

SOLVENT RECYCLER **SR 480V**



- Warranty
- Safety
- Operation

- Service Parts
- Accessory Information
- Registration Form

INSTRUCTION MANUAL & PARTS

2014-06-13

TABLE OF CONTENTS**PAGE**

ISTPURE LIMITED WARRANTY	5
1 - SAFETY	6
1.2 DANGER AND WARNING LABELS	6
1 - SAFETY (CONT'D)	7
1.3 GENERAL SAFETY RULES	7
1.4 PERSONAL SAFETY	7
1.5 UNIT USE AND CARE	7
1.6 SAFETY RULES	8
1.6 SAFETY RULES (CONT'D)	9
2 - GENERAL	10
2.1 INTRODUCTION	10
2.2 BRIEF DESCRIPTION	10
2.3 SITE LOCATION	11
2.4 ABBREVIATIONS	11
2.5 INSTRUMENT IDENTIFICATION	11
3 - INSTALLATION	12
3.1 GENERAL	12
3.2 RIGGING INSTRUCTIONS	12
3.3 SECURING	12
3.4 ELECTRICAL	12
3.5 PROCESS PIPING	13
PERSONNEL SAFETY PRECAUTIONS	16
3.11 ADEQUATE VENTILATION	16
3.12 INSTRUMENT DETAILS :	16
3.13 SOLENOID & ACTUATED VALVES	17
3.14 FLOW TRANSMITTER	17

TABLE OF CONTENTS (CONT'D)

	PAGE
3.21 LEVEL SWITCH.....	20
3.22 PRESSURE RELIEF VALVE	20
3.23 STRAINER.....	20
FLAMMABLE SOLVENTS	21
FLAMMABLE SOLVENTS (VACUUM SYSTEM REQUIRED)	21
NON - FLAMMABLE CHLORINATED SOLVENTS (VACUUM SYSTEM REQUIRED)	22
FLAMMABLE SOLVENTS (VACUUM SYSTEM REQUIRED) CONT'D	22
4 - PRINCIPLE OF OPERATION	23
4.1 DESCRIPTION	23
4.2 OPERATING RECOMMENDATIONS	23
4.3 ESTABLISHING SOLVENT DRYING TEMPERATURES	24
4.4 OPERATION & CONTROL DESCRIPTION.....	24
4.5 OPERATION SEQUENCE	24
START UP	25
5A - START UP CHECK-LIST	25
5.1 CHECK LIST	25
5.2 MOTOR ROTATION	25
5B - DAILY START UP INSPECTION CHECK-LIST	26
5.3 CHECKLIST.....	26
6 - AUTOMATIC CONTROL FEATURES.....	27
6.1 OPERATION & CONTROL DESCRIPTION	27
6.1.1 - ISTPURE FEED ROUTINE	27
6.1.2 - ISTPURE RECIRCULATION ROUTINE	27
6.1.3 - ISTPURE FEED TEMPERATURE CONTROL ROUTINE.....	27
6.1.4 - ISTPURE VACUUM ROUTINE	27
6.1.5 - ISTPURE DISTILLATE TRANSFER ROUTINE	28

TABLE OF CONTENTS (END)

	PAGE
6.1.6 - ISTPURE BOTTOM DISCHARGE ROUTINE	28
6.1.7 OTHER FEATURES	28
6.1.8 OPERATION STOP PROCEDURE:	28
6.2 - HMI SCREENS:.....	29
6.2.1 - OVERVIEW	29
OVERVIEW SCREEN DESCRIPTION :	30
6.2.2 SET POINTS:	31
6.2.3 PID POPUP :.....	32
6.2.4 - ALARM HISTORY :.....	34
6.2.6 - PUMPS POPUP :	35
6.2.7 - VALVE POPUP :	36
7 - FAULT MESSAGES & TROUBLESHOOTING.....	37
7.1 - TROUBLESHOOTING FAULTS CHECKLIST	37
7.1 - TROUBLESHOOTING FAULTS CHECKLIST (CONT'D)	38
7.1 - TROUBLESHOOTING FAULTS CHECKLIST (CONT'D)	39
7.2 - ADDITIONAL TROUBLE SHOOTING	39
7.2 - ADDITIONAL TROUBLE SHOOTING (CONT'D)	40
8.1 SAFETY FEATURES.....	40
8 - SAFETIES	40
8.2 HAZARDS & WARNINGS.....	41
9.1 - MONTHLY INSPECTIONS INCLUDE	42
9 - MAINTENANCE.....	42
10 - WARRANTY	42
11 - GUARANTEES	43
12 - WARRANTY INFORMATION / TECHNICAL ASSISTANCE.....	43

ISTPURE LIMITED WARRANTY

Istpure warrants all equipment led in this manual which is manufactured by Istpure and bearing its name, to be free from defects in material and workmanship on the date of sale by an authorized Istpure distributor to the original purchaser for use. Notwithstanding any special, extended or limited warranty published by Istpure will, for a period of TWELVE (12) months from the date of sale, repair or replace any part of the equipment determined by Istpure to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Istpure's written rECOMmendations.

This warranty does not cover, and Istpure shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non- Istpure component parts. Nor shall Istpure be liable for malfunction, damage or wear caused by the incompatibility with Istpure equipment with structures, accessories, equipment or materials not supplied by Istpure, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Istpure.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Istpure distributor for verification of the claimed defect. If the claimed defect is verified, Istpure will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser, transportation prepaid. If the inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Istpure's sole obligation and the buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought forward within one (1) year of the date of sale.

Istpure MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY Istpure. These items sold, but not manufactured by Istpure (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Istpure will provide the purchaser with reasonable assistance in making any claim for breach of these warranties.

LIMITATION OF LIABILITY

In no event will Istpure be liable for indirect, incidental, special or consequential damages resulting from Istpure supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Istpure, or otherwise.

Report all accidents or "near misses" which involve Istpure products to :
- Technical Assistance

The following items are not covered under the Istpure warranty policy :
- Parts or chassis replacement due to normal wears.

Report all accidents or negligence involving Istpure products to our Service Department :

1 800 361-1185

1 - SAFETY

1.1 GENERAL SAFETY

1. Carefully inspect the shipping crate for any signs of transport damage. The damage to the crate often indicates possibility of transport damage to the equipment inside.
2. Carefully remove your Istpure Solvent Recycler from the shipping crate.
3. Check your equipment immediately to ensure that it is free of transport damage. Report any transport damage to the carrier without delay for possible claim procedures. Istpure Industry inc. is not responsible for damage to equipment after it leaves our warehouse.
4. Check the equipment list and compare it with the parts you have received. If any parts are missing, contact the supplier you purchased the equipment from.

Before operating the Istpure Solvent Recycler, read this Instruction Manual completely. All Istpure products are engineered and manufactured to the highest performance standards and have been subjected to detail testing before shipment from the factory.

1.2 DANGER AND WARNING LABELS



1. Presence of flammable vapors and solvents
2. No smoking or metal grinding nearby
3. Keep away from open flames
4. Wear breathing mask
5. Observe warnings at all times.
6. Read the Instruction Manual carefully.
7. Wear solvent-proof rubber gloves.
8. Wear protective eyewear before use.

1 - SAFETY (CONT'D)**WARNING**

« **READ ALL INSTRUCTIONS** » Failure to follow the **SAFETY RULES** identified by a **BULLET (•)** symbol listed **BELOW** and other safety precautions may result in serious personal injury.
« **SAVE THESE INSTRUCTIONS** »

1.3 GENERAL SAFETY RULES

- **KEEP WORK AREA CLEAN.**
- **KEEP CHILDREN AWAY.** Do not let visitors come in contact with the equipment. All visitors should be kept away from the work area.

1.4 PERSONAL SAFETY

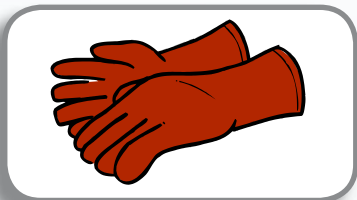
- **DRESS PROPERLY.** Do not wear loose clothing or jewelry. They can be caught in the moving parts. Wear protective hair covering to contain long hair.
- **USE SAFETY EQUIPMENT. WEAR SAFETY GOGGLES** or glasses with side shields.
- **STAY ALERT. USE YOUR COMMON SENSE.** Concentrate on what you are doing. Do not operate the unit when you are tired or under the influence of drugs or alcohols.
- **DO NOT OVERREACH.** Keep proper footing and balance at all times.

1.5 UNIT USE AND CARE

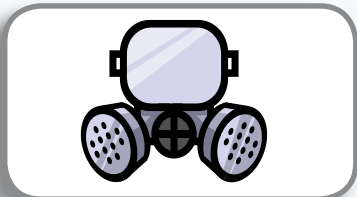
- **DO NOT FORCE THE UNIT.** It will perform better and safer at the rate for which it was designed.
- **THE USE OF ANY OTHER ACCESSORIES** not specified in this manual may create a hazard.
- **CLOSE THE MAIN AIR SUPPLY VALVE AND MAIN POWER DISCONNECT BEFORE SERVICING** or when not in use.
- **DO NOT ALTER OR MISUSE THE UNIT.** These units are precision built. Any alteration or modification not specified is misuse and may result in a dangerous situation.

Only trained repairmen should attempt (•) **ALL REPAIRS**, electrical or mechanical. Contact the nearest Istpure a repair service facility. Use only Istpure replacement parts, any other parts may create a hazard.

1.6 SAFETY RULES

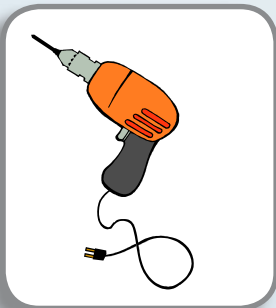


- **THE OPERATOR MUST WEAR** protective water-proof rubber gloves to prevent contact between his hands and the products used for washing.



- **THE OPERATOR MUST WEAR** protective eyewear to prevent spatter from coming in contact with his eyes.

- **STAY ALERT** at the start of the wash cycle. Make sure the liquid solution is not «corrosive» or flammable. Immediately stop the using and replace the solvent whenever you note signs of corrosion on the unit.
- **IF EYES COME IN CONTACT WITH SOLVENTS** rinse thoroughly with water.
- **BEFORE USING** the Solvent Recycler, make sure that all safety devices are in perfect operating condition.
- **BECOME FAMILIAR WITH THE CONTROLS** and their functions before commencing work.
- **BE CAREFUL** when you load or unload the solvent in the unit. Make sure you do not splash or spill the contents on the workshop floor.
- **THE OPERATOR MUST PERIODICALLY** check the level of the solvent contained in the equipment to be sure to not run this pump dry.



- **DO NOT USE ELECTRICAL OR PNEUMATICAL TOOLS WITH THE UNIT. AVOID GASEOUS AREAS.** Do not operate portable electric tools in explosive atmospheres in the presence of flammable liquids or gases. Motors in these tools normally spark, and do not scrape or scratch the machine with metal objects; the sparks might ignite fumes.

