and high throughput production lines of domestic and commercial refrigerators / freezers and other fields of application. It is designed and tested for making use of isobutane (R600a) and propane (R290). Assembly lines making use of most recent refrigerants such as R1234yf and R1234ze are also suggested for the iRockall HC.

Characteristics

- Microprocessor or smart OS (optional) controlled
- Charging speed: up to 25 g/s for HC/HFO refrigerants and up
- Charging capacity: according to local limitations
- High charging accuracy
- Built-in vacuum pump (20,5 m³/h)
- Available with integrated Refrigerant transfer Pump
- Interactive Colour Touchscreen

- Data Collection Application over TCP/IP protocol
- Up to 1000 programmable work cycles Microprocessor controlled
- Microprocessor controlled
- Built in according to the European Machinery Directive, Safety
- standards for Potential Dangerous Areas

The equipment is designed and assembled for the area of assembly of refrigeration units which are going to be charged with flammable gases according to the indications of the ATEX Directive 99/92/ EC. As the working areas are classified as hazardous, these equipment must be installed within a ventilated enclosure able to withhold any refrigerant leaks. The electric and hydraulic components of the vacuum and charging station have been chosen by FT to comply with ATEX for the classification of areas at high risk of explosion and thus make the whole system suitable for working with flammable liquids.

iRockall HC - Due



Touch screen machine Controller



Injectors



Main using applications

- Domestic refrigerators and deep freezers
- Professional Refrigeration
- Refrigerated show cases and cooling cabinets
- Deep Cooling for Medical Products
- Automatic food and beverage dispenser machines
- Ice-cream machines
- Dehumidifiers
- Domestic air conditioners



iRockall HC Technical Characteristics	
Injectors/Type	PLUVIO V3
Injector length	3,5 m
Refrigerant metering systems	1
Charging capacity	Max 10 kg for HC
Charging speed	up to 25 g/s (HC refrigerants) up to 40 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (<100 g HC), ±0,5 % (>100 g HC) ±1,0 g (<200 g HFC), ±1%(>200 g HFC)
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Refrigerants	HFC/HC/HFO/A2L
compressed air supply	6÷7 bar not lubricated
On-board alarms	3 light alarms (green/white/red) on column
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Requested Refrigerant supply	Pressurized, in liquid state
Power Consumption	0,6 kW, with 20,5 m ³ /h vacuum pump
Power Supply	400 V @ 50 Hz – 3ph + GND
Dimensions (L x W x H)	850 x 600 x 1430 mm
Weight	~170 kg

Optional features and devices	
HS version with extra charging speed up to 90 g/s	
Up to four different refrigerant dosing system (HC1/HC2/HC3/HC4)	
Additional light and Acoustic Alarm	
PLUVIO HF injector for High production lines	
Refrigerant dosing system with Massic Coriolis flowmeter	
30,2 m ³ /h Vacuum pump	
Automatic working cycle selection performed by barcode reader	
Remote Printer	

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum and charging unit

iRockall HC-B

Charge

Vacuum

Vacuum and Flammable Refrigerant Charging Unit

iRockall HC-B is an evacuation and charging station for A2L, A2 A3 Class refrigerants and not flammable classes. It is easy to handle and has high charging accuracy. It is intended for medium throughput production lines of domestic and commercial refrigerators / freezers and other fields of application. It is designed and tested for making use of isobutane (R600a) and propane (R290). Assembly lines making use of most recent refrigerants such as R1234yf and R1234ze are also suggested for the iRockall HC-B.

Characteristics

- Microprocessor or smart OS (optional) controlled
- Charging speed: up to 15 g/s for HC/HFO refrigerants and up
- Charging capacity: according to local limitations
- High charging accuracy
- Built-in vacuum pump (20,5 m³/h)
- Integrated Refrigerant transfer Pump
- Interactive Colour Touchscreen

- Data Collection Application over TCP/IP protocol
- Up to 1000 programmable work cycles Microprocessor controlled
- Microprocessor controlled
- Built in according to the European Machinery Directive, Safety
- standards for Potential Dangerous Areas

The equipment is designed and assembled for the area of assembly of refrigeration units which are going to be charged with flammable gases according to the indications of the ATEX Directive 99/92/ EC. As the working areas are classified as hazardous, these equipment must be installed within a ventilated enclosure able to withhold any refrigerant leaks. The electric and hydraulic components of the vacuum and charging station have been chosen by FT to comply with ATEX for the classification of areas at high risk of explosion and thus make the whole system suitable for working with flammable liquids.

iRockall HC2 -B



Touch screen machine Controller



Injectors



Main using applications

- Domestic refrigerators and deep freezers
- Professional Refrigeration
- Deep Cooling for Medical Products
- Automatic food and beverage dispenser machines
- Ice-cream machines
- Dehumidifiers
- Domestic air conditioners



iRockall HC-B Technical Characteristics	
Injectors/Type	PLUVIO V3
Injector length	3,5 m
Refrigerant metering systems	1
Charging capacity	Max 10 kg for HC
Charging speed	up to 10 g/s (HC refrigerants) up to 15 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (HC) ±1,0 g (HFC)
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Refrigerants	HFC/HC/HFO/A2L
compressed air supply	6÷7 bar not lubricated
On-board alarms	3 light alarms (green/white/red) on column
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Requested Refrigerant supply	Tank or pressurized, in liquid state
Power Consumption	0,6 kW, with 20,5 m ³ /h vacuum pump
Power Supply	400 V @ 50 Hz – 3ph + GND
Dimensions (L x W x H)	850 x 600 x 1430 mm
Weight	~170 kg

Optional features and devices	
Up to four different refrigerant dosing system (HC1-B/HC2-B/HC3-B/HC4-B)	
Additional light and Acoustic Alarm	
PLUVIO HF injector for High production lines	
30,2 m ³ /h Vacuum pump	
Automatic working cycle selection performed by barcode reader	
Remote Printer	

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum and charging unit

iRockall HC-M

Charge

Vacuum

Vacuum and Flammable Refrigerant Charging Unit

iRockall HC-M is an evacuation and charging station for A2L, A2 A3 Class refrigerants and not flammable classes. It is easy to handle and has high charging accuracy. It is intended for medium throughput production lines of domestic and commercial refrigerators / freezers and other fields of application. It is designed and tested for making use of isobutane (R600a) and propane (R290). Assembly lines making use of most recent refrigerants such as R1234yf and R1234ze are also suggested for the iRockall HC-M.

Characteristics

- Microprocessor or smart OS (optional) controlled
- Charging speed: up to 15 g/s for HC/HFO refrigerants and up
- Charging capacity: according to local limitations
- High charging accuracy
- Built-in vacuum pump (20,5 m³/h)
- Integrated Refrigerant transfer Pump
- Interactive Colour Touchscreen

- Data Collection Application over TCP/IP protocol
- Up to 1000 programmable work cycles Microprocessor controlled
- Microprocessor controlled
- Built in according to the European Machinery Directive, Safety
- standards for Potential Dangerous Areas

The equipment is designed and assembled for the area of assembly of refrigeration units which are going to be charged with flammable gases according to the indications of the ATEX Directive 99/92/ EC. As the working areas are classified as hazardous, these equipment must be installed within a ventilated enclosure able to withhold any refrigerant leaks. The electric and hydraulic components of the vacuum and charging station have been chosen by FT to comply with ATEX for the classification of areas at high risk of explosion and thus make the whole system suitable for working with flammable liquids.

iRockall HC2 - M



Touch screen machine Controller



Injectors



Main using applications

- Domestic refrigerators and deep freezers
- Professional Refrigeration
- Deep Cooling for Medical Products
- Automatic food and beverage dispenser machines
- Ice-cream machines
- Dehumidifiers
- Domestic air conditioners



iRockall HC-M Technical Characteristics	
Injectors/Type	PLUVIO V3
Injector length	3,5 m
Refrigerant metering systems	1
Charging capacity	Up to 100 kg for HC
Charging speed	up to 10 g/s (HC refrigerants) up to 15 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (HC) ±1,0 g (HFC)
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Refrigerants	HFC/HC/HFO/A2L
compressed air supply	6÷7 bar not lubricated
On-board alarms	3 light alarms (green/white/red) on column
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Requested Refrigerant supply	Tank or pressurized, in liquid state
Power Consumption	0,6 kW, with 20,5 m ³ /h vacuum pump
Power Supply	400 V @ 50 Hz – 3ph + GND
Dimensions (L x W x H)	850 x 600 x 1430 mm
Weight	~170 kg

Optional features and devices	
Up to four different refrigerant dosing system (HC1-M/HC2-M/HC3-M/HC4-M)	
Additional light and Acoustic Alarm	
PLUVIO HF injector for High production lines	
30,2 m ³ /h Vacuum pump	
Automatic working cycle selection performed by barcode reader	
Remote Printer	

* FT software department develops customized software on request

Company Profile
Vacuum and Charging units
HC Refrigerants handling systems
Special Units
Vacuum and Charging Injectors
Refrigerant transfer pump
Pressure test units leak detectors
Preliminary evacuation
Electrical and functional test
Ultrasonic tube sealers
IPCS & IPCS PLUS

Vacuum and charging unit

Medusa

Charge

Vacuum

Monitoring and Gas Extraction System

Medusa is an environment monitoring system that allows to constantly keep safe the vacuum and charging machine within the working area, storage area and, if present, the refrigerant suction and transferring area.

Medusa can be configured according to the customer specific installation:

- Built in agreement to the European Machinery Directive, CE marked, CE Safety standards for potential dangerous areas
- Basic version suggested with three ambient sensors
- Microprocessor controller
- User interface with alarm lights
- Provided with integrated Acoustic Alarm
- Provided with UPS (Uninterruptible Power Supply) to constantly supply the sensors, related lights and sound alarms

Medusa supplies and controls the EOLO fan rate

ventilation by means of a proper Power Electric cabinet. The Power rate can be configured according to the customer layout. Medusa standard version is provided with catalytic sensors that optionally include a sensitivity calibration device to check their performances according to the European Machine Directive.

Components included in the Medusa System

- Main control box
- EOLO multi speed Atex fan
- Fire alarm box
- Gas alarm indicators column (up to three)
- Fan/door alarm indicators column (up to three)
- Spring + microswitch for charging room door
- Pneumatic valve, manual valve and safety valves group + 0,7 l accumulator
- Pneumatic valve, manual valve and safety valves group + refrigerant filter
- 30/40 bar safety valve

Medusa



Eolo fan



Gas Sensor IR/CAT



Main using applications

Medusa signals operators and initiates additional ventilation when the concentration of Isobutane/Propane reaches 15% of the Lower Flammability. The system cuts the power supply to the vacuum and charging unit, putting it in a safe state, when the concentration exceeds 30% of the Lower Flammability. At the same time it activates the Alarm to signal the operators to leave the working area and activate all systems of the fire prevention.



Medusa PL4 / PL4+, Technical Characteristics		Medusa SR/SR+ Per Supply room	Medusa MS8/ MS8+
Environment sensors	From 1 to 4 (PL4) From 5 to 8 (PL4+)	From 1 to 4 From 5 to 8	From 1 to 8 From 9 to 16
Type of environment sensors	Catalytic / Infrared		
Differential pressure switches	1 or 2		
Available Outputs to	<ul style="list-style-type: none"> cut the supply to the charger, to tank changer system, to the vacuum pump in the repair area, to the refrigerant delivery line from the transfer pump audible and light alarms opening delivery valve for “anti-fire agent” 		
Available Inputs to	<ul style="list-style-type: none"> state (ON/OFF) of charger state (Open/Closed) of working area door state (Activated/Not activated) of fire alarm push button 		
Available Eolo Rates	<ul style="list-style-type: none"> 3100 m³/hr /Eolo Jr 3100 m³/hr /Eolo 4000 m³/hr /Eolo L 4500 m³/hr /Eolo XL 		
Control Unit	PL4/PL4+ /MS8/MS8+ SR/SR+ Per Supply Room		
Working temperature	5 °C .. 45 °C		
Power Supply	400 V – 50 Hz – 3ph + N + GND		
Rated electric current	~ 7 A controlling 2 ventilation units ~ 14 A controlling 4 ventilation units		
Dimensions (L x W x H)	800 x 600 x 250 mm		
Weight	~45 kg		

Optional features and devices
Calibration kit for HC sensors
IR environmental sensors
BOX_VALV_ETNA
BOX_VALV_SR
Additional light and Acoustic Alarm

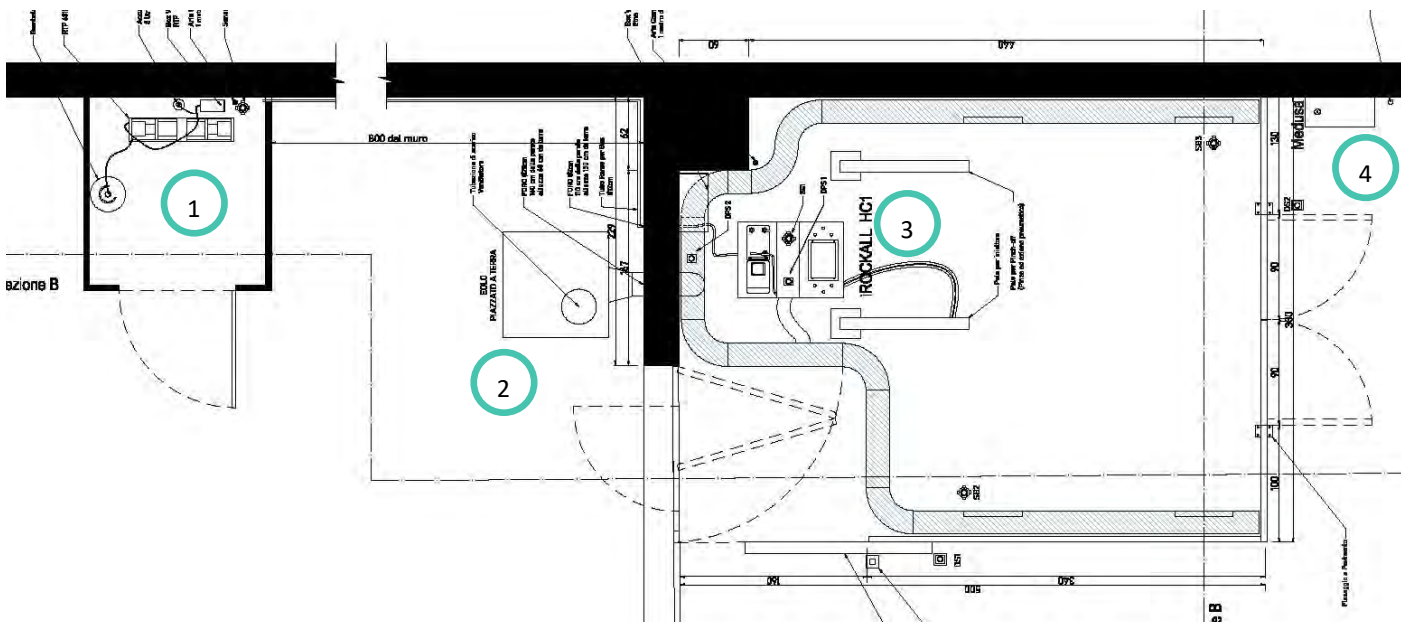
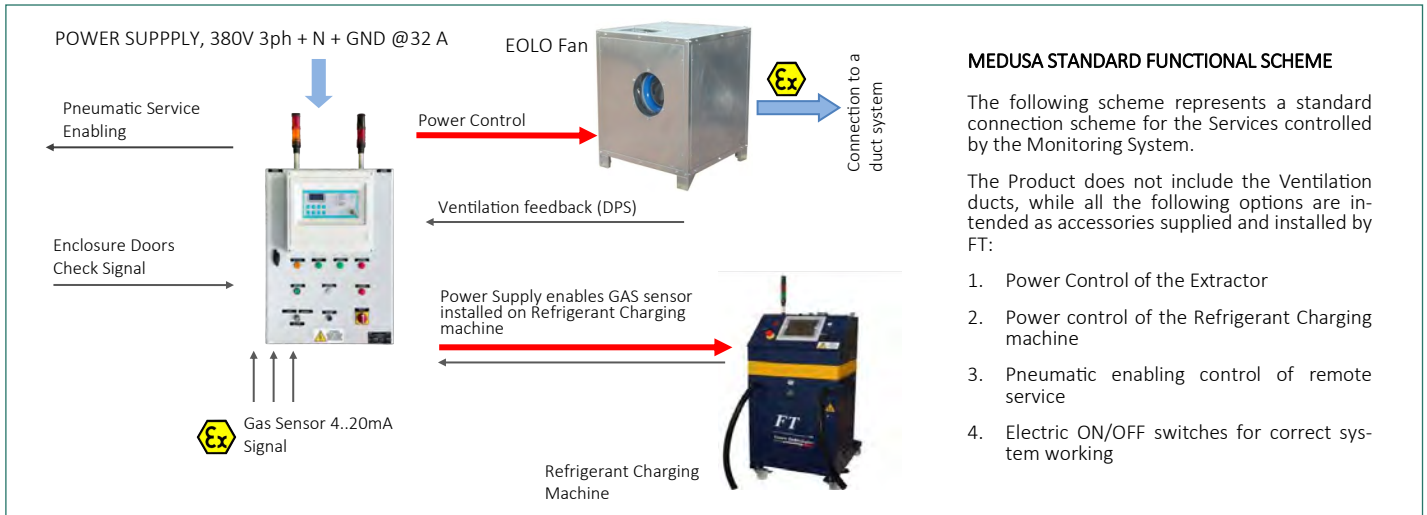
* FT software department develops customized software on request

