NORTEK
FLUIDS
TECHNOLOGY

INSTRUCTION MANUAL

PC235261-33
July 2023
Original manual

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PORTABLE VACUUM DEHYDRATOR

Models 20 LPM

Referencia del modelo:	4111300-B
Pedido Nortek:	PC235261
Proyecto:	BES23030753
Descripción del circuito:	PORTABLE VACUUM DEHYDRATOR 20LPM
Número de fabricación:	3521
Cliente:	KRAFTINDUSTRIE GMBH
Pedido Cliente:	BES23030753
Item Tag:	--

INDEX

1 Introduction

This manual cover the installation and operating procedures for the following NORTEK portable vacuum dehydrators models:

PORTABLE VACUUM DEHYDRATORS WITHOUT COALESCING FILTER

Model 4111300-A . – Portable Vacuum Dehydrator 20L/min. (380V / 50 Hz. Frequency).

Model 4111300-B . – Portable Vacuum Dehydrator 20L/min. (400V / 50 Hz. Frequency).

Model 4111300-C . – Portable Vacuum Dehydrator 20L/min. (415V / 50 Hz. Frequency).

Model 4111300-D . – Portable Vacuum Dehydrator 20L/min. (440V / 60 Hz. Frequency).

Model 4111300-E . – Portable Vacuum Dehydrator 20L/min. (460V / 60 Hz. Frequency).

Model 4111300-F . – Portable Vacuum Dehydrator 20L/min. (480V / 60 Hz. Frequency).

We recommend reading carefully this manual before attempting to start or operate the unit. Follow the set-up instructions to minimize problems. We have attempted to provide complete information to allow you to get your unit in operation as quickly as possible. This manual is a generic description, exact dimensions, characteristics and references are noted on each individual unit, for this information please address to the components in “Portable vacuum dehydrator 20LPM” dossier.

2 Types of risk

The dangers are classified according to the different categories of security warnings. In the following table you will find a general description on rating different symbols (icons) and warning words related to specific hazards and their potential consequences.

Icon	Damage	Warning Word	Definition	Consequence
	Personals	DANGER!	Imminent Danger	Death or serious injuries
		WARNING!	Potentially hazardous situation	Possible plight of death or serious injury
		WATCH OUT!	Less Danger	Serious or minor injuries
	Materials	¡ATTENTION!	Risk of material or environmental damage	Equipment damage , environ-mental damage and material damages to the environment
		INDICATION	Usage tips and other important information and instructions	No personal, environmental or equipment damage


Wear helmet with face protection


Wear protective gloves


Wear safety shoes


Professional recycled


Respect environmental protection measures


Read and follow the instructions in the user manual

3 Safety of the product

NORTEK products are designed and manufactured in order to ensure the highest levels of performance and quality for proper use.

In the process of product design, our main concern is the safety of the user. In addition, this manual should assist in NORTEK products without any problem to use.

Complementarily to the user manual, it is necessary to respect and provide other obligatory universal regulations and all regulations to prevent accidents and protect the environment.

Equipment only can be used by personnel with appropriate training and knowledge of security. Otherwise, there could be danger of injury.

We warn that all users must read carefully this manual before using the equipment and follow the instructions provided here without any limitation. We also advise you to allow a qualified instructor to form you on the use of the product.

WARNING / WATCH OUT
The manual of use of the hoses and fittings to connected equipment should also be taken into account.

Even if you are familiar with the equipment, you will need to read the following safety indications

	Be careful that clothes or any part of the body are not in contact with parts in movement of the equipment.	Immediately notify to the competent person about any modification made in the equipment, including the operative modifications. It could be necessary to stop the equipment.	
	Use safety works, helmet with hear protection, safety shoes and work gloves.	Before to run the equipment check for any deficiency or damage on it.	
	Is totally forbidden to work under hydraulically lifted hanging equipment. If necessary, it will be required to install mechanic supports.	Check there are no visible damages and there are no leakages.	
	In case of failures, e-stop the equipment. Failures must be fixed immediately.	Don't modify the unit without the authorization from NORTEK	
	Follow all the safety instructions related with the equipment included in this manual.	All safety labels in the unit must be keep in good conditions	
	Check all the safety covers are installed and in good conditions.	Don't use any proceed that could put in risk the unit.	

	Safety equipment must be always operative	Don't modify the limits established for this equipment.	
	Before the start-up and while using the equipment be sure that there are no risks for the life of the people.	Respect the time indicated in this manual for checking and inspections.	
	While working near of high voltage equipment take all the safety requirements to avoid electrical current transmissions	Use only NORTEK original spare parts.	
		Be sure there are no cables hanging out of the unit that could risk the unit during transport or installation	
	Avoid electrostatic discharges in the unit, they could produce dangerous sparks.	Avoid extreme temperatures during installation of the unit as they could damage the unit	
	Fluid is filled with mineral oils that could be dangerous for the heath. Read the safety sheets of the fluid used.	While working with the unit, during storage or a major shutdown protect extreme temperatures that could damage the unit and its protections	
	Before to start to work be sure that you will have enough light.	Before to transport the unit check it has been secured to avoid accidents.	
	This user manual must be in an accessible place where the equipment is going to be used.	All the wasted fluids, package and wear components must be eliminated in a safe way for the environment.	

Complementarily to the safety instructions on this owner's manual, it is necessary to respect and indicate all regulations and other universal mandatory regulations, both national and international, to prevent accidents.

WARNING/WATCH OUT/ATTENTION

This equipment is solely intended to be used as indicated in this manual, read chapter « Use of the equipment» If equipment is used for other purpose of those indicated in this manual it will be considered as a misuse and manufacturer/supplier will not be responsible of any damage originated by this misuse. User will be the only person to assume the risk.
It is also considered a correct use the following of the instructions of this manual as well as the conditions of inspection and maintenance.

Never work if you feel tired or dizzy.

4 Use of the equipment

4.1 Principal of operation

Vacuum dehydrator is used to remove the water from the lubrication oil.

