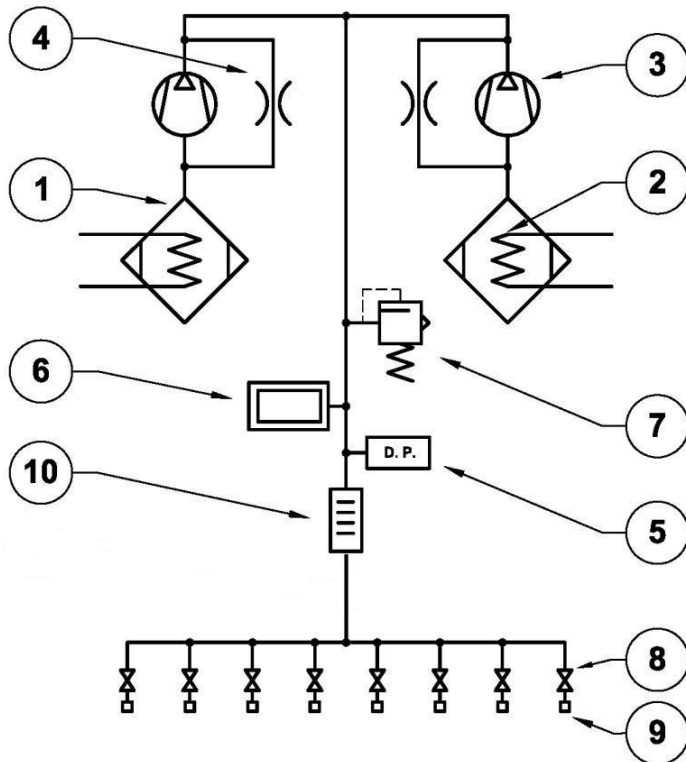


LAB4 DEHYDRATOR

USER MANUAL



- 1 Drying Chamber
- 2 Heater
- 3 Pump
- 4 Air backwashing hole
- 5 Humidity Probe
- 6 Digital pressure gauge
- 7 Relief valve
- 8 Shut off valve
- 9 Dry air outlet
- 10 Flow meter (optional)

C14520.RFS-E.MUG



## 1. SAFETY PRECAUTIONS

	<p><b>This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety instructions that follow this symbol to reduce the risk of possible injury or death as well as property damage. Do not apply any modification or adjustment to the unit.</b></p>
	<p><b>READ CAREFULLY THE PRODUCT INSTALLATION, OPERATING AND MAINTENANCE MANUAL. THIS PRODUCT MUST BE INSTALLED ONLY BY QUALIFIED TECHNICIANS. FOLLOW ALL APPLICABLE LOCAL AND STATE CODES AND REGULATIONS.</b></p>

### GENERAL SAFETY INFORMATIONS

	<ul style="list-style-type: none"> <li>Do not apply any modification or adjustment to the machine.</li> </ul>
	<ul style="list-style-type: none"> <li>The machine must be installed only following the instructions provided by the user manual.</li> </ul>
	<ul style="list-style-type: none"> <li><b>IMPORTANT:</b> improper installation and operation of the machine will result in unsatisfactory performance or failure of the system and will also void your warranty.</li> </ul>
	<ul style="list-style-type: none"> <li>Make sure that the installation place has a good ambient ventilation.</li> </ul>
	<ul style="list-style-type: none"> <li>Air must not be discharged in the same fuel exhaust discharge outlet of other gas machines.</li> </ul>
	<ul style="list-style-type: none"> <li>Ventilation grid must not be choked.</li> </ul>
	<ul style="list-style-type: none"> <li>If the power supply cable is damaged it must be replaced <b>only</b> by the manufacturer or authorized and qualified personnel to avoid dangerous situations.</li> </ul>

### SAFETY INSTRUCTIONS

	<ul style="list-style-type: none"> <li>Follow the instructions provided together with the machine.</li> </ul>
	<ul style="list-style-type: none"> <li><b>DANGER:</b> make attention during machine displacement or movement. Electrocution, burst and burn hazard. Use always qualified gloves.</li> </ul>
	<ul style="list-style-type: none"> <li>Do not install or use the machine if it is damaged.</li> </ul>
	<ul style="list-style-type: none"> <li>Check the correct in-plane position after the installation with a bubble level.</li> </ul>



**ELECTRICAL INSTALLATION**

	<ul style="list-style-type: none"> <li>• <b>WARNING:</b> burn and electrocution hazard.</li> </ul>
	<ul style="list-style-type: none"> <li>• The machine must be electrically grounded. Check for the correct ground connection.</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not use extension cables.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>DANGER:</b> do not touch any power supply cable or power supply connector with wet hands.</li> </ul>
	<ul style="list-style-type: none"> <li>• This machine respects the CEE directive.</li> </ul>

**OPERATION SAFETY PRECAUTIONS**

	<ul style="list-style-type: none"> <li>• <b>DANGER:</b> risk of death, burn, injuries or property damage.</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not apply any modification or adjustment to the machine technical specifications.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>WARNING:</b> do not place or keep any inflammable liquid, material or object near, over or inside the machine.</li> </ul>
	<ul style="list-style-type: none"> <li>• Before any work or maintenance is performed on the machine, turn off the power supply and release pressure in the system.</li> </ul>



