ISOPur™
Fluid Technologies, Inc.

I-800

Fluid Purification Unit

Operator's Manual

ISOPUR FLUID TECHNOLOGIES, INC.

I-800 Operator's Manual

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ISOPur Fluid Technologies, Inc. reserves the right to change this document without notice.

70 Inwood Road • Rocky Hill, CT 06067
Phone 860.571.8590 • Fax 860.571.8815
www.isopurfluid.com

CE Mark

Foreword

Thank you for choosing ISOPur Fluid Technologies, Inc. to solve your oil purification issues. ISOPur has been purifying oil and removing particles of less than 0.1 micron for over 7 years with astounding success.

The I-800 is one of the most advanced, non-conducting fluid purification systems available. This system employs a basic mechanical filter enhanced by an electronic purification system to cleanse the fluid and the entire lubricant path of virtually all particulate 0.1 microns or larger in size.

This manual encompasses all of the information and procedures necessary for installation, start-up, operation, maintenance, and safety requirements for the I-800 Series Fluid Purification Unit. System descriptions, component nomenclature, and special procedures are included together with drawings and specifications. Should there be any inconsistencies in this printed version, please refer to the CD provided.

Safety is a paramount concern at ISOPur. The I-800 conforms to the Essential Health and Safety Requirements of the Industrial Machinery Directive (IMD-98/37/EC) and with the Low Voltage Directive (LVD-73/23/EEC) as amended.

Please note the following before uncrating, installation, and start-up:

- The **control box** contains a high voltage source.
- Only a trained ISOPur Technician is allowed to open the control box. Should an unauthorized individual access the control box, the warranty may be void.
- All power circuits must be locked and tagged out.
- Call the ISOPur Fluid Technologies, Inc. Customer Service Department at 860.571.8590

High voltages are identified as follows:

This is the international warning sign for the existence of high voltage power in the electronics enclosure. The enclosure should never be opened or otherwise penetrated for any reason.

15000

This, in combination with above indicates the maximum possible voltage within the enclosure.

Please review the complete Safety section prior to installation and start-up. ISOPur strives to make our systems as self-sufficient and reliable as possible. Proper attention to the procedures and maintenance practice of this manual should provide many years of successful oil purification. Feedback and suggestions are always welcome. Also contact us by way of our website: www.isopurfluid.com.

Safety

The I-800 conforms to the Essential Health and Safety Requirements of the Industrial Machinery Directive (IMD-98/37/EC) and with the Low Voltage Directive (LVD-73/23/EEC) as amended. The ISOPur 800 is intended for use as ultra fine particulate removal filtration equipment for non-conducting fluids. This is accomplished by employing mechanical filtration and Balanced Charge Purification processing to promote the growth of sub-micron particles.

The process of electrode charging of the two (2) separate fluid paths involves voltages of up to 15,000 volts. While the current is severely limited; these electric charges are to be respected. **All warning labels, signs, instructions, and safety devices should be strictly observed and should never be disabled for any reason**.

Warning Electrical Shock Hazard

The following precautions must be followed without exception. The interlocks are there as a secondary safety issue. The Control Box for the ISOPur Unit covered in this manual contains a high voltage source, which can be hazardous.

No probing, adjustments, connections, disconnection of other mechanical, electrical, or electronic operations are to be carried out in this control box. Understand fully there are no serviceable components inside this unit. High voltages are identified as follows:

This is the international warning sign for the existence of high voltage power in the electronics enclosure. The enclosure should never be opened or otherwise penetrated for any reason.

15000

This, in combination with above indicates the maximum possible voltage within the enclosure.

The cover of the control box acts as a protective shield to the electrical components and should only be opened by a trained ISOPur Fluid Technologies technician.

The green light
Indicates normal operating conditions and should be lit whenever there is power applied and the unit is in operation.

The yellow light
Indicates abnormal operation or a malfunction of the element indicated. See the Fault Indications chart for further explanation of each light.

The pre-filter cartridge and the collection element are to be handled and disposed of in accordance with the requirements of local regulatory codes and statutes that pertain to the fluids being processed. The procedures found in the maintenance section of this manual must also be adhered to.

Unit Dismantling and Disposal

In any circumstances wherein the unit is required to be dismantled and/or disposed of, the following instructions are suggested. However, the ultimate dismantling and disposal shall be as per the regulatory and statute requirements of the local, national, and international authorities. Isolate the unit from the reservoir/sump by closing the supply and discharge valves. Drain fluid form unit and piping, dispose of fluid as per the regulatory and statute requirements. Vent canisters and remove the filters and collection media. The machine supply and discharge lines should be sealed and capped and the canisters closed up. Then the machine should be disposed of as per the local, national, and international requirements.

Heat Protection

In cases where the fluid being processed would heat the vessels, piping, and associated equipment to a temperature that would cause severe burns, a heat shield shall be installed to protect personnel from direct contact. It shall be the responsibility of the purchaser to inform ISOPur Fluid Technologies, Inc. of any fluid temperature hazard.

SAFETY NOTES:
Prior to any installation, remove all plastic caps and plugs.
Ensure filters are installed prior to operating.
Never touch high voltage lead with power on.
This unit has no serviceable parts.
This manual is only provided in English.

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1 Introduction

The I-800 Fluid Purification System is one of the most advanced non-conducting fluid purification systems available. This system employs a basic mechanical filter enhanced by an electronic purification system to cleanse the non-conducting fluid and the entire lubricant path of virtually all particulate 0.1 microns or larger in size.

1.1 Fluid Flow

The patented ISOPur Fluid Technologies, Inc. process introduces a controlled current into the fluid media, which charges the contaminated particles producing enhanced positive and negative charged particles. These charged particles are then mixed within the charging/mixing vessel. During this mixing, the oppositely charged particles combine to form larger particles which are then captured in the proprietary collection element. The balanced agglomeration then proceeds through the fluid system combining with other contaminate and are removed during the subsequent passes through the I-800 Unit. In this manner, the I-800 Fluid Purification System not only cleans the contaminated fluid but after numerous passes through the fluid path, it also cleans the reservoir, piping, and all associated elements of that system.

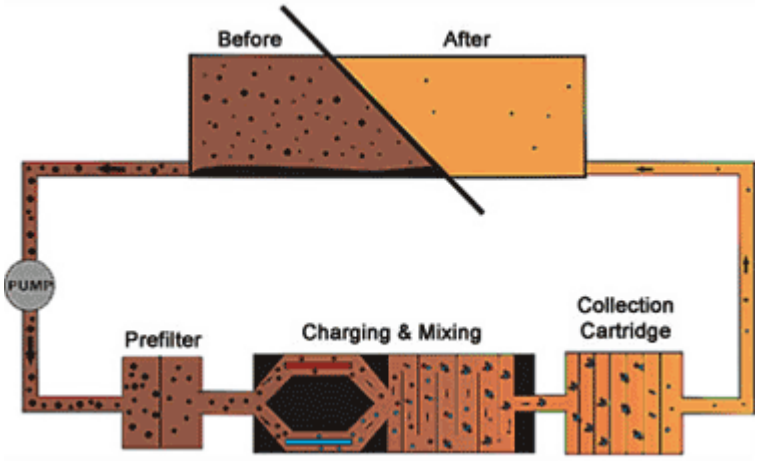


Figure 1: Balanced Charge Purification (BCP)

The I-800 Fluid Purification System configuration is shown in the Component Identification and electrically in the Wiring Diagram. The fluid purification process is explained in the following steps:

1. Incoming fluid enters unit suction valve (see 4 in the Component Identification).

2. The fluid passes into the WYE strainer (see 5 in the Component Identification). This strainer removes the larger particles and debris from the flow.

3. The fluid suction pressure is in the steady state indicated on the suction inlet pressure gage in inches of mercury (in of Hg) vacuum.

4. Then the fluid enters the suction side of the Positive Displacement Pump (see 1 in the Component Identification) (self priming) and is discharged at a positive pressure (P_1) (varying with fluid viscosity and temperature) into the supply piping for the first (1st) stage pre-filter vessel.

