

# PRECISION

EXTRACTION SOLUTIONS

By AGRIFY™



## Model HDU – Hydrocarbon Distillation Unit Operational Manual

**Congratulations on the purchase of your new Precision® Extraction's  
Hydrocarbon Distillation Unit (HDU)!**

You are well on your way to a better experience in professional extraction.

Please read and understand this operational manual thoroughly prior to using your new equipment. Also visit our YouTube channel for video tutorials on the HDU and other Precision® Extraction Solutions products. Remember, safety first!

If you need further assistance or for warranty information, please contact Precision® Extraction Solutions Technical Support directly at (855) 420-0020 ext. 2 or visit our client portal at [support.precisionextraction.com](https://support.precisionextraction.com).

## Table of Contents

<b>SAFETY FIRST!</b>	<b>4</b>
<b>SECTION 1 – PRODUCT OVERVIEW</b>	<b>5</b>
<b>SECTION 2 – GETTING STARTED</b>	<b>6</b>
<b>SECTION 3 – PRESSURE TESTING</b>	<b>7</b>
<b>SECTION 4 – PREPARING FOR OPERATION</b>	<b>8</b>
<b>SECTION 6 – CLEANING THE HDU</b>	<b>9</b>
<b>SECTION 8 – PERIODIC MAINTENANCE</b>	<b>10</b>
<b>APPENDIX A – FACILITY REQUIREMENTS</b>	<b>11</b>
<b>APPENDIX B – ASSEMBLY REQUIREMENTS</b>	<b>12</b>
<b>WARRANTY INFORMATION</b>	<b>12</b>

## Table of Figures

<b>FIGURE 1 – HDU FRONT VIEW</b>	<b>6</b>
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# SAFETY FIRST!

## SAVE THESE INSTRUCTIONS!

It is the owners' and operators' responsibility to read and understand the following safety information. This equipment is to be installed, operated, maintained, cleaned, and transported only by trained, qualified personnel. Follow these safety precautions to ensure the safety of persons and property. Failure to read and heed these instructions places operators, facility, and equipment at risk. Improper use could result in a serious accident. Print this section and display it where it can readily be seen by equipment operator(s).

**DANGER: FIRE AND EXPLOSION HAZARD: MISUSE OF THIS EQUIPMENT CAN RESULT IN PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.**

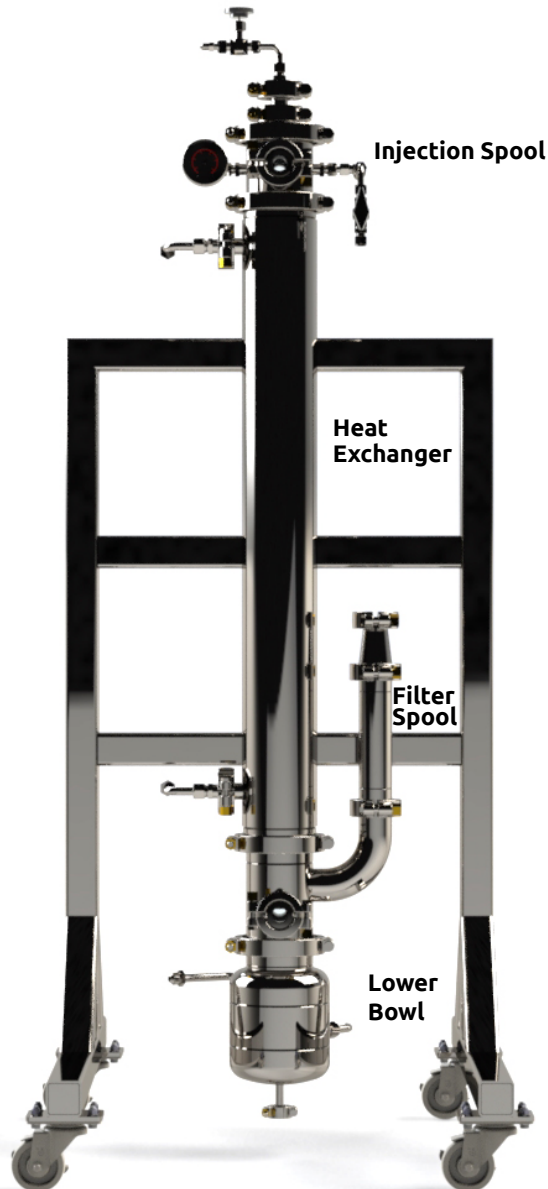
**NOTE: USE OF THIS EQUIPMENT CONSTITUTES USER AGREEMENT TO UTILIZE EQUIPMENT FOR LAWFUL PURPOSES ONLY. USER ASSUMES SOLE RESPONSIBILITY FOR SAFE USE, TRANSPORT, AND STORAGE OF EQUIPMENT. USER ASSUMES ALL RISK ASSOCIATED WITH EQUIPMENT USE.**