## 2. FEATURES

- Output pressure : programmable from 1 kPa to 6 kPa
- Maximum flow rate :  $\geq 300$  liters per hours
  - Safety valve : factory set at 7 kPa  $\pm 15$  %
- Output air dew point : better than - 45°C, @ 20°C ambient temperature, 80% Relative Humidity
- Desiccant regeneration : automatic by heating
  - Local alarms : low/high pressure, high humidity, system failures
  - Remote alarms : the summary alarm is remotely signaled by a SPDT relay
  - Remote monitoring : Web Browser and SNMP (optional)
- Low pressure alarm : programmable from 0,5 kPa
- High pressure alarm : programmable up to 7 kPa
- High humidity alarm : set at 10% of relative humidity  $\pm 2$ %
  - Standard measures : air pressure, hour meter
  - Optional measures : air flow by a digital flowmeter
  - Led indications : power on, alarms
  - Acoustic noise :  $\leq 46$  dBA at 1 m far and 1,5 m height
- Enclosure degree of protection : IP20 according to IEC529
- Operating temperature : -10 °C ÷ + 50 °C
- Storage temperature : -30 °C ÷ + 60 °C
  - Power supply :
    - 48/60 VDC (from 36 to 72 VDC)
    - 100 – 240 VAC, 50/60 Hz (from 90 to 264 VAC), with apposite power supply kit code K14524
- Power consumption : max 55 W during regeneration phase, average 30 W



Dimensions : ■ 19" rack mounting height 3U, depth 200 mm  
■ ETSI N3 rack mounting height 6U, depth 200 mm  
■ Wall mounting height 132 mm, depth 287 mm  
width 482 mm

Weight : about 6,5 kg

Standard outlets : 4 or 8 outlets, each with ON/OFF valve

Outlets fitting 9,5 mm (3/8") diameter, others on request

Shock and vibration

Transportation : conform to ETSI EN 300 019-1-2, Class 2.3

Stationary use : conform to ETSI EN 300 019-1-3, Class 3.1

European Community Directives : 2014/35/EU Low Voltage Directive  
2014/30/EU Electromagnetic Compatibility Directive  
2015/863/UE Environmental compliance (RoHS3)

Safety Normative : EN 62368-1  
CSA Std. C22.2 No. 60950-1

Electromagnetic Compatibility

Normative : EN 55032  
EN 61000  
ETSI EN 301 489-1  
ANSI CFR 47 part 15

Marks : CE  
CB  
UKCA



### 3. DESCRIPTION

The LAB4 dehydrator is designed for continuous operation and automatic duty. It supplies dry air up to 300 l/h with dew point better than  $-45\text{ }^{\circ}\text{C}$ .

Output pressure is selectable within the range from 1 kPa to 6 kPa.

Dry air is vented by four or eight standard independent air outlets with hose-tail fittings accessible from the back side of the equipment. Each outlet has a dedicated shutoff valve.

The air is dried by means of two drying towers containing granular substances. While one tower dries (incoming air releases most of its molecules of water by adsorption) the other one is regenerated by heating and backwashing with a reverse dry air flow. The electronic unit controls drying cycles and adjusts cycles duration according to plant air needs.



Air is compressed by two compressors. A fundamental feature of the dehydrator is the continuous tracking of output pressure. The PWM (Pulse Width Modulation) technique is used to control the speed of two compressors (one for each drying tower) so to optimize pump duty, power consumption, acoustic noise, and improve reliability. Compressor speed control avoids mechanical pressure regulators that introduce undesirable pressure losses and a worst response to flow needs.

The equipment is designed for wall, shelf, 19" and ETSI N3 standard racks mountings with 3 U modular height.

The dehydrator does not need pre-settings nor warm up time before start-up. It does not need preventive maintenance along its lifetime.

No radioactive or chemically hazardous components are used.

The following devices are available on the front panel:

- digital display (output air pressure, hour meter, active alarm messages, output pressure and low/high pressure alarm thresholds settings are available)
- two function keys (  and  ) to scroll and modify settings
- power on and alarms LED
- shut off air outlet valves.

On the rear panel are accessible:

- Air outlets with hose-tail fittings according to the equipment version
- Remote alarm connector
- Power supply connector

Options:

- remote control through Web Browser and SNMP. An Ethernet interface with a RJ45 connector is available on the rear panel
- flowmeter with data showed on the display.

## 4. INSTALLATION

### 4.1 Mounting

The dehydrator is designed for low vibration and low noise and can safely be placed in a 19" or N3 standard rack or cabinet. It is also suitable for wall and shelf mounting.

The dehydrator is factory assembled for the 19" rack mounting.

It is strongly suggested to place the dehydrator in the upper part of the rack without any other equipment above.



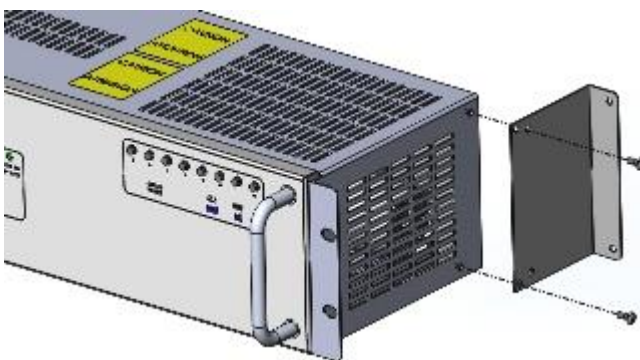
**If the dehydrator cannot be placed in the upper part of the rack, it is mandatory to leave an upper free space of at least one 19" rack unit from the dehydrator to the closest equipment.**