Company Profile
Vacuum and Charging units
HC Refrigerants handling systems
Special Units
Vacuum and Charging Injectors
Refrigerant transfer pump
Pressure test units leak detectors
Preliminary evacuation
Electrical and functional test
Ultrasonic tube sealers
IPCS & IPCS PLUS

Vacuum and charging unit

Medusa

Standard Functional Scheme for Medusa



1. Supply Room Refrigerant transfer pump (RTP)



2. Eolo (Fan Unit) Multi Speed ATEX Fan



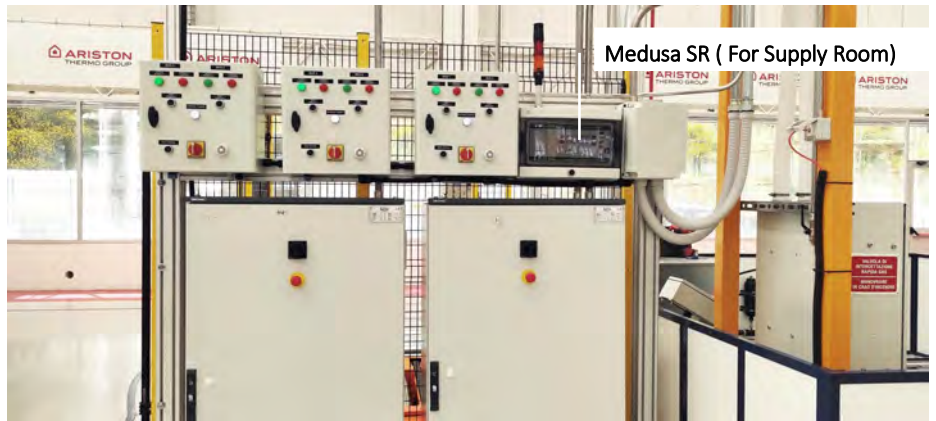
3. iRockall HC-uno



4. Medusa (monitoring and Gas Extraction System)



Sensors and Valves



IR Sensor

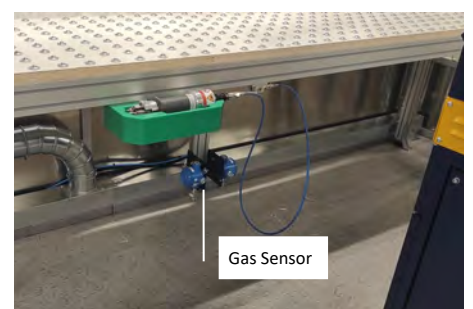
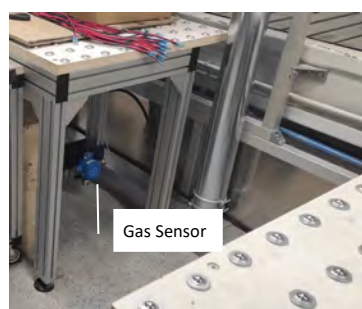
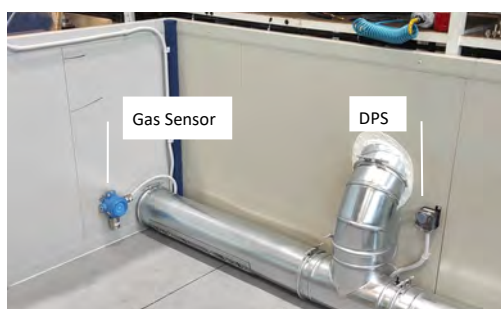
CAT Sensor

DPS

Door Sensor

BOX_VALV_SR

BOX_VALV_ETNA



Company Profile

Vacuum and Charging units

H-C Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

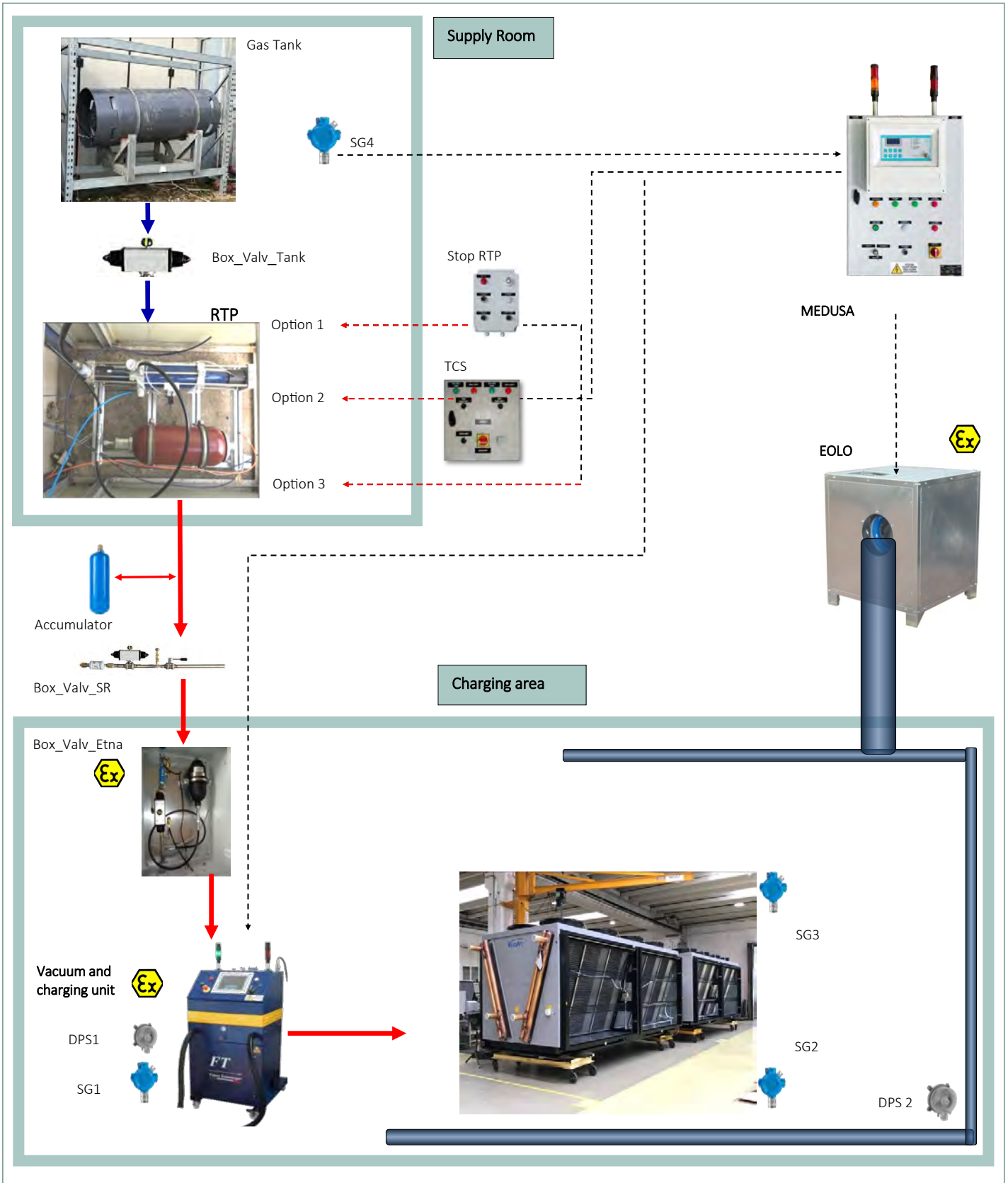
Electrical and functional test

Ultrasonic tube sealers







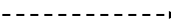
IPCS & IPCS PLUS

Vacuum and charging unit

Medusa Monitoring and Gas Extraction System





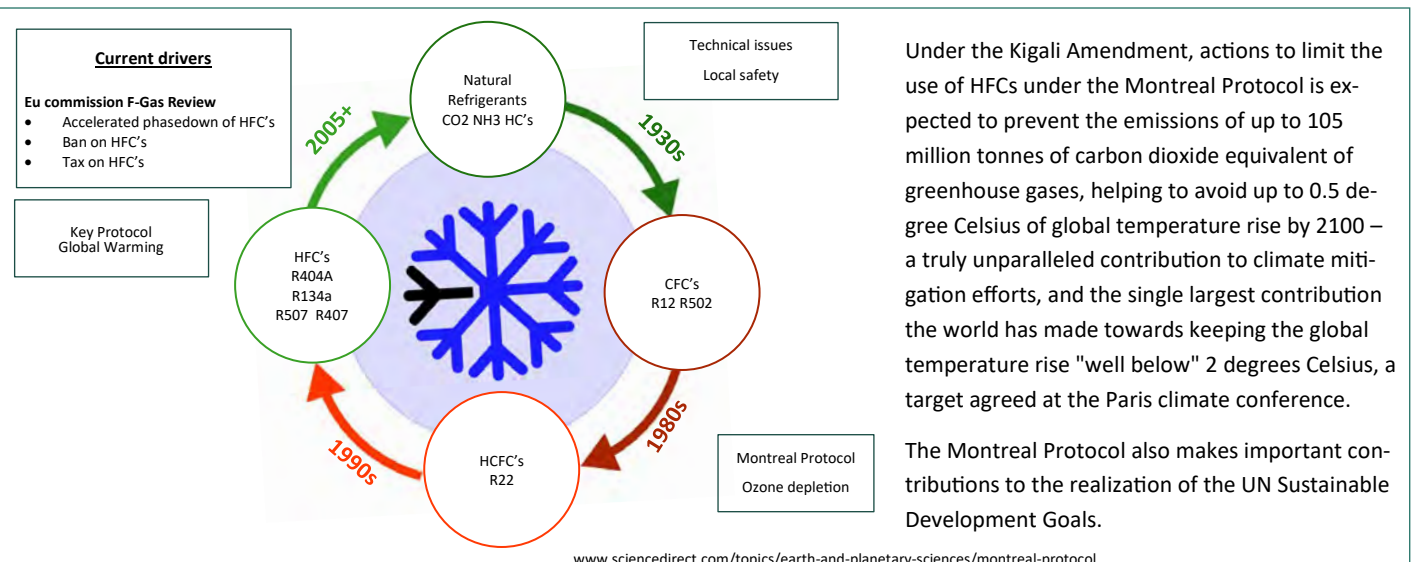
Description	Typology	Function
Gas Tank	Hydraulic	The specifications are made in accordance with the design requirements. For charging of large chillers the capacity reaches 800 kg. In cases of outdoor installation, subject to low winter temperatures, FT recommends the use of thermal covers in order to facilitate the suction of the refrigerant.
BOX_VALV_SR	Hydraulic + Pneumatic	Box Valve Supply Room: Pneumatically operated valve, controlled by the monitoring system for the hydraulic connection between the gas tank and the refrigerant vacuum line. A manual valve is included
BOX_VALV_TANK	Pneumatic	Controls the flow rate of the refrigerant to the RTP
BOX_VALV_ETNA	Hydraulic + Pneumatic	Pneumatic valve for the hydraulic connection between the refrigerant arrival line (usually in the charging area) and the vacuum and charge unit. Pneumatic valve is controlled by the Medusa environmental monitoring system. The valve box is connected directly to the cabinet of vacuum and charge unit through a sheathed FR5 3/8" tube. This tube ensures that the air in the valve box is drawn in through the vacuum and charging unit cabinet which is connected to the air ducts.
RTP	Hydraulic + Pneumatic	Pneumatically operated Refrigerant Transfer Pump: The suction is automatically activated until the in-line pressure balance is reached. The activation is caused by the compressed air regulated by the Medusa environmental monitoring system.
Accumulator	Hydraulic	Hydro-pneumatic Accumulator: An accumulation/damping system for the pressure peaks of the refrigerant is used to level out the pressure and the flow rate inside the vacuum and charging unit. The connector includes a safety valve in the case of failure, where the accumulator is no anymore able to level up the pressure.
MEDUSA	Electronic Power	Ambiental monitoring system and ventilation control system
EOLO	Aeraulic	Forced extraction system is connected to the ventilation circuit and can be customized according to the client's request. It is available with different flow rates based on the processed air, from 3000 to 7000m ³ /hr
 GAS Sensor	Electronic Infrared / catalytic	Gas sensor 4..20 mA. The gas sensors are generally positioned in the following locations: Supply Room / Charging area / Potentially critical points along the ventilation circuit / Inside the cabinet of the vacuum and charge unit / Any possible gas accumulation points in the case of leakage. The signal is sent to the Medusa environmental monitoring system.
Vacuum and charging unit	Digital Pneumatic Hydraulic	Station to perform the vacuum and charging of the refrigerant
	Aeraulic	Ventilation ducts that can be built according to the client's layout
 DPS	Pneumatic Electric ON/OFF	Differential Pressure Switch: DPS will be used to detect the air depression inside the ventilation ducts and the cabin of the vacuum and charge unit. The signal is sent to the Medusa environmental monitoring system.
	Hydraulic	Refrigerant line, Tank pressure
	Hydraulic	Refrigerant line, charging pressure $P = P_{TV} + P_{\text{compressed air RTP}} * 4,27$
	Pneumatic	Pneumatic control signal according to the operating states of Medusa
	Electric	Electric control signal according to the operating states of Medusa
Stop RTP	Pneumatic Electric	Automatic RTP Stopping System
TCS	Pneumatic Electric	Automatic Tank Charging System

Company Profile
Vacuum and Charging units
HFC Refrigerants handling systems
Special Units
Vacuum and Charging Inflectors
Refrigerant transfer pump
Pressure test units leak detectors
Preliminary evacuation
Electrical and functional test
Ultrasonic tube sealers
IPCS & IPCS PLUS

Special Units



Sustainable development GOALS



www.sciencedirect.com/topics/earth-and-planetary-sciences/montreal-protocol

MONTREAL PROTOCOL CONTRIBUTES TO THE



www.unep.org/ozonaction/who-we-are/about-montreal-protocol

Ecologic Non-Flammable Refrigerants

Introduction to the Ecologic No-Flammable refrigerants use

The market for refrigeration and air conditioning units is focusing more and more on issues related to the environmental impact of their systems in order to comply with the Montreal Protocol (1987) and the Kyoto Protocol (1997).

During the last ten years the use of Carbon Dioxide (CO₂) as a refrigerant has gained renewed interest because of ecological problems caused by the use of synthetic fluids (CFC-HCFC-HFC).