## WARNING!

- This equipment is intended for use with Liquefied Petroleum Gases (LP-GAS). Equipment is not equipped with an overfill prevention device. Overfilling vessels may cause a violent rupture, resulting in severe injury or death. Take care to ensure overfilling does not occur.
- Flammable gas under pressure – liquified petroleum gas (LP-GAS) can cause a fire or explosion if ignited. Keep all heat and ignition sources away from the hazardous classified area(s). Make sure all pressure gauges read 0 psig before removing any clamps and verify the system is open to the atmosphere (in case of faulty gauge).
- Avoid breathing LP-GAS vapors. Breathing in vapors may cause heart arrhythmia, loss of consciousness, or even cause suffocation. Exposure may irritate eyes, nose, throat, and skin. Please read the manufacturer's Material Safety Data Sheet for further safety information on LP-GAS and ethanol.
- Operate equipment ONLY in a facility with an approved, functional alarming solvent detector and ventilation/exhaust system sufficient to maintain the atmosphere below 25% of the solvent's lower flammability limit (LFL). Solvent vapors are heavier than air and can settle in low places. When at steady state (when no heating, cooling, or transferring is occurring), monitor pressures for any significant pressure drops. At steady state, a pressure-drop of 10 psig or greater may indicate a leak. Use a C1D1-rated or C1D2-rated (as applicable) handheld combustible gas detector less than 48 in off the ground to identify or confirm the presence of a leak.
- Do not make any unauthorized modifications to the equipment. Do not install replacement parts that have not been approved by Precision® Extraction. Modifications, unapproved components, or improper assembly may result in noncompliance, property damage, or serious injury/death.
- Wear appropriate personal protective equipment (PPE) including safety glasses and gloves during use. Avoid contacting solvent or inhaling solvent vapors. Read the solvent manufacturer's Safety Data Sheet (SDS) for further safety information. Print and retain the solvent manufacturer's SDS on site.
- Hoses may contain solvent under pressure. Contact with cold solvent may cause frostbite or other injuries. Use extreme caution and wear proper PPE when disconnecting any hose.
- Only allow trained personnel to operate or work on the equipment. This applies to all assembly and servicing work.
- Do NOT use or store equipment or containers where they could be exposed to high temperatures. DO NOT heat equipment or containers above 52°C (125°F).
- Ensure the system is properly grounded to reduce the risk of static build up.
- The facility must provide adequate ventilation/exhaust as determined by the Engineer of Record to maintain the local atmosphere below 25% of the Lower Flammability Limit (LFL).
- No air is present in the inert gas push.
- Use only approved solvents.

# Section 1 – Product Overview

Figure 1: HDU Front View



## Section 2 – Getting Started

Review the following system installation and operation requirements information before preparing for operation. Failure to do so may result in improper/unsafe installation and/or dangerous operating conditions.

### 2.1. System Placement

- 2.1.1. The HDU shall be placed on a level surface in a properly ventilated area that has been approved by your AHJ (Authority Having Jurisdiction).