5. Dependent upon the fluid viscosity and temperature, if the inlet pressure (indicated by gage P_1) is about 77 PSIG [5.3 BAR gage] or greater, the relief valve lifts and the fluid passes through the bypass tubing to the discharge side of the unit. This returns the fluid back to the reservoir. If the fluid pressure does not cause the relief valve to open, the fluid enters the 1st stage vessel.

6. The fluid then passes through the 1st stage vessel where it is split into two paths.

7. The fluid is then passed through the charging cell in the 2nd stage charging/mixing vessel.

8. The electrically enhanced ultra-fine particles continue to pass through the collection media in the 3rd stage vessel (see 15 in Component Identification). After the fluid passes through the collection cartridge, it re-enters the reservoir via the unit discharge (see 27 in Component Identification) where it continues the scouring process. This scouring occurs anywhere the ultra-charged product comes in contact with deposits of contaminants and particles within the system. The particles are attracted to each other while in the system and become larger, thus permitting capture in the 1st stage filter (see 9 in Component Identification) and the collection media during subsequent passes through the I-800.

1.2 Electrical System Overview

The diagrams of the electrical system can be found in Electrical Schematics in Appendix B. It is designed to:

- Control the pump and liquid circulation
- Control the charging currents to the particulates in the oil
- Provide safety by limiting hydraulic pressure within the unit pump to safe levels

The system components include:

- Control enclosure: houses control electronics
- Pump pressure switch: Switch to limit pump pressure
- Motor: AC motor to drive the pump

Contained within the control enclosure:

- AC inlet fitting: power cord
- Power ON/OFF switch
- Chassis sub-plate: Mounting plate for other components and system ground
- Charging power supply: Creates and controls charging current
- 12V DC and 24V DC supply: Provides power for charging, external sensors and computer
- Computer: Provides functional logic for system
- Motor starter: Provides control of power to motor
- Motor overload relay: Senses motor current and independently shuts down motor.

The conduits referenced throughout the manual:

- AC inlet conduit: Main power cable
- Motor conduit: Control to motor
- Pump pressure switch conduit: Control to pump pressure switch
- Charging conduit: Control to charging/mixing vessel

1.3 PLC LCD Options

The LCD will display the following:

- Time of day
- Operating parameters – fluid temperature, pressure and flow
- Alarms
- Maintenance alerts
- History examination

The standard power-up message is customizable to the user's company name after completion of startup. The Admin level of the end-user has the following additional functions available:

- Setup/Change passwords for Admin and User levels
- Diagnostic level 1 operation
    - Bypass operation
    - Motor test level 1
- Standard message setup

1.4 Specifications

	US	**International**
Fluid:	Non-conducting	Non-conducting
Max. fluid viscosity:	200 cSt	200 cSt
Max. fluid temperature:	200°F	93°C
Normal fluid pressure:	12-70 PSIG	0.7-4.5 Bars
Dimensions:	70in H x 54in W x 24in D	178cm H x 137cm W x 61cm D
Filter change clearance:	24in above top of unit	61 cm
Weight dry:	800 lbs	364 kg
Operating temperature:	65°F to 200°F	27°C to 93°C
Operating flow rate:	600 gallons/hour to 1200 gallons per hour	2271 liters/hour to 4540 liters/hour
Pump	ISOPur Fluid Technologies	
Electric Motor		
RPM:	1725/1800	1440/1100
H.P.	Various	Various
Voltage:	115/480	230/400
Amperage:	18/6	8/5
Phase:	1, 3	1/3
Cycle:	60HZ	50HZ
1st stage pre-filter:	ISOPur Fluid Technologies	
Collection element	ISOPur Fluid Technologies	
Maximum altitude:	10,000 feet	3,100 meters
Fluid flash point:	Greater than 140°F	65°C
Ambient humidity:	30% to 95%	

1.5 Component Identification

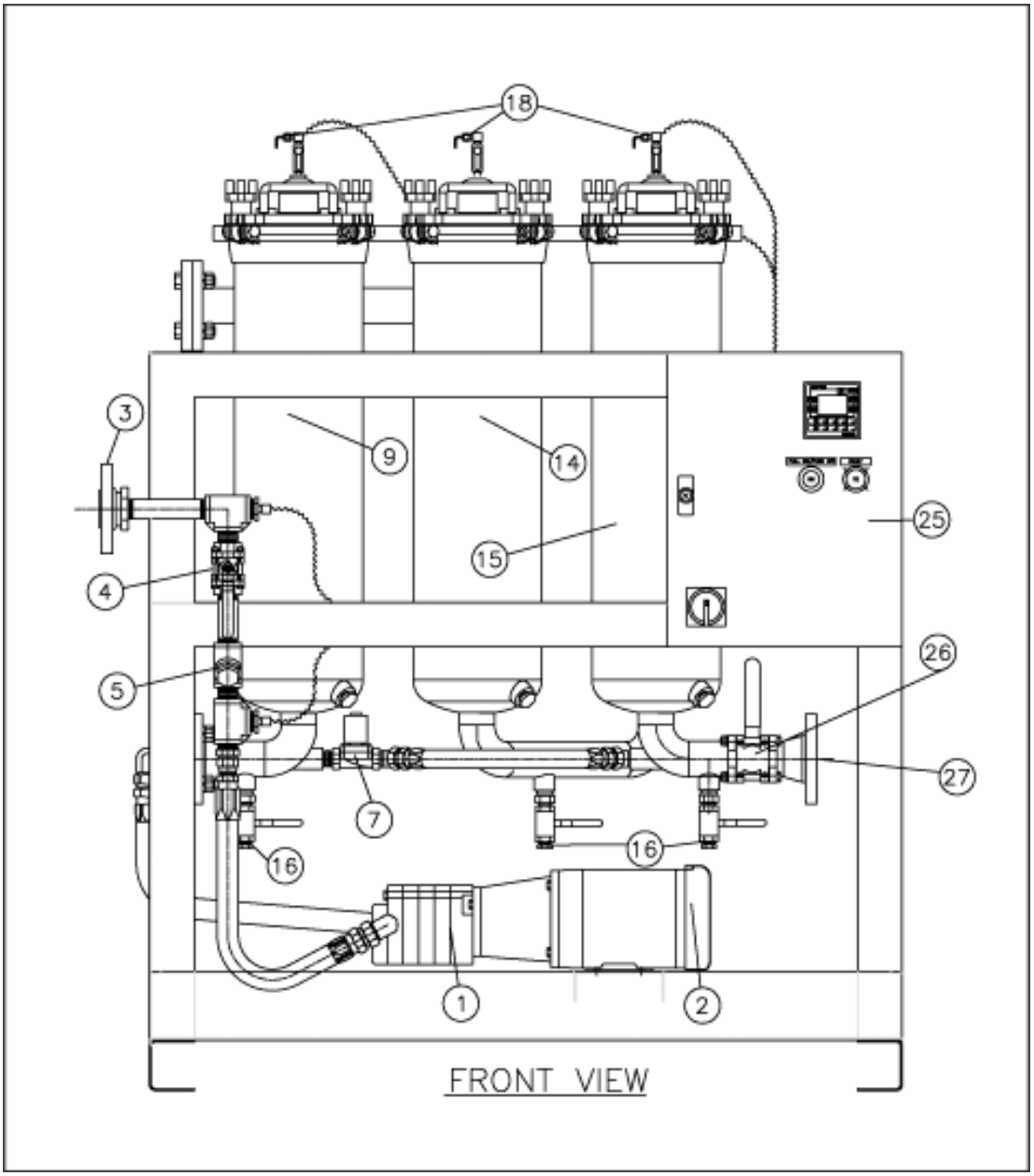


Figure 2: I-800 Component Drawing

1.6 Component Legend

No.	Description	Size	Material	QTY
1	Pos. Disp. Pump	-	Carbon Steel	1
2	Motor, Exp. proof	-	-	1
3	Inlet	2" 150# flange	ST.ST. 304	1
4	Inlet Valve	1" NPT	ST.ST. 304	1
5	Y Strainer	1" NPT	ST.ST. 304	1
7	By-pass Solenoid Valve	¾" normally closed	Brass	1
9	Pre-filter Vessel	8"øx 32" cylinder	ST.ST. 304	1
14	Charging/Mixing Vessel	8"øx 32" cylinder	ST.ST. 304	1
15	Collection Vessel	8"øx 32" cylinder	ST.ST. 304	1
16	Vessel Drain Valve	½" NPT	ST.ST. 304	5
18	Air Vent Valve	¼" NPT	ST.ST. 304	6
25	Control Panel	20" x 16" x 8"	-	1
26	Outlet Valve	2" Butt welded	ST.ST. 304	
27	Outlet	2" 150# flange	ST.ST. 304	