#### 4.1.1 ETSI N3 rack mounting



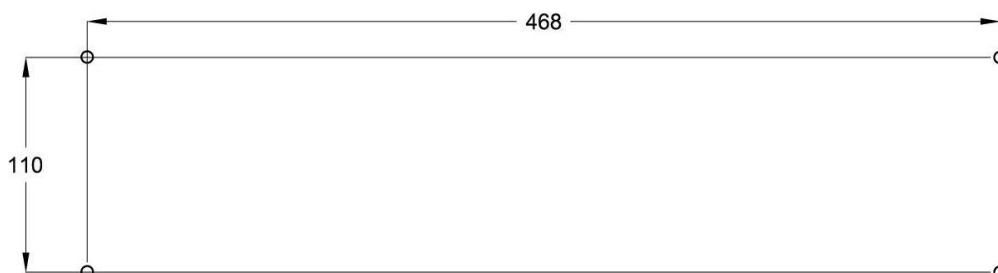
- ETSI-N3 movable brackets and the relevant screws are supplied in the ancillary kit.
- Tighten the ETSI-N3 brackets with the same screws used for rack 19" rack mounting.
- Put the dehydrator into the frame and lock it with the screws supplied in the ancillary kit.

#### 4.1.2 Wall mounting



- The relevant wall brackets and the screws are supplied in the ancillary kit.
- Tighten the two brackets to the equipment with the four screws
- Plug the alarm and power supply connectors before mounting the dehydrator on the wall.

The following picture shows screw hole patterns (measures in mm)

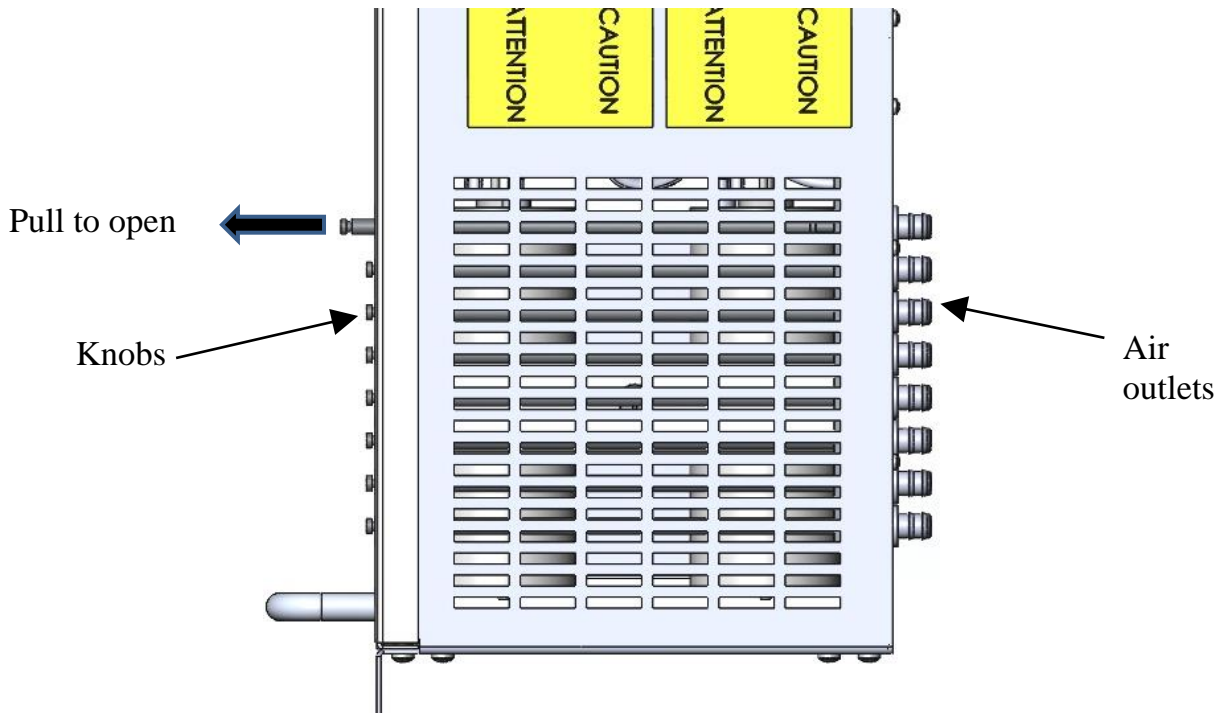


**4.2 Pneumatic connections**

The dehydrator has four or eight air outlets available on the rear side.

Each outlet is equipped with a shutoff valve on the front side.

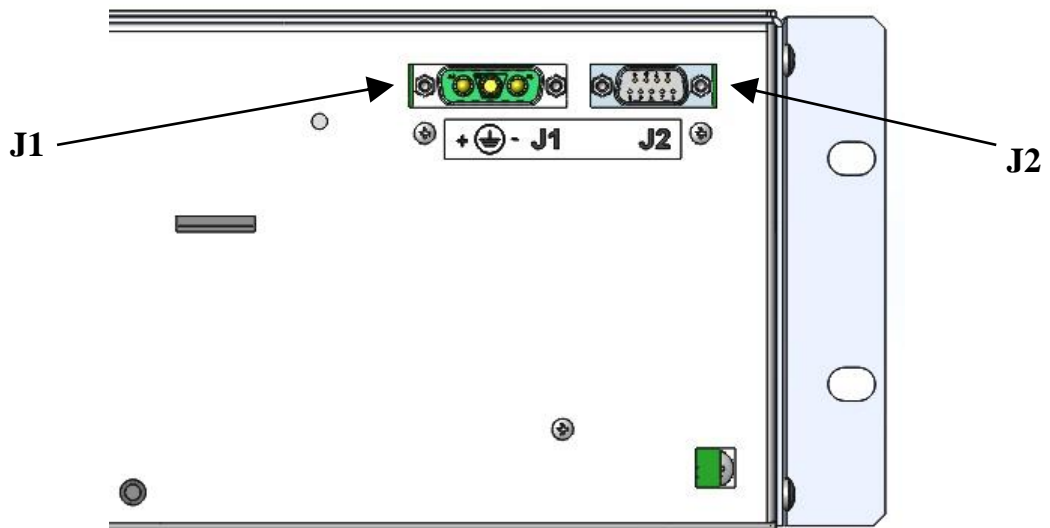
Open, by pulling relevant knob, only valves corresponding to used outlets, keep all the others closed by pushing relevant knob.



