cryopAL

Cryomemo

Tank control

& cryogenic server

User manual

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CE

This manual complies with Directive 93/42/EC concerning medical devices.

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1. Identity of manufacturer

The manufacturer of the Cryomemo medical device is Cryopal:

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2. About this manual

2.1. Purpose of the manual

This manual specifically deals with the *Cryomemo* cryogenic tank regulation unit and its associated *Web server* application. It provides an overview of the device, and details its configuration and usage. It also introduces the *Web server* application, the Ethernet connections to be set up by the user to connect to the host PC or to the local general server, and the application's configuration and usage.

 No system is risk-free, so users are recommended to regularly monitor rooms and tanks containing samples.

***User warning**: The software system is only compatible and operational in a Windows Explorer environment.

2.2. Who this manual is for

This manual is designed for all professionals who would like to use the current version of *Cryomemo* with a cryogenic container from the *GT 40, Arpège, RCB* and *ESPACE* product ranges. The *GT 40* and *Arpège 40* versions are only available in versions equipped with level and temperature indicators, without the option to add a regulation function.

2.3. Important note

Connecting the regulation system to a computer network may require the authorisation and/or technical support help from the network administrator, the assignment of a fixed IP address and the availability of an RJ45 crossover cable for the configuration.

2.4. Reverse engineering

The software discussed in this manual, including the manual itself and the document pertaining to it, are entrusted to the user under license. They are the property of *Cryopal* or of one of its respective holders and are protected by copyright, all rights reserved.

The software can only operate on one computer at a time. This software cannot be distributed, reproduced, translated, disassembled, decompiled, analysed, adapted, modified, integrated or combined with another software program, except for cases authorised by law.

3. Safety information

3.1. Symbols used

Symbol	*Meaning*
	Important information about using the equipment. Failure to follow the instructions given for this point does not result in danger for the user.
	**Warning.** In this operating mode, failure to observe or implement the instructions preceded by this symbol may cause bodily harm, or may damage the equipment or installations.
	**Warning.** In this operating mode, failure to observe or implement instructions preceded by this symbol may expose a person to the risk of electric shock and/or death.
	**Compulsory**: protect your hands with suitable personal protective equipment.
	**Warning**: protective goggles are compulsory.
	**Warning**: the room must be ventilated.
	**Warning**: low temperature.

3.2. Operator safety

This device is used in a medical laboratory environment. The technical equipment is perfectly safe when it leaves the factory. In order to maintain this condition and ensure the device is used safely, you must follow the instructions and take note of the symbols contained in this manual.

Prior to installation, check that the voltage shown on the casing and the power supply voltage are the same.

To avoid all risk of electric shock, this device must only be connected to a power supply system equipped with ground protection.

When it is not totally safe to use the device, it should be withdrawn from service and protected from accidental usage.

The device must only be powered by the power supply unit provided with the product.

The mains plug serves as disconnecting switch.

Full safety cannot be guaranteed in the following cases:

- The equipment is visibly damaged.
- The equipment no longer works.
- After prolonged storage in unsuitable conditions.
- After severe damage sustained during transit.

3.2.1. General safety

Only personnel who have fully read this manual are authorised to handle and use the equipment described in this document.

The application, relative to the device, described in this manual is intended to be exclusively used by previously trained personnel. To ensure the safe and correct use of the device during service and maintenance, it is essential that all personnel observe standard safety procedures.

Preventive maintenance operations must be carried out by technicians who have received appropriate training and certification from the manufacturer.

The maintenance frequencies provided are given for reference only, and should be adjusted by the operator depending on how frequently the equipment is used.

Only spare parts made by *Cryopal* may be used for maintenance. The use of non-*Cryopal* spare parts may affect the safety of this medical device, and releases *Cryopal*

from all liability in the event of an incident. The device will no longer be covered by warranty if non-*Cryopal* spare parts are used.

3.2.2. Safety when using liquid nitrogen

The temperature of liquid nitrogen is -196°C. Therefore:

You must never touch objects that have been in contact with liquid nitrogen with your bare hands.

Always wear special gloves and goggles when handling liquid nitrogen.

The liquid nitrogen used in the storage containers evaporates in the air: 1 litre of liquid nitrogen releases around 700 litres of gaseous nitrogen. Nitrogen is an inert, non-toxic gas, but displaces oxygen when released into the atmosphere. Once the atmospheric oxygen content falls below 19% the human body is at risk.

All rooms and areas that house storage tanks containing liquid nitrogen should be well ventilated at all times and equipped with at least one oxygen gauge. All personnel should be informed of the risks associated with the use of nitrogen.

3.3. Main risks identified

This section lists the main risks that have been identified. The information pertaining to these risks and the risk management methods are explained further on in this document.

Risks linked to the use of electrical power

With electrical appliances manufactured in accordance with current industrial practices, these risks are limited in “normal” circumstances, provided any damaged equipment is isolated and no equipment has been modified.

Risks linked to the use of liquid nitrogen

These risks are limited if operators have been given appropriate information and training and if protective equipment is made available.

Risks linked to electrical devices/electronic environments

These risks are limited if the devices used comply with current standards (in terms of emissions and electromagnetic susceptibility).

Risks linked to configuring the equipment

These risks are limited if the equipment is installed by a trained technician and if the users who operate the system have the required knowledge. Due to the equipment's design, access rights may be restricted.

Risks linked to exporting the product

These risks are limited if the integrator has the necessary professional skills.

Risks linked to the acquisition of temperatures or levels

Safety systems help manage this risk (redundancy of the temperature sensors, etc.). Regular maintenance ensures the reliability of the equipment

Hazards linked to improper use of the cryogenic tank

Common sense, correct installation (with a known environment (PLC, etc.)) and regular maintenance help keep these risks within acceptable levels.

Hazards linked to nitrogen injection

This risk is reduced by the integration of a safety system (2 solenoid valves in series) and the provision of communication systems.

Risk linked to data recovery and storage

This risk does not jeopardise the safety of the stored samples, or is equivalent to an incorrect setting on the device.

Risk linked to communicating with the server through the computer network

This risk consists of the intrusion of a computer virus into an embedded server, knowing that this is not a PC platform and that network security is the responsibility of the servers. Since the server is "independent", only the stored data may be corrupted and tank regulation will not be affected.

Risk linked to communications between the equipment's various components

Once the system has been configured, this risk will not jeopardise the regulation of the system managed by the control box.

Risk linked to the audible alarm

This risk does not jeopardise the safety of the stored samples.

Risk linked to interface faults

This risk does not jeopardise the safety of the stored samples, and the fault can be detected by remote systems.

Risk linked to blowdown

This risk does not jeopardise the safety of the stored samples. Standard equipment that is usually present in a cryogenic room can raise the alarm.

Risk linked to a fault with the settings*

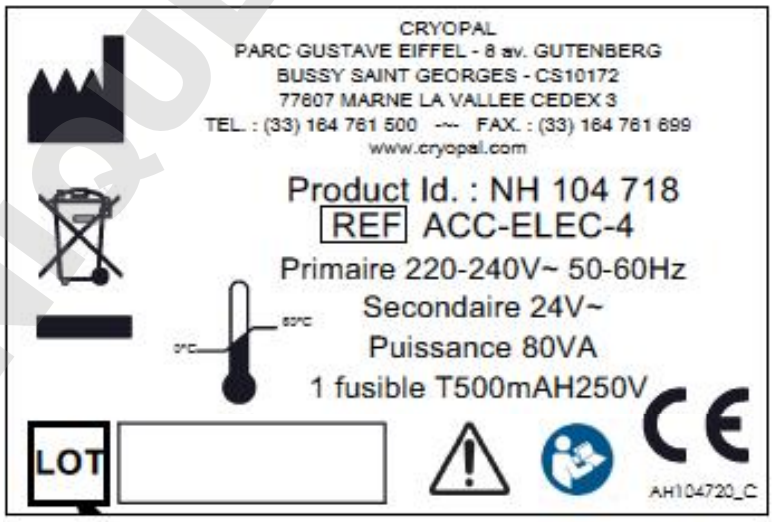
(*settings others than those linked to the device's configuration)

This risk is reduced. User training, regular maintenance and operations in a suitably-equipped room are vital to ensuring safety. The presence of these elements brings the risk down to acceptable levels.

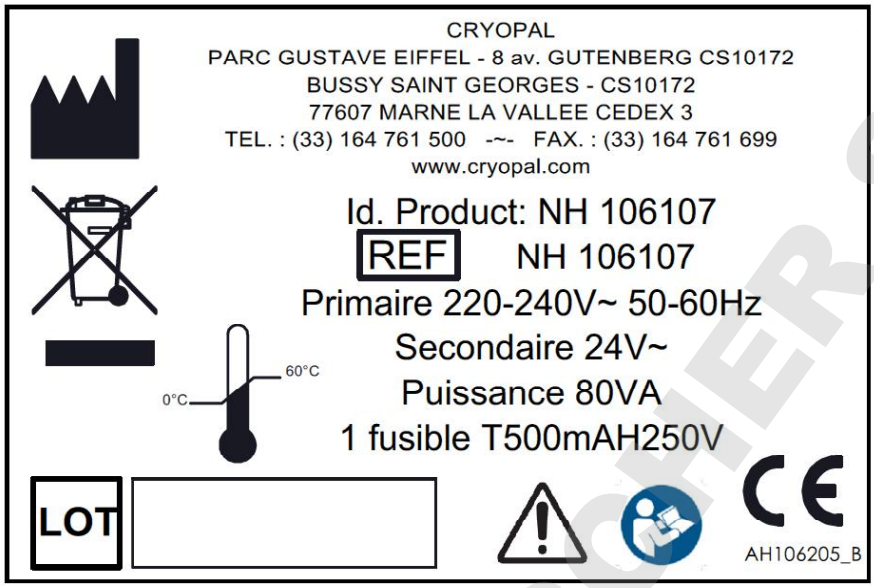
3.4. Precautions in the event of faults

If you suspect that the integrity of the apparatus has been compromised (for example as a result of damage sustained during transit or during use), it should be withdrawn from service. Make sure that the withdrawn equipment cannot be accidentally used by others. The apparatus should be handed over to authorised technicians for inspection. If there is no electric power, data is no longer saved by the equipment.

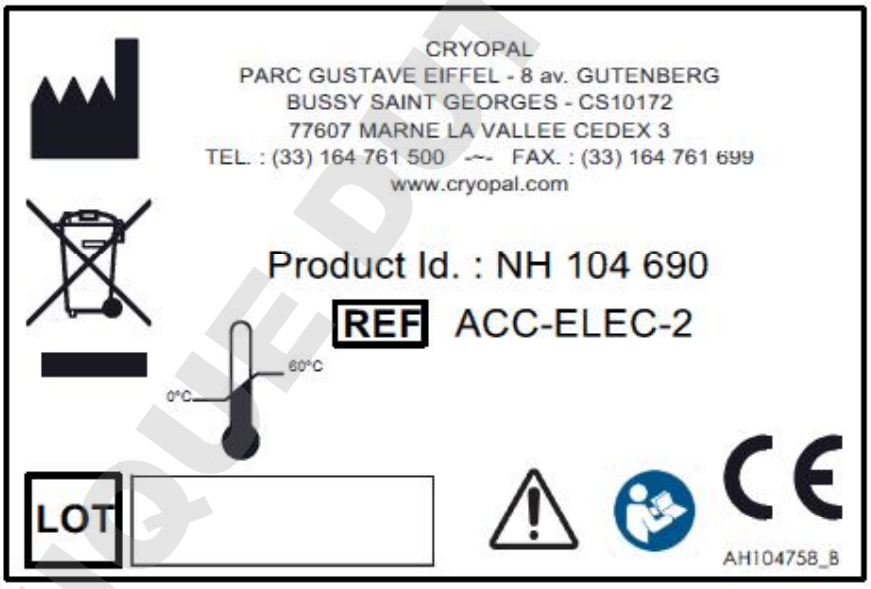
3.5. Description of labels



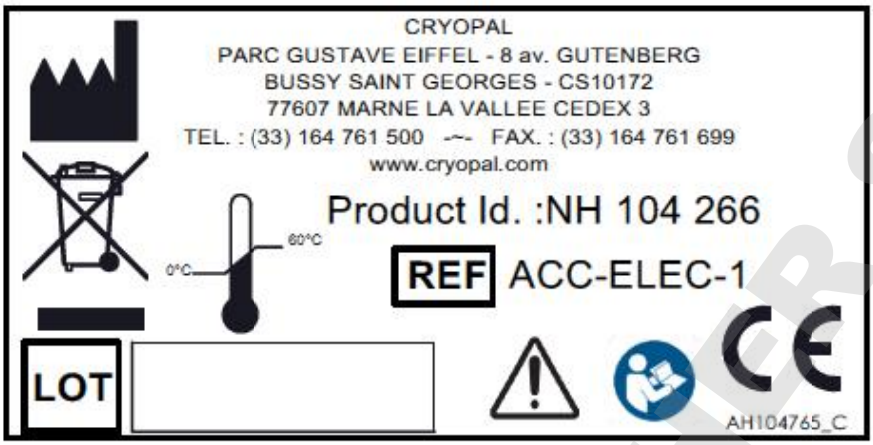
Standard power supply label



UK power supply label



Electronic box label



Electronic display label

3.6. Description of symbols

	Manufacturer		Refer to the instruction manual
	Waste Electrical and Electronic Equipment	CE	CE marking, complies with Directive 93/42/EC
REF	Catalogue reference	LOT	Batch number
	Temperature limits		Warning

4. General information

4.1. Device overview

The Cryomemo device is an electronic kit consisting of level and temperature indicators, and a control and configuration interface.
It is used to control and regulate the nitrogen levels and temperature of cryogenic tanks (*GT 40, Arpège, ESPACE* and *RCB*) using sensors and solenoid valves that control nitrogen intake and blowdown. It is also used to manage alarms.

The *Cryomemo* device is composed of several sub-units controlled by a specific in-built software program:

1- A display unit
2- A control unit
3- A power supply unit
4- Temperature and level sensors
5- Power cable

The following functions are managed by the device:

- **Automatic level regulation** of cryogenic liquid in the container via a relay (dry contact output) on a solenoid valve that supplies liquid nitrogen.
  The *Cryomemo* device offers two regulation levels:
  - Level regulation (when a level threshold is exceeded)
  - Temperature regulation (when a temperature threshold is exceeded)
- **Measurements**:
  - Of liquid nitrogen levels by a capacitive level sensor and displaying the amount of liquid available.
  - Of temperature, by two electronic temperature sensors and a display.
  - Saves data for 40 days (when containers are switched on)
- **Safety**:
  - By monitoring the temperature at a given area in the container.
  - By monitoring the tank filling safety if the liquid nitrogen level regulation system fails.
  - During blowdown, vents out vaporised gas in the container's upstream piping.
  - By generating alarm signals (visual, audible and relay contact).
- **Measurement display** (level, temperature) and settings on a dedicated display unit.

- **Information transmission** by Ethernet network, 4-20 mA or RS 485 outputs. The system is controlled by a specific integrated program that acquires and displays the nitrogen (gas or liquid) level and temperature in the monitored tank. The Web Server application is used to access the Control System's configuration data and measurements via an http connection, in point to point mode. These values can be viewed and modified using an Internet Explorer web browser on a PC, as this is linked to the Control System by an Ethernet cable. An unspecified number of Control Systems connected to an Ethernet network can thus be monitored from one or more PCs.

Name	Cryomemo
Purpose	For use alongside Cryopal cryogenic tanks
Contraindications	Do not use with competition tanks, or beyond the temperature/humidity/pressure ranges specified in the user manual
Performance	Maintain an optimal cryogenic temperature to preserve biological samples
Operational lifetime	10 years
Control unit	Dimensions: 260*310*62 mm
	Weight: 2.5 kg
	Electrical specifications:
	Data transmission via 4/20 mA, RS485 or Ethernet RJ45
	CT and CRT dry contact internal connections (24V AC, 2A max)
	40 measurement days, memory approx. 1MB
	Power supply: 230 V, 50 Hz
	Power: 80 VA
	11 inputs/outputs (M12, M8, RJ45, DIN, etc.)
Display unit	Dimensions: 140*195*82 mm
	Weight: 0.3 kg
	Electrical specifications:
	Graphic LCD
	LEDs on front face

	Sound alarm coupled with LED
	M12 connector for linking to the control unit
Power supply unit	230 V AC single-phase 80 VA 50 Hz
Temperature sensors	Pt100 1/3 Category B resistance thermometer in accordance with IEC751
Level gauge	Capacitive (value associated with the tank)
Associated solenoid valves	24V AC 50 Hz
Materials in direct or indirect contact with the user	Stainless steel, moulded plastic, ABS (for the display unit)

4.2. Operating principle

4.2.1. Filling safety monitoring

A sensor, an electronics assisted software program and a solenoid valve manage filling safety. The filling safety solenoid valve is busy under normal operation (no failure); it is simultaneously controlled by the filling solenoid valve. If the level sensor detects a maximum nitrogen level overflow, the filling safety solenoid valve closes, stopping the nitrogen filling.

4.2.2. Level control

This function is optional for the entire Arpège range, and does not concern the GT 40 and Arpège 40 containers. When the liquid nitrogen level monitored by the capacitive sensor is lower than the set low threshold, a blowdown is first carried out (if the option is available). This causes an evacuation of less cold gases to the outside and decreases the loss of liquid already present in the tank. The blowdown solenoid valve is then activated.

Once the blowdown sensor temperature falls below the set threshold, the programming carried out on the display unit (see section 10.6) or Web Server (see section 11.6.2.3) indicating the presence of more cold, the blowdown solenoid valve closes and the filling solenoid valve opens.

When the high level filling parameter is reached, as measured by the capacitive level sensor, the liquid nitrogen filling solenoid valve closes and the filling stops.

If control equipment other than *Cryomemo* is used, *Cryopal* is no longer liable for the operability of the cryogenic device.

The manufacturer cannot be held responsible for any type of stored products lost as a result of this configuration, even during the cryogenic device's warranty period.

For level and temperature control, only the equipment approved by *Cryopal* may be used.

The presence of the *Cryomemo* regulation system should not be a substitute for local monitoring by the operator.

4.2.3. Temperature control

Two temperature sensors, located in the vent area, monitor the tank's internal temperature. As soon as this temperature is higher than the set threshold, and if the maximum high threshold is not reached, a partial nitrogen filling is carried out. In a temperature compensation operation, the desired goal is to inject gases to lower the temperature without filling the tank.

For safety, two temperature sensors are used. If the difference in the measurement of the two sensors is greater than 5°C, an alarm is generated and the alarm relay is activated.

When the tank temperature falls below the set threshold or when the set filling high level is reached, as measured by the capacitive level sensor, the liquid nitrogen filling solenoid valve closes and stops the adjustment.

If control equipment other than *Cryomemo* is used, *Cryopal* is no longer liable for the operability of the cryogenic device.

The manufacturer cannot be held responsible for any type of stored products lost as a result of this configuration, even during the cryogenic device's warranty period.

For level and temperature control, only the equipment approved by *Cryopal* may be used.

The presence of the *Cryomemo* regulation system should not be a substitute for local monitoring by the operator.

4.3. Location of sub-units on the tank

The control unit is permanently mounted in the rear of a cryogenic tank, while the display unit is installed at the front.

They are designed exclusively for indoor use.

4.3.1. GT40 & Arpège

Figure 4-1: Cryomemo mounted on Arpège tanks

The items available to the user are identical for all models in the range and are detailed below.

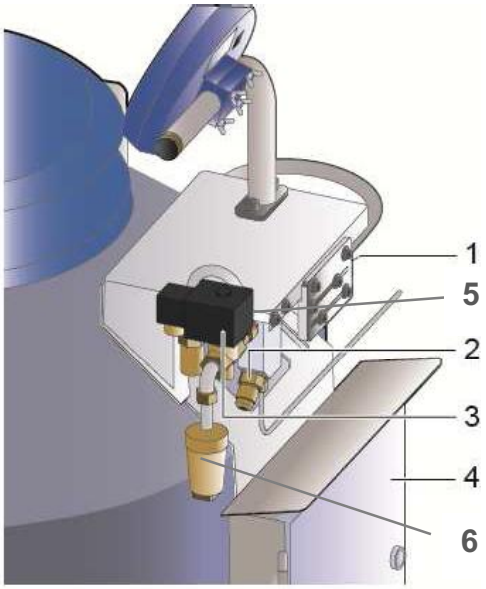


Figure 4-2: rear view of the Arpège tank.

1: Filling and filling safety solenoid valves (not visible on the illustration)

2: Cryogenic tank nitrogen supply connector

3: Blowdown solenoid valve (option)

4: Control unit managing the tank's electronics (solenoid valve, display unit). Mounted at the rear of the device. Powered by a stand-alone supply unit attached to the wall.

5: 1 PT100 temperature sensor that manages blowdown triggering (option)

028

6: Blowdown outlet (option).

Figure 4-3: top-down view of the Arpège tank.

1: PT100 temperature sensor Only temperature sensors approved by *Cryopal* may be used. A bracket for 3 temperature sensors is also available. Two of these sensors are operated by the *Cryomemo*, and the third is available to the operator for traceability or remote monitoring purposes (system external to *Cryomemo*).

2: Capacitive level sensor monitoring nitrogen levels

3: Anti-overflow safety sensor

4: Nitrogen filling tube

4.3.2. ESPACE

Figure 4-4: Cryomemo mounted on ESPACE and ECB tanks

The items available to the user are identical for all models in the range and are detailed below.

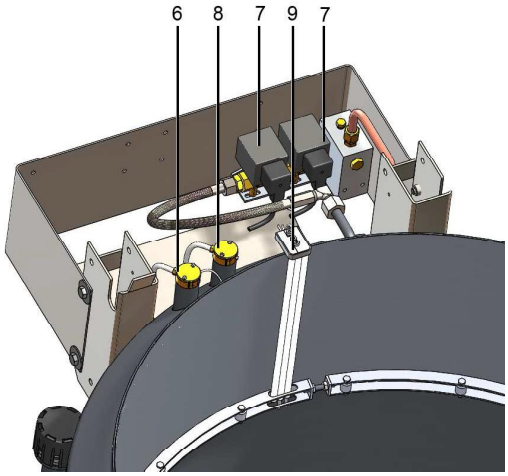


Figure 4-5: internal rear view (lid removed).

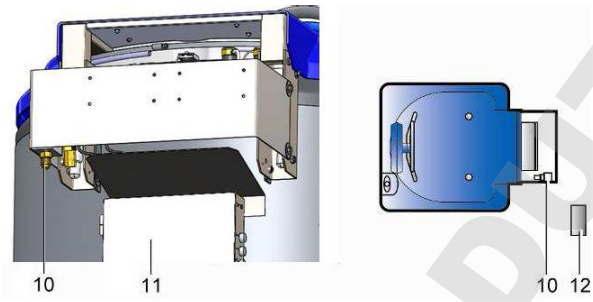


Figure 4-6: rear view.

6: Location of the nitrogen filling safety sensor that cuts a dedicated solenoid valve.

7: Filling and filling safety solenoid valves.

8: Location of the capacitive sensor for measuring liquid nitrogen levels.

9: PT100 temperature sensor Only temperature sensors approved by *Cryopal* may be used. A bracket for 3 temperature sensors is also available. Two of these sensors are for *Cryomemo*, and the third is available to the operator for traceability or remote monitoring purposes (system external to *Cryomemo*).

10: Cryogenic tank nitrogen supply connector.

11: Electronic box managing the tank's electronics (solenoid valve, display unit). Mounted at the rear of the tank.

12: Electronic box powering the control unit. Wall mounted.

1: Blowdown sensor

2: Filling solenoid valve

3: Filling safety solenoid valve.

4: Level sensor.

5: Filling safety sensor.

6: Temperature sensor no. 1.

7: Temperature sensor no. 2.

8: Blowdown outlet

9: Blowdown solenoid valve

10: Nitrogen inlet.

11: Safety valve.

12: Tank filling outlet.

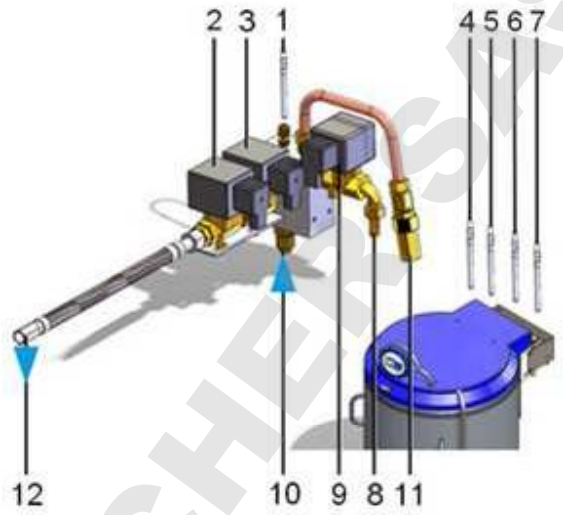


Figure 4-7: location of sub-units (sensors and controlled elements).

4.3.3. RCB

The items available to the user are identical for all models in the range and are detailed below.

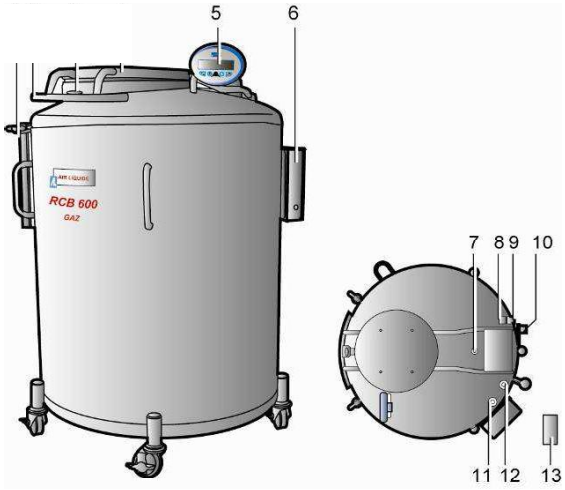


Figure 4-8: General view of an RCB cryogenic tank.

5: Graphic display unit, connected to the control unit. Displays the cryogenic liquid level, the alarm status, and measured temperatures. Refer to NH78397 document for details.

6: Electronic box controlling regulation, managing the display and transmitting information.

7: Temperature sensor: Temperature measurement, by 2 temperature sensors. To upgrade the product, a bracket for 3 temperature sensors will also be available. Two of these sensors are operated by the *Cryomemo*, and the third is available to the operator for traceability or remote monitoring purposes (system external to *Cryomemo*).

8: Filling safety solenoid valve.

9: Filling solenoid valve.

10: Cryogenic tank nitrogen supply connector.

11: Level gauge well: Location of the capacitive sensor for measuring liquid nitrogen levels.

12: Filling safety sensor well: Location of the sensor that prevents nitrogen overflow by shutting off a dedicated solenoid valve.

13: Electronic box powering the control unit. Wall mounted.

4.4. Overview of the product range

Range	Product ref.
ARPEGE	ARPEGE40N-L-101
ARPEGE	ARPEGE55N-L-101
ARPEGE	ARPEGE55N-L-101-UK
ARPEGE	ARPEGE55N-L-102
ARPEGE	ARPEGE55N-L-103
ARPEGE	ARPEGE75N-L-101
ARPEGE	ARPEGE75N-L-102
ARPEGE	ARPEGE75N-L-103
ARPEGE	ARPEGE70N-L-101
ARPEGE	ARPEGE70N-L-102
ARPEGE	ARPEGE70N-L-103
ARPEGE	ARPEGE70N-G-102
ARPEGE	ARPEGE70N-G-103
ARPEGE	ARPEGE110N-L-101
ARPEGE	ARPEGE110N-L-102
ARPEGE	ARPEGE110N-L-102-UK
ARPEGE	ARPEGE110N-L-103
ARPEGE	ARPEGE110N-G-102
ARPEGE	ARPEGE110N-G-102-UK
ARPEGE	ARPEGE110N-G-103
ARPEGE	ARPEGE140N-L-101
ARPEGE	ARPEGE140N-L-102
ARPEGE	ARPEGE140N-L-103
ARPEGE	ARPEGE140N-G-102
ARPEGE	ARPEGE140N-G-103
ARPEGE	ARPEGE170N-L-101
ARPEGE	ARPEGE170N-L-102
ARPEGE	ARPEGE170N-L-102-UK
ARPEGE	ARPEGE170N-L-103
ARPEGE	ARPEGE170N-L-103-UK
ARPEGE	ARPEGE170N-G-102
ARPEGE	ARPEGE170N-G-102-UK
ARPEGE	ARPEGE170N-G-103
ARPEGE	ARPEGE170N-L-104
ARPEGE	ARPEGE170N-L-105
ARPEGE	ARPEGE170N-G-104
NATAL	NATAL40N-1
ESPACE	ESP151N-LC-4

ESPACE	ESP151N-LC-5
ESPACE	ESP151N-LC-5-UK
ESPACE	ESP151N-GC-3
ESPACE	ESP151N-GC-4
ESPACE	ESP331N-LC-7
ESPACE	ESP331N-LC-8
ESPACE	ESP331N-LC-9
ESPACE	ESP331N-LC-10
ESPACE	ESP331N-GC-5
ESPACE	ESP331N-GC-5-UK
ESPACE	ESP331N-GC-6
ESPACE	ESP331N-GC-7
ESPACE	ESP331N-GC-8
ESPACE	ESP331N-LNC-7
ESPACE	ESP331N-LNC-8
ESPACE	ESP331N-LNC-9
ESPACE	ESP331N-LNC-10
ESPACE	ESP331N-GNC-5
ESPACE	ESP331N-GNC-6
ESPACE	ESP331N-GNC-7
ESPACE	ESP331N-GNC-8
ESPACE	ESP661N-LNC-4
ESPACE	ESP661N-LNC-5
ESPACE	ESP661N-GNC-3
ESPACE	ESP661N-GNC-4
RCB	RCB500N-L-9
RCB	RCB500N-L-10
RCB	RCB500N-L-11
RCB	RCB500N-L-12
RCB	RCB600N-L-9
RCB	RCB600N-L-10
RCB	RCB600N-L-11
RCB	RCB600N-L-12
RCB	RCB600N-G-5
RCB	RCB600N-G-6
RCB	RCB600N-G-7
RCB	RCB600N-G-8
RCB	RCB1001N-L-9
RCB	RCB1001N-L-10
RCB	RCB1001N-L-11
RCB	RCB1001N-L-12
RCB	RCB1001N-G-5
RCB	RCB1001N-G-6

RCB	RCB1001N-G-7
RCB	RCB1001N-G-8
CRYOMEMO KIT	UPGRADE-ESP-RCB
CRYOMEMO KIT	UPGRADE-ESP151
CRYOMEMO KIT	UPGRADE-ESP331NC
CRYOMEMO KIT	UPGRADE-ESP331C
CRYOMEMO KIT	UPGRADE-ESP661
CRYOMEMO KIT	UPGRADE-RCB
CRYOMEMO KIT	ACC-ARPN-18
CRYOMEMO KIT	ACC-ARPN-19
CRYOMEMO KIT	ACC-ARPN-20
CRYOMEMO KIT	ACC-ARPN-21
CRYOMEMO KIT	ACC-ARPN-22
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CRYOMEMO KIT	ACC-ARPN-36
CRYOMEMO KIT	ACC-ARPN-37
CRYOMEMO KIT	ACC-ARPN-38
CRYOMEMO KIT	ACC-ARPN-39
CRYOMEMO KIT	ACC-ARPN-40
CRYOMEMO KIT	ACC-ARPN-41
CRYOMEMO KIT	UPGRADE-RCB

5. Usage indication

5.1. User profile

This device is used in laboratory or hospital settings by trained professionals.