As matter of fact, Carbon Dioxide

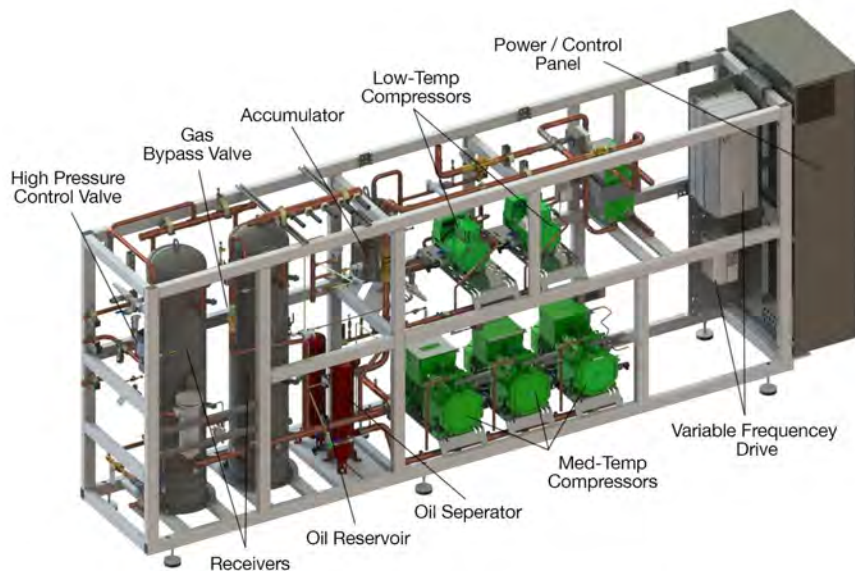
- is a natural refrigerant
- has ODP = 0 (Ozone Depletion Potential)
- has GWP = 1 (Global Warming Potential)
- is not a flammable refrigerant
- is not toxic
- is a product available all around the world
- is a low cost product

Furthermore, European governments are planning the progressive restriction of the use of synthetic refrigerants in any type of heating system: for ex-

ample, the Norwegian government imposes fees for the use of HFC refrigerants while the Austrian has prohibited the use of such refrigerants since 2008; Switzerland and Denmark governments are moving in the same direction .

Governments of the North-European Nations are promoting the use of natural refrigerants, collaborating with organizations like NGO (Non Governmental Organizations) as Greenpeace and UNEP.

FT works hard to encourage and provide industrial solutions that relate to the processing of refrigerant gases in total respect of the environment and according to international protocols.



Advansor CO₂ Transcritical Booster Refrigerant <https://www.hillphoenix.com/product/second-nature-advansor-co2/>

vacuum/pressurization/charge for A1 refrigerant

iFuji

Charge

Vacuum

Pressurization

Step
Pressurization

Charging
Oil

Leak test⁺

Barcode⁺

All-In-One Evacuating Pressurization and Refrigerant Charging Unit

iFuji is designed to fulfil the highest standards required in the processes of vacuum pressurizing and refrigerant charge.

iFuji is equipped with an electronic control of the latest generation, high computing capacity and memory, and is managed by a smart operating system and offers easy interaction for the user.

iFuji communicates with the User facility network and is an integral part of the production process. It has its own standard communications interfaces and software suitable to be connected to company networks to control and export the reports of the performed works directly to an external device. This also allows to integrate other digital devices (such as a Leak detector) directly to the machine thus speeding up and integrating Vacuum

formation, Leak detection and Charging process in a single cycle executed in complete safety.

Thanks to its smart connectivity, **iFuji** is ready for tele-assistance from the mother company, FT srl, enabling significant cost and time savings in critical post-sale situations.

iFuji



Touch screen machine Controller



Injectors PLUVIO V3



iFuji Characteristics

- The smart electronic control of iFuji allows to integrate multiple processes in a single cycle program:
- Vacuum and relevant Test with vacuum decay
- Tracer Gas or Helium + Nitrogen automatic mixture pressurizing with Pressure Decay and Leak Detection point-to-point leak search (data displayed on the unit controller)
- Refrigerant charging

iFuji	
Injectors/Type	PLUVIO V3
Injector length	3,5 m, Different length is available on request
Refrigerant metering systems	1
Charging capacity	310 g for HC* / 10 kg for HFC
Charging speed	Up to 25 g/s (HC Refrigerants) Up to 40 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (<100 g HC), ±0,5 % (>100 g HC) ±1,0 g (<200 g HFC), ±0,5 % (>200 g HFC)
Mixture capacity	Helium and Nitrogen, with two independent pressurizing stadiums
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Compressed air supply	6 ÷ 7 bar not lubricated
Refrigerant delivery	Pressurized in liquid phase
Power Supply	400 V @ 50 Hz – 3ph + GND
Power Consumption	0,7 kW with 20,5 m ³ /h vacuum pump
Dimensions (L x W x H)	850 x 600 x 1400mm
Weight	~160 kg

* The maximum quantity is settled according to the local limitations

Optional features and devices

Up to four different refrigerant dosing system (UNO/DUE/TRE/QUATTRO)

Light and Acoustic Alarm

30,3 m³/h Vacuum Pump with Oil Mist filter

PLUVIO Injector length on request

Automatic working cycle selection performed by bar code reader

Vacuum head Injector 1/4" Hansen

Inficon Family Leak detector function integrated

Available third and fourth processing line

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

vacuum/pressurization/charge for A1 refrigerant

iFuji-B	
Injectors/Type	1/PLUVIO V3
Injector length	3,5 m, Different length is available on request
Refrigerant metering systems	1
Charging capacity	310 g for HC* / 10 kg for HFC
Charging speed	Up to 25 g/s (HC Refrigerants) Up to 40 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (<100 g HC), ±0,5 % (>100 g HC) ±1,0 g (<200 g HFC), ±0,5 % (>200 g HFC)
Mixture capacity	Helium and Nitrogen, with two independent pressurizing stadiums
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Compressed air supply	6 ÷ 7 bar not lubricated
Refrigerant delivery	Pressurized in liquid phase
Power Supply	400 V @ 50 Hz – 3ph + GND
Power Consumption	0,7 kW with 20,5 m ³ /h vacuum pump
Dimensions (L x W x H)	850 x 600 x 1400mm
Weight	~160 kg

Optional features and devices

Up to four different refrigerant dosing system (UNO-B/DUE-B/TRE-B/QUATTRO-B)

Light and Acoustic Alarm

30,3 m³/h Vacuum Pump with Oil Mist filter

PLUVIO Injector length on request

Automatic working cycle selection performed by bar code reader

Only vacuum head Injector 1/4" Hansen female or 1/4" Schrader female

Inficon Family Leak detector functions integrated

Available Glycol/Oil dosing system

iFuji-M	
Injectors/Type	PLUVIO V3
Injector length	3,5 m, Different length is available on request
Refrigerant metering systems	1
Charging capacity	310 g for HC* / 10 kg for HFC
Charging speed	Up to 25 g/s (HC Refrigerants) Up to 40 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (<100 g HC), ±0,5 % (>100 g HC) ±1,0 g (<200 g HFC), ±0,5 % (>200 g HFC)
Mixture capacity	Helium and Nitrogen, with two independent pressurizing stadiums
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Compressed air supply	6 ÷ 7 bar not lubricated
Refrigerant delivery	Pressurized in liquid phase
Power Supply	400 V @ 50 Hz – 3ph + GND
Power Consumption	0,7 kW with 20,5 m ³ /h vacuum pump
Dimensions (L x W x H)	850 x 600 x 1400mm
Weight	~160 kg

Optional features and devices	
Up to four different refrigerant dosing system (UNO-M/DUE-M/TRE-M/QUATTRO-M)	
Light and Acoustic Alarm	
30,3 m ³ /h Vacuum Pump with Oil Mist filter	
PLUVIO Injector length on request	
Automatic working cycle selection performed by bar code reader	
Only vacuum head Injector 1/4" Hansen female or 1/4" Schrader female	
Inficon Family Leak detector functions integrated	
Available Glycol/Oil dosing system	

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

vacuum/pressurization/charge for A2L/A3 refrigerants

iFuji-HC

Charge

Vacuum

Pressurization

Step
Pressurization

Charging
Oil

Leak test⁺

Barcode⁺

All-In-One Evacuating Pressurization and Refrigerant Charging Unit

iFuji-HC is designed to fulfil the highest standards required in the processes of vacuum pressurizing and refrigerant charge.

iFuji-HC is equipped with an electronic control of the latest generation, high computing capacity and memory, and is managed by a smart operating system and offers easy interaction for the user.

iFuji-HC communicates with the User facility network and is an integral part of the production process. It has its own standard communications interfaces and software suitable to be connected to company networks to control and export the reports of the performed works directly to an external device. This also allows to integrate other digital devices (such as a Leak detector) directly to the machine thus speeding up and integrating Vacuum

formation, Leak detection and Charging process in a single cycle executed in complete safety.

Thanks to its smart connectivity, **iFuji-HC** is ready for tele-assistance from the mother company, FT srl, enabling significant cost and time savings in critical post-sale situations.

iFuji HC



Touch screen machine Controller



Injectors PLUVIO V3



iFuji HC Characteristics

- The smart electronic control of iFuji allows to integrate multiple processes in a single cycle program:
- Vacuum and relevant Test with vacuum decay
- Tracer Gas or Helium + Nitrogen automatic mixture pressurizing with Pressure Decay and Leak Detection point-to-point leak search (data displayed on the unit controller)
- Refrigerant charging
- General report release IT coolers



iFuji-HC	
Injectors/Type	PLUVIO V3 ¼" PLUVIO V1 ¼" (only Pressurization and Vacuum)
Injector length	3,5 m, Different length is available on request
Refrigerant metering systems	1
Charging capacity	310 g for HC* / 10 kg for HFC
Charging speed	Up to 25 g/s (HC Refrigerants) Up to 40 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (<100 g HC), ±0,5 % (>100 g HC) ±1,0 g (<200 g HFC), ±0,5 % (>200 g HFC)
Mixture capacity	Helium and Nitrogen, with two independent pressurizing channels
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Compressed air supply	6 ÷ 7 bar not lubricated
Refrigerant delivery	Pressurized in liquid phase
Power Supply	400 V @ 50 Hz – 3ph + GND
Power Consumption	0,7 kW with 20,5 m ³ /h vacuum pump
Dimensions (L x W x H)	850 x 600 x 1400mm
Weight	~160 kg

* The maximum quantity is settled according to the local limitations

Optional features and devices

Light and Acoustic Alarm
30,3 m ³ /h Vacuum Pump with Oil Mist filter
PLUVIO Injector length on request
Automatic working cycle selection performed by bar code reader
Only vacuum head Injector 1/4" Hansen female or 1/4" Schrader female
Inficon Family Leak detector function integrated
Available Glycol/Oil dosing system

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

vacuum/pressurization/charge for A1 refrigerant

iFuji HC-B	
Injectors/Type	PLUVIO V3 ¼" PLUVIO V1 ¼" (only Pressurization and Vacuum)
Injector length	3,5 m, Different length is available on request
Refrigerant metering systems	1
Charging capacity	310 g for HC* / 10 kg for HFC
Charging speed	Up to 25 g/s (HC Refrigerants) Up to 40 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (<100 g HC), ±0,5 % (>100 g HC) ±1,0 g (<200 g HFC), ±0,5 % (>200 g HFC)
Mixture capacity	Helium and Nitrogen, with two independent pressurizing channels
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Compressed air supply	6 ÷ 7 bar not lubricated
Refrigerant delivery	Pressurized in liquid phase
Power Supply	400 V @ 50 Hz – 3ph + GND
Power Consumption	0,7 kW with 20,5 m ³ /h vacuum pump
Dimensions (L x W x H)	850 x 600 x 1400mm
Weight	~160 kg

Optional features and devices

Up to four different refrigerant dosing system (HC1-B/HC2-B/HC3-B/HC4-B)

Light and Acoustic Alarm

30,3 m³/h Vacuum Pump with Oil Mist filter

PLUVIO Injector length on request

Automatic working cycle selection performed by bar code reader

Only vacuum head Injector 1/4" Hansen female or 1/4" Schrader female

Inficon Family Leak detector functions integrated

Available Glycol/Oil dosing system



iFuji HC-M	
Injectors/Type	PLUVIO V3 ¼" PLUVIO V1 ¼" (only Pressurization and Vacuum)
Injector length	3,5 m, Different length is available on request
Refrigerant metering systems	1
Charging capacity	310 g for HC* / 10 kg for HFC
Charging speed	Up to 25 g/s (HC Refrigerants) Up to 40 g/s (HFC refrigerants)
Charging accuracy	±0,5 g (<100 g HC), ±0,5 % (>100 g HC) ±1,0 g (<200 g HFC), ±0,5 % (>200 g HFC)
Mixture capacity	Helium and Nitrogen, with two independent pressurizing channels
Injector connection	¼" Hansen F (ISO 7241B)
Refrigerant supply connection	¼" Hansen M (ISO 7241B)
Programmable work cycles	Up to 1000
Nominal Vacuum pump rate	20,5 m ³ /h
Control unit	TS690
Working temperature	5 °C .. 45 °C
Compressed air supply	6 ÷ 7 bar not lubricated
Refrigerant delivery	Pressurized in liquid phase
Power Supply	400 V @ 50 Hz – 3ph + GND
Power Consumption	0,7 kW with 20,5 m ³ /h vacuum pump
Dimensions (L x W x H)	850 x 600 x 1400mm
Weight	~160 kg

Optional features and devices	
Up to four different refrigerant dosing system (HC1-M/HC2-M/HC3-M/HC4-M)	
Light and Acoustic Alarm	
30,3 m ³ /h Vacuum Pump with Oil Mist filter	
PLUVIO Injector length on request	
Automatic working cycle selection performed by bar code reader	
Only vacuum head Injector 1/4" Hansen female or 1/4" Schrader female	
Inficon Family Leak detector functions integrated	
Available Glycol/Oil dosing system	

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum and Charging Injectors

HCFC, HFC Application



Hansen Connector

- 1/4" or 3/8" Hansen quick coupler (ISO 7241B)
- automotive connection (suction or send side)
- 1/4" SAE quick coupler with Schrader valve



Gustav

- 1/4" Hansen quick coupler (ISO 7241B)
- Only vacuum coupler



PLUVIO V2

- 1/4" or 3/8" Hansen quick coupler (ISO 7241B)
- automotive connection (suction or send side)
- 1/4" SAE quick coupler with Schrader valve

High Performances HC Applications, Multi Refrigerant



PLUVIO V3

- 1/4" or 3/8" Hansen quick coupler (ISO 7241B)
- automotive connection (suction or send side)
- 1/4" SAE quick coupler with Schrader valve
- Start Button integrated
- Charge speed 40 g/s (Refrigerants HCFC)



PLUVIO V4

- 1/4" or 3/8" Hansen quick coupler (ISO 7241B)
- automotive connection (suction or send side)
- 1/4" SAE quick coupler with Schrader valve
- Start Button integrated
- Charge speed 80 g/s (Refrigerants HCFC)



PLUVIO V5

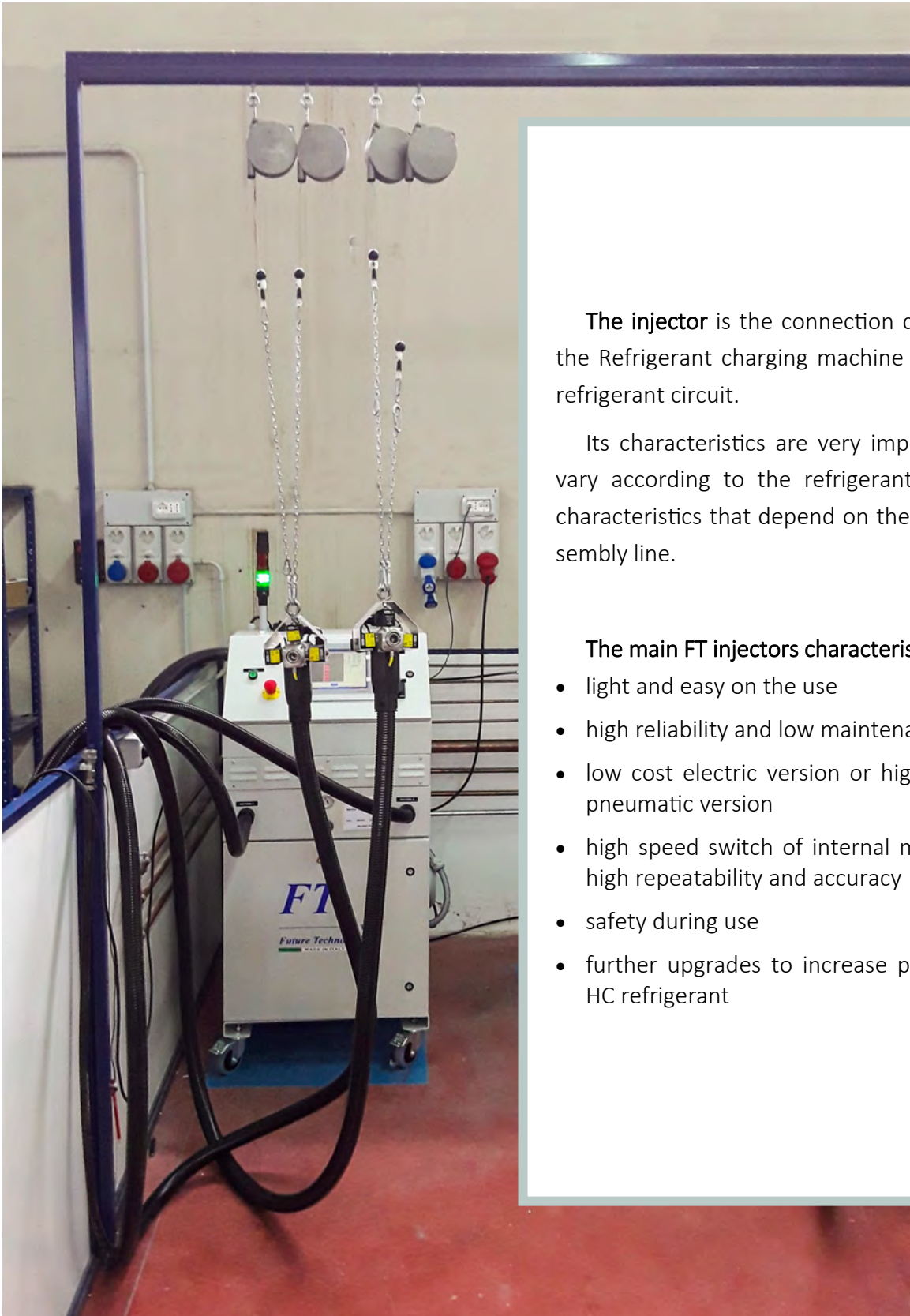
- 1/4" or 3/8" Hansen quick coupler (ISO 7241B)
- automotive connection (suction or send side)
- 1/4" SAE quick coupler with Schrader valve
- Start Button integrated
- Charge speed 40 g/s (Refrigerants HCFC)

MFIL

- High mass production and high precision
- 1/4" or 3/8" Hansen quick coupler (ISO 7241B)
- automotive connection (suction or send side)
- Start Button integrated
- Charge speed 60 g/s (Refrigerants HCFC)



General overview



The **injector** is the connection device between the Refrigerant charging machine and the cooler refrigerant circuit.