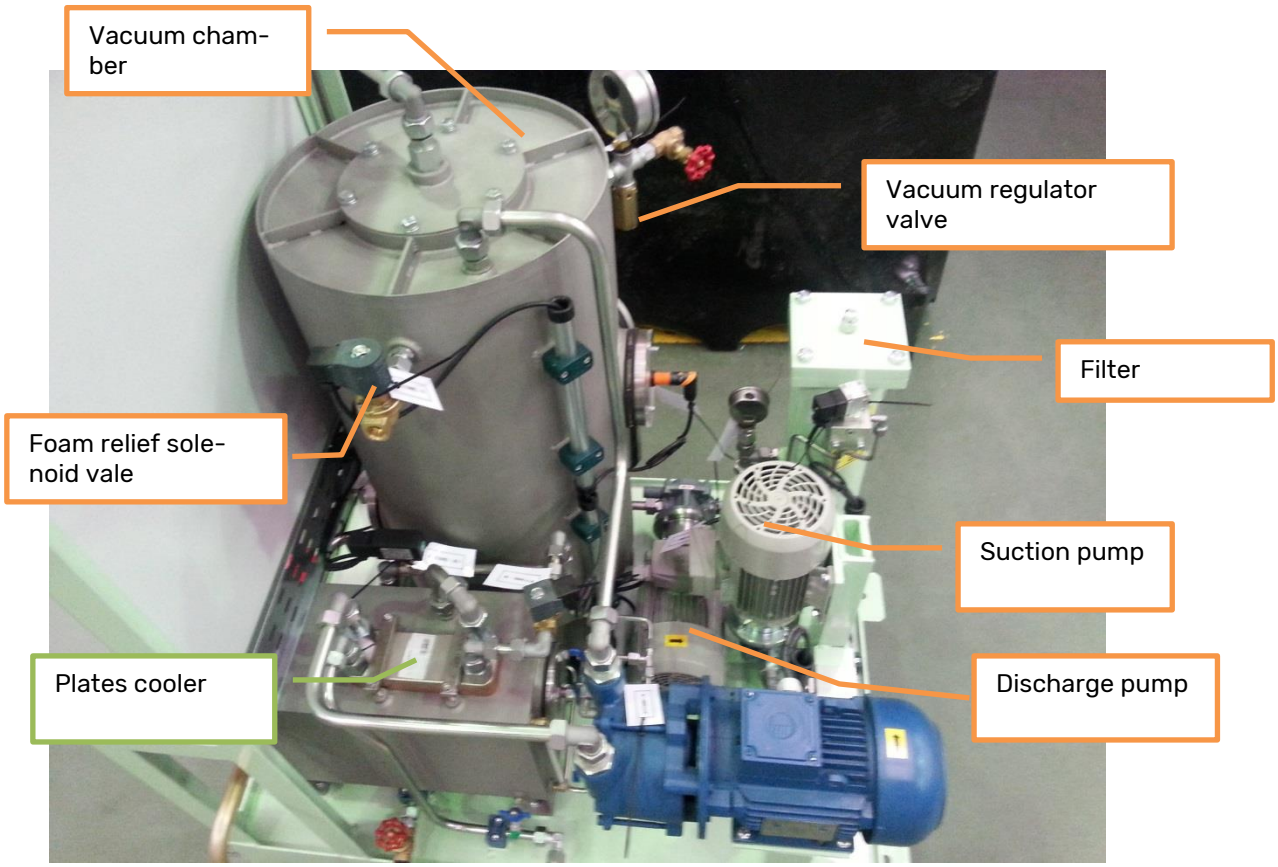
Once water presence is detected the units are run. Once the water is completely removed from the system, the units are switch off.

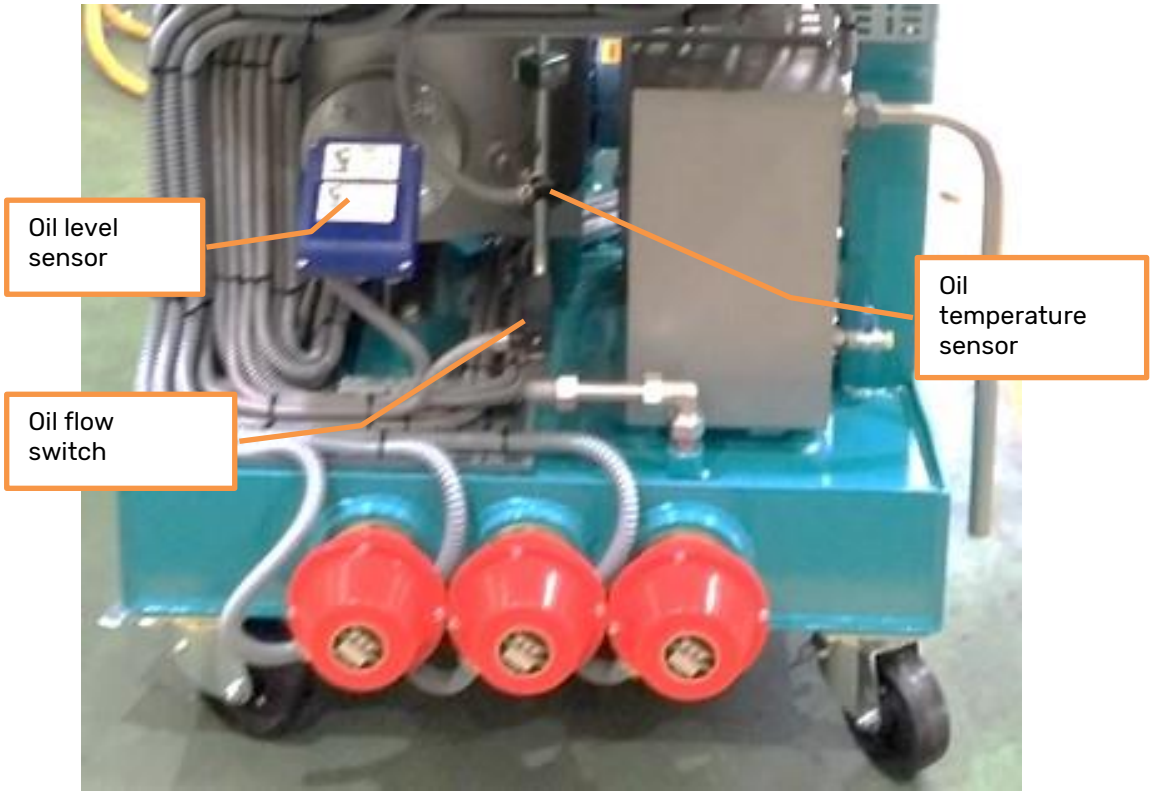
CAUTION / ATENTION

Take note of the working limits of the unit. These values must never be overpassed.

