unopex

# Operation & Maintenance Manual

## Unopex E 50

Solid-Liquid Extraction
Evaporation Unit

Document No: 520802

v1.0_en

# Table of Contents

# Foreword

Dear Customer,

Thank you for choosing E 50 Extraction Evaporation Unit from Unopex. You have made a good choice. Thank you for your trust.

Please read this manual carefully, note the safety precautions before installing and putting the Unopex E 50 Extraction Unit into operation. You will find all necessary information for the safe operation of the plant in this manual.

Follow this manual with regard to installation, operation, cleaning, maintenance, repair, etc. of the plant.

Original language version of this manual is in Turkish and serves as basis for all translations into other languages.



The manufacture of any component with the aid of this manual is also prohibited.

# 1. Introduction

## 1.1 Details on the Declaration of Conformity

CE

The plant complies with the requirements of the European Directives: 2006/42/EC (Machinery Directive) and 2014/35/EU (Low Voltage Directive).

## 1.2 Safety

The safety information in this operation manual is designed to protect the responsible body, operator and the plant from damage.

### 1.2.1 Symbols Used for Safety Instructions

Safety instructions are marked by the below combinations of pictograms and signal words. The signal word describes the classification of the residual risk when disregarding the operation manual.

| | |
|---|---|
| DANGER | **Denotes an immediate hazardous situation that will result in death or serious injuries.** |
| WARNING | **Denotes a general hazardous situation that may result in death or serious injuries.** |
| CAUTION | **Denotes a hazardous situation that can result in injuries.** |
| NOTE | **Denotes a situation that can result in property material damage.** |
| INFORMATION | **Denotes important notes and usable hints.** |

Below are the supplementary safety information symbols and meanings used in this manual.

General warning

Electrical hazard

Hot surfaces

Fragile components


Explosive gases,

Explosive environments

Harmful to health and life

Risk of injuries of the limbs

Risk by chemicals

Wear protective goggles

Wear protective cloth

Wear protective gloves

Wear protective mask

Wash your hands

### 1.2.2 Proper Use

The technical specifications of the Extraction Unit is given in Section-2.

Unopex E 50 Solid-Liquid Extraction Evaporation Unit is designed and manufactured for extraction with solvent and evaporation of useful materials from medicinal and aromatic plants. The materials can be extracted for a desired time with a certain temperature with the solvents; ethanol and water. Filtration and steam distillation of the liquid extract are also possible.

Installation, operation, technical service and maintenance must be carried out according to the instructions in this manual. Failure to comply with the operation manual is deemed improper use and will void the warranty.

**DANGER**

Using the plant in potentially explosive environments

DEATH OR SERIOUS INJURIES THROUGH EXPLOSION

- The equipment and plantation of the device is ex-proof. The plant is not for use in areas which require ex-protected plants. Do not install or start up the plant in explosive environments.
- Ensure sufficient ventilation to directly withdraw released gases and gaseous substances.

**WARNING**

Improper use

SERIOUS INJURY AND PROPERTY DAMAGE

- Store the operation manual where it is easy to access in close proximity to the plant.
- Only adequately qualified and trained in working in ex-proof environments and with ex-proof devices operators may work with the plant.
- Operators must be trained before handling the plant.
- Check that the operators have read and understood the operation manual.
- Define precise responsibilities of the operators.
- Personal protective equipment must be provided to the operators.
- Store, use and dispose of substances used for operating and cleaning the plant properly.
- Be sure to follow the responsible body's safety rules.

**NOTE**

Modifications to the plant by third-parties

DAMAGE TO THE PLANT

- Do not allow third parties to make technical modifications to the plant.
- Modifications to the plant are only permitted with the written approval of the manufacturer.
- Modifications and upgrades shall only be carried out by an authorized Unopex specialist. The manufacturer will decline any claim resulting from unauthorized modifications.
- In case of any modification of the plant not approved by the manufacturer, the CE declaration of conformity and the warranty becomes invalid.
- Only specialists trained by the manufacturer may carry out service, repairs or maintenance work.

The following must be observed without fail:

- Only use the plant in a fault-free condition!
- Have start-up and repairs carried out only by specialists!
- Do not ignore, bypass, dismantle or disconnect any safety devices!

### 1.2.3 Improper Use

Unopex E 50 Solid-Liquid Extraction Evaporation Unit is permitted only for the purposes for which it was manufactured. Risks to users, property and the environment can arise when the plant is damaged, used carelessly or improperly.

Use of the plant for purposes other than the ones mentioned or beyond specified use limits shall relieve the manufacturer of all responsibility in case of damage to persons or things and invalidate the warranty.

The manufacturer accepts no liability for damage caused by technical modifications to the plant, improper handling or use of if the operation manual is not observed.

Below uses are expressly forbidden:

- use of the plant by insufficiently trained personnel
- use of the plant in non-ex-proof environments and by persons not trained in working with ex-proof plant
- use of the plant for applications not specified in section 1.2.2
- use of gases with unknown chemical composition
- use of the plant in areas which require ex-protected plants
- use of the plant without genuine parts and genuine consumables
- use of the plant with disabled, modified or defective safety equipment
- use of biohazardous materials or toxic substances
- use of the plant in an environment where explosive or flammable substances, released gases or gaseous substances are not immediately and directly removed from the environment by an ex-proof fan ventilation system equipped with safety devices and equipment
- the use of substances that solidify during the process inside the plant
- the use of corrosive substances or substances incompatible with the plant materials
- unattended operation
- use of chlorine-containing compounds

### 1.2.4 General Hazards and Safety Notices


Risks due to electrical voltage and current

DEATH, SERIOUS INJURY OR PROPERTY DAMAGE

- The external power supply must always comply with the plant specifications.
- Check that the grounding is adequate.
- Make sure that risks from static electricity are eliminated.
- Check electrical equipment regularly.
- Keep all parts of the body, all hand tools or other conductive objects away from live parts of the electrical system.
- Keep all electrical installations and the control cabinet switched off at all times.
- Do not clean electrical equipment with water or any unknown liquid.
- Do not use the appliance if the power cord is tangled or entangled.
- Replace frayed or defective cables immediately.


Working with harmful or hazardous substances or with substances of unknown composition

DEATH OR SERIOUS INJURY THROUGH EXPLOSION

DEATH OR SERIOUS POISONING BY CONTACT OR INCORPORATION

- Certain gases in or in the vicinity of the plant are highly inflammable.
- Always be aware of the poisoning and explosion risk when working with harmful or hazardous substances.
- Always be aware of the poisoning and explosion risk when working with substances of unknown composition.
- Before operation, check the plant for correct installation and assembling.
- Before operation, inspect parts, sealings and tubes for good condition.
- Exchange defective or worn out parts immediately.
- Clean or replace clogged parts immediately.
- Directly withdraw released gases and gaseous substances by sufficient ventilation.
- Check for gas leakages by performing a dry-run without sample material.
- In case of fire, immediately switch off the main switch of the plant.
- Always provide sufficiently ventilated environments to operate the plant.


Incorporation or inhalation of dangerous gases, liquids, particles and steam

DEATH OR SERIOUS POISONING BY INHALATION OF PARTICLES

- Do not inhale particles.
- Wear protective clothing.
- Wear protective gloves.
- Wear protective eye goggles.
- Wear protective mask.
- Wear non-slip shoes.
- Check all parts for proper sealing before operation.
- Only recover particles in sufficiently ventilated areas.
- Do not use compressed air to clean dusty parts.
- Make sure there is an eye wash station in the work area.
- All potentially hazardous substances must be removed from the work area.
- The exhaust from the plant must be immediately removed from the environment by means of a ventilation system equipped with safety devices and equipment to prevent health risks and environmental pollution.

**DANGER**

Internal overpressure

SERIOUS INJURY AND PROPERTY DAMAGE

- The external compressed air supply must always comply with the specifications of the plant.
- Check all parts, seals and connections for tightness before operation.
- Do not use clogged parts, clean or replace them immediately.
- Do not open any valve uncontrollably if pressure builds up inside the plant.
- Close valves and clamps that are not required during operation.

**DANGER**

Inhalation of inert gases

DEATH BY SERIOUS POISONING OR SUFFOCATION

- Only operate the plant in sufficiently ventilated environments.
- Do not inhale inert gases.
- Ensure sufficient ventilation to directly withdraw released gases and gaseous substances.
- Check all parts, connections and sealings for proper sealing before operation.
- Exchange defective or worn out parts immediately.