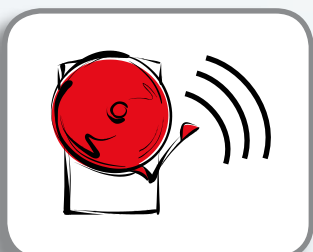
- **DO NOT ALLOW FAMILIARITY GAINED FROM FREQUENT USE OF YOUR WASHER TO BECOME COMPLACENCE.** Always remember that a careless fraction of a second is sufficient to inflict severe injury.
- **DO NOT ALTER OR MISUSE THE UNIT.** Any alteration or modifications is a misuse and may result in serious personal injuries.

1.6 SAFETY RULES (CONT'D)

- **COMPLY WITH LAWS IN THE COUNTRY** where the washer is installed regarding the use and disposal of the products used to wash clean objects.



- **FIRE EXTINGUISHING SYSTEMS** must be installed in the same room or close to the unit in case of emergency. These appliances must be kept efficient and inspected every year by a certified person.



- **THE INSTALLATION SITE MUST PERMIT PERSONNEL TO EASILY AND QUICKLY MOVE AWAY FROM DANGER ZONES IN CASE OF AN EMERGENCY.**

- **DO NOT USE THE UNIT TO** wash or degrease objects designed to come in contact with food.

- **COMPLY WITH LAWS IN THE COUNTRY** where the Solvent Recycler is installed regarding the use and disposal of the products used to wash clean objects.



- **DO NOT USE UNSTABLE REACTIVE** avoid distilling solvent that may include unstable reactives, such as nitrocellulose.

THINK SAFETY! SAFETY IS A COMBINATION OF THE OPERATOR'S COMMON SENSE, KNOWLEDGE OF THE SAFETY AND OPERATING INSTRUCTIONS AND ALERTNESS AT ALL TIMES WHEN THE UNIT IS BEING USED.

2 - GENERAL**2.1 INTRODUCTION**

Dear customer,

We wish to thank you for choosing Istpure.

In order to maximize the use of your solvent recovery system, it is important to read and understand this manual before attempting any flash evaporation.

The contents of this manual should be read in its entire prior to installation and operation. Failure to do so may cause unnecessary delays, omissions of fail-safe devices, or specifications that may result in the cancellation of your warranty. The manual intention is to assist you during the installation and safe operation of the system in part or as a whole. All safety devices associated with the equipment must be installed and additional safeties may be added by the customer, but must be verified by the manufacturer before they can be added to the control system.

The microprocessor controlled system was designed to offer you the ultimate in control and monitoring without compromise to safety. This manual will allow you to understand some of the basic principles of flash evaporation. As you proceed through the instructions to follow you will understand some of the technology behind this system that makes it unique to the industry.

These systems are available in different sizes. The systems and options will be defined throughout the manual allowing you to configure each option as it applies to your particular system.

2.2 BRIEF DESCRIPTION

The system is designed to remove the solvent of spent solvent (Mixture of various solvent). The feed pump feed spent solvent from an external bulk tank into the flash vessel. When level in flash still reached to desired set point, feeding will stop and recirculation loop starts. Once feeding or recirculation starts and inside vessel solvent temperature is less than set point then hot oil supply starts. Hot oil will begin to transfer heat through heat exchanger. When the temperature reaches the solvent boiling point, the solvent will begin to vaporize. Since the mixed liquid within the spent solvent have high boiling point, that will remain inside the vessel and will be discharge through discharge pump when temperature reached above set point. As the solvent vapors travel upward and pass through heat exchanger, it will condense and collected in condensate tank. The flash still bottom RTD monitors the temperature of the residue and when it has reaches an operator set point value discharge pump will starts discharging automatically.

NOTE : When discharging, a continuous exhaust must be provided to remove residual vapors during the discharging of left residue.

During automatic operation the PLC control system monitors all aspects of the feed routine, discharge routine and will display cycle in progress with set points and actual time expired. It will also display any fault message that results during the cycle. During manual mode of operation, operator has to take care of total operation.

This manual should be read in its entirety prior to installation, start-up and operation. Failure to do so may result in injury to person or the unit

2.3 SITE LOCATION

Istpure

2.4 ABBREVIATIONS

Istpure SRU (Solvent Recovery Unit)

2.5 INSTRUMENT IDENTIFICATION

For Complete instrumentation list, which includes part numbers and manufacturers' names refer to the parts list and spare parts list. Fig. 1.1 illustrates ID tags

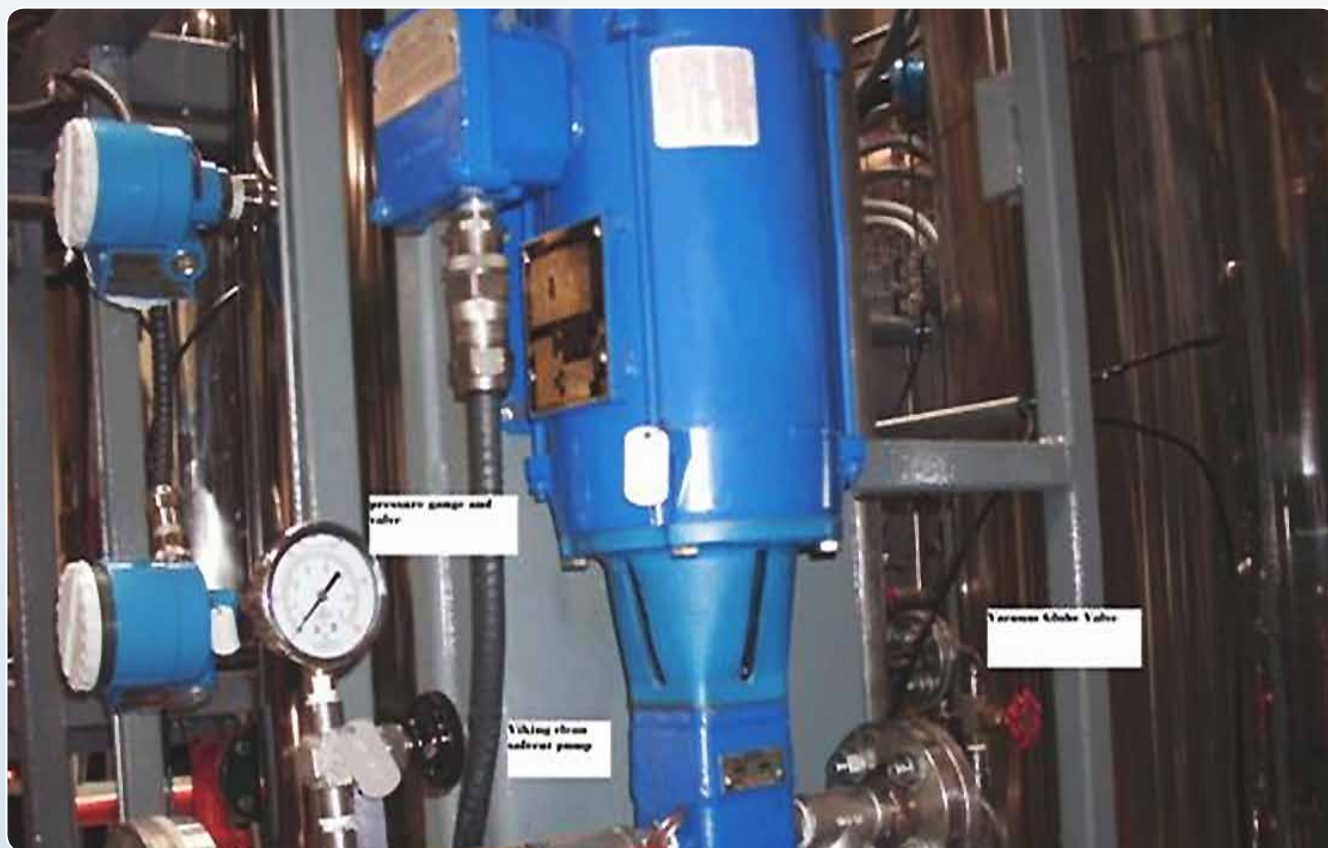


Figure 1.1

3 - INSTALLATION

3.1 GENERAL

On receipt of your system, it is important to inspect for physical damages that may have occurred during shipment. It is possible that due to vibration and handling some components may loosen and sometimes break. Notify «Istpure» prior to correcting these problems so we may assist you and provide the necessary replacement parts.

3.2 RIGGING INSTRUCTIONS

It is recommended that the Owner use professional millwrights or sometimes referred to as riggers to handle the System. It is recommended that extreme caution and care is to be taken when handling the system. When transporting the solvent Recovery system the operator must use his professional experience to avoid bending, scratching and denting. When being transported it is recommended that the SR-480 be placed on a pallet and stabilized with tie down straps or any other method which will secure the machine. If the system must be elevated a fork lift is recommended to raise in front of the front side, but not from the left or right side. The forks must also be adjusted so no harm is done to any of the cylinders or other components.

3.3 SECURING

A bolt and anchor device may be used to secure the skid. There are holes at the bottom of the skid base. Fasten all bolts through holes to the floor. Skid must be level to avoid improper weight distribution, when flash still is filled with product.

3.4 ELECTRICAL

Electrical power must be provided to the main control panel (**MCP**), **460Volts, 3Phase, 60Hz**. See Electrical Schematics. Connect the unit as per the electrical control panel schematics. Refer Appendix B for details. Check correct rotation on all motors, pumps and drives. A separate ground conductor is recommended, connected to the unit's frame. Grounding is essential to ensure a zero resistance to ground, avoiding electrical shock. Proper grounding minimizes the risk to personal. Electrical must meet national electric code (**NEC**) **Class 1, Division 1 regulations**. All electrical components are UL or FM listed.

The electrical components other than the control panel are **NEMA 7x rated for use in a CLASS 1, DIV. 1** location. **The control panel is NEMA 4** rated for installation in dusty and wet environment, and must be either purged to meet Class 1, Div. 1 or installed in an unclassified room.

NOTE : Unit can also come with the Optional purge controls are available for the main control panel, which will comply with regulations for usage in a CLASS 1, DIV. 1 locations

3.5 PROCESS PIPING

All fittings and flanges are provided on the equipment for attachment of piping. Maintain sizes of piping provided per the fitting or flange, reference P&ID. Always install a union or flange for connection and disconnection purposes and for servicing components. Shut off valves are also recommended and are to be tagged to indicate their normal operating position. Piping is schedule 40, 304 stainless steel. All fittings must be rated at a minimum of 150 lbs, when threaded always use Teflon tape and Teflon paste to ensure proper sealing and resistance to chemicals - if flexible connections are desired use metal hoses or metal with Teflon lining to ensure compatibility to chemicals. Heating media must be installed prior to first start up. Fig. 2.2 illustrates process piping.



Figure 2.2

3.6 Utility connections

All Utility connections are described as being the termination points where Istpure will terminate their piping to the SYSTEM. Each utility connection is labeled with letters and tagged per specifications on the unit like (1. Chilled water supply 2. Chilled water return). All utility connection prerequisites must be met before operation of equipment. Ensure that all prerequisites include adequate: Air pressure and Hot Oil connection, electrical connections, Insertion of heat transfer fluid.



Figure 2.3

3.7 Materials of Construction

- Frame constructed of SQ. Tube (2"x 2" x 1/8") material C.S.
- All piping used for process fluids are SS304 schedule 40
- Level and Temperature sensors 316L Stainless Steel
- Pneumatic lines are schedule 40 galvanized with flexible reinforced nylon lines to the actuated valves.