5.2. Intended use

The *Cryomemo* system is used to maintain the cryogenic temperature for the preservation of biological samples.

This device is for use alongside *Cryopal* cryogenic tanks.

5.3. Expected performance

The expected performance of this device is that it maintains an optimal cryogenic temperature for preserving biological samples by regulating the liquid levels and temperature.

5.4. Device service life

The vacuum of *Cryomemo* devices is guaranteed for 6 years. The service life of *Cryomemo* devices is 10 years under normal usage conditions.

5.5. Contraindications

Cryomemo cannot be used with cryogenic tanks manufactured by *Cryopal*'s competitors.

5.6. Potential adverse effects

5.6.1. User

There are two major adverse effects linked to the use of liquid nitrogen:

1. Cold burns or cryogenic burns
2. Anoxia

Furthermore, there is the risk of electric shock if the device is not powered as instructed in the user manual. Consequently, it is compulsory to attach pictograms highlighting these risks on the tanks and in the room. In order to avoid these adverse effects, follow the safety instructions provided in this manual.

6. Materials used

Materials in direct or indirect contact with the user	Stainless steel, moulded plastic, ABS (for the display unit)

7. Control unit

This unit acquires the temperature and level in a tank for control and data transmission on 4/20 mA, RS485 or Ethernet.

7.1. Mechanical specifications

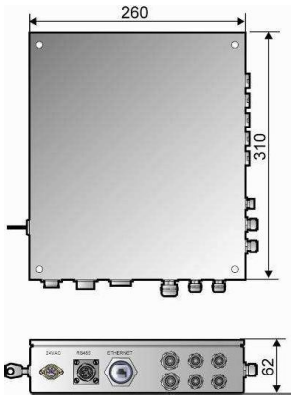

Figure 7-1: Dimensions (in mm).

Data	Principal characteristics
Dimensions	See Figure 7-1.
Weight	Around 2.5 kg.
Casing	Stainless steel.
Casing	The removable lid, held by 4 retaining screws or a latch depending on the version, will be removed when the user connects their specific peripheral equipment.

7.2. Electrical specifications

Data	Principal characteristics
Function:	Acquiring the temperature and level in a tank for control and data transmission on 4/20 mA, RS485 or Ethernet.
Data memory	Approximately 40 days of measurements (fixed sampling rate). Approximately 1MB memory.
Internal connections: (screwed terminals)	Terminal blocks on printed circuit: General alarms: CRT dry contact output (24 V AC, 2 A max). Active filling: CT dry contact output (NO) (24 V AC, 2 A max). Automatic filling control: CT dry contact output (NO) (24 V AC, 2 A max). Simultaneous filling: logic input (positive impulse of approximately 2 seconds) from a NO dry contact. Lid contact: logic input connected to a dry external contact - contact closed when the tank lid is open.

Data	Principal characteristics
	Manual filling control: logic input from normally-open dry external contact on the push button.
Communication	RS485 output terminal block (JBus). 4-20 mA output terminal block (temperature) (4 mA corresponds to 0°C and 20 mA corresponds to -200°C). 4-20 mA output terminal block (level) (4 mA corresponds to 0% and 20 mA corresponds to 100% level). RJ45 Ethernet terminal block.
Connections:	***Face A*** (see Figure 7-9) M12 screwed: to the display unit. M12 screwed: to the filling solenoid valve. M12 screwed: to the filling safety solenoid valve. M8 screwed: to the blowdown solenoid valve. DIN locking: to the blowdown sensor. DIN locking: to the filling safety sensor. DIN locking: to temperature sensor no.2. DIN locking: to temperature sensor no.1. Opening for passing the level capacitive sensor. ***Face B*** (see Figure 7-10) Packing gland for linking the connection internal terminal blocks to the relay outputs. RJ45 for Ethernet connection. DIN locking: to power supply unit. ***Face C*** (see Figure 7-11) Key lock for server IP address modification authorisation.
Alarm relay:	1 CRT relay (dry contacts) - 24 VAC, 2A.

Data	Principal characteristics
Supply voltage:	Power supply unit provided: NH104718 Primary: 230 V 50 Hz. Secondary: 24 V AC, 80 VA max. Altitude < 2000 m; overvoltage category II. Slow-blow fuse, 0.5 A, top breaking capacity; 250 V. Fuse on the NH104174 control board of the NH104690 case: - FUS1 slow-blow, 4 A, Bottom breaking capacity; 250 V. - FUS2 slow-blow, 800 mA, bottom breaking capacity; 250 V.
Consumption:	80 VA max.

7.3. Network specifications

7.3.1. The various types of networks

The following terminology is adopted:

- Integrated Web Server: electronic card integrated into the Control System that allows IP communication between the in-built web server and the PC's web browser.
- Switch: computer network equipment designed to interconnect computer equipment into a local area network with bandwidth optimisation.
- Server: network connected computer that makes a set of files and applications available to users. In this case, it is a general corporate server managing all of the company's Ethernet networks.

Network with a single Control System

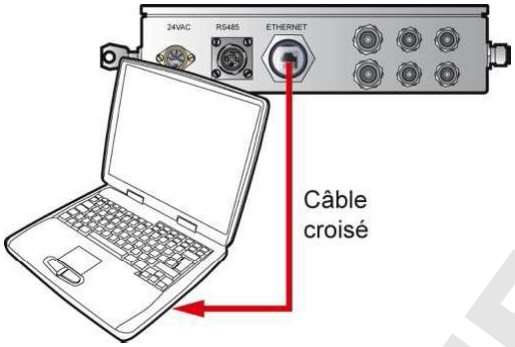

Figure 7-2: direct Ethernet link between the Control System and a single PC using a crossover cable.

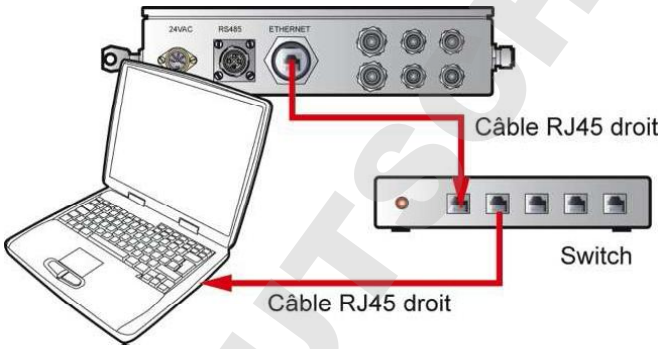

Figure 7-3: Ethernet links between a Control System and a single PC using a switch.

This latter solution avoids the use a crossover cable but requires the use of a switch.

Network with switch

Never use Ethernet crossover cables when using a switch.

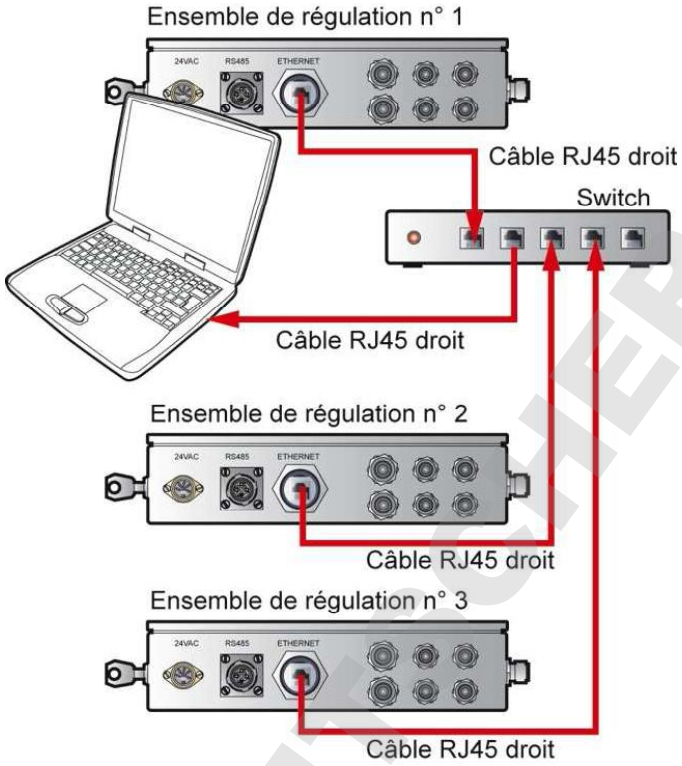

Figure 7-4: Ethernet links between one or more Control Systems and a single PC using a switch.

Network with server

Never use Ethernet crossover cables when using a local server.

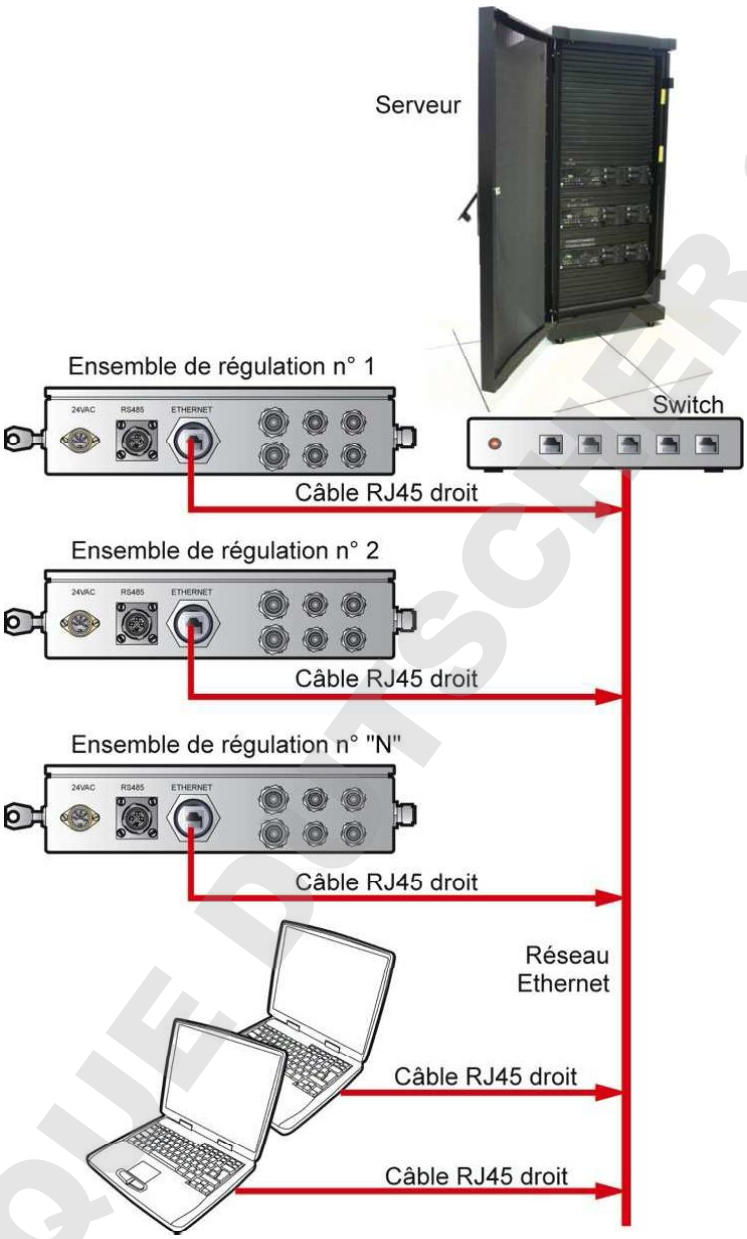

Figure 7-5: Ethernet links between one or more Control Systems and one or more PCs using a corporate server.

Internet network

The in-built web server for the Control System can also be configured and interrogated via a conventional Internet connection, if the provider grants a fixed IP address. This connection to the Internet network will be performed, in this case, identically to all IP connection addressable elements (router, another server's network, etc.).

7.3.2. Possible network configurations

Current configuration

The *Cryomemo* is configured with a fixed local IP address. The 80 (webpage) and 21 (FTP access) ports are open on the *Cryomemo*'s fixed local IP.

Cryomemo can only be accessed from the local network for transferring data files.

URL: ftp://IP_local/A/nom_de_fichier

Cryomemo can only be accessed from the local network for webpages if the company's computer system configuration does not allow the 80 port to be accessed from an external IP.

In addition, for the company's computer stations, the 80 port is only authorised for external output. The 21 and 25 ports are generally blocked.

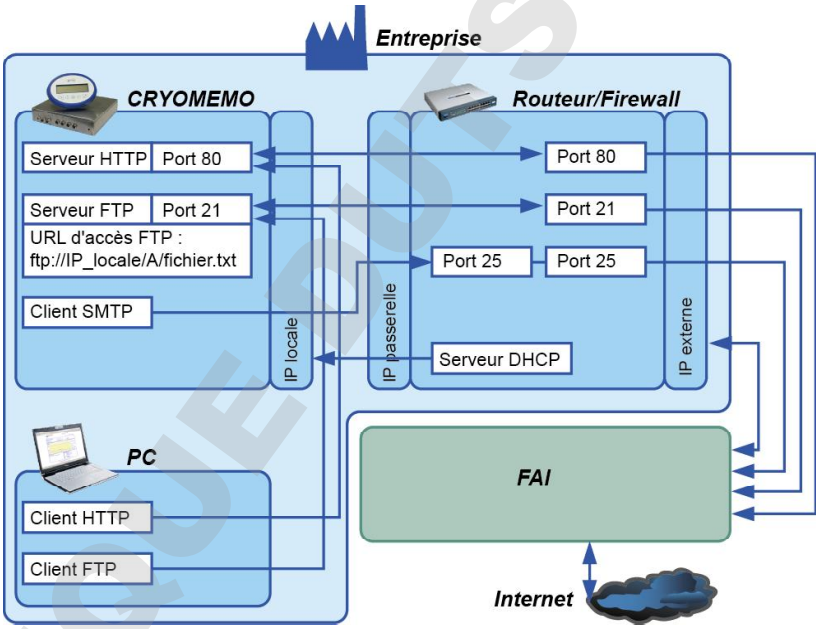

Figure 7-6: current configuration.

Ideal configuration for accessing *Cryomemo* from the internet

This ideal configuration corresponds to a *Cryomemo* connection via a separate and independent network from the company network, and therefore requires a separate subscription with an internet service provider (ISP).

Port	Function	State
80	Webpage	Open towards *Cryomemo.*
21	FTP access	Open towards *Cryomemo.* When building the URL to access the data transfer by FTP, the connection's external IP address needs to be recovered by configuration (router/firewall).
25	SMTP	Authorised at output for sending emails

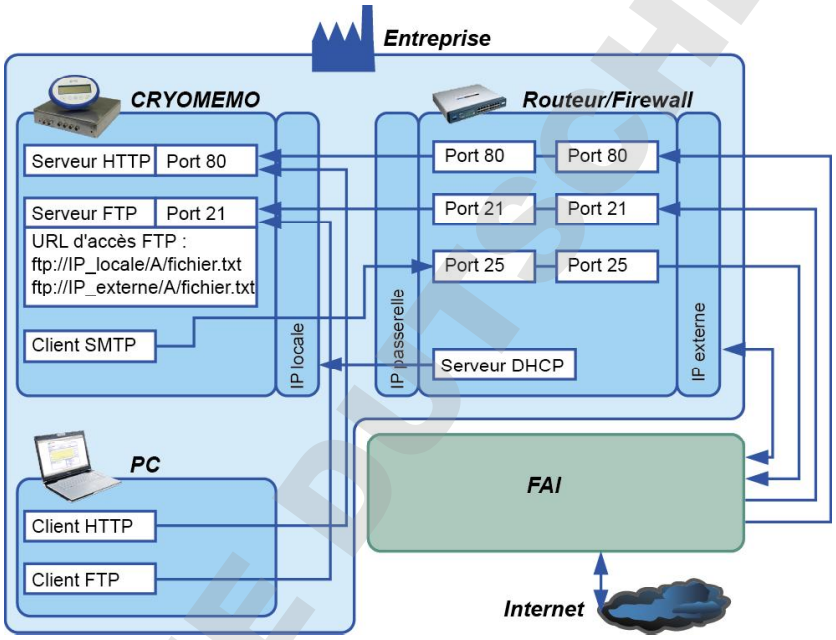

Figure 7-7: ideal configuration for accessing Cryomemo from the internet

General diagram of the application

The following figure presents the access architecture to the various accessible pages and a reference to the sections and pages.

The pages located in the red zone are only accessible by authorised persons, meaning those who have a login and password.

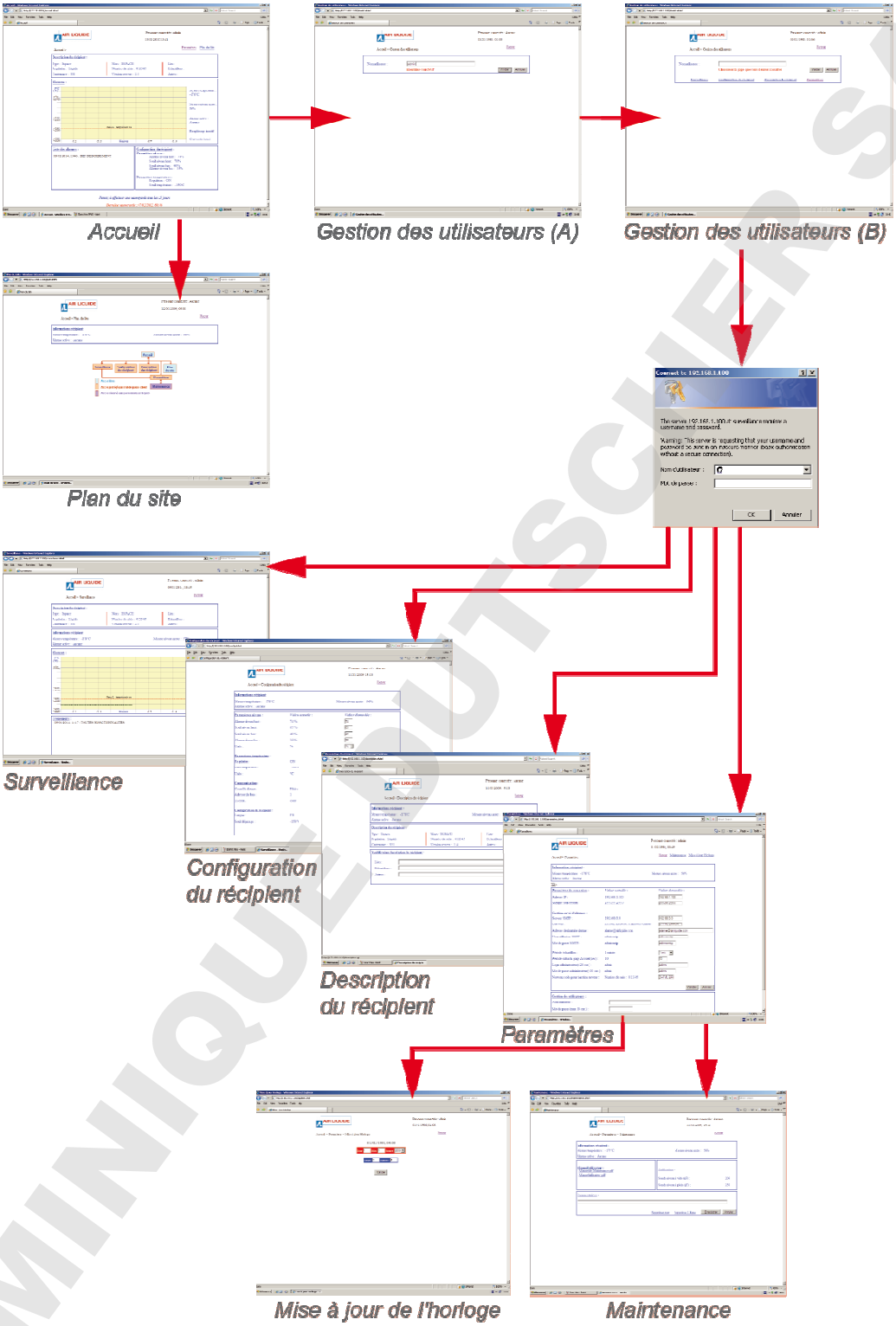

Figure 7-8: general diagram of the on-board web server application pages.

7.4. Cabling

The control unit accepts electric sockets and packing glands for peripheral equipment connections.

7.4.1. Pre-wired connectors

When the tank is delivered, the connectors described below are already connected to the remote-controlled equipment. This paragraph specifies the function of each one of them.

This illustration shows the following connectors:

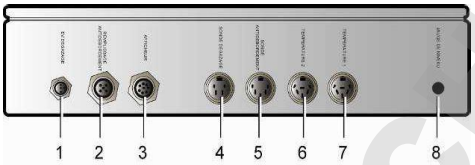

Figure 7-9: connector functions.

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No.	Function	Information
1.	Output to the blowdown solenoid valve. (see *Note 2)*	Lockable connection socket to the tank's blowdown solenoid valve.
2.	Output to the filling safety and filling solenoid valve. (see *Note 1)*	Lockable connection socket to the filling safety and tank filling solenoid valves.
3.	Output to the LCD display.	Connection socket to the LCD display. Cable length of 2.50 metres. The display and specific functions are presented in section 9.
4.	Blowdown sensor input.	Lockable connection socket to the blowdown sensor.
5.	Filling safety sensor input	Lockable connection socket to the filling safety sensor. The maximum level of liquid nitrogen allowed is defined by the mechanical positioning of the PT100 sensor. When the liquid nitrogen touches the sensor, the liquid nitrogen tank filling is halted by the filling safety valve.

6.	Tank temperature sensor no. 2 input.	Lock\able connection socket to tank temperature sensor no. 2.
7.	Tank temperature sensor no. 1 input (see *Note 3).*	Lockable connection socket to tank temperature sensor no. 1.
8.	Level sensor mechanical feed-through (see *Note 4).*	Electric connection to the capacitive level sensor located in the cryogenic tank (annular space).

Note 1: Prevents vessel overflow if the liquid nitrogen level control system fails. The filling safety solenoid valve is busy during the filling phases.

Note 2: Automatic blowdown drains gaseous nitrogen entering the vessel. Blowdown is not activated during manual filling or compensation filling (level control triggered by a temperature increase inside the tank).

Note 3: A 5°C temperature difference between the no. 1 and no. 2 sensors sets off an alarm. A temperature sensor failure is triggered when the measurements taken are below -200°C or over +55°C.

Note 4: A level sensor failure is triggered when the measurements taken are below -6% of the minimum nitrogen level (empty value defined during calibration) or over 106% of the maximum nitrogen level. In this case, the temperature control becomes active; the temperature is maintained until the *Temperature Alarm Threshold* reaches -16°C (ATH - 16°C).

7.4.2. Connectors to be cabled

When the tank is delivered, the connectors described below are already connected to the peripheral equipment. This paragraph specifies the function of each one of them.

This illustration shows the following connectors:

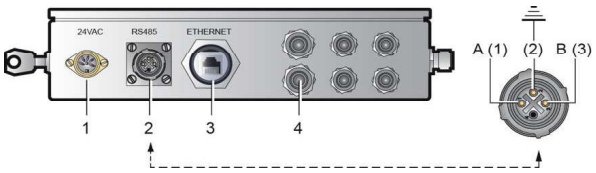


Figure 7-10: connector functions.

No.	Function	Information
1.	Power supply connector	Lockable connection socket to a 24 V AC output of the power supply unit provided with the equipment. Normally, the power supply is not backed up, therefore the level and temperature controls are no longer provided when the electrical power is cut. However, the readings remain active.
2.	*RS485* connector.	*Clipper* type lockable connection socket for RS485 output. The connection is shown in Figure 7-10.
3.	Ethernet connector	RJ45 connection socket to a PC supporting a Web application (browser).
4.	Packing gland	Connecting cable feed-through from the electronic unit internal terminal blocks to the peripheral equipment.

7.5. Lock and key

This side has only one 2-position lock.

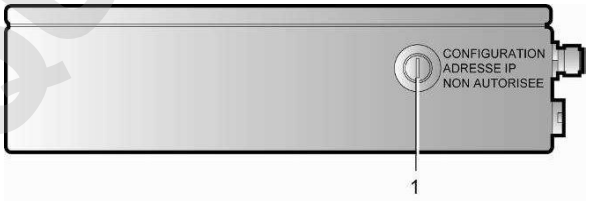


Figure 7-11: 2-position lock.

No.	Function	Information
1.	Key lock	Authorisation to modify the server IP address. - configuration allowed. - “IP address configuration not authorised”: not allowed.

8. Sensors and solenoid valves

The sensors in the Cryomemo device must be adapted to the various tanks for optimal functionality. Depending on the size of the tank and its storage type (liquid or gas), the level gauges will vary and the temperature sensors will be in different positions.

On level gauges approved by *Cryopal* may be used with products in the GT 40, Arpège, ESPACE and RCB range.

8.1. Piping and instrumentation diagram (PID)

No.	Item
1	Blowdown sensor
2	Filling solenoid valve
3	Filling safety solenoid valve
4	Level sensor
5	Filling safety sensor
6	Temperature sensor no. 1
7	Temperature sensor no. 2
8	Blowdown outlet
9	Blowdown solenoid valve
10	Nitrogen inlet
11	Safety valve
12	Tank filling inlet

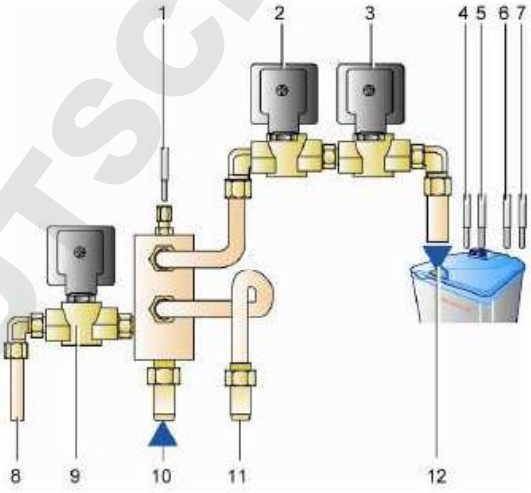
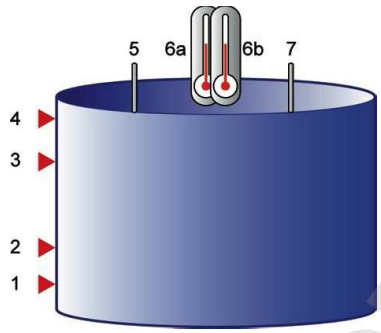


Figure 8-1: Sub-system locations (sensors and solenoid valves).

8.2. Alarm and level thresholds

The figure and table below show the connection between the equipment alarm and liquid nitrogen level thresholds, and the physical location of the sensors on a tank.



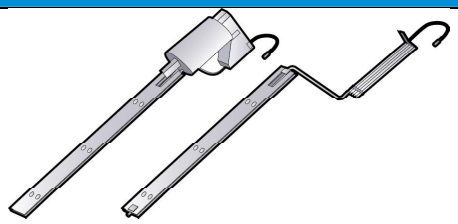
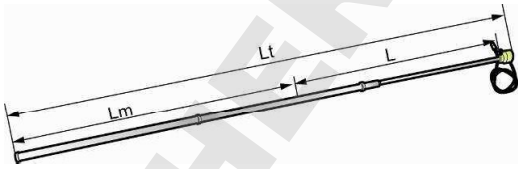
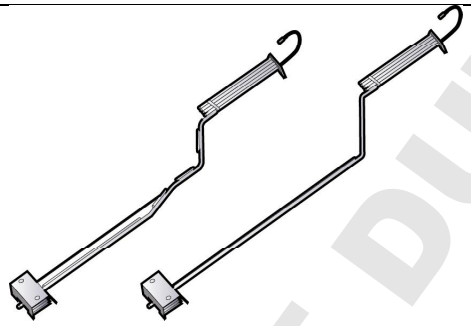
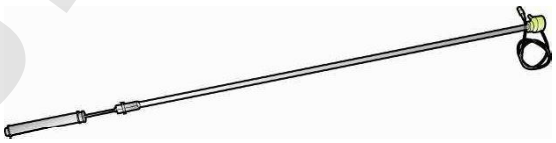
110

Figure 8-2: Physical location of the alarm and level thresholds on a storage tank.