2 Installation

The ISOPur Fluid Technologies, Inc. I-800 Series is shipped fully assembled and tested. The unit is attached to a disposable pallet. All connections and gauge wells are capped and plugged for protection and cleanliness. Every precaution has been taken in packaging and crating the unit, however, a thorough receipt inspection should be made to insure no inadvertent damage has occurred during transport. The unit, as shipped, is in a condition adequate for short-term, indoor and protected storage.

Prior to installation, the unit should be uncrated and left attached to the pallet for ease of handling. The unit requires a volumetric footprint for installation, maintenance, and cartridge changes as follows.

Height: 70 in (178 cm)
Width: 54 in (137 cm)
Depth: 24 in (61 cm)
Clearance for filter changes: 24 in from top of system (61 cm)

2.1 Location

The unit should be located in close proximity to the fluid reservoir which it serves (nominally 25 ft [7.6 m] or less). The unit suction pump should be slightly above the fluid level in the reservoir such that under no circumstances can the fluid be drained from the reservoir into the unit. The suction on the reservoir should be at the lowest point possible to insure the best system performance in fluid and system purification. The discharge back into the reservoir should be at the highest and most remote point from the suction that is possible. This assures good circulation and maximum benefit from the cascading rainfall effect of the returning balanced charged fluid.

Once the location has been chosen, the foundation should be fabricated to align with the mounting holes of the unit so that the I-800 is level and plumb (see Mounting Dimensions in Appendix A). All piping should be installed, flushed, and tested for leaks and then connected to the suction and discharge of the unit.

The approved type (by the appropriate classification society/regulatory body) of electrical wiring and connection to the local motor control center should be made. All checks for safety and proper connection, motor rotation, grounding, and polarity shall be made by persons qualified to perform such electrical installations. All connections are made and tested on the unit with the following exceptions:

- Connection required to the available power source (see Appendix B for the appropriate Wiring Guide):
  - 100 volts, 1-phase 60 hertz **or**
  - 220 volts
  - 230 volts, 1-phase 60 hertz **or**
  - 400 volts, 3-phase 60 hertz
- Connection for remote sensing or sensors and contact closures for motor and pump operation and/or pressure switches. These have been designed and incorporated to provide the commercially standard outputs for remote monitoring and indication systems (i.e. PDI or Rolls Royce Marine Systems).

These connections should be made by personnel familiar with the monitoring and/or status system used at a given facility. This may require an additional software change to that system to provide the required information throughout the facility. In some cases, a failure mode, effects analysis, and demonstration may be required by the classification society/regulatory body.

For the location and type of signal/connection, see the Wiring Guide in Appendix B.

NOTE: In the event that the I-800 Series **cannot** be located within 25 ft (7.6 m), the following pipe sizing is recommended with minimum additional hydraulic losses.

Inlet/suction
Up to 75 ft (22.9 m) from the reservoir:
- Use 2 in (5.08 cm) pipe size schedule 40 ABS 4/13.2 ASTM A53 Type S or E Grade A or equivalent.

Up to 150 ft (45.8 m) from reservoir:
- Use 2.5 in (6.35 cm) pipe with the specifications noted above.

Outlet/discharger
With anti-siphon system at return to the reservoir with pipe size and distances as above.

2.2 Step-by-Step Install

To aid in installation and startup, a checklist is provided. This checklist is not all encompassing. Good engineering practices should always be followed.

1. Uncrate the I-800 Unit and inspect for condition and parts.
2. Remove all plastic caps from the unit
3. Position the unit of the foundation and bolt down on resilient mounts (supplied by purchaser) in accordance with acceptable normal practices.
4. Open vessels with the exception of the charging and mixing vessel (see 14 Component Identification). This vessel should only be opened by trained personnel.
5. In the first vessel insert a pre-filter cartridge.
6. Insert an ISOPur Fluid collection element into the collection media vessel.
7. Make the connections between the fluid reservoir and the inlet (see 3 in Component Identification) of the I-800 unit and then connect the outlet (see 27 in Component Identification) and the reservoir. Insure that all valves on the inlet and discharge side of the I-800 unit are closed.
8. Close each vessel with due regard to the "O" rings and swing the castellated hold down nuts into place. Tighten each of these 12 nuts to 13.6 – 20.3 Joules of torque.
9. Insure that a qualified electrician makes the proper electrical connections.
10. Inspect control box with the switch in the OFF position. An electrician should check for continuity up to the switch for the proper voltage and connects.
11. Clean unit and area of any fluids.
12. On three phase motors, check rotation before unit is placed in full operation.

2.3 Operation Check List - Installation

It is recommended to keep track of the following data log at the unit.
This information is static data taken at initial installation and unlikely to change thereafter.

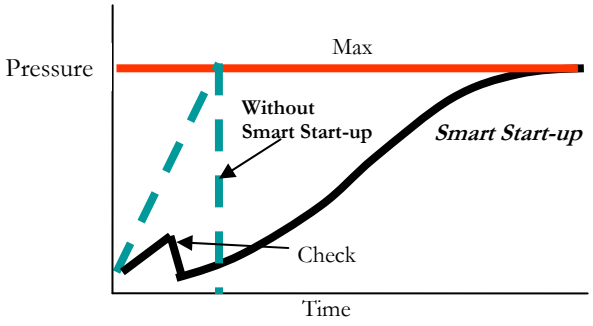
Item	Data	Comments	
ISOPur Model #	I-800	Date installed	
Serial #			
Voltage	110/220/380/400/480		
Phase	3/1		
Breaker rating/number	15A/		
Frequency	50/60		
Design Flow Rate	X GPM		
Motor Serial #			
Pump Serial #/ Rated flow			
Piping run from inlet to tank	feet	Size	Schedule
Piping run from outlet to tank	feet	Size	Schedule
Pre-filter #		Date last change	
Collection Element #		Date last change	
Fluid Type			
Fluid Manufacturer			
Fluid Brand name			
Manufacturer			
Brand name			

3 Operation

3.1 Smart SoftStart

As a direct result of the I-800's variable flow design, it is capable of operation over an increased range of fluid viscosities and temperatures. It also incorporates several new automation features to help with installation and maintenance of the unit.

Figure 3: Smart Start-up



ISOPur Fluid Technologies has incorporated a **Smart SoftStart** technology to remove the pressure of startup at high viscosities. This technology smoothly controls the flow rate as it reaches the Design Flow Rate. While the steady increase in flow is being controlled, the unit also monitors the attendant buildup of pressure. Should the pressure go beyond the maximum (user adjustable), the unit will automatically suspend the ramp up and run at the reduced flow rate to keep the pressure under control.

Once at a safe operating condition, the unit constantly monitors fluid pressure. Should the pressure ever climb above the specified maximum, the unit will automatically adapt to the rising pressure by reducing the flow rate until the pressure is within safe limits. This operation continues as long as the unit is powered up and running. When the flow has to be reduced to 50% of the targeted flow rate, an alarm is set, causing the yellow light to steady. At 25% of the targeted flow rate, the unit will shut down and await operator intervention.