5 Main components

5.1 Component description





Oil inlet

Oil outlet

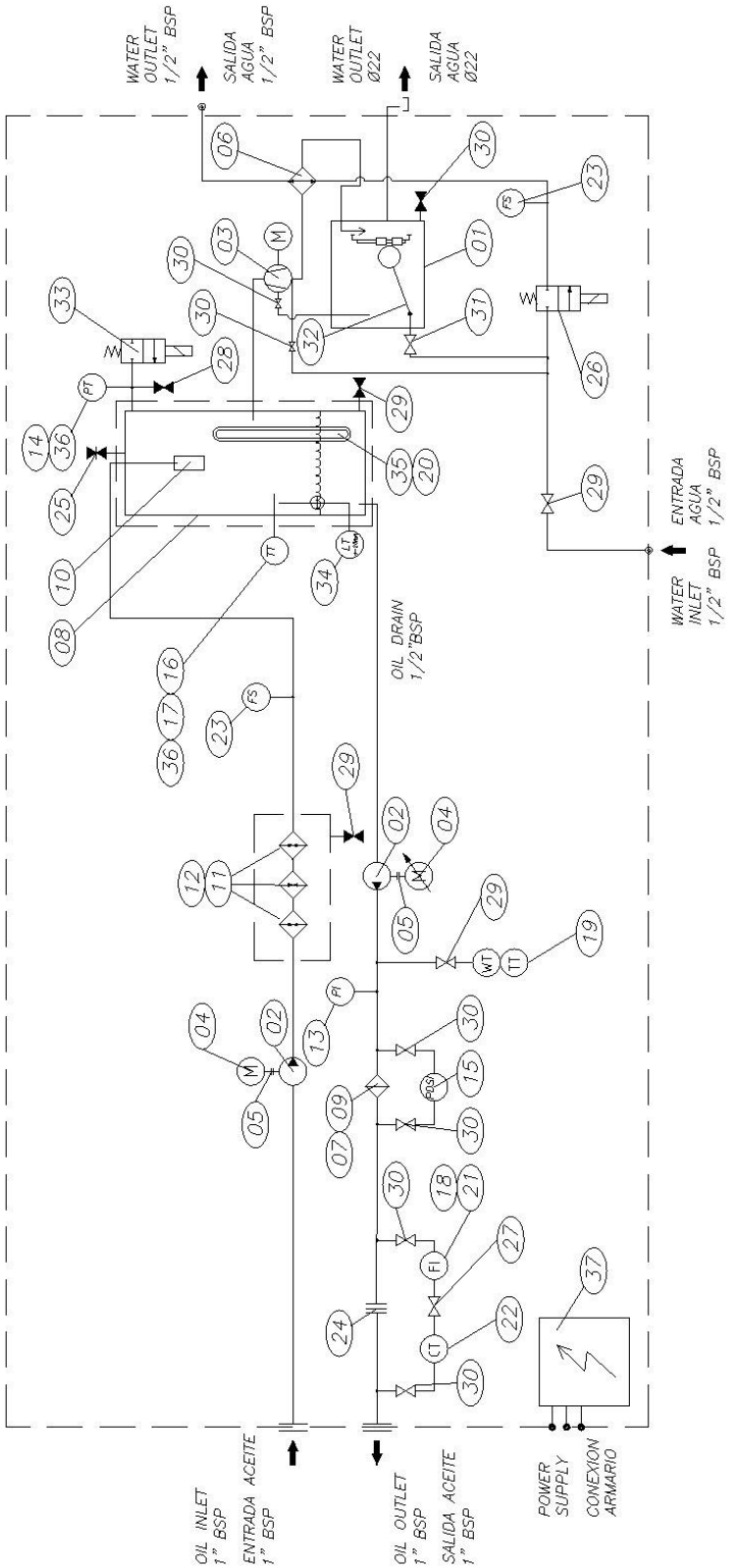
Extracted water outlet

Water outlet

Water inlet

6 Operating principle

It is convenient following this synoptic scheme for tracking the different parts of the dehydrator.



Oil contaminated with water and particles is drawn into the unit from lube tank to be processed by the feed pump (Pos. 01). This feed pump sends the oil through the online heaters (Pos.13) to heat the oil.

A temperature sensor (Pos. 22) in the oil line sends a 4-20mA signal to a temperature regulator located in the control panel. The temperature setting value will normally be between (65~75 °C) depending of the type of oil to be dried.

As a safety device, a flow-switch (Pos.25) is installed in the line so heaters cannot be on if there is no oil flow.

When oil temperature is lower than the set temperature in the temperature regulator, the oil passes thru the vacuum chamber (Pos.07) but the vacuum pump is not running so no vacuum is generated inside the chamber.

A discharge pump (Pos.01) suctions the oil from the vacuum chamber and send it back to the tank thru an in line filter (Pos.11)

The level in the vacuum chamber keeps constant by using a level transmitter (Pos.16), that stop the feeding pump or the discharge pump if there is max or min level.

When above the temperature set point the dehydrator unit is operating in dehydrator mode, the vacuum pump (Pos.06) is running so a vacuum pressure is generated into the vacuum chamber and the saturated water is removed from the oil. To increase the efficiency at the oil inlet of the vacuum chamber there is a dispersing filter element (Pos. 08) inside the chamber.

The oil enters to this vacuum chamber at approximately 65~75 °C, the chamber pressure is -0.6bar to -0.8bar, the vacuum is controlled using a relief valve (Pos. 17).

The vacuum setting value must be adjusted depending on the type of oil used.

A level switch (Pos.20) detects high foam levels in the vacuum chamber. When there is a high foam level the solenoid valve (Pos. 18) is energized opening the vacuum chamber to atmosphere and reducing the vacuum pressure until the foam level goes down.

Vacuum pressure is created by a liquid ring vacuum pump (Pos. 06). This vacuum pump extracts the water steam and air from the oil. The water vapor passes across a plates-cooler (Pos.12) and condensed in the water reservoir (Pos.09).