No.	Sensor type	Alarm type
1.	Level sensor.	Low level alarm
2.	Level sensor.	Low level control threshold.
3.	Level sensor.	High level control threshold
4.	Level sensor.	High level alarm
5.	Filling safety sensor.	Filling safety alarm.
6.	Temperature sensors.	High temperature alarm
7.	Capacitive level sensor.	Level display.

8.3. Mechanical specifications

8.3.1. Level sensors

	GT 40 & Arpège	ESPACE & RCB
Liquid phase	 ***8-3:*** *Liquid phase nitrogen level gauges for Arpège 55 and 75 tanks (illustration on the left) and Arpège 70, 110, 140 and 170 (illustration on the right).*	It is presented as shown below.  *8-4: Liquid phase nitrogen level gauge.* The liquid phase sensor has a measurement length adapted to the cryogenic tank type.
Gaseous phase	 *8-5: Gaseous phase nitrogen level gauges for Arpège 70 and 110 tanks (illustration on the left) and Arpège 140 and 170 (illustration on the right). These gauges are not available for Arpège 40, 55 and 75 tanks.*	It is presented as shown below.  *8-6: Gaseous phase nitrogen level gauge.* The level gauge measurement length is limited in this case, the measurement range being only the one located under the false floor. The control range is not adjustable, but fixed; regulation is carried out either all or nothing according to the nitrogen level in the tank.

A cold level gauge taken out of the tank must be thoroughly dried with a suitable device (e.g. a hot air appliance) before being re-installed.

Control between 80% and 90% is not recommended for liquid phase storage devices, as this will damage the cap.

Because of this level gauge measurement principle, it is vital that the gauge remains in place in its well.

If its removal were to be necessary, a very careful drying will be essential with an approved device (for example, a hair dryer) before re-installing.

8.3.2. Installing level sensors

The installation of sensors (level and temperature) must be carried out by technicians who have received appropriate training and certification from the manufacturer.

8.4. Electrical specifications

No.	Function	Information
6. 7.	**Temperature sensors**	Pt100 1/3 Category B resistance thermometer in accordance with IEC751
4.	**Level sensor**	Capacitive (value associated with the tank)
2. 3. 9.	**Associated solenoid valves**	24V AC 50 Hz

8.5. Factory settings

The factory settings are defined based on the tank type and usage selected by the user (liquid or gas).

8.5.1. Control threshold factory settings

In control, the "factory setting" range is set as follows for all tanks:

Parameter	*Container*
Levels	
High threshold	80
Low threshold	50
High alarm	90
Low alarm	40
Unit	%

The Levels parameter can be modified by the user (see section 11.6 on page 90); only the level control parameters for tanks intended for gaseous phase storage are fixed.

These values may be adjusted within the following limits:

- Max level between 90% and 20%.
- Min level between 80% and 10%.
- With a minimum between min and max Level of 10%.

8.5.2. Temperature factory settings

Parameter	*Container*
Temperature	
TP threshold activation	YES
TP alarm	-135
Unit	°C

The critical Temperature threshold is fixed and cannot be modified by the user.

The *Cryomemo* is set up when the tank is used for the first time.

9. Display unit

The display unit is an alphanumeric LCD. It displays various information at start-up, during use or parameter setting.

9.1. General overview

On the front panel, the display unit comprises the following elements:

Figure 9-1: Display unit front and rear view.

No.	Function	See section
1.	Backlit alphanumeric LCD display	9.5
2.	Fault alarm light (LED) - Green: normal. - Red: fault.	9.6
3.	Internal audible alarm (not visible)	9.7
4.	Soft key .	9.4
5.	Soft key .	9.4
6.	Soft key for audible alarm cancellation and active alarm display.	9.4
7.	Soft key : - to confirm. - to acknowledge the audible alarm. - to select.	9.4
8.	Soft key : - to cancel input data.	9.4

No.	Function	See section
	- or to display each screen without being able to modify the displayed values. - or to return to the main display screen.	
9.	Connection socket for the cable from the display unit to the control unit.	-

9.2. Mechanical specifications

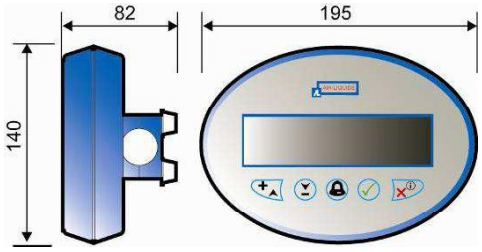


Figure 9-2: Dimensions (in mm).

Data	Principal characteristics
Dimensions	See Figure 9-2.
Weight	Around 0.3 kg.
Casing	Injected plastic.
Electrical specifications:	Graphic LCD LEDs on front face Sound alarm coupled with LED M12 connector for linking to the control unit

9.3. Electrical specifications

Data	Principal characteristics

Position:	Temperature, level, parameter, alarm display.
Display:	Graphic LCD.
	- nitrogen level in the tank (%, cm, inches, depending on setting selection).
	- temperature of one of the two sensors (in °C or °F, depending on setting selection).
	- faults.
	Direct access to settings menus.
Light:	Front alarm LED (faults).
Audible alarm:	Coupled to the LED (same indication). Acknowledged with the or key.
Connector:	M12 for connection to the control unit.

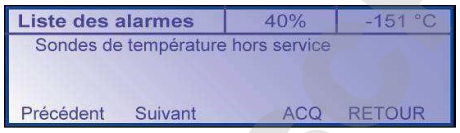
9.4. Buttons

These five soft keys (Figure 9-1, 4 to 8) have the following functions:

Figure 9-3: Function keys.

On the display, the keys activate the functions indicated in lower portion of the display area as follows:

Figure 9-4: Relationship between the function keys and the screen readings.

Button	Function
	Increase values or move up in menus.
	Decrease values or move down in menus.
	- Acknowledging the audible alarm. When the audible alarm sounds, pressing this key clears (mutes) the audible alarm. The alarm output remains active. After the delay time expires, the alarm becomes active again, and… ...displays the alarm history. The upper portion of the screen indicates the level and the current temperature.  *Figure 9-5: Example of an alarm history.* Use the and keys to display any hidden rows. You are automatically returned to the measurement display screen after 30 seconds of inactivity or by pressing the return key .
	- Confirming in menus - Moving to the next step in certain menus. - Switching between *Temperature Sensor 1* / *Temperature Sensor 2* in the main display. - Acknowledging the audible alarm. When the audible alarm sounds, pressing this key clears (mutes) the audible alarm. The alarm output remains active.
	- Displays various screens (*Level, Temperatures, Communication, Configuration, Tank, Version*), but without the option to modify the displayed information. - Returns to the previous screen.

9.5. Alphanumeric display

9.5.1. Overview

The backlit graphic LCD alphanumeric display (Figure 9-1, 1) shows the following information:

- **in normal mode**, refer to section 0 on pages 56 for usage instructions.

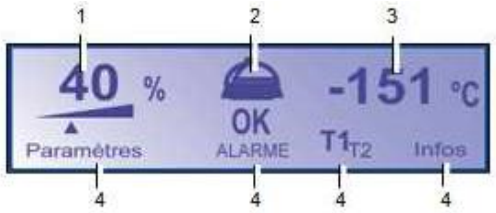


Figure 9-6: Example of normal mode display.

No.	Function	See section
1.	Cryogenic liquid level.	-
2.	Alarm status (OK or ???).	-
3.	Display one of the two tank internal temperatures (T1 or T2).	-
4.	Functions related to the display unit soft keys.	9.5.2

- **in settings mode**, after pressing the key, the following menus are available. The bottom row shows the functions related to the soft keys. Refer to section 0 on page 56 for details.

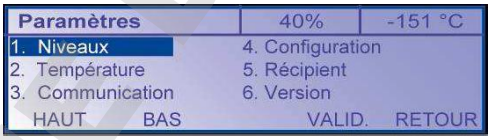


Figure 9-7: Example of settings mode display.

Adjusting the contrast level is described in section 10.8 on page 64.

9.5.2. Use in normal mode

The display shows the information as follows:

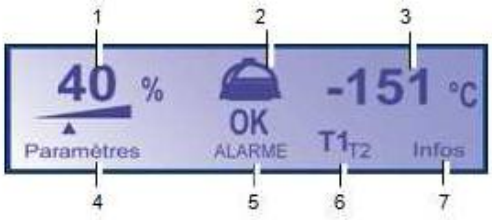


Figure 9-8: Example of normal mode display.

No.	Function
1.	Tank cryogenic liquid level display as a % of the maximum level.
2.	Alarm icon:
	OK: no alarm.
	???: alarm on. At least one of following alarms is active: ▪ Overflow (alarm active even after fault disappears). ▪ Temperature sensors not working (discrepancy between sensors). ▪ Level sensor not working. ▪ Temperature sensor no. 1 not working. ▪ Temperature sensor no. 2 not working. ▪ Above the nitrogen high level alarm threshold. ▪ Below the nitrogen low level alarm threshold. ▪ Temperature threshold exceeded. ▪ Communication failure with the *Cryopal* server. ▪ Blowdown fault. ▪ Power supply fault. ▪ EEPROM fault. ▪ Lid opening fault.
3.	Temperature (T1 or T2) of one of the two sensors. To display the other sensor temperature, press the soft key (✓) located under this icon.
4.	Access the *Settings* menu by pressing . See section 0 on page 56 for details.
5.	Display alarm history. The upper portion of the screen indicates the level and the

No.	Function
	current temperature. Use the and keys to display the hidden rows. You will be automatically returned to the measurement display screen after 30 seconds of inactivity or by pressing .
6.	- **T1**T2: select one of the two temperatures by pressing the key located under this icon. The selected temperature is displayed (3): - **T1**T2 for ***T1*** temperature display. - T1**T2** for ***T2*** temperature display. Note: an alarm is also activated when the two temperatures are different by more than 5°C (Temperature sensors not working).
7.	Successive display of the *Levels, Temperature, Communication, Configuration, Tank, Version* screens with each press. See details for each screen in section 56 on page 56. Pressing cancels these displays.

9.5.3. Use in settings mode

Refer to section 10 on page 56.

9.5.4. Diagram of accessible screens

Figure 9-9 shows the screens and menus that can be accessed from the basic display.

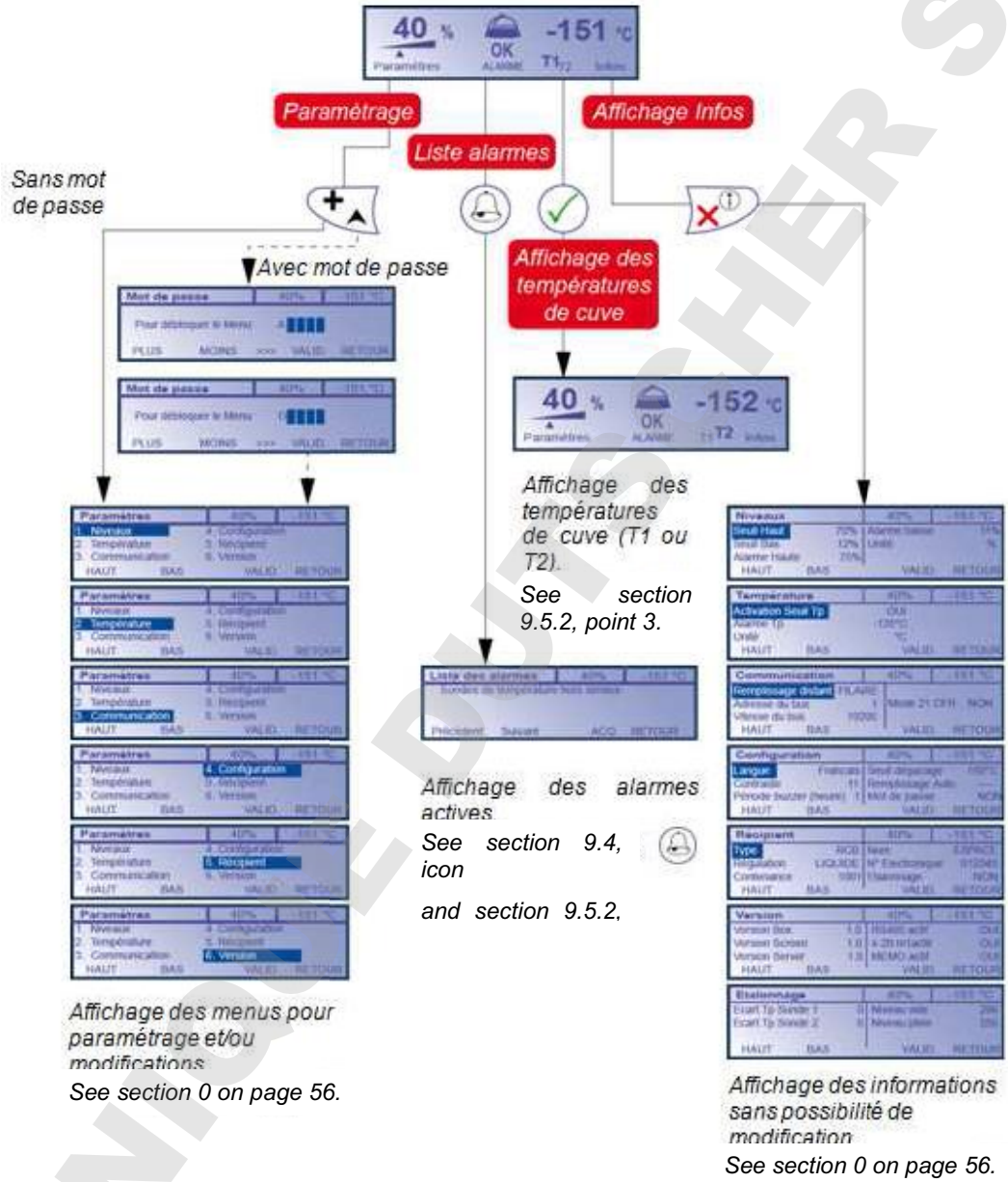


Figure 9-9: Diagram of menus and accessible functions.

9.6. Alarm indicator

When switched on, this light (Figure 9-1, 2) is lit green.

It turns red if there is at least one alarm triggered (list in section 9.5.2, 2) after a 30-second delay. This light will remain red as long as the fault persists. It will turn green again:

- Automatically when the fault disappears - at the same time, the alarm contact is activated.
- Manually after the filling safety fault has disappeared and this has been cleared by the user on the display unit ( ).

9.7. Audible alarm

An audible alarm (buzzer) is activated after a few second delay when there is at least one reason for alarm. The audible alarm activation conditions are identical to those of the alarm light (see section 9.6). The buzzer is located inside the display unit. Clearing the audible alarm (stopping the sound signal) can be done at any time by pressing the soft key (Figure 9-1, 7).

10. Settings menus – Display unit

10.1. General diagram

The figure below shows the general diagram of the menus accessible from the *Settings* selection.

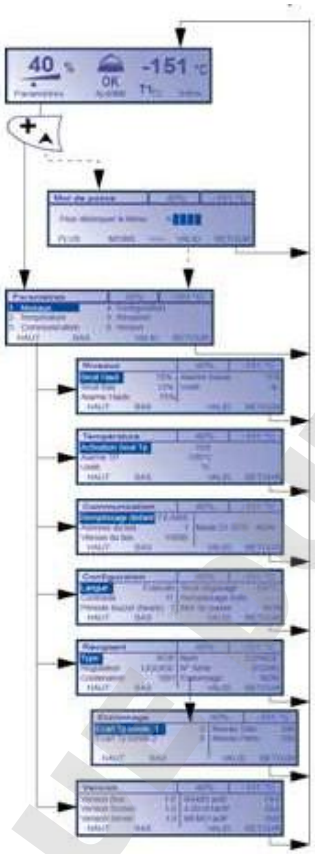
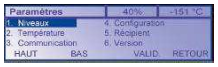


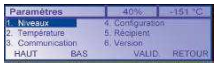
Figure 10-1: Physical location of the alarm and level thresholds on a storage tank.

10.2. "Settings" menu input

It is assumed that the Control Systems have been connected in conformity with section 12 on page 103 (Connecting lines) and section 13 on page 106 (Electrical wiring) and have a normal power supply.

Purpose	Action or result
	The indicator displays the measurement screen.
	Press the key.
	If the *Settings* menu is displayed, continue to section 10.3.
	If the opposite screen is displayed, proceed to steps 4 to 8 as indicated. *Note: this screen indicates that a password is required before displaying the Settings menu (section 10.3, page 57).*
	The screen displays *Password*.
	Use the or keys to increase/decrease the first character.
	If necessary, press the key to move to the next character on the right.
	Repeat step 5 as often as necessary to enter the complete password (number of characters).
	Once the complete and correct password is entered, press .
	The *Settings* menu is displayed. Continue to section 10.3.

10.3. "Settings" menu

Purpose	Action or result
	The indicator displays the menu screen.
	Select the desired menu by using the or keys.
	Confirm your selection with .
	Continue below according to the selection.
	**1. Levels** Manage the high and low level alarm thresholds, as well as the display unit (%, cm or inch). Refer to section 10.5 on page 59.

Purpose	Action or result
	2. Temperature
	Manage the activation, the high temperature alarm activation threshold and the display unit. Refer to section 10.6 on page 61.
	2. Communication
	Manage the bus module address, bus communication speed, 21CFR mode activation, as well as the origin to be taken into account for remote filling commands (cable-controlled, *Modbus*). Refer to section 10.7 on page 63.
	4. Configuration
	Define the display language in the menus, screen contrast, buzzer duration, blowdown threshold, manual filling (on, off) and operation activation with password, with its definition. Refer to section 10.8 on page 64.
	5. Container
	Define the connected tank type, control type, capacity, name, serial number. Use to calibrate the level sensor. Refer to section 10.9 on page 65.
	6. Version
	Display the version numbers of the electronic unit, display and server software programs, as well as the active or inactive state of the RS 485, 4-20 mA communication functions and recovery of traceability data on the server. Refer to section 10.10 on page 67.
	If necessary, return to the home menu by pressing  .

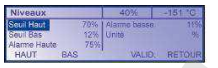
10.4. Button usage instructions

The keys are used in the following way:

Purpose	Action or result
	From the *Settings* menu, select the desired menu (*Levels, Temperature*, etc.) using the  or  keys.
	Confirm your selection with  .
	Select the row to be modified using the  or  keys.
	Confirm your selection with  .
	Use the  or  keys to redefine the desired value.
	Confirm the change with  .
	Return to the *Settings* menu with  .
	Return to the measurement display screen with  .

10.5. “Levels” menu

The level thresholds are fixed in Gas *mode and adjustable in* Liquid *mode*.

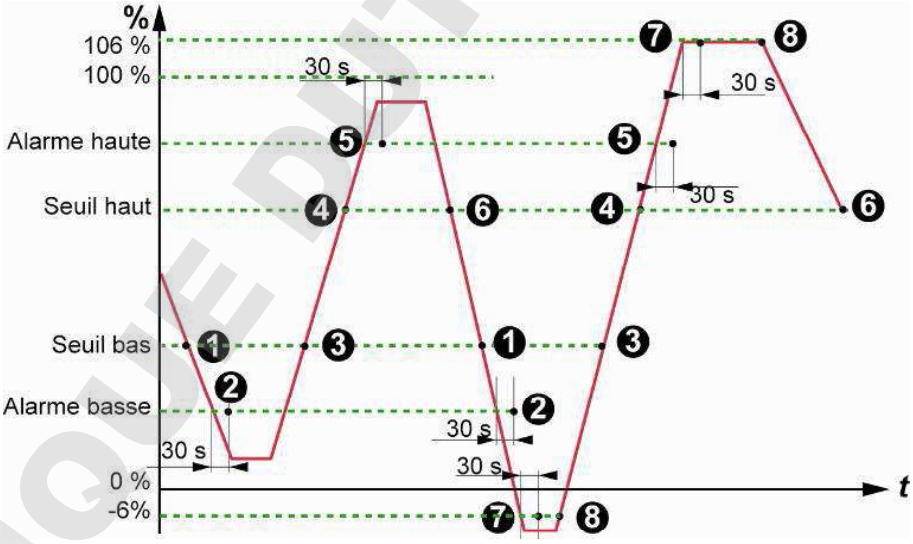
Purpose	Action or result
	The indicator displays the *Levels* screen.
For a display in %	Use the keys as indicated in section 10.4, page 59.
	The displayed information is:
	High threshold: a measured liquid level above this threshold stops the nitrogen filling. The acceptable values are from 20 to 90%. This threshold must be less than the high alarm threshold.
	Low threshold: a measured liquid level below this threshold starts the nitrogen filling. The acceptable values are from 10 to 80%. This threshold must be

	higher than the low alarm threshold.
	High alarm: a measured liquid level above this threshold activates the audible and visual alarms. The acceptable values are from 25 to 95%. The resolution is 1%. The default value is 90%. This threshold must be higher than the low alarm threshold.
	Low alarm: a measured liquid level below this threshold starts the nitrogen filling. The acceptable values are from 5 to 75%. The resolution is 1%. The default value is 40%.
	Unit: display measurements in % of level, centimetres or inches.
	Return to the *Settings* menu by pressing .
	Return to the measurement display screen by pressing .

The graph below specifies the location of various thresholds.

Figure 10-2: Level control operation cycle (liquid or gas).

Gr_01



No.	Name
1.	Activation of the filling solenoid valve relay.
2.	Activation of the audible and visual alarms (buzzer and LED). Alarm pictogram display and alarm relay activation. The filling solenoid valve relay remains active.
3.	Deactivation of visual and audible alarms (buzzer and LED). Alarm pictogram deletion and alarm relay deactivation.
4	Deactivation of the filling solenoid valve relay.
5.	Activation of the audible and visual alarms (buzzer and LED). Alarm pictogram display and alarm relay activation. The filling solenoid valve relay remains inactive.
6.	Deactivation of visual and audible alarms (buzzer and LED). Alarm pictogram deletion and alarm relay deactivation. The filling solenoid valve relay remains inactive.
7.	Deactivation of the filling solenoid valve relay. Alarm pictogram display and alarm relay activation.
8.	Activation of the filling solenoid valve relay.

10.6. "Temperature" menu

Purpose	Action or result
	The indicator displays the *Temperature* screen.
	Use the keys as indicated in section 10.4, page 59.
	The displayed information is:
	Tp threshold activation:
	▪ If *Yes* is selected, the temperature control is active.
	▪ If *No* is selected, the temperature control is not active.
	Tp alarm: a measured temperature above this threshold activates the audible and visual alarms and the alarm relay. The acceptable values are from -170 to -130°C. The resolution is 1°C. The default value is -130°C.
	Unit: Measurement displays in °C or °F.

	Return to the *Settings* menu by pressing .
	Return to the measurement display screen by pressing .

The graph below specifies the threshold settings.

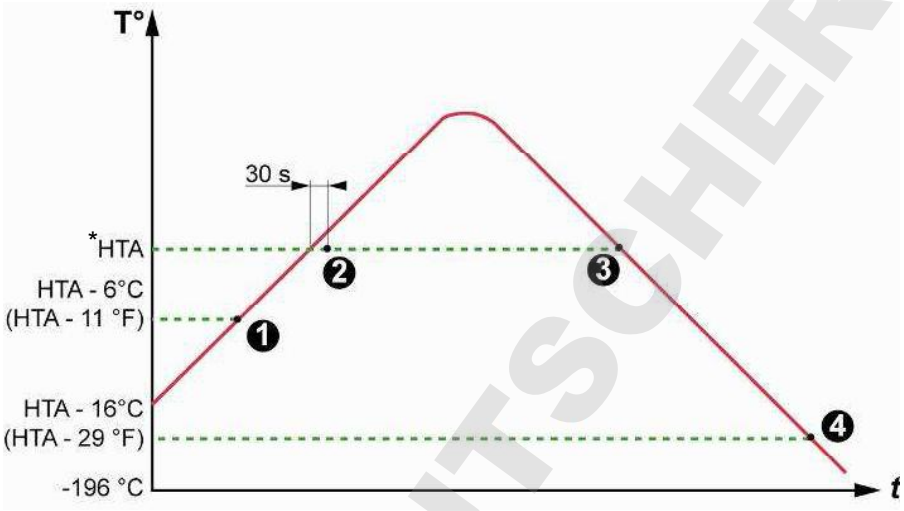


Figure 10-3: the temperature operation cycle.

*HTA: High Temperature Alarm

No.	Meaning
1.	Activation of the filling relay (filling SV command).
2.	Activation of the audible and visual alarms (buzzer and LED). Alarm pictogram display and alarm relay activation.
3.	Deactivation of visual and audible alarms (buzzer and LED). Alarm pictogram deletion and alarm relay deactivation.
4.	Deactivation of the filling relay (filling SV command).

HTA stands for High Temperature Alarm

10.7. "Communication" menu

Purpose	Action or result
	The indicator displays the *Communication* screen.
	Use the keys as indicated in section 10.4, page 59.
	The displayed information is interpreted as follows:
	Remote filling:
	▪ *Cable-controlled*: the *Simultaneous filling* function is active via the corresponding terminal block.
	▪ *Modbus*: the *Simultaneous filling* function is active via the RS485 circuit.
	Bus address: electronic unit logic address indicator (range from 1 to 254 on the same network).
	Bus speed: speed at which data will be transmitted between the electronic unit and automatic control system (2400, 4800, 9600 or 19200 baud).
	21CFR mode: this information is transmitted by the server and cannot be modified manually. Activation and deactivation are made on the server. The 21CFR traceability, part 11, is guaranteed when this setting is enabled.
	Return to the *Settings* menu by pressing  .
	Return to the measurement display screen by pressing  .

10.8. “Configuration” menu

Purpose	Action or result
	The indicator displays the *Configuration* screen.
	Use the keys as indicated in section 10.4, page 59.
	The displayed information is interpreted as follows:
	Language: select the menu display language (French, English, German, Spanish, Italian, Portuguese, Dutch).
	Contrast: value ranging between 5 (light display) and 20 (dark display).
	Buzzer period (hours): the buzzer is inhibited during the time selected (1-90 hours) after pressing the or key.
	Blowdown threshold: temperature which the blowdown solenoid valve will be closed.
	Auto-filling: *On/Off* equivalent to starting up automatic filling with option to stop halfway through.
	Password:
	▪ **No**: parameter modifications can be carried out by anyone.
	▪ **Yes**: parameter modifications can only be carried out after password entry. After confirming this selection, a specific screen is posted (opposite screen):
	Enter the password from 1 to 4 characters, using letters of the alphabet only. Use the or keys to modify the letters and to move to the next character on the right. Confirm with .
	Return to the *Settings* menu by pressing .
	Return to the measurement display screen by pressing .

10.9. "Tank" menu

10.9.1. Basic menu

This information will be defined at the first tank start-up. This menu is used to configure information settings relating to the client's tank. The *Cryomemo* device is set up in the factory depending on the tank with which it will be used.

Purpose	Action or result
	The indicator displays the *Tank* screen.
	Use the keys as indicated in section 10.4, page 59.
	The displayed information is interpreted as follows: **Type**: type of tank (GT 40, Arpège, RCB or ESPACE). **Control**: Gas or liquid **Capacity**: ▪ For the *GT 40 liquid* series: 40 ▪ For the *Arpège liquid* series: 40, 55, 75 ▪ For the *Arpège liquid* series: 70, 110, 140, 170 ▪ For the *Arpège gas* series: 70, 110, 140, 170 ▪ For the *ESPACE liquid* series: 151, 331, 661 ▪ For the *ESPACE gas* series: 151, 331, 661 ▪ For the *RCB liquid* series: 500, 600, 1001 ▪ For the *RCB gas* series: 600, 1001 *Note: to select a tank, start by entering type (ESPACE / RCB), then control (gas / liquid) and finally capacity.* **Name**: *ESPACE* by default. **Electronic no.**: unique unit number, different from the serial number. **Calibration**: calibration procedure for the tank level measurement acquisition chain. Continue to section 6610.9.2.
	Return to the *Settings* menu by pressing  .
	Return to the measurement display screen by pressing  .

10.9.2. Calibration menu

This menu is accessible as indicated in section 10.9.1, *Calibration* row. Once the "*Calibration*: *Yes*" choice is confirmed, the screens are shown as follows. These menus are reserved for *Cryopal* technicians.

Purpose	Action or result
	The *Password* screen opens.
	Enter the password from 1 to 4 characters, using letters of the alphabet only. Use the + or − keys to select the letters and ⏎ to move to the next character on the right. Confirm with ✓.
	Once *Calibration* is displayed, enter the calibration data:
	Tp sensor 1 difference: set between -5 and +5°C.
	Tp sensor 2 difference: set between -5 and +5°C.
	Empty level: condenser capacity numerical value (in pF) representing the minimum level. Refer to the *Cryopal* NH103108 document for the relationship between the numerical value and capacity.
	Full level: condenser capacity numerical value (in pF) representing the maximum level. Refer to the *Cryopal* NH103108 document for the relationship between the numerical value and capacity.
	Once data is entered, return to the *Tank* menu by pressing ESC. Continue to section 10.9.1, step 4.