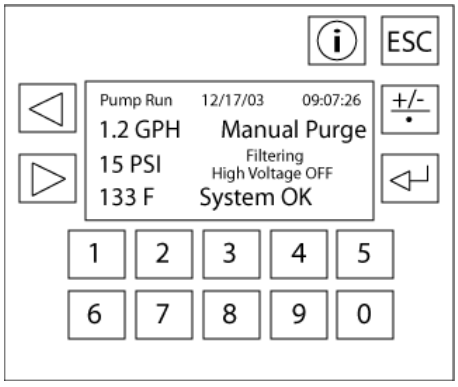
A password controlled option allows the unit to automatically return to a cleaning operation upon restoration of power after an outage. The Return to Cleaning undergoes the same safety precautions as the original start to ensure all parameters are within safe bounds. The unit will automatically sense high pressure excursions, and shut down accordingly.

3.2 Initial Start-up Procedure

The following procedure should be performed prior to the initial startup.

1. Ensure all drain valves are closed.
2. Ensure that electrical power is energized to the unit and that all wiring connections, conduit integrity, and ground fault detectors are functioning.
3. Check for mechanical integrity, conduit connections, latching hardware, security of all switches, door and circuit breakers.
4. Examine the power cable entry and insure that all connections are secure. The functions of the Electrical Control Box are to control or monitor:
   - Electrical power voltage
   - Pump pressure
   - Fluid flow rate
   - Fluid temperature
   - High Voltage
   - Normal and abnormal (off design or malfunction) indications on the control box front panel
5. Insure that all valves from the target fluid reservoir to the unit, inlet valve, outlet valve, and all valves returning the fluid to the reservoir are open.
6. Ensure both air vents on top of the vessels are closed.
7. Turn the main power switch to the ON position.

Figure 4: Control display screen



8. Begin filling the system and purging the air from the canisters by using the MANUAL MODE.
    8a. MANUAL MODE is entered by pulling the GREEN knob located under the control display screen and HOLDING it out for 7-10 seconds until the pump begins to run.
    8b. Place a container under the pre-filter air vent located on top of the canister. Purge the air from the canister by gradually opening the air vent valve on top of the pre-filter canister, allowing air to release. When air stops and fluid begins to escape, close the vent valve.
    8c. Continue to purge the air from the other canister by monitoring the air being expelled from the vents. A flow indication should begin to register on the PLC screen as the unit begins to flood.
9. When air stops exiting the vents and there is a steady flow indication on the PLC screen, the operator can stop MANUAL MODE by depressing the GREEN knob.
10. All pressure readings from the inlet pressure gage should be recorded in the operation log.

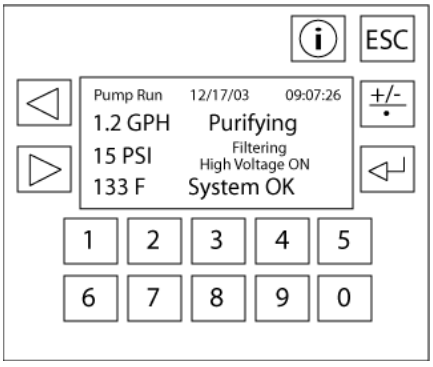
The default condition prior to start is with the main power switch in the OFF position and the proper input voltage connected from a 20 ampere or greater dedicated circuit breaker at the installing facility. This breaker is provided by the customer. *Only qualified electrical maintenance personnel should make the connections.*

3.3 Routine Start-up Procedure

With the I-800 Unit purged of air it is ready for normal operation. The start-up procedure is as follows.

1. Insure that the inlet, outlet and any other system valves to and from the target reservoir are OPEN.
2. Ensure that all drain valves and air vent valves are CLOSED.
3. Turn the main power switch (S1) to the ON position.
4. PULL and RELEASE the GREEN knob, which will initiate the fluid flow sequence. Observe that the GREEN control power light is flashing. Observe the pump/motor for correct rotation.
5. The starting sequence will first cause fluid to flow from the reservoir to the pump with the solenoid valve energized to bypass the filters. Once the control box has determined the fluid to be of the correct operating temperature, it will shut down the unit and close the solenoid valve. After a brief pause, it will then slowly ramp up pressure on the filters and attempt to reach the target flow rate.
6. During this part of the cycle, "Purging" will be displayed. This operation could take several minutes depending on fluid temperature and flow rate. The GREEN knob will be flashing during this time.
7. Observe fluid flowing through the flow meter, and the reading on the control display screen. Rotation of the flow wheel should be relatively constant with no jerky motion.
8. The unit is now functioning **without** the ISOPur electronic charging mixing activated.

Figure 5: High Voltage activated



NOTE: High viscosity fluids will normally produce higher pressures at the same flow rate as lower viscosity fluids.

9. When the target flow has been achieved for a period of 30 seconds, the control display will indicate the readiness to activate the ISOPur purification by showing "Press 1 for HV". At this time, the operator may press "1" on the front of the control display and the I-800 will be fully operational. Immediately upon this action, the GREEN knob will go ON constant and the control display screen will change to "Press 2 to turn HV OFF."

NOTE: Should the unit encounter an operating pressure greater than the maximum allowed during its start-up, it will suspend ramping towards the

design flow rate and settle out at an "Off Design" flow rate that is within the pressure limits. It will signify this by flashing the YELLOW indicator light and displaying the messages "High pressure" and "Ramping Down".

10. Record initial steady state pressure readings for all gages after the first hour of operation.
11. After first operational cycle, return warranty inspection, and receipt control documents to the manufacturer.

3.4 Post Start-up Procedure

The following procedure should be performed after the **first hour of operation**. It is suggested that all results be recorded in the start-up log.

1. Record the initial pressure readings for all gauges.
2. Return warranty, inspection, and receipt control documents to the manufacturer.

3.5 Shut Down Procedure

The following procedures should be followed for normal I-800 Series shut down for filter changing or other forms of maintenance.

1. Take readings of all pressures and record in the machine log.
2. Press "2" on the PLC screen to turn the High Voltage OFF.
3. Press the GREEN button IN to switch OFF the unit.
4. Turn RED on/off switch to OFF.
5. Close the inlet valve to the reservoir
6. Observe the pressure gauges go to zero.
7. Close the unit outlet valve. Secure all other valves in the system to and from the target fluid reservoir.
8. Check the control box, electric motor, and pump for overheating. Also check motor/pump shaft for freedom of rotation and smooth rotation.
9. Check the unit for any signs of leakage and/or abnormalities and report them.

Any abnormal operation, which causes the pump to shut down, will shut down the entire system. See Routine Maintenance for shut down instructions involving cleaning the wye strainer, pre-filter cartridge, and/or the collection media.

3.6 Operation Check List - Ongoing

Dynamic data that could vary at each reading is also recommended for capture in a portion of the log. When recorded as part of a regularly scheduled maintenance activity, these parameters enable maintenance personnel to track the replacement of filter media (i.e. how often and how the fluid quality is being maintained).

Such data can provide the basis for a consumable resource plan and also synchronize maintenance scheduling with machine outage or downtime based on the tracking of the consumption of filter media.

>14/>6/>4	Fluid Temp	P1	P2	P3	Comments

Figure 6: Operation check list – Ongoing

4 Maintenance

Certain parts of the I-800 unit will require maintenance. Maintenance items fall into three categories; routine, periodic, and as required. Not adhering to the maintenance procedures could result in a void of the manufacturer's warranty.

Keep the enclosure cover closed at all times, except during maintenance by a trained ISOPur Fluid technician.

Because the I-800 technology is capable of cleaning and purifying the fluid to a condition better than new, there is the possibility of leaks occurring because the fluid has become *too* clean. Therefore, continuous spot checks for leaks should be made as the system functions.

The front panel contains two (2) sequence initiator switches and five (5) indicator lights listed below.