**4.3 Electrical connections**

Two male connectors are available on the rear side for electrical connections:

- **J1**, 3 pin D-sub-3W3-C, for DC power connection;
- **J2**, 9 pin D sub-miniature IEC48B D series, for remote alarm output.







4.3.2. DC Power connection 48/60 V

An appropriate disconnect device shall be provided as part of the building installation. Disconnect the dehydrator from supply for servicing.

Protection for short-circuit and earth failures of power conductors are a function assigned to installation area system.



Protective earthing is mandatory only for power supply above 60 VDC.

The earthing terminal is available in the power supply connector and it is marked with the symbol

Do not connect the dehydrator to the power supply before having checked for correct type and rated voltage. See power rating marking on the rear side of the dehydrator.

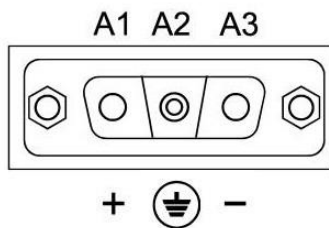
The dehydrator can operate with either:

- negative polarity connected to ground (e. g. 0/+48 V systems)
- positive polarity connected to ground (e. g. -48/0 V systems).

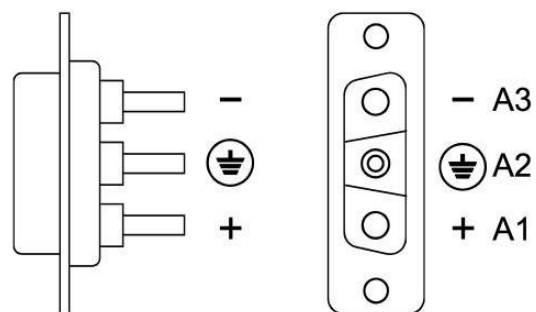
A matching connector and a protective shell are supplied in the ancillary kit.

Connect power cable wires to the matching connector according to the following pinout.

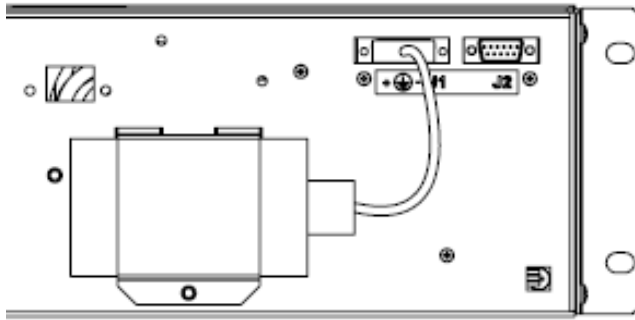
Pin number	J1 label	Function	0/+48 V systems	-48/0 V systems
A1	+	Positive power supply input	+ 48 V	0 V
A2		Protective earthing		
A3	-	Negative supply input	0 V	- 48V



Fixed connector



Matching connector



A power supply adapter kit can be provided (K14524) if dehydrator is intended to be used with AC power supply (100-240 Vac, 50/60 Hz).

The adapter can be fixed on the dehydrator back side using the bracket and the screw provided in the kit.

**4.3.3. Remote alarm output connection**

A summary (OR) alarm is provided by an internal SPDT (Single Pole Double Throw) relay.

The maximum switching current is 0,5 A.

The maximum switching voltage is 60 V.



In case of power failure, the relay switches to alarm position.

Remote alarm connector J2, 9 pin D-Sub type, is on the rear panel.

A matching connector and a protective shell are provided in the ancillary kit.

The following table shows the connector pinout:

<b>J2 - alarm connector pinout</b>	
<b>Pin number</b>	<b>Function</b>
1	Common
5	Closed on alarm
9	Open on alarm



## 5. OPERATION



### **Important note:**

**if the equipment has been left not working or stored for a long time**, both the drying towers will be wet. The dehydrator must be left switched on for not less than 48 hours continuously to let both the drying towers be regenerated, meanwhile all air outlets must be closed.

The High Humidity Alarm must be ignored, during this time.

### 5.1 First startup

Open all the valves corresponding to the used air outlets before proceeding with first startup. Once the dehydrator is powered, after a few seconds, dry air starts flowing out of the outlets. Depending on the volume of user system to be pressurized, it may take some time for the output pressure to achieve factory set value. Dehydrator pressure alarms are enabled after 20 sec. from power on; then low pressure alarm is hold until target pressure is met.

At the very first startup, it is recommended to purge the transmission line with dry air by keeping open the opposite side of the pressurized line for a period of time given by the following formula:

$$\text{purging time (hours)} = (3 \times V) / 300$$

Where V is the pressurized plant volume in liters.

Close the opposite side of the pressurized plant after purging time. Alarms must be ignored during the purging phase.

### 5.2 Normal operation

The dehydrator is designed for continuous operation and automatic duty and does not require any preventive maintenance.