Its characteristics are very important and can vary according to the refrigerant charging unit characteristics that depend on the production assembly line.

The main FT injectors characteristics are:

- light and easy on the use
- high reliability and low maintenance frequency
- low cost electric version or high performance pneumatic version
- high speed switch of internal micro-valves for high repeatability and accuracy
- safety during use
- further upgrades to increase performance on HC refrigerant

Vacuum and Charging Injectors

HCFC, HFC Application



Hansen Connector

The **Hansen Connector** is used for pressurization systems up to 55 bar. The diameter is 1/4" or 3/8" Hansen quick coupler (ISO 7241B).

- This connector is used only with **iAmiata** units.

The **Gustav** injector is used to speed up vacuum performance of the vacuum and charging unit. The diameter is 1/4" Hansen quick coupler (ISO 7241B) with automatic pneumatic needle control.

The **PLUVIO V2** is part of the PLUVIO injectors series, which are electromagnetic piloted to better control the vacuum and refrigerant charge.



Gustav



PLUVIO V2

It is equipped with 1/4" Hansen quick connector or optionally with 1/4" SAE Schrader.

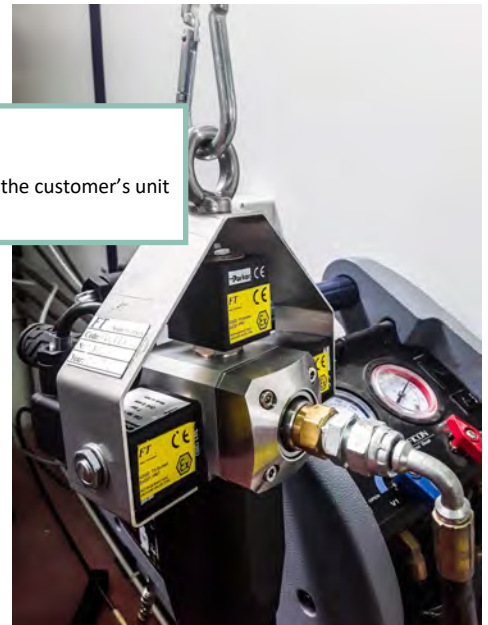
PLUVIO V2 is equipped with an ergonomic handle and START button, and can be supplied on request with an Automatic quick release

- **PLUVIO V2** is supplied as standard injector in **iTeide TTD** and **iRockall** units.

- * The standard length of the injector is 3,5 m but longer ones are available on request.



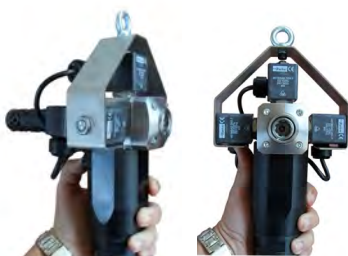
iAmiata unit pressurization systems
The Hansen Connector



PLUVIO V3
connected to the customer's unit



High Performances HC Applications, Multi Refrigerant



PLUVIO V3



PLUVIO V4



PLUVIO V5

PLUVIO series (V3, V4, V5) are vacuum and charging injectors with pneumatic/electromagnetic control, which minimize any dead spaces to ensure the maximum compactness and lossless transfer towards the group circuit from the charging station.

PLUVIO is an injector with no refrigerant release to the environment, designed for medium/low throughput production lines.

The pneumatic needle valve and automatic connection used are 1/4 "or 3/8" Hansen (ISO 7241B). Alternative 1/4 "or 3/8" SAE Automotive connections are also available on request.

* The standard length of the injector is 3.5 m but longer ones are available on request.

PLUVIO is supplied as standard in iRockall HC, but it can be specially configured for other applications

such as the CO2 or High Speed applications.

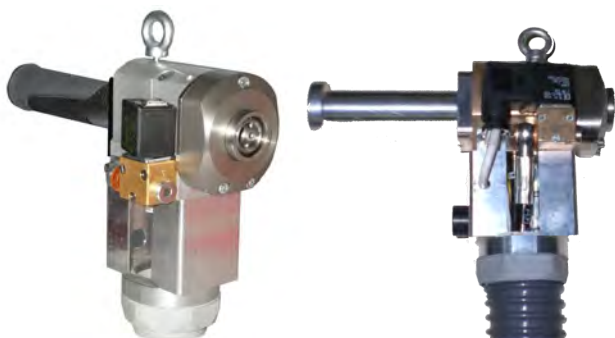
Multi Refrigerant Injectors (V5) (1/4" quick connectors)

These multi refrigerant injectors are designed for special applications where the customer requires a more compact solution in a limited space, or a general multi stadium filling mixture composed by two or more refrigerants.

The solution can be used for two or three refrigerants, vacuum and service exhaust, thanks to its modular design, to host the related Electric Valves, also available in ATEX configuration.

The Automatic coupling and the needle are pneumatically operated.

MFIL



For **High Productivity processes** FT suggests the use of the MFIL Injector.

Thanks to its micro pneumatic technology combined with the speed of the Electric Valves, this Injector is capable to manage very frequent charge cycles without problems. The typical use, for instance, is mass production where it is strictly required to continuously work h-24 with small quantity charges high reliability.

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Refrigerant Transfer Pumps

RTP

RTP - Devices to pressurize and transfer refrigerant to delivery lines

RTP Pumps are designed specifically for the transfer and pressurization of refrigerants. They are provided with a complete set of accessories, which include:

- Pressure regulator fluid in the supply line
- Gauge pressure of the fluid in the supply line
- Safety valve by-pass to protect the RTP from possible over-pressure in the discharge line
- Unit filter / dryer for compressed air

Suggested accessories :

- High capacity filter on the inlet, to protect the pump from solid impurities that may be present in the refrigerant
- Quick couplings with flat faces, to enable rapid

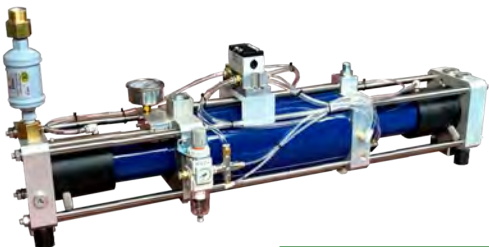
connections and disconnections from the refrigerant lines, in case of pump maintenance operations

- Suction hose to connect the filter to the storage tank and to the pump
- Hose in the supply to connect the pump directly to the refrigerant charging unit
- Safety valve for emission of refrigerant to the outside or inside the tank in case of emergency
- Hydro-pneumatic accumulator to maintain stable discharge pressure in case of unexpected refrigerant flow variation in the distribution system



RTP 6315

Maximum rate 6,0 l/min
 Dimension 540x200x340 mm
 Single compression action
 One Hydraulic cylinder



RTP 6315T

Maximum rate 10,0 l/min
 Dimension 700x200x340 mm
 Double compression action
 Two Hydraulic cylinders

Technical characteristic	RTP 6315 (-HC)	
Maximum rate	6,0 l/min	
dimensions	540x200x340 mm	
Weight	15kg	
Number of Hydraulic cylinders	Single compression action	
Refrigerant compatibility	HFC, HCFC, HFO, HC	
Geometrical multiplier ratio	4,27 ** Equal to the ratio: refrigerant delivery pressure–refrigerant supply pressure) / compressed air pressure features subject to change without notice; please contact FT Sales Service for more information	
Integrated safety valve setting	4000 kPa	
Delivery line connection	3/8" GAS-M	
Suction line connection	3/4" GAS-M	
Compressed air supply	Dried, filtered, not lubricated	
Compressed air Pressure	2 ÷ 6 bar	
Compressed air Pressure pipe typology	RILSAN Øe 8 mm	

Technical characteristic	RTP 6315T (-HC)	RTP 6325T (-HC)
Maximum rate	10,0 l/min	13,0 l/min
dimensions	700x200x340 mm	1100x200x340 mm
Weight	17kg	40kg
Number of Hydraulic cylinders	Double compression action	Double compression action
Refrigerant compatibility	HFC, HCFC, HFO, HC	

Optional features and devices	
RTP Connection KIT	
Automatic RTP Stopping System (RTP SS) (with acoustic alarm, red -green light, HFC or HC)	
Automatic Tank Change system (TCS)	
Customization on special platform composed by RTP SS + TCS + Hydro-pneumatic accumulator	

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Refrigerant Transfer Pumps

Hydro-pneumatic Accumulators

The **hydro-pneumatic accumulator** is a device designed specifically for the storage of liquids under pressure. As liquids are, for all practical purposes, incompressible, the storage is achieved by making use of the compressibility of gases.

The accumulators can be conveniently used in different applications, such as:

- Keep the liquid under pressure, to temporarily maintain high levels of flow rate.
- Stabilization of pressurized lines, to limit the fluctuations of temperature or flow rate.
- Energy storage in the form of pressurized fluid or hydraulic spring.
- Absorb hammering or pulsation of the fluid.

The accumulators are available for many standard Industrial Refrigerants and fluids such as:

- Refrigerants HFC (R134a, R404A, R407C, R410A,

R507, others)

- Refrigerants HCFC
- Refrigerants CFC
- Refrigerants HC and HFO (R600a, R290, R32, R1234ze R1234yf)
- Other “natural gases” as NH₃ (R717) e CO₂ (R744), industrial oils or general fluids
- CE-PED, ATEX and ML available on request

* FT srl provides accumulators with preloaded pressurized nitrogen as standard.

* When choosing an accumulator please contact the technical department of FT srl to communicate the nature of the fluid used.



A- A flexible separator bladder is fitted into a pressure vessel (accumulator shell).



B- An inert gas (nitrogen) is introduced into the bladder through a special valve with pressure P_0 . The bladder expands, filling the entire volume V_0 of the accumulator shell.



C- When circuit pressure P_1 is higher than the gas pre-charge pressure P_0 , the liquid valve opens, and the bladder is compressed reducing the gas volume to V_1 .



D- When the liquid pressure rises to P_2 , the volume of gas reduces to V_2 with an attendant rise in pressure, thus balancing the liquid pressure. This means that the accumulator has been pressurised $\Delta V = V_1 - V_2$ and a potential energy has been created to be utilised as desired.

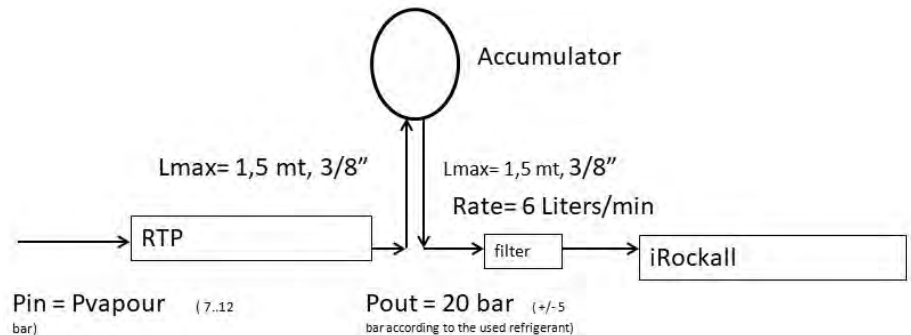
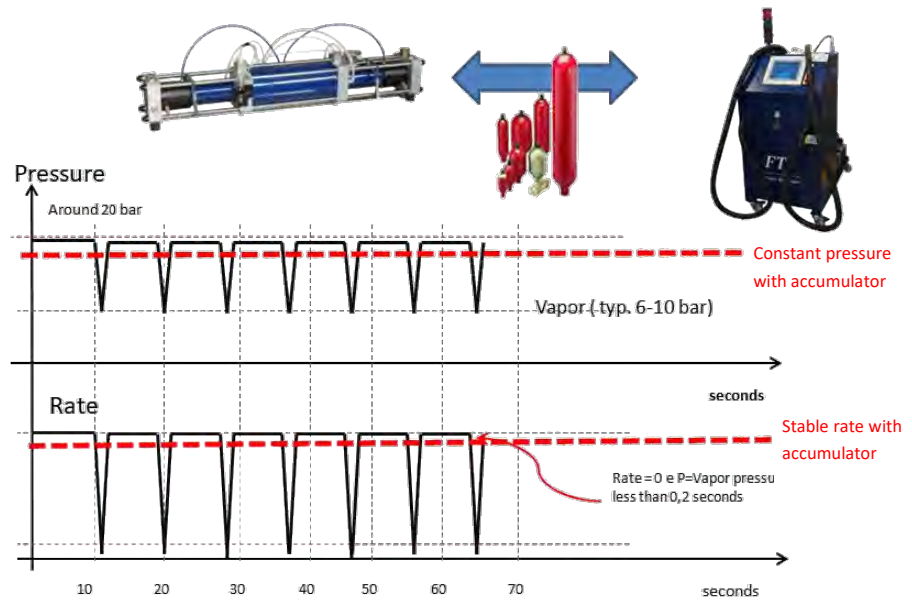
Typical Charge Amount on Refrigerant Circuit	Available and suggested capacity	Dimensions (H x D mm) weight (kg)
from 30 g to 100 g	0,35 Litres	190 x 70mm 2,5 kg
from 100 g to 300 g	0,70 Litres	220 x 92mm 3,2 kg
from 300 g to 1 kg	1,5 Litres	270 x 115mm 6,2 kg
from 1 kg to 3 kg	3,0 Litres	400 x 115mm 9,8 kg
from 3 kg to 10 kg	5,0 Litres	365 x 168mm 15 kg
from 10 kg to 25 kg	15,0 Litres	750 x 168mm 25 kg
over 25 kg	25 Litres	750 x 220mm 36kg

* Contact the technical FT srl for proper sizing accumulators, size and accessory piping

Example of connection and functionality

The pictures show the rate and relevant waveform smoothing in presence of the accumulator (red line).

The FT charging units operate at maximum accuracy when the accumulator is working correctly.



Accessories suggested with Accumulators

Support brackets

Holding collars

Kit pipe / fitting for interfacing with systems RTP

Nitrogen accumulator control kit

Refrigerant Transfer Pumps

RTPSS(-HC)

Automatic RTP Stopping System

RTPSS

Monitoring is done by controlling electrical signals from pneumatic limit switches and liquid sensors that close appropriate electrical contacts on the electronic control unit. Thanks to it and its control logic, the system provides a light and acoustic alarm signal when the tank from which it is being extracted is exhausted.

