General instructions
and
User's Manual
for
recycler
DRESTER 10500CS

TABLE OF CONTENTS

GENERAL INFORMATION

CAUTION

Read the General instructions and User's Manual before using the DRESTER 10500CS.

Do not use the equipment unless you fully understand the General instructions and User's Manual.

The User's Manual must be available when using the unit.

PURPOSE OF THE MACHINE

The DRESTER 10500CS solvent recycler is an electronically controlled solvent recycler that is intended for recycling of the normal solvents used in a body shop only. The DRESTER 10500CS allows for the contaminated solvent, which is produced in a body shop, to be reused by separating the contaminants from the solvent in a process called distillation. By electronically controlling the distillation process the DRESTER 10500CS has got a very high recovery rate. The DRESTER 10500CS uses a water cooled condenser with a fixed volume of water. No tap water connection is needed

These instructions will provide important information about the DRESTER 10500CS recycler, and will describe how to use the recycler safely. Read the entire instructions before using the DRESTER 10500CS. For safe use, it is important that the DRESTER 10500CS and the used solvent are handled properly. It is important that you follow the instructions carefully.

ETL APPROVAL

The DRESTER 10500CS has been tested and listed by ETL for use in both USA and Canada, ETL's listing no. 3078958. It has been tested and approved in accordance with the following standards:

- UL 2208, First Edition August 24, 2001
- UL 1203, Third Edition April 30, 2004
- UL 913, Sixth Edition August 9, 2004
- UL 157, Second Edition March 8, 1996
- CSA-22.2 No. 88-1958
- CSA-22.2 No. 30-M1986
- CSA-22.2 No. 0-M91
- CAN/CSA-22.2 No. 157-92

PERMITTED SOLVENTS

On the market, there are numerous solvents and these instructions cannot account for them all. Only use the DRESTER 10500CS with solvents intended for spray gun cleaning, such as lacquer thinner. Lacquer thinner is a generic term for solvent mixtures typically containing such ingredients as e.g. Acetone, Toluene, Xylene, iso-Butanol. The DRESTER 10500CS can be used with solvents classified as Group IIA according to IEC 60079-20.

Never use any solvent if it is not provided with an MSDS (Material Safety Data Sheet). Read the MSDS carefully, and follow all the instructions and procedures provided in the MSDS. If unsure, or if more information is needed concerning the solvent, please contact your solvent supplier.

SAFETY INFORMATION

Hazards may arise from improper use of the DRESTER 10500CS. Hazards may also arise from improper handling or recycling of solvent. In order to maintain the high safety standard of the DRESTER 10500CS, it is important that these instructions are followed.

- Do not operate the DRESTER 10500CS until you have read and fully understood this entire instructions manual.
- The DRESTER 10500CS should be installed as described in these instructions.
- The DRESTER 10500CS should be used as described in these instructions.
- The DRESTER 10500CS should be maintained as described in these instructions.
- Only original spare parts may be used.
- These instructions must be available and in legible condition in close proximity to the unit.
- These instructions must be translated into the langue spoken by the users
- Do not modify or in any way alter the DRESTER 10500CS.
- Do not operate the DRESTER 10500CS unless the working area is properly vented. Do not operate the unit if the extraction of vapors is insufficient (see chapter “PLACING THE UNIT”).
- Avoid contact with liquid and vapor. Refer to the solvents’ MSDS (Material Safety Data Sheet).
- Wear chemical goggles or similar to protect eyes. Wear chemical-resistant gloves to prevent skin-contact. Wear chemical-resistant clothing to protect against spills or splash.
- Personnel suffering from respiratory problems or allergies to solvents used may not operate the machine.
- Clean up spills immediately. Certain solvent vapors are heavier than air and can spread a long way. They may also collect in pits or other low areas.
- Do not smoke, eat or drink while close to the DRESTER 10500CS.
- A fire extinguisher (dry chemical type ABC, dry chemical type BC, foam, carbon dioxide or Halon) must always be kept nearby when working with flammable solvents. Do not use water.

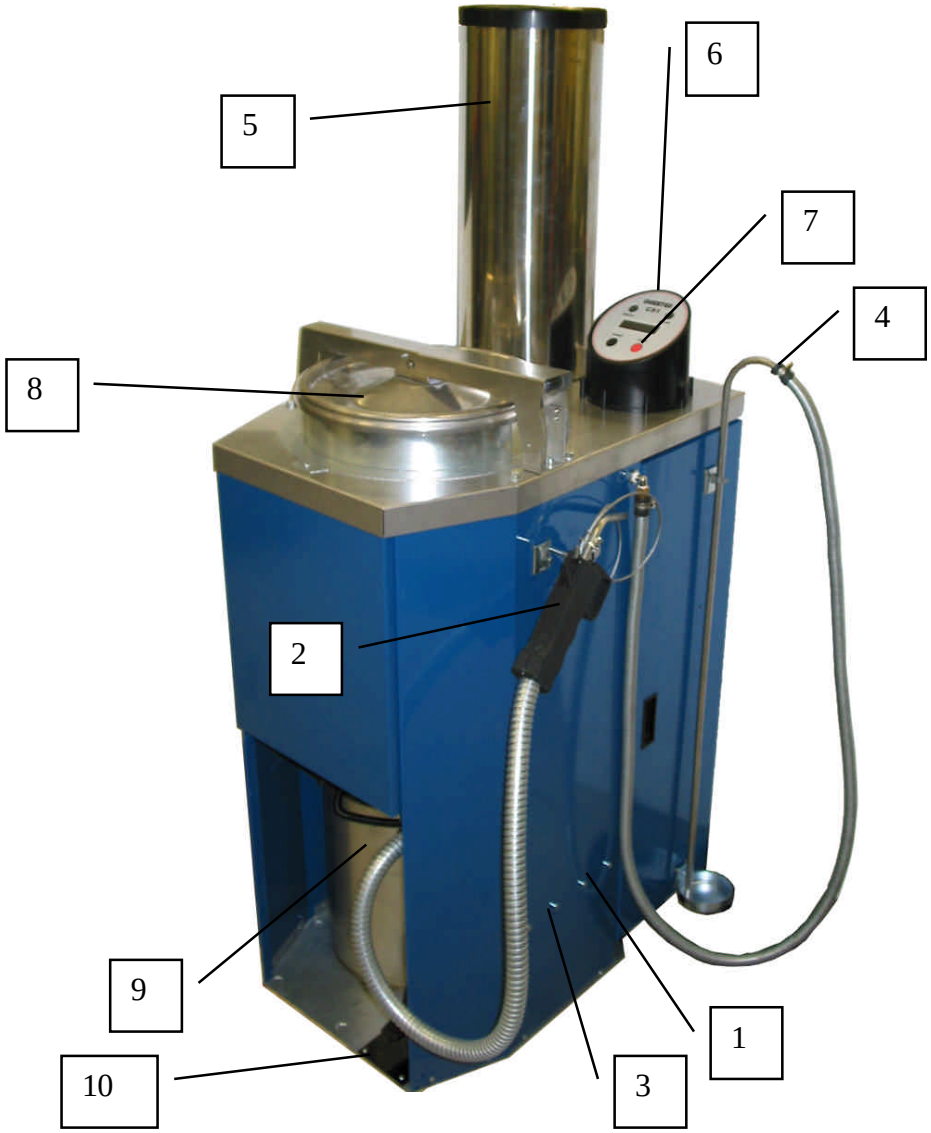
- Make sure that the unit is properly grounded according to applicable laws and regulations

-DO NOT OPEN BOILER LID WHEN UNIT IS OPERATING AND THE GREEN LIGHT IS OFF. If lid is opened while the unit is operating, hot solvent vapors will escape, and cause the gasket ring to swell and pop out of the lid.

- DO NOT USE THE FOOT PEDAL FOR AUTOMATIC LOADING WHEN UNIT IS OPERATING AND THE GREEN LIGHT IS OFF

- DO NOT OVERFILL. THE MAXIMUM BOILER CAPACITY IS 5 US GALLONS. MAXIMUM LEVEL IS UP TO THE POSITION OF THE RECYCLER BAG CLAMPING RING (SEE REFERENCE PICTURE 8).

INTEGRATED USER FEATURES



Picture 1

The features described below are described in detail in chapter “Operation of unit”

1. Integrated pump for unloading the recycled solvent (picture 1, no.1).
2. Discharge handle (picture 1, no.2) for emptying the clean recycled solvent. The handle can be used while machine is operating.
3. Integrated pump for automatic loading of the machine (picture 1, no.3).
4. Suction tube (picture 1 no. 4) for convenient loading of solvent into the machine.
5. Stainless steel water condenser (picture 1, no. 5) with a fixed volume. No tap water connection needed. No electric motor with cooling fan in the machine.
6. Electronically controlled recycling process with a very high efficiency rate (picture 1, no 6).
7. Simple single button operation. No setting of time and temperature (picture 1, no. 7).
8. Large and low situated stainless steel boiler means convenient manual loading of solvent and removal of waste collecting bags (picture 1, no. 8).
9. Stainless steel distillate container (picture 1, no.9) for the collection of recycled solvent
10. Foot valve to operate the loading pump for the suction tube

INTEGRATED SAFETY FEATURES

1. Monitoring of the level in the distillate container (picture 1, no. 9). If not empty, the recycler cannot be started, thus minimizing the risk of overfilling and accidental leakage.
2. Condenser design that gives cool solvent.
3. Water as cooling media.
4. Condenser temperature monitored.
5. Unit operates with very low counter pressure from the condenser.
6. Top notch solvent recovery rate.
7. Solvent separated from cooling media.
8. Self-setting recycling data independent of the operator.
9. Intrinsically safe electronics.
10. Automatic shut off when cycle is complete.
11. "STOP" button for manual shut off at any time.
12. Separate Analogue electronic circuit to shut down the recycler if overheating.
13. Two temperature probes to monitor oil temperature.
14. The unit will automatically indicate when oil requires to be changed.
15. Fuse Protection.

ASSEMBLY

See separate "*Assembly instructions recycler DRESTER 10500CS"*, (document no. 13586).

PLACING THE UNIT

AREA CLASSIFICATION

The DRESTER 10500CS is equipment with the following classification: **CLASS 1 DIVISION 1 / ZONE 1** (ref. NFPA 70) and may therefore be placed in locations classified as Class 1, Division 1 / Zone 1.