**WARNING**

Operation with bent hoses

SERIOUS INJURY AND PROPERTY DAMAGE

- Always inspect the plant for bends or kinks in hoses.
- Eliminate them prior to operation.

**CAUTION**

Handling hot surfaces

RISK OF BURNINGS WHEN HANDLING HOT SURFACES

- Do not touch hot surfaces while working.
- Always wear appropriate personal protective equipment when working with the plant.
- Allow all hot parts to cool down after operation.

**CAUTION**

Always wear the following personal protective equipment when working with the plant

- protective clothing
- protective gloves
- protective eye goggles
- protective mask

Depending on the working conditions, noise levels may occur that may cause deafness, loss of balance or reduced attention. Observe the rules on occupational health and safety and use appropriate personal protective equipment for the ears.

**NOTE**

Liquid spill

PROPERTY DAMAGE

- Do not put any liquid sample vessel on this plant without reservoir-plate and ensure safe positioning of the vessel.
- Do not spill any liquids over the control cabinet, plant or any other part.
- Do not allow any liquid to leak into the control cabinet.
- Wipe off any liquids immediately.
- Always be aware of the risk of plant short-circuits and damage by liquids.
- Do not move the plant when it is loaded with liquid.

### 1.2.5 Further Protective Safety Measures

**INFORMATION**

Emergency strategy
Disconnect the plant from the power supply !

Warning messages on the touch screen operating panel contain a message about the irregularity of the plant, the operator is also warned when defined limit values for defined parameters are exceeded. The operator evaluates the relevance of the message and takes action where necessary.

## 1.3 Staff Qualification

Risks to users, property, and the environment can arise when the plant is used carelessly or improperly.

### 1.3.1 Responsible Body

- The head of the relevant department is the responsible body.
- This operation and maintenance manual is to be stored where it is easy to access in close proximity to the plant and must be made available at all times to the operating personnel.
- Operators must be trained before handling and operating the plant. The head of relevant department is the responsible for training his personnel. Only adequately qualified operators must be permitted to work with the plant.
- Check that the operators have read and understood the operation manual. Define precise responsibilities of the operators.
- System settings of the plant are protected via passwords on the touch screen operating panel and are shared only with the responsible body by the manufacturer. The responsible body must not share those passwords with others.
- The plant meets the recognized safety standards. Integration into a system may give rise to hazards that are characteristic of the other system's design and beyond the control of Unopex. It is the responsibility of the responsible body to ensure that the overall system, into which this plant is integrated, is safe.
- The responsible body must check whether local, national and federal regulations require any mandatory installation of further pollution control plant for the plant /the entire system.
- Appropriate personal protective equipment should be provided to operators and they should be ensured to use it.

### 1.3.2 Operators

- Work on the plant is reserved for appropriately qualified specialists, who have been assigned and trained by the responsible body to do so.
- Operators must confirm by signature that they have carefully read and understood the manual.
- Operators must be at least 18 years old. Under 18-year olds may operate the plant only under the supervision of a qualified specialist.
- Legal regulations, such as local, national and federal laws applying to the plant, installation and working area of the plant must be strictly followed.
- Ensure that the plant is operated in proper condition only.
- Observe all safety instructions and do not ignore, bypass, dismantle or disconnect any safety devices.
- When working with the plant, always wear appropriate personal protective equipments (e.g. protective clothing, protective gloves, protective eye goggles, protective mask, non-slip shoes). Personal protective equipment must meet all requirements for ex-proof environments and materials used. Choose and use adequate measures according to the applications, since some additional protective measures might be necessary.
- Modifications to the plant and modifications to the spare parts used are only permitted with the prior written approval of the manufacturer. The manufacturer will decline any claim resulting from unauthorized modifications. Ensure that modifications and upgrades are carried out by authorized Unopex specialists only.
- Ensure that service, repairs or maintenance work are carried out with care and on schedule and by specialists trained by the manufacturer only.

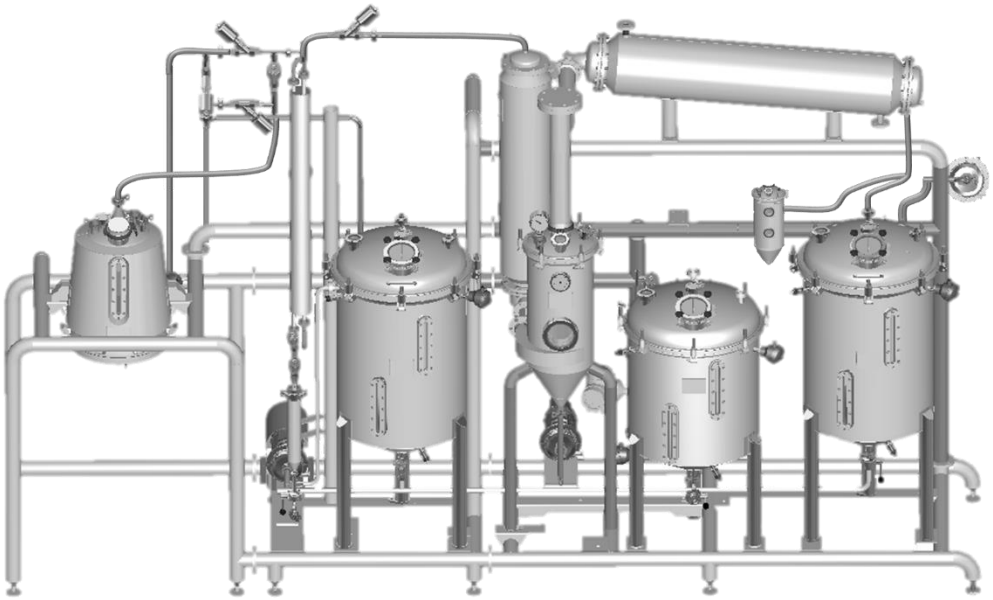
# 2. Technical Specifications

## 2.1 Scope of Delivery

Unopex E 50 Solid-Liquid Extraction Evaporation Unit, is delivered with complete standard accessories.

The delivery contents are indicated in the packing list. The delivery contents must be checked for completeness upon receipt.

In case of any damage and/or missing parts, prepare a document and send it to Unopex Customer Support without delay.



| | |
|---|---|
| **INFORMATION** | For detailed product information, visit www.unopex.com or contact Unopex. |

| | |
|---|---|
| **INFORMATION** | Scope of delivery might change according to specific offers/quotations. |

## 2.2 Technical Data

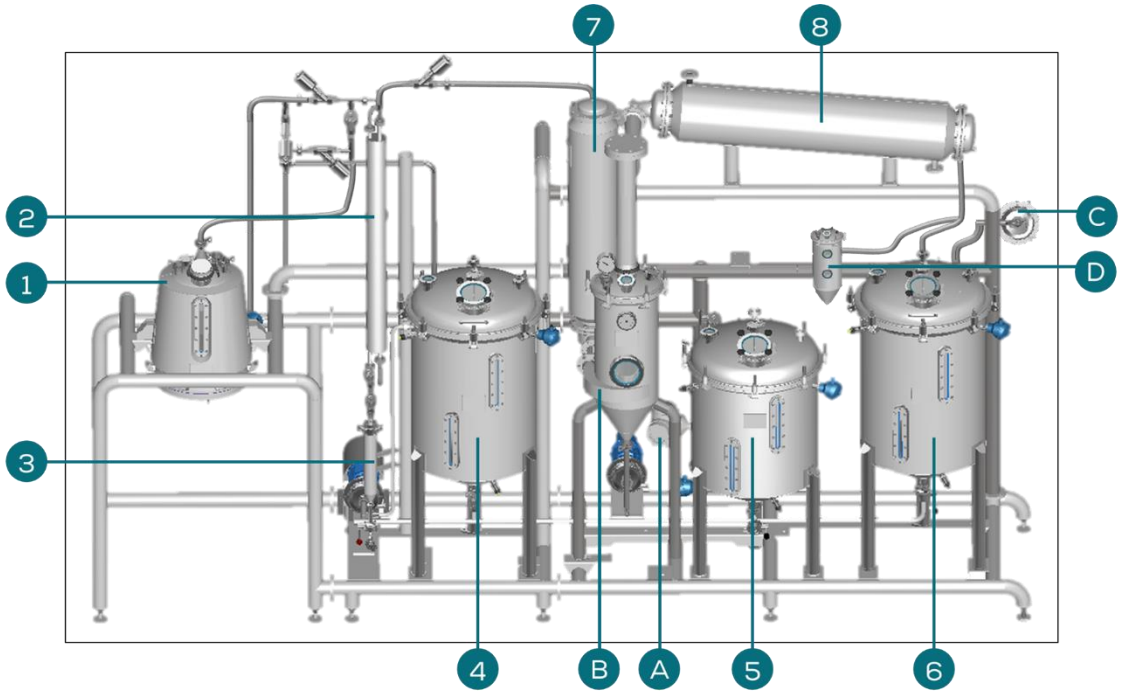
| | |
|---|---|
| Model | Unopex E 50 Solid-Liquid Extraction Evaporation Unit |
| Year of Manufacture | 2023 |
| Extractor volume | 50 L |
| Extract vessel volume | 300 L |
| Solvent vessel volume | 300 L |
| Concentrated vessel volume | 200 L |
| Operation temperature | max. 99 °C |
| Design pressure | -1/+0.5 bar |
| Ambient conditions | suitable for indoor use (5-40 °C) |
| Vacuum system | liquid ring vacuum pump, adjustable vacuum |
| Heating/cooling | steam/chiller |
| Thermal insulation | rockwool |
| Pressurized air requirement | 5 ... 7 bar, water and oil free |
| Voltage | 380 V AC, 50 Hz |
| Operator panel | with touch screen |
| Process parameter data transfer | exported with removable memory |