Water flow must be always supplied. To prevent damages in the vacuum pump a water flow sensor (Pos.25) stops the pump in case that there is not water flow. To reduce water consumption a solenoid valve (Pos.19) closes the water line if the vacuum pump is not running.

The processed oil is pumped out of the vacuum chamber by a discharge pump (Pos. 01), the discharge pump is run by a frequency drive.

The frequency drive increases or reduces the speed of the discharge pump based on the 4-20mA signal from the analogue transmitter (Pos.16) installed in the vacuum chamber.

The clean and dehydrated oil is passed through a filter (Pos.11) and returned to the lubrication system oil tank.

For a more detailed information and verify the model of the components described please address to the components in “Portable vacuum dehydrator 20LPM” dossier

7 Instalation

Installation of the equipment must be done by trained technicians to prevent damages an problems due to a wrong installation.

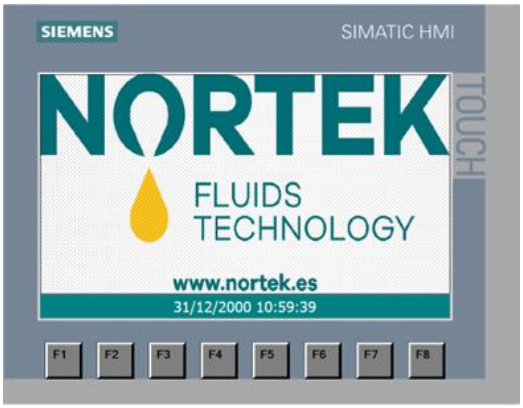
For lifting the unit in a safe mode it is supplied with a transportation structure. The unit shall be grounded and the transport elements removed.

The unit must be grounded using the four brakes on the wheels.

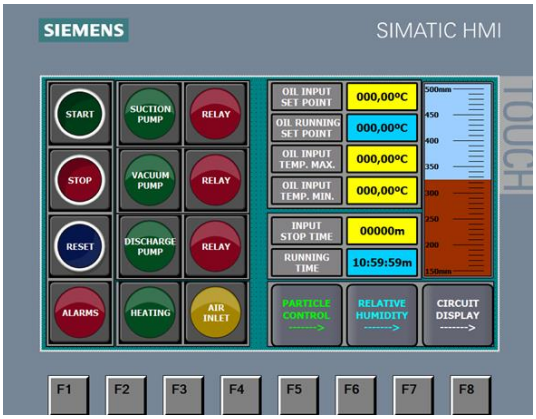
Connect the oil, water and pressure air to each connection following the indications of the drawings.

8 Touch screen instructions

When supplying power to the equipment, the following touch screen appears.



- Press on the NORTEK logo to go to the main screen.



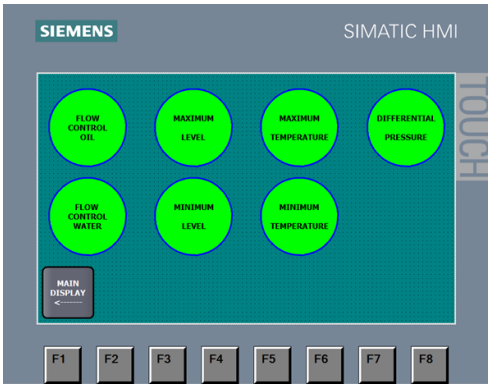
- This screen presents all the information needed to start the dehydration unit.

  By pressing on the yellow buttons, we set the temperature or the automatic stop time before disconnection (recommended time 15 minutes).

  In the event of any anomaly in the equipment, the corresponding alarms shall be intermittent. Press on the **"ALARMS"** button to go the touch screen alarms.

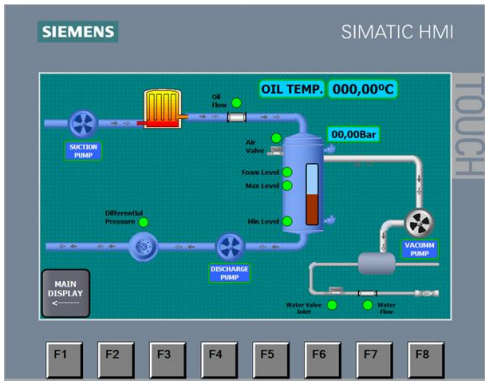
  By clicking on the **"CIRCUIT DISPLAY"** button, the touch screen graphically shows how the process is carried out.

  For manual control of the unit press on the **"MANUAL DISPLAY"** button.



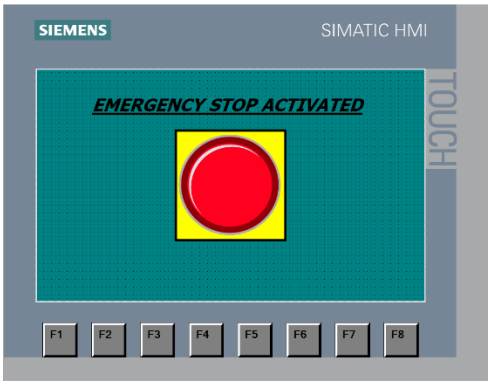
- This touch screen alarm shows with a red flicker where there is any problem.

- Press **"MAIN DISPLAY"** to return to the main screen.

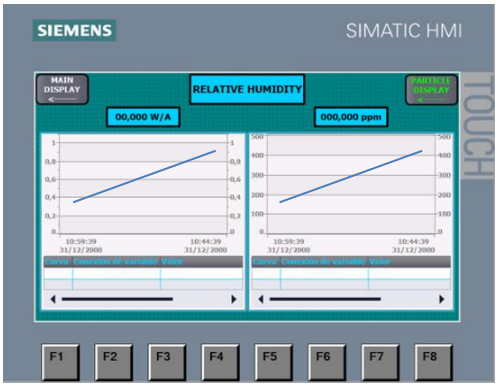


- This touch screen graphically shows how the process is carried out, indicating in red any alarm that may occur, also displaying the pressure and temperature in the dehydrator.

- Press **"MAIN DISPLAY"** to return to the main screen.