If the DRESTER 10500CS is installed in locations classified as Class 1, Division 2 / Zone 2, or in unclassified locations, the area within 8 feet from the unit is to be classified as Class 1, Division 2 / Zone 2 *(see picture 2).*

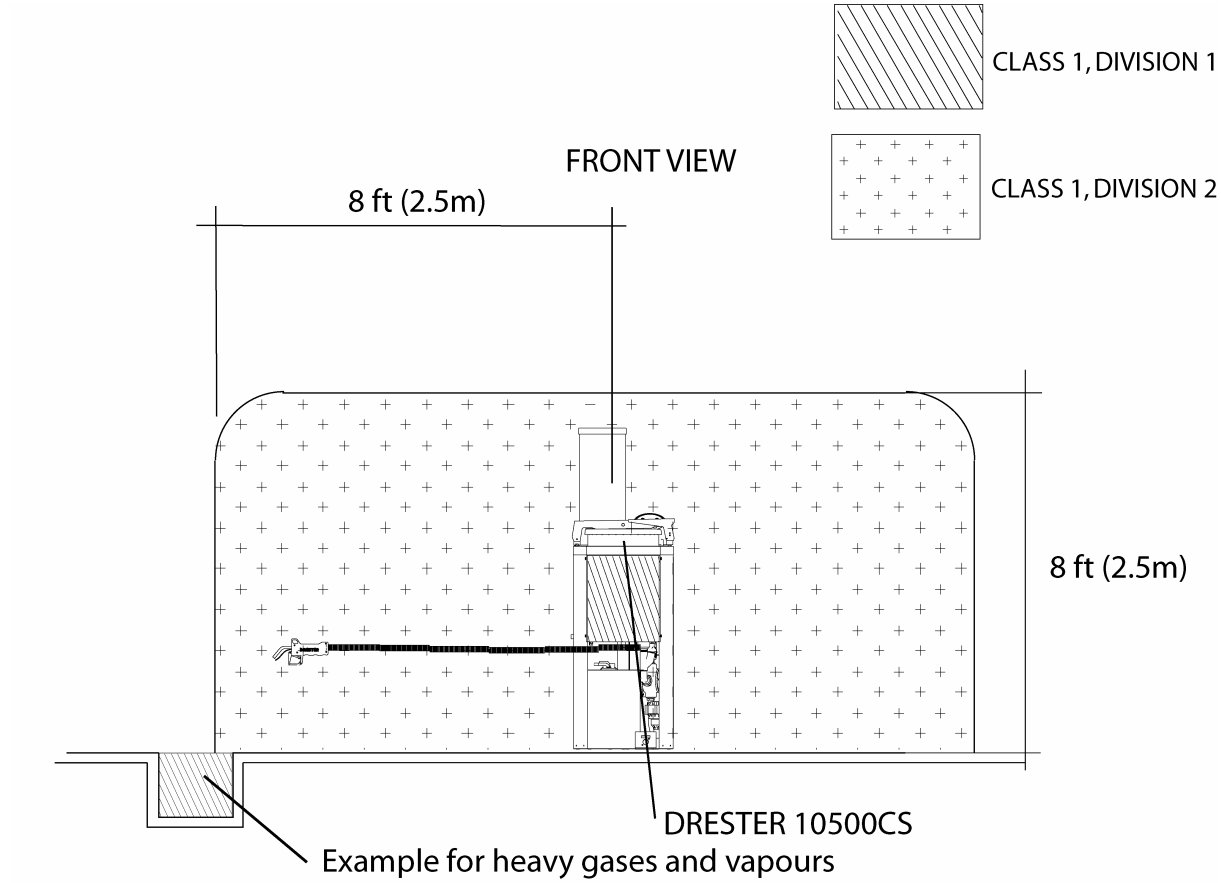
Within classified areas of Class 1, Division 1 / Zone 1 and Class 1, Division 2 / Zone 2, all equipment, such as electrical items and ventilation equipment, must be approved for the applicable Division / Zone. Equipment that generates naked flames or sparks (e.g. welding or grinding equipment) may not be used in these areas. Smoking is not permitted. If in any doubt, contact the local fire service authorities for advice.

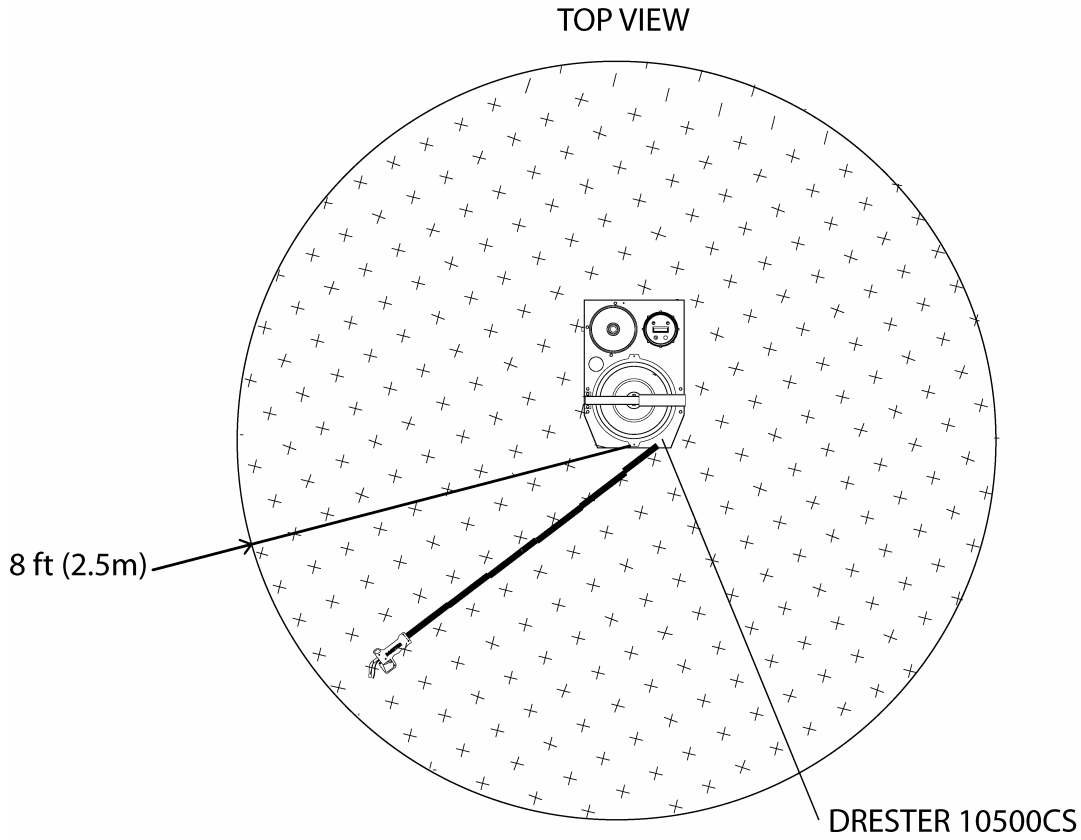
FIRE EXTINGUISHER

A fire extinguisher (dry chemical type ABC, dry chemical type BC, foam, carbon dioxide or Halon) must always be kept nearby when working with flammable solvents. Do not use water.

DRAIN WATER PROTECTION

The unit must be placed in a location where any accidental leakage of solvent is prevented from spreading into the drain water system.


CLASS 1, DIVISION 1
CLASS 1, DIVISION 2
FRONT VIEW
8 ft (2.5m)
8 ft (2.5m)
DRESTER 10500CS
Example for heavy gases and vapours


TOP VIEW
8 ft (2.5m)
DRESTER 10500CS

Picture 2

VENTILATION REQUIRED

Picture 2 (front view) shows an example how heavy gases and vapors can collect in pits and other pockets due to the fact that these gases are heavier than air.

The DRESTER 10500CS, if not installed in the open air, must be installed in rooms which conform to the effective fire control laws and must have sufficient natural or artificial ventilation to prevent the formation of explosive gas/vapor/air mixtures.

The openings of the air channels have to be placed in such a way that the evacuation of emerging vapors does not cause any form of danger.

Air ventilators (and their motor), situated in hazardous locations or in outlet air channels, must be approved for use in such locations and may therefore not cause sparks of any kind. Verify ventilation arrangement with the authorities.

INSTALLATION

ELECTRIC INSTALLATION

The DRESTER 10500CS must be connected to a 200-240 VAC 2-phase, 50 - 60 Hz, power mains (see manufacturers label on the side of the machine). Check that the cable and control box have not been damaged during transport.

DRESTER 10500CS comes equipped with a 16 ft (5 m) power cable. The length (16 ft / 5 m) means that the connecting point for the mains can be placed outside the hazardous location generated by the unit (as described in chapter AREA CLASSIFICATION).

Should, however, the connection to the electrical main lie within any hazardous location, the power cable must be connected in a way approved for such location. The cable can be used in hazardous locations together with cable fittings such as *Appleton's TMCX6550* or *Crouse-Hinds' IXTMCX165*. Installation in a hazardous location must be done by a professional electrician, in accordance with applicable standards and regulations.

PNEUMATIC INSTALLATION

The unit must be connected to compressed air of 7-12 bar (110-180 psi). When in use (operating the load or discharge pumps), the unit consumes approx 150 litres/min (6 cfm) of air.
The air connection (1/4" female thread) is on the lower right side of the unit (see reference pictures, picture 1). To prevent pressure drops, the air line and couplings must be adequately dimensioned. The regulator on the unit is pre-set to 5 bar (80 psi).

The compressed air supplied to the unit must be clean and dry and free from oil. If it is not first led through a water trap and filter, it may cause damage to the pneumatic components of the unit and will invalidate any warranty claims.

GROUNDING

Make sure that the unit is properly grounded according to applicable laws and regulations.

PREPARATIONS FOR USE

FILLING OF WATER CONDENSER

Before the machine can be operated for the first time, the water condenser must be filled with normal tap water (see reference pictures, picture 2). The condenser has fixed volume of approximately 10 US gallons (37 litres). Fill the condenser with water until the water level is 2-3” from the top. Fit the lid (see reference pictures, picture 3)

The water is used to absorb the energy in the vapor of the distilled (recycled) solvent and thereby shifting the phase of the solvent from vapor to fluid (condensation).

Under normal conditions, a recycling process heats up the water in the condenser to a medium temperature of approx 60 ºC (140ºF), and thus preventing any build up of bacteria in the water. During normal operation, the temperature of the water will increase, reaching its highest temperature at the top of the condenser.

The specially designed lid reduces the water loss to a minimum. Check the water level once a month, especially when the unit is used in warm conditions (25ºC-40ºC, 77ºF-104ºF)

OPERATING INSTRUCTIONS

Operating instructions should be formulated on the basis of this manual and translated into the language spoken by the employees. It should always be available close to the machine. To avoid confusion, the employees must be informed about the properties of the solvent currently being processed in the machine.

PERSONNEL PROTECTION

Always wear protective solvent-resistant gloves when handling solvents.
Personnel suffering from chronic respiratory problems or allergies to solvents must not operate the machine.
Two fire extinguishers must always be kept nearby when working with flammable solvents.
Read chapter “SAFETY INFORMATION” and take necessary measurements before use.