## 2.3 Material

| | |
|---|---|
| Metal parts in contact with product | AISI 316/316L/316TI stainless steel |
| Metal parts not in contact with product | AISI 304 stainless steel |

# 3. Product Description

## 3.1 Overview




| | | | |
|---|---|---|---|
| 1 | Extractor | A | Inline Concentration Controller |
| 2 | Heater | B | Vapor-Liquid Separator |
| 3 | Filter | C | Vacuum Pump |
| 4 | Extract Vessel | D | Phase Separator |
| 5 | Concentrate Vessel | | |
| 6 | Solvent Vessel | | |
| 7 | Evaporator | | |
| 8 | Condenser | | |

**INFORMATION** Components and parts might change according to specific offers/quotations.

## 3.2 Description of Plant Functions

### 3.2.1 Extraction

Solvent extraction of useful materials from medicinal and aromatic plants is carried out at this stage. Extracts can be obtained by maceration or percolation (from top to bottom and from bottom to top). Water, ethyl alcohol or water-ethyl alcohol mixture can be used as solvent.

In the extraction process;

1. The plant material is placed in the extractor.
2. The solvent tank is filled with suitable solvent.
3. With the help of a pump, the solvent is fed into the extractor through the preheater.
4. At the end of the extraction process, the solvent remaining in the residue in the extractor is recovered with water vapor so that it can be reused and solvent vapors are prevented from spreading to the environment.

During the process, pump ratio, extraction time and liquid flow direction can be adjusted and extraction temperature and pressure can be monitored via the touch screen control panel.

### 3.2.2 Filtration

The liquid extract obtained as a result of extraction is purified from the particles in it at this stage.

In the filtration process, the liquid extract is passed through the filter with the help of a pump.

During the process, the pump rate and filtration time can be adjusted via the touch screen control panel.

### 3.2.3 Evaporation

The process of concentrating the solvent contained in the filtered extract by evaporation is carried out at this stage.

In the evaporation process;

1. The liquid extract is transferred to the evaporator by passing through the preheater with the help of a pump.
2. The heated solvent evaporates in the evaporator and separates in the separator.
3. Solvent vapors are recovered by condensing in the condenser.
4. During the process, the solids concentration of the solvent is automatically measured and transferred to the concentrated product tank.

During the process, pump rates, evaporation temperature, pressure, product solid concentration and evaporation time can be adjusted via the touch screen control panel.

### 3.2.4 Steam Distillation

It is the process of taking the essential oils contained in medicinal and aromatic plants with water vapor.

In the steam distillation process;

1. The plant material is placed in the extractor.

2. Water vapor is fed into the extractor from the bottom.
3. Essential oils are condensed by being carried to the condenser with water vapor.
4. Water and essential oil accumulate in the phase separator, phase separation takes place, essential oil is collected.

## 3.3 External Connections

## (supply and return line connections)

- Compressed air supply
- Steam
- Condensed steam
- Chiller cooling supply
- Operating water
- Exhaust
- $N_2$
- Vacuum
- CIP

## 3.4 Control Cabinet

On the control cabinet;

- on/off button,
- signal indicator for control voltage,
- emergency stop are placed.

# 4. Preparations Before Operation


MORTAL DANGER

- Do not operate a damaged plant.
- Do not operate the plant if the installation of the plant or the assembly of its parts is improper.
- Make sure that risks from static electricity are eliminated.
- Please contact the Unopex Customer Support when needed.


Death or serious injuries by use in explosive environments

- Do not install or operate the plant in explosive environments.
- Do not install or operate the plant with explosive mixtures.
- Check all connections for correct installation before operation.
- Directly withdraw released gases and gaseous substances.
- Only operate the plant in sufficiently ventilated environments.


SERIOUS INJURY

- Place the plant on stable, horizontal and vibration-free surface in an adequately dimensioned area.
- Get help from others where you need for heavy parts/components of the plant.
- Take special care when loading, transporting and unloading to avoid damages.
- Do not move the plant while assembled.
- Keep limbs out of moving parts/crushing zones.
- Check for damages to glass parts.
- Do not touch thin/sharp edges of the parts/components.

## 4.1 Un-packing

- Check for damage to the packaging. Damage can indicate property damage to the plant or parts/components.
- Check for any transport damage when unpacking the plant or parts/components.
- If necessary, prepare a status report immediately and always contact your forwarding agent regarding the settlement of claims.
- Follow the instructions under “Chapter 8.2” for the disposal of packaging material.
- Keep the original packaging for future transportation.
- If the plant is not assembled immediately after delivery, store it with all electrical components in a vibration-free, frost-free area; place on a foundation (do not place directly on the ground) and cover to protect against penetration of dust and humidity.

## 4.2 Ambient & Installation Conditions

Consider the ambient conditions under "Chapter 2.2".

Take into consideration of the dimensions and weight of the plant. Be sure that the floor can withstand the weight of the plant with full product.

Install the plant upright on a stable, horizontal, anti-slippery and vibration-free surface where you can easily reach.

Maintain wall and ceiling clearance for adequate air exchange (dissipation of waste heat, supply of fresh air for the plant and work area). Do not operate the plant in an inadequately dimensioned area.

**INFORMATION**

Use required sealing rings and gaskets for each connection and consider the correct mounting directions.

Screw all threaded connections tightly.

## 4.3 Connecting to the Power Supply

**NOTE**

Risk of plant damage by wrong mains supply

- External mains supply must meet the voltage and the current specified on the name plate.
- Check for sufficient grounding.

**INFORMATION**

Additional electrical safety measures might be necessary to meet local laws and regulation!

External power or emergency stop switches must meet the requirements of the related standards, be accessible at any time and clearly labeled.

External connections and extension lines must be provided with a grounded conductor lead and power cords must meet the input power requirements.

Mains plug must be accessible at any time to cut the power in case of emergency by unplugging,

Connect the electrical panel of the Unopex E 50 Solid-Liquid Extraction Evaporation Unit to the mains supply in accordance with the plant specifications. The mains circuit must handle the electrical load of the plant and must be equipped with all electrical safety measures including proper grounding. After the installation, electrical safety tests are recommended to verify safe system condition such as sufficient grounding. All electrical works may only be carried out by qualified personnel. It must be ensured that risks from static electricity are eliminated in the working environment.