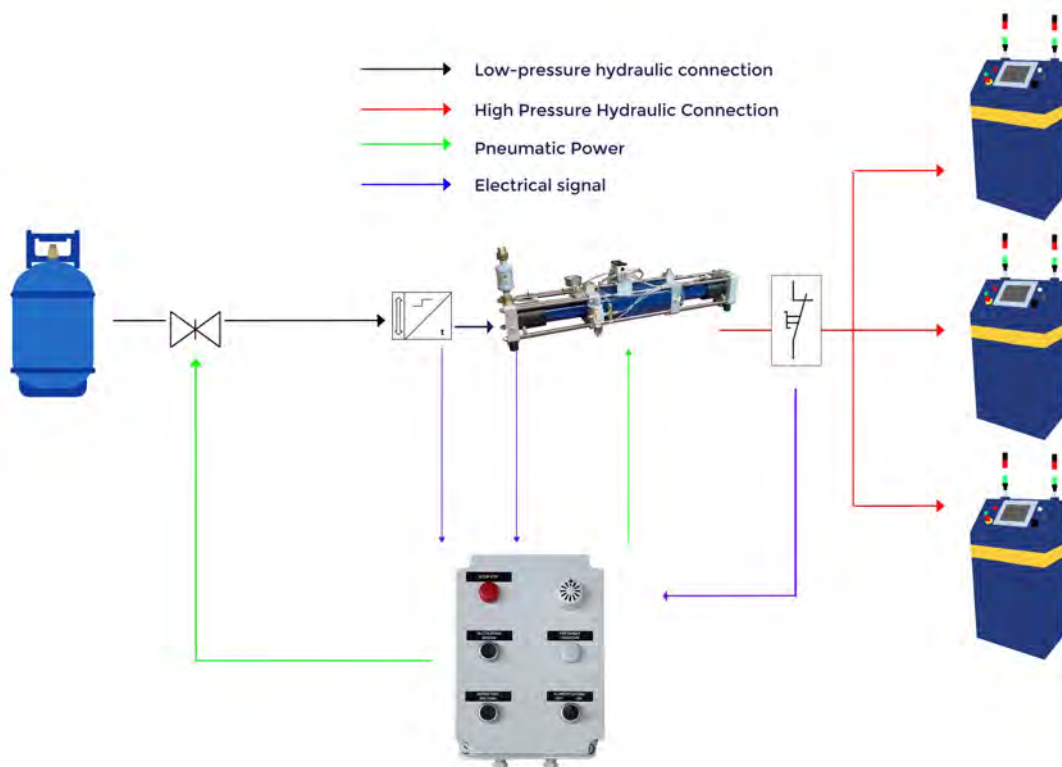
Contextually, the system provides to the control of appropriate electropneumatic valves by automatic disconnection procedure from the empty tank and relevant inhibits of refrigerant transfer Pump (RTP).

Thus, the system will:

- Stop the RTP from extracting the refrigerant from the tank by
- Provide acoustic and luminous signal to warn the operator that the tank is empty or is not properly connected to the RTP extraction line (e.g. the manual cylinder valve is closed)



Automatic RTP Stopping System



RTPTCS (-HC)

Automatic Tank Changing System

RTPTCS

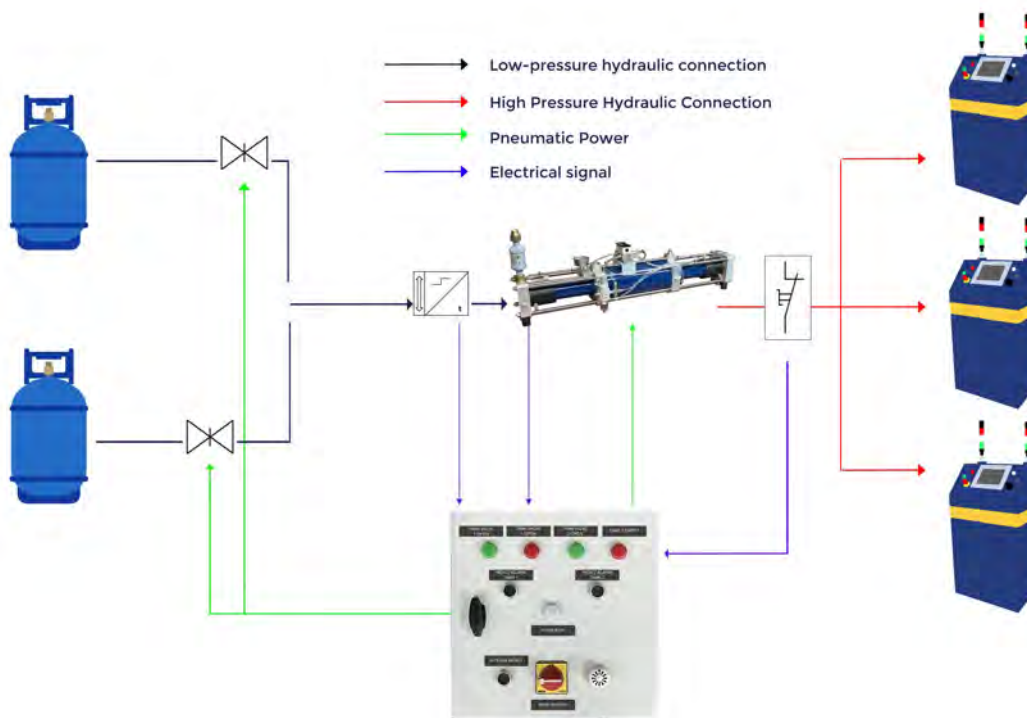
Monitoring is done by controlling electrical signals from pneumatic limit switches and liquid sensors that close appropriate electrical contacts on the electronic control unit. Thanks to it and its control logic, the system provides a light and acoustic alarm signal when the tank from which it is being extracted is exhausted. Contextually, the system provides to the control of appropriate electropneumatic valves by automatic disconnection procedure from the empty tank and the connection to the full tank with the suction manifold of the Refrigerant Transfer Pump (RTP).

Thus, the system will:

- switch the refrigerant transfer pump suction to the full tank by closing the pneumatic valve of the empty tank and opening the pneumatic valve of the spare tank
- provide indications of the status of the tanks and the operations to be done to resume refrigerant transfer functions to inhibit the RTP if both tanks are empty



Automatic Tank Charging System



Refrigerant Transfer Pumps

R-RTP (-HC)

Refrigerant Recovery unit

R-RTP Refrigerant Recovery unit

RTP refrigerant transfer pumps are suitable for both continuous and intermittent operation.

They are intended for extracting refrigerant fluid from tanks or large refrigeration units that have been decommissioned or are in need of repair, near which the pump is normally installed, and for transferring the recovered fluid to appropriate recovery tanks.

A further application involves the high-speed recovery of refrigerant fluid from a circuit/tank to a storage tank.

Extraction occurs at the vapor pressure of the

fluid at environment temperature.

Delivery is performed at a pressure such that the refrigerant remains in a liquid state throughout the pipeline just before the point of use, preventing the vapor bubble formation.

This condition is essential for the proper operation of vacuum and charging machines.



Technical characteristic	R-RTP 6315T (-HC)
Maximum rate	6,0 l/min
dimensions	540x200x340 mm
Weight	15kg
Number of Hydraulic cylinders	Single compression action
Refrigerant compatibility	HFC, HCFC, HFO, HC
Geometrical multiplier ratio	4,27 <small>** Equal to the ratio: refrigerant delivery pressure–refrigerant supply pressure) / compressed air pressure features subject to change without notice; please contact FT Sales Service for more information</small>

Technical characteristic	R-RTP 6325T (-HC)
Delivery line connection	3/8" GAS-M
Suction line connection	3/4" GAS-M
Compressed air supply	Dried, filtered, not lubricated
Compressed air Pressure	2 ÷ 6 bar
Compressed air Pressure pipe typology	RILSAN Øe 8 mm

Optional features and devices
Gas detection sensor for immediate system shutdown if fluid is present inside the cabinet. (Only on executions with class A2L and A3 refrigerants)
Dehydrating filter and oil separator
Additional kits consisting of aspiration and discharge piping

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

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Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum, gas tracer and pressurization units & Leak detectors

iAmiata

Vacuum

Pressurization

Step
Pressurization

Strength
Test +

Leak test +

Barcode +

Vacuum, tracer gas (N2 or He) mixtures and pressurization unit

iAmiata is a bench station for mixing Helium and Nitrogen gases and creation of test leaks with rising vacuum, pressure decay and point to point micro leaks detections.

iAmiata has been designed specifically to perform pressure tests and leak tests of refrigerating units with the use of inert gas or tracer gases such as helium or nitrogen/hydrogen, according to the ISO 10156 Standard; before the charging of the test gas it is possible to perform a vacuum cycle so to get a first cleaning of the unit and to make a preliminary sealing test.

iAmiata is ideal for the tracing of leaks from components and refrigerating units, on production lines for any kind of appliance, wherever a pressure test or/and a trace gas leak test is required.

iAmiata can be easily interfaced with the Inficon and Pfeiffer Leak detectors, with complete control of the main functionalities, configuration and report of the leak test over the relevant copper circuits.

iAmiata for pressure stress test

iAmiata connected to leak detector



iAmiata



Touch screen machine Controller



Connections



Functional Characteristics:

- High versatility and portability thanks to compact design
- Maximum test pressure 55 bar
- Digital gauges for pressure and vacuum measurement
- Integrated pneumatic vacuum pump (5,2 m³/h capacity)
- Setting of working cycle parameters, monitoring and printing test reports by connecting to an external PC
- Bar code reader (optional)
- Microprocessor controlled
- Up to 1000 programmable working cycles
- Reporting of the sub cycle in progress
- Built in agreement to the European Machinery Directive, Safety standards CE marked

iAmiata General Technical Characteristics	
Tracer gas/mixtures	He or N2 / He & N2 blend
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Pressure Sensor resolution	1 kPa
Connection to the unit to be tested	¼" Hansen F (ISO 7241B), ¼" SAE at request
Vacuum pump capacity	Integrated pneumatic depressor 5,2 m ³ /h; DN16KF flange for connection to ext. vacuum pump
Programmable work cycles	Up to 1000
Safety valve security setting	63 bar, configurable at request
Control unit	TS690
Working temperature	from 5 °C to 45° C
PC Connection	LAN
Compressed air supply	6 ÷ 7 bar not lubricated
Power Supply	400 V @ 50 Hz – 3ph + GND
Power Consumption	0,7 kW
Dimensions (L x W x H) **	850 x 560 x 1400mm
Weight	~150 kg

* The provided unit could not exactly match the one described here

** IAmiata TT has a different dimension

Optional features and devices
DCA (Data Collector Application over TCP/IP protocol)
Available up to 4 Mixture pressurization Systems and 2 Vacuum Pumps
Automatic working cycle selection performed by bar code reader
On-Board printer
Obstructed vacuum group test and/or capillary test
iAmiata UNO -1 Special configuration without Vacuum Pump

* FT software department develops customized software on request

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

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Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum, gas tracer and pressurization units & Leak detectors

Vacuuming

The iAmiata machine generally is equipped with the vacuum pump that allows vacuuming to be performed on a unit under test.

Through vacuuming unwanted air and gases are extracted from the circuit being processed, it also allows any moisture present to evaporate and be extracted as gas by the vacuum pump.

Vacuuming generally is preparatory to beginning processing on a unit under test, but it can also be omitted depending on the state of the circuit under test.

iAmiata Uno TT (Table top unit)	
Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 2
Vacuum/Pressurization System	1 Injection System
Flowmeter	1
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request
Dimension	560 x 420 x 300 mm

iAmiata Uno	
Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 2
Vacuum/Pressurization System	1 Injection System
Flowmeter	1
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request

Pressurization

Pressurization is the function that allows a circuit to be loaded with a drawn mixture at a certain user-configurable pressure. Then the machine automatically assesses the presence of leaks through the pressure drop test, and following this, if properly configured, leak detection can be carried out through an Inficon P3000 and P3000XL leak-

detector.

the pressure input from the capillary, then it is possible to say that the capillary is not obstructed and place the test OK.

This function can only be enabled by the user if the Hardware is equipped with the corresponding pressure and control valve. Please contact FT technical department for more information.

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

iAmiata Due Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 2
Vacuum/Pressurization System	2 Injection System
Flowmeter	2
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request

iAmiata Quattro Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 4
Vacuum/Pressurization System	4 Injection System
Flowmeter	4
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request

* FT software department develops customized software on request

Vacuum, gas tracer and pressurization units & Leak detectors

Stress Test in iAmiata ST1

The Stress Test function belongs only to the iAmiata ST machine.

The purpose is to test the tightness of the high circuit, low circuit and the separation valve by loading nitrogen simultaneously on both sides of the circuit.

The high and low circuits are pressurized at

different pressures, and this difference must always be monitored and controlled so that a safety differential cannot be exceeded.

Then the machine automatically assesses the presence of leaks through the pressure drop test, and to follow, if properly configured, a pressurization phase and leak detection can be carried out through a leak detector from the Inficon P3000 and P3000XL family.

iAmiata ST1 Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 2
Vacuum/Pressurization System 1 Injection System Strength-Test	1 Injection System
Flowmeter	2 (1 for High P and 1 for Low P)
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request

iAmiata ST2 Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 4
Vacuum/Pressurization System 2 Injection System Strength-Test	2 Injection System
Flowmeter	4 (2 for High P and 2 for Low P)
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request

Capillary monitoring in iAmiata CBT

The capillary check function allows, prior to the pressurization stage, to tell whether the capillary is clogged. Two pressure sensors must be present in the machine to perform this test.

The circuit is pressurized only on the capillary side; then the sensor on the low-pressure circuit is monitored. If the pressure readout has the same

value as the pressure input from the capillary, then it is possible to say that the capillary is not obstructed and place the test OK.

This function can only be enabled by the user if the Hardware is equipped with the corresponding pressure and control valve. Please contact FT technical department for more information.

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

iAmiata Uno CBT1 Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 2
Vacuum/Pressurization System 1 Injection system with capillary obstruction test	1 Injection System
Flowmeter	1
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request

iAmiata CBT2 Technical Characteristics	
Tracer gas/mixtures	2
Injectors	Min 4
Vacuum/Pressurization System 1 Injection system with capillary obstruction test	2 Injection System
Flowmeter	2
Injector Length	3,5 m, Different length is available on request
Maximum Test pressure	55 bar
Safety valve security setting	63 bar, configurable at request

* FT software department develops customized software on request

Vacuum, gas tracer and pressurization units & Leak detectors

D-TEK Select (Portable Leak Detector)

Infrared leak detector portable version - for A1 and A2 refrigerant gas



D-TEK Select

This refrigerant leak detector uses an innovative infrared absorption sensing cell that is extremely sensitive to all refrigerants and is not sensitive to any other type of gases.

D-TEK Select Refrigerant Leak Detector maintains the sensitivity over time for consistent, accurate and reliable performance, even with the newer refrigerant blends.

Best of all, the sensing cell lasts for approximately 1,000 hours. Additional enhancements include a charging status indicator, sensor failure indication, and rechargeable NiMH batteries.

Specifications

Detection capabilities	R22, R134a, R404a, R410a, R448a, R507 (AZ-50), R32, HFO1234yf, SF6, and all other CFCs, HCFCs, HFCs, and HFOs
Minimum Sensitivity	3,0 g/year
Sensitivity according to EN14624 (R134a)	1,0 g/year
Operating Principle	Sniffer with evaluation of thermo-conductive sampled gas
Heating time / reaction time	~ 1 minute / 1 s
Leak detection method	Multiple LEDs, variable intensity audio alarm indicate leak strength
Probe length	38 cm
Autonomy	6,5 hours
Recharging time	8 hours (230 Vac battery charger)
Dimensions / Weight	220 x 65 x 30 mm / 0,45 kg
Standard content of the supply	Infrared cell, NiMH battery, spare filters, wall charger, 12 V car charger, hard plastic carrying case.

GAS-Mate (Portable Leak Detector)

safely detect flammable refrigerant and combustible A3 refrigerant leaks



GAS-Mate

The ideal tool for locating leaks in forming gas, flammable refrigerant, or combustible heating and appliance applications. GAS-Mate is also intrinsically safe, so you can leak check with confidence. **GAS-Mate** outperforms other models with twice the sensitivity of many competitors - down to 5 ppm methane, the main component of natural gas. It also detects many other combustible gases, such as ammonia, propane, ethanol and hydrogen sulphide. No calibration is required for GAS-Mate or its field-replaceable sensor. Simply turn the unit on, allow it to warm up for two minutes and it is ready to quickly pinpoint any gas leaks present. When the **GAS-Mate** detects combustible gas, it emits an acoustic sound and the leak indicators flash. The faster emission of a sound or a fixed alarm indicates a higher concentration of gas.