An automatic Built-In Test Equipment (BITE) discovers and locates failures that may occur. BITE alarms are showed on the display.

### 5.3 LED indicator

The front LED is solid green during normal operation.

When LED turns red one or more alarms occurred.



## 5.4 Alarms description

The following alarms are available on the display:

<b>LOW PRESSURE</b>	<p>The alarm indicates that pressure is lower than the pressure threshold value. Possible cause is excessive output air leakages.</p> <p>Low pressure alarm is enabled 20 seconds after power on.</p>
<b>HIGH PRESSURE</b>	<p>The alarm indicates that pressure is higher than the pressure threshold value. In case of leakageless user system, possible cause of this alarm is the air thermal expansion.</p> <p>High pressure alarm is enabled 20 seconds after power on.</p>
<b>HIGH HUMIDITY</b>	<p>The alarm indicates that the output air flow has a Relative Humidity higher than 10%. This alarm can turn on at first start-up if the dehydrator has been stocked for weeks in humid place; in this case the alarm must disappear within 24 hours after start-up.</p> <p>During normal operation, this alarm indicates a dehydrator failure.</p> <p>High humidity alarm is enabled 30 minutes after power on.</p>

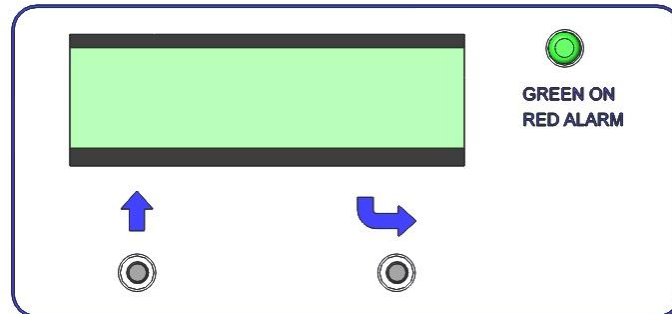
The following BITE alarms, available on the display, inform us if a system failure occurs and if a **corrective maintenance is required**, see chapter 8 for details.

<b>H1 NOT WORKING</b>	<p>The heater of drying chamber 1 doesn't work.</p> <p>The regeneration cycle is not is not correctly performed and high humidity alarm can come in.</p>
<b>H2 NOT WORKING</b>	<p>The heater of drying chamber 2 doesn't work.</p> <p>The regeneration cycle is not is not correctly performed and high humidity alarm can come in.</p>
<b>P1 NOT WORKING</b>	<p>The air pump 1 doesn't work.</p> <p>Air cannot be correctly compressed and low pressure alarm can come in.</p>
<b>P2 NOT WORKING</b>	<p>The air pump 2 doesn't work.</p> <p>Air cannot be correctly compressed and low pressure alarm can come in.</p>
<b>HS NOT WORKING</b>	<p>The Humidity Probe doesn't work.</p> <p>The humidity alarm cannot be managed.</p>



6. MENU FUNCTIONS

On the front side of the dehydrator a display and two function keys allow user to get information and to set some parameters such as output pressure and alarms thresholds.



6.1 Data menu

The menus are arranged in pages displayed on the LCD and user can scroll the pages by pressing the key “↵”.

On startup the following *main page*<sup>1</sup> (permanent page) is displayed. In this page the operating gauge pressure and the hour meter value are showed:

P	r	e	s	s	u	r	e	2	.	0	k	P	a
h	o	u	r	m	e	t	e	r	0	0	3	1	2

The first row displays the operating gauge pressure and the example shows that running measured pressure is “2 kPa”-

The second row shows the hour meter value. The example shows the dehydrator has been running for 312 hours long.

Press the key “↑” to get optional information in the second row: air flow liter per hours (only for dehydrator with flowmeter).

When alarm(s) is active, the hour meter value is replaced by the alarm message indication:

P	r	e	s	s	u	r	e	0	.	4	k	P	a
L	O	W	P	R	E	S	S	U	R	E			

This example shows the operating pressure is “0,4 kPa (low pressure factory default threshold is 1 kPa). The string “LOW PRESSURE” is the alarm message relevant to the *low pressure* condition. Simultaneously, the ALARM LED lights red.

When more than one alarm is active, the strings relevant to the pending alarms alternate one each other on the second row of the display.

<sup>1</sup> A new page appears on the display when the key “↵” is pressed. The display provides *auto return* to *main page* from any other one (*secondary pages*). The timeout is fixed in one minute. At any pressing of the key “↵”, user scrolls all the available service pages (*secondary pages*) until *main page* is selected again.



## 6.2 Pressure and alarm threshold settings

Press the key “**↵**” to access **the pressure target setting page**. The following screen appears on the display:

```
P r e s s u r e   s e t
p o i n t :      2 . 0   k P a
```

The example shows the target pressure is 2 kPa.

Press the key “**↑**” to increase the pressure target. Only increment key is provided. When the maximum selectable value is reached (6 kPa), the minimum allowable value (1 kPa) is automatically displayed at the next key pressing. The value will increase automatically keeping the key pressed down.

Press the key “**↵**” to **enter** the new target pressure setting<sup>2</sup> and to reach **the low pressure setting page**:

```
L o w   p r e s s u r e
a l a r m :      1 . 0   k P a
```

The example shows that the low pressure alarm threshold is set at 1 kPa.

Press the key “**↑**” to increase the low pressure threshold. Increment function key only is provided. When the maximum value is reached (target pressure, selected in the previous page, minus 0,5), the minimum allowable value (0,5 kPa) is automatically displayed at the next key pressing. The value will increase automatically keeping the key pressed down.