3.8 Machine Assembly

The System will be shipped and received in single large pieces. In most cases the unit is crated to ensure maximum protection during shipping. Because the unit is shipped in minimum pieces to less assembly is required. If the solvent Recovery System is crated it is important to disassemble the crate with precaution to ensure no damage is caused to the unit. We strongly recommend the use of a professional equipment movers or contractors to avoid damage of equipment or injury to personnel.

NOTE : Only trained and certified personnel may proceed with this installation.

3.9 Location

All Istpure Solvent Distillation unit when Class 1, Div 1 rated properly installed meet all "National Electrical Code Section 500 (ANSI/NFPA 70)" requirements to be rated fully "Explosion Proof", and therefore can be safely installed in most environments, including those with Class I, Division I, Group D conditions.

For Maximum safety, the System and its optional systems should be installed following the standards of the NFPA 30 and 70 codes.

To find the proper location site for this machine please reference the utility connections or if requested Equipment layout drawing.

OSHA REQUIRES : At least 3' of space between equipment and walls.

3.10 Pneumatic Piping

Pneumatic Piping requirements must match minimum size provided at the point of connection. Maximum air pressure of 120 P.S.I.G will ensure the safety and design criteria of all components. Galvanized piping schedule 40 is recommended. Provide only clean, dry air for maximum performance and wear life of pneumatically operated components.

Maintain lubricant levels in all lubricators to prevent excessive wear and stalling. Install Air Dumps with

Lockouts for additional safety. See Fig 2.4.



Figure 2.4

PERSONNEL SAFETY PRECAUTIONS

When working with high-pressure equipments, you must wear approved safety glasses or face shields. Do not expose direct high-pressure air against the deck, workbench, or other equipments. Low-pressure air may be used for certain specified maintenance-related cleaning or drying tasks. Always obtain permission to use low-pressure air for these purposes. Never expose direct any pressurized air jet toward your (or another persons) body.

During any equipment operation, keep all parts of the body clear of any component that moves as a result of pneumatic or hydraulic pressure.

Safety precautions must be observed and common sense used all the time. Do not think that once you have learned all the applicable safety rules you can sit back and relax. Review them periodically, particularly for those jobs seldom performed. Try to improve upon any rules in effect. Safety is everyone's responsibility, not just those who drew up the regulations. Many accidents are caused by personnel who are so familiar with their jobs. They think they can take shortcuts. Personnel who do not know the applicable safety precautions often are the cause of accidents. We also cannot forget the many tragic accidents caused by practical jokers. However, in the majority of instances, plain carelessness is the biggest threat, Stay alert!

3.11 ADEQUATE VENTILATION

Enclosed areas where Class I liquids are processed in the machine must be ventilated at a rate of not less than 1 cubic foot of air per minute for each square foot of solid floor area.

CAUTION

Most Class II and III liquids will become Class I liquids when heated to their distillation temperatures see solvent table page 26-27.

When processing liquids other than those rated at Class I, the unit should be place in an area that has a regular and steady exchange of air that exceeds the vapor production capability of the machine and the solvent being reclaimed by a factor of five, so that if vapors should escape from the unit they can not build up to dangerous levels.

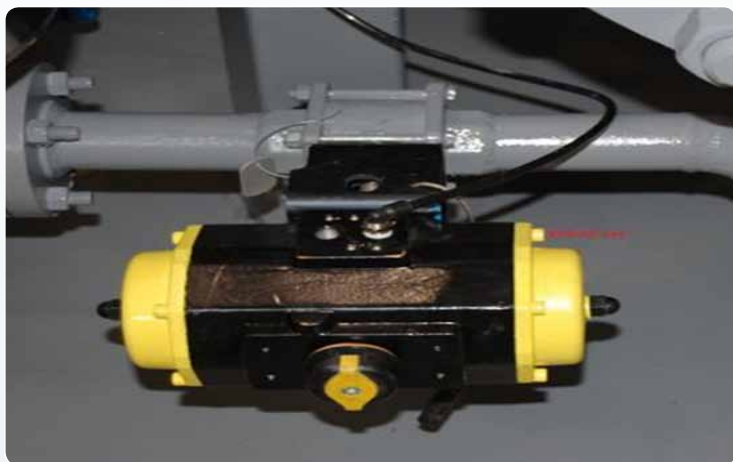
Solvent vapors are heavier-than-air, so vents should be provided at floor level so that if any vapors occurs it should escape from the machine so that; it will not build up to hazardous levels.

Local air-quality standards and codes should be checked for the proper treatment or containment of any vapors or fumes that may be released from ventilation of the area where the machine is located.

3.12 INSTRUMENT DETAILS :

SR Nb.	DESCRIPTION	QUANTITY
1	PUMP	6
2	MOTOR	6
3	SOLENOID VALVES	6
4	ACTUATED VALVES	6
5	MANUAL VALVES	30
6	FLOW TRANSMITTER	1
7	LEVEL TRANSMITTER	1
8	PRESSURE TRANSMITTER	1
9	TEMPERATURE ELEMENT	5
10	TEMPERATURE & PRESSURE GAUGES	10
11	CONTROL VALVE	3
12	CHECK VALVE	3
13	LEVEL SWITCH & SENSOR	7
14	FLOW SWITCH & PRESSURE SWITCH	3
15	PRESSURE RELIEF VALVE	4
16	STRAINER	4

3.13 SOLENOID & ACTUATED VALVES



Actuated valves provide for automatic open-close valve positioning as illustrated in Figure 35. Most solenoid actuated valves also have a manual override that permits manual positioning of the valve for as long as the override is manually positioned. Solenoids position the valve by attracting a magnetic slug attached to the valve stem. In single solenoid valves, spring pressure acts against the motion of the slug when power is applied to the solenoid. These valves can be arranged such that power to the solenoid either opens or closes the valve. When power to the solenoid is removed, the spring returns the valve to the opposite position. Two solenoids can be used to provide for both opening and closing by applying power to the appropriate solenoid.

A solenoid valve is an electromechanical valve for use with liquid or gas. The valve is controlled by an electric current through a solenoid coil. Solenoid valves may have two or more ports: in the case of a two-port

Valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold.

Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

3.14 FLOW TRANSMITTER



Flow transmitters provide electrical outputs that are proportional to flow inputs. They use flow meters to measure the flow of liquids and gases. Flow transmitters output analog voltages, analog currents, frequencies and pulses. Analog voltage outputs are simple, usually linear, functions of the measurement. They are continuous rather than pulsed or discrete. Analog current outputs are suitable for sending signals over long distances. They include current loops such as 4 – 20 mA and use feedback to provide an appropriate current regardless of impedance or noise. Frequency and pulse signal outputs are encoded via amplitude modulation (AM), frequency modulation (FM), and pulse width modulation (PWM). They are also expressed as sine waves and pulse trains. Some flow transmitters are inserted perpendicular to the flow path and require a threaded-hole pipe for access. Others are inserted parallel to the flow patch between two pieces of process pipes and clamped into place.

3.15 LEVEL TRANSMITTER



A radar signal is emitted via an antenna, reflected on the product surface and received after a time t . The radar principle used is FMCW (Frequency Modulated Continuous Wave). The FMCW-radar transmits a high frequency signal whose frequency increases linearly during the measurement phase (called the frequency sweep).

The signal is emitted, reflected on the measuring surface and received with a time delay, t . Delay time, $t=2d/c$, where d is the distance to the product surface and c is the speed of light in the gas above the product. For further signal processing the difference Δf is calculated from the actual transmit frequency and the receive frequency.

The difference is directly proportional to the distance. A large frequency difference corresponds to a large distance and vice versa. The frequency difference Δf is transformed via a Fourier transformation (FFT) into a frequency spectrum and then the distance is calculated from the spectrum. The level results from the difference between tank height and measuring distance.

3.16 TEMPERATURE ELEMENT (RTD)



Resistance Temperature Detectors (RTD), as the name implies, are sensors used to measure temperature by correlating the resistance of the RTD element with temperature. Most RTD elements consist of a length of fine coiled wire wrapped around a ceramic or glass core. The element is usually quite fragile, so it is often placed inside a sheathed probe to protect it. The RTD element is made from a pure material whose resistance at various temperatures has been documented. The material has a predictable change in resistance as the temperature changes; it is this predictable change that is used to determine temperature.

3.17 PRESSURE GAUGE

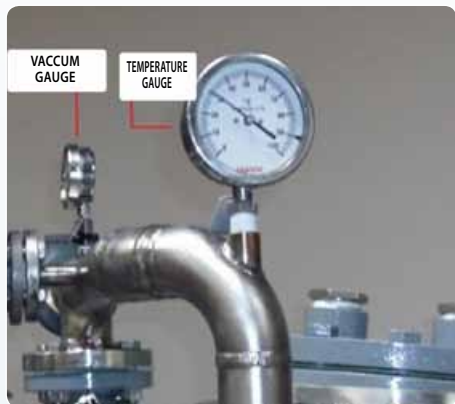


Pressure gauges and switches are among the most often used instruments in a system. But because of their great numbers, attention to maintenance--and reliability--can be compromised. This is unfortunate because, if a system is operated with a failed pressure switch, the safety of the system may be compromised. Conversely, if a system can operate safely while a gauge is defective, it shows that the gauge was not needed in the first place. Therefore, one goal of good process instrumentation design is to install fewer but more useful and more reliable pressure gauges and switches.

One way to reduce the number of gauges in a system is to stop installing them on the basis of habit (such as placing a pressure gauge on the discharge of every pump). Instead, review the need for each device individually. During the review one should ask: «What will I do with the reading of this gauge?» and install one only if there is a logical answer to the question. If a gauge only indicates that a pump is running, it is not needed, since one can hear and see that.

If the gauge indicates the pressure (or pressure drop) in the process, that information is valuable only if one can do something about it (like cleaning a filter); otherwise it is useless. If one approaches the specification of pressure gauges with this mentality, the number of gauges used will be reduced. If a system uses fewer, better gauges, reliability will increase.

3.18 TEMPERATURE GAUGE



A temperature gauge is a device used to indicate the temperature of an item being monitored. The display can be an analogue dial, an analogue range or a digital readout. Common methods of measuring temperature include bimetallic strip (the bending of which increases with temperature) and the thermocouple which produces an electronic voltage that depends on the temperature.

3.19 CONTROL VALVE



A flow control valve regulates the flow or pressure of a fluid. Control valves normally respond to signals generated by independent devices such as flow meters or temperature gauges.

Control valves are normally fitted with actuators and positioners. Pneumatically-actuated globe valves and Diaphragm Valves are widely used for control purposes in many industries, although quarter-turn types such as (modified) ball, gate and butterfly valves are also used.

Control valves can also work with hydraulic actuators (also known as hydraulic pilots). These types of valves are also known as Automatic Control Valves. The hydraulic actuators will respond to changes of pressure or flow and will open/close the valve.

Automatic Control Valves do not require an external power source, which means that the fluid pressure is enough to open and close the valve. Automatic control valves include: pressure reducing valves, flow control valves, back-pressure sustaining valves, altitude valves, and relief valves. An altitude valve controls the level of a tank. The altitude valve will remain open while the tank is not full and it will close when the tanks reaches its maximum level. The opening and closing of the valve requires no external power source (electric, pneumatic, or man power), it is done automatically, hence its name.