- Control power membrane switch: Provides protection for control circuit
- Control-on indicator: Provides indication of system power-on and control circuit breaker on
- Pump-on indicator: Provides indication of electrical power connection to motor
- HI voltage membrane switch: Turns on/off high voltage electrodes
- HI voltage-on indicator: Provides indication of electrical power connection to high voltage electrodes
- Over pressure indicator: Notes that the power to the pump and motor (see 1 and 2 in Component Identification) has been shut off due to high pressure (exceeding the switch pressure setting (default is 75 PSI)
- Motor overload indicator: Indicates motor shut off by excessive motor current due to overload or failure

4.1 Routine Maintenance

When the unit has run for two (2) hours:

- Record both the pump pressure gauge reading and the charging/mixing gauge reading for reference. The filter cartridge should be changed whenever the pump pressure exceeds the charging/mixing pressure by 15 PSIG (1.0 BAR - under normal temperature, viscosity, and flow).
- Record the collection pressure gauge and outlet pressure gauge readings for reference. The collection element requires change when the collection pressure gauge reading is approx. 10 PSIG (0.68 BAR) higher than the outlet pressure reading. The collection element must be changed in accordance with the filter cartridge change.

4.2 Changing Filter Cartridge

1. Proceed with normal shutdown sequence as outline in the Shut Down Procedure.
2. Determine which elements need to be cleaned and/or changed. This can be accomplished by the normal state pressure gauge differentials at the normal operating temperature of the fluid. If either of the filter or collection media needs changing, the wye strainer should also be cleaned.
3. Insure that the individual vessels have reached ambient pressure. At this point, the air vent valve on all vessels should be opened to insure that the fluid is at ambient pressure.
4. Open the drain valve and drain one (1) quart (0.5 liter) from each vessel whose element is to be changed. Drains are located at the base of each vessel (see 16 in Component Identification) and at the inlet wye strainer plug. These drains are intended for use in servicing any one vessel or to drain the system completely. The drain pan has sufficient capacity to contain the entire charge of fluid. A separate container should be used to catch the liquid from the drain pan.
5. After removing the amount of fluid from the vessel, close the drain valves and evenly loosen castellated nuts to the point of finger tight.
6. Open the vessel and remove the element to be changed, placing it in a container to drain the remaining fluid. Dispose of the spent cartridges in accordance with the requirements of the regulatory codes and statutes respecting the fluids processed.
7. Insert a new element into the vessel and examine that vessel's "O" rings for damage. If damaged or distorted, replace with a new "O" ring. Use some of the draining fluid to lubricate and hold the new "O" ring in place.

8. Close the vessel(s) with regard to the "O" rings. Tighten the castellated nuts and tighten the "O" rings to the required 13.6-20.4 Joules of torque.

4.21 Pressure Indications

The **wye strainer** filter will need cleaning if the inlet suction gage exceeds approximately 25 in of HG (63.5 cm of HG).

The **1st stage filter** (pre-filter) will require changing if the 1st stage inlet pressure gauge (marked P_1 on the machine) minus the 1st stage outlet pressure (marked P_2 on the machine) reading is around or greater than 15 PSIG (1.0 BAR).

The **3th stage filter** (collection cartridge) pressure is indicated by the collection cartridge differential pressure gage. The collection cartridge should be changed when the differential pressure gage reading is approximately 0.69 BAR.

4.3 Wye Strainer Cleaning

Good engineering practice suggests that if the vessel elements should need replacing, the wye strainer element should also be cleaned. Use the following steps to clean the strainer:

1. Insure the isolation valves are all closed.
2. Place a 32 oz (1 liter) container under the strainer drain plug.
3. Remove the strainer drain plug and allow the fluid to drain. Wipe clean.
4. Remove the debris from the screen at a solvent cleaning station.
5. Reassemble, replace and tighten. Open the isolation valves and check for leaks. The unit is ready for restart.

4.4 Periodic Maintenance

The following maintenance procedures should take place quarterly, annually, and every 2 years.

4.41 Quarterly

- Check all piping and valves for possible leaks
- Record the exact location of leakage and repair
- Change the filter cartridge – if not changed within the last three (3) months

4.42 Annually

- Change the collection element if not changed within the last six (6) months
- Clean the inlet wye strainer element
- Change the coalescer cartridges if not changed in the last 12 months.
- Every two (2) years - replace air vents (see 18 on the Component Identification)

4.5 As Required Maintenance

- Ball valve leaking - Replace seals
- Pressure gauge not responding – Replace
- Air cannot be heard coming form air vents on start up - Replace offending vent
- Motor hot – First check pump pressure (under 35 PSIG [2.41 BAR] normal). Clean fan and shroud on motor. Check electrical line voltage and current. Check motor start and disconnect switch.
- Noise from pump – Check strainer gauge (under 10in. Hg. [25.4 cm] is normal). Check for leaks. Replace pump or replace gears.
- Oil leaking around pump shaft – Replace seal
- Control enclosure hot – Determine source of heat and call ISOPur representative.

4.6 Abnormal Conditions

Abnormal conditions, such as high pressures, will shut down the system. These include:

- High oil viscosity
- Clogged filters or collection elements
- Line blockage
- Outlet valves closed or restricted
- Electrical malfunction

4.7 Fault Indicators

Indicator	Color	Condition	Action Required
Control power on	Off	Power switch OFF	None
	Off	Abnormal breaker trips	Contact ISOPur - Do not operate
	Green	Power switch ON and breaker on	None
Pump on	Off	Power switch OFF	None
	Off	Power switch ON and breaker off	None
	Green	Power switch ON and breaker on	None
	Off	Abnormal yellow fault light on	???
	Off	Abnormal power and control lights are on	Contact ISOPur - Do not operate
Overpressure	Off	Normal	None
	Yellow	Abnormal trips if pump pressure > 44 PSI	-Check outlet valves/lines and valves returning to take -Check valves out of position - that would create high fluid pressure
	Yellow	Abnormal for multiple trips	Contact ISOPur – possible block in line. Repair condition and restart
Motor Overload	Off	Normal	None
	Yellow	Pump pressure may be too high	-Check outlet valves/lines and valves returning to take -Check valves out of position - that would create high fluid pressure
	Yellow	In/outlet lines may be blocked	-Check pressure relief bypass hose connection -Check in/outlet valves, lines and strainer for blockage
	Yellow	Fluid viscosity may be too high	Check specs

5 Warranty

This ISOPur Fluid Technologies, Inc. product is warranted against defective components and workmanship for a period of one year. Remedies are limited to repair or replacement of defective components. This warranty is the sole warranty provided by the company and supercedes all other warranties, expressed or implied, unless specifically given in writing by the company.