UNDERSTANDING THE PROCESS OF RECYCLING SOLVENTS

GENERAL

It is impossible to design a distillation unit that can treat any type of solvent or waste! Every solvent or diluents (se chapter “DEFINITIONS”) has got its own unique properties. When different solvents are being mixed with contaminants like paint and pigments, as in the case in a body shop, the properties and behaviour when boiled or heated might cause unwanted effects.

It is therefore absolutely necessary to know in advance the chemical and physical properties of the product or products that are to be treated.

Since the distillation of inflammable solvents can lead to fire-hazards and can create potentially explosive atmospheres, security measures have to be taken against fire and explosions.

DRESTER 10500CS IS INTENDED TO RECYCLE THE NORMAL SOLVENTS USED IN A BODY SHOP, CONTAMINATED WITH SOLID CONTAMINANTS AND NOT LIQUID (SEE CHAPTER “IDENTIFICATION OF THE CONTAMINANTS IN THE SOLVENT”.

IT MAY NOT BE USED TO DISTIL (RECYCLE) SOLVENTS CONTAINING NITROCELLULOSE OR ANY OTHER SUBSTANCES THAT CAN UNDERGO DANGEROUS CHEMICAL REACTIONS, OR THAT CAN CAUSE FIRE OR EXPLOSIONS WHEN HEATED UP TO 200ºC / 392ºF.

IT IS EXTREMELY IMPORTANT THAT ANY USER READS AND UNDERSTANDS THE FOLLOWING CHAPTERS EXPLAINING WITCH SUBSTANCES CAN BE RECYCLED AND THE RISKS INVOLVED IN THE RECYCLING PROCESS.

Ask your supplier for the MSDS (Material Safety Data Sheet) of each single product. When distilling the product/products one must take into account the chemical and physical properties, paying special attention to the auto-ignition temperature.

DEFINITIONS

SOLVENT:	Liquid that without reacting chemically, dissolves other substances (it solutes) forming a solution
DILUENTS:	Diluents is a mixture of solvents.
RESIDUES:	What remains after the recycling (heating) process is done. Normally paint sludge and a very low percentage of solvent.
MSDS MATERIAL SAFETY DATA SHEET:	Deliveries of solvents or diluents have to be accompanied by safety data sheets on witch is found: name, physical and chemical properties, classification, labelling, toxicity, legislation, explosion limits, rules for storage, transport and treatment and the security measures that have to be taken when dealing with the substance

IDENTIFICATION OF THE SOLVENT TO BE DISTILLED

When distilling solvents or diluents special attention has to be paid to the physical and chemical properties. This chapter explains some of the most important properties:

FLASH POINT

The flash point is the minimum temperature at which, above a free liquid surface of a solvent, a gas or vapor phase is formed. The vapor formed will burn spontaneously if it comes in contact with a flame or a spark. It is clear that, the lower the flash point, the higher the risk when handling the solvent.

AUTO IGNITION TEMPERATURE AND TEMPERATURE CLASS

All inflammable solvents have a specific auto ignition temperature. The auto ignition temperature is the minimum temperature at which the solvent, in contact with air, catches fire spontaneously and where the burning process proceeds without input of energy from the outside.
TO PREVENT AUTO IGNITION, THE MAXIMUM SURFACE TEMPERATURE WHEN THE MACHINE IS FUNCTIONING SHOULD NEVER BE HIGHER THAN THE AUTO IGNITION TEMPERATURE OF THE TREATED SOLVENT.
These temperatures are arranged into six groups or "TEMPERATURE CLASSES"

CLASS	MAXIMUM SURFACE TEMPERATURE	
T1	= 450ºC	
T2	= 300ºC	*SUB DIV:(T2A=280ºC, T2B=260ºC, T2C=230ºC, T2D=215ºC)*
T3	= 200ºC	*SUB DIV:(T3A=180ºC, T3B=165ºC, T3C=160ºC)*
T4	= 135ºC	
T5	= 100ºC	
T6	= 85ºC	

The DRESTER 10500CS is classified as class T3 equipment (see name plate on the side of the machine). This means that the unit can be used to distil (recycle) solvents belonging to T1, T2 and T3. However there are exceptions to this rule. Some substances may, even if they are classified as T1, T2 or T3 react in a dangerous way when recycled in T3 classified equipment (see table 1 for some examples). Consult your supplier or a professional chemist if in any doubt.
Examples of auto ignition temperature, temperature class and distillation temperatures are given in Table 1.

HEAT OF VAPORISATION

The heat of vaporisation is the amount of energy needed to transform one kilogram of material from the liquid phase into the gas phase. It is expressed in kcal/kg.

Examples of the heat of vaporisation:

TRICHLOROETHANE	57 kcal/kg
ACETONE	128 kcal/kg
ETHANOL	200 kcal/kg
WATER	540 kcal/kg

The recycling rate/speed is dependent of the heat of vaporisation and the energy input. A higher heat of vaporisation means a longer time of distillation.

DENSITY OF THE VAPOR PHASE

Depending on the relative densities in respect to air, vapors of inflammable solvents can be divided into:

-"heavy", when their relative density is higher than 1.1 (=heavier than air)

-"light", when their relative density is lower than 0.9 (=lighter than air)

This parameter is important for knowing the extent of the danger area and for the positioning of the ventilation holes (see chapter “AREA CLASSIFICATION” and “REQUIRED VENTILATION”).

DISTILLATION TEMPERATURE

The boiling point of a liquid is the temperature at which the liquid is transformed into gas under normal atmospheric pressure (1013 hPa). A solvent normally has one specific and constant boiling point.

A mixture of solvents has a temperature range in which it boils. The different ingredients boil at different temperatures. A polluted solvent normally boils at a higher temperature, than a non polluted solvent.

The boiling point is independent of the heating source. The bigger the temperature difference between heating source and boiling point, the faster the evaporation process will take place (more violent boiling). More energy is put into the process, hence the faster evaporation. During the distillation process it is common practice to take the heating temperature 30 to 40° higher than the boiling point of the solvent.

Although the rate of evaporation can be sped up by having a bigger temperature difference, this can lead to foaming of the polluted solvent inside the boiler. If the foam reaches up to the vapor manifold it could lead to fouling of the condenser and of the produced distillate. Eventually this can even lead to blocking of the condenser.

ACIDITY

In the DRESTER 10500CS all relevant metal parts that come in contact with solvent and solvent vapors are made of stainless steel (AISI 304). The DRESTER 10500CS with the stainless steel construction is suitable for the distillation of neutral and slightly acid solvents.

Inflammable solvents (chetones, alcohols, glycols, esters, aromats) are neutral when they are newly bought. They can become acid for the following reasons:

1) Through oxidation due to long and/or wrong storage. Before doing a distillation, especially when the solvents have been stored for a long time, the acidity (pH) should be checked.

2) Acidification during the distillation process:
   a) With thermo-instable solvents the acidification occurs above a certain temperature (critical temperature). Check with your supplier about the acidification properties dependant on temperature.
   b) Acidification due to changes of the residue, this generally occurs during the baking phase of the distillation.

Distilling (recycling) acid solvents will invalidate any warranty claims.

The recycler bags (Drester no. 10550) used to collect the residues may dissolve when distilling acid solvents.

HALOGENATED SOLVENTS

Halogenated solvents (even stabilized) can acidify during normal use as washing liquid and also during distillation.
Check the pH, and neutralize the solvent if necessary.

IDENTIFICATION OF THE CONTAMINANTS IN THE SOLVENT

The identification of the contaminants that are in the solvent to be distilled is just as important as the identification of the solvent. The chemical substances that are normally treated (hydrocarbons, chlorinated hydrocarbons, esters, glycols, chetones, and alcohols) and most of the common contaminants (pigments, glue, ink and oil) can be heated up to the maximum working temperature of the distillation unit (200°C) without any problem.

However one has to pay close attention to the presence of other substances that can undergo dangerous chemical reactions, or that can cause fire or explosions. This chapter gives some examples of reactions that can occur, however each case has to be examined individually.

LIQUID CONTAMINANTS

The most common liquid contaminants are oil, ink and water. The presence of liquid contaminants during distillation may lead to contamination of the distillate.

In presence of water one has to pay attention to the distillation behaviour (formation of azeotropes). Azeotropes is a mixture of liquids that has a constant boiling point because the vapor has the same composition as the liquid mixture. The boiling point of an azeotropic mixture may be higher or lower than that of any of its components. The components of the solution cannot be separated by simple distillation.

SOLID CONTAMINANTS

The most common solid contaminants are: resins, pigments, paints and polymers. The advantage of solid contaminants is that, when they are not already classified as 'toxic and noxiuos', they can simply be transported to a controlled waste dump, on the condition that the percentage of solvent does not exceed that of the maximum limit posed legally in each country.

Paint residues can give a light colouring to the distillate in the drying phase (see chapter “The distilling process”). In most cases however this light colouring does not give any problems when reusing the distillate.

DANGEROUS CHEMICAL REACTIONS

The chemical substances that are normally treated in a bodyshop can be heated up to the maximum working temperature of the distillation unit (200°C) without any problem.

However, one has to pay close attention to the presence of other substances that can undergo dangerous chemical reactions, or that can cause fire or explosions.

Unwanted and dangerous reactions can be caused by:

1. The presence of peroxides (formed in presence of oxygen and in absence of stabilisers during storage of solvents like tetrahydrofuran, ethyl ether and chetones) can cause unwanted reactions.
2. Explosions by heating of nitro-substances (nitro methane, nitro-aromats) or substances containing nitrate (nitric acid esters).
3. Explosions due to the presence of nitrocellulose in certain paints (SEE CHAPTER IDENTIFICATION OF THE SUBSTANCE TO BE DISTILLED)
4. Presence of metal complexes that can be explosive in dry form.
5. Strongly oxidising substances (nitric acid, chromates, perchlorates) in presence of oxidisable substances.
6. Possibility of catalytic reactions in the solvent due to the presence of rust, azo-substances, colour pigments, or the possibility for decay of certain substances (cancerogenous aromatic amines from azo-substances).

DISTILLATION RESIDUES AND WASTE PROCESSING

In general, the distillation residues consist of a mixture of solvents and contaminants. They are considered as waste and have to be processed according to the laws of the country.

CHECK CAREFULLY WITH THE APPROPRIATE AUTHORITY TO ENSURE THAT THE WASTE IS HANDLED ACCORDING TO THE APPLICABLE LAWS AND REGULATION. YOU MAY NEED INFORMATION FROM THE PAINT MANUFACTURER WHEN DOING SO.

During the classification one has always got to pay attention to the percentage of organic solvents; special attention also has to be paid to the presence of heavy metals like lead, chrome, cadmium, etc. For the official classification of the waste one has to contact an authorised laboratory for analyses.

