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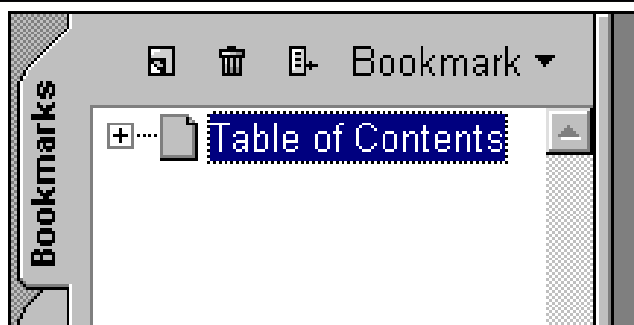
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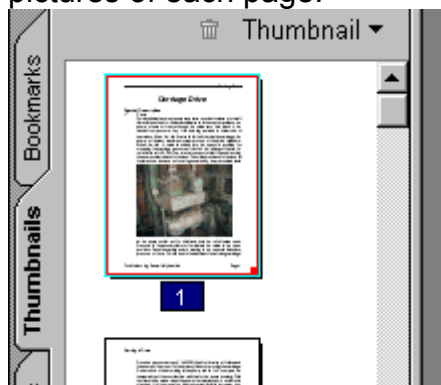
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Konus Burners, Primary, and Vat Pumps

Symbol Description

AV1 Air Pilot Valve

When the valve solenoid is de-energized, pilot pressure to the No. 3WV valve is ported to the atmosphere. This allows the stem of the No. 3WV valve to move downward. When the stem is fully down, as in the emergency mode, flow from the operating vat pump will be directed through the valve and return to the Konus. When the valve solenoid is energized, the pilot valve spool will shift to the closed position. Air flow from the pilot chamber to the atmosphere is then blocked. AV1 is a normally open, two position, two way, single solenoid, spring return, directional valve.

AV2 Air Pilot Valve

This valve is energized and de-energized to control the position of the No. 3WV valve. When this solenoid energizes, the pilot valve spool will shift open. The AV1 valve will be energized at the same time. This permits air pressure to flow into the pilot chamber of the No. 3WV three-way valve. This permits the valve stem to move upward. When in the fully up position, oil will flow from the primary pump through the No. 3WV valve and return to the Konus burner.

AV3 Air Pilot Valve

When the system is operating in the normal mode, the solenoid on this valve is energized. Air pilot pressure is then directed to shift the No. 2WV two-way valve into the open position. The stem on the No. 2WV valve will move toward the pilot head in this condition. There is an orifice plate inside the No. 2WV valve. This orifice plate will limit the maximum flow through the valve for a given inlet pressure.

In the emergency mode of operation, the No. AV3 solenoid de-energizes. The spring inside the pilot head will then force the stem toward the valve, shifting it to the closed position. Flow from the operating vat pump will then be ported through the No. 3WV valve then to the Konus burner. AV3 is a normally closed, two position, three way, single solenoid, spring return, directional valve.

AV4 Air Pilot Valve

During normal operation of the system, the solenoid on this valve is energized. The pilot spool will then shift, directing pilot pressure to shift the EV2 two-way valve to the closed position. This blocks flow from the Konus burner to the suction port of the operating vat pump.

In the emergency mode of operation, the air pilot valve solenoid de-energizes. Air pressure in the pilot chamber is then directed to the atmosphere. The spring in the pilot head will shift the EV2 valve to the open position. A flow path is now created from the Konus burner through the valve and to the inlet of the operating vat pump. The oil is then ported through the HE heat exchanger located in the log ponds. The heat is dissipated to the ponds in this mode. The flow is then ported through the No. 3WV valve and back to the Konus burner. AV4 is a normally closed, two position, three way, single solenoid, spring return, directional valve.

AV5 Air Pilot Valve

During normal operation of the system, the solenoid on this valve is energized. The pilot spool will then shift, directing pilot pressure to shift the EV1 two-way valve to the closed position. This blocks flow from the Konus burner to the suction port of the operating vat pump.

In the emergency mode of operation, the air pilot valve solenoid de-energizes. Air pressure in the pilot chamber is then directed to the atmosphere. The spring in the pilot head will shift the EV1 valve to the open position. A flow path is now created from the Konus burner through the valve and to the inlet of the operating vat pump. The oil is

then ported through the HE heat exchanger located in the log ponds. The heat is dissipated to the ponds in this mode. The flow is then ported through the No. 3WV valve and back to the Konus burner. AV5 is a normally closed, two position, three way, single solenoid, spring return, directional valve.

BO2 Temperature Switch

The switch is set at 140°C and is used to bypass the flow setpoints at start-up. On initial start-up, lower flow rates will exist through the FO orifices because of the colder oil. Once the oil temperature rises to the setting of the switch (140°C), the flow meters (FM1 and FM2) must read above 300. This means that the pressure drop across the specific orifice is above .3 BAR. This switch is labeled “Inlet Temperature Too Low” in the PLC program.



BT Buffer Tank

As the oil is heated and cooled, it will expand and contract respectively by 7% for every 100° of temperature. As the oil expands, it will flow into the buffer tank. Some of the heat in the buffer tank will be dissipated through the walls and to the atmosphere. This permits the oil to cool before flowing into the level tank. The buffer tank is located below the level tank. Therefore, the buffer tank will be full of oil at all times.