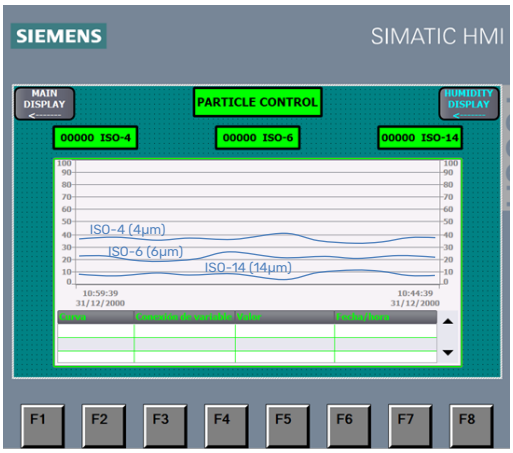


- In case of emergency mushroom use, the touch screen will be displayed in this way.



- This screen graphically shows the amount of emulsified water in the oil by means of 2 graphs, one shows the water saturation in a range of values from 0 to 1, where 0 shows that the oil is free of water and 1 shows that the oil is completely saturated with water that begins to precipitate. For values lower than 1, the other graph shows the parallel evolution of the concentration of water in the oil in particles per million "ppm" at the temperature of the measurement.

- Press **"PARTICLE DISPLAY"** button to go the particle control screen.
- Press **"MAIN DISPLAY"** to return to the main screen.



- This screen graphically shows the cleaning level of the oil by means of a particle control, ISO 4406 establishes a code formed by three numbers separated by bars, by which, we can know the concentration of particles according to their size, of 4µm, 6µm and 14µm, so that for example for code 17/15/13, we will have a certain particle concentration >4µm per milliliter given by ISO code 17 and a certain particle concentration >6µm per milliliter given by ISO code 15 and a certain particle concentration >14µm per milliliter given by the ISO code 13.

- Press **"HUMIDITY DISPLAY"** button to go the relative humidity screen.
- Press **"MAIN DISPLAY"** to return to the main screen.

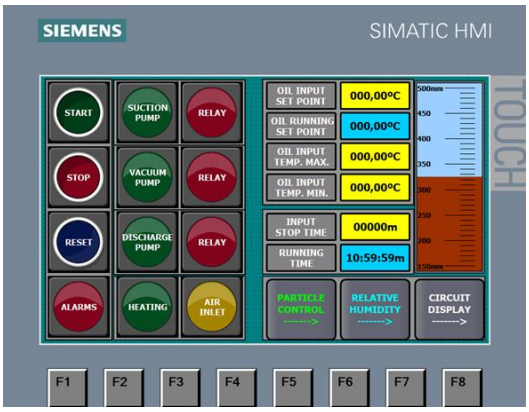
9 Start the unit

First start of the equipment must be done by trained technicians to prevent damages and problems due to a wrong commissioning. In case of doubts ask NORTEK for assistance.

Before to start the unit please make sure all connections are correct and the voltage supply is as per indicated in the plate located in the control panel.

Prior to operate the unit check the motors rotation following this procedure (It will be needed to be done with two persons).

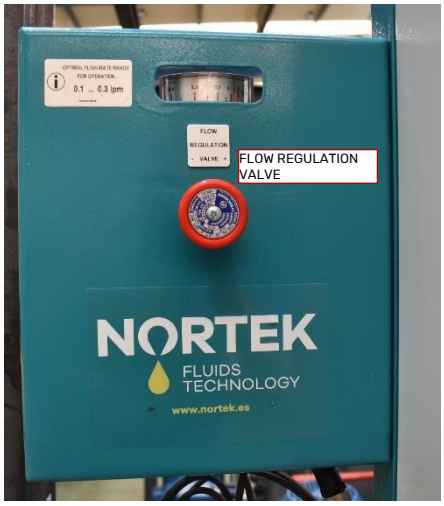
1. Open the butterfly suction valve.
2. In the touch screen select .



3. Push "START" button and immediately the "STOP" button.
4. One person must check the sense of rotation of suction and discharge motors
5. Verify that rotation of the suction motor and discharge motor is as indicated in the label of the motors.
6. If not, switch off the main switch in the panel and change the voltage phases feeding to the control panel.
7. Repeat points 1 to 6.

10 Operation

10.1 Adjusting particle control



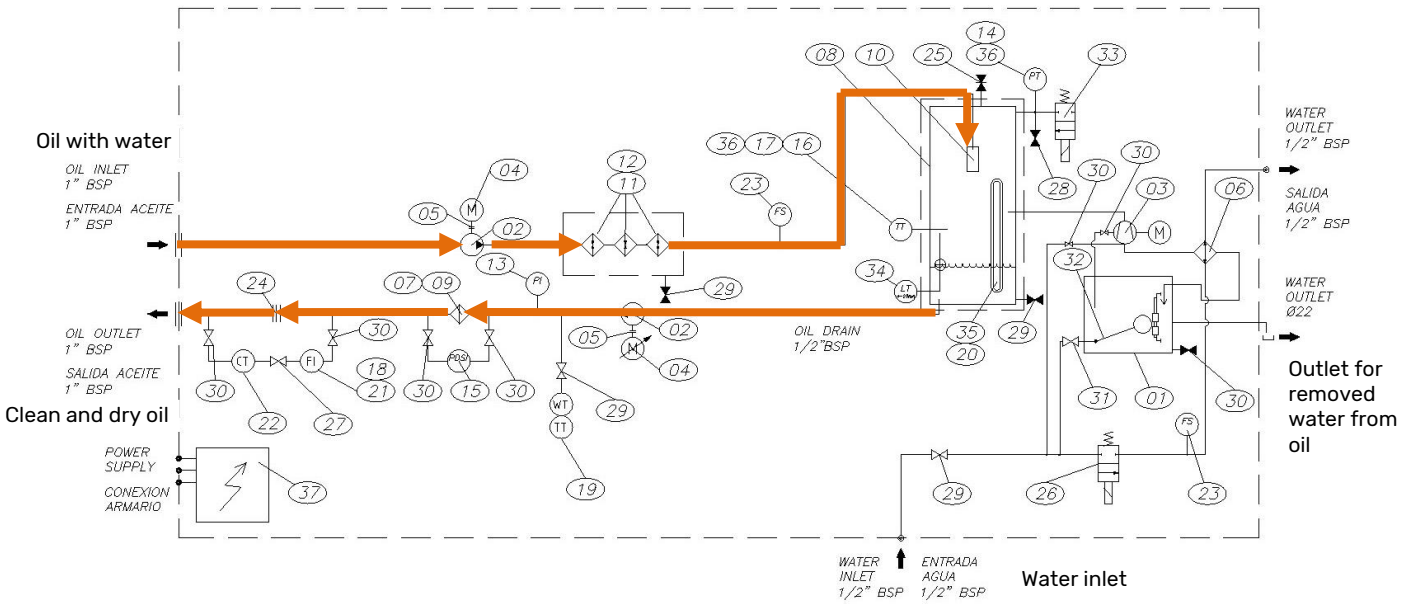
For the correct operation of the particle control and relative humidity, it is necessary that the sample collection flow is in a range of 0.1 to 0.3 LPM, for which, we will adjust with the valve of the panel of the figure until its adjustment.