# 5. Operation

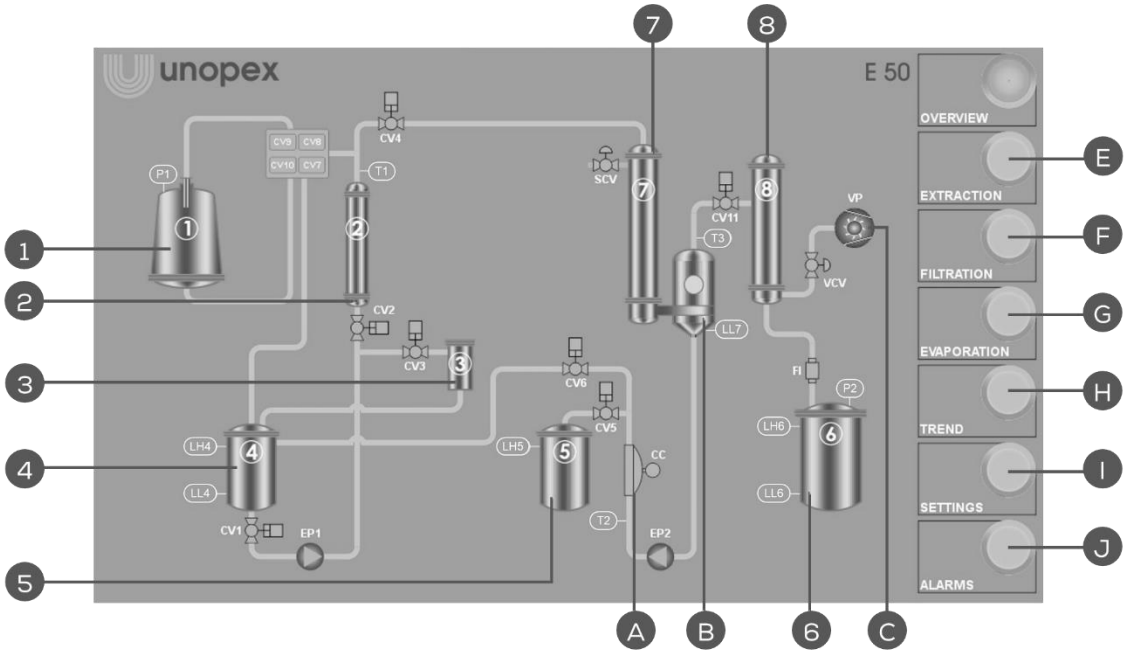
## 5.1 Final Check Before Operation

Carry out the following checks and safety warnings prior to each operation.

- Only adequately qualified personnel who have been adequately must be trained may work with the plant.
- Each person working with the plant must read and understand the entire operation and maintenance manual and has to be familiar with the operating principles of the plant, all parts, equipment and hardware including the control panel and their functions.
- Local, national and international laws and safety rules set by responsible body's must be strictly followed.
- All necessary precautions must be taken to ensure safe and functional operation of the plant.
- Personal protective equipment must be provided to the operators.
- Operators must wear non-slip shoes and protective clothing, gloves, eye goggles and mask during operation.
- Store this manual where it is easy to access in close proximity to the plant.
- Initial checks and periodical inspections must be performed properly.
- External pressure air supply and heating/cooling systems must always meet the plant specifications.
- Check the plant for correct installation and assembling.
- Check all parts, connections, hoses tubes and sealings for good condition and tight connection.
- Check the lid for correct seat and tight connection.
- Inspect all glass parts visually for possible damage.
- Exchange worn out or defective parts or components immediately.
- Close valves and clamp connections which are not necessary during operation with blind components.
- Ensure that no uncontrolled pressure may be released from the plant which would endanger life and limb of users or third persons.
- Check the electrical connections.
- Check for leakages by performing an initial run without sample material.
- Check for connections for disposing the substances used for operation and cleaning of the plant.
- Do not use compressed air to clean dusty parts.
- All possibly hazardous substances and fumes have to be removed from the working area.
- Exhausts leaving the plant have to be lead away instantly by a ventilation system which is equipped with safety devices and equipment to avoid health risk or contamination of the environment.
- The plant must be supervised during operation to prevent any unauthorized person to cause any possible damage.
- Inspect and report any changes to the plant concerning safety immediately.
- Operate the plant only in perfect working conditions.

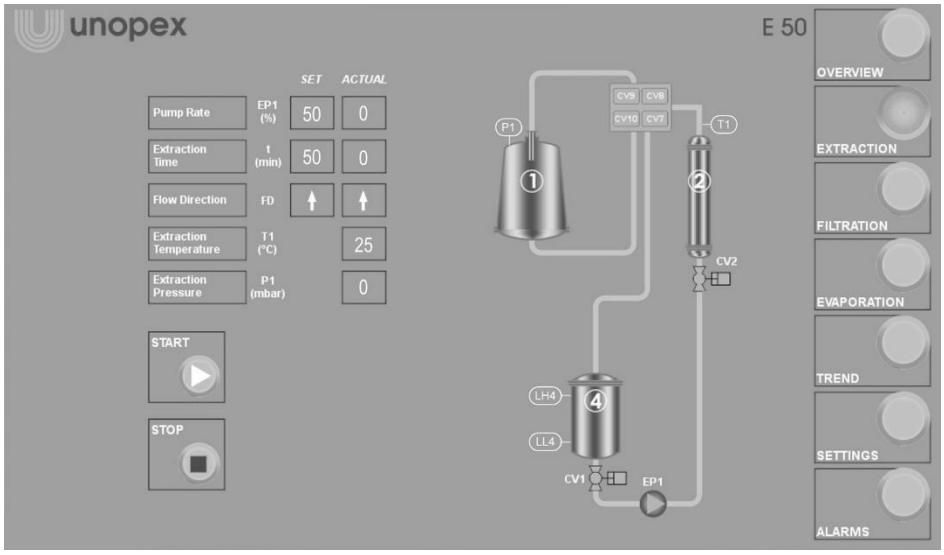
## 5.2 Operating Elements and Touchscreen Operating Panel

### 5.2.1 Description of the Touchscreen Operating Panel

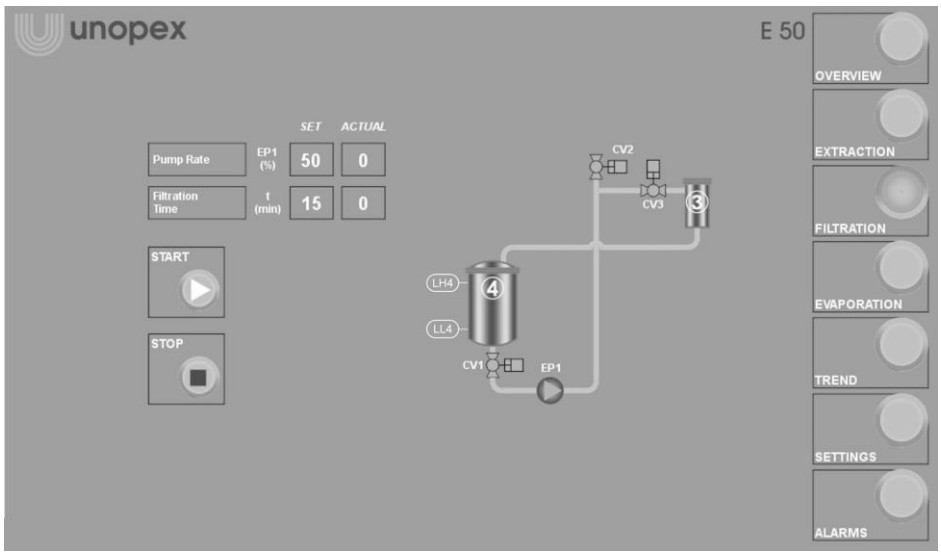



| | | | |
|---|---|---|---|
| 1 | Extractor | A | Inline Concentration Controller |
| 2 | Heater | B | Vapor-Liquid Separator |
| 3 | Filter | C | Vacuum Pump |
| 4 | Extract Vessel | E | Extraction page entering |
| 5 | Concentrate Vessel | F | Filtration page entering |
| 6 | Solvent Vessel | G | Evaporation page entering |
| 7 | Evaporator | H | Trend page entering |
| 8 | Condenser | I | Settings page entering |
| | | J | Alarms page entering |

