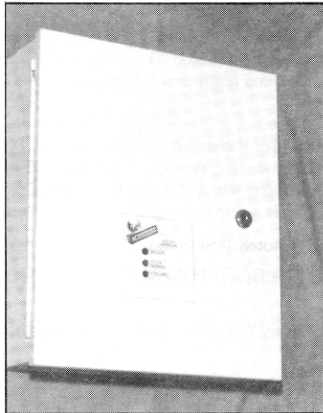


---

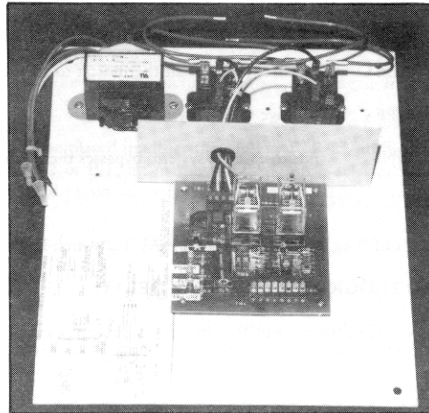
## LEAD/LAG CONTROLLERS

## MODEL PSP & BSP

---



Pump/Boiler Sequencer Panels



(CM) Custom Mount Models  
PSP-10CM shown



Underwriters  
Laboratories, Inc.®  
LISTED

### GENERAL DESCRIPTION:

Toxalert has two basic lead/lag controller types. One designed for dual circulating pumps and the other to automatically sequence boilers when they are to be controlled in a lead/standby sequence.

### ON-OFF AUTO:

Both controller types feature an internal ON-OFF-AUTO switch mounted on the printed circuit board that operates the controlled equipment. In the "AUTO" position the controller automatically operates the controlled equipment via a SPST outdoor air thermostat. In the "ON" position the equipment is positively turned ON, and positively turned off in the "OFF" position. The ON-OFF-AUTO switch function can be remotely controlled by installing a three position switch remote from the Lead/Lag controller (See technical description).

### LEAD/LAG:

The LEAD/LAG switch is also mounted on the printed circuit board and is designed to choose the lead equipment. With the switch in the R-1 (relay #1) position, pump #1 or boiler #1 is in the LEAD position and equipment operated by relay 2 is automatically in the lag or standby position. With the switch in the R-2 position the equipment (pump or boiler) operated by relay #2 is in the lead position, and equipment connected to R-1 automatically becomes the lag or standby equipment. The LEAD/LAG switch function may also be controlled remotely by simply installing a remote SPST switch. (See technical description.)

## FEATURES:

---

- **LOW VOLTAGE CONTROL CIRCUITRY**  
Flow Switch and outside air thermostat operation (24VAC).
- **LIGHT EMITTING DIODES** (LED's) for status indication, long life, maintenance free operation.
  - 1) POWER ON – (Green)
  - 2) FLOW NORMAL – (Green)
  - 3) FAILURE – (Red)
- **SPDT CONTACTS FOR REMOTE ALARM ANNUNCIATION**
- **ALL MODELS** will operate on 120, 208 or 240 VAC
- **ON-OFF-AUTO OPERATION:**  
AUTO – requires outdoor air thermostat to activate sequencer circuits.  
OFF – positive OFF of system.  
ON – positive On of system, bypasses the outdoor air thermostat.
- **REMOTE CONTROL:**  
Lead/Lag switch and ON-OFF-AUTO switch functions can easily be operated remotely (low voltage).
- **FIELD PROGRAMMABLE TIME DELAY:**  
Delay of lag function operation. Pump controller time delay from 10 seconds to 3 minutes. Boiler controller 30 seconds to 16 minutes.

---

## STANDARD MODELS:

The PSP, Pump Sequence Panels are available in four models, Model PSP-10 & PSP-12 are electronic controllers housed in a 12" W x 14" H x 4" D surface mount enclosure with key locking hinged door. Models PSP-10 CM and PSP-12 CM are electronic controllers mounted on a 10.5" W x 14" H steel mounting plate for incorporation into a custom control panel. The PSP models also come with two different output relay contact ratings, PSP-10 and PSP-10CM models have contacts rated for 15 A. at 120/220 VAC, and the PSP-12 and PSP-12 CM contacts are rated for 30A at 120/220 VAC.

Model Numbers are:

PSP-10 and PSP-10CM\*  
PSP-12 and PSP-12CM\*

The BSP, Boiler Sequence Panels, controllers are also available with and without surface mount enclosures. The Model BSP-15 controller is housed in a 12" W x 14" H x 4" D surface mount enclosure with key locking hinged door and BSP-15 CM controller is mounted on a 10.5" W x 14" H steel mounting plate. Both models have an output relay contact rating of 15A at 120/220VAC.

Model Numbers are:

BSP-15 and BSP-15CM\*

\*CM=Custom mount (controller mounted on steel plate for incorporation into custom panel.)

## TIMING:

All PSP-10 and 12 controllers are shipped from the factory with a 30 seconds delay and all BSP-15 controllers are shipped from the factory with a 6 minutes delay unless other time delay period is requested. The time delay period starts when the outdoor air thermostat calls for pump/boiler to start, or if the On-Off-Auto switch is switched to "On". If the pump/boiler does not proof operation within the time delay period then the standby pump/boiler is turned on by the controller.