ATTENTION!

Never operate the system with the protections removed. Operation of the equipment must be done by trained technicians to prevent damages and problems due to a wrong operation.

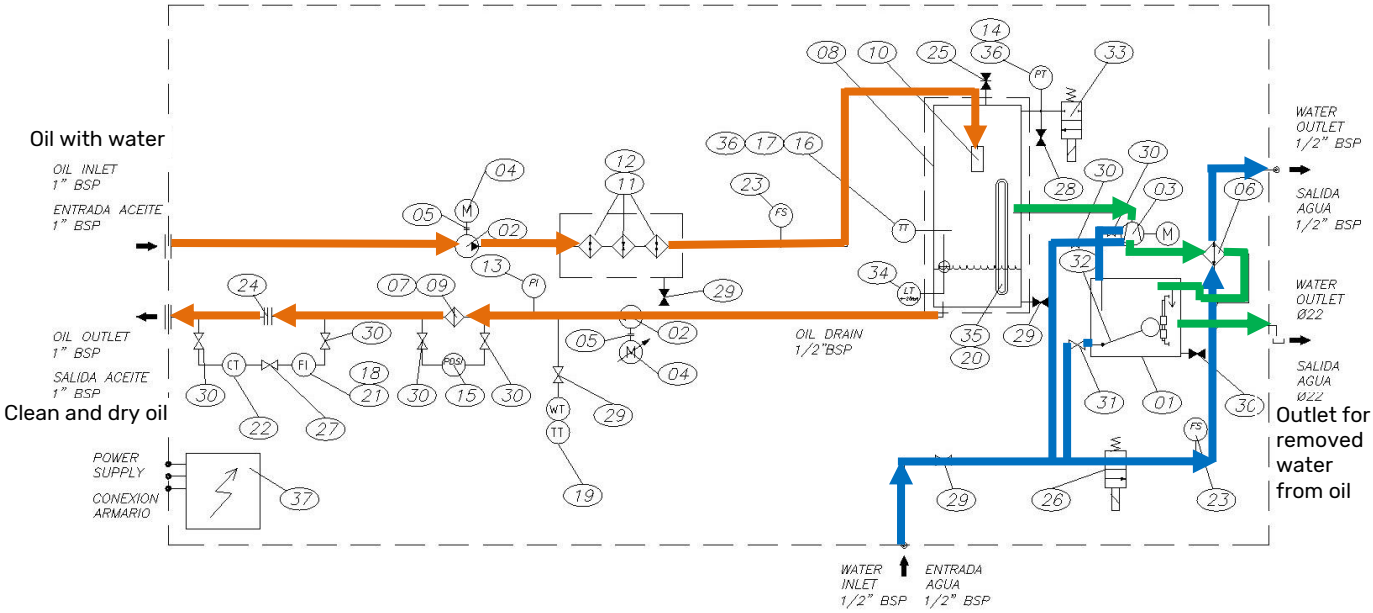
10.2 Operating the unit

When the unit is started the supply pump will pump oil from the system tank through the heaters and the vacuum chamber. The discharge pump will suction the oil from the vacuum chamber sending it to the tank through an online filter. Vacuum pump is not running.



When the oil temperature reaches the set point the unit starts in dehydrating mode. The water solenoid valve will energize and start circulating cool water through the plates cooler. The vacuum pump will start. The vacuum pump will draw the separated steam out of the vacuum chamber and pass it across the tube heat exchanger. The steam will condense back to water and collect in the separation tank. Once the separation tank is full, the separated water will start to discharge. During operation, the foam level is monitored by the foam level indicator.

If this indicator detects foam, the foam relief solenoid valve will energize and break the vacuum to the chamber. Once the foam level drops, the valve is de-energized.



NOTE: The unit is not meant to run continuous in dehydrating mode as this will shorten the life of the vacuum pump. Once water is removed, stop the system.

10.3 Operating procedure

Below are detailed instructions for start/stop procedure for the vacuum dehydrator units.

10.3.1 Starting the dehydrator for the first time

1. Open the Non-Contact water supply globe valve
2. Open the red valve on the heater tank to fill the tank with water
3. Prime vacuum pump using the valve shown in Figure I, ensure the lower valve is normally open so the hydraulic seal is maintained within the vacuum pump.

