# PUMP CONTROLS & LIQUID LEVEL CONTROLS

Protect and disable a pump if a hazardous condition arises. PumpSaver® offers a wide variety of controls for both single phase and three phase applications. Intrinsically safe relays are specifically designed to interface between hazardous and non-hazardous areas.



### *Alternating Relays*



### *Intrinsically Safe Relays*



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and to download our Fresh Water Pumping Catalog, visit
**Littelfuse.com/PumpProtection**

# ACBC-120 SERIES

## Alarm Controller and Battery Charger for pump control panels


## Description

The ACBC-120 Series is a dual purpose alarm controller/battery charging unit. When there is a loss of 120VAC power, the ACBC-120's primary function as an alarm controller activates. When this power loss occurs, input power is switched to a 12VDC, lead-acid, rechargeable backup battery and a 12VDC alarm consisting of a strobe light and/or a horn is activated. The horn follows a 2 second on/2 second off pattern with a "horn silence" option to turn the sound off. An LED indicator on the unit also signals that the device has entered the alarm mode.

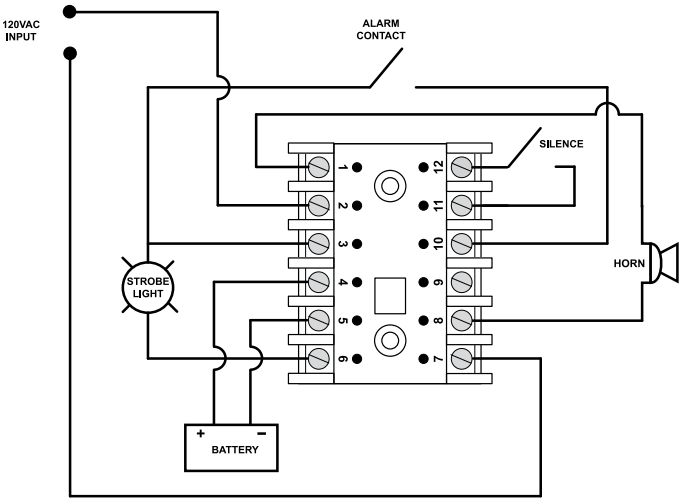
When 120VAC input is present the alarm circuit can be tested and the unit's secondary function as a 12VDC backup battery charger is activated. In fast charge mode, the unit has the capability to source up to 100mA of charging current. However, the device normally charges at a current of 14mA in maintenance mode. The alarm circuit can be tested by pressing the "test" button located on the front of the unit or by activating an external switch via the "alarm contact" pin.

The device has the ability to signal low battery voltage if the voltage drops below 10.5VDC. The device can also detect if no battery is present or if the battery is connected backwards. In either of these cases, the ACBC-120 will signal a battery error and will not attempt to charge.

**Must use Model SD12-PC socket for UL Rating!**

*Note: Manufacturer's recommended screw terminal torque for the SD Series Sockets is 12 in.-lbs.

## Wiring Diagram




For dimensional drawing see: Appendix, page 509, Figure 8.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Controls 12VDC alarm circuit** | Activates strobe and/or horn when power loss occurs |
| **Selectable fast charge mode** | Unit sources higher charging current up to 100mA (normal mode is 14mA) |
| **Trip delay timer** | Prevents nuisance tripping |
| **Battery fault detection and reverse polarity protection** | Signals if battery voltage drops below 10.5VDC and can detect if no battery is present or if the battery is connected backwards |
| **LED indication** | Visual indication of unit status or trip |
| **Test button** | Preventative maintenance check of the alarm circuit by pressing the test button on the unit or externally through alarm contact connection |

## Ordering Information

| MODEL | LINE VOTAGE | DESCRIPTION |
|---|---|---|
| ACBC-120 | 120VAC | Does not include SD12-PC socket for mounting |
| ACBC-120-SD | 120VAC | Includes SD12-PC socket for mounting |