---

## **SEQUENCE OF OPERATION (PUMP SEQUENCE):**

In circulating pump applications, two circulating pumps are ordinarily used in the water line, a lead or main operating pump and a standby or backup pump. The "Lead pump" manual selector (S3) is placed in either the "R-1" or "R-2" position for selection of the lead pump. The green LED indicates a "Flow-Normal" condition whenever either pump P-1 or P-2 is operating normally. If the lead pump fails to operate the SPDT pressure differential or flow switch (supplied by others) power the time delay circuit. If the flow is interrupted for more than 30 seconds (adjustable 10 seconds to 4 minutes), the time delay relay will simultaneously deenergize the lead pump, energize the standby pump, activate the red "LEAD Pump Failure" LED and trigger the remote alarm circuitry. A set of form C alarm contacts are brought out to the low voltage terminal strip for remote alarm indication. 24VAC (30VA max.) can be picked up from the terminals "H" and "N" on TB-1 and fed through the alarm contacts to power a remote alarm device(s).

After an alarm indication and after the cause of the interruption has been eliminated, by repairing or replacing the lead pump, the square red "Reset" button (S2) on the P.C. board, must be depressed to reestablish the selected lead/standby sequence, turn off the red "lead Pump Failure" LED, and reset the remote alarm contacts. The continuous indication of the green "Function Normal" LED again indicates lead pump operation.

The "LEAD/LAG" manual selector switch (S3) mounted on the P.C. board can be placed in either the "R-1" or "R-2" position. In case of lead pump "failure", the sequence will always index to the standby pump; P-2 or P-1, no matter which pump is selected as the lead pump. In the event of power failure, the sequence will immediately start the lead pump when power is restored. If the lead pump has failed, the standby pump will begin operating after the 30 second flow interruption.

## **SEQUENCE OF OPERATION (BOILER SEQUENCE):**

The sequence of operation for the boiler controller is the same as for the pump controller except that the delay time is 6 minutes (standard) rather than 30 seconds for the pump sequence. Also, the proof of operation device, pressure sensor, thermostat, or other proof of operation device (supplied by others) would be different from the pump flow proving device.

## **MOUNTING:**

The Toxalert Lead/Lag controllers with cabinets may be mounted on the wall and is not position sensitive. The CM – (customer mounted) controllers can be mounted in any custom control panel and will require approximately 10.5"W x 12.5"H x 3.0" D.

## **WIRING:**

The sequencer is provided with line voltage power supply connections and pump relay connections in the top of the cabinet. A low voltage, eight station terminal strip is located on the bottom of the P.C. board to connect the outdoor air thermostat, the SPDT flow (or operations) indication device and optional remote alarm Panel(s). The Pump Sequence panels are assembled to permit low voltage wiring to enter through the bottom. If the Lead/Lag and/or the ON-OFF-AUTO switches are to be remotely mounted they can be wired with wire as small as #18 and may be up to 200 feet from its controller. All wiring must be in accordance with applicable national and local electrical codes.

## **REMOTE LEAD/LAG OPERATION:**

The Lead/Lag function can easily be accomplished by mounting a SPST switch in a remote location. The wiring is 24 VAC and will require a switch that can switch .5A. Wire the remote switch across terminals H and LL of TB2 mounted in the upper left corner of the printed circuit board. Cut jumper J-2 to disable the board mounted Lead/Lag switch. When the remote Lead/Lag switch is in the open position, Relay #1 will control the lead equipment. With the switch closed, relay #2 will control the lead equipment and relay #1 will control its standby equipment.

## **REMOTE ON-OFF-AUTO:**

Remote ON-OFF-AUTO can easily be accomplished by mounting a DPDT switch with ON-OFF-AUTO action, in a remote location. The wiring is 24 VAC and will require a switch than can switch .5A. Wire the remote ON-OFF-AUTO switch as described. A spare terminal with the neutral (N) side of 24 VAC is furnished on TB1. Wire (N) terminal to common of remote switch. The auto side of the remote switch is to be wired to terminal 1 of TB4, and the on side to terminal 2 of TB4. Cut jumper J1 and J3 to deactivate the PC board AUTO-OFF-ON switch.

**TABLE #1**

PSP-10 & PSP-12	
TR VALUES IN OHMS	RESULTING TIME DELAY
100K	10 seconds
300K	30 seconds **
620K	1 minute
1.2 meg	2 minutes
1.8 meg	3 minutes
2.4 meg	4 minutes

**TABLE #2**

BSP-15 & BSP-15CM	
TR VALUES IN OHMS	RESULTING TIME DELAY
100K	30 seconds
200K	1 minute
360K	2 minutes
560K	3 minutes
750K	4 minutes
910K	5 minutes
1.2 meg	6 minutes **
1.3 meg	7 minutes
1.5 meg	8.25 minutes
1.8 meg	10 minutes
2.0 meg	11 minutes
3.0 meg	16 minutes

\* TR resistors are mounted on the Timing Register (TR) terminal strip (TB3) which is mounted on the P.C. board. 1/8 or 1/4 watt resistors may be used.

\*\* Time delay of standard units.

**REQUIRED AUXILIARY EQUIPMENT (Supplied by Others)**

- A) SPDT Differential Pressure Switch or Flow Switch  
Suggest: Robertshaw PF-126 Floating D Differential Pressure switch or Penn P74FA-5 pressure Differential Switch.
- B) Outside air thermostat for "AUTOMATIC" operation.  
Suggest: Honeywell T675, or Columbus Electric LB100 (SPST) or LB200 (DPST) remote bulb thermostats, or TC-100 series remote bulb controllers from Dynacon. Toxalert has controlling devices you need for application. Please call.

**LEAD/LAG CONTROLLER EXTERNAL WIRING**