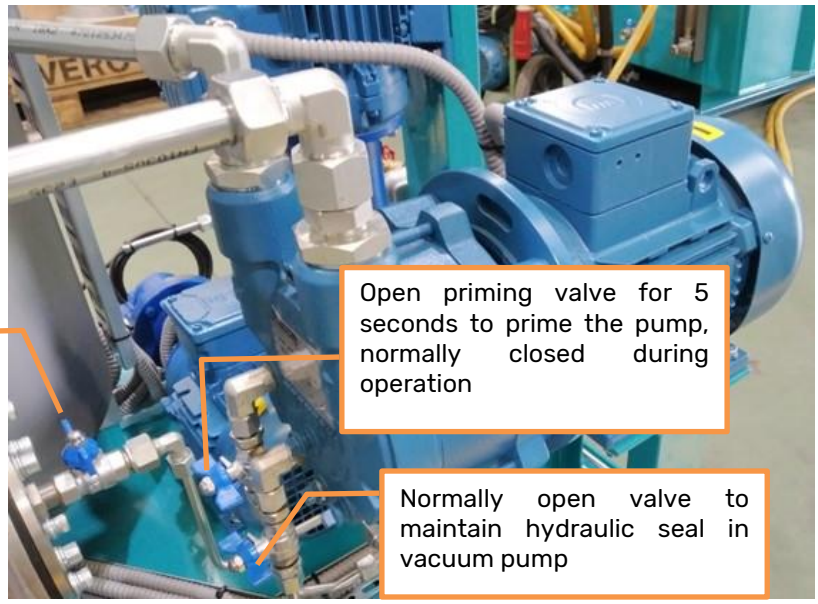
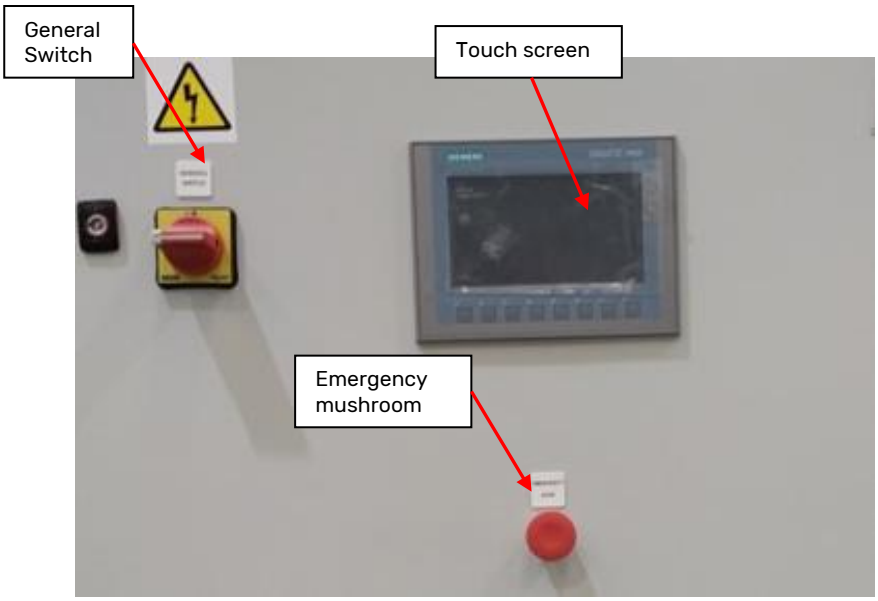


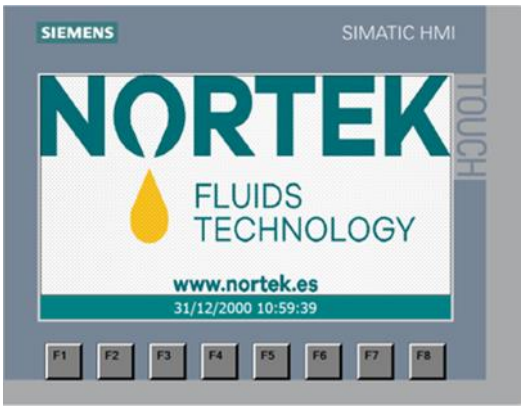
Figure I: Normal position of water valves around the vacuum

10.3.2 Starting unit

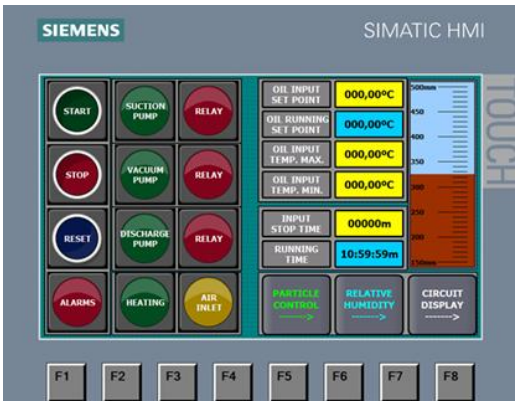
1. Open the supply valve to the selected suction pump.
2. Open the return to tank valve.
3. See the follow figure for disposition of switches on the operator station.



4. When the “General Switch” is connected, the following touch screen appears.



- Press on the NORTEK logo to go to the main screen.

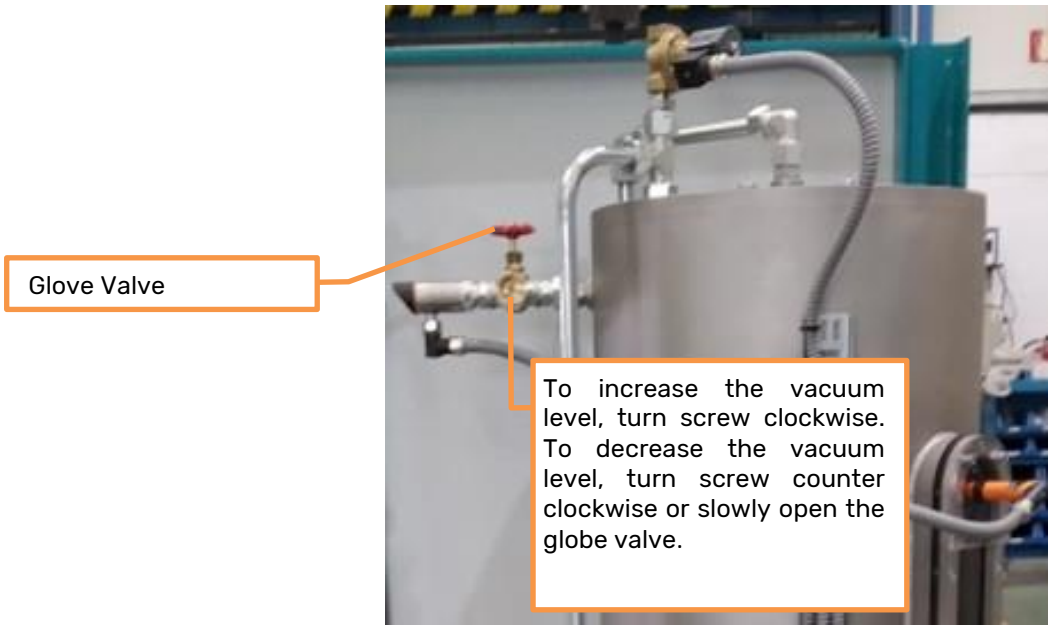


- Push “START” button

The LEDs “SUCTION PUMP”, “DISCHARGE PUMP” and “WARMING” are illuminated, when the oil temperature reaches the set point.