CV1 Check Valve

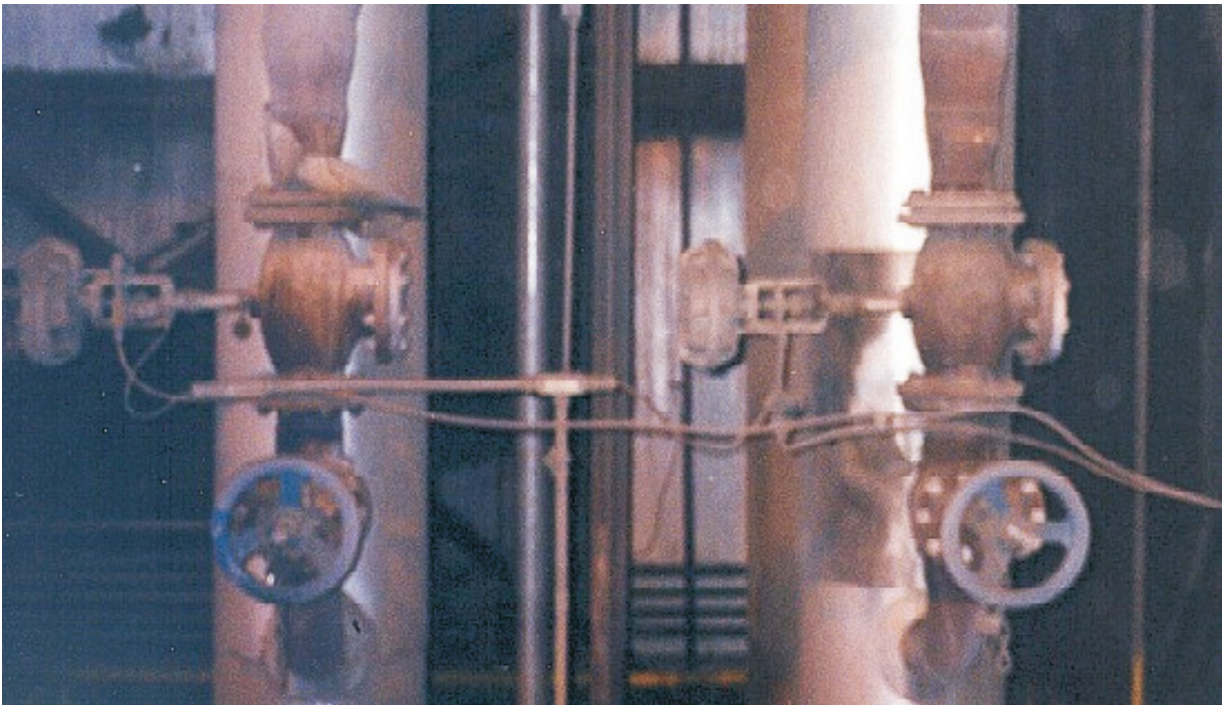
This check valve will permit free flow from the primary pumps to the inlet of the operating vat pump. When in the normal operating mode, the No. 2WV valve will be shifted open allowing some of the oil that exhausts out of the ponds heat exchanger, to flow to the vat pump's suction. This check valve will block the oil flow out of valve No. 2WV to the No. 3WV valve but allow free flow from the primary pumps to the operating vat pump's suction.

CV2 Check Valve

This check valve will allow the return oil to flow back to the Konus burners. When the MV1 manual valve is opened this check valve will block the primary pump's volume to the return line.

EV1 Directional Valve

This valve is controlled by the AV5 air pilot valve. When in the normal mode of operation, the AV5 solenoid is energized, which directs pilot pressure to shift the EV1 valve closed. Flow is blocked from the operating Konus burner to the suction of the vat pump. In the emergency mode of operation, the AV5 solenoid will de-energize. Air pressure holding the valve closed will then be ported back to the atmosphere. This permits the EV1 valve to shift open. This creates a flow path from the No. 1 Konus burner to be ported to the suction line of the operating vat pump. The vat pump will then port the oil through the HE heat exchanger located in the log pond. The heat exchanger will dissipate the heat in the oil to the ponds. The thermal oil will then flow through the No. 3WV valve and back into the No. 1 burner.



EV2 Directional Valve

This valve is controlled by the AV4 air pilot valve. When in the normal mode of operation, the AV4 solenoid is energized, which directs pilot pressure to shift the EV2 valve closed. Flow is blocked from the operating Konus burner to the suction of the vat pump. When in the emergency mode of operation, the AV4 solenoid will de-energize. Air pressure holding the valve closed will then be ported back to the atmosphere. This permits the EV2 valve to shift open. This creates a flow path from the No. 2 Konus burner to be ported to the suction line of the operating vat pump. The vat pump will then port the oil through the HE heat exchanger located in the log pond. The heat exchanger will dissipate the heat in the oil to the ponds. The thermal oil will then flow through the No. 3WV valve and back into the No. 2 burner.

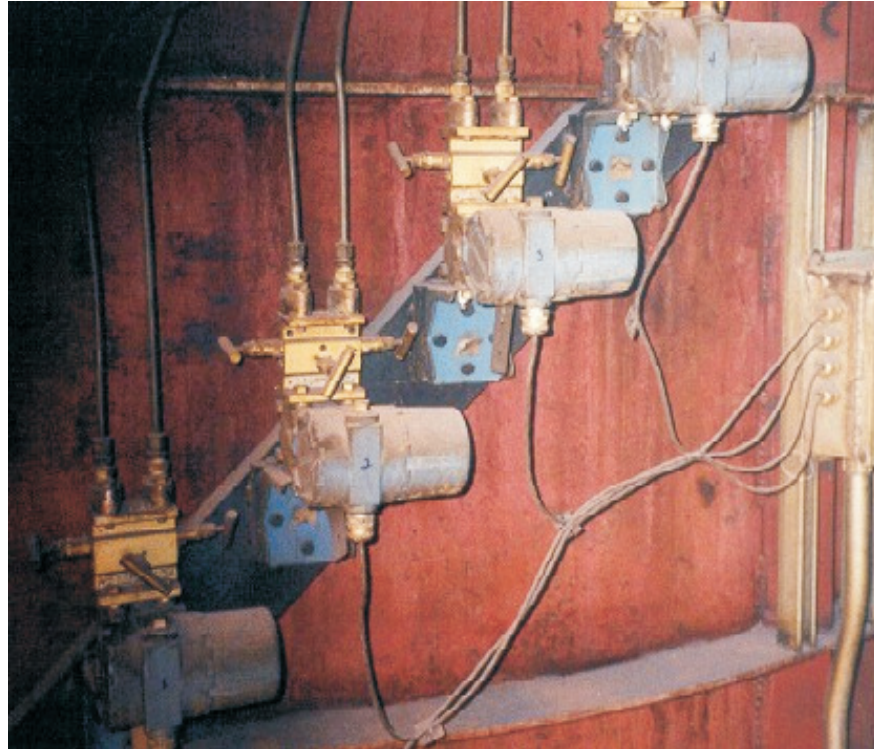
F1 Filter

This filter will remove particles of contamination from the flow supplied by the vat pumps prior to being ported through the No. 3WV valve. The filter should be changed or cleaned regularly to prevent contaminants from entering the valve and operating Konus burner.