10.10. "Version" menu

Purpose	Action or result
	The indicator displays the "Version" screen.
	Use the keys as indicated in section 10.4, page 59.
	The displayed information is interpreted as follows: **Version box**: version number of application software integrated into the control electronic unit. **Version screen**: version number of application software integrated into the HMI electronic unit. **Version Server**: version number of application software integrated into the server. **RS485 active**: *Yes* indicates that the function is available (*). **4-20 mA active**: *Yes* indicates that the function is available (*). **MEMO active**: *Yes* indicates that the functionality (traceability) is available (*).
	Return to the *Settings* menu by pressing  .
	Return to the measurement display screen by pressing  .

(*) settings carried out via the server.

10.11. Quit the Settings menu

Quit the *Settings* menu by:

- Using the  button.
- Not pressing anything for more than 30 seconds. In this case any changes that have been made are not saved.

11. Settings menus - Web Server

The Web Server application is used to access the Control System's configuration data and measurements via an http connection, in point to point mode. These values can be viewed and modified using an Internet Explorer web browser on a PC, as this is linked to the Control System by an Ethernet cable.

Equipment required:

The user will need to have the following equipment available to perform the task:

- A PC with a *Windows XP/Vista/7/8/10* operating system.
- An Ethernet link between the Control System(s) and PC (see section 7.3.1, page 32).
- One or more Control Systems to be set up.

11.1. The Settings page

This section discusses the Settings page. This displays the connection settings for the Control System in question.

11.1.1. Access to the *Settings* page

It is assumed that the Control Systems have been connected in compliance with section 12 on page 103 (Connecting lines) and section 13 on page 106 (Electrical wiring) and have a normal power supply.

Proceed as follows:

1. On the PC, launch the web browser.
2. In the browser address bar, enter the IP number for the Control System to be configured. Use the http://xxx.xxx.xxx.xxx format.

022

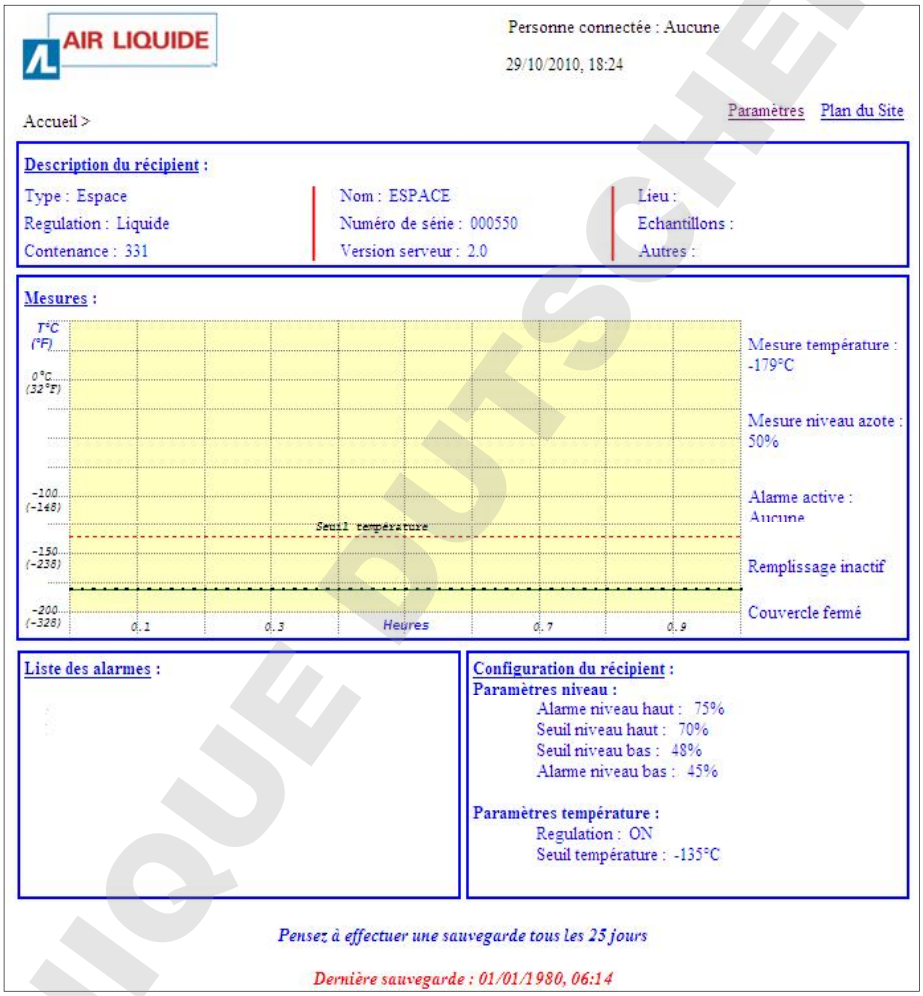
Figure 11-1: entering the address for the integrated web server to be configured.

Remember: the IP addresses for the Control Systems have been noted in the table on page 164.

3. The *Home* page is displayed (see Figure 11-2).

4. Display the *Settings* menu - this page can only be accessed by the administrator (see section 11.1, page 68).

   Starting on the *Home* page, click *Settings*, enter the administrator name (admin by default), click *Confirm*. On the new page, click *Settings*, enter the administrator name (admin by default) and the password (admin by default) and click *OK*.



010

Figure 11-2: example of Welcome page.

11.1.1. Page content

The figure below shows an example of a *Settings* page.

020

Figure 11-3: Settings page.

11.1.1.1. Tank information

Label	Function
Temperature measurement	Data cannot be modified Current value, in °C, of the temperature inside the tank.
Measured nitrogen level	Data cannot be modified Current value, in %, of the nitrogen level inside the tank.
Active alarm	Data cannot be modified This field indicates the presence of a triggered alarm. ▪ None: no alarm is currently active. ▪ Level sensors not working, *Filling Safety or overflow protection*, *Temperature threshold exceeded*, *Settings fault*, *Communication fault*, Level low alarm, Level high alarm, Temperature sensor no. 1, Temperature sensor no. 2, Blowdown fault, Power supply fault, EPROM fault, measurements overwritten: last alarm type activated.

11.1.1.2. Connection parameters

Label	Function
IP address	Data is modifiable Integrated web server's current IP (Internet Protocol) address. Possible modification in the *Requested value* column. Enter the new value in decimal format xxx.xxx.xxx.xxx. If the address entered is not a valid IP address, the integrated web server will not take the modification into account. Note: when the new IP address is confirmed, it will redirect to the log-in error web page. Enter the new IP address into the browser's address line to connect to the integrated web server.
Subnet mask	Data is modifiable The server authorises the connection to a certain number of integrated web servers. The mask can also limit the network or not. Example: with the 255.255.255.0 mask (the most common), the last digit authorises 254 machines on the same sub-network. If the mask entered is not a valid IP mask, the integrated web server will not take the modification into account.

<table>
<tr><th>Label</th><th>Function</th></tr>
<tr><td>Gateway</td><td>Data is modifiable
Gateway IP address. Enter the new value in decimal format xxx.xxx.xxx.xxx.
Contact the network administrator for this information.</td></tr>
<tr><td>Administrator login</td><td>Data is modifiable
Current name of authorised administrator to access this screen and the tank configuration screen.
Modify the login with another name with a length less than 20 characters.</td></tr>
<tr><td>Administrator password</td><td>Data is modifiable
Current password of authorised administrator to access this screen and the tank configuration screen.
Modify the password with another one less than 10 characters long.</td></tr>
<tr><td>New code for server function</td><td>Depending on the product level, three levels of functionality are accessible:
<table>
<tr><th>Activated function</th><th>Function 1</th><th>Function 2</th><th>Function 3</th></tr>
<tr><td>RS485</td><td>No</td><td>Yes</td><td>Yes</td></tr>
<tr><td>4-20 mA level / T°</td><td>No</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Traceability (MEMO)</td><td>No</td><td>No</td><td>Yes</td></tr>
<tr><td>Basic integrated web server</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
</table>
With level 3, the data is saved in the integrated web server's memory and is available for later use.
The code is obtained from Cryopal based on the version ordered. It is possible at all times to upgrade to a higher functional version of the application.
The code entered manually in this field allows the activation of one of the levels described below.
To order a change of functionality from Cryopal, proceed as follows:
1. Get the Control System's serial number See the Home page, Serial number</td></tr>
</table>

Label	Function
	field (section 11.2.1.2, page 76). 2. Contact *Cryopal*, who will provide a code. 3. Enter the received code into the *New server functionality code* field. 4. Click *Confirm*. The system now has the new functionalities. 5. Keep this number safe (see page 164). If the integrated web server is pulled from its connector (located on the Control System motherboard), the code received in step 2 will need to be entered again.

11.1.2. Updating the system date and time

Proceed as follows.

1. Access the *Settings* page as indicated in section 11.1.1 on page 68.
2. Once this page is displayed, click in the *Clock update* zone.

Figure 11-4: top of the Settings page.

3. Enter the new timestamp values and click *Confirm*.

   In the event of an error on the days (1 <= day <= 31), months (1 <= month <= 12), hours (0 <= hour <= 23) and /or minutes (0 <= minutes <= 59), the error message (ERROR) relating to the erroneous value will be displayed.

   The clock will be backed up, including after restarting or a power outage.

026

Figure 11-5: modification of timestamp parameters.

4. Click *Return* to close the page.

The application does not manage GMT/BST timestamps.

11.2. *Home* page

This chapter presents the Home page. This displays the main information relative to monitoring the tank in question.

11.2.1. Displaying the Home page

It is assumed that the Control Systems have been connected in compliance with section 12 on page 103 (Connecting lines) and section 13 on page 106 (Electrical wiring) and have a normal power supply.

Proceed as follows:

1. On the PC, launch the web browser.
2. In the browser address bar, enter the IP number for the Control System to be viewed. Use the http://xxx.xxx.xxx.xxx format.

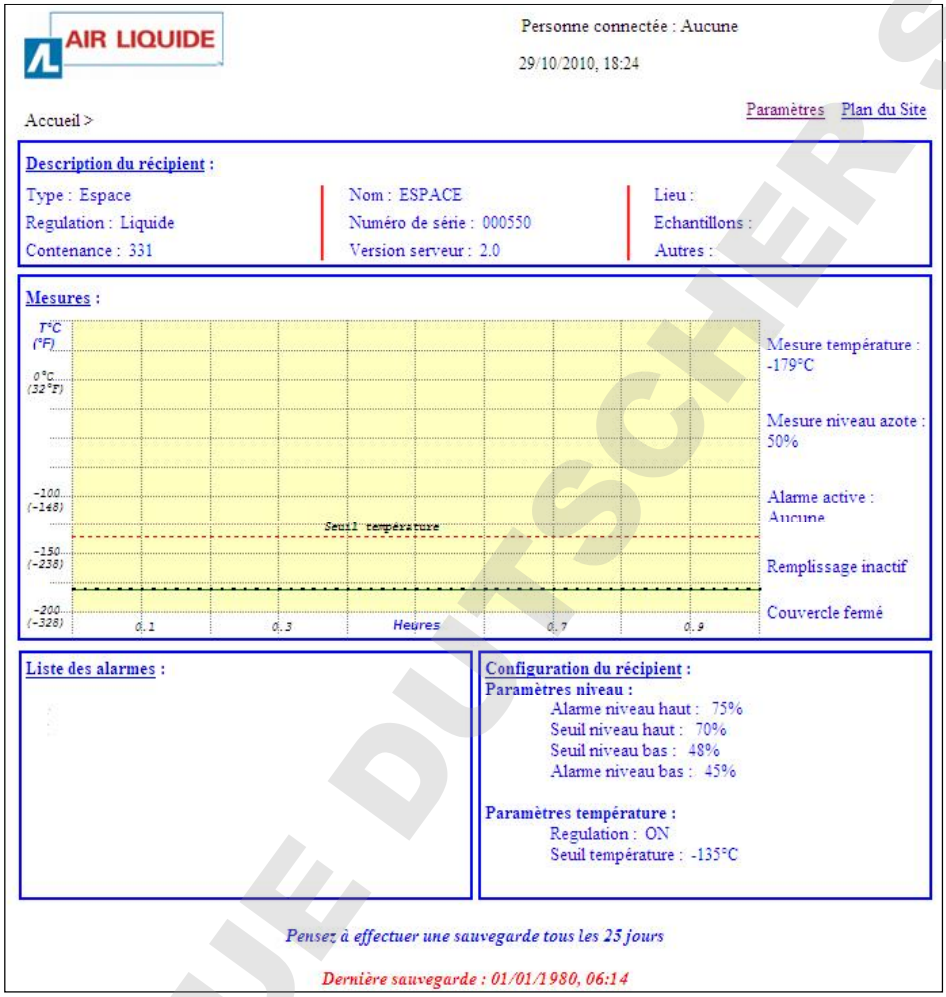
022

Figure 11-6: entry field for the integrated web server address to be viewed.

3. The *Home* page is displayed.

11.2.1. Page content

The page comes up as in the following example (Figure 11-7).

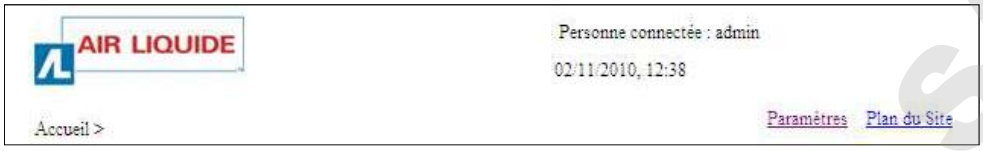


100

Figure 11-7: example of a Home page.

A click on the various zones opens the corresponding additional page after entering the password; refer to the sections below.

11.2.1.1. Logged in user



110

Figure 11-8: the Tank Description zone.

Each web page is identified on the integrated web server thanks to its corresponding path, *Home*> in this case.

The clock saved by the module as well as the *Logged in user* on the integrated web server are displayed. This information will be present on all integrated web server pages. Refer to section 11.1.2, page73, for how to update the clock.

11.2.1.2. Tank data

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Figure 11-9: the Tank Description zone.

These requirements pertain to

Label	Function
Type	Non-modifiable data provided by the Control System. Displays the tank type. The displayable types are: *ESPACE, RCB* and *Arpège*.
Control	Non-modifiable data provided by the Control System. *Displays the type of control level* Liquid *or* Gas.
Capacity	Non-modifiable data provided by the Control System. Displays the capacity in litres of the connected tank.
Name	Non-modifiable data provided by the Control System. Displays the name defined by the logged in tank user. This header is modifiable using the Control System display. (*Tank* screen). See instruction code NH78397.
Serial number	Non-modifiable data provided by the Control System. Displays the serial number for the connected tank.

Label	Function
Server version	Non-modifiable data provided by the Control System. Displays the version number for the application on the connected integrated web server.
Location	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the location of the connected tank.
Sample	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the content of the connected tank.
Others	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the additional information relative to the connected tank.

A click on this zone opens the *User management* page. Refer to section 11.4 on page 82.

11.2.1.3. Measurements

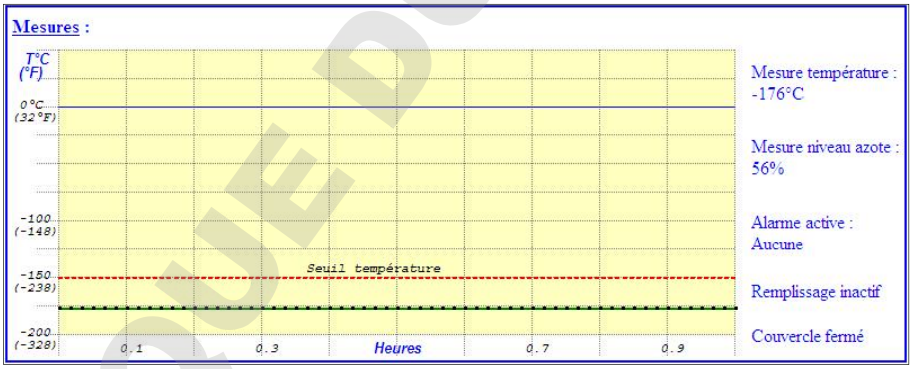

Figure 11-10: the Measurements zone.

This zone displays the temperature measurement graph. The nitrogen level and current temperature values in the tank in question are indicated on the right side of the graph. When switched on, the graph is progressively plotted out. The page is regularly refreshed every "x" seconds (10 seconds is the recommended value on the *Settings* screen. See section 11.1, page 68, *Refresh frequency* label).

The integrated web server saves the measurements every 30 seconds.

The graph can only be viewed if the web browser accepts the execution of scripts in the background. For the *Internet Explorer* browser, select 'Tools' / 'Internet Options' / 'Advanced' / 'Security 'and tick "Authorise active content to run in files on My Computer".

A click on this zone opens the *Monitoring* page. Refer to section 11.5 on page 84.

The *Temperature measurement* and *Nitrogen level measurement* fields

The *Temperature Measurement* and *Nitrogen Level Measurement* fields display the current temperature and nitrogen level readings. The temperature is constantly reported on the central graph.

The *Active Alarm* field

The *Active Alarm* field indicates the absence of alarm (*None*) or the presence of a triggered alarm (see section 11.1.1.1 on page 71, *Active Alarm* label).

Important: if several alarms are present simultaneously, only the last alarm detected will be displayed. If the operator resolves the fault relating to the alarm being displayed or if the alarm disappears, the chronologically preceding alarm will be displayed, and so on.

The *Filling* field

The *Filling* field indicates the state of the tank's liquid nitrogen filling function:

- *Inactive*: no filling in progress.
- *Active:* filling is in progress.

The *Lid* field

The *Lid* field indicates the current state of the tank's lid, *Closed* or *Open*. This information comes from the lid contact located on the tank.

The graph

The "x" time axis on the graph is configurable between 1 minute and 2 hours (configurable on the *Settings* screen. See section 11.1, page 68, *Sampling period* label). This period corresponds to the one between two measurement points displayed.

The graph does not update itself in the event of a change in sampling speed. However, a dotted vertical bar shows the modification to the sampling period, as shown in the following illustration.

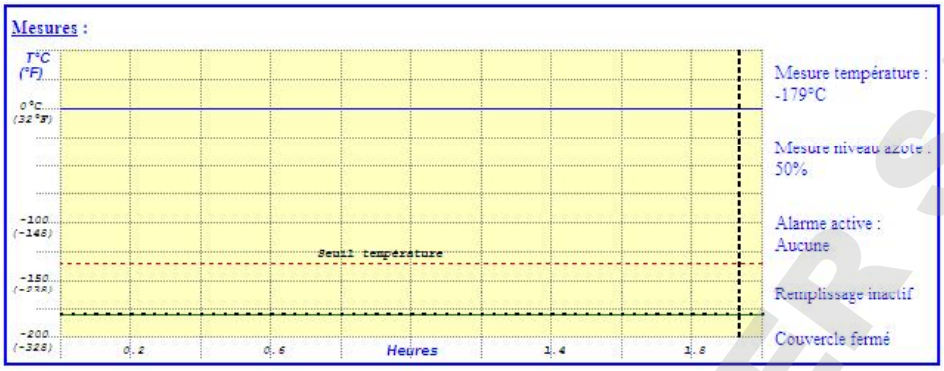

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Figure 11-11: dotted vertical bar showing the modification to the sampling period.

If a modification has been made to the sampling period, the time scale is false before the dotted vertical bar. When the graph fills the entire page, it is offset to the left and updates its last value on the extreme right.

If the temperature exceeds the set threshold (indicated by a red dotted line), the measurement is displayed in red. Similarly, if the level exceeds the high and low alarms, the level will be displayed in red.

11.2.1.4. List of alarms

The five maximum alarms that recently occurred will be summarised in the *List of alarms* field.

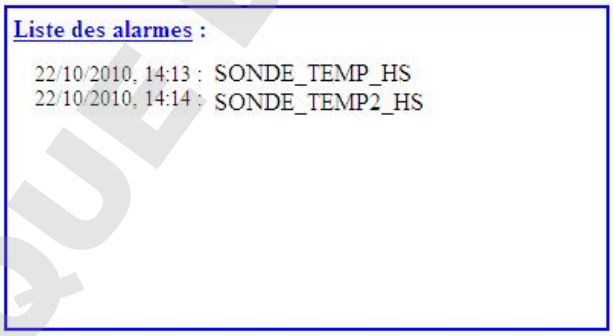

Figure 11-12: the List of alarms zone.

text via the optional *Traceability* function. Refer to section 11.5.1.3, “

The *Data Retrieval* **field**” on page 87.

A click on this zone opens the *User management* page. Refer to section 11.4 on page 82.

11.2.1.5. Tank configuration

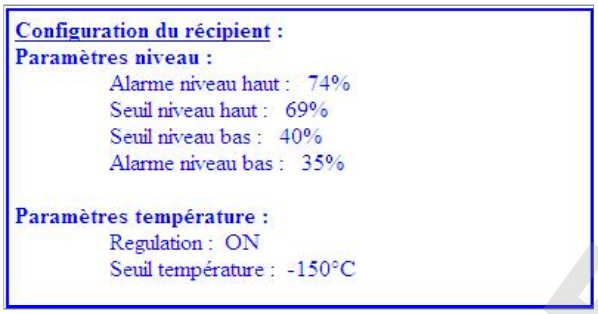

Figure 11-13: the Tank Configuration zone.

This zone groups together the tank parameters.

- Nitrogen level parameters in the tank: High level alarm, High level threshold, Low level threshold and Low level alarm.
- Nitrogen temperature parameters in the tank: *Control On/Off* (control active or inactive), *Temperature threshold* (alarm when the temperature is higher than the indicated value).

This data is modified in the *Tank Configuration* page (see section 11.6, page 90).

11.2.1.6. Last backup

Figure 11-14: the Last Backup zone.

The date of the last backup is displayed at the right of the *Last Backup* description, when it has been performed. This backup consists of retrieving data saved in the integrated web server and storing it in text format on a specific user media format.

The backup procedure is the subject of section 11.5.1.3, page 87, “

The *Data Retrieval* **field**”. It is recommended to perform the backup every 25 days. Effectively, the backup file can back up the equivalent of 27 days. Without a backup, the oldest data will be automatically deleted.

11.3. The active zones

From this page, the user can navigate to one of the following six pages:

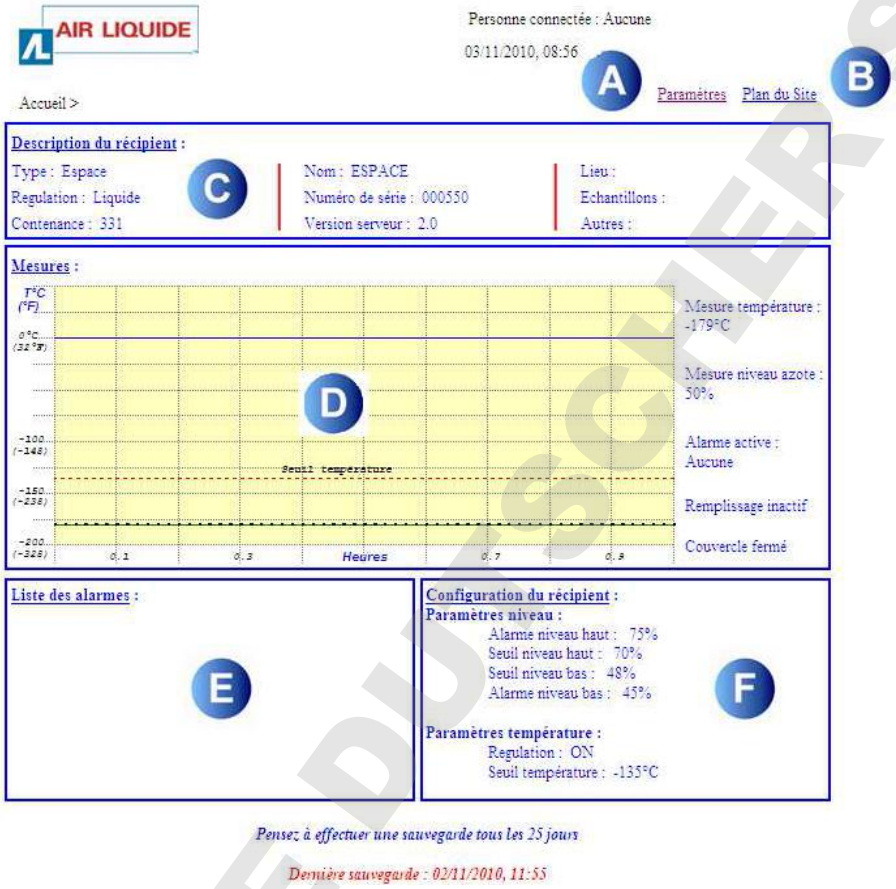

Figure 11-15: the zones and active links.

No.	Zone or link
A	***Settings***: redirects to the *Settings* page (page 68) if the administrator is already logged in, or to the login page if the user is not yet logged in (administrator access only, section 11.1, page 68).
B	***Site map***: redirects to the *Site map* page (page 100) which will inform the user on the architecture of the integrated web server and the possible accesses.
C	***Tank description***: redirects to the *Tank description* page (page 96) if the user is already logged in, or to the login page if the user is not yet logged in.
D	***Measurements***: redirects to the *Monitoring* page (page 84) if the user is already logged in, or to the login page if the user is not yet logged in.
E	***Alarm list***: redirects to the *Monitoring* page (page 84) if the user is already logged in, or to the

	login page if the user is not yet logged in.
F	***Tank configuration***: redirects to the *Tank Configuration* page (page 90) if the administrator is already logged in, or to the login page if the user is not yet logged in (administrator access only, section 11.1, page 68).

11.4. The User management page

This page is used to authorise access to protected pages (Monitoring, Tank configuration, Tank description, Settings) once the user is duly logged in.

11.4.1. Displaying the page

Proceed as follows:

1. On the PC, launch the web browser.
2. In the browser address bar, enter the IP number for the Control System to be viewed. Use the http://xxx.xxx.xxx.xxx format.

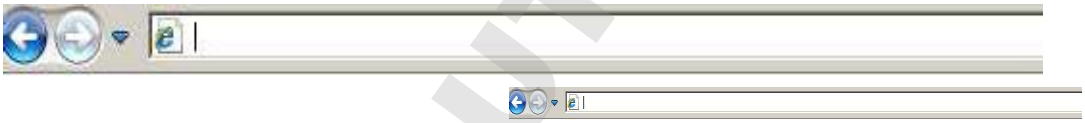

Figure 11-16: entering the address for the integrated web server to be displayed.

The IP addresses for the accessible Control Systems have been noted on page 164.

3. On the *Home* page displayed, click anywhere to display the *User management* page.

11.4.1. Page content

The page comes up as in the following example. This page asks the user to log in to access to the protected pages. The user must first enter their username in the *Username* field.

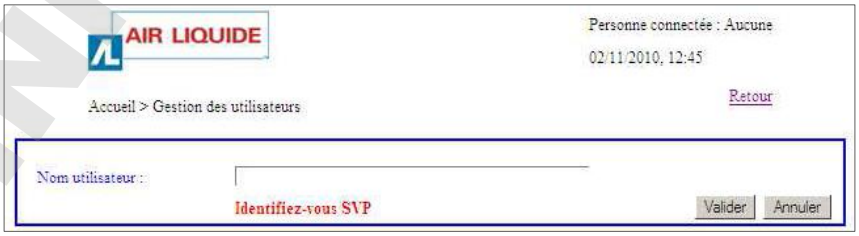

Figure 11-17: the page before entering the login.

- If the username (login) is not saved in the integrated web server directory, the user will be asked to try again.

Figure 11-18: the page after entering an unknown login.

- If the username (login) is saved in the integrated web server directory, the user will have access to the links on the following pages:

Figure 11-19: the page after entering the login.

- *Monitoring*: see section 11.5, page 84.
- *Tank configuration*: see section 11.6, page 90.
- *Tank description*: see section 11.7, page 96.
- *Settings*: see section 11.1, page 68.

When the selected page is clicked, the user will need to log in again with their username (just entered) as well as their password.

Figure 11-20: example of a home window

- Once logged in, the user remains connected for a fixed period of time, which is 3 minutes by default. This value is not modifiable.
- If the logged in user closes the web browser, they are automatically logged out. It will therefore be necessary to proceed with a new login with username and password in order to have access to the protected pages. However, as long as a new user has not logged back in with a new login, the previous user will remain logged into the integrated web server for up to 3 minutes.

11.5. The Monitoring page

This page is only accessible once the user has logged in. The Monitoring page displays similar information to that in the Home page, the difference being you can now access the Data Retrieval function and list of events.

11.5.1. Displaying the Monitoring page

Proceed as indicated in section 11.3 on page 81 to access this page. The *Monitoring* page appears as follows:

Figure 11-21: the Monitoring page.

11.5.1. Page content

11.5.1.1. Logged in user

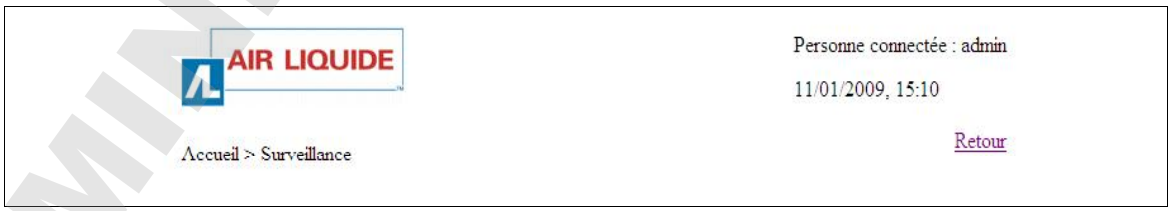

Figure 11-22: the Tank Description zone.

Each web page is identified on the integrated web server by its relative path, Home > Monitoring in this case.

The clock saved by the module as well as the *Logged in user* on the integrated web server are displayed. This information will be present on all integrated web server pages.

Note: refer to section 11.1.2, page73, for how to update the clock.