### 2.2. Mounting of Components

**NOTE:** Process in/out hoses should be supplied by Precision. The hose and fitting set will be tailored to the end user’s extraction system. Precision Extraction is not responsible for poor performance of the system due to improper hosing.

- 2.2.1. Securely mount all vessels to the mounting rack.
- 2.2.2. Ensure all lock pins are in place for tanks.
- 2.2.3. Level all components.
- 2.2.4. Lock all castors on the mounting rack.

### 2.3. TCU Options

**NOTE:** Any TCU that is used in conjunction with the HDU must be NRTL listed and cannot use flammable chilling/heating media.

- 2.3.1. For hazardous environments (Class I, Division 1 and Class I, Division 2 locations) both a liquid heat source and a cooling source need to be plumbed into the hazardous area.
- 2.3.2. Confirm with Precision Extraction all TCU options that are present on site at the client facility, so a suitable option is used. A suitable TCU may also be sourced through Precision Extraction.

### 2.4. Solvent Requirements

- 2.4.1. Use only approved solvents. Approved solvents are displayed in the following table. Never mix solvents other than what is stated below. Thoroughly clean the system before changing solvents.

Approved Solvent(s)	Operating Process Flow
Butane	Compressed N2 Gas
Isobutane	
Propane	
Propane/Butane Blend	

## Section 3 – Pressure Testing

The HDU comes factory tested and inspected for sustained pressure holding capabilities. However, shipping and moving of the unit may cause pressure leaks and/or equipment exposure to drastic changes in temperature. It is the operator's responsibility to check for pressure leaks prior to operation.

### 3.1. Checking System for Leaks

- 3.1.1. Attach all the components and hose assemblies.
- 3.1.2. With all valves on the system open, bring the system pressure to 150 psig using a nitrogen cylinder.
- 3.1.3. Note the actual readings of the pressure gauge by taking a photo for later comparison.
- 3.1.4. Allow the system to sit under 150 psig for one hour if this is a primary test (first pressure test).
- 3.1.5. Take note of any difference in pressure. This indicates a leak, and that the system is unsafe to operate.

### 3.2. Identifying Leaks

- 3.2.1. Fill a spray bottle with soapy water. Spray the area of the unit where a leak is suspected. The presence of bubbles confirms a leak.
- 3.2.2. The most common areas for leaks are the tri-clamp gasket sealing joints.
  - 3.2.2.1. Before adjusting any pieces on the unit, vent the system down to 0 psig.

## Section 4 – Preparing and Operating the HDU

Prior to use, the operator must read and be familiar with the specific operation manual of the extraction equipment. The following procedure outlines the steps to prepare operate the HDU. Nitrogen gas may be required to transfer solvent between vessels. This section is meant to be the baseline information for the operator to develop their internal SOP.

- 4.1. Turn on all axillary ancillary equipment.
- 4.2. Fill filter spool with distillation matrix.
- 4.3. Connect DOT source tank to the HDU inlet and connect the HDU outlet to the extraction system.
- 4.4. Once the TCU has reached the desired temperature, open the outlet valve on the DOT cylinder to charge the hose with solvent.
- 4.5. Slowly open the needle valve, allowing the solvent to enter the HDU and the pressure to rise to 20 psig.
- 4.6. Close needle valve.
- 4.7. Begin solvent recovery.
- 4.8. Open valve into expansion column.
- 4.9. Open recovery valve into the solvent tank
- 4.10. Slowly open needle valve, allowing solvent to flow into the heat exchanger.
- 4.11. Monitor flow in top sight glass/bottom sight glass.
- 4.12. When bottom sight glass looks like rain, inlet valve is open too much.
- 4.13. Bottom sight glass should look misty with little drops of liquid falling.
- 4.14. Inlet valve can be opened as much as possible, in relation to what you see in the lower sight glass.
- 4.15. As the LP-Gas descends into the heat exchanger it will undergo a phase change from liquid to gas. Additionally, contaminants that were present in the feedstock will be deposited into the bottom bowl at the base of the heat exchanger.
- 4.16. As the gas passes through the filter column additional contaminants will be collected on the medium inside the filter column.
- 4.17. End the distillation once the desired amount of the solvent has been cleaned.
  - 4.17.1. If using a scale for the DOT tank, DOT valve can be shut when desired weight has been transferred out of the tank.
  - 4.17.2. If not using scale, use the sight glass on the solvent tank to indicate when to close the DOT valve.