Appendix A

A1 Mechanical Diagrams

A2 Recommended Connections

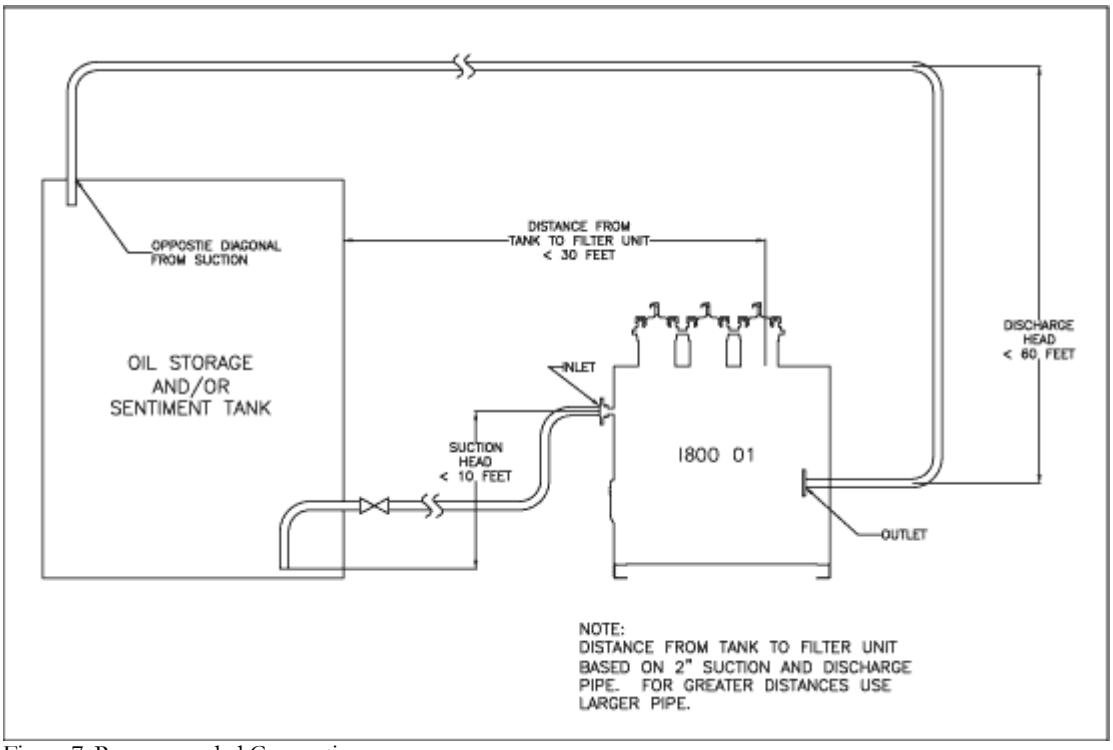


Figure 7: Recommended Connections

A3 Mounting Dimensions

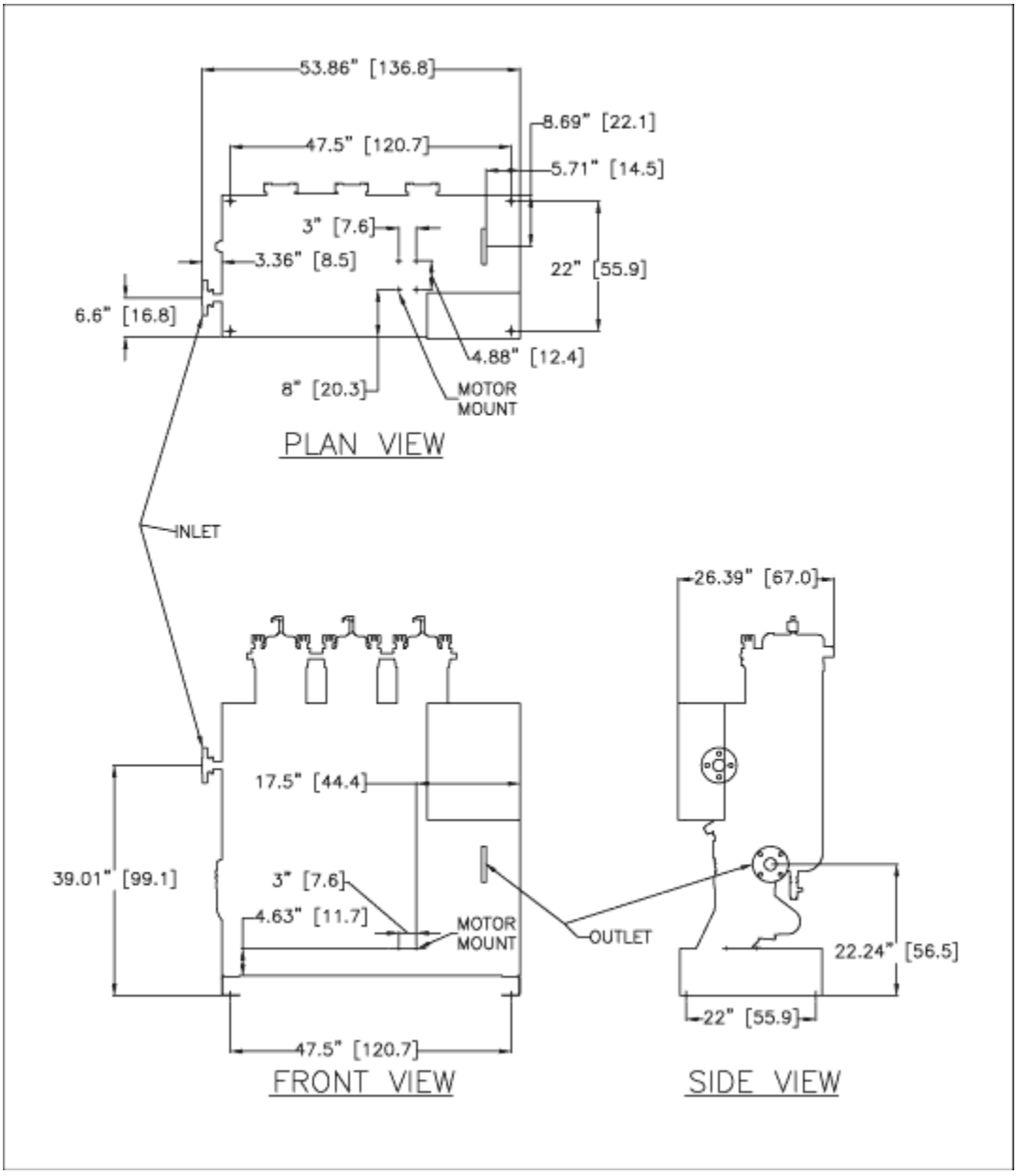


Figure 8: Mounting Dimensions and Fit-up

Appendix B

B1 Electrical Diagrams