3.20 CHECK VALVE

A swing check valve or tilting disc check valve is check valve in which the disc, the movable part to block the flow, swings on a hinge or trunnion, either onto the seat to block reverse flow or off the seat to allow forward flow. The seat opening cross-section may be perpendicular to the centerline between the two ports or at an angle. Although swing check valves can come in various sizes, large check valves are often swing check valves. The flapper valve in a flush-toilet mechanism is an example of this type of valve. Tank pressure holding it closed is overcome by manual lift of the flapper. It then remains open until the tank drains and the flapper falls due to gravity. Another variation of this mechanism is the clapper valve, used in applications such firefighting and fire life safety systems. A hinged gate only remains open in the inflowing direction. The clapper valve often also has a spring that keeps the gate shut when there is no forward pressure.

3.21 LEVEL SWITCH



Level sensors detect the level of substances that flow, including liquids, slurries, granular materials, and powders. All such substances flow to become essentially level in their containers (or other physical boundaries) because of gravity. The substance to be measured can be inside a container or can be in its natural form (e.g. a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low.

There are many physical and application variables that affect the selection of the optimal level monitoring method for industrial and commercial processes. The selection criteria include the physical phase (liquid, solid or slurry), temperature, pressure or vacuum, chemistry, dielectric constant of medium, density (specific gravity) of medium, agitation, acoustical or electrical noise, vibration, mechanical shock, tank or bin size and shape. Also important are the application constraints: price, accuracy, appearance, response rate, ease of calibration or programming, physical size and mounting of the instrument, monitoring or control of continuous or discrete (point) levels.

3.22 PRESSURE RELIEF VALVE



The pressure is relieved by allowing the pressurised fluid to flow from an auxiliary passage out of the system. The relief valve is designed or set to open at a predetermined set pressure to protect pressure vessels and other equipment from being subjected to pressures that exceed their design limits. When the set pressure is exceeded, the relief valve becomes the « path of least resistance » as the valve is forced open and a portion of the fluid is diverted through the auxiliary route. The diverted fluid (liquid, gas or liquid-gas mixture) is usually routed through a piping system known as a flare header or relief header to a central, elevated gas flare where it is usually burned and the resulting combustion gases are released to the atmosphere. As the fluid is diverted, the pressure inside the vessel will drop. Once it reaches the valve's reseating pressure, the valve will close.

The blowdown is usually stated as a percentage of set pressure and refers to how much the pressure needs to drop before the valve resets. The blowdown can vary from roughly 2-20%, and some valves have adjustable blowdowns.

3.23 STRAINER



“Y” Strainers take their name from their configuration. They are most commonly used in pressurized lines, gas or liquid, but can also be used in suction or vacuum conditions. They are intended for applications where small amounts of solid particulate are expected, and where clean-out will be infrequent. If solids will flush easily from the screen, and fluid can be exhausted to atmosphere, a blow-down valve on the drain port will allow clean-out without removal of the screen, and without interrupting the process flow.

FLAMMABLE SOLVENTS

SOLVENT TYPE	Distillation Temperature		Temperature Class	Ignition Temperature		Seal	Condenser Type	
	°C	°F		°C	°F	Silicone	cop	s/st
Acetone	56	133	T2	535	995	A	A	A
Alcohol Amyl	145	293	T2			A		B
Alcohol Butyl	118	244	T2			A	A	A
Alcohol Ethyl	79	175	T2	362		A	A	A
Amyl Acetate	126-155	259-311	T2	375	707	A	A	A
Benzol (Benzene)	80	176	T-1	498	1040	A	B	B
Butanol (Butyl Alcohol)	118	244	T2	366	691	A	A	A
Butyl Acetate	128	262	T-2	370	698	A	B	A
Cabinol	65	149	T-2	385	725	A	B	A
Cellosolve Acetate	156	313	T-2	377	711	A	B	A
Cyclohexanone	155	311	T-2	419	786	A	B	A
Ethyl Acetate	79	174	T-2	427	801	A	A	A
Ethyl Alcohol (Ethanol)	79	175	T-2			A	A	A
Ethyl Benzene	136	277	T-1	466	871	A	A	A
Ethyl Glycol Acetate	156	313	T-2	377	711	A	A	A
Iso Amyl Acetate	125-155	257-311	T-2	375	707	A		A
Iso Butyl Acetate	104-119	219-246	T-2	420	788	A		
Iso Butyl Alcohol	111	232	T-2	430	806	A		
Iso Propane	83	181	T-2	400	752	A	B	A
Iso Propyl Acetate	89	192	T-2	460	860	A	A	A
Iso Propyl Alcohol	83	181	T-2	400	752	A		A
Iso Propyl Glycol	143	289	T-2	345	653	A		
Lacquer Solvents	140	284	T2	535	995	A	A	A
Methyl Acetate	58	136	T-2	454	850	A	B	A
Methyl Cellosolve Acetate	156	313	T-2	377	711	A	B	A
Methyl Ethyl Ketone (M.E.K.)	80	176	T-1	530	986	A	A	A
Methyl Glycol Acetate	137-152	278-305	T-2	380	716	A	A	A
Methyl Isobutyl Ketone (M.I.B.K.)	117	243	T-1	459	858	A	B	A
N. Butyl	118	244	T2	366	691	A		A
Pentanol	138	280	T2	327	621	A		A
Propanol	98	208	T2	371	700	A		A
Propyl Alcohol	98	208	T2	371	700	A	A	A
Propyle Acetate	101	214	T2	450	850	A	A	A
Paint Thinner	140	284	T2	535	995	A	B	B
Sec. Butyl Alcohol	101	214	T2	390	734	A		A
Toluol	110	231	T1	480	905	A	A	A

FLAMMABLE SOLVENTS (VACUUM SYSTEM REQUIRED)

SOLVENT TYPE	Distillation Temperature		Temperature Class	Ignition Temperature		Seal	Condenser Type	
	°C	°F		°C	°F	Teflon braided	cop	s/st
Aliphatic hydrocarbons		370			487	A	A	A
Bottcherin		370			487	A	A	A
Citrus terpenes	176	349		237	458	A	A	A

FLAMMABLE SOLVENTS (VACUUM SYSTEM REQUIRED) CONT'D

SOLVENT TYPE	Distillation Temperature		Temperature Class	Ignition Temperature		Seal Teflon braided	Condenser Type	
	°C	°F		°C	°F		cop	s/st
D Limonene	176	349		237	458	A	A	A
Dimethylformamide (DMF)	153	307	T-2	445	833	A	A	A
Ether Glycol	210			277		A	A	A
LO NX (Kodak)	203	398		N/A	N/A	A	A	A
N-Methylpyrrolidone	202	396		N/A	N/A	A	A	A
White Spirit	150-175	302-374	T-2	353	489	A	A	A
Varsol	150	302	T-2	351	487	A	A	A
Virosol 225				N/A	N/A	A	A	A
Xylol (Xylene)	144	291	T-1	463	907	A	A	B

NON - FLAMMABLE CHLORINATED SOLVENTS (VACUUM SYSTEM REQUIRED)

SOLVENT TYPE	Distillation Temperature		Temperature Class	Ignition Temperature		Seal Silicone	Condenser Type	
	°C	°F		°C	°F		cop	s/st
1,1,1, Trichloroethane- (Methyl Chloroform)	74	165				A		A
n-Propyl Chloride	47	117				A		A
Isopropyl chloride	40	104				A		A
Methylene chloride	40	106				A		A
Dichloroethylene	37	99				A		B
Ethylene dichloride	84	183				A		A
Monochlorobenzene	133	273				A		A
Propylene dichloride	98	208				A		A
Chloroform	61	142				A		A
Trichloroethylene	92	198				A		A
Trichloroethane	115	239				A		A
Ortho dichlorobenzene	182	361				A		A
1,2,3. trichloropropane	158	317				A		A
Carbon tetrachloride	78	172				A		A
Perchloroethylene	122	254				A		A
Tetrachloroethane	147	297				A		A



WARNING



The information and data set forth in this catalog or the information disclosed by a representative is for your general information only. Many factors influence the resistance of materials to corrosion, such as temperature, concentration, aeration and contaminants.

A – Recommended

B – Not Recommended

Blank – Information not available

4 - PRINCIPLE OF OPERATION

4.1 Description

The system operates on a principle of reduced pressure to separate a mixture of solvent by flashing and vaporization (flash evaporation) of pre-heated feed into individual components. The system consists of a flash still, condenser, decanter vessel, pre-heater (heat exchanger), transfer pumps and associated instruments like temperature indicators, pressure gauges, pressure indicators, flow transmitters, level transmitters, temperature transmitters, control valves, solenoid valves etc.

Flash still consists of hollow section with demister pad; Pre-heated feed stream enters from throttled nozzle which provides reduction in pressure because of this low boiler escape towards top of still under influence of vacuum. Temperature sensor (Istpure-TE-103) is provided on side - top of flash still to monitor the d-limonene vapor temp & (Istpure-TE-104) is provided on side - bottom of still to monitor the impurities, feed and bottom temp. In normal course of operation, the still bottom section temperature will be near linoleic acid and oleic acid mixture boiling temperature and the still top temperature will be near solvent, boiling temperature at given pressure (Vacuum).

The Condenser (Istpure-HE-101) is use to condense vapors from the top of the still & condense the solvents vapors. The liquid collected from the condenser will be clean solvent & very little traces of linoleic acid. The solvent will be transferred using Decanter Bottom Pump (Istpure-PU-101) based on the level in the Decanter (Istpure-DEC-101).

Bottom impurities collected in flash still is transfer by flash still discharge pump (Istpure-PU-102)

The solvent recovery process is started at the processor in the control panel. Operator minimum attention required, but must never be left unattended. Solvent recovery process has been automated with a programmable logic controller (PLC). The PLC continuously monitors and controls each step of the operation. The basic system comes with a PLC controlled panel, which must be placed in a non-hazardous location, unless it is equipped with the Class 1, Division 1 purge option. The PLC runs the program, does a self-diagnostic check and tests all temperature signals. If a Resistance Temperature Detector (RTD) becomes faulty or is disconnected accidentally the PLC will receive a broken wire fault and shut down the system. In short, all systems are controlled by one source. Any Default of any monitoring device will stop the process offering you the ultimate in safety. When Emergency Stop Push Button is pressed while operating this unit, all the system (D-limonene recovery process) shut down.

4.2 Operating Recommendations

After the plant has been commissioned as per the instructions in the installation procedures, the processor will continually monitor all safeties, temperatures and fill sequences from the PLC processor. It is advisable to periodically check the center lines of the physical gauge on the top of the flash still, column and the temperatures located on the operating screen of the HMI. The pressure should not exceed 14.7 PSIA. If pressure exceeds 14.7 PSIA, the Pressure Relief Valve (Istpure-PRV-101) will open relieving the system of any additional increase in pressure. Normal operating condition is within 1 to 1.5 PSIA (-13.7 to -13.1 PSIG).