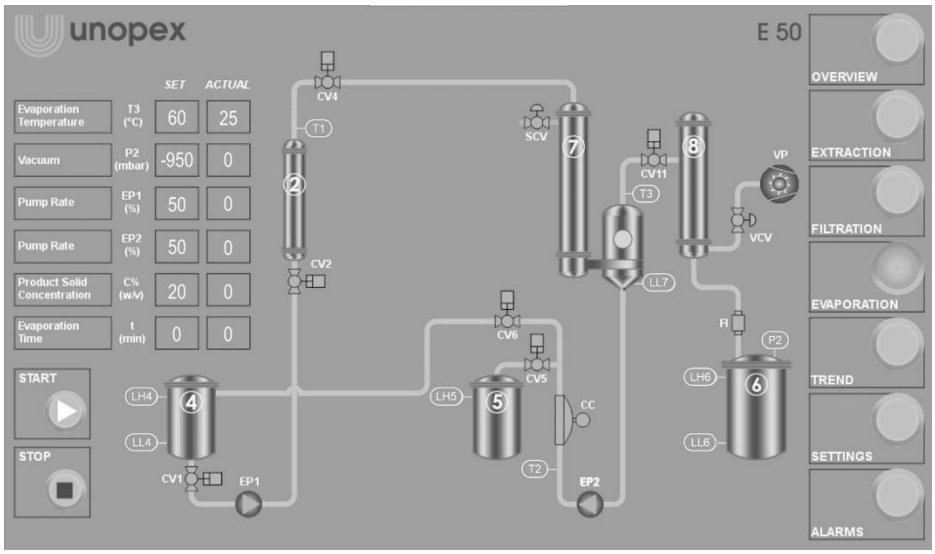
### 5.2.2 Extraction




### 5.2.3 Filtration



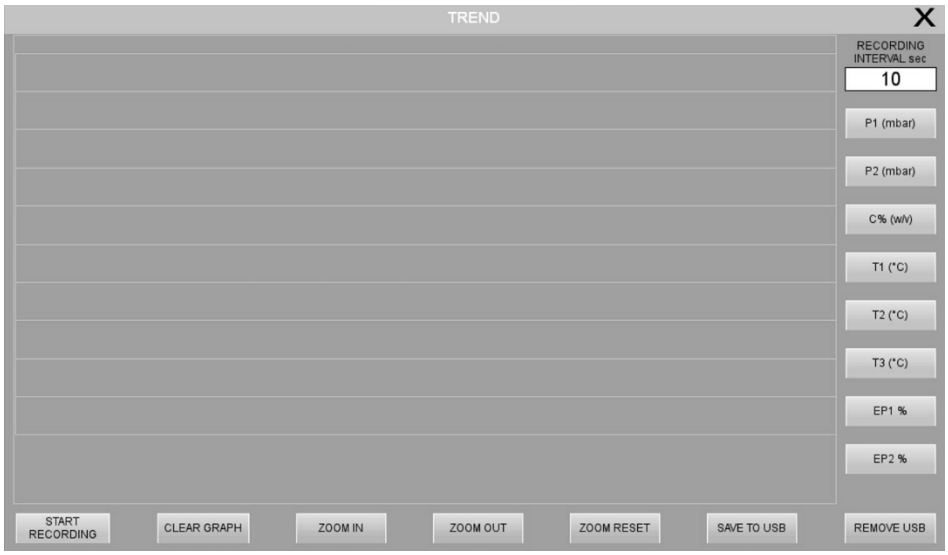
### 5.2.4 Evaporation



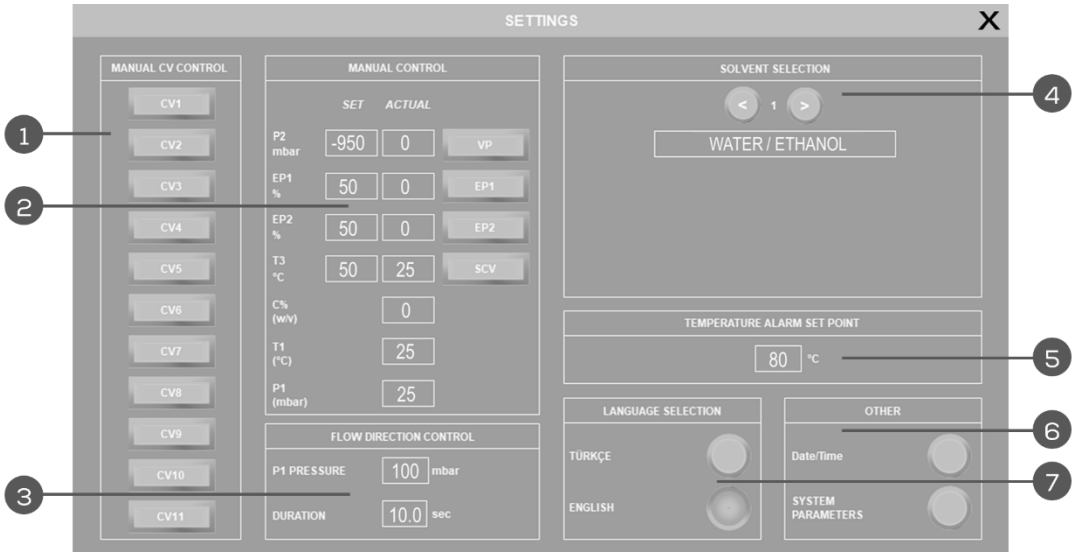

### 5.2.5 Trend

Insert a usb flash drive into the unit.

Tab to TREND page on the touchscreen operating panel, set recording period and start recording. Date, Time, Extraction Pressure (P1, mbar), Vacuum (P2, mbar), Concentrated Extract Solid Concentration (C%, w/v), Extraction Temperature (T1, °C), Concentrated Extract Temperature (T2, °C), Evaporation Temperature (T3 °C), EP1 Pump rate (EP1, %) and EP2 Pump rate (EP2, %) will be displayed on the screen. The data can be saved in csv file format into the flash drive by pressing "stop recording" and then "save to usb" on the touchscreen.



### 5.2.6 Settings




1. Control valves can be opened and closed manually.
2. Extraction pressure (P1, mbar), Vacuum (P2, mbar), Product solid concentration (C%, w/v), Extraction temperature (T1, °C), Evaporation temperature (T3 °C), Extract pump flow rate (EP1, %) and Concentrated extract pump flow rate (EP2, %) parametreleri izlenebilir; Vacuum (P2, mbar), Evaporation temperature (T3 °C), EP1 pump flow rate (EP1, %) and EP2 pump flow rate (EP2, %) parametreleri set edilebilir.
3. The maximum pressure value inside the extractor during extraction can be set. If the pressure exceeds this value, the flow direction will reverse and will be restored after the set time or if the pressure drops.

**INFORMATION**

If the extractor pressure drops below the maximum value before the set time is completed, the flow direction will be restored without waiting for the set time.

4. The choice of solvent to work with must be made. The correct choice of solvent is essential for accurate measurement of the product solid concentration. In the factory setting, "water/ethanol mixture" and "pure ethanol" are available as solvents.
5. The temperature alarm can be set. The plant will alarm if any of the temperatures T1, T2 or T3 exceeds this value.
6. System date and time can be set.
7. System language can be selected.

**INFORMATION**

Password (111111) must be entered for Flow Direction Control, Solvent Selection and Temperature Alarm Setpoint.

## 5.3 Operating Procedure

**WARNING**

MORTAL DANGER

When the plant is running, do not open or demount any clamps, pipelines, sensors etc.
Open or close valves only according to the operating instructions.
In case of power failure or emergency stop button is pressed during operation, the temperature and pressure in the system may increase. The environment should be immediately illuminated, open steam manual valves should be closed and the system should be brought to atmospheric pressure by breaking the vacuum. Before restarting, the entire system including heating and cooling units must be checked.

**NOTE**

If any of the parameters is not normal, identify the cause and fix it before operating the plant. Operate the plant only in perfect working conditions.

**NOTE**

During operation, the vacuum tank must be continuously supplied with water manually. Otherwise, dry running may cause malfunction or damage to the vacuum pump.

**NOTE**

For operational safety reasons, the operator must not leave the work area during operation of the plant.

**INFORMATION**

The medicinal and aromatic plants to be put into the plant must be ground in such a way that they cannot pass through the filter holes placed under the extractor and do not cause clogging. The raw material and solvent must always be put into the plant when it is not running.

**INFORMATION**

Make sure that compressed air, steam, chiller, vacuum connections are made and manual supply valves are open. Blind valves and clamps that are not required during operation.

**INFORMATION**

The process parameters (temperature, pressure, vacuum, valve flow directions etc.) should be adjusted and optimized by the operator according to the requirements of the raw materials and product.

Set the main switch on the side of the electrical panel to position "1". Set the on-off button on the safety panel to position "1". The green light will turn on on the control voltage signal indicator and the signal indicator on the electrical panel, the home screen will appear on the touch screen operator panel.

### 5.3.1 Operating the Complementary Units

Making the Vacuum System Ready

It is checked that the pure water supply connection to the vacuum pump (C) is made and the manual water valve is open. The valve should be open enough to supply sufficient water to the pump and should be checked during operation.

Making the Steam Generator Ready

1. It is checked that the pure water supply connection to the Steam Generator is made and the manual water valve is open.