FM1 - FM2 Flow Transducers

These transducers are used to monitor the flow through the orifice plates at the burner outlets. There are four transducers on each burner to monitor the pressure drop across the four orifices. For a given pressure drop across the FO orifice, a specific flow rate will be maintained for a given oil temperature. The flow meter scale is 0 – 600, which represents a 0 - .6 BAR pressure drop across the orifice. Once the temperature is above the BO2 setting (140°C), a reading of 300 (.3 BAR) or above should be read. The normal pressure drop indicated by the meter is approximately .425 BAR. If the pressure difference drops below .1 BAR, the burner is shut down. This will occur if the No. 1 and 2 meters or the No. 3 and 4 meters are reading less than 100 and the oil temperature is not below 140°C as indicated by the BO2 temperature switch. Once this occurs, an alarm delay timer starts for three seconds. The “flow control” safety interlock then

opens and the burner shuts down. The operator will get a “flow control” indication along with an alarm on the panel view. A drop in flow rate could be caused by dirty strainers, worn pumps, bad couplings, or electric motor problems. Make sure all heat exchangers are operating properly and that the proper primary and secondary loop valves are open.



FO Fixed Orifices

These orifices are located at the outlet of the Konus burners. These orifices are used to indicate a pressure drop which will be converted into a flow rate by the FM1 and FM2 transducers. In the normal operating mode these orifices should indicate a pressure drop of .3 BAR or higher. If two of the pressure transducers on the specific burner indicate a flow rate below .1 BAR, an alarm delayed timer will start for 3 seconds. The flow control safety interlock then opens and the burner shuts down. The operator will get a flow control indication

along with an alarm on the panel view. This low flow could be caused by plugged orifices, dirty filters, worn pumps, bad couplings, or electric motor problems. Make sure all heat exchangers are operating properly and that the proper primary and secondary loop valves are open.

FS1 Float Switch

If the fluid level in the level tank drops below this switch, the system will go into the emergency mode of operation. To refill the tank, the FS1 and FS2 switches can be held in position, allowing the level pump to deliver oil, until the oil rises above the FS2 level. The switches should then be released. The tank can also be filled by the fill/drain pump by opening and closing the corresponding manual valves near the level and fill/drain pump.

FS2 Float Switch

When the oil level in the level tank drops below the setting of this switch, the level pump is turned on. Once the FS3 switch is actuated, the pump is turned off.

FS3 Float Switch

When refilling the level tank, the level pump will be turned off when the switch is actuated.

GS1 - GS2 Gas Separators

These will permit the nitrogen in the oil to separate and be vented to the top of the buffer and level tank. The nitrogen is then directed from the top of the level tank back into the drain tank.

HE Heat Exchanger

Oil from the operating vat pump is continuously re-circulated through this heat exchanger, which is used to heat the water in the log ponds. A temperature sensor in the pond will cause the machine controller to position the No. 3WV valve for allowing more or less heated oil to flow from the primary pump to the inlet of the vat pump.

IV Inlet Valve

During normal operation, the valves are open, which will permit oil flow from the Konus burners through the EV1 and/or EV2 valves to the suction ports of the vat pumps in emergency operation. These valves should be closed when changing the vat pumps. Please refer to the “Isolation and Change Out Procedure” for the sequence of opening and closing these valves.

LT Level Tank

Oil is maintained in this tank between the FS2 and FS3 float switches at all times. When the oil level drops below the FS2 position, the level pump located near the drain tank will start. The oil level will rise as the pump delivers oil into the tank. Once the level rises and the FS3 switch actuates, the level pump is turned off. This tank can also be refilled with the fill/drain pump. Specific manual valves will have to be opened and closed to utilize this pump for filling.

If the level drops below the bottom switch (FS1) position, the system will automatically go into the emergency mode of operation. This can occur by a problem with the level pump or drive motor, low oil level in the drain tank, specific valves in the improper position, or a leak in the lines. Once the problem is corrected, the following procedure can be used to refill the level tank; hold the FS1 and FS2 in the normal operating position, which will start the level pump. Once the oil level rises above the FS2 position, the switches can be released.



MV1 Manual Valve

During normal operation, this manual valve is closed. The valve can be opened when necessary to re-circulate the primary pump volume back into the Konus. This can be used to heat the oil.

NO1 Manual Valve

During normal operation this valve is open allowing flow from the primary pump through the CV1 check valve then to the suction of the operating vat pump. The oil flowing through the valve will also be ported to the "B" port of the No. 3WV valve. Closing the valve will block flow from the primary pump through the valve.

NO2 Manual Valve

During normal operation this valve is open. This permits the oil that exhausts out of the “AB” port of the No. 3WV valve to flow back into the Konus burner. Closing this valve isolates the 3WV valve to the Konus burners.

NO3 Manual Valve

This valve is located near the ponds heat exchanger. During the normal mode of operation the valve is open permitting oil flow out of the heat exchanger to the No.2WV and 3WV air operated valves. The NO3 valve should be closed anytime it is necessary to isolate the heat exchanger.

NO4 Manual Valve

This valve is normally open which allows oil flow from the vat pump into the heat exchanger. The valve is located near the heat exchanger. Closing the valve isolates flow from the vat pump to the heat exchanger.

OV Outlet Valve

During normal operation, the outlet valve is in the open position. This permits oil flow from the VP1 vat pump to be directed to the heat exchanger in the ponds. Please refer to the “Isolation and Change Out Procedure” for the sequence of opening and closing these valves when changing the pump.