Table 1. Shows example of temperature classes. This is not a list of solvents approved for recycling in the Drester 10500CS.

SOLVENT	DISTILLATION TEMPERATURE (ºC)	(ºF)	TEMP. CLASS	AUTOIGNITION TEMPERATURE (ºC)	(º F)
ACETONE	56	133	T1	535	995
AMYL ACETATE	126-155	259-311	T2	375	707
BENZENE	80	176	T1	560	1040
BUTANOL n.	118	244	T2	366	691
2-BUTANONE	80	176	T2	404	759
BUTYL ACETATE	128	262	T2	370	698
sec. BUTYL ALCOHOL	101	214	T2	390	734
BUTYL CARBITOL	234	453	T3	228	442
BUTYL CELLOSOLVE	173	343	T4	239	462
BUTYL CELLOSOLVE ACETATE	192	378	T3	280	536
BUTYL DIGLYCOL	234	453	T3	228	442
BUTYL GLYCOL	173	343	T3	239	462
CARBINOL	65	149	T2	385	725
CELLOSOLVE	143	289	T4	235	455
CELLOSOLVE ACETATE	156	313	T2	377	711
CYCLOHEXANE	81	178	T3	260	500
CYCLOHEXANOL	162	324	T3	300	572
CYCLOHEXANONE	155	311	T2	419	786
DICHLOROETHANE	84	183	T2	412	774
1,2-DICHLOROPROPANE	56	133	T1	555	1031
DIMETHYLFORMAMIDE (DMF)	153	307	T2	445	833
ETHYL ACETATE	79	174	T2	427	801
ETHYL BENZENE	136	277	T2	380	716
ETHYL GLYCOL ACETATE	156	313	T2	377	711
sim-ETHYLENE CHLORIDE	84	183	T2	412	774
HEXAMETHYLENE	81	178	T3	260	500
n-HEXANE	70	158	T3	240	464
ISOBUTYL ACETATE	119	246	T2	420	788
ISOBUTYL ALCOHOL	111	232	T2	430	806
ISOPROPANOL	83	181	T2	400	752
ISOPROPYL ACETATE	89	192	T2	460	860
ISOPROPYL ALCOHOL	83	181	T2	400	752
ISOPROPYL GLYCOL	143	289	T2	345	653
METHYL ACETATE	58	136	T2	475	887
METHYL CELLOSOLVE	124	255	T3	285	545
METHYL CELLOSOLVE ACETATE	156	313	T2	377	711
METHYL GLYCOL ACETATE	137-152	279-306	T2	380	716
M.E.K. (METHYL ETHYL KETONE)	80	176	T2	404	759
M.I.B.K. (METHYL ISOBUTYL KETONE)	117	243	T2	459	858
NAFTA A - LIGHT FRACTION	130-165	266-329	T3	245	473
NAFTA B - HEAVY FRACTION	150-220	302-428	T3	250	482
n-OCTANE	126	259	T4	220	428
PENTANOL n.	138	280	T2	327	621
n-PROPANOL	98	208	T3	371	700
n-PROPYL ALCOHOL	98	208	T3	371	700
TURPENTINE	152-170	306-338	T3	250	482
TOLUENE	111	232	T1	535	995
STYRENE	146	295	T2	490	914
WHITE SPIRIT	150-190	302-374	T3	254	489
XYLENE	140	284	T2	525	977

THE RECYCLING PROCESS

FIRST STEP: DISTILLATION

With a distillation it is possible to separate volatile substances (solvents and diluents) from non-volatile (resins, pigments, glues, etc.) or hardly volatile (oil, ink, etc.) substances. When boiling the mixture of solvents including contaminants; only the volatile fraction evaporates and is condensed. The contaminants remain on the bottom as residue.

The distillation process in the DRESTER 10500CS is performed at atmospheric pressure. The boiling points as mentioned in table 1 are all at a pressure of 760 mmHg (normal atmospheric pressure 1 atm).

SECOND STEP: BAKING

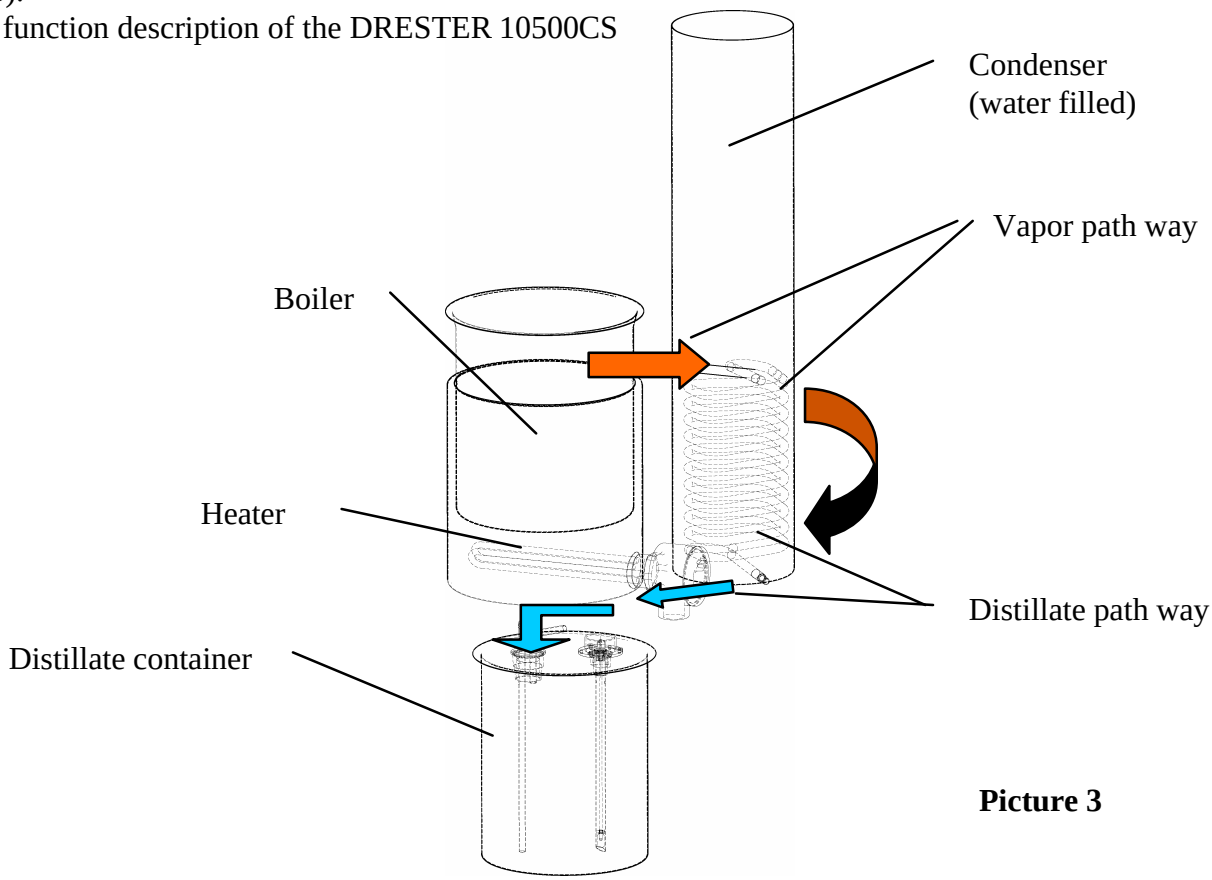
In this phase the working temperature is higher than the distillation temperature and normally not lower than 180 - 190 °C. This is done in order to get the residues as solid as possible. In this phase of drying the paint residues, the distillate can become lightly coloured. The reason is that some of the pigments escape from the residue and collects in the distillate container.

The light colouring has no major influence on the quality of the distillate, especially if the distillate is used as washing liquid. If for some reason, a perfectly clean distillate is desired, it is recommended that the distillate is emptied before the final step of “baking” in the process. Use the tap handle on the side of the machine to empty the distillate (see chapter Operation of unit).

CONDENSATION

During the first and second step of distillation and baking, the hot vapors are being led through the condenser. The water in the condenser will absorb the energy in the vapors and thereby condensate it into a distillate. The distillate is collected in the distillate container (see picture 3).

General function description of the DRESTER 10500CS



Picture 3

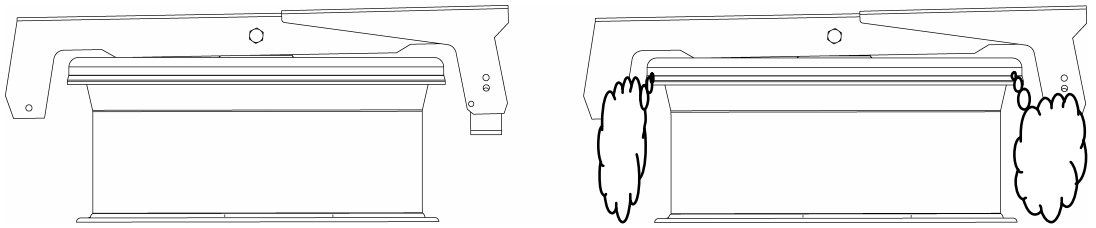
PROCESS RISKS

The distillation process is normally done at atmospheric pressure. Under normal conditions, the vapors have a free path way through the condenser and down into the distillate container. If this path way is blocked in any way the lid of the boiler works as a safety valve.

In case of an overpressure the gasses will escape between boiler and lid (see picture 4). If gasses escape between boiler and lid, the machine has to be stopped and the cause of the overpressure has to be taken away.

The condenser can become blocked by for example foam from the distillation process.

Each product produces foam during boiling. To insure a clean distillate and an unblocked condenser the foam level may never reach the level of the vapor manifold. The difference between loading capacity and the boiler volume is in most cases big enough not to cause any problem



Picture 4

The most important factors for the formation of foam are:

- The bigger the difference between boiling point of the solvent and the temperature of the heating oil in the jacket, the bigger the formation of foam.
- Physical and chemical properties of the solvent.
- Pressure at which the distillation is performed.
- Working under vacuum increases the formation of foam. The deeper the vacuum, the bigger the formation of foam. It is strictly prohibited to use the DRESTER 10500CS under vacuum/with vacuum devices.
- Physical and chemical properties of the contaminants. In some cases paint residues of the same type but of different colour can have different foaming characteristics.

Reducing the risk of foaming by:

- Letting the dirty solvent rest for before distilling it. (up to 48 hours)
- Load the boiler with less solvent than usual. This will reduce the formation of foam.
- Change to mode 1 (see chapter “OPERATION”).

SOLVENT LOSS

Although the DRESTER 10500CS has got an extremely high efficiency rate, it is inevitable that some solvent loss occurs. The distillation process consists of two phases: evaporation followed by condensation.