**INFORMATION**

The Steam Generator produces steam by heating the water inside with electric resistances and there must be sufficient amount of pure water inside for it to work. When the amount of water falls below a certain level, the automatic water valve of the unit will open and pure water will be supplied until it reaches a sufficient level.

2. Turn the main switch on the side of the Steam Generator to position "1", the green light will be on the energy signal indicator.
3. Turn the ON/OFF button clockwise to activate, the red light of the button will be on.
4. Turn the HEATER-1 button clockwise to activate, the green light of the button will be on.

**INFORMATION**

Steam Generator has 3 sets of electric resistances. The activation of the electric resistance sets should be done by the operator according to the steam requirement during operation. With the HEATER-1, HEATER-2 and HEATER-3 buttons, the resistance sets can be activated individually or together.

5. The increase in steam pressure in the Steam Generator should be observed from the pressure gauges on it.

Making the Chiller Unit Ready

1. It is checked that the pure water supply connection of the Chiller Unit is made and the manual water valve is open.

**NOTE**

Depending on the ambient conditions and operating temperature, the Chiller Unit must contain the appropriate amount of antifreeze. Otherwise, freezing may occur and cause malfunction or damage to the unit.

2. Turn the main switch on the side of the Chiller Unit to position "1", the digital display on the front of the unit will turn on.
3. Start the unit by pressing the START/STOP button once.
4. It should be observed on the digital display that the temperature in the Chiller Unit has dropped.

### 5.3.2 Extraction Process

1. The top cover of the extractor (1) is opened and the weighed ground plant is filled into the extractor carefully and without clogging, and the cover is closed tightly. The total volume of the ground plant should be max. 25 liters.
2. The solvent is slowly and carefully filled into the Solvent Tank (6). The solvent in the tank should be below the LH6 level. Water, ethanol or a water/ethanol mixture can be used as solvent.
3. All valves must be in the closed position (especially check that the manual valve V1.4 is closed).
4. The Extraction page on the touchscreen is used to perform the extraction process and to set and monitor the process parameters.
5. Manual valves V1.1, V4.3, V6.1, V6.2 and V8.1 are opened to transfer the amount of solvent to be used in the extraction from the Solvent Tank (6) to the Extractor (1) and Extract Tank (4).

6. EP1 Pump Flow Rate is set as 10% and Liquid Flow Direction is set as up (↑) on the screen. Press the START button, the automatic valves on the extraction lines will open, the EP1 pump will start and the Extractor (1) will start filling with solvent. The level of solvent in the extractor (1) is monitored from the glass level indicator, if necessary, the EP1 pump flow rate set value can be increased.

**INFORMATION**

The amount of solvent to be used in extraction is determined by the operator. During solvent transfer, the liquid in the Solvent Tank (6) should not fall below the LL6 level and the liquid level in the Extract Tank (4) should be between LL4 and LH4 levels.

7. Close V6.1 and V6.2 manual valves, then open V4.1 manual valve. (If desired, V4.1 can be closed and V6.1 and V6.2 can be opened to feed fresh solvent to the process again.)
8. Extraction process parameters are set to the desired values on the screen.
9. Heater (2) vapor inlet manual valve V2.1 is adjusted and Extraction Temperature (T1) is brought to the desired temperature. The heated solvent vapors will condense in the Condenser (8) and accumulate in the Solvent Tank (6).
10. The extraction process will continue for the set Extraction time (t) and will stop automatically when the time expires. (If desired, the process can also be stopped by pressing the STOP button on the screen).
1. When the extraction process is completed, the steam inlet manual valve V2.1 is closed with V4.1.

### 5.3.3 Filtration Process

1. Manual valves V1.2 and V1.3 are opened to transfer the liquid from the Extractor (1) to the Extract Tank (4).
2. The Filtration page on the touch screen is used to perform the filtration process, set and monitor the process parameters.
3. EP1 Pump Flow rate is set as 10% on the screen. Press the START button, the solvent level in the extractor (1) is monitored from the glass level indicator, if necessary, the EP1 pump flow rate set value can be increased. EP1 pump is stopped when the solvent in the extractor (1) runs out.

**NOTE**

Pumps must not be run dry. Dry running may cause malfunction or damage to the pumps.

4. For filtration of diluted extract in the Extract Tank (4), manual valves V1.1, V1.2 and V1.3 are closed and valve V4.1 is opened.
5. The filtration process parameters are set to the desired values on the screen.
6. The filtration process will continue for the set filtration time (t) and will stop automatically when the time expires. (If desired, the process can also be stopped by pressing the STOP button on the screen).
7. When the filtration process is completed, V4.1 and V4.3 manual valves are closed.

### 5.3.4 Evaporation Process

1. The Evaporation page on the touch screen is used to perform the evaporation process, set and monitor process parameters.
2. Manual valves V4.1, V4.3, V5.2, V6.4 and V8.1 are opened to transfer the dilute extract from the Extract Tank (4) to the evaporator, all other manual valves must be checked to be closed.
3. Evaporation temperature (T3), evaporation pressure (P2) and product solid concentration (C%) are set to the desired values.

**NOTE**

When the Vacuum Pump is in operation, a small amount of water should flow out of the pump continuously. This should be checked by the operator at short intervals and if necessary, the valve opening should be readjusted manually.

4. EP1 and EP2 Pump Flow rates are set as 10% on the screen. START button is pressed, the liquid level in the Vapor-Liquid Separator (B) is monitored through the sight glass, the level should be balanced to be above the cone.

**INFORMATION**

EP2 pump flow rate can be increased to decrease the liquid level in the Vapor-Liquid Separator and EP1 pump flow rate can be increased to increase it. By adjusting the pump flow rates, the liquid level in the separator is balanced.

**INFORMATION**

Manual valve V2.1 can be opened for preheating in the evaporation process.

5. Instantaneous values of evaporation temperature (T3), evaporation pressure (P2) and product solid concentration (C%) parameters are monitored on the screen.

**NOTE**

Liquid levels in the Vapor-Liquid Separator and Extract Tank should be checked by the operator at short intervals. A decrease in level may cause blockages in the evaporator, a rise in level may cause inadequate vapor-liquid separation in the separator, liquid entrainment into the condenser and solvent contamination.

6. When the product solid concentration (C%) reaches the set value, CV6 valve will automatically close and CV5 valve will open, the product will accumulate in the Concentrate Tank (5).
7. The solvent vapor formed during evaporation will condense in the Condenser (8) and flow into the Solvent Tank (6). Liquid flow can be monitored from the glass flow indicator located under the Condenser (8).
8. Evaporation process will continue for the set Evaporation time (t) and will stop automatically when the time is up. (If desired, the process can be stopped by pressing the STOP button on the screen).
9. When the evaporation process is completed, V4.1, V4.3, V5.2, V6.4 and V8.1 manual valves are closed.

### 5.3.5 Steam Distillation Process

1. The top cover of the extractor (1) is opened and the weighed ground plant is filled into the extractor carefully and without clogging, and the cover is closed tightly. The total volume of the ground plant should be max. 25 liters.
2. All valves must be in closed position.

3. The bottom inlet of the extractor is connected to the manual valve V1.4 with a clamp connection and a hose.
4. Manual valves V1.1, V1.3 and V8.2 are opened to collect the essential oil that will condense with the water vapor in the condenser.
5. Clean steam should be used for steam distillation.
6. Manual valve V1.4 is opened to supply water vapor from the Steam Generator into the Extractor, the valve opening is set by the operator.

**INFORMATION**

The Settings page on the touchscreen is used to monitor the Extractor pressure (P1) during the execution of the Steam Distillation process.

7. The essential oil condensed in the condenser together with the water vapor is collected in the Phase Separator and monitored through the sight glass. When phase separation is realized, the light phase and heavy phase can be taken by opening the manual valves in the separator.
8. When the Steam Distillation process is completed, manual valve V1.4 is closed first, followed by manual valves V1.1 and V1.3. V8.2 manual valve is closed after the liquid flow into the Phase Separator is stopped.
9. After the essential oil is taken, the remaining water in the Phase Separator is drained.

## 5.4 Cleaning

**CAUTION**

RISK OF BURNINGS WHEN HANDLING HOT LIQUID OR SURFACES

- Take care to avoid splashing hot substances or products and causing serious burns.
- Do not touch hot surfaces.
- Always wear proper personal protective equipment when cleaning with the plant.
- Allow all hot parts to cool down after operation.
- Always open valves slowly and carefully, taking precautions to avoid uncontrolled release of liquids or gases.

**NOTE**

- The plant must be cleaned after each operation.
- Use soapy water as detergent only.
- Acid or chlorine solutions must never be used.

