

**INSTALLATION
OPERATION
MAINTENANCE**

FOR

CONDENSATE LIFTING PUMP



SAKTHI INDUSTRIES

NO.: 1, 10TH STREET, KAMARAJAR ROAD,
TASS INDUSTRIAL ESTATE, AMBATTUR, CHENNAI,
TAMILNADU, INDIA-600 098
PHONE NO.: 044- 2625 8502

EMAIL ID.: sales@excelvalves.com, WEB: www.excelvalves.com

1. Introduction

EXCEL Condensate Lifting Pumps are designed for the transfer of condensate from an area of steam utilization to the point of steam generation i.e. the boiler house. This condensate can then be used as an ideal source for boiler feed water. The CLP is essentially a mechanical pump, which drives its motive force from the pressure of a motive gas, usually steam or compressed air. The main advantages of using mechanical pumps are: lower operating cost, less maintenance, higher reliability, no pump cavitation due to high temperature etc.

EXCEL CLP are supplied as a complete skid mounted unit, inclusive of the condensate receiver, inlet piping with required head, the main pumping unit, accessories for controlling the operation of the pump and a flow meter with Totaliser for measuring the quantity of condensate flow.

2. Operating Principle:

The Condensate Lifting Pump System (CLP) operates on a positive displacement principle. Its operation is as follows:

Filling Mode: In the filling stroke, the condensate from a receiver flows by the gravity head into the main pump body. As the condensate level in the tank rises, during this period, the exhaust valve is held open so that the air inside the main pump is replaced by the condensate and air is vented.

Transition to Pump Mode: As soon as the condensate reached to the Max. Position, The exhaust valve will be closed automatically and controller opens the steam inlet valve. The steam rushes in pressurizing the pump to the steam pressure. This steam exerts pressure on the water in the pump. As the water cannot flow backwards from the condensate inlet (due to the NRV), it gets pumped out through the condensate outlet.

The condensate is now pumped back to the boiler feed water tank. It is important to note that the steam is not used up to pump the water – only the pressure exerted by the steam is used as a motive force. Hence the steam consumption is very little.

Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps

Also, during the Pump Mode, the quantity of condensate pumped is exactly equal to the volume of water between the two Float positions and therefore each pump stroke represents a fixed amount of condensate returned. The number of strokes is recorder by the controller, and multiplied by the fixed volume to quantify the total condensate returned to the boiler house.

Transition to Filling Mode: As soon as the float reaches to Lower position the controller closes the steam inlet valve during which exhaust valve opens automatically. The small quantity of steam in the pump is exhausted, and the pump body returns to atmospheric pressure. As soon as this happens, the positive gravity head enables the condensate to start filling into the pump, and the cycle is repeated.

3. SPECIFICATIONS:

Operating Conditions:

EXCEL Condensate Lifting Units are designed to operate under the following conditions:

Operating motive pressure: 1.5 to 9 kg/cm² (g)

Electrical Specifications

Input supply Voltage: Single phase 230V AC only

Input Supply Frequency: 50 Hz

Mechanical Specifications

Protection Rating: IP65

Totalizer Protection Rating: IP40 (Panel Mount)

Ambient Temp: 0 to 50 degrees C

Steam Consumption: 2.2 kg/ ton of liquid pumped

Materials:

Main Pump Body: IS1239 Class C

Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps

Condensate Receiver: IS1239 Class C

Steam, Condensate & Overflow Piping IS1239 Class C

Air Inlet & Outlet Flanges: MS Flanges ASA # 150

Steam / Air Inlet Valve: Pneumatically actuated SS Angle valve.

Condensate Inlet Valve: Butterfly valve with EPDM seat

Condensate Inlet Strainer: CS

Disc Check Valves: ASTM A 351 – CF8 (Trim AISI316)