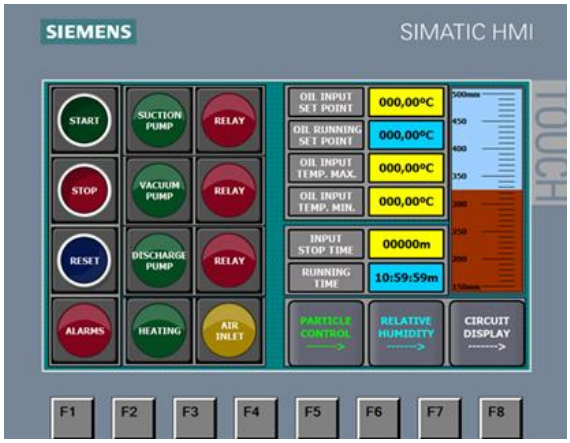
5. Vacuum pump will start automatically once the unit reaches the set point temperature and the LEDs “VACUUM PUMP” is illuminated.

See Figure III for vacuum adjustment procedure.



For ISO VG 460, consider vacuum of -0.8 bar and temperature of 80°C for optimum dehydration.
For ISO VG 150, consider vacuum of -0.77 bar and temperature of 75°C for optimum dehydration.

10.3.3 Stopping the Dehydrator



Automatic Stop:

1. Press “STOP” button.
   The heaters will automatically switch off and the vacuum pump will stop.
   The touch screen will show the countdown indicating the time remaining to stop automatically the pumps.
2. Turn off main power supply

11 Storage

If the equipment is going to be storage for a long time take the following precautions:

- Unit must be storage indoor in a dry and clean area.
- Close all the connections and protect them to avoid dirty go inside.
- If the original plastic protection has been removed it is recommended to cover it to prevent dust cover it.
- After a long storage, if the equipment has been storage for a long period of time check all the components and verify they are not damaged neither rusted.

CAUTION!

When lifting and carrying the equipment be sure that you are using the correct tools for the size and weight of the unit.

12 Maintenance and reparation

Servicing must be done only by NORTEK technicians or people trained by NORTEK.

Use only NORTEK original components as indicated in the bill of materials and spare parts list.

When servicing the unit be careful to keep all components clean to avoid damages in the equipment.

CAUTION / ATTENTION

For servicing the unit it is necessary a well equiped workshop and well trained technicians.

For major maintenance be sure that equipment has been cool down, power is off and pressure has been released.

Gaskets and couplings cannot be repaired, always must been replaced by NORTEK original parts.

INFORMATION:

Before to use elements from other suppliers contact with NORTEK.

Don't proceed with any reparation if you don't have the NORTEK spare parts list.

ATENTION!

Clean the unit before to proceed any check. Don't use aggressive medias as they could damage the unit.

Checking (maintenance measures):

Check at least monthly the proper functioning of the pump and in case of permanent use check its operation weekly.

Operation check:

- If suspicious noise is heard.
- Checks with maximum load.

Visual inspection procedure:

- Verify that all connections are adjusted.
- Verify that the tightness is general, without leaks.
- Check for deterioration in the pump casing.
- Verify that all liquid levels are within the required tolerances.
- Verify that all non-movable fasteners are good.
- Check that there are no corrosion points.
- Check all pressure gauges. It is recommended to keep a record with this information to determine when the next revision is needed.
- Verify that all activity posters, signs, indications and warnings are available and legible.

MAINTENANCE SERVICE	
Yearly	• Clean the pump deeply. • Clean the vacuum chamber deeply. • Clean the equipment and apply oil to all metal parts, in order to avoid corrosion points. • Clean the filtering elements inside the vacuum chamber (35 microns). • Remove and check the filter separator.
According to the indication of the differential pressure gauge.	• Change the filter element when it is saturated.

12.1 BASIC TROUBLESHOOTING

Below is table for basic troubleshooting of the vacuum dehydrator. The unit is meant to be started and left running without attention. There are safety interlocks to ensure if there is a problem the equipment will stop and not be damaged. If there is an alarm, the light on top of the unit will be red and the alarm will be displayed on the touch screen.

ALARM SCREEN	CAUSE	SOLUTION
FLOW CONTROL OIL FAILURE	There is no oil flow, heaters cannot run.	Check suction pump is running
		Check flow switch is correctly wired.
		Check flow switch operation.
FLOW CONTROL WATER FAILURE	There is no water flow through the vacuum pump and vacuum chamber coil.	Check flow switch is correctly wired.
		Check flow switch operation.
		Check there is water in the tank.
		Check there are no leakages.
MAXIMUM TEMPERATURE	Water temperature is higher than the set value. (aprox.100ºC)	Check thermostat set value
		Check thermostat operation
DIRTY DIFFERENTIAL PRESSURE	Filter element is saturated	Change filter element for a new one.
MAXIMUM LEVEL	Maximum level of oil in vacuum chamber.	Check discharge pump is running
		Check level transmitter is correctly wired.
MINIMUM LEVEL	Minimum level of oil in vacuum chamber.	Check suction pump is running
		Check level transmitter is correctly wired.

Note: In the touch screen, it will appear only as one flashing alarm. Press on the flashing to go to the alarms screen.

12.2 Basic maintenance procedures

A dirty filter is indicated when the differential pressure is equal to 1.5 bar. To change the filter, use the following procedure:

1. Drain the offline housing and remove the filter elements
2. Filter elements are disposable type, they must be replaced with new elements

The vacuum chamber should be cleaned once a year. The top of the tower must be removed and all dispersing plates removed and thoroughly cleaned. The inspection hatch at the bottom of the chamber should also be opened and the chamber should be thoroughly cleaned.

Return filters should be changed when back pressure indicated by a pressure transducer is equal to 0.5 bar.

To change the filter, use the following procedure:

1. Open the return filter bypass valve
2. Close the tank return valve
3. Open the top of the tank and remove the return filter elements.
4. The elements are 149 micron mesh type elements, they are cleanable and can be either cleaned or replaced depending on contamination level

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