In solvent mixtures, a fraction of the low boiling substances is lost during use due to natural evaporation. During distillation, a fraction of the high boiling solvents is lost because of the fact that they remain in the residue. They are simply not vaporised due to the fact that they have a boiling point higher than 200ºC (392ºF). In practice the low and high boiling fractions of the solvent mixture will decrease in percentage. It is therefore good practice to dilute the distillate regularly with fresh product.

OPERATION OF UNIT

FITTING OF BAGS

1. Check that the green light on the control panel is on. This means that the unit is cool and the lid of the boiler can be opened.
2. Open the lid.
3. Remove the bag retainer ring.
4. Remove the used bag. Should it stick to the bottom, press ”START” and let the recycler warm up for 5 minutes. Press”STOP” and gently pull out the bag and clean the boiler.
5. Open a new bag and place inside boiler. Tuck the bag well down to the bottom of the boiler.
6. Squeeze the bag retainer ring and place it down into the bag. The ring must slide into the recess of the boiler (see reference pictures, picture 9).
7. Snap the bag retainer ring into position, in the recess of the boiler.
8. Make sure the bag is tucked well behind the waste intake manifold (see reference pictures, picture 8)
9. The bag should be replaced before each cycle.

LOADING AND STARTING

1. Check that the green light on the control panel is on. This means that the unit is cool and the lid of the boiler can be opened.
2. Open the lid.
3. Fit a new bag as described above.
4. Make sure that the solvent to be processed in the DRESTER 10500CS is identified and suited for recycling, according to the chapter “UNDERSTANDING THE PROCESS OF RECYCLING SOLVENTS” in this manual.
5. **Alternative 1: Pump loading**:
   Pump solvent into the DRESTER 10500CS (IF NOT ALREADY LOADED). This is done by placing the suction tube (see reference pictures, picture 4, no 4) in the container or gun cleaner to be emptied. Press the foot pedal (see reference pictures, picture 4, no10). As long as the pedal is pressed the transfer pump will pump solvent into the recycler bag. NOTE. THE MAXIMUM LEVEL (5 US GALLON) IS REACHED WHEN THE SOLVENT LEVEL REACHES THE CLAMPING RING FOR THE RECYCLER BAG (see reference pictures, picture 8). THE CLAMPING RING MUST BE PLACED IN THE BOILER RECESS (see reference pictures, picture 9). DO NOT OVERFILL!
   Alternative 2: Manual loading
   Pour the solvent into the boiler. Be careful not to spill any solvent into the vapor manifold, behind the plastic bag or on top of the unit. NOTE. THE MAXIMUM LEVEL IS REACHED WHEN THE SOLVENT LEVEL REACHES THE CLAMPING RING FOR THE RECYCLER BAG. DO NOT OVERFILL! (also see chapter “FOAMING”).
6. Close the lid and secure.

7. If the display reads *"Ready to start Mode 1" (or "mode 2"/" mode 3")* proceed to step 8. If the display reads *"Empty can before start! Index yyy"* (Index yyy is of interest for the manufacturer only), you must unload the collecting container to make space for the new solvent that is to be processed. The unloading is done by using the discharge handle (see picture 1, no 1). Make sure that the container that is to be loaded is grounded with the clamp from the tap handle. Press the trigger of the discharge handle and unload the clean solvent until the container is empty and the pump is pumping air. The display will now read *"Ready to start Mode 1" (or "mode 2"/" mode 3")*
8. Press "START" button, yellow light will come on and the display will read "*Recycling.. Temp XX ° F"*. Temp XX ° F indicates the temperature of the diathermic oil.
9. At the very end of the recycling process, the display will read "*Baking.. Temp XX ° F"* meaning that the process is in its last 20 minutes.
10. Once the recycling is complete the unit will automatically shut off, the yellow light will begin to flash and the display will read "*Cooling down.. Temp XX ° F "*.
11. When the oil has cooled down to 135 °F (57° C), and the condenser is cold (if not the display will read "*Cooling down.. Water still hot"*) the recycler is ready for use again. Green light will come on and the display will read *"Empty can before start! Index:yyy "*. The lid of the boiler is safe to open.

DISCHARGE OF CLEAN SOLVENT

Clean solvent can be discharged through the tap handle on the unit's right-hand side (picture 4, no.2). The clean solvent is always cool and can be discharged at any time, even when the unit is operating. It is important to avoid electrostatic sparks when discharging solvent. Therefore, before discharging clean solvent, connect the tap handle's ground clamp to the receiving container. Then push the tap handle's trigger and clean solvent is discharged through the pipe. Note that the collecting container must be emptied before a new batch can be run.

USING THE STOP BUTTON

If the "STOP" button is pressed during the recycling process, the process will be aborted, the recycler will go to cool down mode and the display will read: *"Cycle aborted Temp XX ° F"*.

IN CASE OF POWER FAILURE

Should the mains power go down, and come on again during the recycling operation, one of the following things will happen:

- If the oil temperature is <u>above</u> 135 °F (57°C) **<u>and</u>** the oil temperature <u>has not</u> dropped more than 5°C during the power failure:
  The recycling process will automatically continue where it was interrupted by the power failure.

- If the oil temperature is <u>below</u> 135 °F (57°C) **<u>or</u>** the oil temperature <u>has</u> dropped more than 5°C during the power failure:
  The recycling process will be interrupted, yellow light will flash, and the display will read: *"Power failure Please restart"*. Press "START" button and the recycling process will continue, or press "STOP" button and the process will be aborted, the recycler will go to cool down mode and the display will read: *"Cycle aborted Temp XX ° F"*.

- If the recycler is in cool down mode i.e. the yellow light is flashing, and the display reads *"Cooling down.. Temp XX ° F "*:
  The recycler will continue in the cool down mode.

RECYCLING MODES
The DRESTER 10500CS has got three different programmes that can be used.
Mode 1, Mode 2 and Mode 3.

Mode 1:

This program should be used if the solvent has a low percentage of solvents with low boiling points, e.g. acetone.
Mode 1 uses a slightly increased level of power during the initial heating of the solvents. This means that the cycle-time is slightly shorter.

Mode 2: DEFAULT MODE

This is the default program of the unit. It can be used for the normal solvents and residues found in a body shop (see chapter "PERMITTED SOLVENTS"). Mode 2 uses a low level of power over a longer period of time. This means that the cycle-time is slightly longer but the efficiency rate higher.

This mode is also suitable for solvents containing a high level of substances with low boiling points 50-80ºC (122-176ºF) e.g. acetone. Mode 2 also reduces the risk of foaming.

Mode 3:

Mode 3 can be used when the acetone level (or other substances with a low boiling temperature) of the solvent is very low. The cycle time in this mode is shorter.

When green light is on, the different modes can be set the following way:

Press the "STOP" and "START" button at the same time for 10 seconds, keep "STOP" button pressed and step forward with the "START" button. On the display you will step by step be able to choose:

- Recycling mode 1
- Recycling mode 2
- Recycling mode 3
- Resetting working hours

Release the buttons when the display is reading the above chosen mode or feature. By doing this the last showed mode or feature is set.

MAINTENANCE

OIL MAINTENANCE

The unit will automatically indicate when it requires an oil change; the display will read, *"Oil change due. Press start"*. By pressing the "START" button you can continue to use the recycler. The pictures referred to in the text below can be fund in **reference pictures** at the end of this manual. Oil change is carried out as follows:

1. Make sure the oil is cold.
2. Disconnect power.
3. Place a collection pan under the lower oil tap (see referenced pictures, picture 5). The collecting pan/drum must be big enough to take 3,6 US Gallons (13,6 litres) of oil.
4. Remove the oil plug (see referenced pictures, picture 5) and drain out all of the oil. Note: It is highly recommended that once the oil is drained, the heating element is removed, and properly cleaned before proceeding with step 6. This will increase the lifespan of the heater and improve the function of the unit. Contact your supplier for further advice.
5. Re-Apply Teflon tape to lower oil cap and then refit it.
6. Remove the oil pipe cover (see reference pictures, picture 6).
7. Refill oil, no more than 3,6 US gallon (13,6 litres) into the oil pipe. Use DRESTER DIATHERMIC OIL (DRESTER NO 10720). Use a funnel to avoid spilling oil into the machine. If refilling oil of a different brand the minimum requirements of the oil are: Cracking temperature higher than 320ºC (608 ºF) and viscosity close to 31cSt at 40ºC (104ºF) and 5,3 cSt at 100ºC (212ºF).
8. Refit oil pipe cover
9. Reconnect power.

Press the "STOP" and "START" button at the same time for <u>10 seconds</u>, keep "STOP" button pressed and step forward with the "START" button. On the display you will step by step be able to choose:

- Recycling mode 1
- Recycling mode 2
- Recycling mode 3
- Resetting working hours

Release the buttons when the display reading is "Resetting working hours". By doing this the working hours of the oil is reset and the machine is ready for use again.

WATER LEVEL

Check water level regularly. The water level in the condenser must lie 2-3” from the top edge of the condenser. If the water is not heated (by running the unit) for longer period of time there is a risk that mould will develop. In the case of mould developing or if the water smells bad the water must be changed. Water change is carried out as follows:

1. Disconnect power
2. Place a collecting drum big enough to contain 10 US gallons (40 litres) under the water outlet (see reference pictures, picture 7) on the left side of the unit. Alternative: Lead the water to a drainage system.
3. Remove condenser lid
4. Remove the water plug and drain water.
5. Re apply Teflon tape and refit the water plug
6. Refill tap water up to 2-3” from the top edge.
7. Refit the condenser lid.
8. Reconnect power

CHANGING THE CAN LEVEL SETTING

The DRESTER 10500CS has a default safety setting for the can level. The can level is the electronically measured solvent level in the distillate container. The default setting works with most of the solvents found in a body shop. If however the default safety setting needs to be changed, it is possible to do so. Contact your supplier for further advice.

IN CASE OF DISTILLATE OR CONDENSER CONTAMINATION

If the distillate container for some reason should become contaminated with pigments or polluted solvent (see chapter “THE DISTILLING PROCESS”) it needs to be cleaned. Cleaning is carried out as follows:

1. Make sure the distillate container is empty. The display will show: *“Ready to start Mode 1” (or “mode 2”/” mode 3”).* If container is not empty, empty it completely with the discharge handle (reference pictures, picture 4 / no 2).
2. Disconnect power.
3. Remove the four screws attaching the foot pedal (see reference pictures, picture 10) to the bottom plate.
4. Take the distillate container out of the machine. Leave all hoses and attachments in place.
5. Clean the condenser and the hoses by flushing clean solvent into the vapor manifold (see reference pictures, picture 8).
6. Remove the three clips on the container flange and take off the lid
7. Clean the distillate container.
8. Clean the level indicator (see reference pictures, picture 11)
9. Fit the lid and clips back onto the container.
10. Place container back into the machine. Make sure no hoses are blocked
11. Fit the pedal back onto the bottom plate with the four screws

IN CASE OF ERROR MESSAGE

The DRESTER 10500CS is monitored for malfunctions, of hardware, of software as well as of recycling data. In case of malfunction, the recycling process will be interrupted, red light will flash, and the following messages can be read on the display. Should this happen, push "START" and "STOP" buttons at the same time. The display will then read, *"Turn off power and repair error"*. It is a good idea to turn the power off and on again to check whether error message remains. Contact your supplier for further advice and error correction.