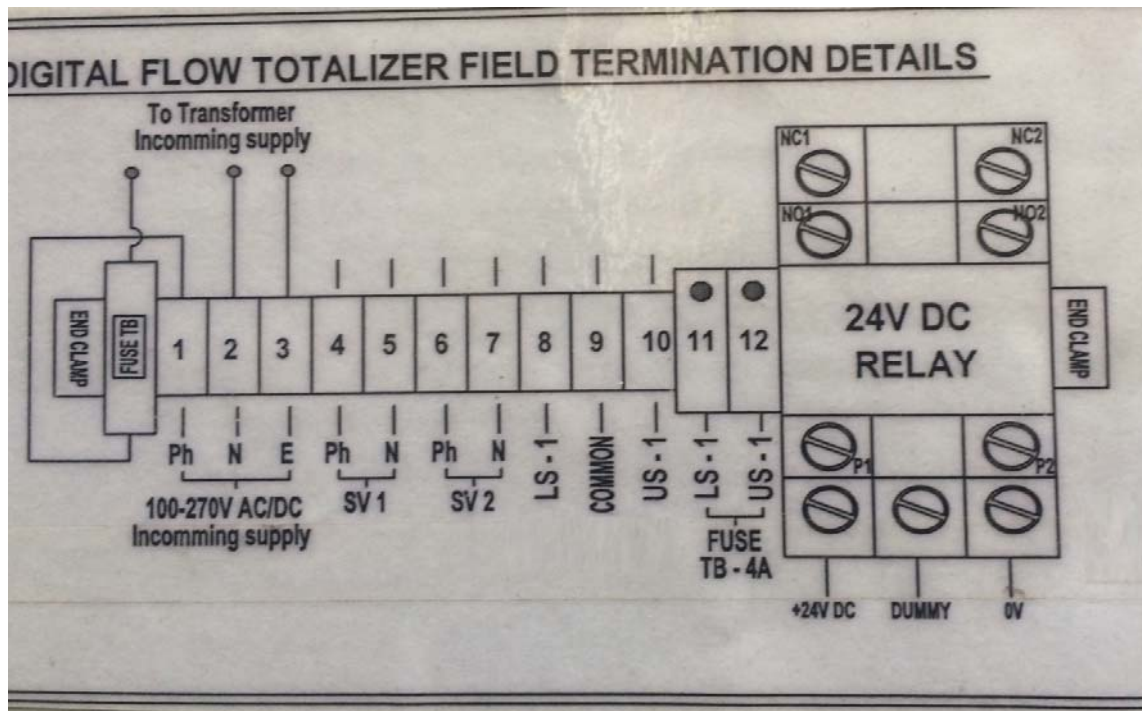
Motive Line isolating valve: SS 316 Ball Valve, PTFE Seal

Skid & Frame Assembly: MS IS2062

Gaskets: CAF

4. INSTALLATION:

Wiring: Please refer below connection diagram for connecting Flow Totaliser and Solenoid Valves, Float level Sensor. Incoming Supply Point No.:3, Earth connection is mandatory.



Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps

Mechanical Installation:

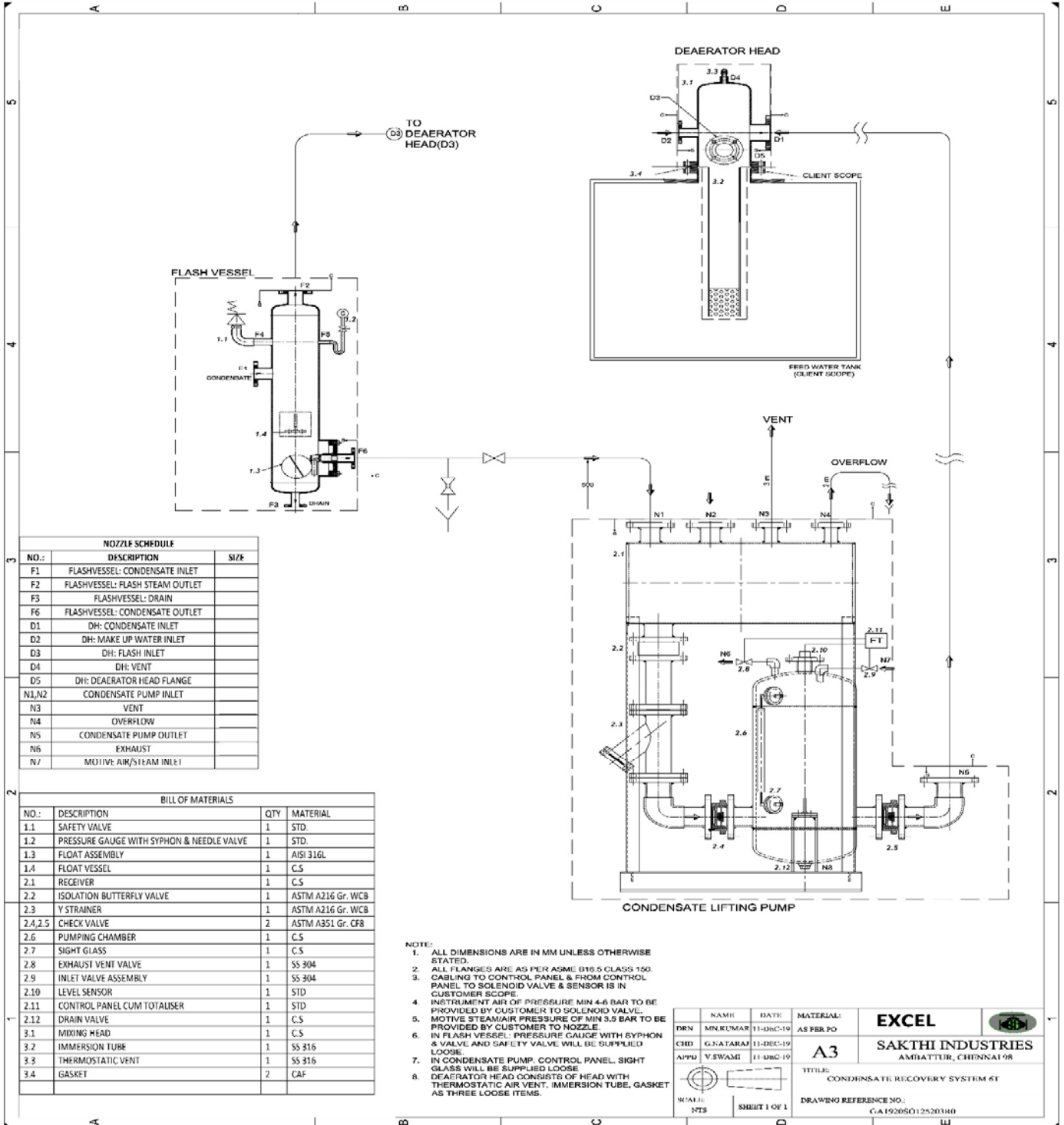
A) Before starting the installation, ensure that all steam, air and condensate lines are closed. All pipes required to complete the installation should be as per the drawings /recommendations provided by EXCEL.