PP1 - PP2 Primary Pumps

These 1100 GPM, centrifugal pumps are used to supply oil to all circuits and pumps in the thermal oil loop. This includes flow to the vat pumps for heating the log ponds, the secondary and counter heat pumps on the press, the steam generator, and the various heaters located throughout the plant. The No. 1 Konus will supply suction fluid to pump No. 1 and Konus No. 2 supplies oil to primary pump No. 2. Please refer to the “Isolation and Change Out Procedure” for the proper sequence of changing these pumps.



PP3 Stand-By Pump

This 1100 GPM, centrifugal pump is used as a backup for the PP1 or PP2 pump. Specific manual valves would have to be opened to allow oil from the specific Konus to flow into the pump suction. When operating, this pump will supply oil to the vat pump, the press secondary and counter heat pumps, the steam generator, and various heaters throughout the plant.

PSF1 - PSF2 - PSF3 Suction Filters

These filters will remove the contamination from the oil prior to being directed to the primary pumps. These strainers should be changed or cleaned on a regular basis. If the strainer were to become contaminated then cavitation of the pump can occur.

PT1 - PT2 Pressure Transducers

These transducers are used to convert the air pressure in the Konus burners into a proportional signal.

VBV Manual Valve

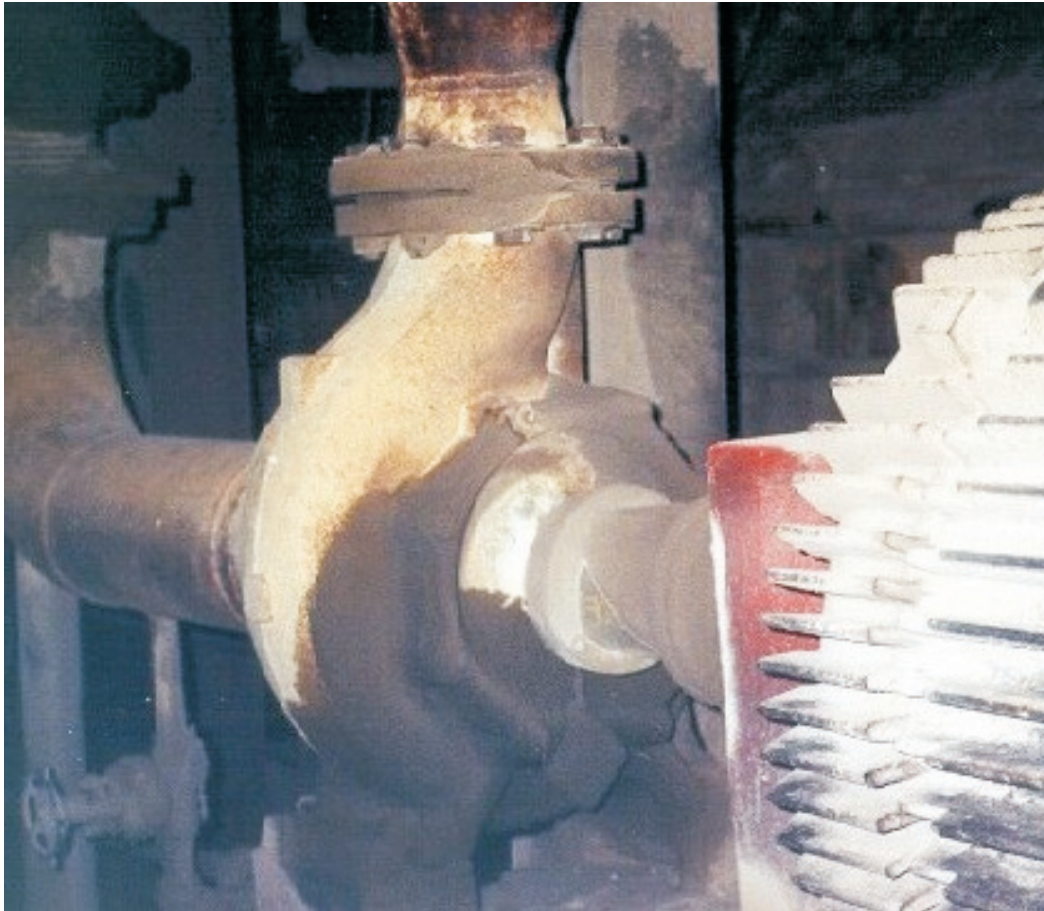
This 2-inch ball valve is located on the top of the level tank. The valve should be open when necessary to vent the volatile gases out of the hot oil system. Please refer to the “Procedure to Vent Volatile Gases Off the Hot Oil System” text located in the miscellaneous section of this manual for the operation of this valve. VDP Vat Drain Pump

This pump is located near the log ponds. The pump can be used when necessary to drain the oil out of the heat exchanger and corresponding line back to the drain tank.

VP1 - VP2 Vat Pumps

These 1100 GPM, centrifugal type pumps are used to supply thermal oil to the HE heat exchanger located in the ponds. Some or all of the volume that flows out of the heat exchanger will return back to the operating pump’s suction through the No. 2WV directional valve. The excess oil will flow through the No. 3WV valve then back into the Konus burner.

In the emergency operation, the No. 3WV valve will port all of the oil that is supplied by the vat pump back to the Konus burner. The No. 2WV valve will be closed in the emergency operation. Please refer to the “Isolation and Change Out Procedure” for the sequence of changing the specific pump.



VSF1 - VSF2 Suction Filters

These filters will remove contamination from the oil prior to being ported to the suction port of the operating vat pump. If the specific filter were to become contaminated then cavitation of the pump can occur. These filters should be cleaned or changed on a regular basis.