"Error code: 1"
"Oil probe faulty"
Means that one of the 2 temperature probes for oil is malfunctioning.
Correction: Contact your supplier for support.

"Error code: 2"
"Oil probe faulty"
Means that the other of the 2 temperature probes for oil is malfunctioning.
Correction: Contact your supplier for support.

"Error code: 3"
"H2O probe faulty"
Means that the temperature probe for the condenser is malfunctioning.
Correction: Contact your supplier for support.

"Error code: 4" is not used

"Error code: 5" is not used

"Error code: 6" is not used

"Error code: 7" is not used

"Error code 8" is not used

“Error code: 9”
“Oil probe diff.”
Means reading of temperature from the two temperature probes for oil differs too much.
Correction: Contact your supplier for support.

“Error code: 10”
“Check oil level”
Means that the oil temperature rises too fast.
Correction: Check for oil leaks under and around the boiler. If the unit is leaking oil contact your supplier for further advice. Otherwise: Make sure that the oil volume is 3,6 US Gallon (13,6 litres). This is done by following step 1-9 in chapter “Oil Change”

“Error code: 11”
“Check fuses”
Means that the oil temperature rises too slowly because of heater power failure.
Correction: Contact your supplier for support.

“Error code 12” is not used

“Error code: 13”
“Circuits faulty”
Means faulty computer.
Correction: Contact your supplier for support.

“Error code: 14”
“Oil temp to high”
Means the Analog temperature control system has monitored too high oil temperature.
Correction: Allow the recycler to cool down. Otherwise Contact your supplier for support

“Error code: 15”
“H2O temp high”
Means that the condenser, hence the water is too hot.
Correction: Check the water level in the condenser, top up with water if the level is low, if level is OK allow it to cool down, or replace the water if quick cool down is desired.

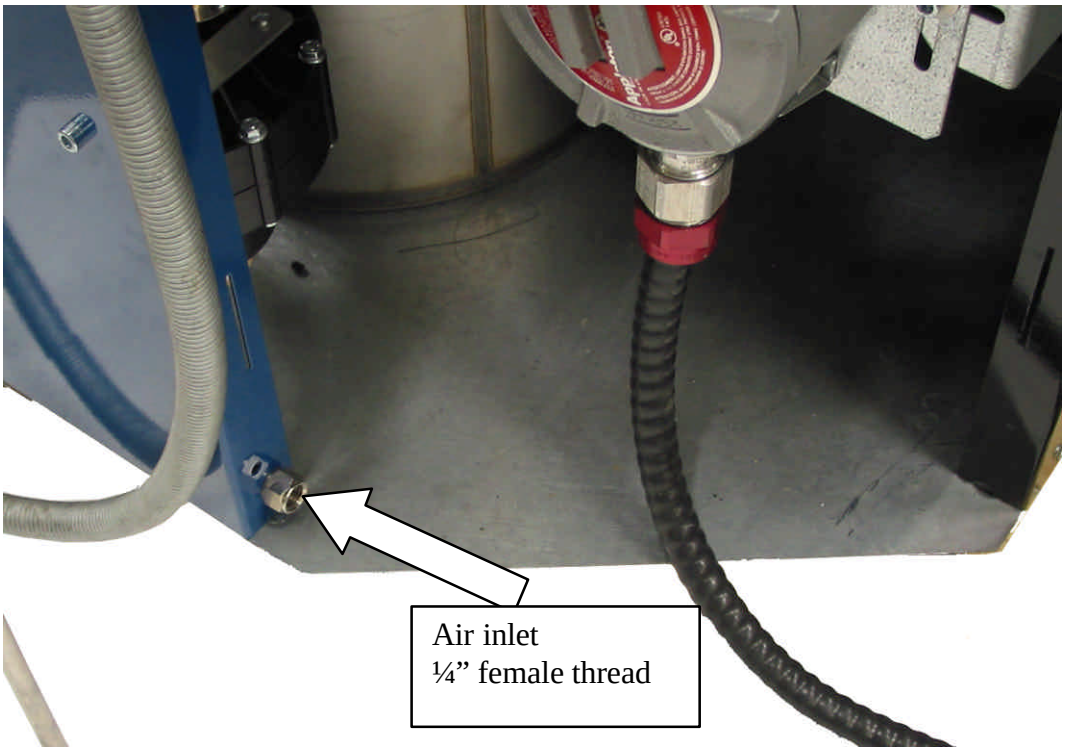
“Error”
“Level indicator”
Means abnormal reading of the level indicator.
Correction: Make sure the level indicator is not grounded nor has any metal contact. Make sure the level indicator is clean. Otherwise replace the level indicator, or the cable to the level indicator.

TECHNICAL DATA

MANUFACTURED BY:	HEDSON TECHNOLOGIES AB HAMMARVÄGEN 4 S-232 37 Arlöv SWEDEN Tel +46 40 53 42 00 Fax +46 40 43 29 01
MODEL:	*DRESTER 10500CS*
HAZARDOUS LOCATIONS:	Class 1, Division 1, Groups C, D
TEMP CODE:	T3
ELECTRICAL PROTECTION:	Intrinsic protection & explosion proof
FUSE PROTECTION:	10 A delayed action
VOLTAGE:	200-240 VAC single phase, 50 - 60 Hz
CURRENT:	max 9 A
POWER:	1.9 kW
POWER CABLE LENGTH:	16 feet (5 m)
CAPACITY:	5,3 US Gallons (20 liters
OPERATING TEMPERATURE:	40 °F – 380 °F (10° Celsius to 193° Celsius)
ANALOG SAFETY CIRCUIT CUT OFF TEMP:	392 °F (200° Celsius)
MAX AMBIENT TEMPERATURE:	104 °F (40° Celsius)
DIATHERMIC OIL VOLUME :	3,6 US gallons (13,6 liters)
MATERIAL BOILER:	Stainless steel
MATERIAL CONDENSER:	Stainless steel
MATERIAL DISTILLATE CONTAINER	Stainless steel
DIMENSIONS:	Length: 28,3” (720 mm) Operating height (to boiler lid): 40,6” (1030 mm) Max height (to condenser lid): 61” (1550 mm) Width: 18,9” (480 mm)
WEIGHT:	231 lbs (105 kg) (as shipped with bags, wrapping and box) 187 lbs (85 kg) (out of the box) 264 lbs (120 kg) (topped up with water ready to use)
RECYCLING TIME PER CYCLE:	~7 hours (full batch of lacquer thinner) ~5 hours (cooling down) (At 68 °F (20 °C) ambient temperature)
PATENTS :	US pat. no.:6819 251 US pat. no.:6797 123