### 5.4.1 Discharge of Plant Residue

1. All valves must be in closed position.
2. First of all, the solvent must be removed from the plant residue remaining in the Extractor (1) and the residue must be turned into cake. During this process, the Settings page on the touch screen is used to set and monitor the process parameters.
3. Manual valves V1.1, V1.2 and V4.1 and control valve CV1 are opened.
4. P2 is set to -500 mbar and the Vacuum Pump (VP) is started.

**NOTE**

When the Vacuum Pump is in operation, a small amount of water should flow out of the pump continuously. This should be checked by the operator at short intervals and if necessary, the valve opening should be readjusted manually.

5. After completion of the process, the plant residue in cake form must be discharge.
6. VP, V1.1, V1.2, V4.1 and CV1 are closed respectively.
7. Before opening the bottom cover of the Extractor (1), the hoses on the bottom of the Extractor are removed, then the 8 nuts tightening the bottom cover are loosened. After all nuts are loosened, the "wet cake discharge bin" is placed under the Extractor. Remove 8 nuts (Nut removal should be started from the back side of the extractor and the 2 nuts on the front side should be removed last). The residue in cake form remaining in the Extractor will be poured into the "wet cake discharge bin".

**INFORMATION**

Disposal of residue should be done in accordance with current regulations.

8. After the residue discharge is finished, the Extractor bottom cover should be closed and fixed with nuts.
9. In order to clean the particles/ residues that may be in the filter (3), the line is drained by opening the V3.1 manual valve. The clamp connecting the filter body and cover is opened and the inside of the filter is removed. After the filter and its inside are completely cleaned, the clamp connection is made by placing it.

### 5.4.2 Emptying of Lines and Tanks

1. All valves must be in the closed position.
2. The Settings page on the touch screen is used to set and monitor the process parameters during the Emptying of Lines and Tanks process.
3. All CV control valves (CV1...CV11) are opened for the emptying of all lines.
4. Open the manual valve V3.1.
5. Open manual valve V4.1 for draining the Extract Tank (4).
6. Open manual valve V5.1 for draining the Concentrate Tank (5).
7. Manual valves V6.1 and V6.3 are opened for the draining of the Solvent Tank (6).
8. EP2 manual valve is opened for evaporator (7), Vapor-Liquid Separator and connected lines.
9. Manual valves V1.1, V1.2, V1.3, V6.2 and EP1 are opened for the emptying of Heater (2), Extractor (1) and connected lines.

### 5.4.3 CIP Washing

1. All valves must be in the closed position.
2. The Settings page on the touch screen is used to perform the washing process, set and monitor process parameters.
3. Manual valves V1.1, V1.2, V3.1, V4.1, V4.1, V5.1, V6.1, V6.2 and V6.3 and control valve CV1 are opened for cleaning the tanks using the CIP ball; manual valves EP1 and EP2 are opened for draining the lines during washing.
4. The CIP ball apparatus is installed separately on the Extractor (1), Extract Tank (4), Concentrate Tank (5), Solvent Tank (6) and Vapor-Liquid Separator respectively and each of them is washed for min. 15 minutes each.

**INFORMATION** The water to be fed to the CIP ball should be in the 2-2.5 bar pressure range. For effective washing, it is recommended that the water temperature should be in the range of 60-80°C.

5. After the CIP process is completed, the CIP ball apparatus is removed, CV1 control valve and all manual valves are closed.
6. If necessary, the washing process is repeated.

### 5.4.4 Cleaning of Lines

1. All valves must be in the closed position.
2. The Settings page on the touchscreen is used to perform the cleaning process and to set and monitor the process parameters.
3. The Solvent Tank (6) is filled with water. Manual valves V6.1 and V6.2 are opened.
4. For cleaning the filter lines, CV3 control valve and V3.1 manual valve are opened respectively, EP1 pump is set to 25% and started. After sufficient cleaning is achieved, EP1 pump is stopped. When cleaning is completed, CV3 control valve and V3.1 manual valve are closed.
5. Control valves CV2, CV8 and CV10 and manual valve V1.1 are opened for cleaning the extractor lines. EP1 pump is set to 25% and started. EP1 pump is stopped after sufficient cleaning is achieved.

   CV8 and CV10 control valves are closed, CV7 and CV9 control valves are opened. EP1 pump is started by setting to 25%. EP1 pump is stopped after sufficient cleaning is achieved. When cleaning is completed, CV2, CV7 and CV9 control valves and V1.1 manual valve are closed.
6. For cleaning the evaporator lines, CV2, CV4 and CV5 control valves are opened first. EP1 pump is set to 25% and started. When the water starts to come to the Vapor-Liquid Separator, EP2 pump is set to 25% and started. After sufficient cleaning is achieved, EP1 and EP2 pumps are stopped.

   CV5 control valve is closed, CV6 control valve is opened. EP1 pump is set to 25% and started. When the water starts to come into the Vapor-Liquid Separator, EP2 pump is set to 25% and started. After sufficient cleaning is achieved, EP1 and EP2 pumps are stopped. When cleaning is completed, CV2, CV4 and CV6 control valves are closed.
7. If necessary, the cleaning process is repeated.
8. After cleaning, the washing water inside the unit is drained.

# 6. Maintenance and Repairs

**WARNING**

DEATH OR SERIOUS INJURIES

- Before carrying out maintenance or repair, make sure that the system is open to the atmosphere/ depressurized, that there are no flammable/explosive gases or vapors inside the plant or in the environment, and that the environment is sufficiently ventilated.
- Wear proper protective equipment.

**WARNING**

DEATH OR SERIOUS BURNING

- Switch off the plant, disconnect the power cord and prevent unintentional restart before maintenance and repairs.
- Do not spill any liquids over any electronic parts or components.
- Do not touch parts inside the plant with wet hands.
- Do not squeeze cables, hoses or other items at reassembling.
- Exchange defective cabling or hoses before reassembling.

**CAUTION**

Always wear the following personal protective equipment when working with the plant

- protective clothing
- protective gloves
- protective eye goggles
- protective mask

Depending on operating conditions, noise levels might arise which can lead to deafness, loss of balance or reduced attention. Consider local noise regulations and use the proper personal protective equipment for ears.

**CAUTION**

Risk of minor or moderate burnings

- Some components can get hot during operation. Do not touch hot surfaces.
- Allow all hot parts to cool down before maintenance and repairs.

Ensure that the following check and maintenance works are carried out with care and on schedule and by specialists trained by the manufacturer only.

- Check cleanliness of the plant after each operation.
- Check safety devices (safety valves, switches etc.) monthly.
- Check all screw connections manually for tightness; check all cables, flexible pipes and hoses on damage and ageing; check scrappers on wear every three months.
- Calibrate measuring instruments every year.

- Check all gaskets of screwed connections for leakages and change every two years or earlier if necessary.

Modifications to the plant and modifications to the spare parts used are only permitted with the prior written approval of the manufacturer. The manufacturer will decline any claim resulting from unauthorized modifications. Ensure that modifications and upgrades (including software modifications) are carried out by authorized Unopex specialists only.

Only use original spare parts which correspond to the technical requirements defined by the manufacturer.

## 6.1 Customer Service

Service and repair or maintenance work on the plant must be performed with care by authorized personnel only. These authorized personnel have a comprehensive technical training and knowledge of possible dangers which might arise from the plant and components.

Contact Unopex customer service for spare parts delivery, repairs or technical advice. Contact information is given on the website www.unopex.com.