2WV Directional Valve

In the normal mode of operation, the AV3 valve solenoid is energized, which shifts the No. 2WV valve to the open position. There is an orifice plate inside the valve that will restrict the oil flow that is ported back to the suction port of the operating vat pump. A temperature sensing probe in the ponds is used to control the No. 3WV valve. The No. 3WV valve will direct the vat pump volume that does not flow through the No. 2WV valve back to the operating Konus burner. If more heat is required to the ponds, then the No. 3WV valve will port more oil back to the Konus. This results in a lower inlet pressure to the No. 2WV valve. Less oil will be ported through the 2WV valve to the vat pump suction. The excess oil required at the vat pump suction that does not flow through the No. 2WV valve will be supplied by the primary pump through check valve CV1. This means that a higher volume of the inlet fluid to the vat pump will be heated, which results in more heat directed through the ponds heat exchanger.

If the heat in the ponds is above the desired temperature, the No. 3WV valve will allow less flow out of the heat exchanger to the Konus burner. This creates a higher pressure at the No. 2WV valve, which produces a higher flow rate. The primary pump will supply less heated oil to the vat pump suction. Therefore, cooler oil will flow through the ponds heat exchanger.

In the emergency mode of operation, the AV3 air pilot valve solenoid will de-energize. This permits the No. 2WV valve to spring return to the closed position. At the same time, the No. 3WV valve will shift, directing the full volume out of the heat exchanger to flow back into the burner. The suction fluid to the vat pump will be supplied from the primary pump (if running) or directly from the burner through the EV1 or EV2 valves.

When the stem moves from the operator toward the valve, the valve is shifting closed. The stem will move out toward the pilot operator when in the open position. No. 2WV is a normally closed, two position, two way, air piloted, spring return, directional valve.



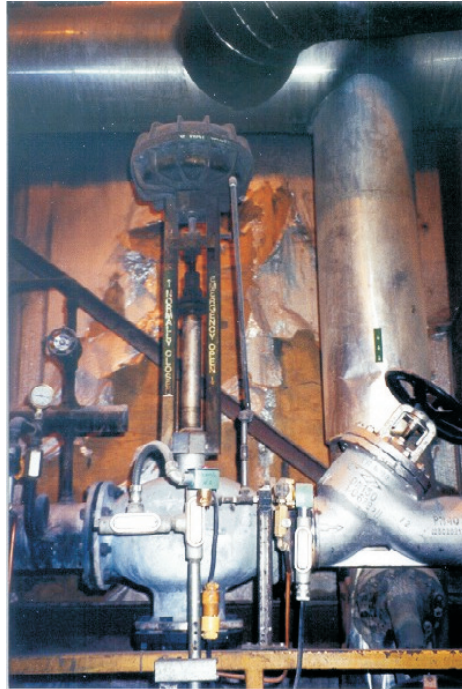
3WV Directional Valve

This valve is primarily used to control the heat of the log ponds. A temperature probe in the ponds will indicate the heat to the machine controller. The valve is controlled by the AV1 and AV2 air piloted valves. In the emergency mode of operation, the two valve solenoids are de-energized, which directs air pressure in the diaphragm to the atmosphere. The spring will then shift the valve stem downwards, allowing the total volume out of the ponds heat exchanger to flow

back into the burner. In this mode, the No. 2WV valve is in the closed position. Therefore, the oil in the burner is directed to the vat pump suction either directly or through the primary pump, if running. This oil is forced through the ponds heat exchanger. This heat is dissipated to the ponds. This prevents the oil in the burners from reaching a dangerously high temperature level.

When the temperature sensor in the ponds indicates that the temperature is too high, the AV1 and AV2 air pilot valves energize. A short timer (1 – 2 seconds) will then start. The valve stem will then move up, which will restrict the flow from the heat exchanger to the Konus burner. This restriction causes a higher pressure at the inlet of the No. 2WV valve. More oil will flow through the orifice plate in valve No. 2WV then back into the vat pump suction. The primary pump will deliver the additional oil required by the vat pump. Once the timer elapses, the AV2 valve is de-energized. Air pressure is then locked in between the air valves and pilot chamber.

If the probe indicates that the temperature is too low, the AV1 valve will energize and the same timer will start. The spring inside the pilot head will then move the valve stem downward, creating a greater flow path from the heat exchanger through the valve and to the heaters. The pressure at the inlet port of the No. 2WV valve will then be reduced. Less flow will be ported through the No. 2WV valve with a lower pressure drop between the inlet and outlet ports. This means that more oil will have to be supplied from the primary pumps to supply what the vat pump is calling for. Once the timer elapses, the AV1 pilot valve will de-energize, permitting the No. 3WV valve to maintain its position. No. 3WV is a normally open, infinite positioning, three way, air piloted, spring return, directional valve.



1 Manual Valve

When the PP1 primary pump is being used to supply oil to the thermal oil circuits, this valve is open. When necessary to bleed the oil out of the pump for replacing, the valve should be closed. Please refer to the "Isolation and Change Out Procedure" for the sequence for opening and closing this valve.

2 Manual Valve

When the downstream PP1 primary pump is used to supply oil to the system, this valve should be in the open position. The valve should be closed when necessary to change the pump or filter. Please refer to the "Isolation and Change Out Procedure" for the sequence of opening and closing this valve.

3 Manual Valve

During normal operation, the valve should be in the closed position. When necessary to change the PP2 pump, this valve should be opened to allow the fluid to be ported back to the drain tank by the drain pump. Please refer to the “Isolation and Change Out Procedure” for the sequence that this valve is opened and closed.

4 Manual Valve

During normal operation, the valve should be in the closed position. When necessary to change the PP1 pump, this valve should be opened to allow the fluid to be ported back to the drain tank by the drain pump. Please refer to the “Isolation and Change Out Procedure” for the sequence that this valve is opened and closed.

5 Manual Valve

When the PP2 primary pump is being used to supply oil to the thermal oil circuits, this valve is open. When necessary to bleed the oil out of the pump for replacing, the valve should be closed. Please refer to the “Isolation and Change Out Procedure” for the sequence for opening and closing this valve.

6 Manual Valve

When the downstream PP2 primary pump is used to supply oil to the system, this valve should be in the open position. The valve should be closed when necessary to change the pump or filter. Please refer to the “Isolation and Change Out Procedure” for the sequence of opening and closing this valve.