REFERENCE PICTURES

Picture 1: Pneumatic installation



Picture 1

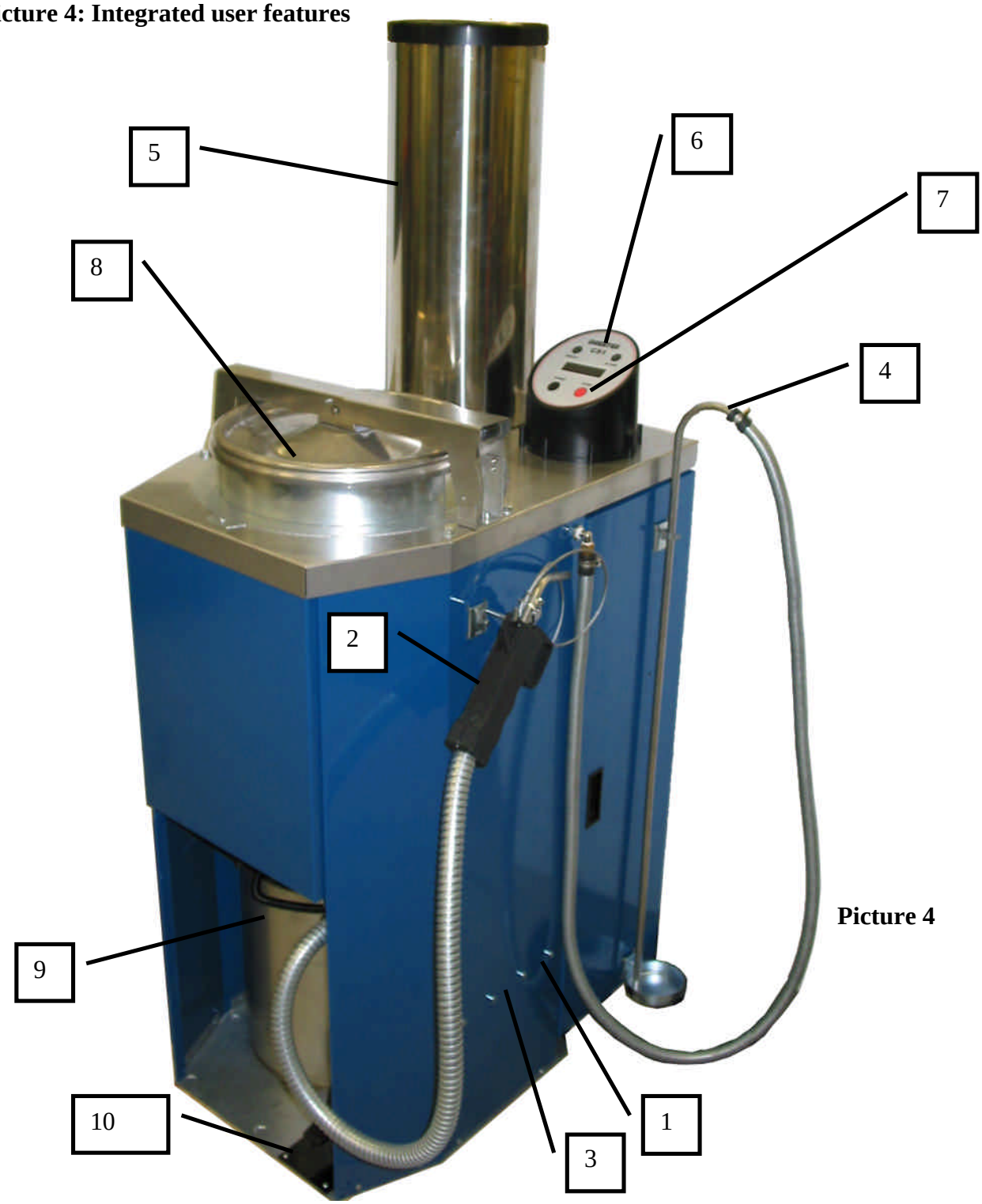
Picture 2: Filling of water condenser

Picture 2

Picture 2: Filling of water condenser

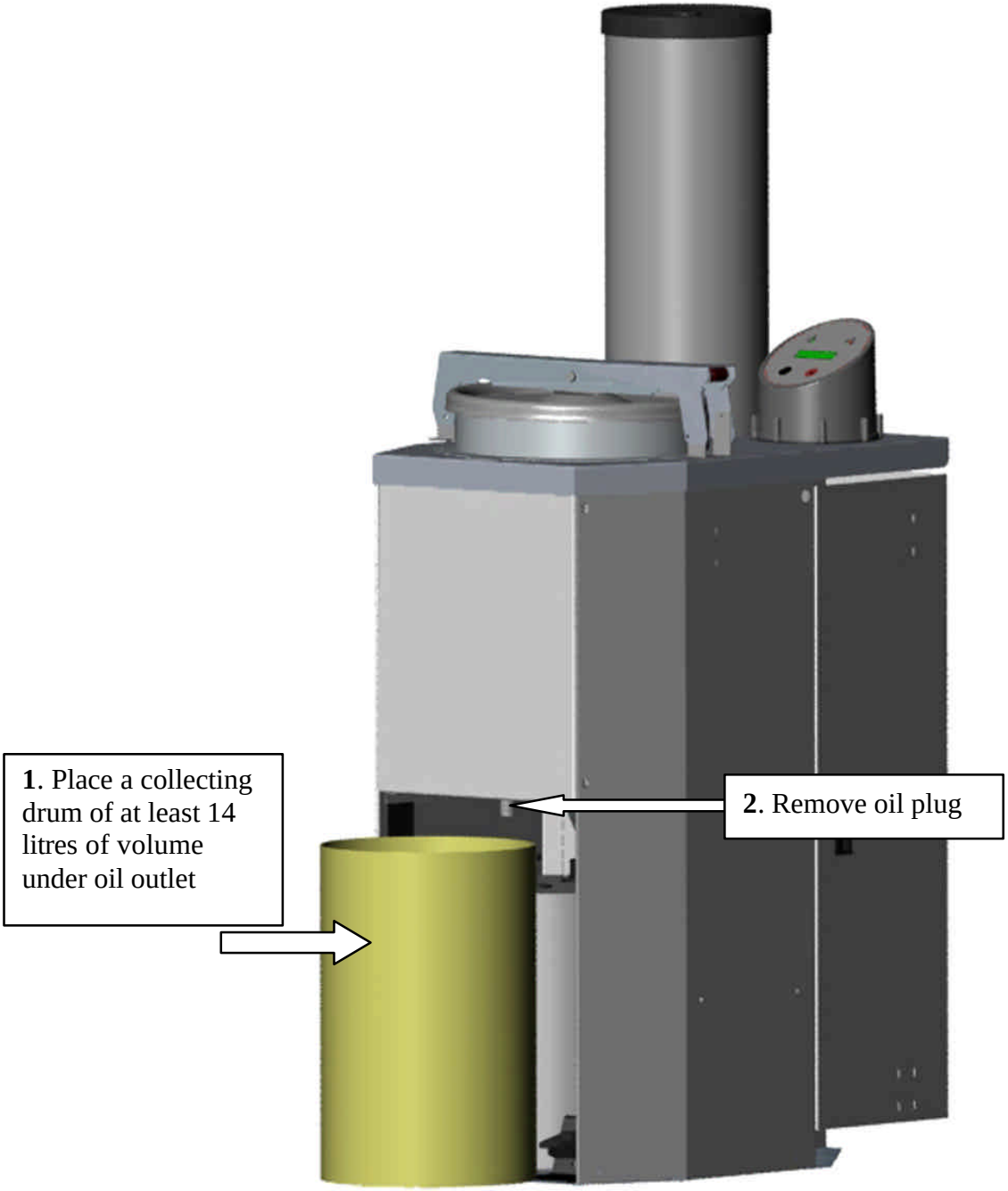
Picture 3

Picture 4: Integrated user features



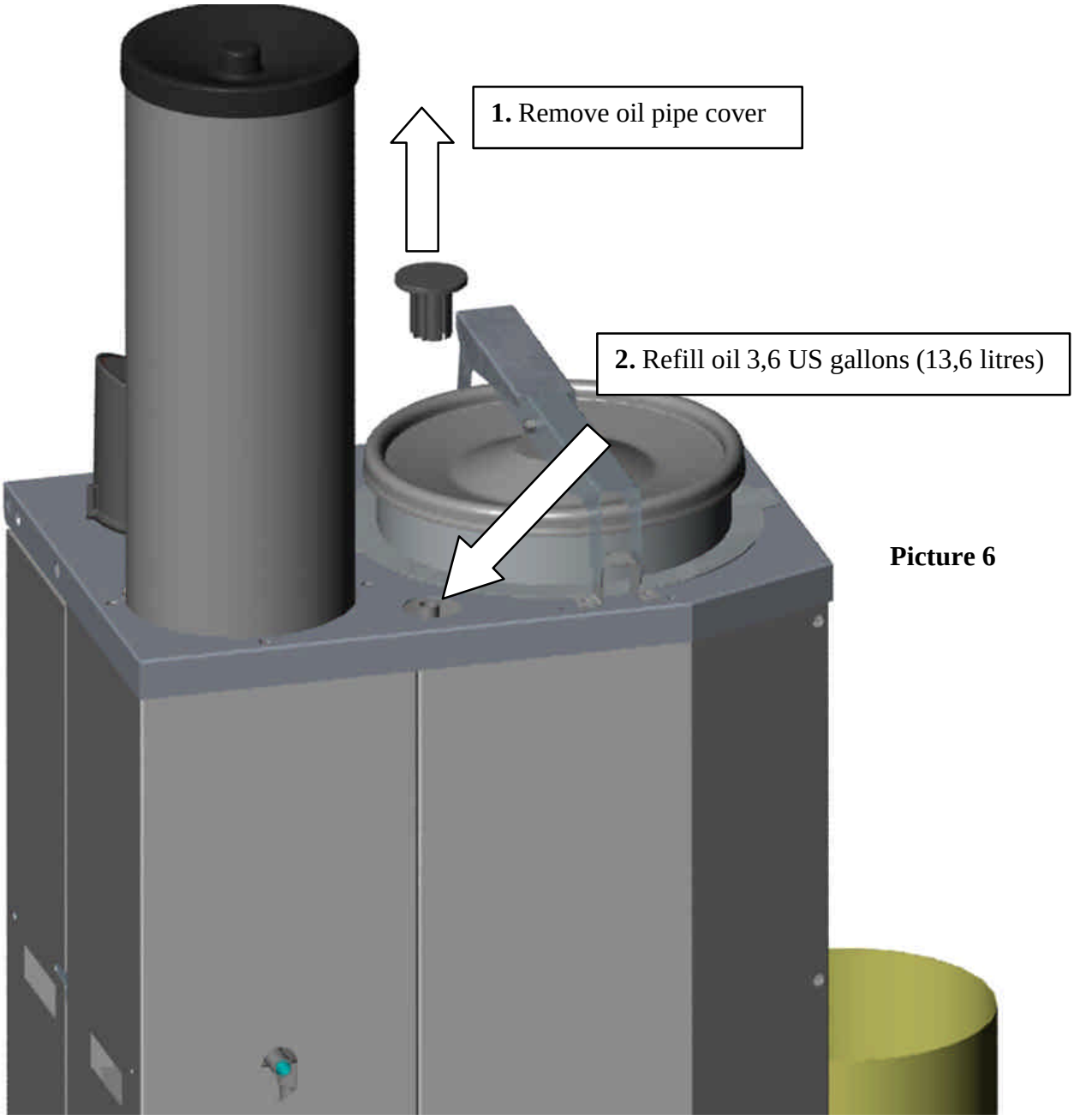
Picture 4

Picture 5: Oil draining
Note: Make sure oil is cold before emptying. Disconnect power before oil change