To maximize recovery rates :

1. Continuous operation is required
2. Avoid switching from manual to automatic and vice-versa.
3. Promote «Good Housekeeping».
4. Do not interrupt the normal operating cycle unless absolutely necessary. The result may be one or a combination of the symptoms mentioned above.

4.3 Establishing solvent drying Temperatures

Always check all ingredients in your feed mixture and contaminants. As the flash still unit will be used to separate d-limonene from d-limonene, linoleic acid and oleic acid mixture, temperature sensor of the still i.e. (Istpure-TE-101) will be near the solvent boiling point. It is recommended to start the system by giving set point of boiling temp of d-limonene to temperature sensor (Istpure-TE-101) in Auto mode. Once the product quality is established it can be transferred to Cascade mode for optimum results.

4.4 Operation & Control Description

This system is designed for the separation of d-limonene from linoleic acid and oleic acid. Chilled water, Hot Oil, Compressed Air Supply should be ensured before starting the system. During startup when operator enables "Master Control" from HMI -Master Screen starts for the set time entered from HMI.

Remove all the alarms to operate the system in auto mode. To start particular loop ensure all the conditions to start the loop in auto mode are satisfied.

For detail automated control description refer to Chapter no. 6

*Note : In order to do the trouble shooting or maintenance, the pump & valve of respective routine can be operated manually by transferring the control from Auto to Manual mode for the respective routine.

4.5 Operation Sequence

1. Pre-checks

- Ensure vacuum pump (Istpure-PU-106) is operating.
- Ensure all dry testing is completed.
- Ensure all set points for level, temperature, flow, and pressure transmitters are correct.
- Ensure that all Manual valves are at correct position.
- Ensure Air supply pressure is > 120 psig.
- All PID loops are in manual mode.
- Ensure that proper electric supply voltage is connected as specified in Electrical drawing and on equipment name plate.
- Ensure that all pumps rotational directions are set as required.
- Ensure all the alarms have been removed.
- Ensure Chilled Water, Hot Oil supply.

2. When operator powers up the Panel (i.e. HMI) the system defaults in Manual Mode and Master Mode is disabled. All PID Controllers & loops are in Manual Mode.
3. Operator shall enter or confirm the all necessary System & Alarm set point for various loop on set point screen as per process requirement.

5A - START UP CHECK-LIST

5.1 Check List

1. When you intend to use the system engage the main electrical disconnect. When all disconnects is closed, you will see the operation interface terminal (HMI) illuminate. The electrical power should be on continuously and shut off only for maintenance or emergencies.

Very important : All electric pumps should be primed by manually opening all valves in line to prevent overheating or loss of the mechanical seal.

Your unit is equipped with a compressed air pressure switch to verify sufficient air pressure prior to operating. If the air pressure drops to < 90 P.S.I.G. a fault will appear on the operator interface (HMI). To clear the fault, establish > 90 P.S.I.G. on the main air pressure gauge and press "ACK" button on the operator interface (HMI). It will be necessary to confirm pressure of at least 100 P.S.I.G. before starting the system. Maximum: 120 P.S.I.G.

Note : All auto valves are pneumatic and will not operate properly under 90 P.S.I. They are spring return valves so they will close on loss of air or electrical power for safety.

2. Chilled water supply lines must be on to condense vapors and provide auto cooling. Do not turn off during operation.
3. If you intend to shut any solvent supply valve (not recommended) when not in use it will be critical to ensure it is turned on prior to start up to prevent premature shutdown of the flash still.
4. Chilled water supply lines must be clear and opened. Do not turn off during operation. Any Manual valves on the Chilled water lines must be locked out in the open position. This will avoid any pressurization on the flash still.
5. All openings such as man way door are closed during operation of the machine in order to start and run the unit.
6. The unit is supplied with Identification labels and tags.

5.2 Motor Rotation



Ensure correct Rotation of pumps and motors by reviewing the pictures below. All pumps and motors have been tested at correct rotation.

Initially Confirm Feed pump motor, Discharge Pump motor & Recirculation pump motor direction is in maintenance mode.

Confirm Electrical Supply connection point that all 3 phases are placed in correct order, Ex: L1, L2, L3 are clearly marked on connection point.

Always jog motors to confirm correct fan rotation. See Fig. 4.1.

Pump might not be typical in appearance.

5.3 CHECKLIST

INSPECTOR: _____ **DATE:** _____

ITEM	ITEM INSPECTED	(Y/N)	COMMENTS
1	Check Clean Solvent liquid level		
2	Check adequate Chilled water available		
3	Check Air Pressure, must be above 120 P.S.I.G.		
4	Check Hot Oil		
5	Check set points in setup menu		
6	Check pressure gauges		
7	Check Main Screen on (HMI): Confirm that there are no Alarms. If so reset each		

COMMENTS :

6 - AUTOMATIC CONTROL FEATURES

6.1 OPERATION & CONTROL DESCRIPTION

6.1.1- Istpure Feed Routine

Press start button to start total system in auto mode and press stop button to stop total system.

The purpose of this routine is to feed the discharge from bulk tank to DRU Flash Still Vessel. Ensure that Istpure-PU-104 pump for DRU feed flow from bulk tank is in healthy condition.

Once you press start button, and If Level in FS is above than Flash Still FEED START SETPOINT (Istpure-LT-102) then DRU Feed Control PID (Istpure-FIC-101) loop Shift in Auto mode thus it opens AV-104 and Istpure-PU-104 starts. The Flow Transmitter (Istpure-FT-101) will transfer flow signal to PID controller. The output of the Controller (Istpure-FIC-101) will regulate the DRU Feed Flow Control Valve (Istpure-FCV-101) to maintain the feed flow rate at given set point and feed to FS will stop when it reaches to feed stop level set point entered in Istpure-LT-101.

The dirty solvent tank bottom discharge pump (PU-104) will start only after level in dirty solvent tank is above Istpure-LSL-103.

6.1.2- Istpure Recirculation Routine

After Feed routine start and level is above in Flash Still FEED STOP SETPOINT (Istpure-LT-102) then it opens AV-103 and PU-103 starts automatically in this routine, if level in FS-101 reaches below 5% then stop PU-103 and AV -103.

6.1.3- Istpure Feed Temperature control Routine

This loop starts only after recirculation routine is in progress. This loop controls the Hot Oil supply temperature at HE-103 based on DRU Feed Flow Temperature (TE-101). Once this loop starts in auto mode then it starts Istpure-PU-105 and then DRU Feed Temperature Control PID (Istpure-TE-101) loop. If the level in Istpure-T-101 reached to low level that is LSL-102 then pump Istpure-PU-105 stops. PV for PID Controller will be the temperature signal from Preheater Outlet Temperature Transmitter (Istpure-TE-101).

If we are not getting any signal from FSL-102 for 1 min then PU-105 and hot oil heater stops automatically.

6.1.4- Istpure Vacuum Routine

The purpose of this routine is to create the vacuum to flash the mixture in DRU flash Still Vessel (Istpure-FS-101) with the help of DRU Vacuum Pump (Istpure-PU-106). Once we press start button then vacuum pump (Istpure-PU-106) starts automatically.

1. When the level in DRU Decanter reached below LSL-101, then STOP DRU Vacuum Pump (Istpure-PU-106) and CLOSE vacuum Priming Valve (Istpure-AV-105) & it stops total system automatically.
2. In this routine, when vacuum Pump (Istpure-PU-106) stops any time during operation, vent valve Istpure-AV-107 is open for 30 Sec.
3. If we are not getting vacuum (during start up or in running condition) below low vacuum alarm set point for the duration of low vacuum time set point then total system will stop.
4. If we are not getting any signal from FSL-101 for 1 min then PU-105 and hot oil heater stops automatically.

6.1.5- Istpure Distillate Transfer Routine

The purpose of this routine is to start & stop the Decanter Bottom Pump (Istpure-PU-101).

1. When Decanter liquid level (Istpure-LSW-101) is reached then it automatically opens transfer Valve (Istpure-AV-102) and Start Decanter Bottom Pump (Istpure-PU-101) and set Decanter (Settable) discharge Timer.
2. It stops when below two conditions reaches :
When timer done and when level in clean solvent collection tank reaches to LSH-101 then close (Istpure-AV-102) and stop (Istpure-PU-101).

6.1.6- Istpure Bottom Discharge Routine

The purpose of this routine is to Start the DRU Bottom Discharge Pump (Istpure-PU-102) & Open the Discharge Valve (Istpure-AV-101) based on Flash Still Vessel Level Controller (Istpure-LT-101). It operates as below :

1. If liquid level in DRU Flash Still Vessel (Istpure-LT-101) \geq DRU Bottom Discharge Start Level Set Point and Istpure-TE-104 \geq DRU Bottom Discharge Start Temp Set Point, then Open the DRU Bottom Transfer Valve (Istpure-AV-101) and Start the DRU Bottom Discharge Pump (Istpure-PU-102).
2. If liquid level in DRU Flash Still Vessel (Istpure-LT-101) $<$ DRU Bottom Discharge Stop Level Set Point and Istpure-TE-104 $<$ DRU Bottom Discharge stop Temp Set Point then Stop the DRU Bottom Discharge Pump (Istpure-PU-102) & Close DRU Bottom Transfer Valve (Istpure-AV-101).

6.1.7 Other Features

1. In Auto or Manual operation, whenever overload fault indication comes, PLC Gives stop command to respected Pump and generate alarm on HMI.
2. RTD ranges are: For TI-101 and TI-102 0-450 F the rest are 0-392 F.
3. All Overloads are NC contacts to PLC. i.e. in alarm condition, the contact will be opened.
4. Form Maintenance Screen all Digital Outputs & Analog Outputs will be operated by changing system in Manual mode.
5. If any sensor (RTD OR other transmitter) wires is open then respected sensor wires open alarm will be displayed on HMI.

All set point are configurable from HMI.