11.5.1.2. Tank data

Figure 11-23: the Tank Description zone.

Label	Function
Type	Non-modifiable data provided by the Control System. Displays the tank type. The displayable types are: *ESPACE*, *RCB*, *Arpège and GT 40*.
Control	Non-modifiable data provided by the Control System. *Displays the type of control level* Liquid *or* Gas.
Capacity	Non-modifiable data provided by the Control System. Displays the capacity in litres of the connected tank.
Name	Non-modifiable data provided by the Control System. Displays the name defined by the logged in tank user. This header is modifiable using the Control System display. (*Tank* screen). See instruction code NH78397.
Serial number	Non-modifiable data provided by the Control System. Displays the serial number for the connected tank.
Server version	Non-modifiable data provided by the Control System. Displays the version number for the application on the connected integrated web server.
Location	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the location of the connected tank.
Sample	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the content of the connected tank.
Others	Modifiable data provided by the integrated web server. Refer to the *Tank*

Label	Function
	Description section on page 96 for details. Displays the additional information relative to the connected tank.

11.5.1.3. Measurements

Figure 11-24: the Measurements zone.

This zone displays the temperature measurement graph. The nitrogen level and current temperature values in the tank in question are indicated on the right side of the graph. When switched on, the graph is progressively plotted out. The page is regularly refreshed every "x" seconds (10 seconds is the recommended value on the *Settings* screen. See section 11.1, page 68, *Refresh frequency* label).

The integrated web server saves the measurements every 30 seconds.

The graph can only be viewed if the web browser accepts the execution of scripts in the background. For the *Internet Explorer* browser, select 'Tools' / 'Internet Options' / 'Advanced' / 'Security' and tick "Authorise active content to run in files on My Computer".

The *Data Retrieval* field

This is only usable when the *Traceability* option is active. It retrieves measurements (levels and T1 temperature), events, alarms and changes to settings saved in the integrated web server memory, to a file in text format.

When you click on the *Data Retrieval* field, the next page is displayed.

Figure 11-25: the Data Retrieval page.

Proceed as indicated below for the data retrieval:

1. Click the *Data Retrieval* row (Figure 11-25).
2. A window proposes either opening the *DataMS.csv* file directly, or saving it to a media device (hard drive, USB stick, etc.).
3. The file data can then be processed in a spreadsheet application (such as *Excel™)*. The basics of the 21CFR standard are mirrored without it being applied in its entirety.

	A	B	C	D
2		03/11/2010, 09:14	admin	
3		Location		
4		Echantillons		
5		Autres		
6				
7	ALARMES			
8		01/01/1980, 04:51	SONDE TEMP 1	
9		01/01/1980, 04:52	SONDE TEMP 1	
10				
11	PARAMETRES			
12		02/11/2010, 11:55	admin	SAUVEG. FICHIER
13		03/11/2010, 09:13	admin	SAUVEG. FICHIER
14				
15	MESURES			
16		Date	%	C
17		01/01/1980, 04:33	50	-179
18		02/11/2010, 11:50	50	-179
19		02/11/2010, 11:51	50	-179
20		02/11/2010, 11:51	50	-179
21		02/11/2010, 11:52	50	-179
22		02/11/2010, 11:52	50	-179
23		02/11/2010, 11:53	50	-179
24		02/11/2010, 11:53	50	-179
25		02/11/2010, 11:54	50	-179
26		02/11/2010, 11:54	50	-179

Figure 11-26: the retrieved data.

4. Record the file using the *File* > *Save* menu under the menu bar from the opened text file (Figure 11-26).

   The data on the integrated web server are not modifiable from the PC via Internet Explorer, therefore there is no need to encrypt the data on the web server. However, the user (network administrator or other) is responsible for ensuring the backup, protection and integrity of the data recorded on the PC.

The *Setting* field

Access to the *Settings* page. Refer to section 11.1 on page 68.

The graph

The "x" time axis on the graph is configurable between 1 minute and 2 hours (configurable on the *Settings* screen. See section 11.1, page 68, *Sampling period* label). This period corresponds to the one between two measurement points displayed.

The graph does not update itself in the event of a change in sampling speed. However, a dotted vertical bar shows the modification to the sampling period, as shown in the following illustration.

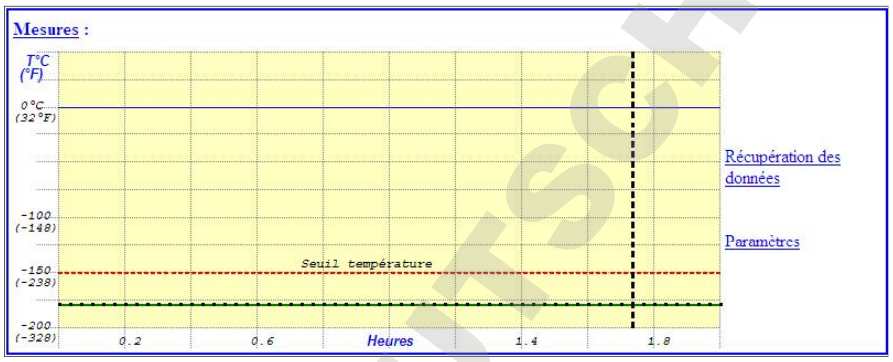

Figure 11-27: dotted vertical bar showing the modification to the sampling period.

The time scale is in hours; it is automatically resized based on the sampling period chosen. If a modification has been made to the sampling period, the time scale is false before the dotted vertical bar. When the graph fills the entire page, it is offset to the left and updates its last value on the extreme right.

If the temperature exceeds the set threshold, the measurement is displayed in red. Similarly, if the level exceeds the high and low alarms, the level will be displayed in red.

The curves presented on the graphs correspond to data saved in the .txt file.

11.5.1.4. Events

This zone discusses the history of the latest events that occurred on the integrated web server. An event is an alarm or a change in functionality.

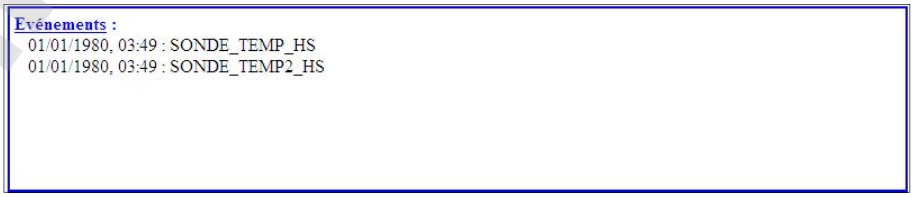

Figure 11-28: the Events zone.

11.6. The Tank Configuration page

This page is only accessible after the administrator has logged in; the administrator is defined as indicated in section 11.1, page 68.

11.6.1. Accessing the page

Proceed as indicated in section 11.6 on page 90 to access this page. The *Tank Configuration* page appears as follows:

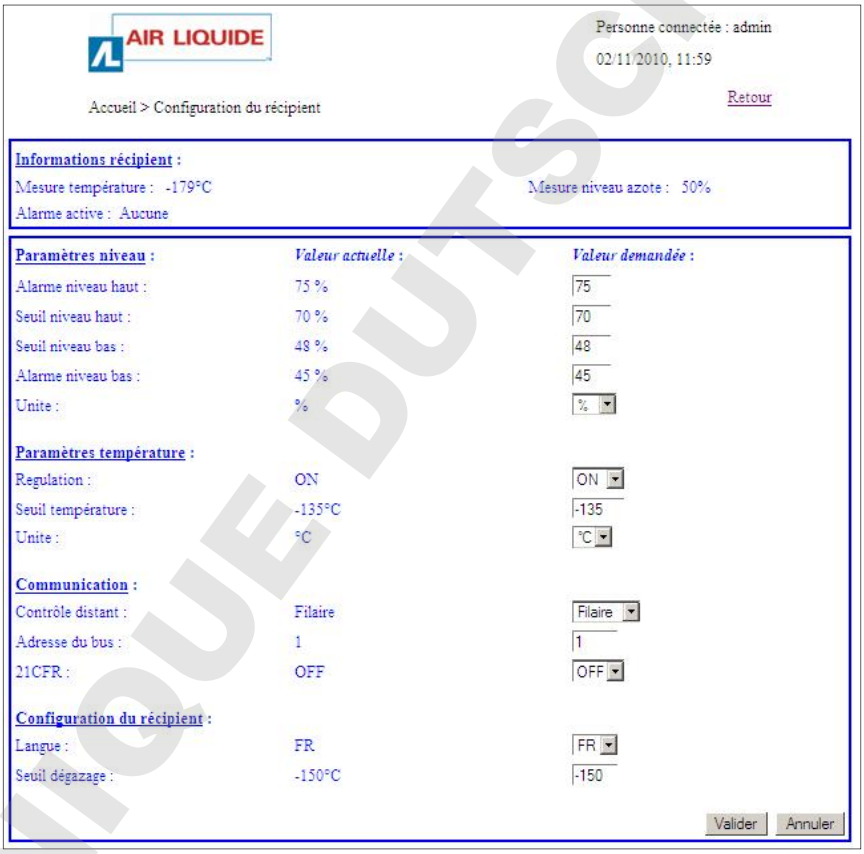

Figure 11-29: the Tank Configuration page

11.6.2. Page content

11.6.2.1. Tank information

The displayed information is:

Figure 11-30: top of the Tank Configuration page.

Label	Function
Temperature measurement	Data cannot be modified Current value, in °C, of the temperature inside the tank.
Measured nitrogen level	Data cannot be modified Current value, in %, of the nitrogen level inside the tank.
Active alarm	Data cannot be modified This field indicates the presence of a triggered alarm. ▪ None: no alarm is currently active. ▪ Level sensors not working, *Filling Safety or overflow protection*, *Temperature threshold exceeded*, *Settings fault*, *Communication fault*, Level low alarm, Level high alarm, Temperature sensor no. 1, Temperature sensor no. 2, Blowdown fault, Power supply fault, EPROM fault, measurements overwritten: last alarm type activated.

11.6.2.2. Level settings

Figure 11-31: Level Settings part.

Label	Function
High level alarm	Note: this value cannot be modified if the level unit (see Level label) is in centimetres or inches. ***Liquid phase*** A measured liquid level above this threshold activates the audible and visual alarms. The acceptable values are from 28 to 94%. The resolution is 1%. The default value is 90%. This threshold must be higher than the low alarm threshold. ***Gaseous phase*** In this mode, the threshold is automatically 94%.
High level threshold	Note: this value cannot be modified if the level unit (see Level label) is in centimetres or inches. ***Liquid phase*** A measured liquid level greater than this threshold stops the nitrogen filling. The acceptable values are from 22 to 88%. This threshold must be lower than the high alarm threshold. The default value is 80%. ***Gaseous phase*** In this mode, the threshold is automatically 80%.
Low level alarm	Note: this value cannot be modified if the level unit (see Level label) is in centimetres or inches. ***Liquid phase*** A measured liquid level below this threshold starts the nitrogen filling. The acceptable values are from 7 to 75%. The resolution is 1%. The default value is 40%. ***Gaseous phase*** In this mode, the threshold is automatically 25%.
Low level threshold	Note: this value cannot be modified if the level unit (see Level label) is in centimetres or inches. ***Liquid phase*** A measured liquid level below this threshold starts the nitrogen filling. The acceptable values are from 12 to 80%. The resolution is 1%. The default value is 50%. ***Gaseous phase***

Label	Function
	In this mode, the threshold is automatically 40%.
Unit	The level is displayed in percent (%) by default. The user can however choose the option to display in centimetres (cm) or inches (“). In this case, the values are converted based on type (Escape or RCP), control (Liquid or Gas) and tank capacity. **Important**: it will be impossible to modify the level threshold and alarm values if the level unit is in centimetres or in inches

If these conditions are not all respected, a red error message relating to the erroneous value will be displayed. The new values are not confirmed by the integrated web server and are therefore not taken into account by the control unit.

11.6.2.3. Temperature settings

Figure 11-32: Level Settings part.

Label	Function
Control	***In Liquid mode*** **ON**: temperature control is active. The nitrogen filling relay will be activated when the tank's temperature is greater than the temperature threshold. **OFF**: temperature control is not active. The nitrogen filling relay will be not activated when the tank's temperature is greater than the temperature threshold. The threshold exceeded alarm is no longer taken into account and the temperature will not be displayed as red on the homepage. ***In Gas mode*** **ON**: temperature control is always active (ON); the field becomes invisible
Temperature threshold	***In Liquid mode*** A measured temperature higher than this threshold activates the audible and visual alarms and the alarm relay. Acceptable values range from -170 to 0°C. The resolution is 1°C. The default value is -130°C.

Label	Function
	The modified value must meet the following conditions: -170°C (-274°F) <= Temperature threshold <= 0°C (32°F) If these conditions are not all respected, an error message relating to the erroneous value will be displayed (in red). The new value is not confirmed by the integrated web server, and will not be sent. ***In Gas mode*** For an operation in gaseous phase, the temperature control is always active (ON) and the temperature is set to -135°C (-202°F).
Unit	Measurements are displayed in °C or in °F. The default temperature display is in Celsius (°C).

11.6.2.4. Communication

Figure 11-33: Level Settings part.

Label	Function
Remote control	Selection of filling control. **Cable-controlled**: the *Simultaneous filling* function is active via the corresponding terminal block. **Teleflo**: the *Simultaneous filling* function is active via the RS485 circuit.
Bus address	Electronic unit logic address indicator (range from 1 to 254 on the same network). If these conditions are not all respected, an error message will be displayed (in red). The new value is not confirmed by the integrated web server, and will not be taken into account.
21CFR	American law standardising the management of user connected and authenticated to data. **OFF**: 21CFR traceability, part 11, is not ensured. In this case, all the adjustments are possible via the Control System display. **ON**: 21CFR traceability, part 11, is ensured. In this case, no adjustment is allowed via

Label	Function
	the Control System display.

11.6.2.5. Tank configuration

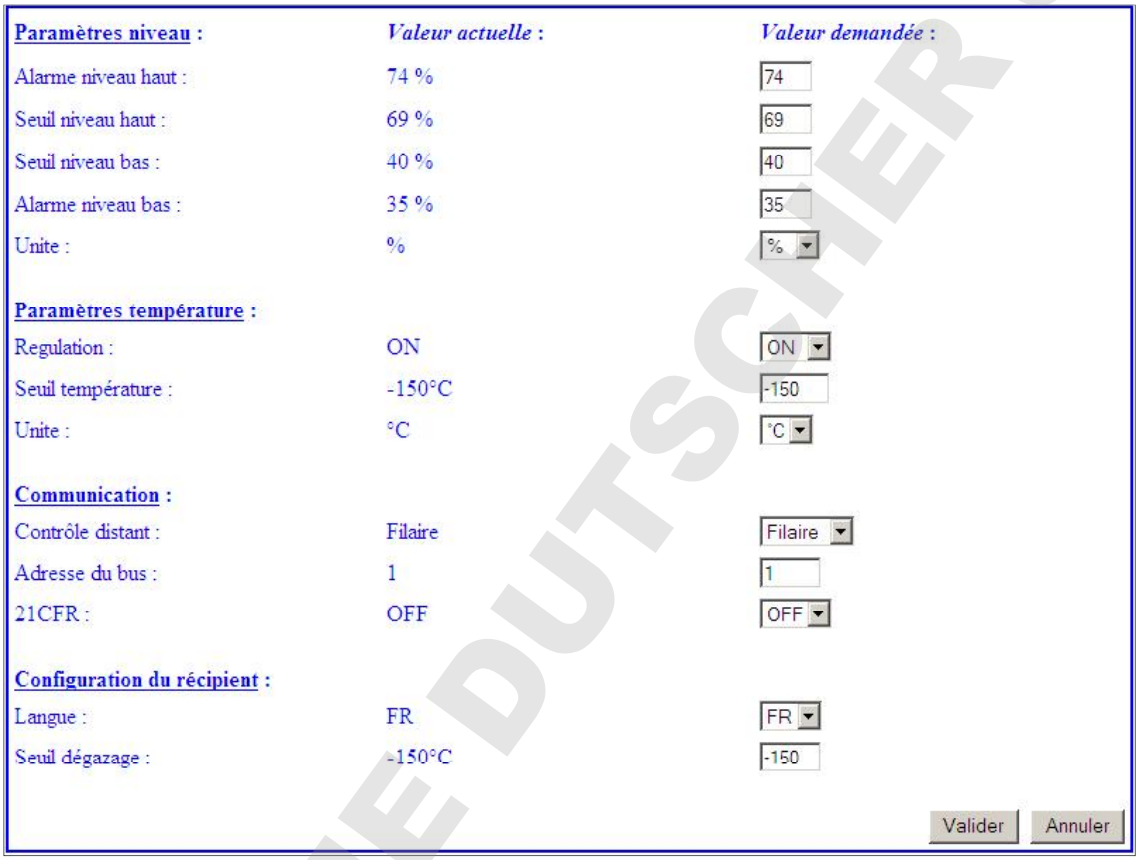

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Figure 11-34: Level Settings part.

Label	Function
Language	Selection of the menu display language (French, English, German, Spanish, Italian, Portuguese, Dutch). The reference language on the measurement and settings backup file is always English.
Blowdown threshold	Temperature at which the blowdown solenoid valve will be closed. The value may be modified on the following condition: -190°C (-310°F) < Blowdown threshold < -150°C (-238°F). If this condition is not respected, an error message will be displayed (in red). The

Label	Function
	new value is not confirmed by the integrated web server and will not be taken into account. It is not possible to modify the blowdown threshold value if the temperature unit is in °F.
Confirm	Confirms the modifications made
Cancel	Erases the value awaiting confirmation.

11.7. The Tank Description page

This page is only accessible after the user has logged in; the administrator is defined as indicated in section 11.1, page 68. The Tank Description page is used to add information specific to the tank. This data will be displayed in the Tank description zone in the screens that have this zone displayed.

11.7.1. Accessing the page

Proceed as indicated in section 11.3 on page 81 to access this page.

11.7.2. Page content

The figure below shows an example of a page.

Figure 11-35: top of the Settings page.

11.7.2.1. Logged in user

Figure 11-36: the Tank Description zone.

Each web page is identified on the integrated web server by its relative path, Home > Monitoring in this case.

The clock backed up by the integrated web server module as well as the *Logged in user* on the integrated web server are displayed. This information will be present on all the integrated web server pages.

Note: refer to section 11.1.2, page73, for how to update the clock.

11.7.2.2. Tank data

Figure 11-37: the Tank Description zone.

Label	Function
Type	Non-modifiable data provided by the Control System. Displays the tank type. The displayable types are: *ESPACE*, *RCB* and in the future *Arpège*.
Control	Non-modifiable data provided by the Control System. *Displays the type of control level* Liquid *or* Gas.
Capacity	Non-modifiable data provided by the Control System. Displays the capacity in litres of the connected tank.
Name	Non-modifiable data provided by the Control System. Displays the name defined by the logged in tank user. This header is modifiable by using the Control System display. (*Tank* screen). See instruction code NH78397.
Serial number	Non-modifiable data provided by the Control System. Displays the serial number for the connected tank.
Server version	Non-modifiable data provided by the Control System. Displays the version number for the application on the connected integrated web server.
Location	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the location of the connected tank.
Sample	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the content of the connected tank.
Others	Modifiable data provided by the integrated web server. Refer to the *Tank Description* section on page 96 for details. Displays the additional information relative to the connected tank.

11.7.2.3. Modification of Tank description

Figure 11-38: the Tank Description zone.

Label	Function
Location	Enter the location of the connected tank. A maximum of 50 characters is allowed.
Sample	Enter the contents of the connected tank. A maximum of 50 characters is allowed.
Others	Enter the additional information relative to the connected tank. A maximum of 50 characters is allowed.

Once the data has been entered, click on *Confirm* and close the page. The *Cancel* button deletes the entries in the *Location, Sample* and *Others* fields.

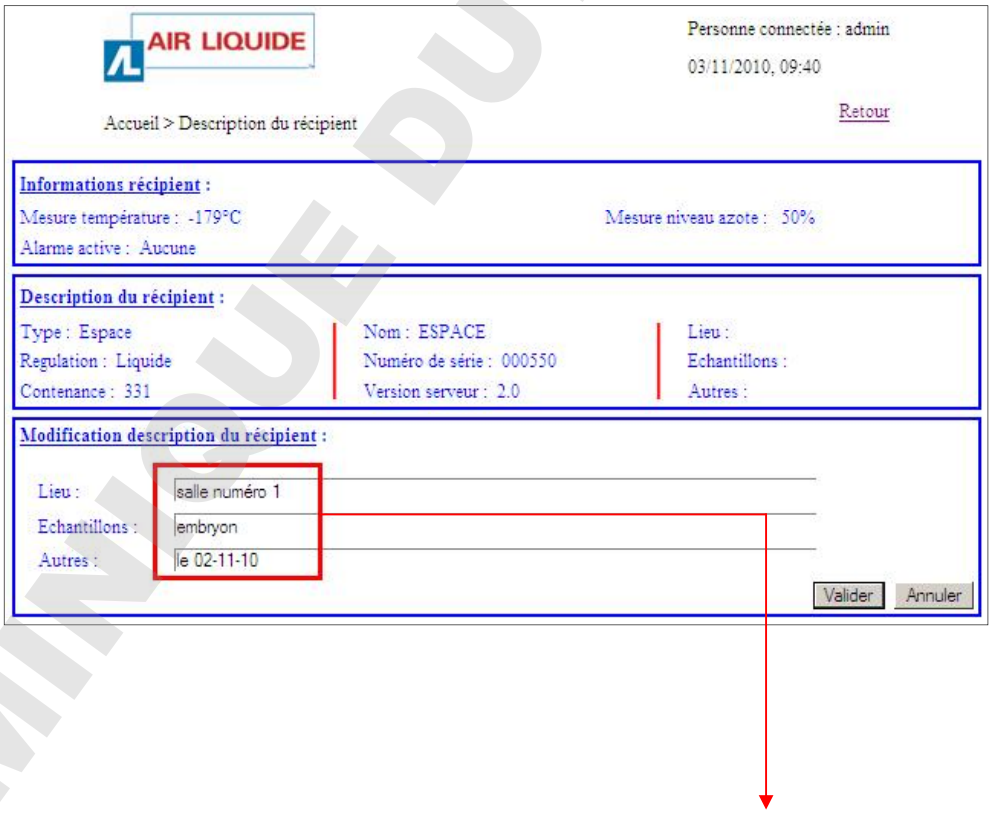

Figure 11-39: the Tank description zone and corresponding display in the various application pages

11.8. The Site Map page

This page, accessible from the Home page, displays an overview of the structure of the application pages.

11.8.1. Displaying the page

From the *Home* page, click on the *Site map* link.

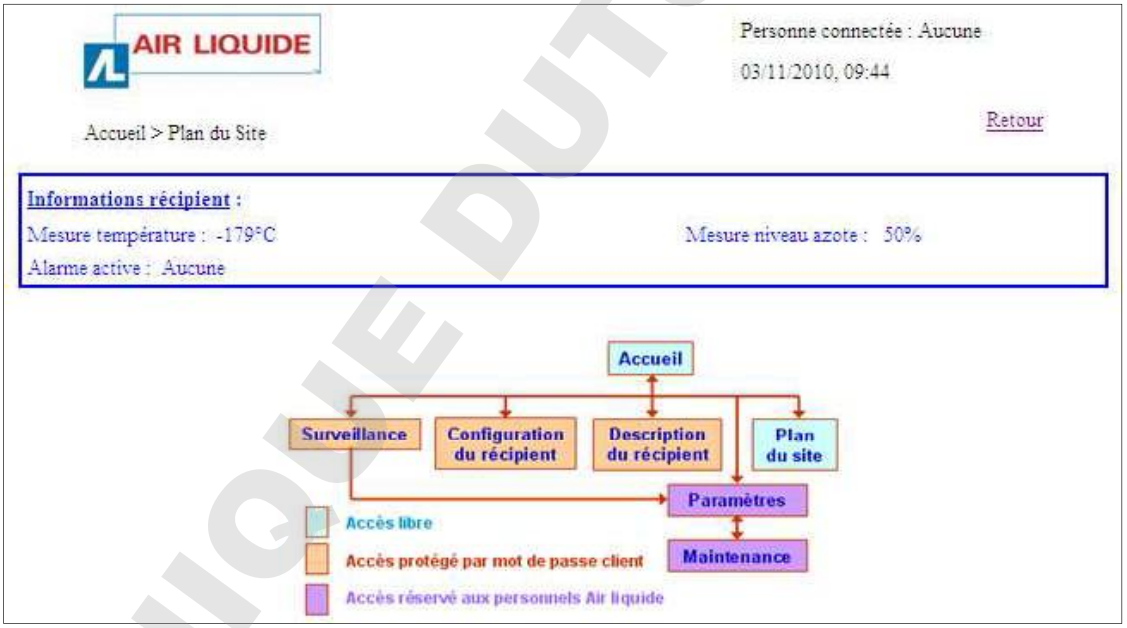

Figure 11-40: the Site Map page.

11.8.1. Page content

11.8.1.1. Tank information

Figure 11-41: the Tank information zone.

Label	Function
Temperature measurement	Data cannot be modified Current value, in °C, of the temperature inside the tank.
Nitrogen level measurement	Data cannot be modified Current value, in %, of the nitrogen level inside the tank.
Active alarm	Data cannot be modified This field indicates the presence of a triggered alarm. • None: no alarm is currently active. • Level sensors not working, *Filling Safety or overflow protection*, *Temperature threshold exceeded*, *Settings fault*, *Communication fault*, Level low alarm, Level high alarm, Temperature sensor no. 1, Temperature sensor no. 2, Blowdown fault, Power supply fault, EPROM fault, measurements overwritten: last alarm type activated.

11.8.1.2. Site architecture

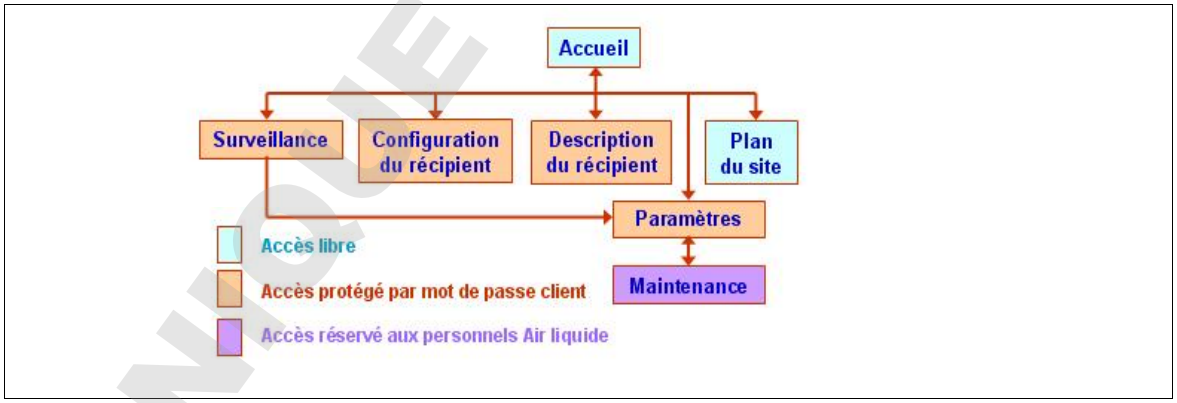

Figure 11-42: the site architecture

- The zones with a light blue background are accessible pages for any application user.
- The zones with a red background are pages accessible by users who have entered a login and password.

- The zone with a dark blue background is only accessible by *Cryopal* technical personnel. It allows comments to be added after maintenance work on the equipment, as well as viewing the calibration stops for the tank level sensor in question.

Figure 11-43: the maintenance page is only accessible to Cryopal personnel.

12. Connecting lines

This section concerns only cryogenic devices equipped with automatic and continuous *Cryomemo* filling system connected to the cryogenic supply line, generally a vacuum line.

For cryogenic tanks not equipped with automatic filling, filling will be carried out manually (refer to the user manual of the tank in question).

It is recommended to collect and channel heat expansion valves outside of the room and in a ventilated area.

The maximum pressure of liquid nitrogen supply must be below 3 bars (1.5 bar recommended). Using a higher pressure can damage the solenoid valve or prevent its proper operation.

Proceed as follows:

1. Connect the cryogenic tank liquid nitrogen supply connector to the vacuum line with the flexible cryogenic hose. This connector is located at the rear of the cryogenic tank.
2. Tighten the "ear" connections by hand.
3. Check that the supply hose connections are tight after cool-down.

12.1. GT 40 & Arpège

Figure 12-1: suggested fluid piping diagram.

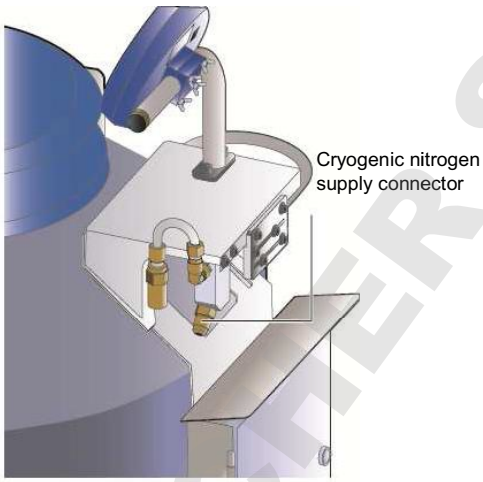

Figure 12-2: connecting the cryogenic tank to the cryogenic supply line.