Specifications

Detection capabilities	R290, R600a, and R441a; Detects forming gas (95% Nitrogen, 5% Hydrogen)
Minimum Sensitivity	5 ppm: methane, R290 (propane), R600a (isobutane), hydrogen;
Operating Principle	Sniffer with evaluation of thermo-conductive sampled gas
Heating time / reaction time	~ 1 minute / 1 s
Leak detection method	Multiple LEDs, variable intensity audio alarm indicate leak strength
Probe length	38 cm
Autonomy	25 hours
Recharging time	8 hours (230 Vac battery charger)
Dimensions / Weight	220 x 65 x 30 mm / 0,45 kg
Standard content of the supply	Sensor, two "D" size alkaline batteries, hard plastic carrying case

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

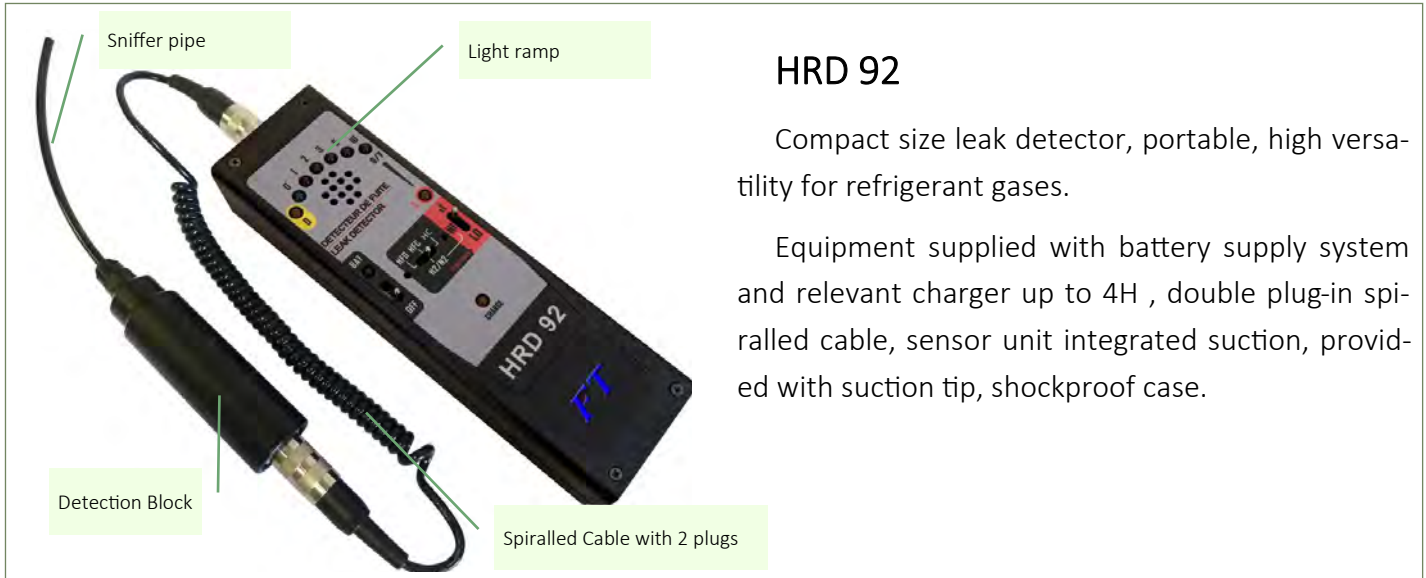
Ultrasonic tube sealers

IPCS & IPCS PLUS

Vacuum, gas tracer and pressurization units & Leak detectors

HRD 92 (portable Leak Detector)

Portable version - for refrigerant gas and tracers mixtures



HRD 92

Compact size leak detector, portable, high versatility for refrigerant gases.

Equipment supplied with battery supply system and relevant charger up to 4H , double plug-in spiralled cable, sensor unit integrated suction, provided with suction tip, shockproof case.

Specifications

Available probes	All refrigerant gases detection block R1234ze, R134a, R404, R407, R410... R290, R600, NH3. Blends R1234ze & R134a Tracer mixture gases N2/H2 (5% H2)
Sensitivity probes for HFC and HC	from 0,3 to 30 g/year HFC, on three scales: 0,3 ÷ 3 g/year HFC, alarm @ 1 g/year 1 ÷ 10 g/year HFC, alarm @ 3 g/year 3 ÷ 30 g/year HFC, alarm @ 10 g/year from 0,1 to 10 g/year HC, on three scales: 0,1 ÷ 1 g/year HC, alarm @ 0,3 g/year 0,3 ÷ 3 g/year HC, alarm @ 1 g/year 1 ÷ 10 g/year HC, alarm @ 10 g/year
Sensitivity probes for tracer mixtures N2/H2	from 2x10 ⁻⁶ to 2x10 ⁻⁴ cm ³ /s H2, on three scales: 2x10 ⁻⁶ ÷ 2x10 ⁻⁴ cm ³ /s H2, alarm @ 6x10 ⁻⁶ cm ³ /s 8x10 ⁻⁶ ÷ 8x10 ⁻⁵ cm ³ /s H2, alarm @ 2x10 ⁻⁵ cm ³ /s 2x10 ⁻⁵ ÷ 2x10 ⁻⁴ cm ³ /s H2, alarm @ 6x10 ⁻⁵ cm ³ /s
Operating Principle	Sniffer with evaluation of thermo-conductive sampled gas
Heating time / reaction time	~ 1 minute / 1 s
Reading display	Array of 6 LED alarm light and sound, self-diagnosis by means of LEDs indicating temporary malfunction or permanent as saturation, degassing, etc.
Probe length	1,5 m
Autonomy	4 hours
Recharging time	8 hours (230 Vac battery charger)
Dimensions / Weight	220 x 65 x 30 mm / 0,45 kg
Standard content of the supply	Charger, sensor with integrated suction unit, suction tip, shockproof case

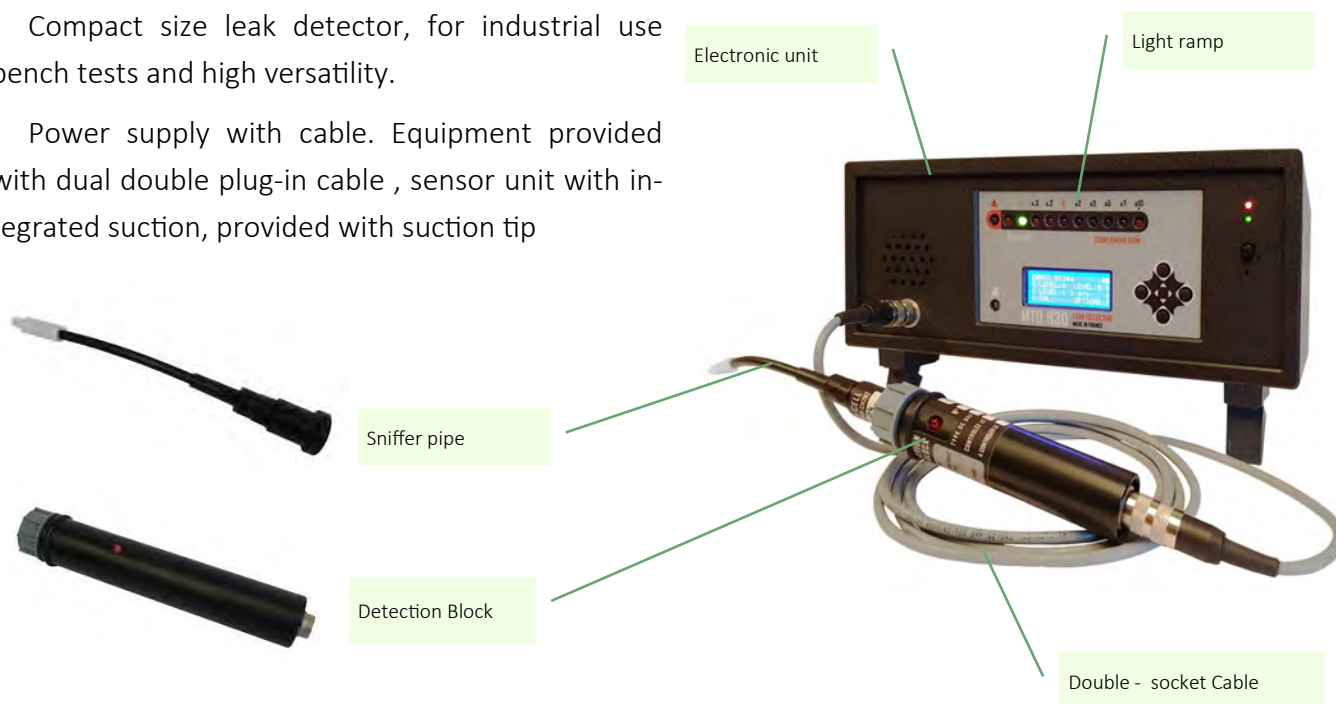
MTD 930 (Industrial Leak Detector)

industrial version - for refrigerant and HFO gas and tracers mixtures

MTD 930

Compact size leak detector, for industrial use bench tests and high versatility.

Power supply with cable. Equipment provided with dual double plug-in cable, sensor unit with integrated suction, provided with suction tip



Specifications

Available Probe	R1234ze, R134a, R404, R407, R410a R290, R600 tracer mixture gases N2/H2 (5% H2)
Minimum Sensitivity for HFC, HC and HFO	H2/N2: 1 * 10 ⁻⁵ cc/s Equivalent R134a: 1 g/yr
Operating Principle	Sniffer with evaluation of thermo-conductive sampled gas
Reading display	4 lines LCD screen Light ramp with 3-tone sound signal Saturation indication with 10 times the set value Degassing Countdown timer Adjustable sound volume Indication of environmental contamination
Power supply / consumption	230/110 V, 50/60 Hz, 25 W
Cable length	1,5 m
Dimensions / Weight	300x 200 x 150 mm / 5 kg
Standard content of the supply	power supply cable, sensor with integrated suction unit, suction tip

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Inletors

Refrigerant transfer pump

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IPCS & IPCS PLUS

Vacuum, gas tracer and pressurization units & Leak detectors

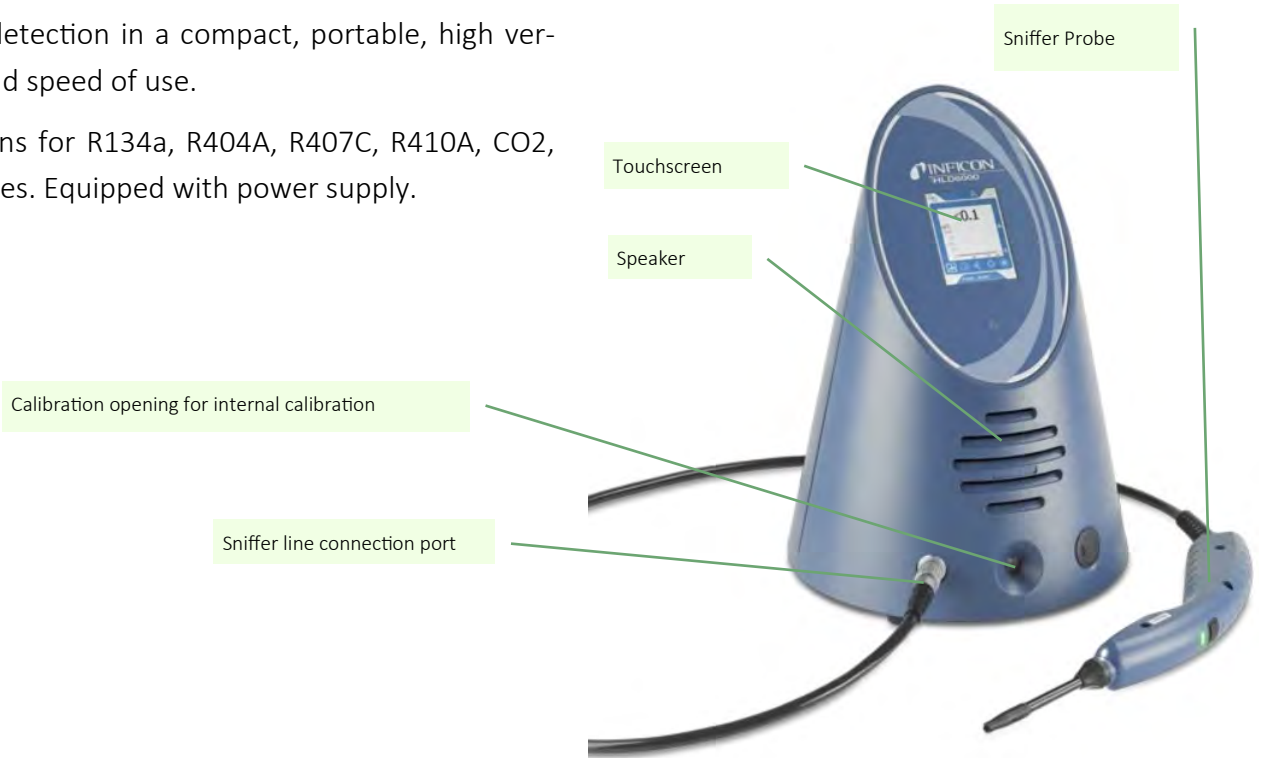
HLD 6000 (industrial Leak Detector)

Infrared version - for Refrigerant Gas including HC

HLD 6000

Leak detection in a compact, portable, high versatility and speed of use.

Versions for R134a, R404A, R407C, R410A, CO₂, other gases. Equipped with power supply.



Specifications

Detection capabilities	Version available for R134a, R404A, R407C, R410A, CO ₂ and other gases
Sensitivity	1 ÷ 50 g/year
Signalling	Digital
Zero	Automatic, with self-compensation of environmental contamination
Reaction time	< 1 s
Calibration	Feasible within seconds by referring to internal calibrated leak
Probe length	4,8 m
Auto Test	available, aspirated gas flow 320 sccm
Working temperature	10 ÷ 50 °C
Dimensions (high x diameter)/ Weight	365 x 260 mm / 4,5 kg
Power supply / consumption	220/240 V - 50/60 Hz

Ecotec E3000 (Industrial Leak Detector)

Mass spectrometer - for refrigerant gases and tracer mixtures

Ecotec E3000

The Ecotec E3000 is a professional bench Leak detector with high functionality and versatility. Power is supplied by cable. Equipment provided with dual plug-in cable, sensor unit with integrated suction, suction tip. This device can be interfaced with the Pressurizing station **iAmiata**.



Specifications

Detection capabilities	Gas CFC, HCFC, HFC, HC, He, etc.
Maximum Sensitivity	0,05 g/year 1×10^{-6} mbar l/s for He
Signalling	Digital by means of bar graph
Zero	Automatic, with self-compensation of environmental contamination
Number of detecting gases at the same time	Up to 4
Number of gas in the database	Over 100
Reaction time	<0,8 s
Calibration	Feasible within seconds by referring to internal certificated leak ECO. The operation can be done by external instruments.
Probe length	3 m
Auto Test	available, aspirated gas flow 160 sccm
Working temperature	10 ÷ 45 °C
Dimensions / Weight	610 x 370 x 265 mm / 34 kg
Power supply / consumption	220/240 V - 50/60 Hz

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

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IPCS & IPCS PLUS

Vacuum, gas tracer and pressurization units & Leak detectors

Protec P3000 (Industrial Leak Detector)

Quartz window technology - for He tracer gas

Protec P3000

Protec P3000 is a professional bench Leak detector with High versatility. The device can be connected to the **iAmiata** and **iFuji** units for a full data communication relevant to the leaks detection process.

Power supply with cable. Equipment provided with dual plug-in cable , sensor unit with integrated suction, suction tip.