18 Manual Valve

During normal operation this valve is open. In the emergency mode of operation the EV1 valve will open allowing flow through valve No. 18 then to the VP1 suction port. When necessary to isolate or change the No. 1 vat pump this valve should be closed. Please refer to the “Isolation and Change Out Procedure for the No. 1 Vat Pump” for the opening and closing of this valve.

21 Manual Valve

During normal operation this valve is open. In the emergency mode of operation the EV2 valve will open allowing flow through valve No. 21 then to the VP2 suction port. When necessary to isolate or change the No. 2 vat pump this valve should be closed. Please refer to the “Isolation and Change Out Procedure for the No. 2 Vat Pump” for the opening and closing of this valve.

22 Manual Valve

This valve is located at the outlet port of the No. 2 vat pump. During normal operation this valve is open. Please refer to the “Isolation and Change Out Procedure for the No. 2 Vat Pump” in the Miscellaneous Section of this manual for the opening and closing of this valve.

23 Manual Valve

During normal operation, the valve should be in the closed position. When necessary to change the VP1 pump, this valve should be opened to allow the fluid to be ported back to the drain tank by the drain pump. Please refer to the “Isolation and Change Out Procedure” for the sequence that this valve is opened and closed.

24 Manual Valve

During normal operation, the valve should be in the closed position. When necessary to change the VP2 pump, this valve should be opened to allow the fluid to be ported back to the drain tank by the drain pump. Please refer to the “Isolation and Change Out Procedure” for the sequence that this valve is opened and closed.

25 Manual Valve

This valve is located by the entrance door to the burner building. The valve is normally closed and is used when necessary to drain the vat pumps outlet main header. Opening this valve will allow air in when draining the header or allow oil out when refilling the header.

26 Manual Valve

This valve is located near the entrance door of the burner building. The valve is closed during the normal operation of the thermal oil system. The valve is used when necessary to allow air in or oil out of the vat pumps suction lines.

27 Manual Valve

This valve is located near the entrance door to the burner building. The valve should be open when necessary to allow air in or oil out of the return lines to the Konus burners.

167 Manual Valve

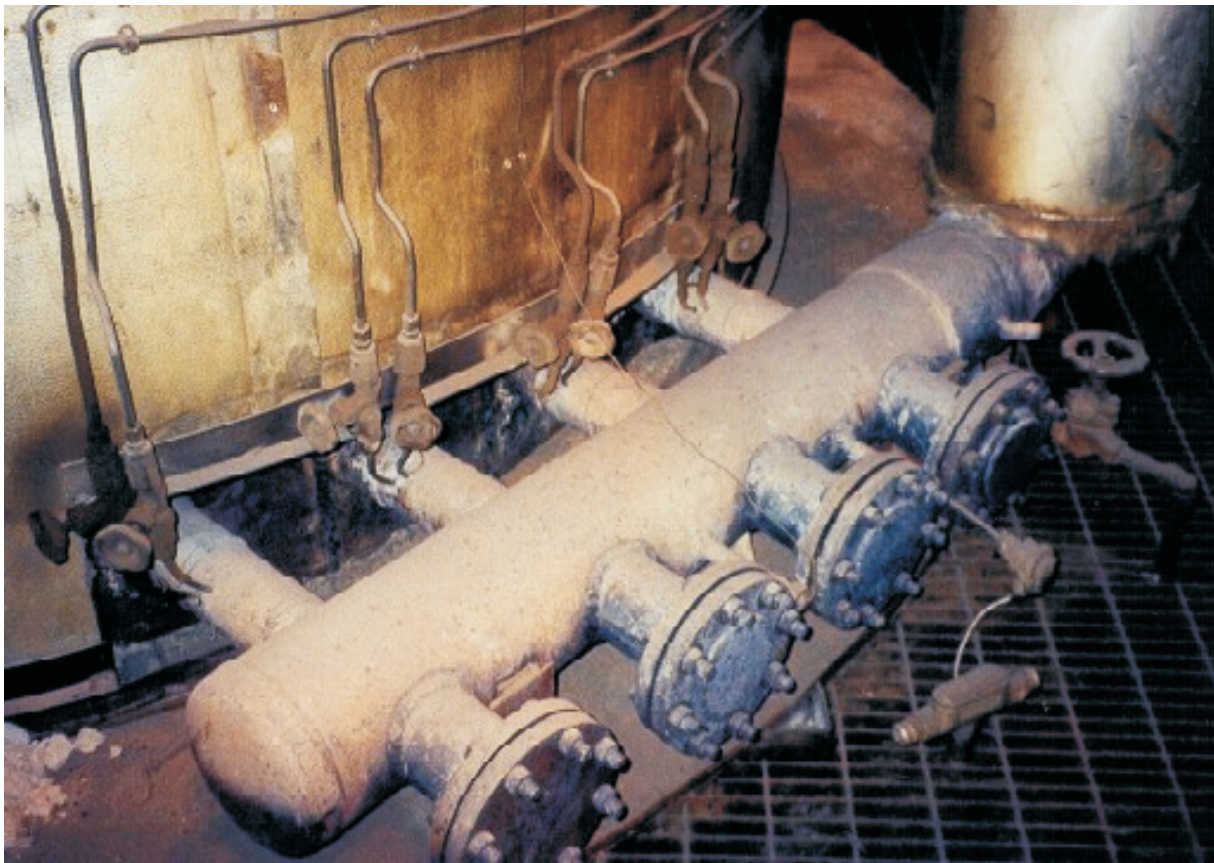
When the downstream PP3 primary pump is used to supply oil to the system, this valve should be in the open position. The valve should be closed when necessary to change the pump or filter. Please refer to the “Isolation and Change Out Procedure” for the sequence of opening and closing this valve.