12.2. ESPACE

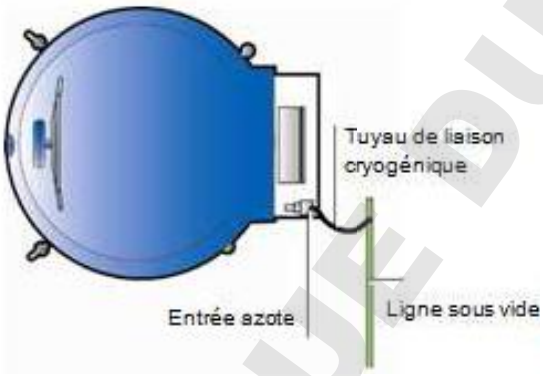

Figure 12-3: suggested fluid piping diagram.

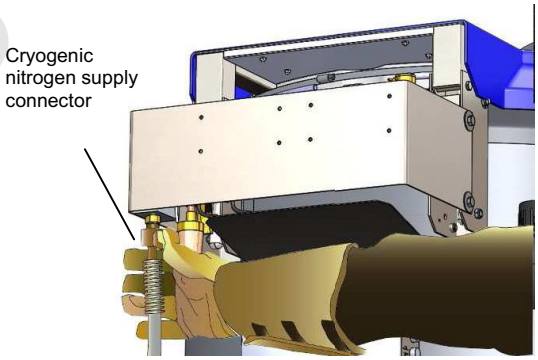

Figure 12-4: connecting the cryogenic tank to the cryogenic supply line.

12.3. RCB

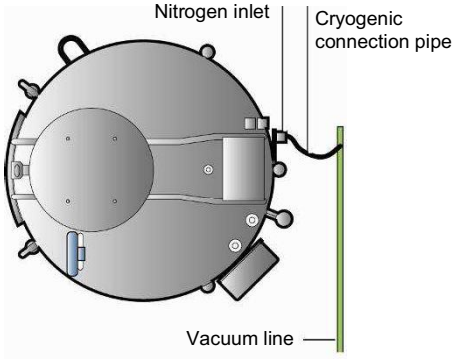

Figure 12-5: suggested fluid piping diagram.

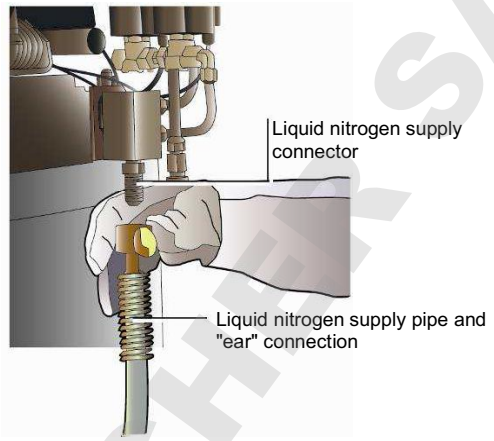

Figure 12-6: connecting the cryogenic tank to the cryogenic supply line.

13. Electric wiring

This section discusses the factory wiring (see the following pages).

13.1. Factory wiring reminder

Refer to section 7.1 on page 30.

13.2. Required cables

Function	Additional information	Type
Ethernet connection	Connection to the monitoring and parameter setting remote PC.	Ethernet with RJ45 plugs (not supplied).

13.3. Recommended cables according to the desired options

Function	Additional information	Type
Level measurement	4-20 mA output.	2 6/10 wires with screen and ferrites.
Temperature measurement	4-20 mA output.	2 6/10 wires with screen and ferrites.
Recording measurements specific to the user	RS 485 output.	2 6/10 wires with screen and ferrites.
Simultaneous filling control	Input from an external normally open (NO) dry contact.	2 6/10 wires without screen.
"Active filling" output	NO-NC dry contact output. Connection to an information device (indicator, etc.). The contact is activated during a filling cycle.	2 or 3 6/10 wires without screen.
Alarm output	Dry contact output NO-NC, for connection to an information device (indicator, etc.).	2 or 3 6/10 wires without screen, to adapt according to the consumption of the device connected to this output.

13.4. Ethernet socket

If necessary, to connect the *Ethernet* output (Figure 7-10, 3) to the Ethernet network linking the control unit to the *Cryopal* server to use the network functions (display, traceability).

13.5. RS 485 connector

The connection to the RS485 line will be carried out via the Clipper connector marked *RS485* located on the control unit.

Note: the earth (2 in the figure below) will be connected to the RS 485 receiver equipment “0 V” terminal.

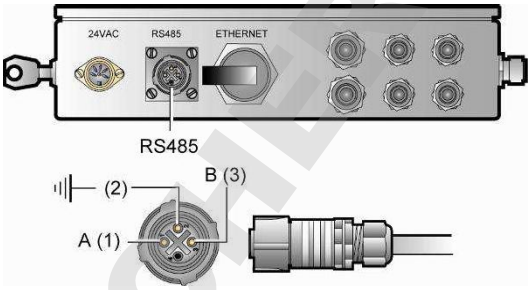

Figure 13-1: connector functions.

13.6. Power supply unit

Check that the following initial conditions are observed before connecting any equipment:

- Suitability between the installation characteristics (transfer lines) and the requirements for the devices/equipment in the room.
- The electric supply network quality will have to meet certain criteria, such as supply voltage, mains frequency, ground quality, backup power, etc.

Connect the control unit (
Figure 13-2, 1) to the power supply unit (2) with the provided cable (3), and to the single-phase 230 V AC mains 80 VA 50 Hz (4).

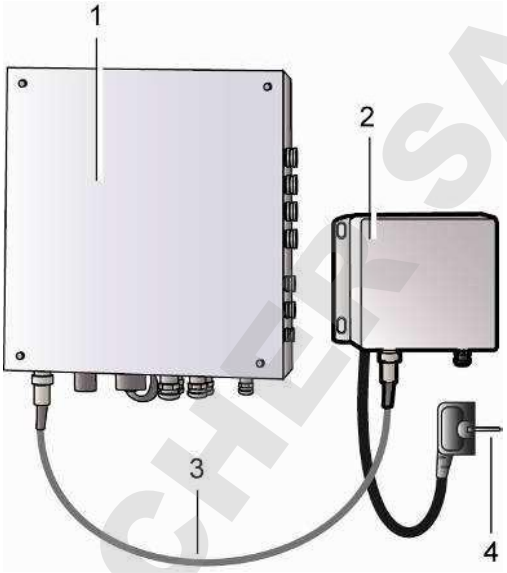

Figure 13-2: the power supply unit.

A main power failure does not cause a saved data loss. However, since the module is no longer supplied, the Ethernet communication and data recording are stopped.

Mounted on the wall at a sufficient distance from the ground to avoid any risk of splash during ground cleaning, it will be connected to:

- The electric mains (230 V AC, 1 A, with ground).
- The cryogenic tank control unit by the approx. 2.5 m cable provided, cable carrying 24 V AC power.

It is essential to install a disconnecting switch and a ground-fault circuit breaker on the mains line feeding the cryogenic tank power supply unit; no disconnecting device is provided on the delivered power supply unit.

In no event should the electrical unit be attached to the device.

14. Before using the equipment

This chapter summarises all actions to be undertaken in order to use equipment. It is sufficient to follow the paragraphs below and refer to the indicated references for a complete equipment use.

14.1. Electric wiring

Refer to section 13 on page 106.

Located at the rear of the cryogenic tank, the control unit will be connected to the user's equipment (PC, alarm devices, recorder, etc.) in accordance with the instructions provided in this manual.

14.1.1. Switching on

It is assumed that the Control Systems have been connected in compliance with section 12 on page 103 (Connecting lines) and section 13 on page 106 (Electrical wiring) and have a normal power supply.

Disconnect the *Ethernet* and/or *Modbus* network connection if it was already connected to prevent any risk of a false network alarm. When switching on, certain alarms would be set off and retransmitted to the server. Warn your safety officer that you are starting up the cryogenic tank, if required.

1. Move the main disconnecting switch supplying the power supply unit to "On" position.
2. Reconnect the *Ethernet* and/or *Modbus* network connection.

14.2. Configuring the control unit

The control unit will configured in line with the instructions given in this manual.

The safety of the samples will only be assured if the system were correctly set up, the definition of some of these parameters and thus the system operation conditions is the owner's responsibility.

Proceed as follows:

Action	See section
Enter the *Settings* menu.	10.2
Display language definition	
Select *Configuration*.	10.3
▪ Define the display language	10.8
Return to the *Settings* menu.	10.3
Tank settings definition*	
Select *Tank*.	10.3
▪ Define the tank parameters.	10.9
Return to the *Settings* menu.	10.3
Definition of thresholds and units (levels and temperature)	
Select *Levels*.	10.3
▪ Define the thresholds, alarms and level units of the levels.	10.5
Return to the *Settings* menu.	10.3
Select *Temperatures*.	10.3
▪ Define the thresholds and units of the temperatures.	10.6
Return to the *Settings* menu.	10.3
Definition of communication parameters	
Select *Communication*.	10.3
▪ Define the communication parameters.	10.7
Return to the *Settings* menu.	10.3
Return to the *Settings* menu.	10.3
Possible password definition	
Select *Configuration*.	10.3
▪ Define the password if necessary.	10.8
Return to the display of values.	9.5.1

Using the indicator	
The indicator is ready for use.	9.5.2

14.3. IP address configuration - Web server

*This first **temporary** parameter will be mandatory on a directly connected PC linked to the Control System using a crossover cable (Figure 7-2, page 33).*

Upon delivery, the IP address for the Control System is configured to 172.31.80.35. It is therefore necessary to modify it in order to prevent any address conflict with other Control Systems connected at a future time.

The user will need to have the following equipment available to perform the task:

- A PC with a *Windows XP/Vista/7/8/10* operating system.
- A crossover Ethernet cable.
- One or more Control Systems on which each fixed IP address will be configured.

14.3.1. General operating procedure

This paragraph presents, in a simplified manner, the work that will be done for each of the Control Systems to be linked to the PC via an Ethernet link. These are detailed in sections 14.3.2 to 14.3.6.

The procedures described in this section will be performed on site, for each of the Control Systems, **exclusively** via a crossover Ethernet cable connected between the Control System's Ethernet installed on the tank and the PC; there should not be any connection to a network at this point. The actions will be performed in the following order:

- PC IP address configuration (section 14.3.2).
- Local connection to the integrated web server to be configured up to the PC using the crossover Ethernet cable
- Configuring the Control System connected to the PC (section 14.3.4).
- Disconnect the Ethernet crossover cable (section 14.3.5).
- If necessary, similar steps at the four points described above for each of the other Control Systems using crossover (section 14.3.6).

- For a site where there are several Control Systems, the connection of non-crossover cables of all the Control Systems to a network or to a switch (section 14.3.7). For a site that has a single Control System, its connection to the PC via Ethernet crossover cable (Figure 7-2, page 33) or through a switch (Figure 7-3 or Figure 7-4) using a normal Ethernet cable (not crossover).
- Confirm settings of the Control System(s) (via the display unit - section 10.3, page 57 or via the web server - section 11.2.1.5, page 80).

14.3.2. PC IP address test

Proceed as follows:

1. The Control System is normally installed on the tank and supplied with 24 V DC.
2. Connect an Ethernet crossover cable between the PC and the Ethernet connector from the Control System in accordance with Figure 7-2 on page 33.

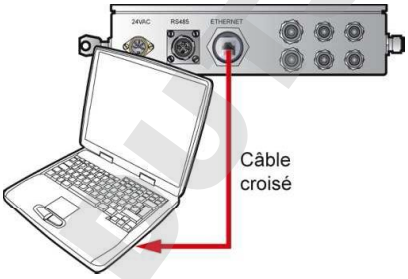

Figure 14-1: location of the Ethernet connector and the connection to the PC via Ethernet crossover cable.

3. On the PC, start Windows.
4. Access the network configuration by successively selecting *Start* > *Parameters* > *Network cards* > *Local network connection*.

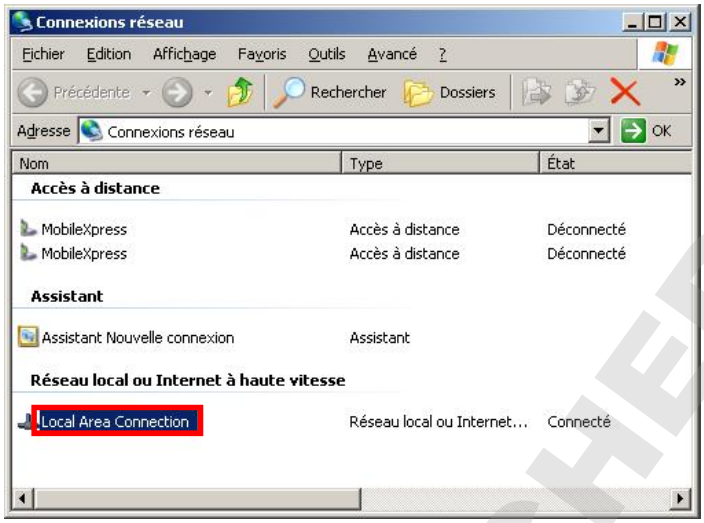

Figure 14-2: the "Local area connection" icon.

5. Double-click on this icon. In the *General* tab, click the *Properties* button.

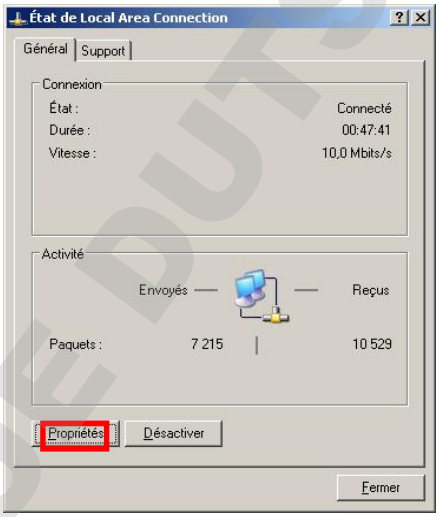

Figure 14-3: the General tab.

6. In the *Local Area Connection Properties* window, select *Internet Protocol (TCP/IP)* and click *OK*.

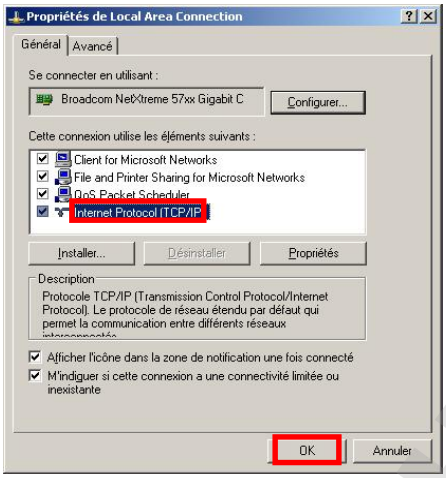

Figure 14-4: the General tab.

7. In the window being displayed, check that the *IP Address* field for the PC is **different** from 172.31.80.35. Effectively, this address, which is actually that of the PC, must be different from the default address for the integrated web server.

   If this address is identical to 172.31.80.35, click on the *Use next IP address* radio button and temporarily modify that address, for example, by entering a different address such as 172.31.80.36.

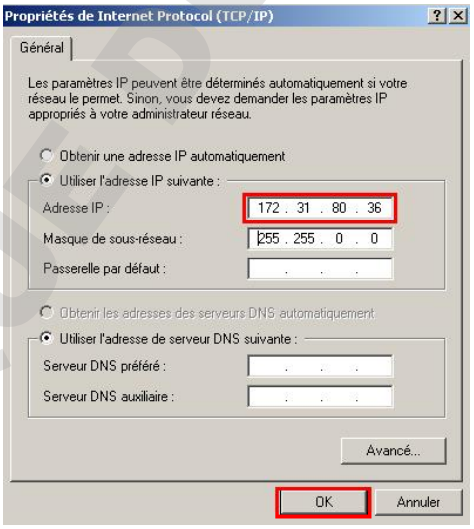

Figure 14-5: the PC's IP address indicated here must be different to 192.168.1.100.

8. Click on OK and close the set of open windows.

14.3.3. Temporary connection to the integrated web server

Proceed as follows:

1. On the PC, launch the internet browser (Internet Explorer, Firefox, etc.).
2. In the address bar, enter http://172.31.80.35.

Figure 14-6: entering the base address for the integrated web server.

3. Confirm using the *Enter* key. The integrated web server's *Home* page is displayed.

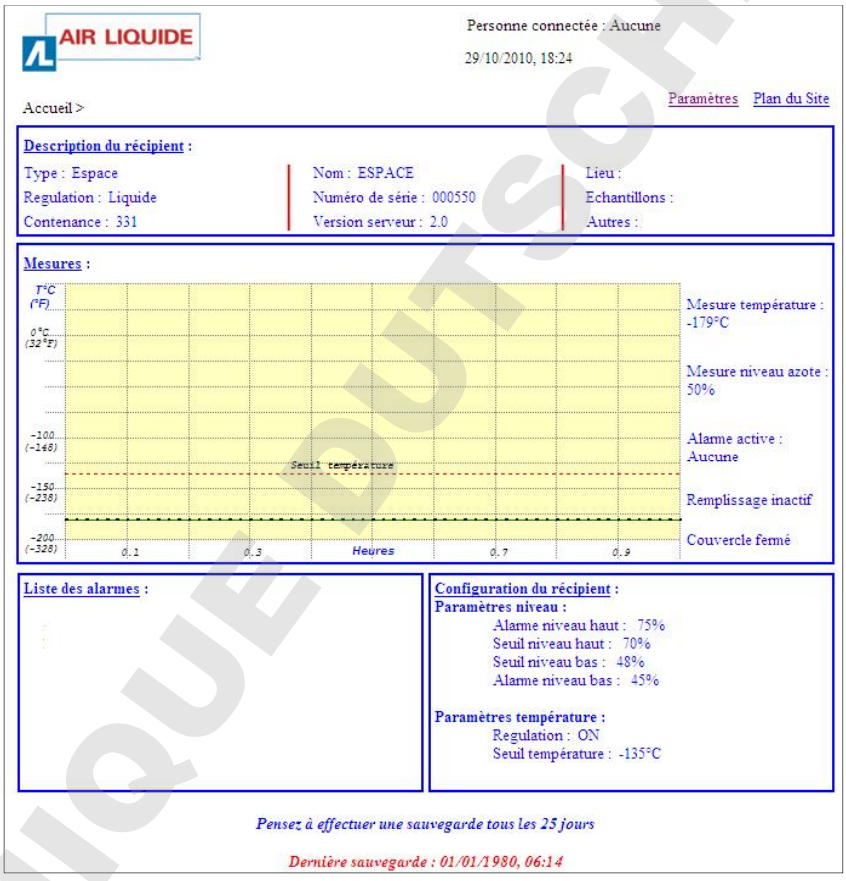

Figure 14-7: integrated web server Home page.

14.3.4. Control System address settings

Access to the *Settings* page:

Proceed as follows:

1. On the Control System, flip the IP address configuration key (Figure 14-8, 1) in the vertical position.

> The key does not prevent the modification of the parameters (except the IP address), it only prevents the remote modification of the IP address.

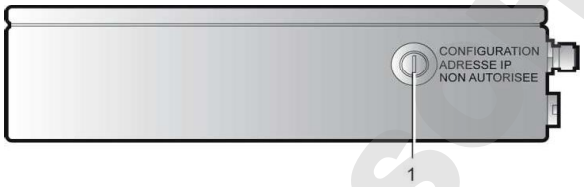

Figure 14-8: The 2-position lock must be in the vertical position to configure the IP address on the Settings page.

2. With the internet browser displaying the integrated web server's *Home* page (see Figure 14-7), click on *Settings*.

Figure 14-9: integrated web server Home page.

3. Enter the *Username* and click *Confirm*.

   The default username is 'admin'.

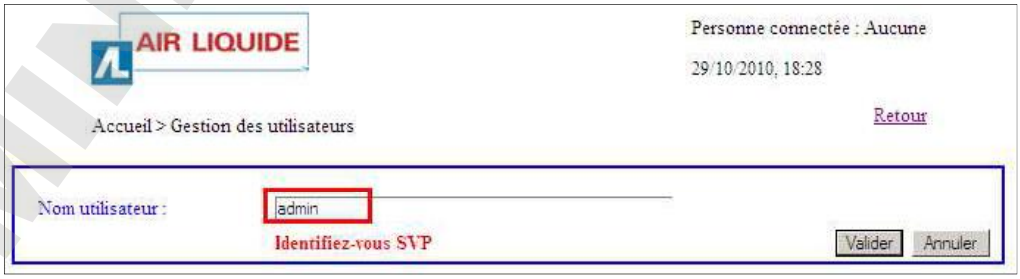

Figure 14-10: first User Management window.

4. In the page being displayed, click *Settings* and *Confirm*.

Figure 14-11: second User Management window.

5. Enter the *Username* and *Password* and click OK.
   (The default *Username* and *Password* are 'admin').

Figure 14-12: entering the additional login and password for the integrated web server.

5. The integrated web server settings page is displayed.

Figure 14-13: the integrated web server Settings page.

Configuring the integrated web server IP address

Proceed as follows:

Remember: the key must be in the horizontal position in order to allow writing into the IP Address field.

1. If the Control System must be installed on an Ethernet network, get an IP address from the network administrator. Enter a network address in the xxx.xxx.xxx.xxx format.
2. In the page displayed, click on the *IP Address* zone and enter the new IP address for the integrated web server.

Figure 14-14: modification of the IP address in the Settings page for the integrated web server.

3. Note this address in the table on page 164.
4. Then click the *Confirm* button. Then log back in on via Internet Explorer to this new IP address for the server and access the *Home* page.
   The integrated web server has a new address from now on.

The page is automatically closed after a period of inactivity.

5. The other modifications that can be made by the user are outlined in section 11.1 on page 68.

14.3.5. Disconnecting the Ethernet crossover cable

1. Disconnect the Ethernet cable from the Control System.
2. The Control System's IP address is now configured.

14.3.6. Other integrated web servers

If other integrated web servers need to be installed on a network and/or switch, do the same as described in sections 14.3.2 to 14.3.5 for each of them, in order to assign a unique IP address on each network.

A summary table is provided on page 164.

14.3.7. Connection of the Control Systems to the network

For a single Control System, you can use a crossover cable dozens of metres long. However, it is recommended to use at least one switch.

When using the network (one of the topologies described in section 7.3.1 on page 32), proceed as follows:

1. Remove the crossover cable and link the Control System to the network using a non-crossover cable.

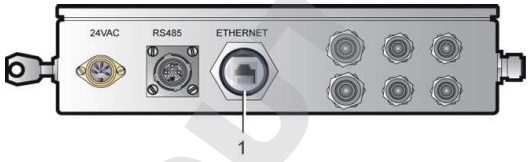

Figure 14-15: location of Ethernet connector.

2. Connect the PC to the network.
3. Proceed to section 14.3.8 on page 120.

14.3.8. Finalising the settings

If the laptop's IP address has been modified (see section 14.3.2 on page 112), reassign the initial address.

The finalisation of the settings consists of a complete definition of the various parameters for each integrated web server. Continue to the next section.

15. Using the equipment

15.1. Display of measurements

Refer to the values described in section 9.4 on page 49.

15.2. Level management

This paragraph details the equipment's main usage phases as well as the references back to explanatory sections. The equipment is installed.

Action	See section
Display the current nitrogen level	9.5.2
Nitrogen level alarm: define or change the threshold	10.5
Nitrogen level alarm: display alarm status	9.5.2
Level alarm: acknowledge audible and visual alarm	9.6 9.7
Calibrate the sensor values corresponding to 0% and 100% levels	10.9.110.9.2
Nitrogen filling solenoid valve: manual remote control	15.5
Password: enter the password	10.1
Password: set/reset the password.	10.8
Nitrogen level: display	9.5.2
Current settings: show alarm setting(s)	10.5
Display the current settings	9.5.2 (Info)

15.3. Temperature management

Action	See section
Display the current temperatures.	9.5.2
Temperature alarm: define or change the threshold	10.6
Temperature alarm: display the status	9.5.2
Temperature alarm: acknowledge audible and visual alarm	9.6 9.7
Password: enter the password	10.1
Password: set/reset the password.	10.8
Set the system parameters.	10.1
Current settings: show temperature alarm setting	10.6
Current temperature: display	9.5.2 (Info)
Display the current settings	9.5.2 (Info)

15.4. Acknowledging the audible alarm

A few seconds after an alarm occurs (level, temperature, fault, etc.) the audible (buzzer) and visual (front facing LED) alarms are activated. Pressing the or key acknowledges (stops) the audible alarm. The visual alarm remains activated, as well as the corresponding relay.

The visual alarm will only disappear automatically once the cause of the alarm is no longer present. The relay will change to the no-alarm state as well.

15.5. Manual filling

This type of filling allows you to fill or top up the liquid nitrogen level of a cryogenic tank already containing liquid nitrogen. Manual filling is carried out on the user's request by pressing the push button (Figure 15-1, 1), when the tank's liquid nitrogen level needs to be topped up.

General procedure (GT 40/Arpège/ESPACE/RCB):

- **Hold**: press down on the push button and release it when the desired level is reached. While holding down this button, the filling solenoid valve is powered and the blowdown function stops.

- **Four successive presses in less than 2 seconds**: tank filling is launched. It is automatically stopped when the High level (UCL) is reached (see Figure 15-2 to Figure 15-19). The blowdown function is activated if the option is present and the temperature on the blowdown sensor is not reached.

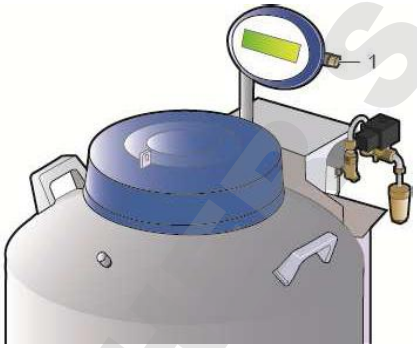

Figure 15-1: the manual filling push button.

15.6. Automatic filling

This filling type is automatically generated by the equipment. Automatic filling is activated when:

- The tank level reaches the low threshold.
- The internal temperature is higher than the alarm temperature, when the *Temperature compensation* mode is active.

This type of filling can also be carried out on demand by using the push button (4 successive presses), the simultaneous filling wired input (J10), or by sending a request via the RS485 bus (*Modbus*).

For this request to be effective, the level must be greater than 1%.

15.6.1. GT 40 & Arpège

The GT 40 and Arpège 40 containers do not have a control function to trigger automatic filling.

Liquid and gaseous phases

1. Check that the liquid nitrogen supply hose is correctly connected, in accordance with section 12 on page 103.

Modify the cryogenic device's control and/or alarm thresholds if required. Refer to section 10.5 and 10.6.

2. Open the liquid nitrogen supply valve on the cryogenic device.
3. When switched on, the *Cryomemo* starts filling automatically as far as the high level. As the level is managed by the control unit, the tank is filled up to the upper threshold set on the display.

   Depending on the cryogenic device's capacity, this step can last several hours. It will stop automatically when the programmed upper threshold is reached.
4. After a thirty minute stabilization, verify that the level reached corresponds to the programmed level with the help of the measurement scales (see the figures in section 15.8) and the provided level indicator.

According to the manufacturing tolerances and measurement method, a difference between the measurement taken and the theoretical measurement is normal. This difference remains acceptable as long as it does not exceed 5%.

5. An hour after filling is complete, top up by starting an automatic fill (four quick presses on the manual filling button).
6. For each configuration, check the cryogenic device filling levels regularly for one week. These must be within the tolerance ranges specified in section 15.8 on page 127.

During the first and subsequent fills, ensure that the device filling time does not exceed 60 minutes. If this is the case, contact your distributor responsible for maintenance.

15.6.2. ESPACE & RCB

Liquid phase:

Modify the cryogenic tank control and/or alarm thresholds if required. Refer to section 10.5 and 10.6.

The cryogenic tank is completely empty. Proceed as follows:

1. Since filling is not automatically activated by the control unit, manually fill the tank with a hose, while leaving the cap wide open, until the automatic filling starts.
2. As the level is managed by the control unit, the tank is filled up to the upper threshold set on the display.
   Depending on the cryogenic tank's capacity, this step can last several hours. It will stop automatically when the programmed upper threshold is reached.
3. After a thirty minute stabilisation, verify that the level reached corresponds to the programmed level with the help of the measurement scales (see the figures in section 15.8) and the provided strip.

According to the manufacturing tolerances and measurement method, a difference between the measurement taken and the theoretical measurement is normal. This difference remains acceptable as long as it does not exceed 5%.

4. For each configuration, check the cryogenic tank filling levels regularly for one week.
   These must be within the tolerance ranges specified in section 15.8 on page 127.

Gaseous phase:

The cryogenic tank is completely empty. Proceed as follows:

1. Since filling is not automatically activated by the control unit, unlock the key lock on an assisted cap and open the cap. Manually fill the tank with a hose, while leaving the cap wide open, until the automatic filling starts.
2. When the liquid level reaches approximately 50% of the height available under the spill plate, stop the nitrogen filling by closing the nitrogen inlet manual valve.
3. Wait 30 minutes.
   This phase is essential because of the time necessary to cool down the nitrogen level sensor.
4. After this break, open the nitrogen inlet manual valve.
5. As the level is managed by the control unit, the tank is filled up to the upper level set on the display.
   Depending on the cryogenic tank's capacity, this step can last several hours. It will stop automatically when the programmed upper threshold is reached.

6. After a thirty minute stabilisation, verify that the level reached corresponds to the programmed level with the help of the measurement scales (see the figures in section 15.8) and the provided strip.

> According to the manufacturing tolerances and measurement method, a difference between the measurement taken and the theoretical measurement is normal. This difference remains acceptable as long as it does not exceed 5%.

7. For each configuration, check the cryogenic tank filling levels regularly for one week.
   These must be within the tolerance ranges specified in section 15.8 on page 127.

15.7. Semi-automatic filling

This filling type is carried out by manual request as follows.