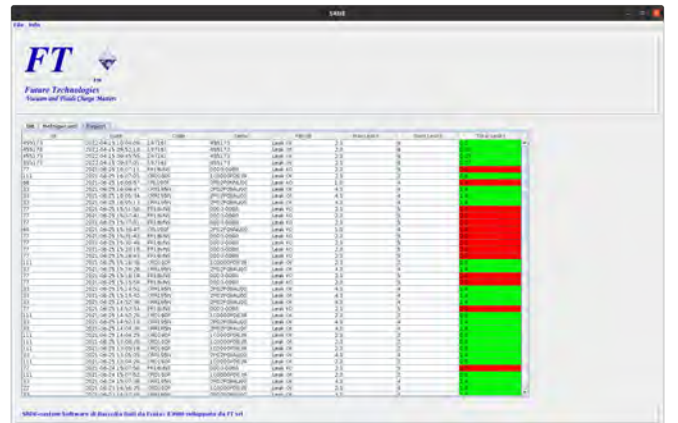
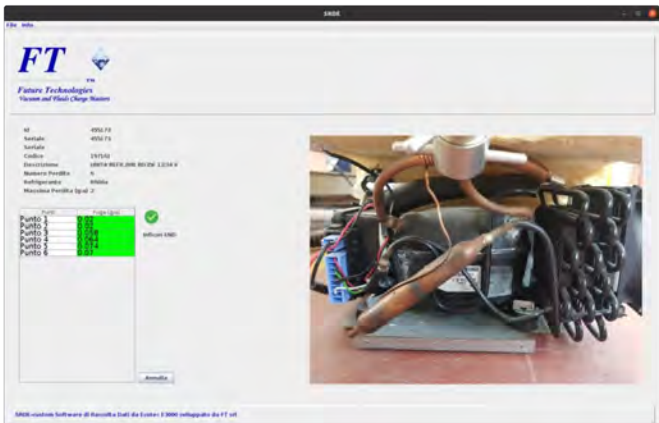
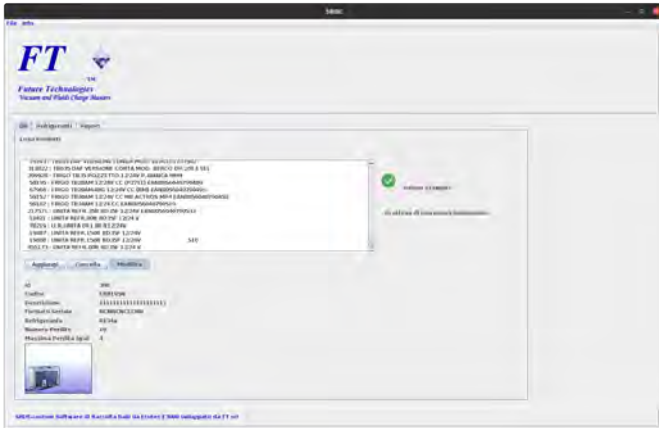
Specifications	PROTEC P3000	PROTEC P3000 XL
Detection capabilities	Helium	
Maximum sensitivity / Range measure	1x10 ⁻⁷ mbar l/s / 5 decades	1x10 ⁻⁷ mbar l/s / 5 decades
Signalling	Digital by means of bar graph	
Zero	Automatic, with self-compensation of environmental pollution	
Reaction time	< 700 ms	< 450 ms
Calibration	Feasible within a few seconds referring to the calibrated leak certified PRO-Check integrated into the instrument	
Probe length	3 m, other length are available on request	
Auto Test	Available, gas flow aspirated 300 sccm	Available, gas flow aspirated 3000 sccm
Working temperature	10 ÷ 45 °C	
Dimensions / Weight	610 x 370 x 265 mm / 27 kg	
Power supply / consumption	220/240 V - 50/60 Hz	

SRDE (Sistema raccolta dati Ecotec) Ecotec data collection software

SRDE software allows to automate the data collection from the leak detector.

Scanning of the related barcode of the machine called "ricetta" helps the operator in the process of searching for leaks for a given product, thereafter the process of detecting will be start and the software shows the result of the operation via a video and saves it in a the database.

the barcode reader provides SRDE the information about that specific machine, for example, the refrigerator so that the software can create a detailed map of the potential leak points. This method helps the operator to be more precise in the detection process.



Company Profile

Vacuum and Charge-
ing units

HC Refrigerants
handling systems

Special Units

Vacuum and Charge-
ing Injectors

Refrigerant transfer
pump

Pressure test units
leak detectors

Preliminary vacua-
tion

Electrical and func-
tional test

Ultrasonic tube
sealers

IPCS & IPCS PLUS

Preliminary evacuation systems

iEPS XX Evacuation pumping System For pre-evacuation circuits

Vacuum

iEPS XX Evacuation pumping System

iEPS performs the evacuation, and the relevant vacuum rise test on chiller circuits. Its working is based on one or more Vacuum Pumps installed inside its cabinet or in a remote cabinet; Thanks to ON/OFF valves this system allow the evacuation up to 4 chillers unit, each one can be composed by up to two pipes connection.

All the operations are done automatically by an electronic control that is programmable in CYCLES by the user.

Main Features:

- available pumps flow rates: 16, 20, 30, 40, 80, 90 m³ / h
- setting up to 1000 different cycles can be pre-set; more on request.
- working cycle to achieve a vacuum level at a threshold within a specified time and related rise test.
- digital indication of the vacuum level through active head Pirani.
- Can be connected to the sides of the high and low pressure of two independent groups, or to the different sections of the larger groups.
- Overall dimensions 1150x600x400 mm.
- Power: 400 V - 50 Hz - 3ph + N + earth. Other upon request.



Optional features and devices

Up to four independent vacuum system (UNO/DUE/TRE/QUATTRO)

Printer

Connection to the group available with 1/4" or 3/8" female Quick Coupler Hansen

Remote pump model available

Barcode reader

Light and Acoustic Alarm

E2M and MVP Series vacuum pump
For pre-evacuation circuits carousels

E2M series vacuum pumps

The E2M series is the international reference point for both performance and long term reliability for vacuum pumps in the industrial installations. E2M pumps can be equipped, according to the application needs, with a very large set of accessories and are available in broad range of capacities: 18, 28, 40, 80, 175 and 275 @ 50 Hz.

In cases where very high pumping speeds are required, E2M pumps can suitably be coupled to Roots mechanical booster pumps. Other pump models are available on request.



MVP series vacuum pumps

MP vacuum pumps are top quality and last generation pumps, very easy to use, very quiet during operation and intuitive in maintenance. All controls are clearly marked and have large finger grips for ease of use. The sight glass is clearly visible and both inlet and outlet are fitted with standard NW 25 flanges for easy connection to accessories.

Large diameter oil passages allow for easy maintenance and any filling spillage is contained by the oil box well. No special tools are needed for servicing. The high reliability and top performance of this innovative line of pumps are highly regarded in the refrigeration and A/C applications.



Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Preliminary evacuation systems

FT_ADCSI

Vacuum Gauge

FT_ADCSI

The **vacuum gauge system** is used to monitor the vacuum value read by the sensor, which is connected to the vacuum pump under consideration.

A vacuum threshold can be assigned to the control unit to be considered as a target value to be reached during the vacuum process.

when the vacuum value read by the sensor is higher than the settled vacuum threshold **FT_ADCSI** gives out a red light signal.

when vacuum value read by sensor is lower than settled vacuum threshold **ACDSI** gives out a green light signal.

The vacuum gauge consists of:

- Edwards vacuum sensor model APG200 with Pirani technology.
- Wifi adapter, only for models that provide connection via wifi.

- Eaton Plc that allows to check the control unit display and access to all relevant functions.
- The enclosure is also equipped with two indicator lights:
 - ◆ Green to indicate that the vacuum value is below the LOW threshold (VACUUM OK),
 - ◆ Red to indicate that the vacuum value is over the HIGH threshold (VACUUM NOT OK)
- Power supply input - 230Vac 50/60 Hz
- LAN cable for vacuum signal input



The screen shows the following data:

- date and time of vacuum phase start.
- The vacuum level is indicated graphically by a progress bar on a logarithmic scale, of which the full scale corresponds to atmospheric pressure.
- Vacuum level expressed in Pascal
- Vacuum Threshold.
- Vacuum time.

FT Vacuum State Indicator

- ◆ Green (vacuum threshold reached)
- ◆ Red (vacuum threshold not reached)



GV-XXX

Vacuum Group Unit

GV-XXX

GV-XXX is suitable for evacuation of refrigeration units in both to production and repair phases in industrial processes. Dry pumps represent an industry standard, used over many years proving to be a strong, and reliable vacuum execution solution in a wide range of applications.

The unit has an electrical control panel to enable operation of the vacuum pump and vacuum monitoring. They can be configured with relevant vacuum pipes according to customer requirements.

The exhaust line of the pump can be equipped with high efficiency filter that allows the recovery of the retained oil in order to reduce the consumption of oil by the vacuum pump.

Main features and accessories:

- Filter to protect the vacuum pump from liquids, such as compressor oil or moisture.
- Digital Pirani vacuum gauge with adjustable set point. Alternatively Vacuum State Indicator, with light indicators to show the vacuum status:
 - ◆ Green to indicate that the vacuum value is below the LOW threshold (VACUUM OK),
 - ◆ Red to indicate that the vacuum value is over the HIGH threshold (VACUUM NOT OK)
- Two lines of high conductance vacuum with quick Hansen F to connect the units to be evacuated

Example of a **multiple vacuum group for large refrigeration units** in both initial production and repair.

Multiple vacuum group is consist of:

- Electrical panel Pump ignition and vacuum gauge
- Vacuum meter
- Vacuum Sensor
- Vacuum interceptor block for each pipeline



Optional features and devices

Available pumps flow rates: 40, 80, 90 m³ / h

Up to eight lines of high conductance vacuum with quick Hansen Female

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Electrical and functional test

MP500 MP510

Semiautomatic electrical safety tester

MP500 & MP510

Portable semiautomatic systems—consisting of one (MP500) or two (MP510) control boxes—designed to test single-phase powered appliances, rated with power up to 3 kVA (MP500) or up to 4,5 kVA (MP510).

The system is controlled by microprocessor and provided with LCD display allowing the configuration of different test programs for the different appliance to be tested. It can locally store up to 200 test programs and 100 test results. It is ready to be fitted to barcode reader. Serial interface for remote PC connection to manage, program and store data of performed tests.

Performed Tests

- Ground conductor efficiency
- Insulation resistance
- Dielectric strength (applied voltage)
- Residual current
- Electrical absorption, 50 or 60 Hz
- Leakage current (only with MP510)

MP500



MP510



Optional features and devices

Ground test probe

Calibration box

Barcode reader

On-board printer

Software for collecting data in external PC

ESC

Automatic electrical safety tester

ESC

ESC is an automatic test system housed in a metal cabinet (with or without castors) designed to test single-phase or three phase appliances having rated power up to 10kVA, with the possibility to supply the appliance with stabilized tension.

The system is provided with microprocessor controller and LCD display which allows the configuration of different testing programs for different appliance to be tested. The system can locally store up to 200 test programs and 100 test results. It is ready to be fitted to barcode reader. Serial interface for remote PC connection to manage, program and file data of performed tests.

Performed Tests

- Ground conductor efficiency
- Insulation resistance
- Dielectric strength (applied voltage)
- Residual current
- Electrical absorption, 50 or 60 Hz
- Short-circuit



ESC Test System



ESC three-Phase with satellites

Optional features and devices

Ground test probe

Calibration box

Barcode reader

On-board printer

Software for collecting data in external PC

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Electrical and functional test

CAR1000

Low TAKT Time Productivity System for appliance performance tests

CAR1000

CAR1000 system is designed to run performance functional performance tests on electrical equipment, in particular refrigerators and AC units of all kinds. It consists of a central control unit and a number of acquisition boxes placed near the products under test.

Each acquisition box monitors up to 3 temperatures as standard (or up to 5 as option) and the current of the unit under test (power load as an option).

The control unit reads the data collected by the acquisition boxes, stores the test data on a database, identifies the product model by identification code, and then compares the test data with the reference parameters for the model, in order to decide whether the unit has successfully passed the test or not.

The Pass/Reject result is displayed on the screen and stored in a database. The can be formatted in order to comply with the ISO 9000 standard framework.



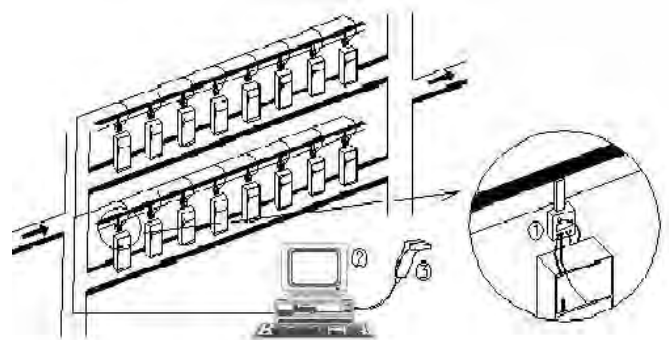
CAR1000 is available on the following versions:

- Moving Carousel, suitable for mass production lines of domestic appliances
- Batch Test

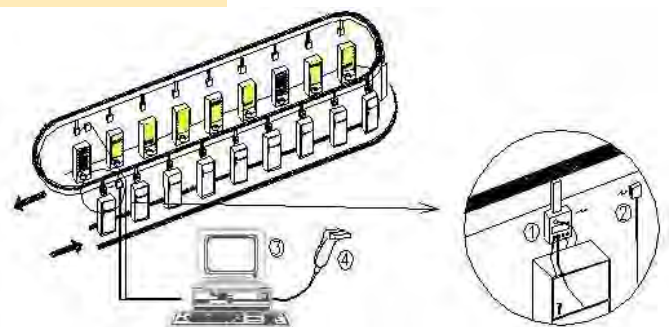
In the Batch Test version the products are tested in batches. The acquisition boxes are mounted in a fixed position, usually on a wall, and the items to test are placed next to them.

Once the test cycle is completed the products are removed and a new batch is connected to the test system. The acquisition boxes send the data to the control station via RS422 serial link. This version is more suitable for small and medium production lines.

Batch test



Moving Carousel



Technical Characteristics of the CAR 1000	
Personal computer and test management software	Company Profile Vacuum and Charging units HC Refrigerants handling systems Special Units Vacuum and Charging Injectors Refrigerant transfer pump Pressure test units leak detectors Preliminary evacuation Electrical and functional test Ultrasonic tube sealers IPCS & IPCS PLUS
Keyboard or barcode reader for data input	
Printer for reports	
PC/box interface with relevant acquisition board	
PT100 probe for temperature detecting	
C-loop Data acquisition	
Dimensions: L = 550 mm, W = 600 mm, H = 1800 mm on cabinet	

Technical Characteristics of the Acquisition Box	
Acquisition Box Dimension: L = 400mm, W= 300mm, H = 350mm	Company Profile Vacuum and Charging units HC Refrigerants handling systems Special Units Vacuum and Charging Injectors Refrigerant transfer pump Pressure test units leak detectors Preliminary evacuation Electrical and functional test Ultrasonic tube sealers IPCS & IPCS PLUS
N. 2 NTC temperature probes (range -50 ÷ +100 °C, +/-1 °C), (up to 5 as option)	
N. 1 amperemeter (or wattmeter as option) to measure the current or power absorption (0-10A +/-1 f.s.)	
N. 1 Schuko electric plugs 230 V, 50 Hz (other on demand)	
N. 1 magnetics and thermic switch device	
N. 1 safety connector	
N. 1 RS485 port + C-Loop connector	

Optional features and devices	
Nr. 1 Digital Input for Stop acquisition	Company Profile Vacuum and Charging units HC Refrigerants handling systems Special Units Vacuum and Charging Injectors Refrigerant transfer pump Pressure test units leak detectors Preliminary evacuation Electrical and functional test Ultrasonic tube sealers IPCS & IPCS PLUS
N. 6 DIP switch to identify the acquisition box (up to 128)	
Barcode reader	
Portable barcode reader for reading box code-D.U.T.code and transmission to the control unit through suitable interface (batch test)	

Electrical and functional test

FT King System Test

High TAKT Time Productivity System for appliance performance tests

FT King System Test

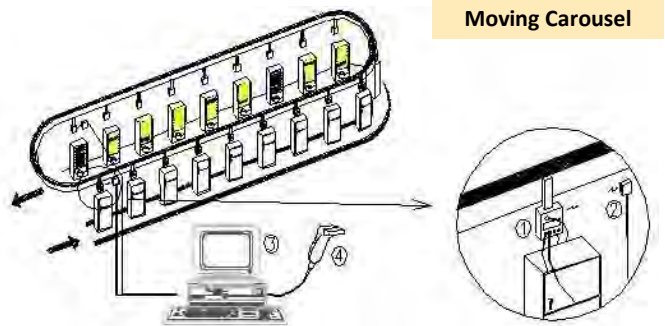
FT King System Test is designed for high speed production lines where many refrigeration units have to be tested at same time in a carousel room. FT King System Test consists of a central control unit (Server PC) and a number of acquisition boxes placed near the products to be tested.