168 Manual Valve

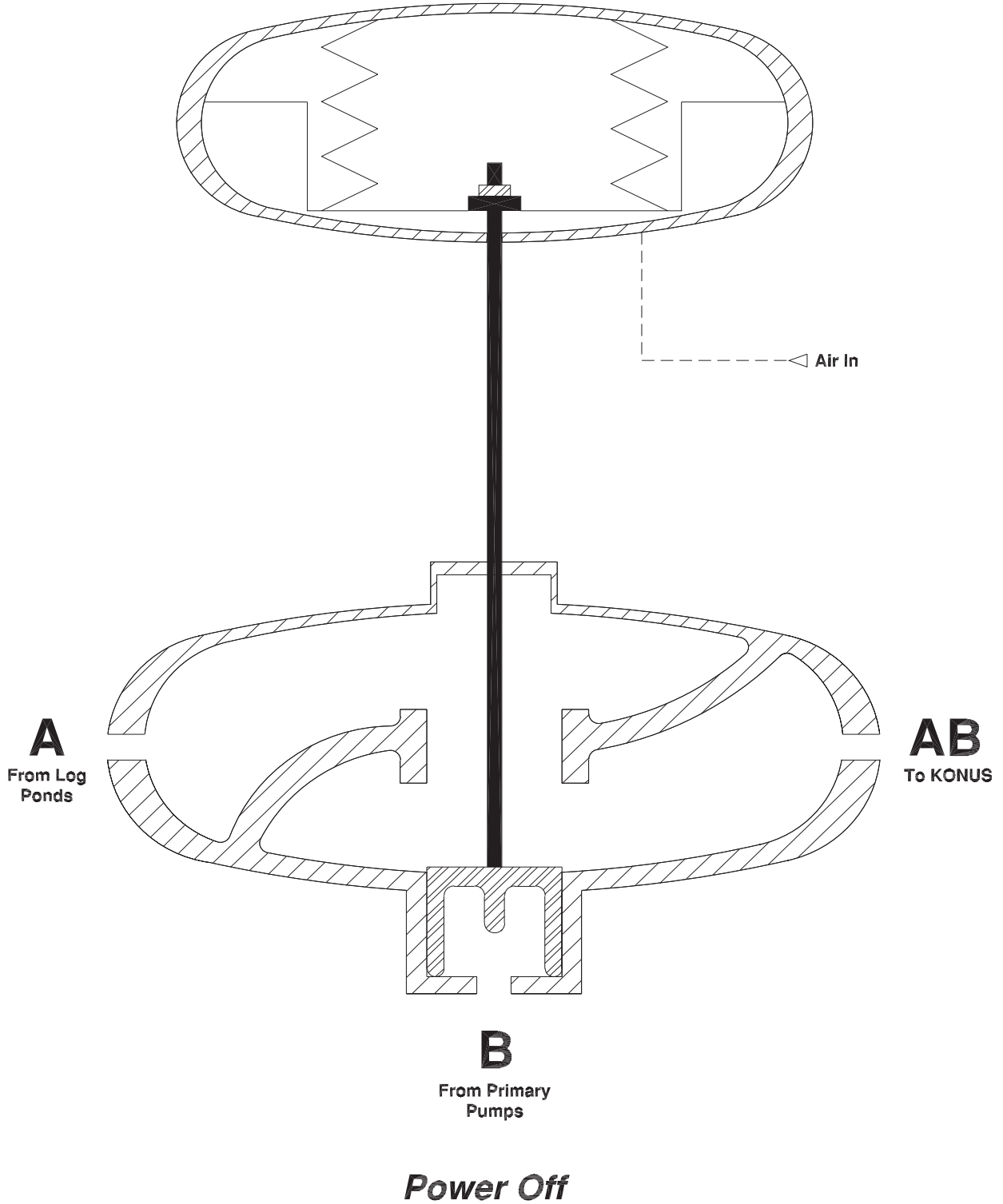
When the standby PP3 primary pump is being used to supply oil to the thermal oil circuits, this valve is open. When necessary to bleed the oil out of the pump for replacing, the valve should be closed. Please refer to the “Isolation and Change Out Procedure” for the sequence for opening and closing this valve.