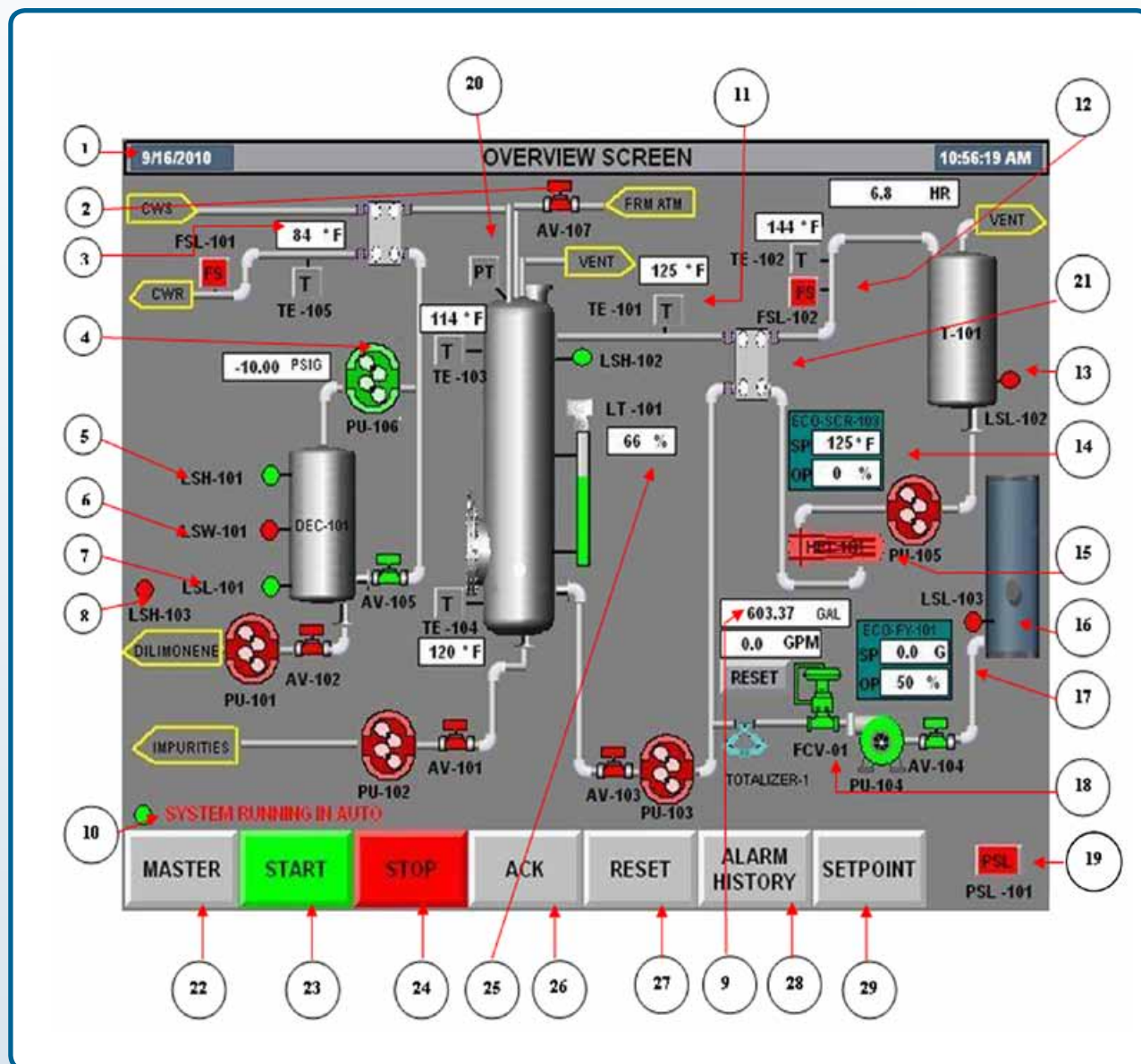
6.1.8 Operation Stop Procedure:

When operator wants to stop the system, operator has to press start button on overview screen, this will stop total system as per below steps :

1. Hot oil loop stops.
2. Feed loop stops.
3. FS bottom discharge loop stops.
4. Vacuum loop will stops.
5. Decanter discharge loop will stops.
6. Recirculation loop will stops.
7. Disable Master Control.
8. Switch off all electrical panels.

6.2 - HMI Screens:

6.2.1 - Overview



This is the Overview Screen which allows navigation to "SET POINT, PID, and ALARM HISTORY" screens.

"ACK / RESET" buttons are provided to acknowledge and reset the alarms respectively.

Overview screen description :

1. **Time :** Current time and date are displayed in this field. Time format is 12 hours.
2. **Valve Animation :** This is valve animation. It shows the current status of the valve e.g. If valve is OPEN then valve color becomes Green, else it remains RED. When clicked to valve symbol, screens will pop-up which allows user to open or close or to operate in AUTO/MANUAL mode.
3. **Temperature Indicator :** This is Chilled Water return temperature indicator (TE-105) which displays temperature.
4. **Pump Motor Animation :** This is pump motor animation. It shows the current status of the pump motor e.g. If pump motor is ON then pump color becomes Green. If pump motor is OFF then pump color becomes Red. If pump motor is OVERLOADED then pump color will indicates Yellow. When clicked to Pump symbol, screens will pop-up which allows to user to ON or OFF or to operate in AUTO/MANUAL mode. Also, it will show interlock screen.
5. **Level switch :** High Level switch (LSH-101) in DEC-101
6. **Level switch :** Working Level switch (LSW-101) in DEC-101
7. **Level switch :** Low Level switch (LSL-101) in DEC-101
8. **Level switch :** Low Level switch (LSH-103) in DEC-101
9. **Flow Totalizer :** This Indicates Totalized Flow.
10. **Indicator :** This indicator indicated sytem running in Auto. **RTD Animation:** This is RTD animation. It shows animation for RTD Wire Break. E.g. If RTD is Wire Break then RTD color becomes Yellow.
11. **Flow Switch Animation :** This is Flow Switch animation. It shows animation for Low Flow. E.g.If Flow is not Low then flow switch shows Green . If Flow is Low then flow Switch becomes Red.
12. **Level Switch :** Low Level Switch (LSL-102) on Oil Tank (T-102)
13. **PID Popup :** This is for Temperature Control PID popup.
14. **Heater :** This is Heater HT-101.
15. **Level Switch :** Low Level switch (LSL-103) in Dirty Tank.
16. **PID Popup :** This is for Flow Control PID popup.
17. **Flow Control Valve :** This is flow control valve, which shows animation. E.g. If there is Flow then Control Valve colour becomes Green.
18. **Pressure Switch :** This is Pressure Switch animation. It shows animation for Compressed Air Low. E.g.If Air is not Low then pressure switch shows Green If Air is Low then pressure Switch becomes Red
19. **Pressure Transmitter Animation :** This is Pressure Transmitter animation. It shows animation for PT Wire Break.
20. **Heat Exchanger :** This is plate type heat exchanger .It tranfer Heat to Dirty Solvent Coming from Dirty tank.
21. **Master Button :** This button is used to go to on Master Screen.
22. **Start button :** This button is used to start the system in auto mode.
23. **Stop Button :** This button is used to stop the system in auto mode.
24. **Pressure Indicator :** Level indicator (LT-101) which displays current level.
25. **Ack button :** This button is used to acknowledge the Alarm.
26. **Reset button :** This button is used to reset the Alarm.
27. **Alarm Histrory :** This button is used to go to Alarm history Screen.
28. **Setpoint button :** This button is used to go to Setpoint Screen.

6.2.2 Set points:

VALUES IN BELOW ARE AS PER TESTING DONE BEFORE DISPATCHING UNIT MAY VARY DURING OPERATING WITH D-LIMONENE:

9/16/2010

SYSTEM SETPOINT

10:58:23 AM

STREAM NAME	SETPOINT	
FS BOTTOM DISCHARGE START SETPOINT(LT-101)	68	%
FS BOTTOM DISCHARGE STOP SETPOINT(LT-101)	65	%
FS BOTTOM DISCHARGE TEMP SETPOINT(TE-104)	115	° F
FS HIGH PRESSURE ALARM SETPOINT(PT-101)	3	PSIG
COOLING WATER RETURN HIGH TEMP SETPOINT(TE-105)	95	DEG F
LOW VACUUM ALARM SETPOINT(PT-101)	.8	PSIG
LOW VACUUM TIMER ALARM SETPOINT(PT-101)	1	MIN
FS FEED START SETPOINT(LT-101)	65	%
FS FEED STOP SETPOINT(LT-101)	68	%
DEC. BOTTOM DISCHARGE PUMP TIME SETPOINT(PU-101)	10	SEC

OVERVIEW

ACK

RESET

To access the setup screen press set point button on overview screen. The Set point screen is where the operator can view and / or change all operating parameters. (In order to insert or Put any values) To adjust parameters, the operator will use touch keys to move around from setpoint to setpoint. Once the operator has reached to the parameters they wish to change, touch the desired setpoint. After all values have been changed, it proceeds to the Overview button again to return to Overview screen. At any time operating or in idle, the operator can access the setup menu to change parameters. The Sytem parameter changes will take effect immediately. All values will have to be «entered» within the parameters displayed next to the message, or the terminal will maintain the previous values entered. The enter key must be pressed after each entry or value will not be accepted. On completion or at any time «Overview button must be pressed, it enables you to return to the Overview screen.

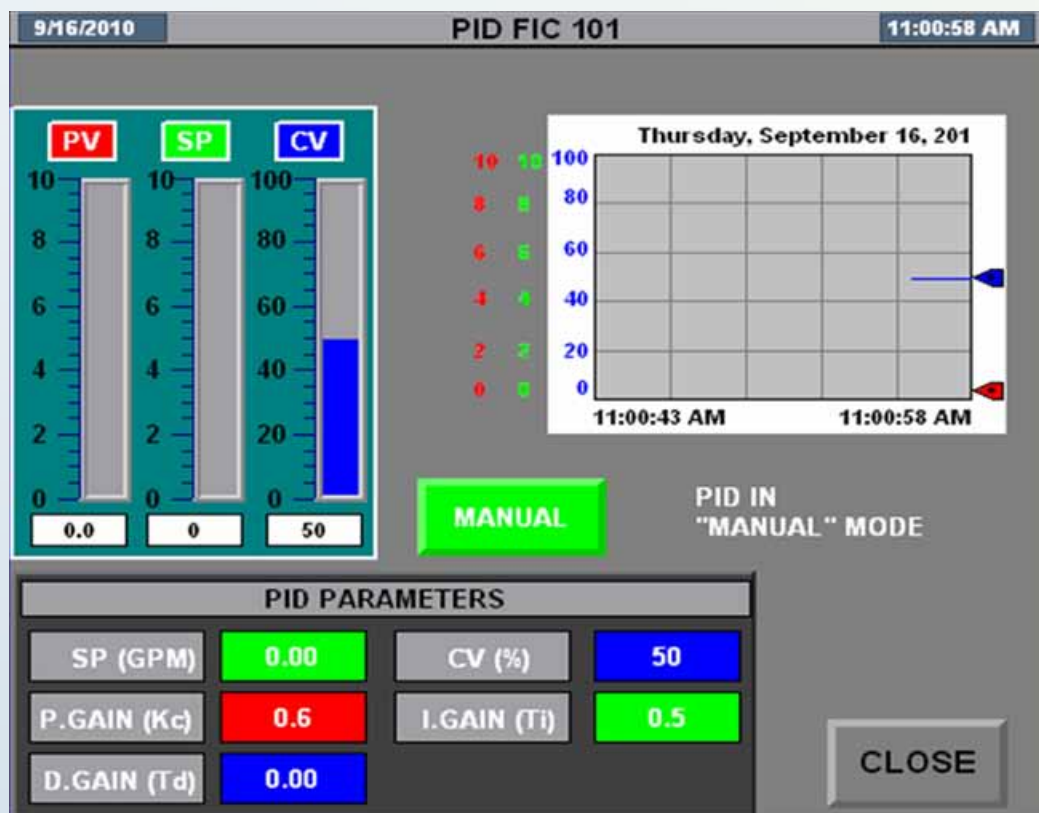
NOTE : All values are retentive and will remain as set until changed through the setup procedure. All “setup” values are retentive when power is shut-off or power failure occurs.

Typical Set points of the Sytem :

These are sample set points that are recommended by SRS.