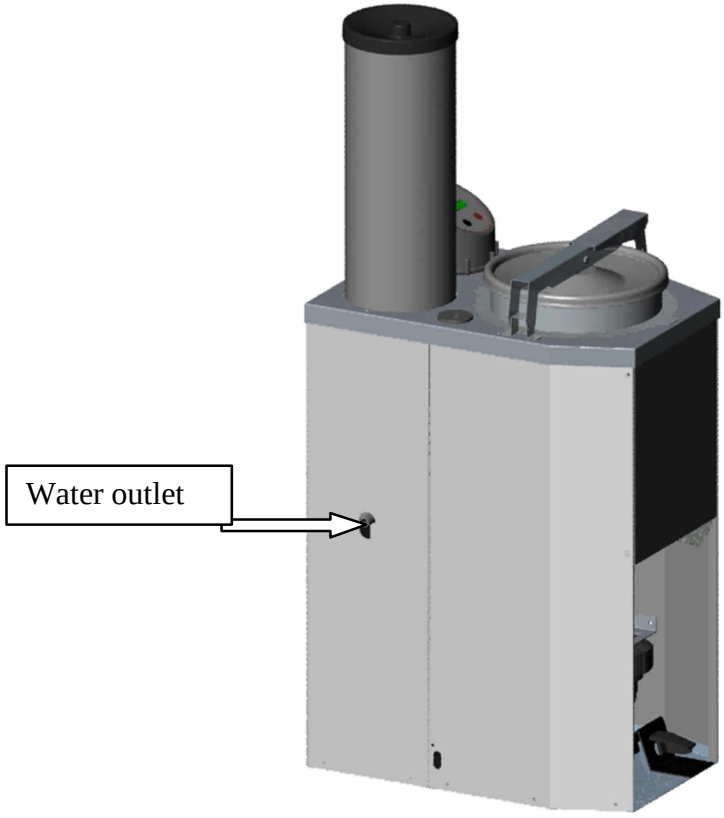
Picture 5

Picture 6: Refilling oil
Note: Use a funnel in order to prevent spilling



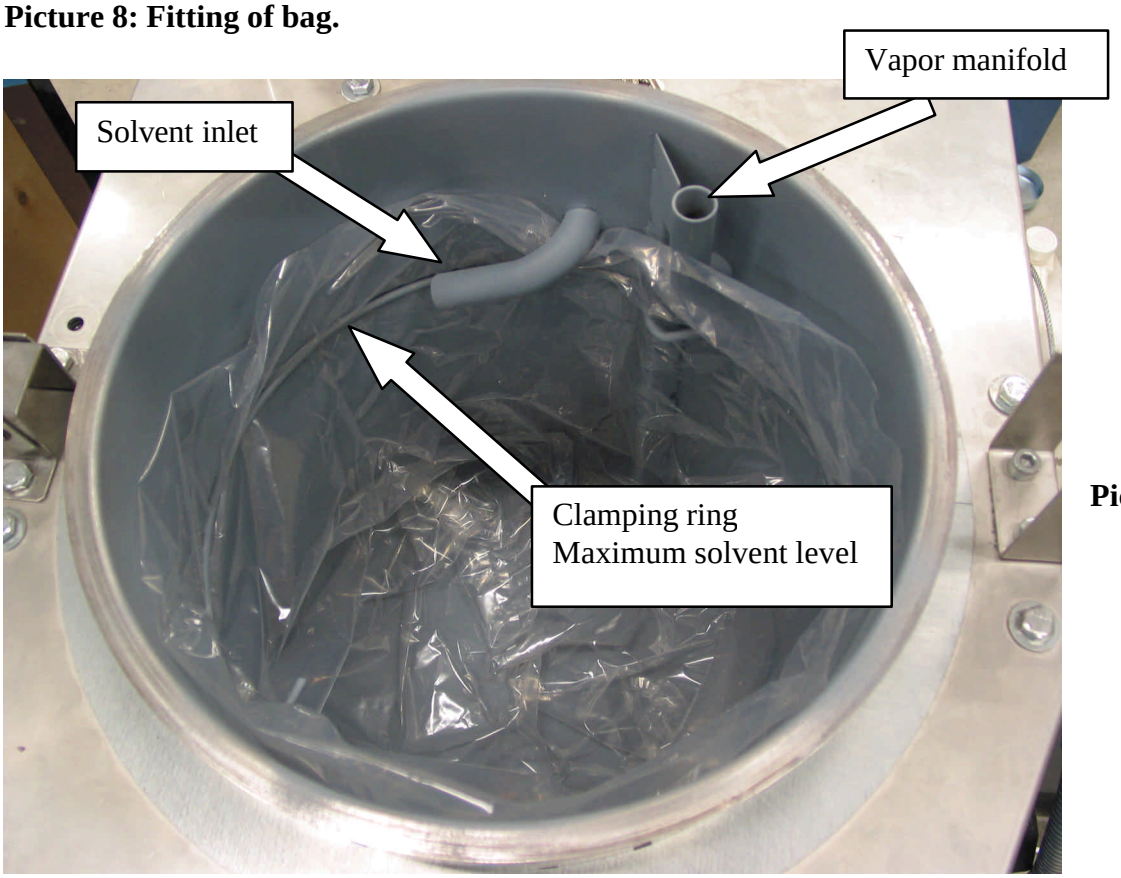
Picture 6

Picture 7: Water change.
Note: Disconnect power before water change



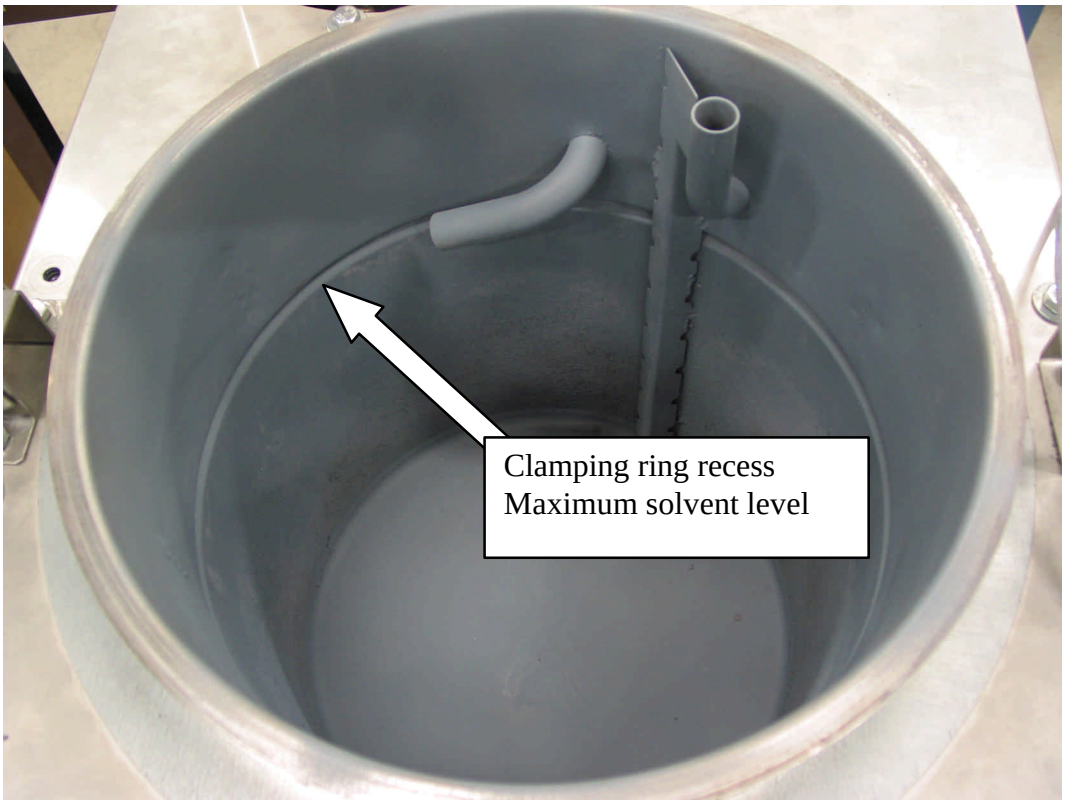
Picture 7

Picture 8: Fitting of bag.



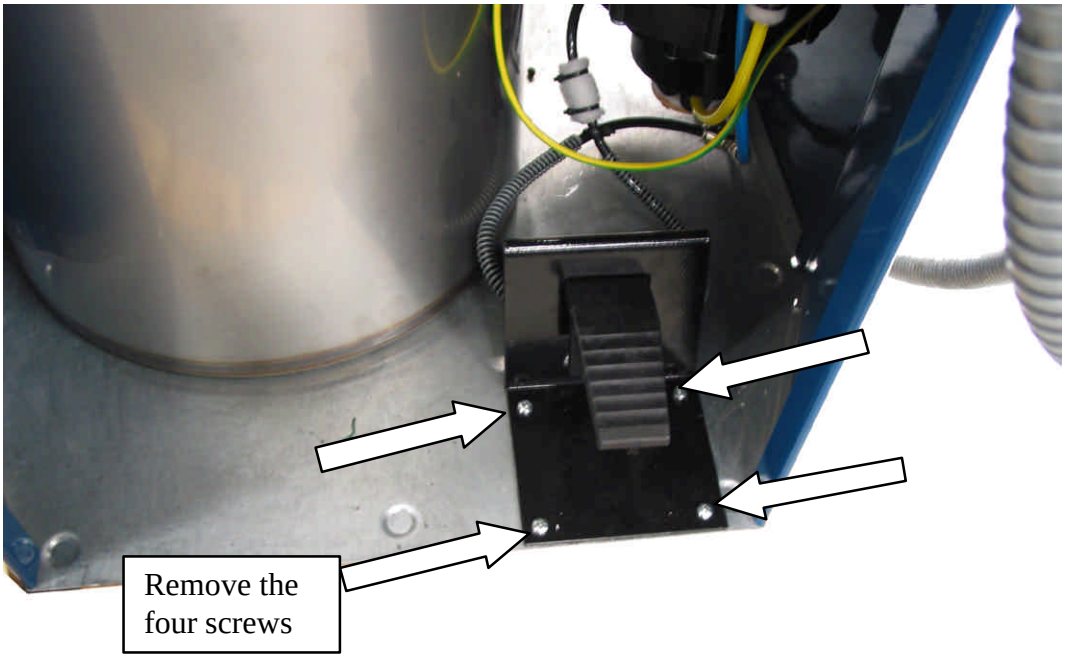
Picture 8

Picture 9: Clamping ring recess and maximum level



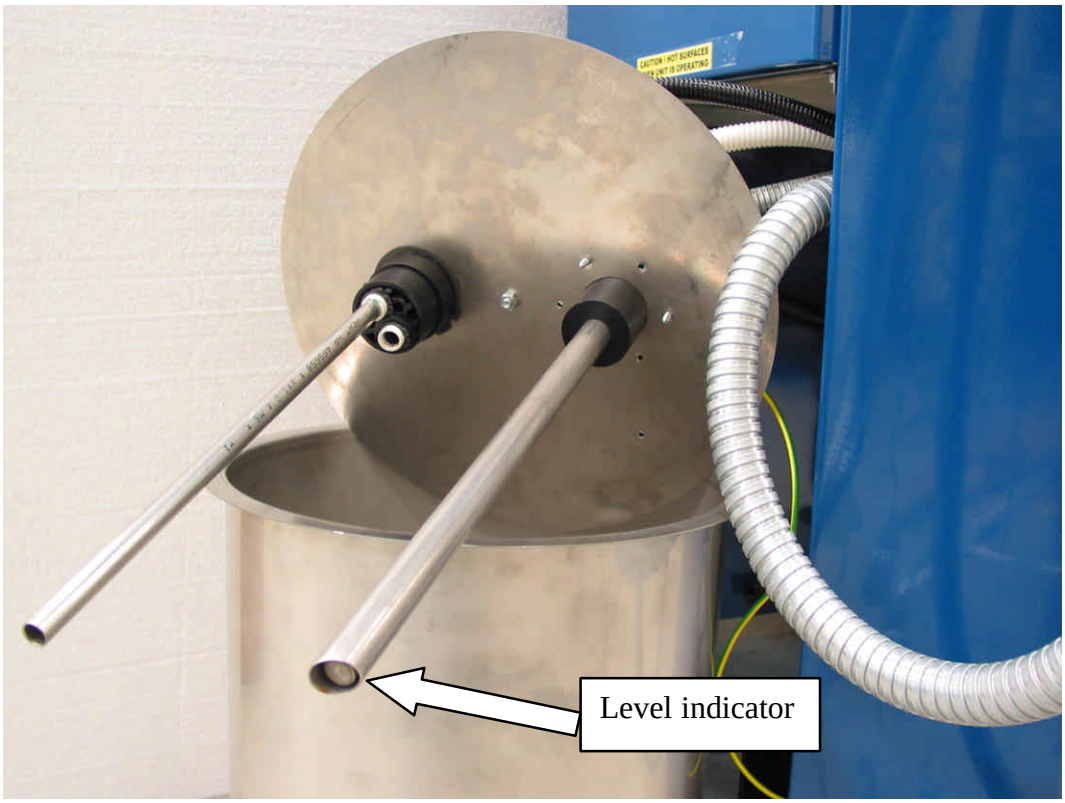
Picture 9

Picture 11: In case of distillate or condenser contamination



Picture 10

Picture 12: Cleaning the level indicator



Picture 11