This type of filling can also be carried out on demand by using the push button (4 successive presses), the simultaneous filling wired input (J10), or by sending a request via the RS485 bus (*Modbus*).

> For this request to be effective, the level must be greater than 1%.

Purpose	Action or result
	The indicator displays the measurement screen.
	Enter the *Settings* menu (see section 10.2, steps 1 to 8).
	Using the  or  keys, select *4. Configuration.*
	Using the  or  keys, select *Auto-Filling* and confirm ().
	The screen is displayed as shown opposite.
	Using the  or  keys, select *On* (activate automatic filling) or *Of* (deactivate automatic filling).
	Confirm ().

Return to the measurements display by pressing several times.

15.8. Filling level

Devices equipped with Cryomemo have a liquid nitrogen level temperature monitoring system with alarm transmission.

Each of the following sections shows the cryogenic tank internal part and, more particularly, the position of the racks or canisters, as well as the level gauge measurement range and alarm thresholds.

The following acronyms are used:

Acronym	Information
NS	Maximum liquid nitrogen filling level.
NI	Minimum liquid nitrogen filling level.
NI-NS	NI-NS is the adjustable minimum difference (10%) between high and low thresholds.
A	High alarm
B	High threshold
C	Low threshold
D	Low alarm
❶	Recorded heights (mm)
❷	Level in % of measurement range in liquid phase
❸	Level in % of measurement range in gaseous phase

The alarm thresholds listed are the default values (factory settings).

15.8.1. GT 40 & Arpège

GT 40: Products with this model must only be stored in liquid state.

Arpège 40: Products with this model must only be stored in liquid state.

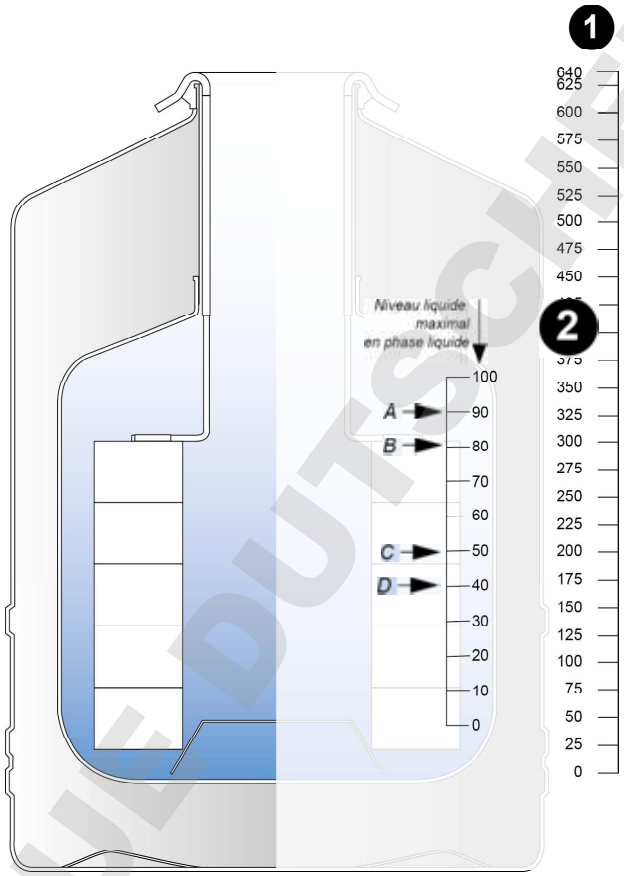

Figure 15-2: Arpège 40 – Liquid phase – measurement scale

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]
100%	40

Arpège 55: Products with this model must only be stored in liquid state.

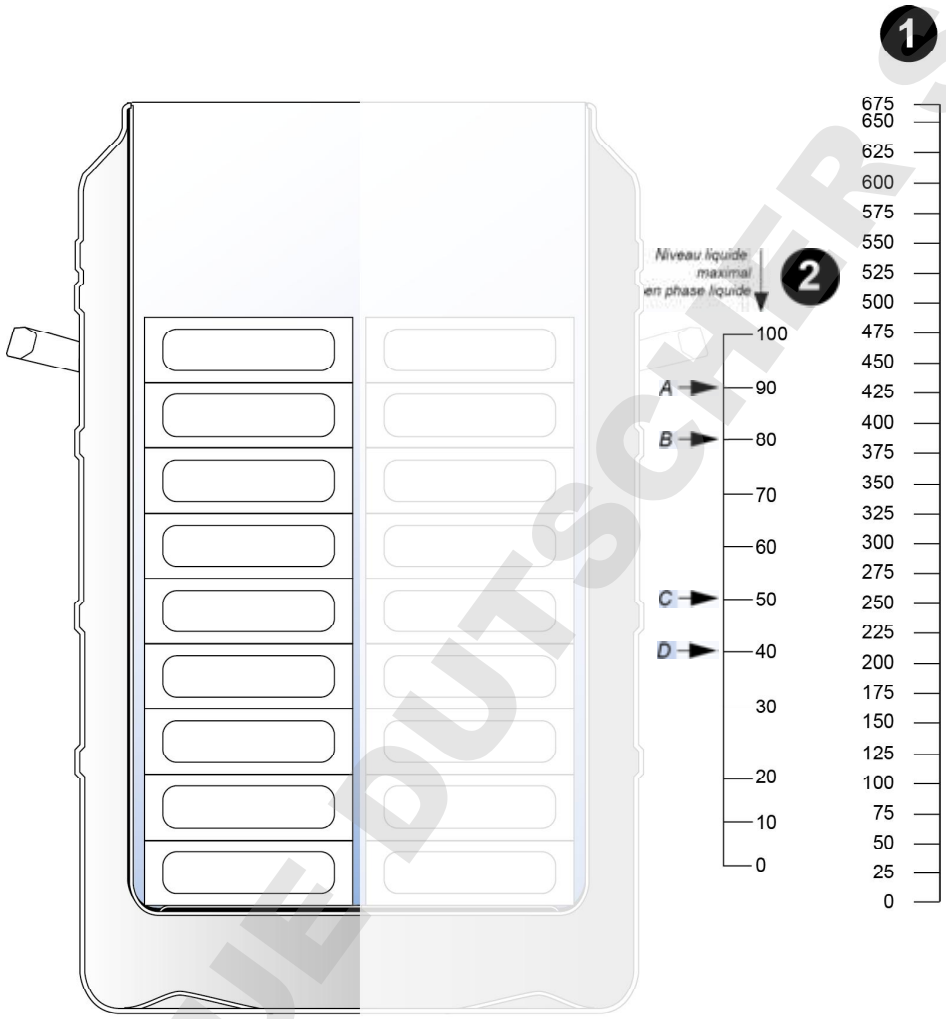

Figure 15-3: Arpège 55 – Liquid phase – measurement scale

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]
100%	55

Arpège 75: Products must only be stored in liquid state.

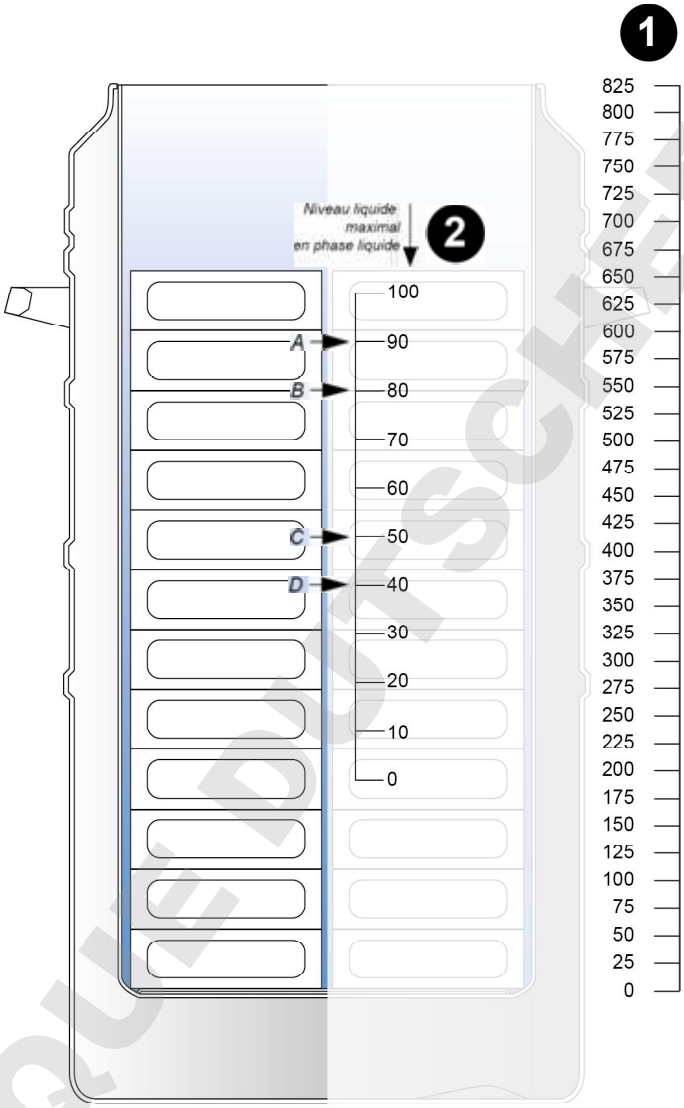

Figure 15-4: Arpège 75 – Liquid phase – measurement scale

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]
100%	72

Arpège 70: Products can be stored in liquid or gaseous state.

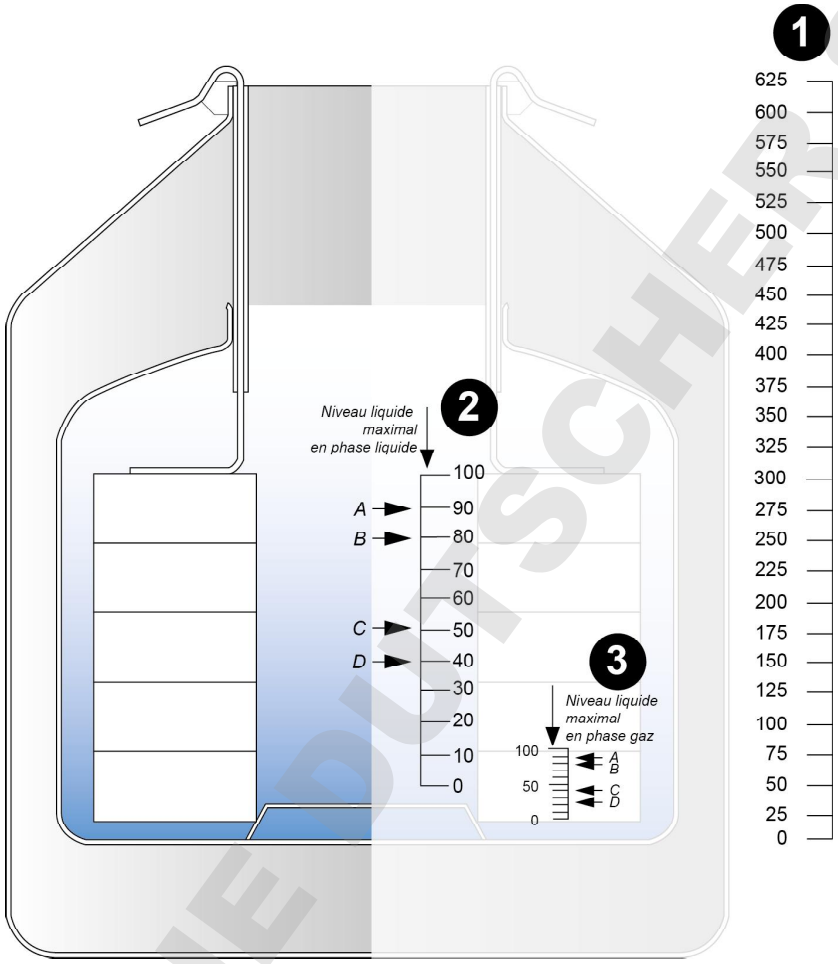

Figure 15-5: Arpège 70 – Liquid and gaseous phases – measurement scale

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
100%	72	15

Arpège 110: Products can be stored in liquid or gaseous state.

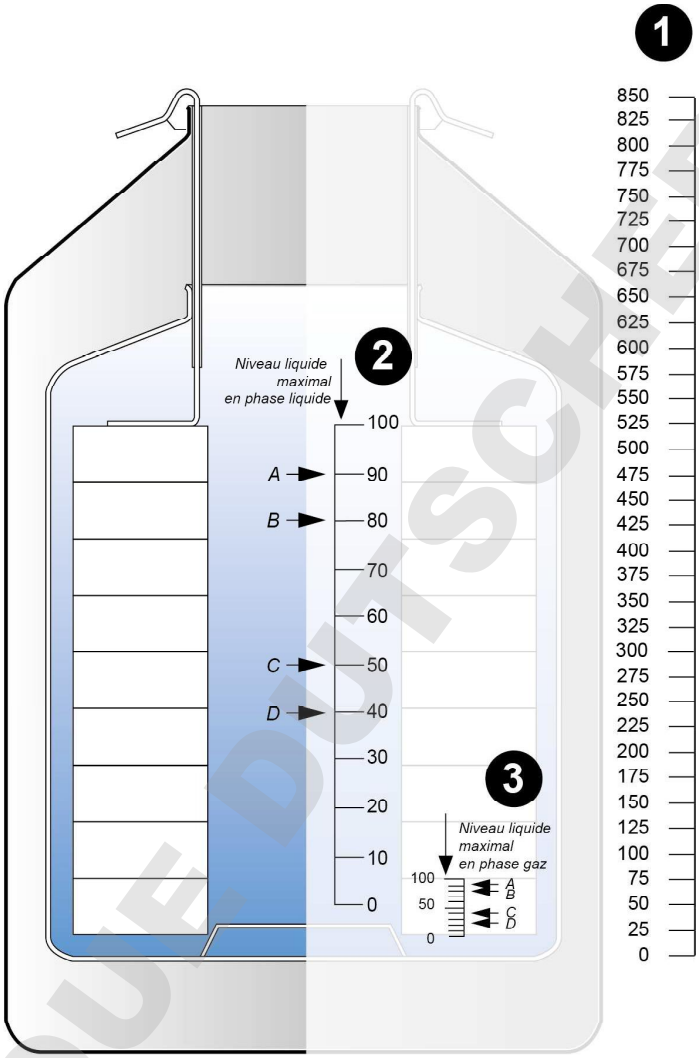

Figure 15-6: Arpège 110 – Liquid and gaseous phases – measurement scale

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
100%	116	15

Arpège 140: Products can be stored in liquid or gaseous state.

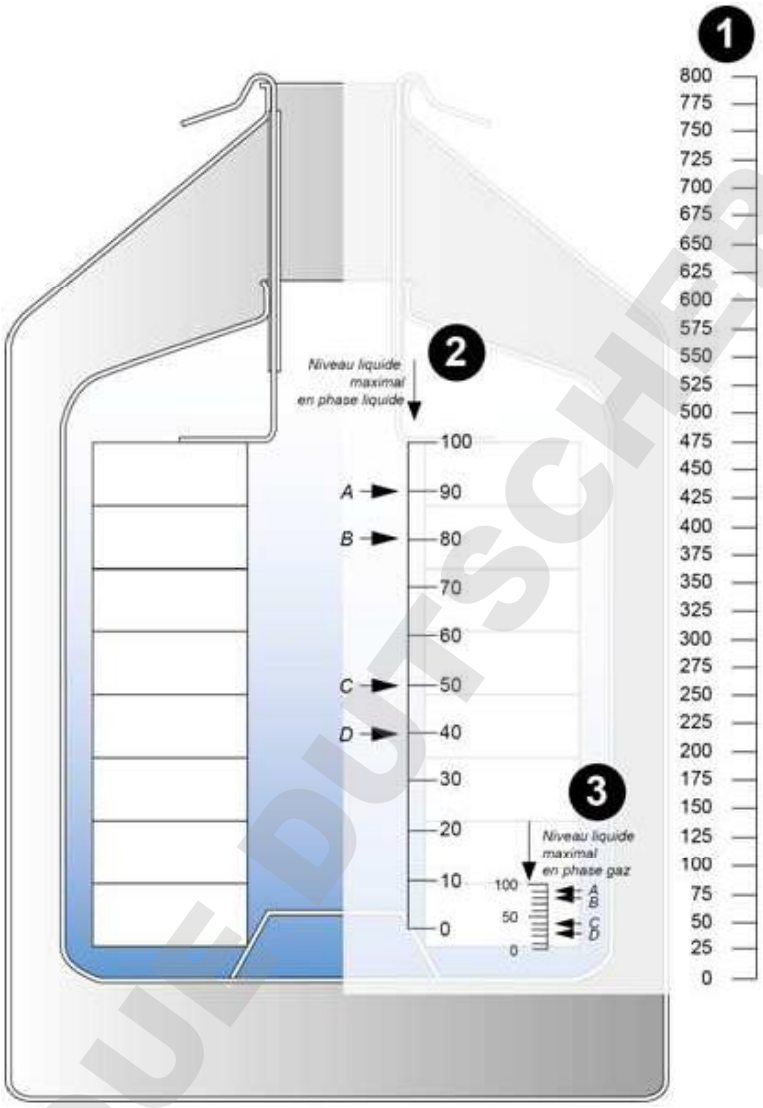

Figure 15-7: Arpège 140 – Liquid phase – measurement scale

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
100%	144	20

Arpège 170: Products can be stored in liquid or gaseous state.

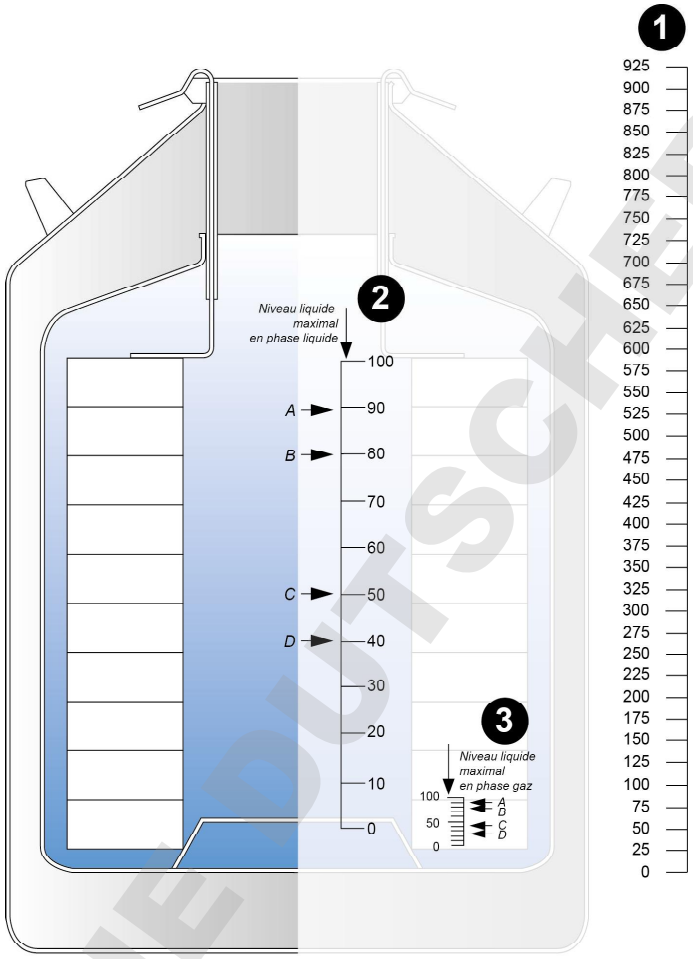

Figure 15-8: Arpège 170 – Liquid and gaseous phases – measurement scale

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
100%	172	20

15.8.2. ESPACE

ESPACE 151

Products can be stored in liquid or gaseous state.

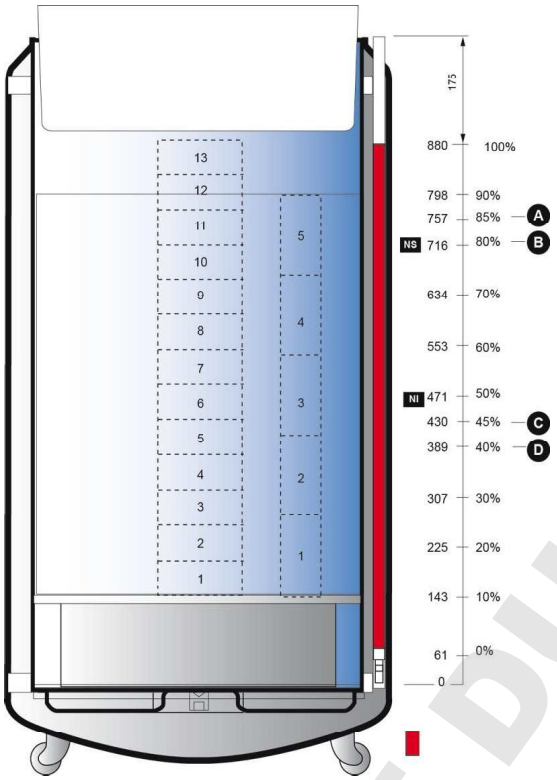

Figure 15-9: ESPACE 151 - liquid state - measurement scale.

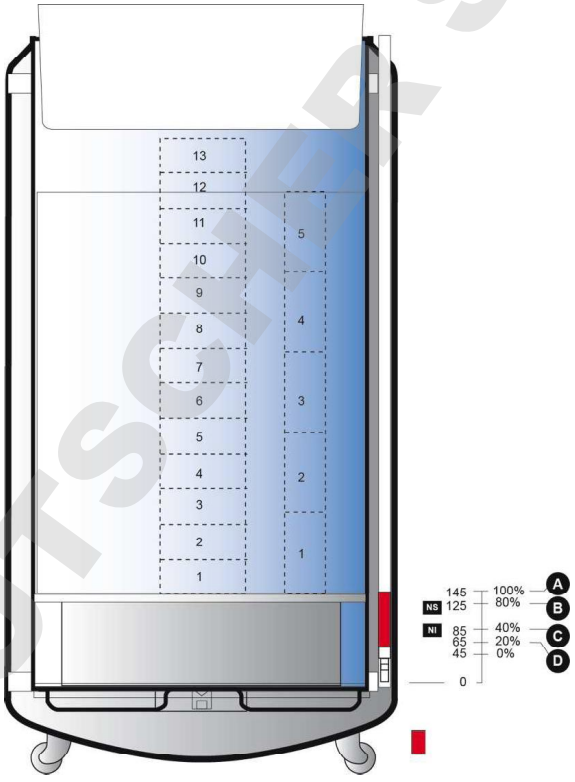

Figure 15-10: ESPACE 151 - gaseous state - measurement scale.

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
Stationary Tank	5	5
0%	5	5
20%	43	9
40%	80	14
80%	155	23
100%	193	27

ESPACE 331

Products can be stored in liquid or gaseous state.

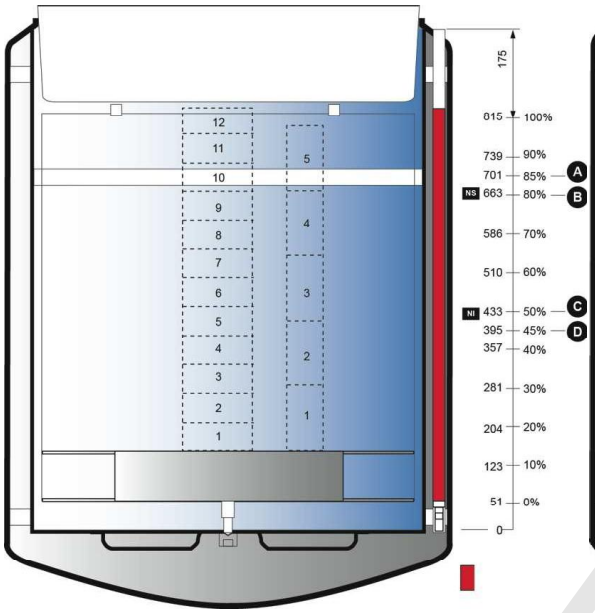

Figure 15-11: ESPACE 331 - liquid state with revolving basket - measurement scale.

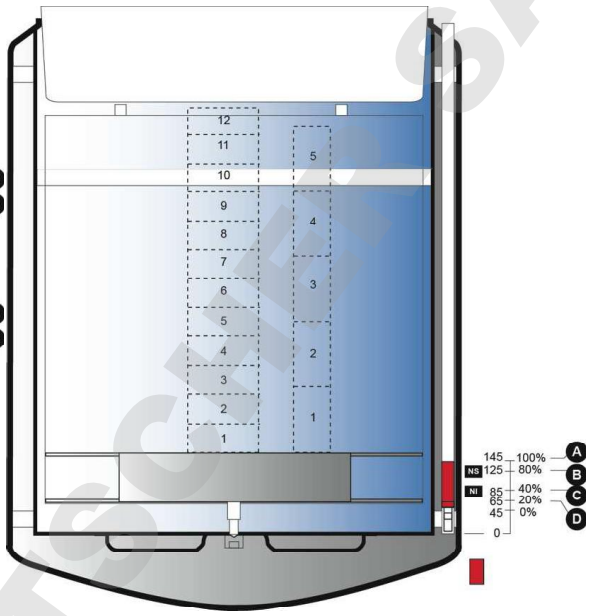

Figure 15-12: ESPACE 331 - gaseous state with revolving basket - measurement scale.

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
Stationary tank	23	23
0%	23	23
20%	94	32
40%	166	42
80%	309	61
100%	380	70

ESPACE 661

Products can be stored in liquid or gaseous state.

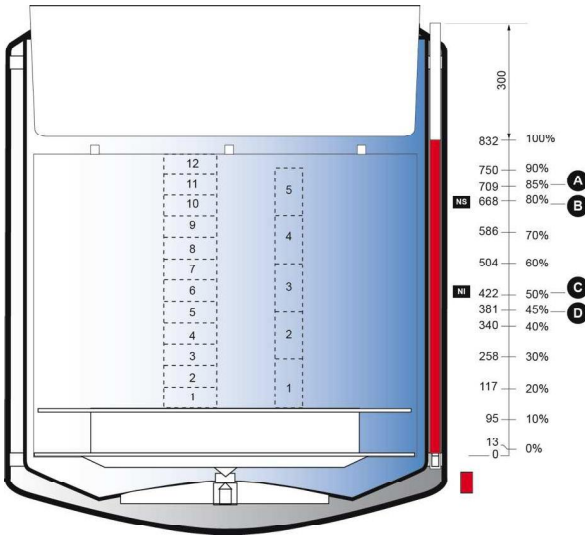

Figure 15-13: ESPACE 661 - liquid state with revolving basket - measurement scale.

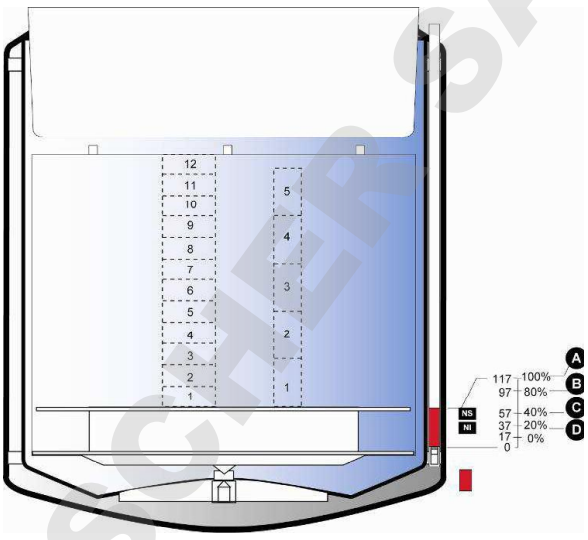

Figure 15-14: ESPACE 661 - gaseous state with revolving basket - measurement scale.

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
Stationary tank	90	90
0%	90	90
20%	231	107
40%	372	124
80%	654	159
100%	795	176

15.8.3. RCB

RCB 500

Products must only be stored in liquid state.

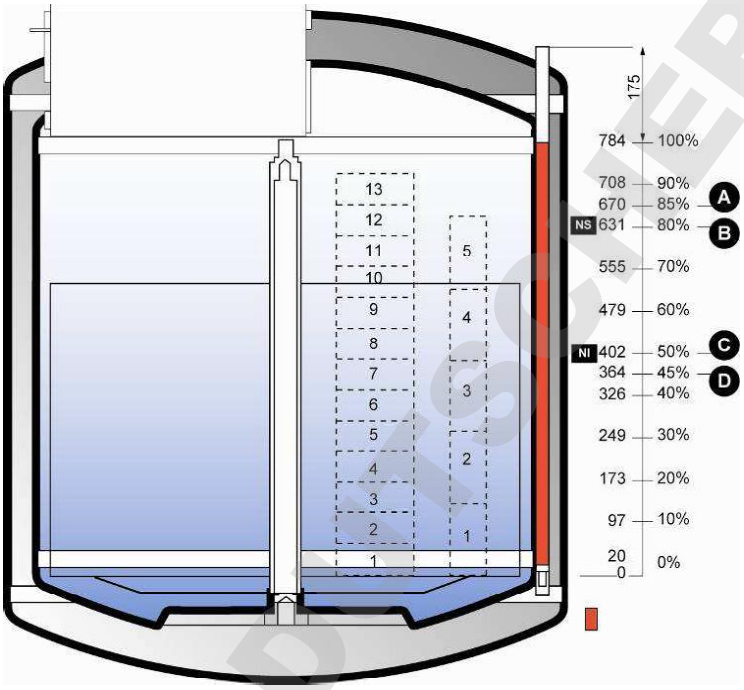

Figure 15-15: RCB 500 - measurement scale.