# 7. Troubleshooting

## 7.1 Alarm Messages and Remedy

| Alarm Number | Alarm Description | Possible cause | Remedy |
|---|---|---|---|
| ARM 101.1 | EP1 Pump failure ! | Overload of motor drive due to clogging | Clean pipelines |
| | | Defective frequency converter, wiring of pump or motor | Check the wiring of pump |
| | | | Contact Unopex customer service |
| ARM 101.2 | EP2 Pump failure ! | Overload of motor drive due to clogging | Clean pipelines |
| | | Defective frequency converter, wiring of pump | Check the wiring of pump |
| | | | Contact Unopex customer service |
| ARM 102.1 | P1 Pressure is high ! | Clogged extractor filter | Clean the extractor filter |
| | | Extraction temperature is too high | Turn off the steam valve |
| | | Defective pressure sensor or wiring | Check wiring of pressure sensor |
| | | | Contact Unopex customer service |
| ARM 102.2 | P2 Pressure is high ! | Evaporation temperature is too high | Turn off the steam valve |
| | | Vapor does not condense | Check the cooling valve and unit |
| | | Defective pressure sensor or wiring | Check wiring of pressure sensor |
| | | | Contact Unopex customer service |
| ARM 103.1 | T1 Temperature is high ! | T1 temperature is above temperature alarm set point | Turn off the steam valves, alarm should disappear below temperature alarm set point |
| | | | Set the alarm to the desired value |
| | | Defective temperature sensor | Contact Unopex customer service |
| ARM 103.2 | T2 Temperature is high ! | T2 temperature is above temperature alarm set point | Turn off the steam valves, alarm should disappear below temperature alarm set point |
| | | | Set the alarm to the desired value |
| | | Defective temperature sensor | Contact Unopex customer service |
| ARM 103.3 | T3 Temperature is high ! | T3 temperature is above temperature alarm set point | Turn off the steam valves, alarm should disappear below temperature alarm set point |
| | | | Set the alarm to the desired value |
| | | Defective temperature sensor | Contact Unopex customer service |
| ARM 104.1 | T1 Temperature is too high ! | T1 temperature above operation limit<br>Defective temperature sensor | Turn off the steam valves, |
| | | | Contact Unopex customer service |

| Alarm Number | Alarm Description | Possible cause | Remedy |
|---|---|---|---|
| ARM 104.2 | T2 Temperature is too high ! | T2 temperature above operation limit<br><br>Defective heating control or temperature sensor | Turn off the steam valves,<br><br>Contact Unopex customer service |
| ARM 104.3 | T3 Temperature is too high ! | T3 temperature above operation limit<br><br>Defective heating control or temperature sensor | Turn off the steam valves,<br><br>Contact Unopex customer service |
| ARM 105.1 | T1 Temperature Sensor failure ! | Sensor not connected, defective sensor, sensor cable or internal wiring | Check wiring of the temperature sensor<br><br>Switch off the device and try again<br><br>Replace the temperature sensor<br><br>Contact Unopex customer service |
| ARM 105.2 | T2 Temperature Sensor failure ! | Sensor not connected, defective sensor, sensor cable or internal wiring | Check wiring of the temperature sensor<br><br>Switch off the device and try again<br><br>Replace the temperature sensor<br><br>Contact Unopex customer service |
| ARM 105.3 | T3 Temperature Sensor failure ! | Sensor not connected, defective sensor, sensor cable or internal wiring | Check wiring of the temperature sensor<br><br>Switch off the device and try again<br><br>Replace the temperature sensor<br><br>Contact Unopex customer service |
| ARM 106.1 | P1 Pressure Sensor failure ! | Sensor not connected, defective sensor, sensor cable or internal wiring | Check wiring of the pressure sensor correctly<br><br>Switch off the device and try again<br><br>Replace the pressure sensor<br><br>Contact Unopex customer service |
| ARM 106.2 | P2 Pressure Sensor failure ! | Sensor not connected, defective sensor, sensor cable or internal wiring | Check wiring of the pressure sensor correctly<br><br>Switch off the device and try again<br><br>Replace the pressure sensor<br><br>Contact Unopex customer service |

| Alarm Number | Alarm Description | Possible cause | Remedy |
|---|---|---|---|
| ARM 107.1 | Tank 4 level is low ! | Low level of extract vessel | Check the liquid level regarding the operation mode |
| | | Leakage | Check leakage, localize and fix it |
| | | Defective wiring or switch | Check wiring of the level switch |
| | | | Switch off the device and try again |
| | | | Contact Unopex customer service |
| ARM 107.2 | Tank 4 level is high ! | High level of extract vessel | Check and empty the vessel |
| | | Defective wiring or switch | Check wiring of the level switch |
| | | | Switch off the device and try again |
| | | | Contact Unopex customer service |
| ARM 107.3 | Tank 6 level is low ! | Low level of solvent vessel | Add solvent into the vessel |
| | | Leakage | Check leakage, localize and fix it |
| | | Defective wiring or switch | Check wiring of the level switch |
| | | | Switch off the device and try again |
| | | | Contact Unopex customer service |
| ARM 107.4 | Tank 6 level is high ! | High level of solvent vessel | Check and empty the vessel |
| | | Defective wiring or switch | Check wiring of the level switch |
| | | | Switch off the device and try again |
| | | | Contact Unopex customer service |
| ARM 107.5 | Tank 5 level is high ! | High level of concentrate vessel | Check and empty the vessel |
| | | Defective wiring or switch | Check wiring of the level switch |
| | | | Switch off the device and try again |
| | | | Contact Unopex customer service |
| ARM 108 | CC Concentration Controller failure ! | Controller not connected, defective sensor, sensor cable or internal wiring | Plug in the controller correctly |
| | | | Switch off the device and try again |
| | | | Replace the controller |
| | | | Contact Unopex customer service |
| ARM 109 | VP Vacuum Pump failure ! | Defective protector or wiring | Check the wiring of pump |
| | | Defective vacuum pump | Replace the vacuum pump |
| | | | Contact Unopex customer service |

## 7.2 Malfunctions

| Malfunction | Possible cause | Remedy |
|---|---|---|
| System cannot be switched on | Activated emergency stop | Release the emergency stop button |
| | Main switch turned off | Turn on the main switch |
| | No voltage | Check mains supply |
| | | Contact the Unopex customer service |
| Pumps do not deliver the liquid | Leakage on piping | Check leakage, localize and fix it |
| | Valves are wrong positioned | Correct the position of the valves |
| Vapor does not condense | No cooling | Turn on the chilling unit |
| | | Check the cooling water supply |
| Evaporation does not occur | Steam generator is switched off | Turn on the steam generator |
| | Steam supply to the plant is not sufficient | Check the steam valves and supply |
| | T3 set point is below the evaporation temperature | Set a new temperature set point above evaporation temperature |
| | Vacuum set point is above the evaporation pressure | Set a new vacuum set point below evaporation pressure |
| | Vacuum does not reach to the set value | See remedy for system does not achieve the set vacuum values |
| System does not heat up | T3 set point is below the product temperature | Set a new temperature set point above evaporation temperature |
| | Steam supply to the plant is not sufficient | Check the steam supplied |
| | | Contact Unopex customer service |
| Control valves can not be positioned | No compressed air supply | Make sure that the compressed air is supplied to the valves |
| | Compressed air connection configuration is incorrect | Make the hose-valve connections in correct configuration |
| | Air leakage | Check compressed air line through control valve connection and check valve seal, detect leakage and remove it |
| | Defective wiring, control valve or selenoid valve | Check wiring of the control valve, selenoid valve and valve sensor |
| | | Contact Unopex customer service |
| Manuel valves can not be positioned | Valve safety is fitted | Release the valve safety |
| | Deposits in the valve | Dismantle the valve and clean it |
| | Defective valve | Replace the valve |
| | | Contact Unopex customer service |

| Malfunction | Possible cause | Remedy |
|---|---|---|
| Incorrect C% measurement | Wrong solvent selection | Select the correct solvent on touchscreen |
| | Air in the CC pipeline | Adjust the EP2 pump rate |
| | | Contact Unopex customer service |
| T1 temperature does not reach to the desired temperature values | Steam supply to the plant is not sufficient | Check the steam valves and supply |
| | System does not heat up | See remedy for system does not heat up |
| System does not reach to the set vacuum value | Leakage | Close valves and clamp connections which are not necessary during operation with blind components |
| | Sealing material incompatibility | Check all parts, valves, connections, hoses tubes and sealings for good condition and tight connection, exchange worn out or defective parts or components |
| | | Check compatibility/corrosion resistance of sealing material |

# 8. Taking Out of Operation

**WARNING**

Death or serious poisoning by contact or incorporation of harmful substances

- Wear appropriate personal protective equipments (e.g. protective clothing, protective gloves, protective eye goggles, etc).
- Remove all liquids and dusty residues from the plant to remove possibly dangerous substances
- Do not use compressed air for removing dusty residues

## 8.1 Storage, Packing and Transport

Switch off the plant, remove the power cord, clean the plant thoroughly.

Store the plant and its components in a dry location.

**INFORMATION**

When returning a component of the plant to the manufacturer for repair work, visit www.unopex.com and download the safety clearance form, then complete and send it with the component.

## 8.2 Disposal

For environmentally friendly disposal of the plant, do comply with all regional and local disposal regulations applicable for you.

**INFORMATION**

Contact your local authorities for any questions concerning disposal.

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