B2 Process Schematic

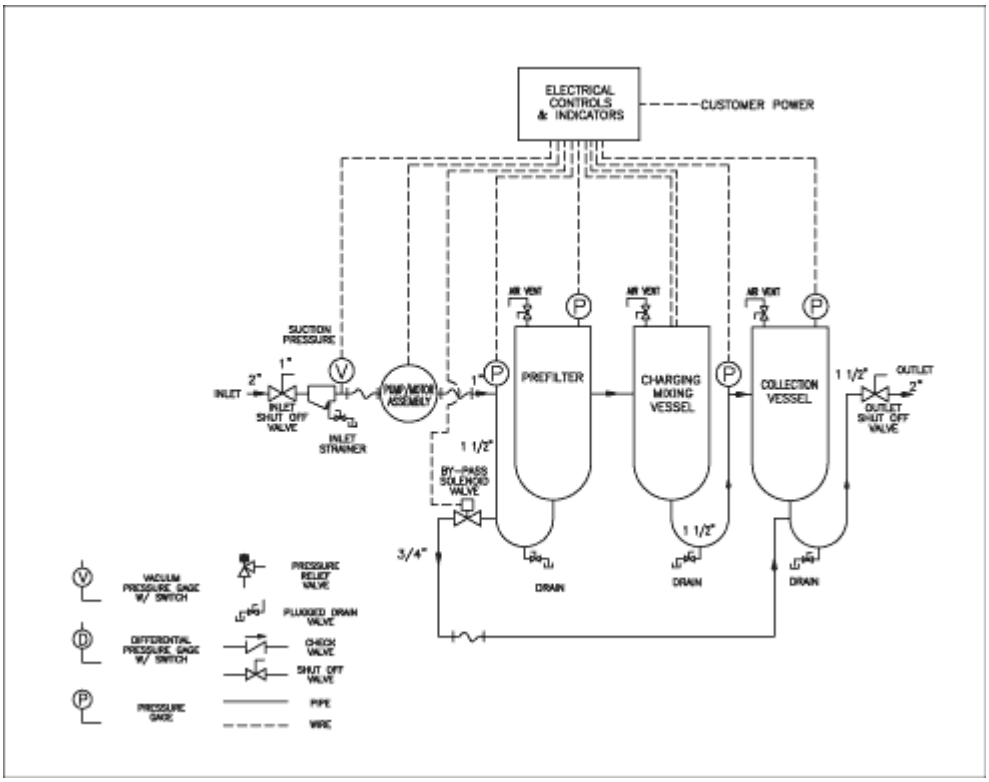


Figure 9: I-800 Process Schematic

B3 PLC 120v Wiring

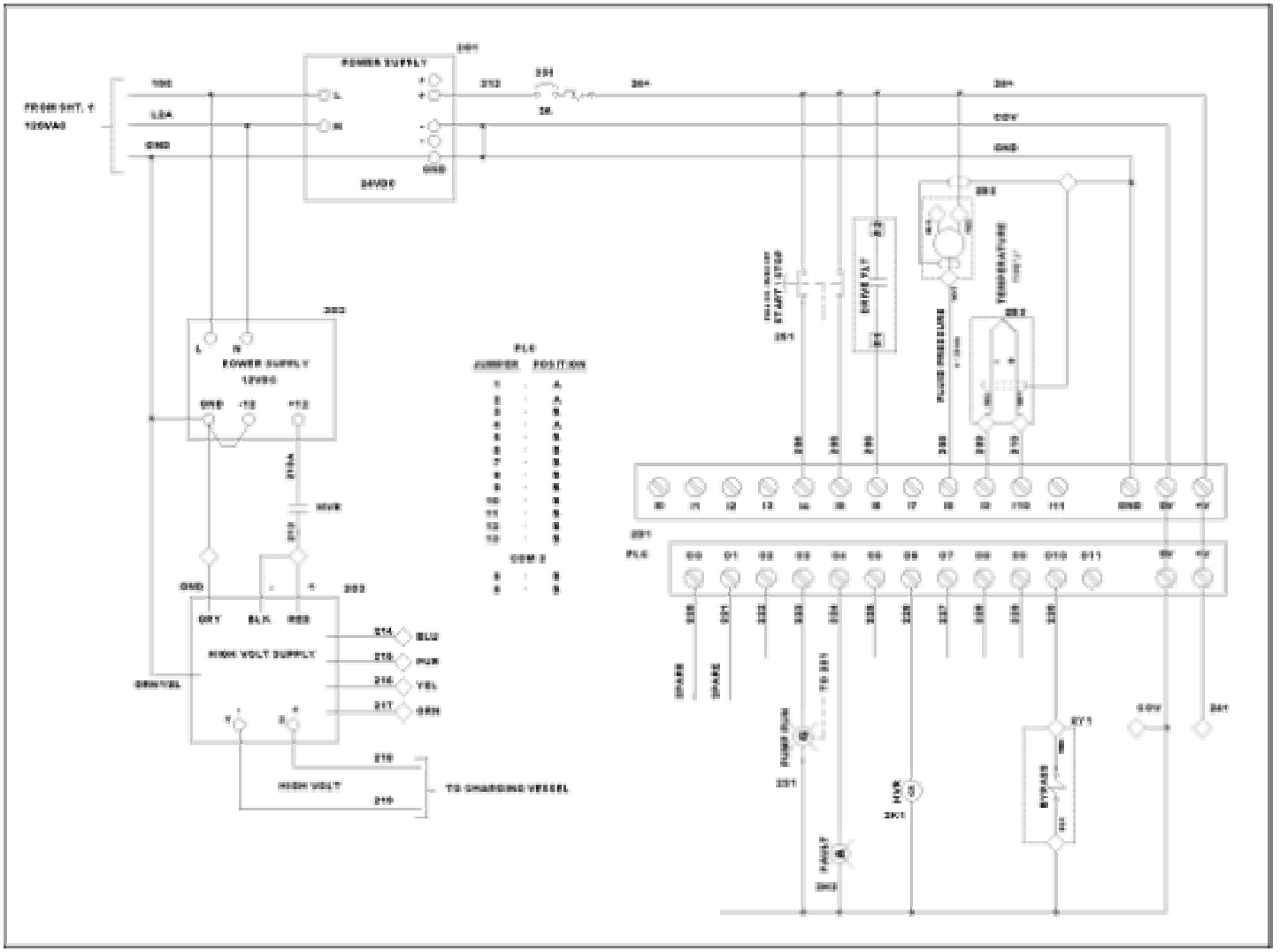


Figure 10: PLC 120v Wiring Diagram

B4 120v, 50/60Hz, 1 Phase

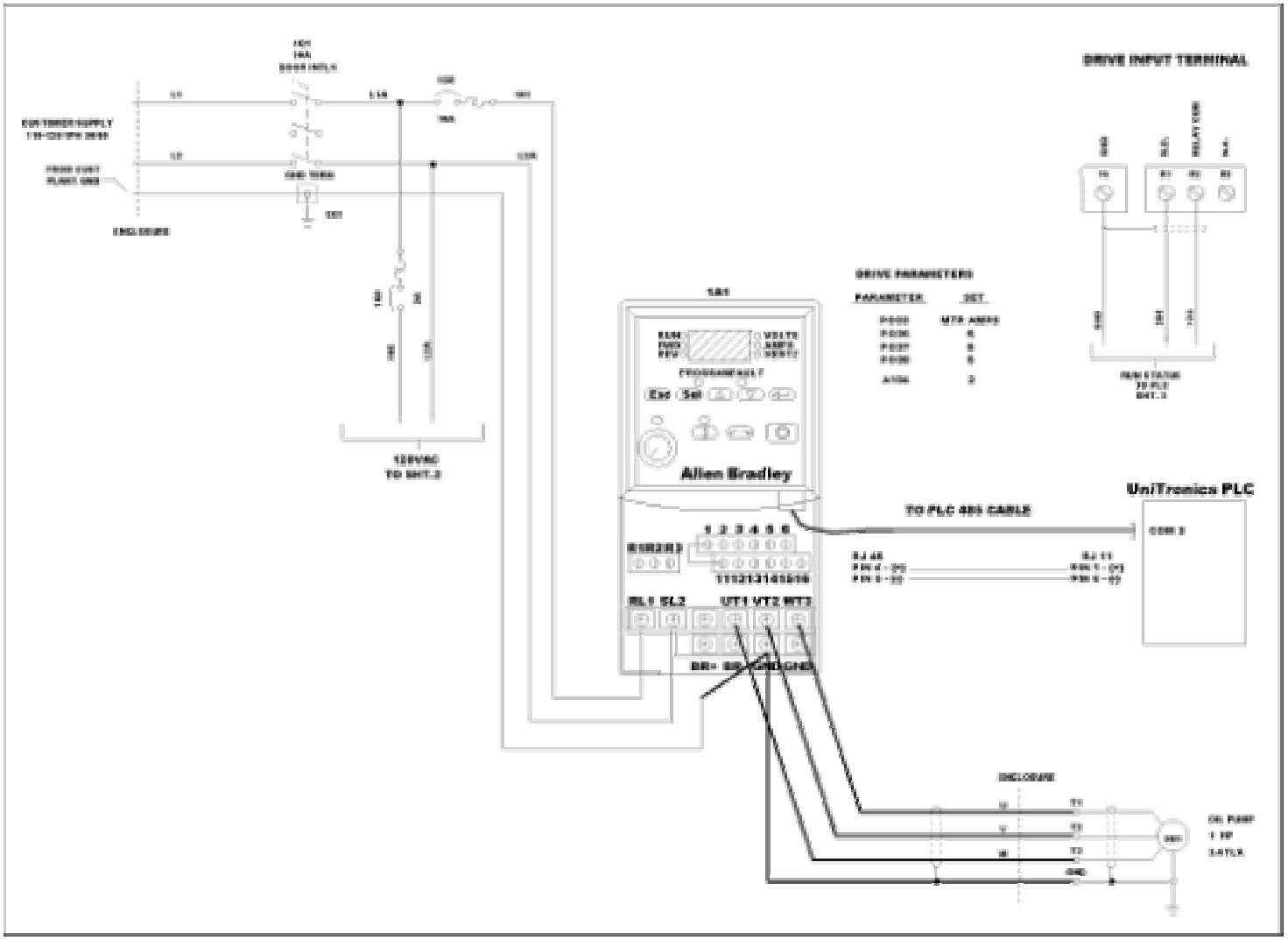