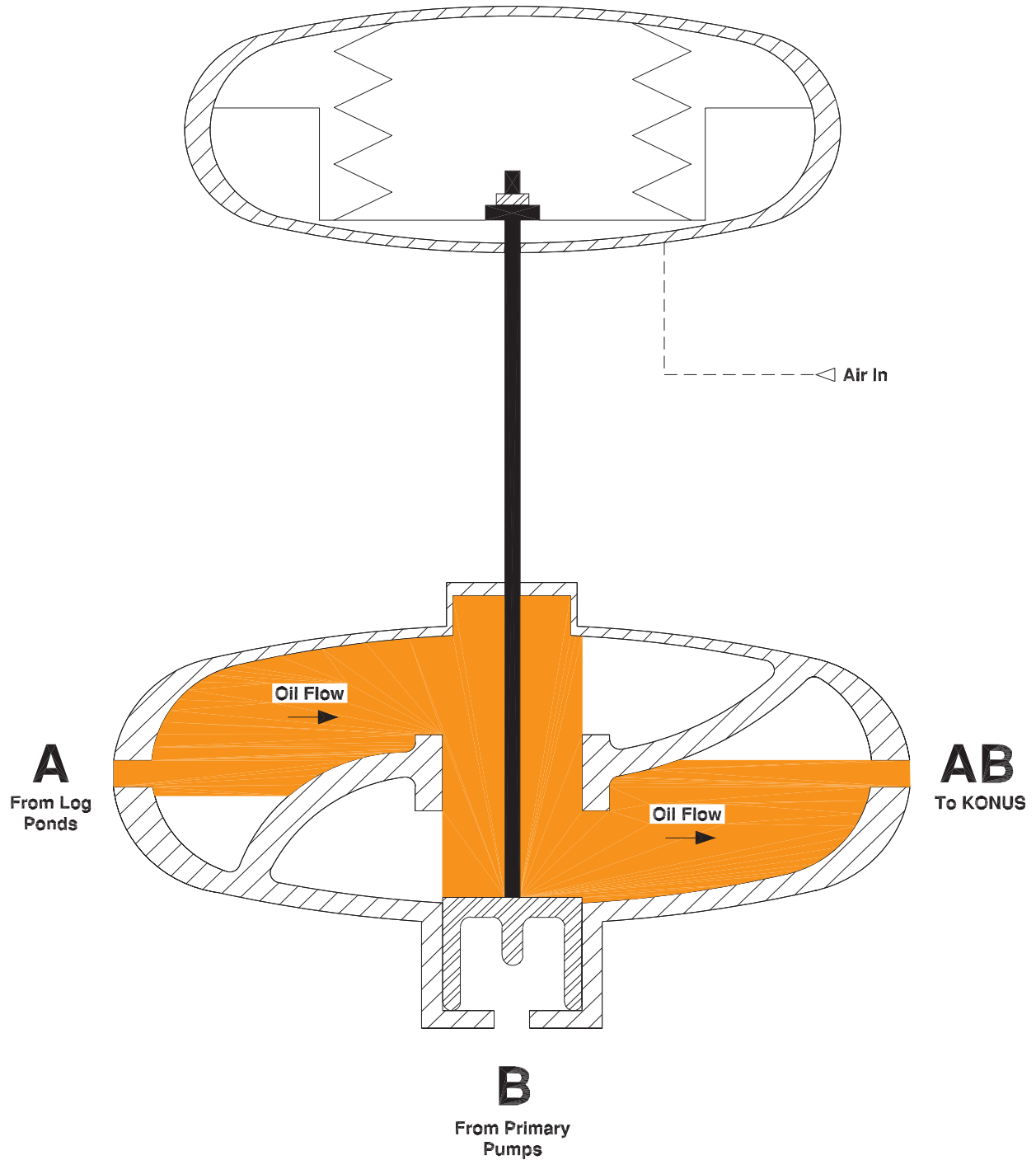
169 Manual Valve

During normal operation, the valve should be in the closed position. When necessary to change the pump, this valve should be opened to allow the fluid to be ported back to the drain tank by the drain pump. Please refer to the “Isolation and Change Out Procedure” for the sequence that this valve is opened and closed.

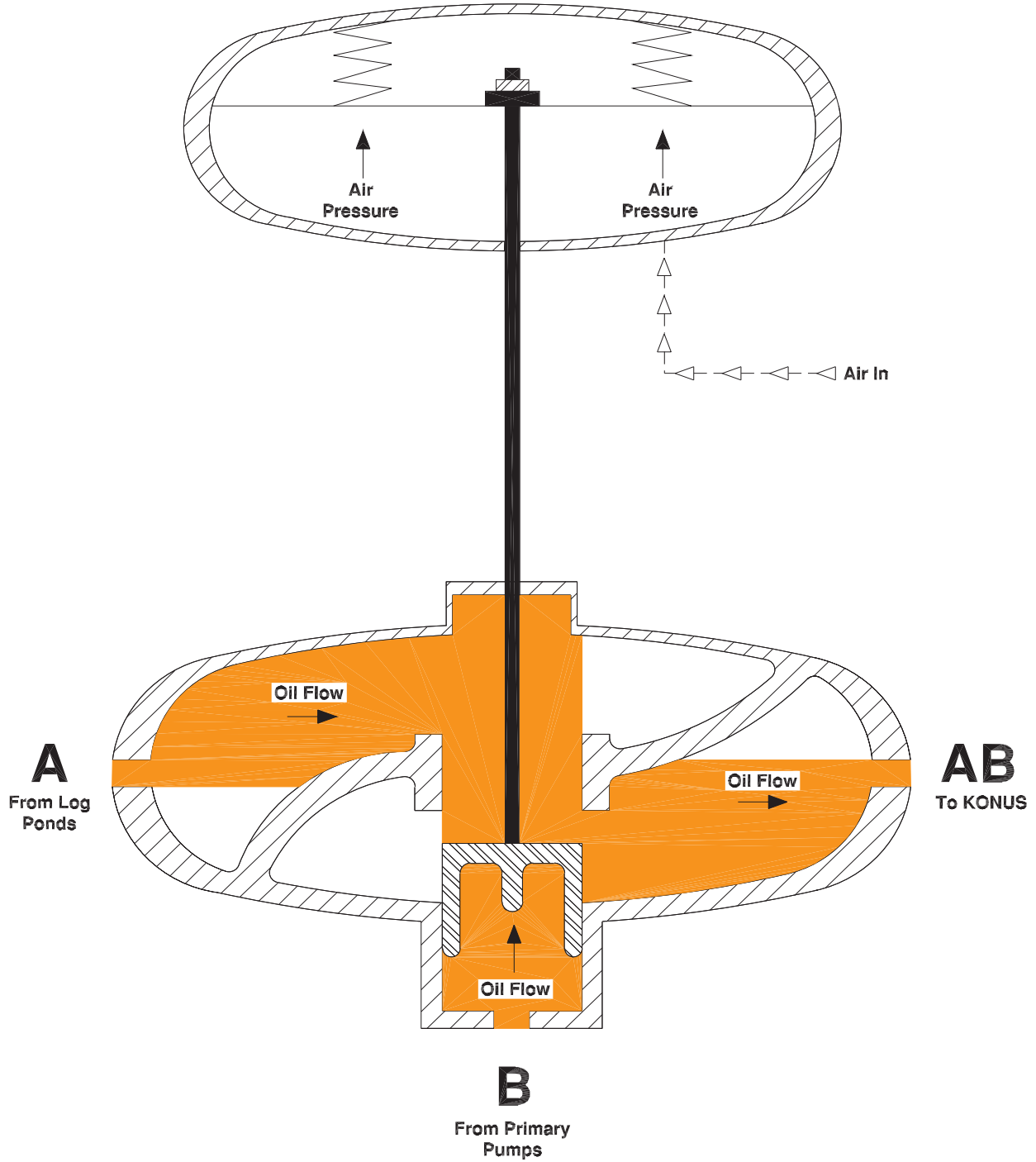


Konus Outlet Header





Emergency Operation - Port A Open to Port AB



Partially Open - Restricted Flow Between All Ports