SR. #	Description	Recommended Set Point	Set Point Range
1	FS Bottom Discharge start Setpoint	68 %	1-100 %
2	FS Bottom Discharge start Setpoint	65 %	1-100 %
3	FS Bottom Discharge temp Setpoint	245 deg F	1-350 Deg F
4	FS High Pressure Alarm Setpoint	3 psig	1-20 Psig
5	Chilled water High Temp Alarm Setpoint	65 deg F	1-500 Deg F
6	Low Vacuum Alarm Setpoint	-8 psig	-15-20 Psig
7	Low Vacuum Alarm Timer Setpoint	1 min	1-30 Min
8	FS Feed Start Setpoint	65 %	1-100 %
9	FS Feed Sop Setpoint	68 %	1-100 %
10	DEC Bottom Discharge Pump Time Setpoint	10 sec	5-180 Sec

6.2.3PID POPUP :

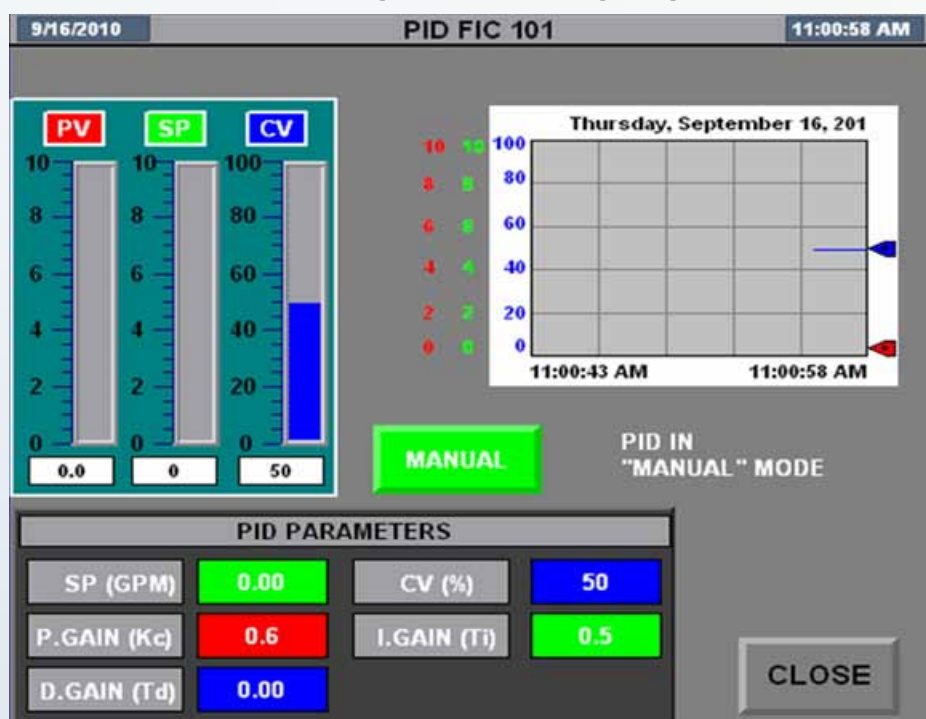


This screen shows the process parameters related to PID controllers (FIC-101).

The following table indicates the parameters shown

SR. NO.	Parameter	Description	Set Point Range	Recommended value
1	PV	Process Value	1-10 GPM	-
2	SP	setpoint	0-5 GPM	-
3	CV	Control Variable or Output	0-100	-
4	P.GAIN(Kc)	Proportional Gain	0-25.5	0.6
5	D. GAIN(Td)	Derivative Gain	0-2.55	0
6	I.GAIN(Ti)	Intergral Gain	0-25.5	0.5

For detail control description refer chapter point number 6.1.1



This screen shows the process parameters related to PID controllers (TIC-101).

The following Table indicates the parameters shown :

SR. NO.	Parameter	Description	Set Point Range	Recommended
1	PV	Process Value	1-100 %	-
2	SP	setpoint	0-450 Deg F	-
3	CV	Control Variable or Output	0-100	-
4	P.GAIN(Kc)	Proportional Gain	0-25.5	3
5	D. GAIN(Td)	Derivative Gain	0-2.55	0
6	I.GAIN(Ti)	Intergral Gain	0-25.5	1

For detail control description refer chapter point number 6.1.1

6.2.4 - Alarm History :

9/16/2010 ALARM HISTORY 11:02:13 AM		
Alarm time	Acknowledge time	Message
9/16/2010 10:51:58 AM	9/16/2010 10:52:01 AM	Pump PU-105 Overload Alarm
9/16/2010 10:49:39 AM	9/16/2010 10:50:00 AM	Pump PU-105 Overload Alarm
9/16/2010 10:49:08 AM	9/16/2010 10:49:12 AM	Pump PU-105 Overload Alarm

Ack Alarm

Silence Alarms

Clear All

Ack All

OVERVIEW

ACK

RESET

SETPOINT

ALARM COUNT

Pressing the ALARM HISTORY button while in the Overview screen can access the Alarm History screen. The Alarm screen is where the operator can view all alarm history.

This screen also displays any current alarms or faults in the system. A brief message will show where and what is the fault. By pressing the ACK button, you acknowledge any faults and attempt to reset them from main screen. If the faults continue to exist, the fault will return. The ACK button must be pressed to reset all faults.

9/16/2010 ALARM COUNT 11:06:23 AM	
Number Of Alarm Occurred	
MOC-101 Overload Alarm	3
MOC-102 Overload Alarm No.of Count	5
MOC-103 Overload Alarm No.of Count	8
MOC-104 Overload Alarm No.of Count	7
MOC-105 Overload Alarm No.of Count	1
MOC-106 Overload Alarm No.of Count	1
Heater SCR Overload Alarm No.of Count	42
LSL102 Low Level In T-101 Alarm No.of Count	67
LSL101 Low Level In DEC-101 Alarm No.of Count	1
LSH102 High Level In FS-101 Alarm No.of Count	6
PSL101 Compressed Air Press Low Alarm	19

OVERVIEW

ALARM HISTORY

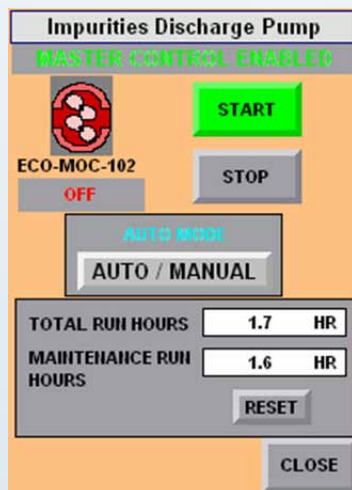
ALARM COUNT-1

Pressing the ALARM COUNT Button while in the Alarm History screen can access the Alarm Count screen. Alarm counts can be seen on Alarm Count Screen.

6.2.6- Pumps Popup :



These are pumps pop-up screen. To operate this screen has options like "AUTO / MANUAL Mode". Operator can view "TOTAL / MAINTENANCE RUN HOURS". "RESET" button will reset the maintenance run hours of the pump.

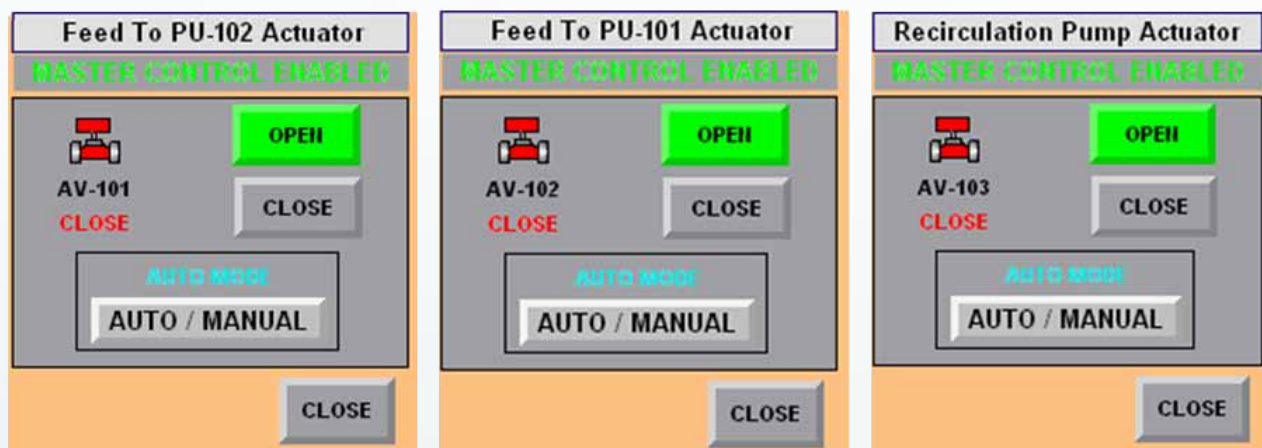


These are pumps pop-up screen. To operate this screen has options like "AUTO / MANUAL Mode". Operator can view "TOTAL / MAINTENANCE RUN HOURS". "RESET" button will reset the maintenance run hours of the pump.

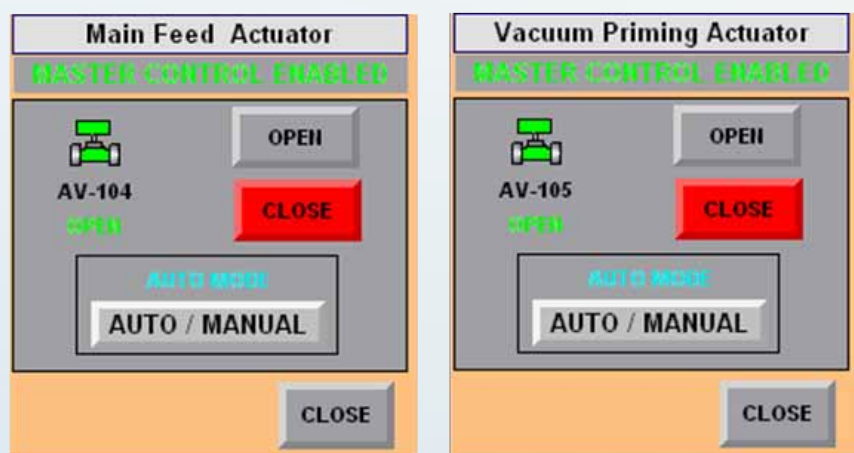


These are pumps pop-up screen. To operate this screen has options like "AUTO / MANUAL Mode". Operator can view "TOTAL / MAINTENANCE RUN HOURS". "RESET" button will reset the maintenance run hours of the pump.

6.2.7- Valve Popup :



These are valves pop-up screen. To operate valve this screen has options like AUTO /MANUAL.



These are valves pop-up screen. To operate valve this screen has options like AUTO /MANUAL.

7 - FAULT MESSAGES & TROUBLESHOOTING

Note : All faults must be reset to «start» the system. To reset the faults, correct the problem and touch the “ACK” key. After faults have been reset, the red alarm banner will disappear.