Each acquisition box controls up to 5 temperature probes and the current absorbed by the unit under test (power load as an option). Finally, the management software creates and summarizes a final report of the temperature trend (visible in real time) and a power absorption diagram with the operating ratio based on the parameters stored for each model under test.

FT King System Test Data acquisition communication works by utilizing a radio communication on Industrial protocols RS-485 WiFi installed on the acquisition box and in the central Personal Computer that works as server receiver.

General Overview:

FT King System Test is a refrigerator temperature performance data acquisition and processing system, which is mainly used to detect the temperature inside the refrigerator and the pipeline temperature during the refrigeration process. The system can collect temperature and power data according to the device under test's setup cycle. At the outlet, the temperature and power data collected over a period of time is transmitted via radio to the computer. The computer displays the values and related curves so that the inspector can visually interpret the data. After the inspection is completed, the system can automatically determine whether the product is suitable according to the established standards. The generated reports can be exported in DB file so to be acquired by a quality elaboration system.





Technical Characteristics FT King System Test Features

Server PC with pre-installed Software and relevant drivers

Barcode reader for data input

Realtime Temperature and Power consumption charts displayed on Monitor

Up to 200 acquisition boxes that can be managed at same time for a 180 minutes test time

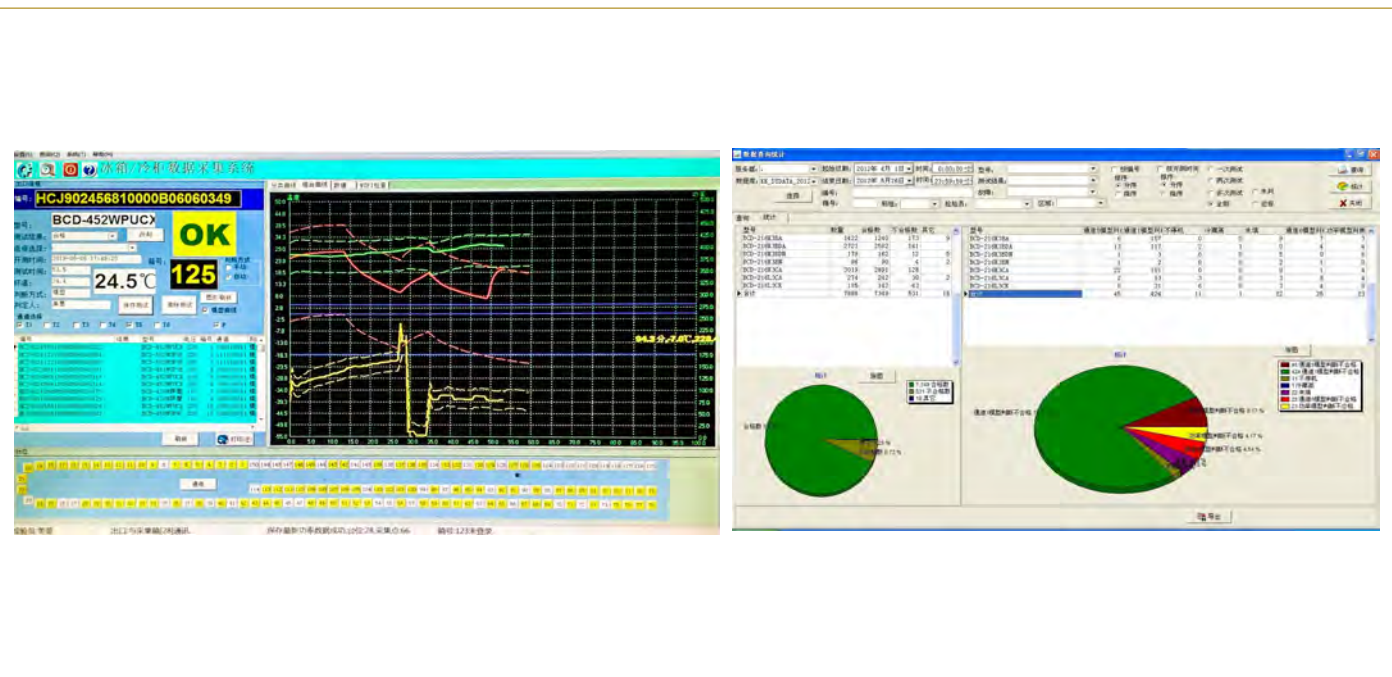
Wireless Board for radio data broadcasting to acquisition box

Wireless Data acquisition by continuous loop Boxes query

Reports stored in Microsoft standard Databases with SQL standardized language with all relevant function of searching and order the results

Pass/fail criteria related to particular type of fridge for model such as power consumption and temperature

Test duration up to 180 minutes



Technical Characteristics of the Acquisition Box

Acquisition Box Dimension: L = 400mm, W= 300mm, H = 350mm

up to 5 NTC digital temperature probes (range -50 ÷ +100 °C, +/-1 °C)

N. 1 amperemeter to measure the current or power absorption (0-10A +/-1 f.r.)

N. 1 Schuko electric plugs 230 V, 50 Hz (110 V 50/60 Hz on demand)

N. 1 magnetic and thermic switch device

N. 3 Service Lamps for working phases

N. 1 Wireless Radio module for communication to Server PC

On request: Onboard display for an immediate monitoring of running test

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Ultrasonic Tube Sealing

URV 20

System for copper pipe fast sealing with ultrasonic technology

URV-20

The ultrasonic tube sealer URV-20 series represents a radical new design for industrial tube sealers and is equipped with several innovative features, based on the experience of engineers and the manufacturing know-how of machine users all over the world.

The URV-20 series provides unique performance at extremely compact dimensions and low weight.

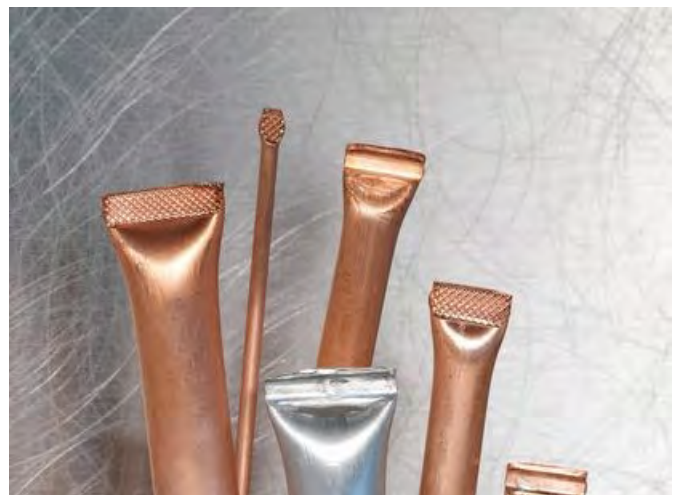
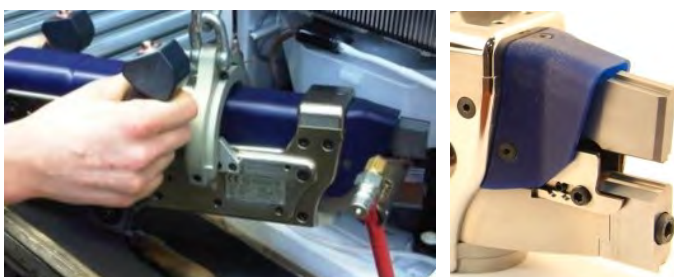
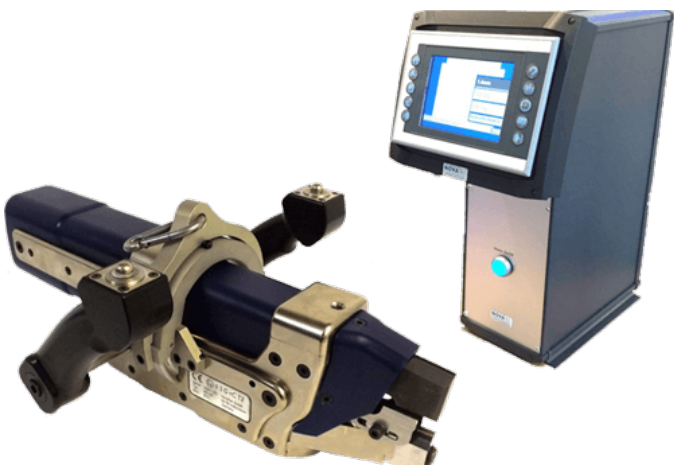
A particular focus throughout the design phase has been put on the ergonomics, to allow the worker to handle the machine in an effortless and more convenient way. Thus, all handling and activation features are designed according to the latest standards of industrial requirements.

Applications:

- Gas-tight sealing with simultaneous cutting of Copper service pipes up to ½" or 12mm outer diameter
- Used for refrigerators or air-conditioners to seal and cut the compressor and dryer filter service pipe after filling the unit with coolant
- Up to 3500 gas-tight welding/cuttings per shift

Benefits:

- Smallest and lightest machine (only 7kg) on the market with extremely compact design. This allows welding even in confined spaces
- Consistent good welding results, even when the tube quality changes Especially useful when the copper pipes are made with hard material or the copper material is not perfectly clean and free of oxides
- Precise power graph for process control at a glance
- Lowest maintenance requirements

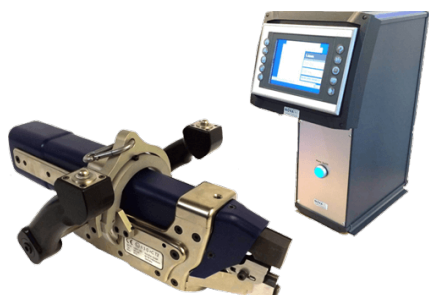




Technical Characteristics URV 20

Weight of the machine	7Kg
Weight of the 360° suspension	1 kg
Weight of the generator	18 kg
Weight of the connecting cable	~ 3 kg
Gross weight including packing	~ 35 kg
Compressed air pressure	5,5 bar (recommended 6 bar filtered and no lubricated)
Voltage Supply	230V +/-5% (single phase + GND) @50/60 Hz
Booster - Converter frequency	20 kHz
Power consumption	2,2 kW peak
Typical welding time	below 1 second

URV-20 ULTRASONIC TUBE COMPRESSOR



URV-20 WITH 360° SUSPENSION



URV-20 WITH 3D SUSPENSION



URV-20 WITH HORIZONTAL SUSPENSION



Optional features and devices

Atex version for Fridges charged with Flammable Gas
3-D suspension
360° suspension
Horizontal suspension
Light pointer on the welding area

Company Profile

Vacuum and Charging units

HC Refrigerants handling systems

Special Units

Vacuum and Charging Injectors

Refrigerant transfer pump

Pressure test units leak detectors

Preliminary evacuation

Electrical and functional test

Ultrasonic tube sealers

IPCS & IPCS PLUS

Intelligent Production System Control (IPCS) & IPCS PLUS

IPCS

Intelligent Production System Control (IPCS) & IPCS PLUS

IPCS

IPCS is an innovative platform for collecting data on the field (operating machines, instrumentation and apparatus) utilized in refrigeration, air conditioner and heat pump production lines.

IPCS collects and stores both process parameters and test results making them available to real-time monitoring and control applications. Due to its modularity, it easily adapts to pre-existing production environments, also manages third-party machinery, and implements “machine-to-machine” connections to optimize and synchronize certain work steps ensuring that products are manufactured and tested according to construction specifications. This makes it possible to solve daily challenges in a timely manner, optimizing processes and keeping the production flow in line with set goals.

Distinctive features:

- Interoperable and flexible;
- Manages FT and third-party machinery;
- Connects to third-party monitoring and control applications;
- Real-time functions;
- Technology and Industry 4.0.

Benefits:

Upgradeable, Adaptable and Flexible: Can be modified to meet new needs or conditions effectively.

Data Collection: Stores all collected data such as measurements, statistics, alerts, reports. Data Storage Database provides access to specialized tools for statistics, maintenance, monitoring, and quality control to improve processing and reduce downtime.

Extendable: Ability to add functionality or extend scope or to include new elements or functions

Expandable: Ability to increase capacity or performance based on customer needs.



Connection with third-party monitoring and control applications already in the Customer's information system.



IPCS PLUS

Intelligent Production System Control (IPCS) & IPCS PLUS

IPCS PLUS (IPCS + Net@PRO)

IPCS PLUS is the result of the integration of IPCS with **Net@pro**, an advanced manufacturing execution system (MES) made by **Qualitas spa** that offers comprehensive factory control and management.

IPCS PLUS is an innovative platform designed for comprehensive monitoring, control and planning of air conditioner, chiller and heat pump production lines. It collects detailed data at every stage of processing, enabling real-time alarm monitoring. Its modularity allows IPCS PLUS to easily adapt to different production needs, making it highly configurable by customers. The platform features a simple, intuitive, and easy-to-use interface that improves quality standards, productivity, and real-time production status updates.

IPCS PLUS also enables remote production planning and modification, automatically synchronizing machines with the production plan. The platform manages process data and alarms, including monitoring of third-party machinery, ensuring that products are manufactured and tested according to specifications.

This enables timely resolution of daily challenges, optimizing processes and keeping the production flow in line with set goals.

IPCS PLUS Distinctive features:

- Monitoring and diagnosis
- Machine configuration
- Machine maintenance
- Web and APP access
- Data analysis and statistics
- Real-time production tracking



- Best software solution for Industry 5.0
- NET@PRO can also be provided in cloud mode.

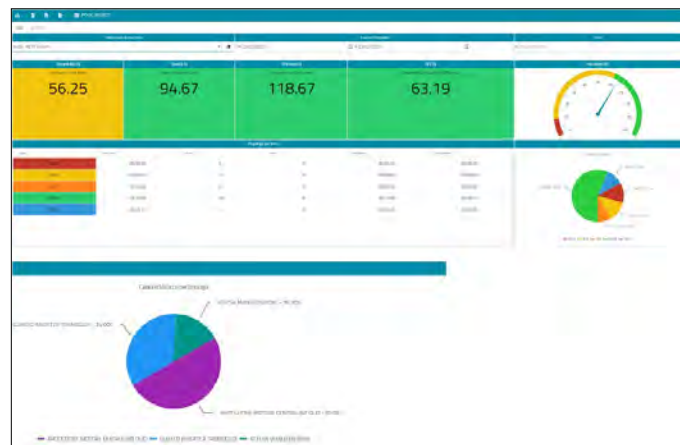
Modular: Composed of distinct, interconnected units that can be added, removed, or replaced independently. For example :

- Inventory management
- maintenance management

Extendable: Ability to add functionality or extend scope or to include new elements or functions

Expandable: Ability to increase the capacity or performance according to customer needs.

Interface example for the Production Management Area (MES)



30+ Years of experience both FT and Qualitas

700 FT running machines and Qualitas active customers

20.000 NET@PRO users

- Company Profile
- Vacuum and Charging units
- HC Refrigerants handling systems
- Special Units
- Vacuum and Charging Inletors
- Refrigerant transfer pump
- Pressure test units leak detectors
- Preliminary evacuation
- Electrical and functional test
- Ultrasonic tube sealers
- IPCS & IPCS PLUS

ASSISTANCE AND SUPPORTS

The main goal of FT Srl is helping customers to manage their plants and systems in a safer and more efficient way. Assistance and maintenance are always in first place to satisfy every technical need of our customers.

Our company offers accurate and professional assistance with central and delocalized references on the Italian territory and in every country of the world.

Pre- Sale / After Sale Support:

Tel: (+39) 345 35 777 08

contact@ftonweb.com

Sale / Technical Inquiry

- Refrigerant Charging System
- Refrigerant Transfer Pumps
- Vacuum Groups
- Leak Detection
- General Sale
- General Technical Inquiry



CONTACT

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Tel: (+39) 0564 957385

Hours: 08:30 – 13:00, 14:00 – 18:00

contact@ftonweb.com

Activities Performed on Site

- Sales management
- Project management
- Technical department / R&D
- After-sales and commissioning service
- Maintenance service





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