Press the key “**↵**” to **enter** the new low pressure threshold and to reach **the high pressure setting page**:

```
H i g h   p r e s s u r e
a l a r m :      6 . 0   k P a
```

The example shows that the high pressure alarm threshold is set at 6 kPa.

Press the key “**↑**” to increase the displayed value. When the maximum value of 7 kPa is reached, the target pressure value + 0,5 kPa is automatically displayed at the next key pressing. The value will increase automatically keeping the key pressed down.

Press the key “**↵**” to **enter** the new high pressure threshold and to return to main page.

<sup>2</sup> in order to avoid unwanted changes in the operating pressure, target pressure is not modified until exiting setting page.



**7. ETHERNET INTERFACE (OPTIONAL)**

The dehydrator provides a 10/100 BASE-TX Ethernet connectivity as option. The RJ45 Ethernet connector is located on the rear panel.

An embedded web server allows real-time remote control and monitoring of the dehydrator.

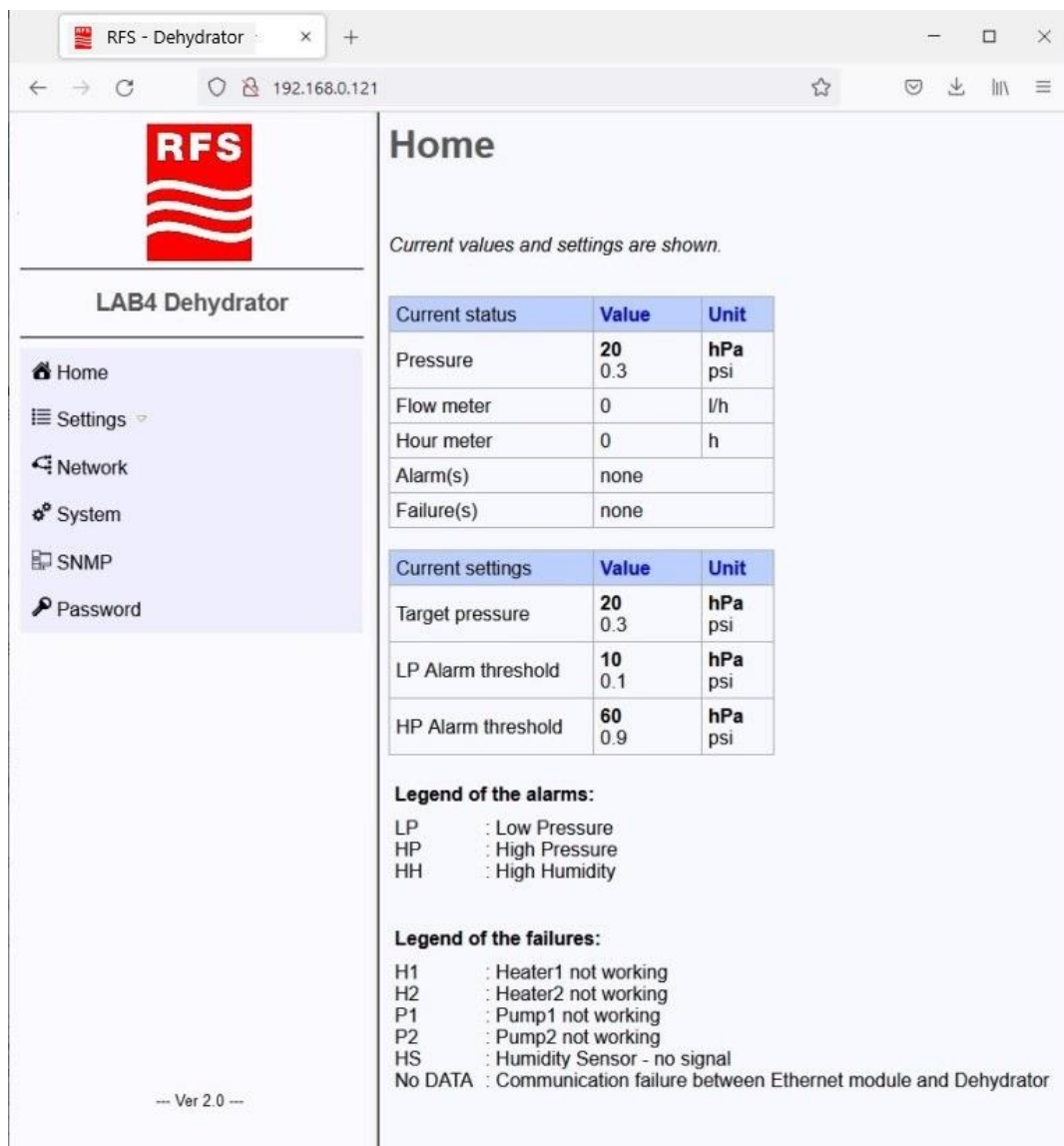
Every TCP connection is defined by a destination IP address. The dehydrator must have assigned a unique IP address for a correct network operation.

The default IP address is showed on a label near the RJ45 Ethernet connector. Different IP address and port can be assigned, see § 7.1.

You must properly configure the network settings of the device to be on the same subnet with the dehydrator.

Start a web browser on your device connected to the same LAN of the dehydrator and enter the dehydrator IP address in the address field of the browser.