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]
Stationary tank	45
0%	45
20%	142
40%	239
80%	433
100%	530

RCB 600

Products can be stored in liquid or gaseous state.

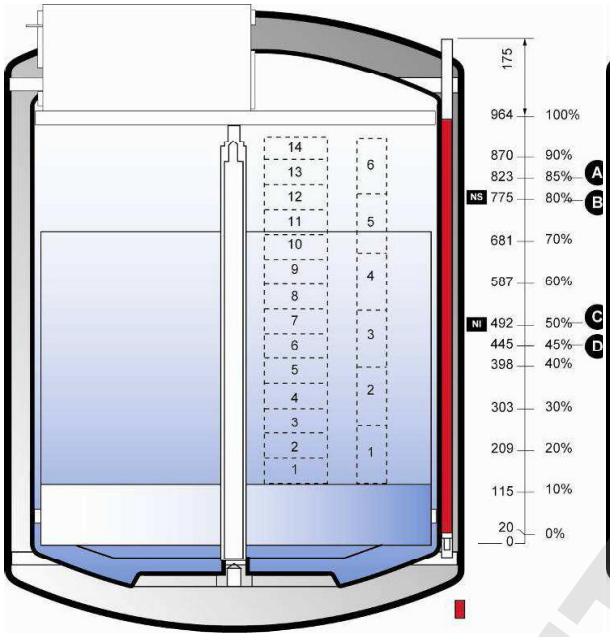

Figure 15-16: RCB 600 - liquid state - measurement scale.

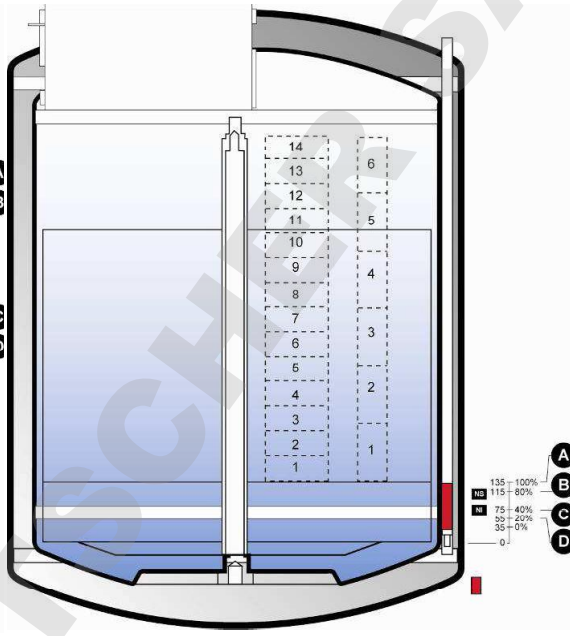

Figure 15-17: RCB 600 - gaseous state - measurement scale.

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
Stationary tank	45	45
0%	45	45
20%	165	58
40%	284	71
80%	523	96
100%	643	109

RCB 1001

Products can be stored in liquid or gaseous state.

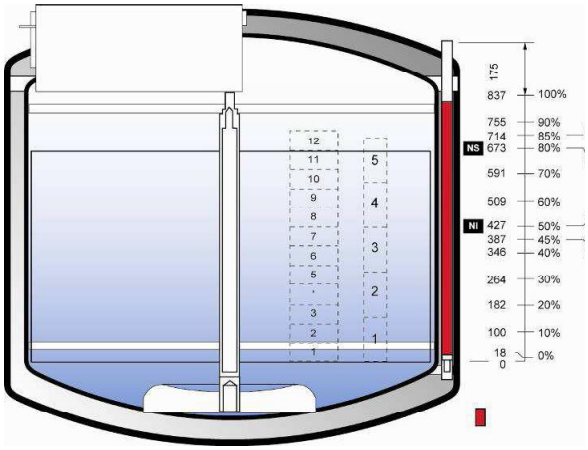

Figure 15-18: RCB 1001 - liquid state - measurement scale.

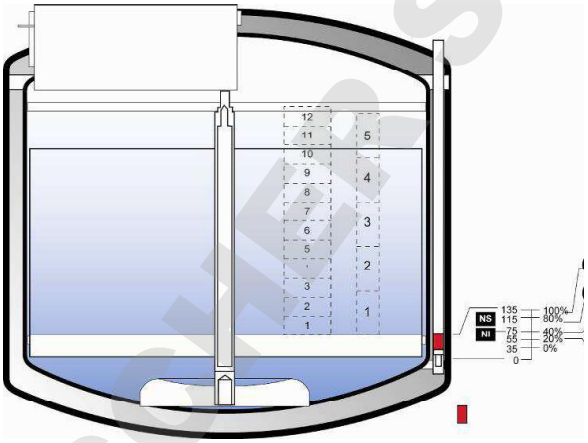

Figure 15-19: Figure 15-20: RCB 1001 - gaseous state - measurement scale.

Relationship between the measurement scale and liquid quantity remaining

(values can vary slightly)

Measurement scale	Liquid phase [L]	Gaseous phase [L]
Stationary tank	115	115
0%	115	115
20%	298	137
40%	481	159
80%	847	203
100%	1030	225

16. Use of the application - Web server

This chapter lists the actions that the application user will be called upon to accomplish with references to the corresponding chapters or paragraphs.

16.1. Using the application

Subject	Section	Page
Step 1: Before connecting to the network, configure the IP address of each Control System (to be noted on the sheet attached in Appendix) and update the integrated clock.	14.3	111
Step 2: For each Control System, define the parameters as well as the authorised users.	11.1	68
Step 3: Configure the integrated web server for the tank (level alarm threshold settings, temperature parameters, communication, display language, blowdown threshold in particular)	11.6.2	90
Step 4: Complete the tank description (location, frozen samples, other information)	11.7.2	96
Step 5: Consult the information relating to the tank (information, measurements, list of alarms)	11.2	74
Step 6: Perform a backup every 25 days maximum of the information saved in the integrated web server. Click on Retrieve the data. See *The data retrieval field* section	-	87

16.2. Administrator

Subject	Section	Page
Administrator login: Administrator login field	11.1.1.2	71
Administrator password: Administrator password field	11.1.1.2	71

16.3. Data (retrieval for backup)

Subject	Section	Page
Retrieval: Data Retrieval field	-	87

Backup: Data Retrieval field	-	87

16.4. Graph (settings)

Subject	Section	Page
Menu display language: Language field	11.6.2.5	95

16.5. Integrated clock

Subject	Section	Page
Date (adjust, modify)	11.1.2	73
Time (adjust, modify)	11.1.2	73

16.6. Tank: IP, bus communication

Subject	Section	Page
Bus address: Bus address field	11.6.2.4	94
IP address: IP address field	11.1.1.2	71
Remote control: Remote control field	11.6.2.4	94
Subnet mask: Subnet mask field	11.1.1.2	71

16.7. Tank: measurements, alarms, information

Subject	Section	Page
Alarms (list): List of alarms field	11.2.1.4	79
Other information (display): Others field	11.2.1.2	76
Other information (settings): Others field	11.7.2.3	99
Tank configuration: Tank configuration field	11.2.1.5	80
Tank capacity: Capacity field	11.2.1.2	76
Blowdown (threshold settings): Blowdown threshold field	11.6.2.5	95
Data (backup): Data Retrieval field	-	87
Event (read): Events field	11.5.1.4	89

16.8. Tank: filling, state of lid

Subject	Section	Page
Lid (open/closed) – display state: Lid field	11.2.1.3	77
Filling (in progress/inactive) – display current status: Filling field	11.2.1.3	77

16.9. Integrated web server

Subject	Section	Page
Function code - New server function code field	11.2.1.2	76
Version number for integrated web server application: Server version field	11.2.1.2	76

16.10. Authorised user

Subject	Section	Page
User login: Username field	11.1.1.2	71
User password: create	11.1.1.2	71
User password: modify	11.1.1.2	71
Passwords: Password field	11.1.1.2	71

17. Alarm messages

17.1. Alarm reminder

An alarm is systematically accompanied by:

- The generation of a cyclic audible signal that can be acknowledged (muted) by pressing the or key.
- The icon displayed on the screen.
- The red LED switching on.
- Alarm relay switching.
- Its presence in the list of active alarms, a list displayable by pressing the key.

Apart from the filling safety alarm, alarms are deleted automatically: therefore, they cannot be done manually.

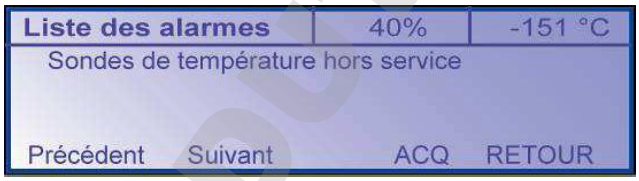

Figure 17-1: The fault is clearly indicated when pressing the key.

When a fault occurs, press the or key to acknowledge (stop) the audible alarm. The fault will be displayed as long as it lasts; it will only be automatically erased once it has been resolved.

17.2. List of alarm messages

The display indicates the presence of a fault as shown in the table on the following page:

Display	Cause	Corrective action
Settings error	Alarm threshold not compliant, temperature outside range, etc.	Enter the allowed values.
Overflow detected	Maximum level exceeded.	
Level sensor out of order	Defective capacitive sensor.	Change the level sensor.

Display	Cause	Corrective action
Temperature sensors out of order	Difference between the 2 sensors over 5°C.	Identify the faulty sensor and calibrate the channels.
Temperature sensor 1 out of order	Temperature sensor no.1 defective.	Change temperature sensor no.1.
Temperature sensor 2 out of order	Temperature sensor no. 2 defective.	Change temperature sensor no. 2.
Nitrogen level exceeds the high alarm threshold	The allowable maximum level is reached.	Check the filling solenoid valve, level and blowdown sensors (if OOS), the wiring, the level sensor calibration values, and see if the connectors are correctly connected to the sensors, etc.
Nitrogen level exceeds the low alarm threshold	The allowable minimum level is reached.	Check the empty tank nitrogen supply system, filling solenoid valve, blowdown solenoid valve, wiring, electrical contacts, etc.
Temperature threshold exceeded	The internal temperature threshold has been exceeded (temperature too high).	Check the empty tank nitrogen supply system, filling solenoid valve, blowdown solenoid valve, etc.
Cryopal server communication failure	Defective link between control unit and server or defective Ethernet card.	Check the control unit output jack, the Ethernet cable, the communication parameters and, as a last resort, change the Ethernet card.
Power supply fault	The power supply is too low or interrupted.	Check the power fuses or value of the box's supply voltage.
EEPROM fault	EEPROM inactive	Need to change the EEPROM IC12 in the unit board
Blowdown fault	Blowdown lasts for more than 30 minutes.	Supply problem on the nitrogen line or check the blowdown sensor.
Lid fault	The tank lid has stayed	Check the lid contact or close the tank

Display	Cause	Corrective action
Open.	open for more than 7 minutes or the contact is broken.	lid.

18. Storage and handling conditions

The data used in this manual is valid for altitudes of less than 2,000 metres.

18.1. Kit storage conditions

- Ambient temperature: -30°C to 60°C
- Relative humidity: 0% to 85% without condensation
- Atmospheric pressure: 500 hPa to 1150 hPa

18.2. Handling conditions

Operating temperature: 20°C ±5°C.

Relative working humidity: 30 to 65% without condensation.

19. Servicing

This section presents the few maintenance procedures to be carried out by the operator as part of the cryogenic tank's regular use.

19.1. Servicing the device

This section should be read by competent, qualified persons who have been trained and authorised by the manufacturer to perform servicing work.

Servicing is required to ensure the equipment remains in good working order. This is the responsibility of the cryogenic device operator.

The frequency of this check depends essentially on the equipment's frequency of usage (intensive, moderate, occasional). It should be defined by the sales manager in consultation with the operator.

Operation	*Frequency**
Cryomemo level reading check With the provided indicator, check the consistency between the level displayed reading and the actual level in the tank. If these differ by >10%, contact your distributor.	Once per month

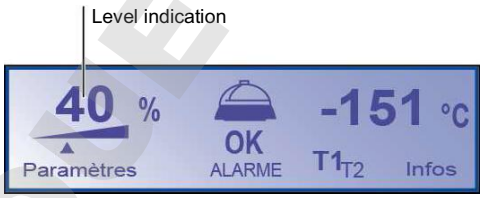

Figure 19-1: location of the level indication on the LCD display on the display unit.

20. Help

20.1. Filling levels not respected

Cause	Solution
Device incorrectly calibrated	Contact the distributor responsible for upkeep of the device.
Unsuitable device regulation level settings	Set a new level control parameter. See section 10.5 on page 59.

Does not apply to the *GT 40* or *Arpège 40* tanks.

20.2. Permanent blowdown

Cause	Solution
Solenoid valve iced and blocked	De-ice the solenoid valve and replace it
Malfunctioning blowdown management	Replace the control unit and/or sensor

Does not apply to the *GT 40* or *Arpège 40* tanks.

20.3. Inoperative blowdown

Cause	Solution
Disconnected blowdown sensor	Reconnect the sensor
Solenoid valve not iced and stuck	Replace the solenoid valve
Defective blowdown sensor	Replace the sensor
Malfunctioning blowdown management	Replace the control unit
Solenoid valve power cord broken or disconnected	Check the state of the cable, its connection or replace it

Does not apply to the *GT 40* or *Arpège 40* tanks.

21. Spare parts

Cryopal assumes no responsibility if:

- A modification has been made to the device and/or its related equipment
- Other accessories and/or electronic devices not approved and referenced by *Cryopal* are used.
- another filling control system is used other than *Cryomemo*

For accessories, options, housing and possible upgrade kits, contact your usual sales representative.

Spare parts will be installed in accordance with the instructions in the *Cryomemo maintenance* document, code NH78462.

21.1. Spare parts

21.1.1. Standard parts

Part	*Codes*
Power supply unit 230 V/1 A - 24V 50 Hz	ACC-ELEC-4
Power supply cable NH104718	ACC-ELEC-5
Display unit	ACC-ELEC-1
Box cable to display unit	ACC-ELEC-3
Control unit	ACC-ELEC-2
4-20 mA card	ACC-ELEC-6
SV socket card	ACC-ELEC-7
Sensor socket card	ACC-ELEC-8
RS485 card	ACC-ELEC-9
Programmed server card	ACC-ELEC-10
Key switch	ACC-ELEC-11
Fuse kit	ACC-ELEC-12
26-wire connection strip (J17-J18)	ACC-ELEC-13
16-wire connection strip (J15-J27)	ACC-ELEC-14

Part	Codes
CR2032 button battery 3V 180 mAh	ACC-ELEC-15
Filling/filling safety SV cable	ACC-ELEC-16
Blowdown sensor (option NH104805-1)	ACC-ELEC-18
Blowdown SV cable (option NH104805-1)	ACC-ELEC-19
Filling safety sensor	ACC-ELEC-20
Tank temperature sensor	ACC-ELEC-21
24V solenoid valve	ACC-GNL-1

21.1.2. GT 40 parts

Part	Codes
Arpège 40* level measuring gauge kit	ACC-ARPN-1
Electronic kit for Arpège 40 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-40
Electronic kit for Arpège 70 Liq (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-49

21.1.3. Arpège parts

Part	Codes
Arpège 40* level measuring gauge kit	ACC-ARPN-1
Arpège 55*-75* level measuring gauge kit	ACC-ARPN-2
Arpège 70* Liquid level measuring gauge kit	ACC-ARPN-3
Arpège 110* Liquid level measuring gauge kit	ACC-ARPN-4
Arpège 140* Liquid level measuring gauge kit	ACC-ARPN-5
Arpège 170* Liquid level measuring gauge kit	ACC-ARPN-6
Arpège 70* Gas level measuring gauge kit	ACC-ARPN-7
Arpège 110* Gas level measuring gauge kit	ACC-ARPN-8
Arpège 140* Gas level measuring gauge kit	ACC-ARPN-9
Arpège 170* Gas level measuring gauge kit	ACC-ARPN-10
Arpège 55*-75* filling pipe kit	ACC-ARPN-11

Part	Codes
Arpège 70*-110* Liquid filling pipe kit	ACC-ARPN-12
Arpège 140*-170* Liquid filling pipe kit	ACC-ARPN-13
Arpège 70* Gas filling pipe kit	ACC-ARPN-14
Arpège 110* Gas filling pipe kit	ACC-ARPN-15
Arpège 140* Gas filling pipe kit	ACC-ARPN-16
Arpège 170* Gas filling pipe kit	ACC-ARPN-17
Replacement double SV kit	ACC-ARPN-42
270 hose	ACC-ARPN-43
430 hose	ACC-ARPN-44
Triple connector	ACC-ARPN-45
Blowdown kit	ACC-ARPN-46
Electronic kit for Arpège 55 Liq (calibrated level gauge and indicator) for tank with RS485 or 4-20mA unit	ACC-CRYOBIO-41
Electronic kit for Arpège 55 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-42
Electronic kit for Arpège 55 Liq (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-43
Electronic kit for Arpège 55 Liq (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-44
Electronic kit for Arpège 75 Liq (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-53
Electronic kit for Arpège 75 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-54
Electronic kit for Arpège 75 Liq (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-55
Electronic kit for Arpège 75 Liq (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-56
Electronic kit for Arpège 40 Liq (calibrated level gauge and indicator for Cryoview)	ACC-CRYOBIO-39
Electronic kit for Arpège 40 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-40
Electronic kit for Arpège 70 Liq (calibrated level gauge and indicator for	ACC-CRYOBIO-49

Part	Codes
RS485 or 4-20mA unit)	
Electronic kit for Arpège 70 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-50
Electronic kit for Arpège 70 Liq (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-51
Electronic kit for Arpège 70 Liq (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-52
Electronic kit for Arpège 110 Liq (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-61
Electronic kit for Arpège 110 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-62
Electronic kit for Arpège 110 Liq (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-63
Electronic kit for Arpège 110 Liq (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-64
Electronic kit for Arpège 140 Liq (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-69
Electronic kit for Arpège 140 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-70
Electronic kit for Arpège 140 Liq (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-71
Electronic kit for Arpège 170 Liq (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-77
Electronic kit for Arpège 170 Liq (calibrated level gauge and indicator)	ACC-CRYOBIO-78
Electronic kit for Arpège 170 Liq (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-79
Electronic kit for Arpège 170 Liq (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-80
Electronic kit for Arpège 70 Gas (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-45
Electronic kit for Arpège 70 Gas (calibrated level gauge and indicator)	ACC-CRYOBIO-46
Electronic kit for Arpège 70 Gas (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-47

Part	Codes
Electronic kit for Arpège 70 Gas (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-48
Electronic kit for Arpège 110 Gas (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-57
Electronic kit for Arpège 110 Gas (calibrated level gauge and indicator)	ACC-CRYOBIO-58
Electronic kit for Arpège 110 Gas (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-59
Electronic kit for Arpège 110 Gas (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-60
Electronic kit for Arpège 140 Gas (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-65
Electronic kit for Arpège 140 Gas (calibrated level gauge and indicator)	ACC-CRYOBIO-66
Electronic kit for Arpège 140 Gas (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-67
Electronic kit for Arpège 140 Gas (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-68
Electronic kit for Arpège 170 Gas (calibrated level gauge and indicator for RS485 or 4-20mA unit)	ACC-CRYOBIO-73
Electronic kit for Arpège 170 Gas (calibrated level gauge and indicator)	ACC-CRYOBIO-74
Electronic kit for Arpège 170 Gas (calibrated level gauge and indicator for Control)	ACC-CRYOBIO-75
Electronic kit for Arpège 170 Gas (calibrated level gauge and indicator for Control and Cryoview)	ACC-CRYOBIO-76

21.1.4. ESPACE parts

Part	Codes
ESPACE 151 gaseous phase level gauge	ACC-ESP-200
ESPACE 331 gaseous phase level gauge	ACC-ESP-201
ESPACE 661 gaseous phase level gauge	ACC-ESP-202

Part	Codes
ESPACE 151 liquid phase level gauge	ACC-CRYOBIO-2
ESPACE 331 liquid phase level gauge	ACC-CRYOBIO-3
ESPACE 661 liquid phase level gauge	ACC-ESP-205
ESP151 display support arm	ACC-ESP-349
ESP331 display support arm	ACC-ESP-350
ESP661 display support arm	ACC-ESP-351
RCB display support arm (for upgrade)	ACC-RCB-216
ESPACE - RCB Cryomemo blowdown kit	ACC-ESP-RCB
Old ESPACE 3 T° sensor holder	ACC-ESP-353
ESP661 G Ext / ESP661 L Ext 3 sensor holder	ACC-ESP-358
ESP151 G Ext / ESP331 G Ext 3 sensor holder	ACC-ESP-359
ESP331 L Ext 3 sensor holder	ACC-ESP-360
ESP151 L Ext 3 sensor holder	ACC-ESP-361
OLD ESP661 G and L 3 sensor holder	ACC-ESP-362
ESP Extreme 2 SV kit	ACC-ESP-363
ESP Extreme blowdown option	ACC-ESP-364
ESP151 blowdown option upgrade	ACC-ESP-365
ESP331 blowdown option upgrade	ACC-ESP-366
ESP661 blowdown option upgrade	ACC-ESP-367

21.1.5. RCB parts

Part	Codes
Blowdown device	NH104805 (Code ?)
RCB display support arm (for upgrade)	ACC-RCB-216

Part	Codes
Power supply unit 4x24V (220V - 4x24V)	ACC-GNL-19
SV/Unit control cable (Arpège, RCB & ESPACE NC)	ACC-GNL-20
Cryo-Simulator unit	ACC-GNL-18
Cryoview unit (unit + RS & RJ45 cables)	ACC-CRYOVIEW-5
Base unit for 4/20 mA cards	ACC-GNL-3
Remote level or temperature monitoring 4/20 mA card	ACC-GNL-14
Gas control card - Alarm at 20%	ACC-GNL-17
Liquid control card - Alarm at 5%	ACC-GNL-15
Liquid control 4/20mA card - Alarm at 10%	ACC-GNL-16
Control & digital remote monitoring unit (RS485)	ACC-GNL-13
24V solenoid valve	ACC-GNL-1
Gaseous phase level indicator (Control) (Model to be specified)	ACC-GNL-5
Simple level indicator including RS485 connection (Liquid & Gas) ESPACE/RCB/Arpège	ACC-GNL-8
Gas level & temp control indicator for Cryoview	ACC-CRYOVIEW-7
Liquid level & temp control indicator for Cryoview	ACC-CRYOVIEW-6
Level indicator (Liquid & Gas) for installing 4/20mA & RS485 units only ESPACE/RCB/Arpège (model and phase to be specified)	ACC-GNL-10
Liquid phase level indicator (control) (model to be specified)	ACC-GNL-12
Temperature indicator (Liquid & Gas) for installing 4/20mA & RS485 units only ESPACE/RCB/Arpège	ACC-GNL-11
Simple temperature indicator including RS485 connection (Liquid & Gas) ESPACE/RCB/Arpège	ACC-GNL-9
Capacitive gauge (uncalibrated) for liquid phase ESPACE151 & RCB1001	ACC-CRYOBIO-2

Part	Codes
Capacitive gauge (uncalibrated) for liquid phase ESPACE331 & RCB500	ACC-CRYOBIO-3
Capacitive gauge (uncalibrated) for RCB600 Liquid phase	ACC-RCB-102
Capacitive gauge (uncalibrated) for RCB1001 Gas	ACC-RCB-100
Capacitive gauge (uncalibrated) for RCB600 Gas	ACC-RCB-101
RCB500* gaseous phase level gauge	N/A
RCB1001 blowdown kit for automatic filling	ACC-RCB-2
RCB1001 blowdown kit for remote monitoring	ACC-RCB-4
RCB500/600 blowdown kit for automatic filling	ACC-RCB-1
RCB500/600 blowdown kit for remote monitoring	ACC-RCB-3
Double solenoid valve option for RCB 1001	ACC-RCB-201
Double solenoid valve option for RCB 500/600	ACC-RCB-200
Temperature sensor (anti-overflow) for ESPACE/RCB - Note: the anti-overflow system will also need to be replaced by the new one (Ref. 2006)	ACC-GNL-6
Temperature sensor (blowdown) for ESPACE/RCB/Arpège 55/75 - Note: the blowdown system will also need to be replaced by the new one (Ref. 2006)	ACC-GNL-7
Anti-overflow system (unit alone) for ESPACE/RCB	ACC-GNL-4
Full anti-overflow system for ESPACE & RCB	ACC-ESP-106
Electronic kit for RCB1001G (calibrated gauge + level indicator) for tank with RS485 or 420mA unit	ACC-CRYOBIO-103
Electronic kit for RCB600G (calibrated gauge + level indicator) for tank with RS485 or 420mA unit	ACC-CRYOBIO-104
Electronic kit for ESP151L/RCB1001L (calibrated gauge + level indicator) for tank with RS485 or 420mA unit	ACC-CRYOBIO-402
Electronic kit for ESP331L/RCB500L (calibrated gauge + level indicator) for tank with RS485 or 420mA unit	ACC-CRYOBIO-404
Electronic kit for RCB600L (calibrated gauge + level indicator) for tank with RS485 or 420mA unit	ACC-CRYOBIO-407

Part	Codes
Electronic kit for RCB600G (calibrated gauge + level indicator + Ctrl) for tank without RS485 or 420mA unit	ACC-CRYOBIO-209
Electronic kit for ESP151L/RCB1001L (calibrated gauge + level indicator) for tank without RS485 or 420mA unit	ACC-CRYOBIO-302
Electronic kit for ESP151L/RCB1001L (calibrated gauge + level indicator + Ctrl) for tank without RS485 or 420mA unit	ACC-CRYOBIO-303
Electronic kit for ESP331L/RCB500L (calibrated gauge + level indicator) for tank without RS485 or 420mA unit	ACC-CRYOBIO-306
Electronic kit for ESP331L/RCB500L (calibrated gauge + level indicator + Ctrl) for tank without RS485 or 420mA unit	ACC-CRYOBIO-307
Electronic kit for RCB600L (calibrated gauge + level indicator) for tank without RS485 or 420mA unit	ACC-CRYOBIO-312
Electronic kit for RCB600L (calibrated gauge + level indicator + Ctrl) for tank without RS485 or 420mA unit	ACC-CRYOBIO-313

22. Disposal

In terms of the WEEE 2012/19/EC directive, the *Cryomemo* may be composed of parts that are harmful to the environment. All owners are therefore asked to contact maintenance agents in order to learn about the procedure to follow to recycle the device.

The control unit contains a CR2032 (3 V) type battery for the real time clock (RTC). This battery will be removed before the destruction of the control unit and will be deposited in a used battery collection centre.

23. Guarantee and limit of liability

23.1. Warranty

The warranty period takes effect on the date of the equipment delivery note is issued and lasts for one year.

Goods are delivered at the seller's risk where delivered by a carrier selected by *Cryopal*. In other cases delivery is at the buyer's risk.

The seller warrants the equipment free of any design faults and defects of manufacture and construction affecting the containers.

The vendor's guarantee is strictly limited, at the seller's choice, to repairing or replacing the parts which it acknowledges as defective and to the cost of labour, not including transport and packing charges.

Replaced defective parts revert to being the Seller's property.

The repair, modification or replacement of parts during the warranty period does not extend the warranty period.

To qualify for the warranty, the user must submit a claim to the vendor within 15 days of receipt of the equipment, accompanied by the delivery note.

The required repairs, modifications or replacements due to normal wear and tear, deterioration or accidents from faulty operation, insufficient supervision or maintenance, negligence, overloads, usage not consistent with the instructions for use, as well as shocks, being dropped, or deterioration due to bad weather are not covered by the warranty (see the operating instructions).

This warranty is immediately invalidated in the event of the replacement or repair of original parts by persons not authorised by *Cryopal*.

Within the limits imposed by applicable legislation, it is expressly agreed that the warranty awarded in this article is the only one implicitly, explicitly or lawfully granted by the vendor with regard to the equipment sold, and that, except where stated to the contrary in writing, the buyer renounces entitlement to any legal action which the it (or its employees, affiliate companies, successors or concession holders) might take against the vendor, its employees, affiliate companies, successors or concession holders, in connection with the equipment sold; this provision includes, without limitation, actions concerning personal injury, damage to goods not covered by the agreement, indirect or consequential losses or damage and particularly loss of

use or of profit, loss of cryogenic liquid or of products in storage etc. Within the limits imposed by applicable legislation, the buyer undertakes to compensate the vendor, its employees, affiliate companies, successors and concession holders, for all claims, complaints, demands, court orders, convictions or liabilities of any nature, as well as all costs and expenses incurred by or imposed on the vendor in connection with the materials sold.

Replacement parts must be used in the conditions of service originally defined by the vendor. In particular, safety devices sold as replacement parts must be installed as replacements for the original safety devices in conditions of service (pressure, temperature, gas, valve diameter etc.) identical to the original.

Application of this guarantee takes place in accordance with the vendor's general terms and conditions of sale.

Like every other device, your equipment may be subject to a mechanical failure. The manufacturer cannot be held responsible for any type of stored products lost as a result of this failure, even during the warranty period.

23.2. Limits of liability

Neither *Cryopal*, nor any related company, may under any circumstances be held liable for any damages, including but not limited to damages for loss of manufacture, interruption of manufacture, loss of information, defect in the indicator or its accessories, personal injury, loss of time, financial or material losses, or for any consequences whether indirect or subsequent to a failure occurring in the course of use, or inability to use the product, even in a situation where *Cryopal* had been made aware of such damages.

24. Appendix

24.1. User tables

24.1.1. IP addresses for the Control Systems installed on the site

Reference	Location	IP Address
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Table 1: IP addresses for the Control Systems installed on the site.

24.1.2. Serial number - Server code relationship table

Serial number	Server code

Table 2: Relationship table for Serial number - Server code