B) The CLP packaged unit should be installed in such a way that the condensate from the various steam traps should have no back pressure on them i.e. the condensate should flow into the receiver by gravity. The CLP unit should be placed on a level floor with the help of suitable level gauge. As the overflow/Vent line for the receiver may drains to the bottom of the unit, a provision should be available for draining the excess condensate if overflow conditions are expected.

C) Connect the condensate discharge lines to the receiver unit through the flanges provided on top of the receiver. There are four connections on top of the receiver, flanged ASA # 150, of which two may be used for condensate, while one is reserved for venting and one is for overflow. Venting is required to ensure gravity flow of condensate by gravity from the receiver to the main pumping chamber. In case there are more number of condensate lines, fabricate a separate header to collect condensate before the receiver. As the receiver is designed for atmospheric pressure operation, the condensate should be at a low pressure, In case condensate is available at high pressure, consider the use of EXCEL Flash Separator to reduce the condensate pressure as well as generate flash steam from the condensate.

D) Connect the outlet of the Pump Unit to the condensate return line going to the feed Water tank. For best performance, we recommend that the vertical head should be overcome immediately after the pump, and from the highest point in the return line, the condensate will flow by gravity to the feed tank. For optimum results at the feed tank, and to mix condensate with make-up water, consider the use of an EXCEL Deaerator heads /Injectors.

Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps



Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps

7  Fig.: Typical Installation of Condensate recovery system

E) Connect the operating motive medium (normally Air) to the inlet on top of the pump unit, to the inlet isolation ball valve, Install a pressure gauge on the motive steam / Airline, Ensure that the steam / Air supply pressure is as recommended by SI. Higher steam pressure could cause damage to the solenoid valves used in the system. A safety valve is a good precaution if consistent pressure is not likely to be available.

F) The exhaust line should be piped to the steam space being vented without any restriction. As this line will discharge steam / Air periodically the exhaust.

5. MAINTENANCE:

*Strainers:

The condensate inlet line is provided with strainer to prevent welding slag, dirt and other particles from damaging the critical components of the unit. These strainer have a mesh in it which needs to be cleaned periodically to prevent choking. We recommend that this is done quarterly. Before removing any of the components of the system, ensure that all connections to the unit i.e. electricity, steam and condensate are switched off / isolated to prevent injury to personnel or damage to the unit.

*Other parts:

However, in extreme conditions of dirt or particles getting into the main pump unit, the float may get stuck on the inlet tube, ceasing the operation of the pump in such a case remove the top flange of the main pump unit, noting the orientation of all lines, Check that the inlet tube is clean and the float moves freely on it Wipe the inlet tube clean of scale or deposit Refit the top flange replacing any gaskets if required.