## Section 5 – Cleaning the HDU

The system can be internally cleaned without any disassembly by following the standard operation procedure for this unit. Clean solvent being transferred through the system will clean the surfaces and deposit any contaminants into the bottom bowl. In the event of each component needing to be cleaned individually, adhere to the following protocols. Before disassembling any components on the HDU, ensure the system is completely vented of pressure/solvent. Additionally, ensure all TCUs are powered off before opening tanks to atmosphere in accordance with internal procedures.

**Note: When operating in a CGMP environment the operator must perform a cleaning validation in accordance with their internal procedures.**

### 5.1. Cleaning

- 5.1.1. Verify all solvent has been drained and open the vent valve to ensure the system is at atmospheric pressure.
- 5.1.2. Detach all hose connections.
- 5.1.3. Remove the clamps and spools one at a time.
- 5.1.4. Discard and replace the distillation medium from the filter column.
- 5.1.4. Remove the bottom bowl and, using a stainless-steel food grade cleaning agent, wipe and clean all surfaces of the bowl.
- 5.1.4. Using a stainless-steel food grade cleaning agent, wipe and clean all surfaces of the HDU spools.
- 5.1.4.1. Verify each tube of the heat exchanger is clean and clean as necessary.

**Note: Additional cleaning solutions may be used after proper evaluation.**

- 5.1.5. Using a food grade cleaning agent safe for use with the gasket material, wipe and clean the gaskets.
- 5.1.6. Allow all components to completely dry.

**Note: This process can be accelerated by reassembling and pulling vacuum.**

- 5.1.7. Install the clamps, spools, and bowl.
- 5.1.8. Reattach all hose connections.

## Section 6 – Periodic Maintenance

Periodic maintenance is essential to the safe and proper operation of your equipment. Contact Precision® Extraction Solutions directly for replacement components. Obtaining replacement components from a third party voids your warranty and invalidates the engineering peer review of the equipment.

Use ONLY approved, food-safe cleaners, solvents, and sanitizers. Conduct the cleaning activities in an area with adequate ventilation or under an explosion-proof fume hood.

The wear on the individual machine components varies greatly depending on the amount of usage in a timeframe. Always replace worn components immediately. It is EXTREMELY IMPORTANT to inspect all nuts, bolts, and gaskets before every use of the system. If there is any question as to the integrity of any given component, replace it immediately.

Actions	Frequency
Inspect all seals, nuts, bolts, and gaskets. If damaged, replace.	Before every use
Inspect sanitary clamp bolts/nuts.	Every use or at first visible sign of wear
Inspect gaskets for visible signs of wear. Retighten if necessary.	Every use or at first visible sign of wear
Perform a complete system cleaning.	Monthly
Ensure pressure relief valves perform as intended. Replace as needed.	Monthly
Inspect the ball valves. Replace as needed.	Annually
Inspect the quick connects. Replace if damaged.	Annually
Inspect the sight glass for signs of damage or wear. Replace as needed.	Periodically
Clean the surface of the sight glass using a standard commercial cleaner and a soft cloth.	Periodically
Inspect the high-pressure clamp. Ensure the two segments have a gap between them and the inside diameter is not touching the outside diameter if the hub.	Periodically
Check the clamp locking nuts are tight to prevent the nuts from loosening.	Periodically
Visually check the pressure gauge display and function for damage at regular intervals in line with the operating conditions and ambient conditions.	Periodically
Clean the pressure gauge with a non-aggressive cleaning agent. Close the ventilation valve in accordance with the protection category of the device.	Periodically

# Appendix A - Facility Requirements

The system can be internally cleaned without any disassembly by following the standard operation procedure for this unit. Clean solvent being transferred through the system will clean the surfaces and deposit any contaminants into the bottom bowl. In the event of each component needing to be cleaned individually, adhere to the following protocols. Before disassembling any components on the HDU, ensure the system is completely vented of pressure/solvent. Additionally, ensure all TCUs are powered off before opening tanks to atmosphere in accordance with internal procedures.