Figure 11 120v Schematic

B5 230v, 50/60Hz, 1 Phase Schematic

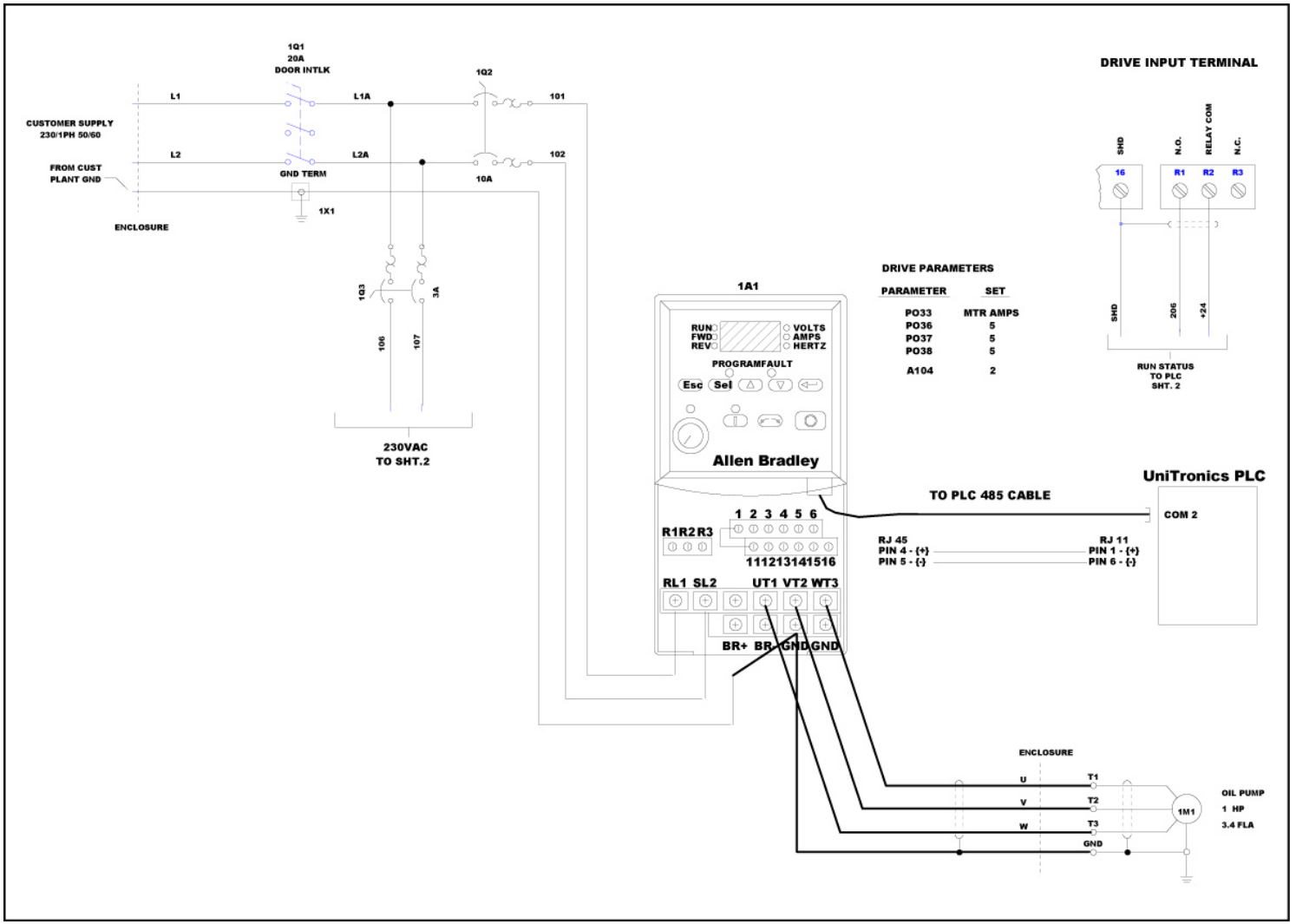


Figure 12: 230v Schematic

B6 460v, 50/60Hz, 1 Phase Schematic

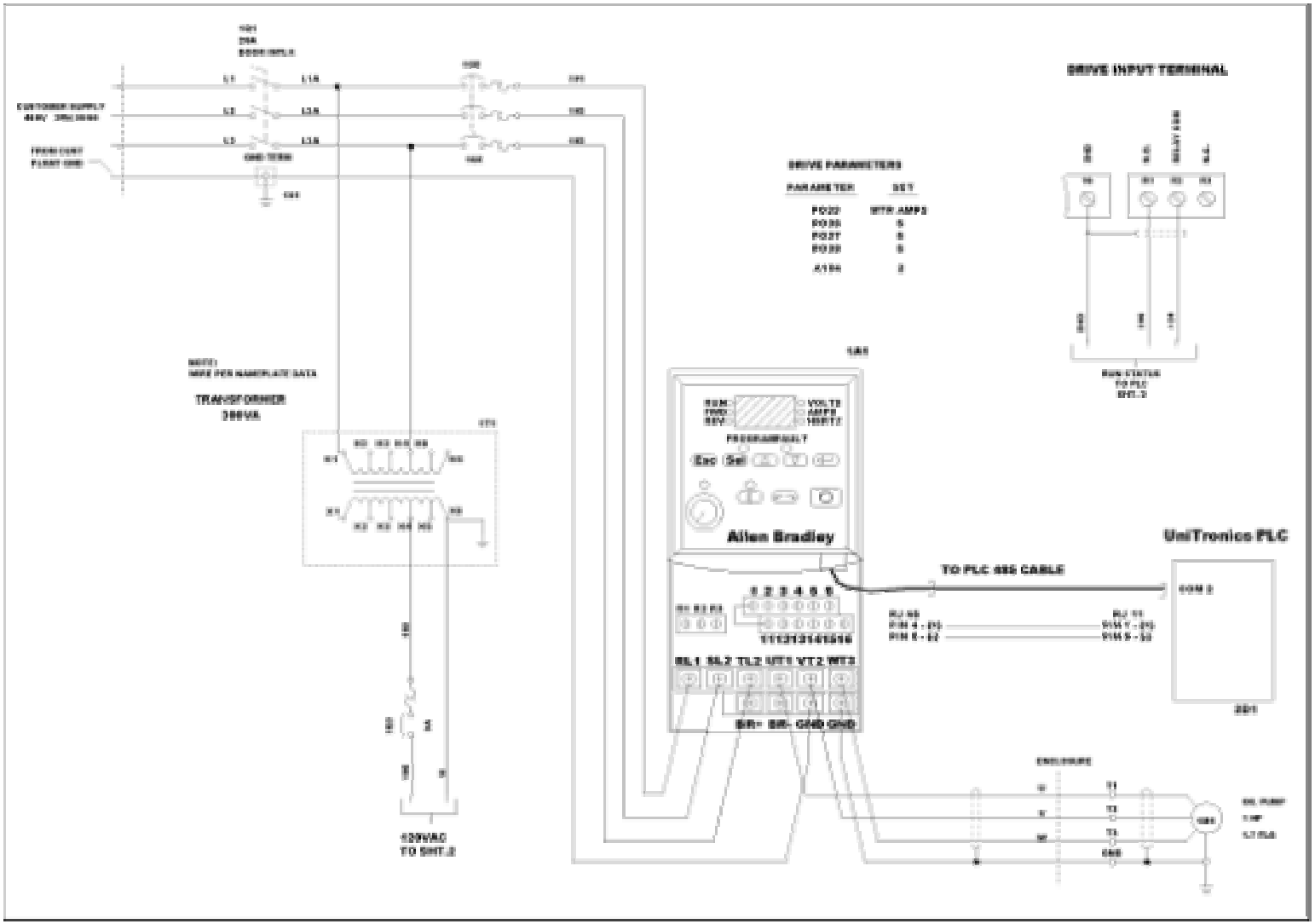


Figure 13 460v Schematic

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