For example, if the IP address is 192.168.0.120 (factory default), the following web page is displayed:





in the box “**Current status**” are shown:

- the current (real-time) air output pressure
- the air flow (if available)
- the hour meter
- the current alarm(s)
- the current failure(s)

in the box “**Current settings**”:

- the target pressure
- the low pressure alarm threshold
- the high pressure alarm threshold

The menu is available on the left side of the web page.

Move the mouse over “**Settings**” to get access to three sub-menus and:

- select “**Target Pressure**” to enter a new working pressure
- select “**Low Pressure alarm threshold**” to enter a new low pressure alarm threshold
- select “**High Pressure alarm threshold**” to enter a new high pressure alarm threshold

Select “**Network**” to change the IP address

Select “**System**” to get MAC Address and reboot the Ethernet module

Select “**SNMP**” to set *system Contact*, *system Description*, *system Location* and *system Name* for this dehydrator

Select “**Password**” to set a password, if required to login, or to get a free access (default, no username and password required).



**Note:**

- in the Password web page, to **get a free access** (default) select **Disable** as option for the Login field and then click on Submit.
- If user wants to **set a password** to login, select **Enable** as option for the Login field, type the password, confirm the password and click on Submit. The Username “**admin**” is fixed and cannot be changed. User must type “**admin**” (lower case) in the username first field of login window.





## 7.1 LAN configuration

Select “**Network**” to access the LAN configuration page and to set the new IP address, the subnet mask and the gateway.

The screenshot shows a web browser window titled "RFS - Dehydrator" with the address bar displaying "192.168.0.120". The main content area is titled "Network" and contains a note: "A unique IP address must be assigned to the dehydrator for the correct operation in the LAN. Always ask your network administrator for the appropriate LAN settings." Below this is a "Network Setup" section with the following fields: "DHCP Client" set to "Disable", "IP Address" set to "192.168.0.120", "Network Mask" set to "255.255.255.0", and "Gateway" set to "192.168.0.1". A "Submit" button is located at the bottom of the form. On the left side, there is a sidebar menu with options: Home, Settings, Network, System, SNMP, and Password.

Select “Network” in the menu:

- **DHCP Client:** is always disable.
- **IP Address:** the IP address of your dehydrator. To change it, enter an unused IP address from the address range used on your LAN.
- **Network Mask:** type the subnet mask based on the IP address that you assign.
- **Gateway:** the IP address of the gateway of your LAN. For more complex networks, enter the address of the router for the network segment to which the dehydrator is connected.

Click the **Submit** button and your settings are saved.



**Note:**

If you change the LAN IP address while connected through the browser, you will be disconnected. To reconnect, open a new connection using the new IP address.

**Remind to update the new IP address on the label placed on the rear side of the dehydrator (close to the RJ45 connector).**



## 7.2 Simple Network Management Protocol (SNMP)

The dehydrator supports SNMP protocol version 1 (SNMPv1) and version 2C (SNMPv2c).

The default READ Community name is: **public**

The relevant OID numbers are the following:

**Note:** the pressure unit of measure is **hPa** = kPa x 10

OID	Description	Note
1.3.6.1.4.1.48157.1.1.0	Current Pressure	Returns the current reading of the output pressure
1.3.6.1.4.1.48157.1.2.0	Target Pressure	Returns the pressure target
1.3.6.1.4.1.48157.1.3.0	Low Pressure Alarm threshold	Returns the low pressure alarm threshold
1.3.6.1.4.1.48157.1.4.0	High Pressure Alarm threshold	Returns the high-pressure alarm threshold
1.3.6.1.4.1.48157.1.5.0	Flow Reading (optional)	If the optional flowmeter is available, it returns the current overall output flow. The unit of measure is litres per hour
1.3.6.1.4.1.48157.1.6.0	Hour Meter	Returns the dehydrator working time. The unit of measure is hour
1.3.6.1.4.1.48157.1.7.0	Alarm Code	Returns The alarm code: 0 = No alarm 1 = Low Pressure 2 = High Pressure 3 = High Humidity 4 = Low Pressure and High Humidity 5 = High Pressure and High Humidity

## 8. CORRECTIVE MAINTENANCE AND SPARE PART



The dehydrator does not require any preventive maintenance.

In case of dehydrator failure please contact Radio Frequency Systems Customer Service (see first page).

In case of servicing made by the customer itself, Radio Frequency Systems will supply the necessary spare parts and support.

Servicing does not require specialized personnel. No setting-up or calibration is needed.

In case of servicing, it is mandatory to keep the following in mind:

	<b><u>Disconnect the dehydrator from power supply</u> before servicing.</b>
	<b>Due to the high temperature of some parts (purposely marked) inside the dehydrator, it is mandatory to <u>wait for at least one hour</u> after the switch-off, before servicing inside.</b>

A list of spare parts available at service stock is given in the following table:

**Note: always mention on orders the dehydrator P/N or S/N printed on the rear label of the dehydrator.**

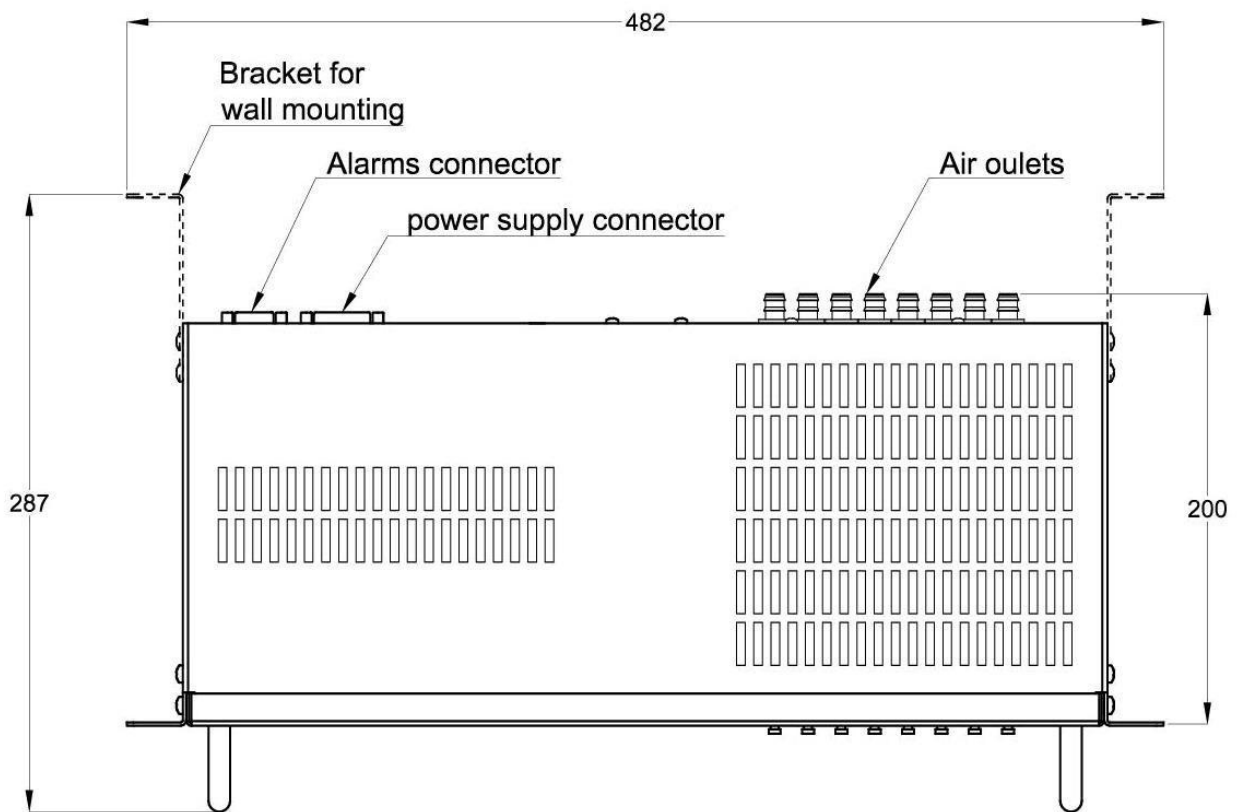
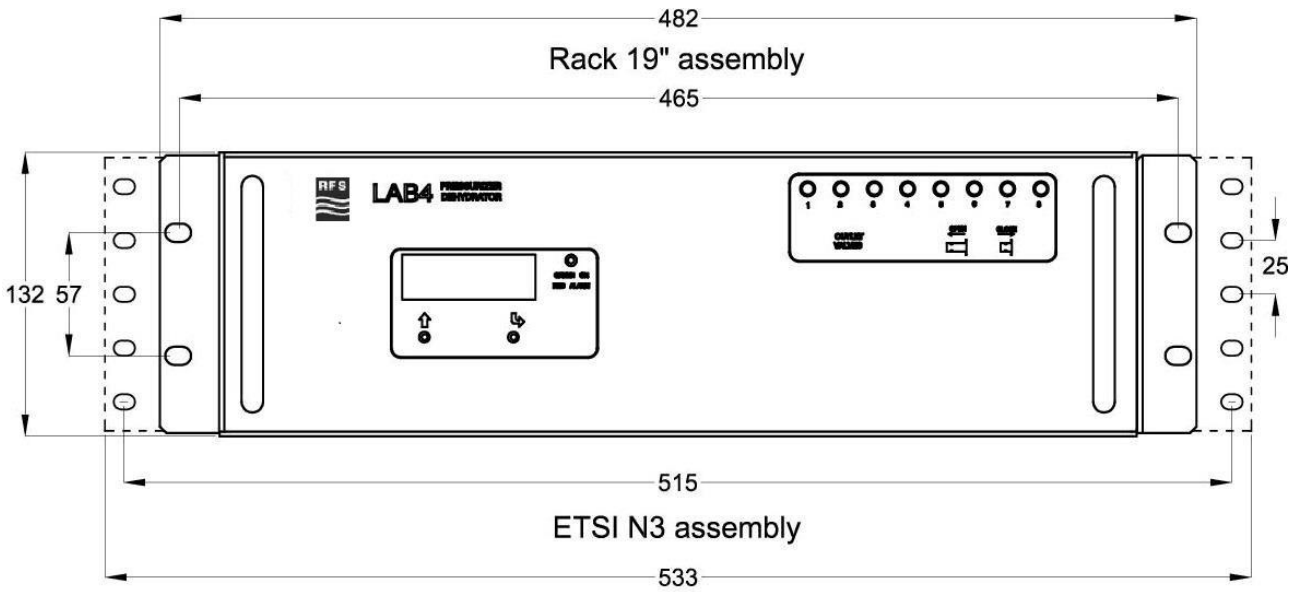
Description	Part Number
Electronic boards kit	K16673.001
Humidity detector	C16672.400
Diaphragm pump	2PPBA747016S
Drying towers kit	K14516
Ethernet board kit	K15401.102

### Optional add-on

Description	Part Number
AC/DC power supply adapter kit	K14524

**Note:** K14524 power supply kit allows AC Power Supply from 90 to 264 Vac 50/60 Hz.

9. OUTLINE



Dimensions in mm