The local Authority Having Jurisdiction (AHJ) must approve installation of this equipment. The AHJ will determine the facility requirements for operation of extractors.

## 8.1. Minimum Requirements

- 8.1.1. Use adequate ventilation/exhaust determined by the Engineer of Record to maintain the local atmosphere below 25% of the Lower Flammability Limit (LFL) for solvent.
- 8.1.2. Design exhaust systems in accordance with the International Mechanical Code and shall be ON whenever LP-GAS is stored or used in the extraction area.
- 8.1.3. Locate supplementary equipment within another room.
- 8.1.4. Use a hydrocarbon meter that alarms at or below 25% of the LFL in the extraction area. Install the detector 12 - 18 inches from the floor level to detect heavy hydrocarbon gases. A qualified individual should install and calibrate the detector to the appropriate solvent of use at least annually.
- 8.1.5. Open the collection bowl or collection pot to remove the product within a fume hood or in an area that provides adequate ventilation/exhaust to maintain the local atmosphere below 25% of the LFL as determined by the Engineer of Record.

## 8.2. OSHA Standards in the Workplace

- 8.2.1. If using this system in a workplace setting, be aware that it is the responsibility of the employer to furnish a workplace which is free from recognized hazards that cause or likely to cause death or serious physical harm to employees.
- 8.2.2. Review Occupational Health and Safety Administration (OSHA) standards for site-specific applicability prior to the operation of this system include (but not be limited to):
  - 8.2.2.1. 40 CFR § 1910.22 – General requirements for housekeeping and aisles/passageways
  - 8.2.2.2. 40 CFR § 1910.38-39 – Emergency Action and Fire Prevention Plans
  - 8.2.2.3. 40 CFR § 1910.101 – General requirements for the use of compressed gases
  - 8.2.2.4. 40 CFR § 1910.110 – Storage and handling of Liquefied Petroleum Gases (LP-GAS)
  - 8.2.2.5. 40 CFR § 1910.132-138 – Personal Protective Equipment (PPE)
  - 8.2.2.6. 40 CFR § 1910.144-145 – Specifications for marking physical hazards and accident prevention signs and tags
  - 8.2.2.7. 40 CFR § 1910.147 – Control of hazardous energy (lockout/tag out)
  - 8.2.2.8. 40 CFR § 1910.151 – Medical services and first aid
  - 8.2.2.9. 40 CFR § 1910.157 – Portable fire extinguishers
  - 8.2.2.10. 40 CFR § 1910.1000 – Control of occupational exposure to air contaminants (e.g. solvents)
  - 8.2.2.11. 40 CFR § 1910.1200 – Hazard communication

# Appendix B - Assembly Requirements

To ensure the sanitary clamps and gaskets are properly sealed, the bolts/nuts must be properly torqued. Always torque sanitary clamps to the material manufacturer’s specifications listed below. Never overtighten.

Clamp Size	Part Number	Manufacturer Torque Spec.
0.5" HP	CL-13MHP-0.5	Nuts to 20 foot-pounds
1" HP	CL-13MHP-1.0	Nuts to 20 foot-pounds
2" HP	CL-13MHP-2.0	Nuts to 20 foot-pounds
4" HP	CL-13MHP-4.0	Nuts to 20 foot-pounds
6" HP	CL-13MHP-6.0	Nuts to 20 foot-pounds

## WARRANTY INFORMATION

For any further assistance or for warranty information, please contact Precision® Extraction Solutions Technical Support directly at (855) 420-0020 ext. 2 or visit our client portal at [support.precisionextraction.com](http://support.precisionextraction.com).