The check valves on the inlet & outlet of the pump are spring loaded Disc Check Valves. The disc in these valves sits on a metal seat, and any particles getting lodged on the seat can cause a leak in the valve in the reverse direction. The check valves can be removed by opening three of the four flange bolts and swinging the valve out. It may then be

Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps

inspected and cleaned. While replacing the valve, check the condition of the gaskets, and ensure that the valve is properly positioned.

The internals of the unit are factory assembled and tested and should not be tampered with as far as possible. We do recommend any user servicing of their parts, and checks are required annually, with the help of EXCEL Trained service personnel's.

6. TROUBLESHOOTING:

Double check wiring connections between Flow totaliser and Level Float Sensor, and Solenoid Valves as per wiring drawing.

* No display on Flow Totaliser:

The most likely reason for this is the power supply. Check on terminals of the Totalizer to ensure that power supply is reaching the unit.

Check for presence of power supply to the unit. Also, inspect the fuse to see that it is not blown, and replace with a 240 V glass fuse. Do not use a larger resisting fuse as this can cause damage to the unit.

If supply is available, but the display is blank, please contact EXCEL.

*Pump does not work on Start-up, but display is ON:

Usually the pump will start as soon as power supply and required air supply was given, If not follow the below procedure to trouble shoot:

a) The pump may not be filling, Check that condensate inlet butterfly valve is open (the handle will be in line with the piping in open position) If the valve is open, the strainer may be choked. Clean and replace the mesh if required.

Note: If the float is in lower position more than 40 Seconds, then the totaliser panel will show Low Error [LOErr]

b) If the pump is filling, but condensate overflow through exhaust angle valve line, so check the following: May be Angle Valve or Solenoid valve defective if Wiring and Air supply is correct. CLU may not pump the condensate if the motive air supply is closed or if the pressure is not sufficient. Check that the steam / Air inlet ball valve is open, and that the pressure is at least 0.5 to 1 bar higher than the static head against which the pump is discharging. The static head can be approximated as follows: back pressure = (lift in m X 0.1) + return line pressure. For example, if the pump is discharging to an overhead feed tank at height of 30 m and the feed tank is at atmospheric pressure, the back pressure = (0.1 X 30) + 0 = 3 Bar g. So the steam pressure should be at least 3.5 Barg. Also check other compressed air lines to Solenoid Valves. If problem persist follow, Check whether solenoid valves are working or not. If it is not replace the defective part. If it is ok, check whether Angle valve is working or not. If it is not, replace the Angle valve.

Note: If the float is in upper position (fully filled) more than 300 Seconds, then the totaliser panel will show High Error [HIErr]

***Pump appears normal, but condensate overflows:**

The condensate is collected in the receiver before flowing into the pump by gravity. If the receiver overflows, it means that the condensate is not being pumped as fast as it is accumulating in the receiver. This may happen if the pump is not sized properly, and the flow capacity of the pump is less than the quantity of condensate or inlet condensate pressure is high. Check the capacity table to see if the capacity is sufficient. The pump may not be filling quickly if there is any choking or restriction in the condensate inlet line. Check the butterfly valve is in fully open position, and the strainer mesh is not choked.

7. SERVICE & SPARES

The EXCEL CLU unit has a 1 year warranty. We stock circuit boards, valves, strainers and other components for immediate exchange after we have isolated the cause of the problem. Out of warrant repairs are done on a flat fee basis after the warranty has expired, or under the terms and conditions of a valid Annual Maintenance Contract.

Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps

Spare Parts

The following EXCEL original spare parts are available:

*Gaskets

Gasket Kit for CLU 25/40/50/80/100/150

SS Mesh for Strainers

Mesh for Strainer, pack of 5

Size – ½" / 1" / 1 ½" / 2" / 3" / 4" / 6"

*Valves

Condensate Inlet Valve, Size - 1" / 1 ½" / 2" / 3" / 4" / 6"

*Steam Inlet Ball Valve, ½"

*Steam Inlet Control Valve

*Steam / Air Exhaust Valve

***Condensate Inlet /Outlet Check Valve,**

1" / 1 ½" / 2" / 3" / 4" / 6"

Set of internals (Float & Guide Tube)

***Flow Totaliser**

Excel Brand IBR/ Non IBR Globe, Gate, Bellow Seal Valves, Ball Valves, Control Valves, Pressure regulating valves, NRV, Y Strainers, Safety Valves, Ball Float & Venturi Traps