7.1 - Troubleshooting Faults Checklist

INSPECTOR: _____ DATE: _____

ITEM	DESCRIPTION OF PROBLEM	(Y/N)	POSSIBLE SOLUTIONS
1.	Recirculation Pump Motor Overload Alarm		<p>If the Recirculation pump motor is overloaded and results in a trip condition then main control panel must be opened and the motor protector must be «reset». (By qualified electrician). If the problem continues check pump motor amperage on each phase.</p> <p>Press “ALARM ACK” key to acknowledge the alarm. Press “RESET” button to reset the alarm.</p>
2.	Feed Pump Motor Overload Alarm		<p>If the Feed pump motor is overloaded and results in a trip condition then main control panel must be opened and the motor protector must be «reset». (By qualified electrician). If the problem continues Feed pump motor amperage on each phase, must be checked.</p> <p>Press “ALARM ACK” key to acknowledge the alarm. Press “RESET” button to reset the alarm.</p>
3.	Air Pressure Low Alarm		<ul style="list-style-type: none"> • Check air pressure, MUST BE > 120 P.S.I.G. • Check Air transducer calibration, adjustment information is located on side of sensor • Check air dump, wait 10 seconds before reset • Reset Main Disconnect handle and then wait 5 seconds before turning back on. • Check for closed Manual valves, wait 10 seconds before reset. <p>Press “ALARM ACK” key to acknowledge the alarm Press “RESET” button to reset the alarm</p>
4.	Chilled Water Flow LOW		<ul style="list-style-type: none"> • Check Chilled water supply. • Check Water Flow switch working properly. • Check chilled water supply pump overload alarm. <p>Press “ALARM ACK” key to acknowledge the alarm Press “RESET” button to reset the alarm</p>

7.1 - Troubleshooting Faults Checklist (cont'd)

ITEM	DESCRIPTION OF PROBLEM	(Y/N)	POSSIBLE SOLUTIONS
6.	Vapor Temp. High		<ul style="list-style-type: none"> Fault occurs when temperature exceeds vapor temp high set point. Check Vapor temperature. <p>Press "ALARM ACK" key to acknowledge the alarm Press "RESET" button to reset the alarm.</p>
7.	Bottom Temp		<ul style="list-style-type: none"> Fault occurs when temperature exceeds temp high set point. Check temperature transducer. <p>Press "ALARM ACK" key to acknowledge the alarm Press "RESET" button to reset the alarm.</p>
8.	Water Temp RTD Burn out / open		<ul style="list-style-type: none"> Located in Chilled water return path Check Calibration on sensor and receiver. <p>Press "ACK" key on alarm banner to see if it resets Press "RESET" button to reset the alarm.</p>
9.	Vapor Temp RTD Burn out / open		<ul style="list-style-type: none"> Located on top of the vessel Check Calibration on sensor and receiver. <p>Press "ACK" key on alarm banner to see if it resets Press "RESET" button to reset the alarm</p>
10.	Bottom Temp RTD Burn out / open		<ul style="list-style-type: none"> Located at bottom side of vessel. Check Calibration on sensor and receiver. <p>Press "ACK" key on alarm banner to see if it resets Press "RESET" button to reset the alarm</p>
11.	Vessel (Istpure-FS-101) Level High		<ul style="list-style-type: none"> Fault occurs when solvent level inside vessel is greater than High level +10% Located on top of the vessel <p>Press "ACK" key on alarm banner to see if it resets Press "RESET" button to reset the alarm</p>
12.	Vacuum Low		<ul style="list-style-type: none"> Check distillate tank level. Check vacuum pump overload alarm. Check position of vacuum pump suction actuated valve. <p>Press "ACK" key on alarm banner to see if it resets Press "RESET" button to reset the alarm.</p>
13.	Vessel (Istpure-DEC-101) Level Low		<ul style="list-style-type: none"> Fault occurs when liquid level inside clean tank is low located at top of Tank. Check vapor temperature at top of Flash still. <p>Press "ACK" key on alarm banner to see if it resets Press "RESET" button to reset the alarm</p>

7.1 - Troubleshooting Faults Checklist (cont'd)

ITEM	DESCRIPTION OF PROBLEM	(Y/N)	POSSIBLE SOLUTIONS
14.	Dirty solvent feed temperature low(TE-101)		<ul style="list-style-type: none"> • Check hot oil supply temperature. • Check Hot oil supply pump overload alarm. • Check hot oil supply tank level. <p>Press "ACK" key on alarm banner to see if it resets Press "RESET" button to reset the alarm.</p>

COMMENTS : _____

7.2 - Additional Trouble Shooting

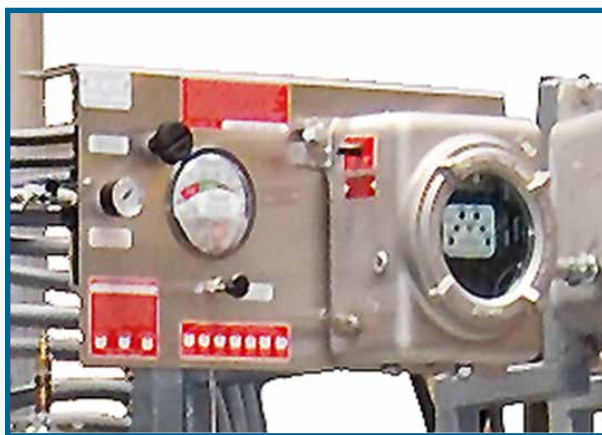
Control Panel Trouble Shooting : Refer to blueprints for locations and wiring details when troubleshooting faults as listed below.

Blackout of Operator Interface : Check fuse located at the back of the terminal. Check if power cable is secured. Check the secondary fuse on transformer TX-1. Check wiring. Reference: Electrical Schematics.

Blackout of PLC : Check fuse to the processor. Outputs and inputs have separate fuses and should be checked if all the lights are out on the card or cards. Check PLC runs light (on) battery (off) and CPU (off). If out of sequence PLC will not operate. Reference Electrical Schematics.

Complete blackout : Check power supply to the main disconnect on the panel. If a purge panel is provided see «purge panel». If main power is as listed on the name plate, check the fuses on the primary and secondary side of the control transformer. If an «emergency» stop button is provided, test for continuity when «power is off». Reference Electrical Schematics.

7.2 - Additional Trouble Shooting (cont'd)



Operator interface: (The following applies to customers with the Ethernet hub option). Failure to communicate may be a result of a loose communication cable between the PLC and HMI.8 Check if Interface displays a message on the screen.

Input / output failure: «see blackout of PLC». If a specific I/O is not functioning observe I/O lights on the card. Reference I/O number on blueprint to specific item on the card.

All inputs are 24V DC. If device can be manually activated then verify input to light on the input card. Light should go «on» or «off» as positions change. < 50 V DC is indicated with a conductor color of Blue.

All outputs are 24V DC. Check output light on card and verify voltage at the card and the terminal strip if used. Output card supply fuse should be checked if no lights appear, when the system is started. Outputs are indicated with a conductor color of Blue. <120V AC but not less than 50V DC is indicated with a conductor color of Red.

8 - SAFETIES

8.1 Safety Features

The processor through individual RTD's monitors the temperature continually positioned in these areas. RTD failure will result in a shutdown of the system. All RTD's provide temperature readings to the processor. These readings are used to control the process and provide high limit protection. All limits are adjustable for high limits. Do not remove factory seal.

Note : Maximum allowable temperature may vary according to your application.

8.2 Hazards & Warnings

In order to operate the system safely, be sure qualified personnel check the safeties monthly.

Never : Bypass a safety for testing or operating.

Never : Attempt to operate a unit with safeties bypassed.

Never : Operate or test a unit when connections piping or assemblies are leaking.

Never : Replace any item with a temporary component without consulting a factory representative.

Never : Allow anyone other than qualified personnel to service the unit.

Never : Service or attempt to correct a problem with the electrical power supply on. Ensure proper disconnection of wash supply and return lines before servicing.

Never : Service the unit if solvent is present in the system.

Never : Crawl into the distillation system because it is deemed confined space unless system is locked out and the scrapers need to be adjusted. Caution when entering vessel. VOC's may be present.

Always : Ensure flammable liquids are kept out of and away from the unit.

Always : Use caution in loading and unloading the system to reduce the possibility injury.

Always : Wear protective gloves, glasses, respiratory equipment and clothing when loading and unloading the unit.

Always : Do a visual inspection for leaks upon start-up.

9 - MAINTENANCE

During the testing or trouble shooting of the Fractionation Unit it is recommended that you review the manual for operating procedures, safeties and warnings listed in various sections.

9.1 - Monthly Inspections Include

- A.** Visual inspection of the flange joints to determine if leakage is occurring.
- B.** Check all piping to see if any blocking has occurred.
- D.** Inspection of piping and components within the system for leaks. Tighten unions, flanges to reduce the possibility of leaking caused by normal vibration of the fractionation unit.
- F.** Keep operator interface touch screen clean - Do not use solvent. Hand wipe or use soap and water. Clear plastic may be taped to the face and periodically changed.
- G.** Visual check of level sensors to ensure materials are not accumulating that will cause false alarms.
- I.** Check mechanical seals on pressure pumps by a visual inspection of the seal area to determine if a leak are present. Use manufactures procedures for replacement of seal or other components.
- J.** Check all motors, gears, and/or pumps to see if they require any priming.
- K.** Ensure connection to ground. Check equipment ground and bonding to building ground system.
- L.** On completion restore all utilities required to operate the system and observe at least one operation with a qualified operator to ensure the system is functioning properly.

10 - WARRANTY

Warranty period extends for 12 months after commissioning and not more than 15 months from the shipping date. All systems are tested at the factory prior to shipment. The manufacturer is not responsible for defects or damages resulting from the shipping or from the usage of our equipment. This includes corrosion or misuse of the system or components that results in damages or excessive wear.

In no event shall "Istpure" be liable for any direct, incidental or consequential damages from the sale or use of our product. This disclaimer applies both during and after the term of this warranty.

Customer failure to provide information or adequate analysis of the chemicals being processed could result in excessive wear or damages to the system and will result in loss of warranty.

Component replacement which become defective during the conditions set forth by the manufacturer will be replaceable free of charge provided they were not subjected to corrosion and comply with the conditions and warranty offered by the supplier or manufacturer. Exclusions include gaskets, pump packing, mechanical seals and pumps subjected to normal use.

We will repair or replace components deemed defective during the commissioning of the system without cost. Services of a field engineer will be provided at current rates if specialized knowledge beyond the scope of normal and routine servicing is required. The customer at no charge will provide Normal and routine servicing and component replacement to Istpure. No claims for loss, damage or labor will be allowed.

11 - GUARANTEES

No guarantees are implied or intended regarding performance of the system. The system is designed to be compatible with the chemicals being processed based on information provided by the customer. The system is designed to wash parts covered with materials that have not hardened or cured. The unit should not be unnecessarily loaded with containers that are partially or full of product to prevent blockage of nozzles and prohibit cleaning. Performance assessments are directly related to these conditions and due to production inconsistencies are impossible to guarantee.

12 - WARRANTY INFORMATION / TECHNICAL ASSISTANCE

International
Surface
Technologies

**For more information, prices or technical assistance,
contact your local IST distributor or call / fax our
Consumer Information Numbers :**

Tel. : **1 800 361-1185** Tel. : **450 963-4400** Fax : **450 963-5122**

Or visit us at :

www.istbpure.com

Istpure would like to thank you for your recent purchase of our product line. Please complete the card below and either mail or fax it to our office so that we may start the warranty of your product and keep you up to date on the EPA regulations by fax. Again, thank you for your purchase and if you have any suggestions or comments, please feel free to contact our office.

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