## Accessories

**SD12-PC 12-pin Rectangle Socket**
Rectangle Socket for the ACBC-120.
12-pin surface mountable.

# ACBC-120 SERIES

## Specifications

### Input Characteristics

| | |
|---|---|
| **Supply Voltage** | |
| **AC Input Voltage** | 120V +/-10% |
| **Frequency** | 50/60Hz |
| **AC Input Current** | 0.018A (max.) 0.003 (typical) |
| **AC Input Power** | 2.4W (max.) fast charge current<br>0.4W (typical) maint. charge current |

### Functional Characteristics

| | |
|---|---|
| **Battery Charging Characteristics** | |
| **Acceptable Battery Type** | 12V lead-acid rechargeable |
| **Fast Charge Current** | 100mA +/-10% |
| **Maintenance Charge Current** | 14mA +/-50% |
| **Low Battery Alert Level** | 10.5V |

### Output Characteristics

| | |
|---|---|
| **Strobe Light Alarm Output** | 12VDC@1A (max.) |
| **Horn Alarm Output** | 12VDC@1A (max.) |

### General Characteristics

| | |
|---|---|
| **Temperature Range** | -40° to 60°C (-40° to 140°F) |

### Standards Passed

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air |
| **Radio Frequency, Radiated** | 150MHz, 10V/m |
| **Fast Transient Burst** | IEC 61000-4-4, Level 4, 4kV input lines;<br>4kV signal lines |
| **Safety Marks** | |
| **UL** | |
| **(SD12-PC socket required)** | UL508 (File #E68520) |
| **Dimensions** | **H** 44.45 mm (1.75"); **W** 60.325 mm (2.375");<br>**D** 104.775 mm (4.125") (with socket) |
| **Weight** | 0.7 lb. (11.2 oz., 317.51 g) |
| **Mounting Method** | Surface mount with #8 or #10 screws<br>(plug into SD12-PC socket) |
| **Socket Available** | Model SD12-PC (UL Rating 600V)<br>The 600V socket can be surface mounted |

# PC-102 SERIES

## Dual Seal-Leak Detector or Seal-Leak & Over-Temperature Detector


## Description

The PC-102 is a dual-channel switch that provides dual protection against seal failures and over-temperature in submersible pumping applications.

Both units have two form-C isolated output relays and two LEDs, which illuminate when each associated output relay is energized.

The sensitivity adjustment (4.7k-100kOhms) allows you to define the input impedance at which the output relays will change state. The sensitivity for the over-temperature detector can be set to 4k Ohms with use of the DIP switches.

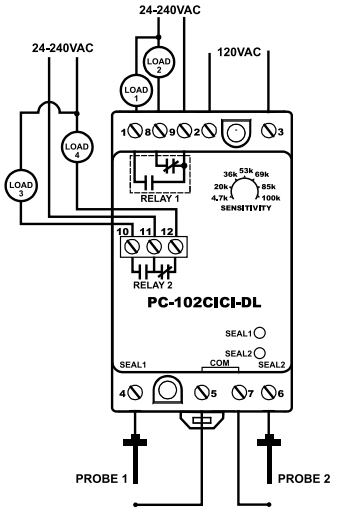
**This unit may not be compatible with Flygt pumps.**

## Features & Benefits

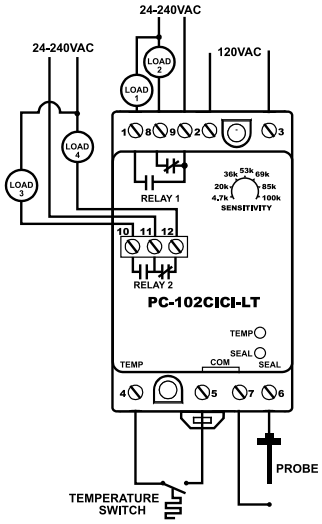
| FEATURES | BENEFITS |
|---|---|
| **Finger-safe terminals** | Meets IEC 61000 safety requirements |
| **Compact design for DIN rail or surface mount** | Allows flexiblility in panel installation |
| **LED Status Indicator** | Visual indication of relay engagement |
| **Two input channels** | Flexibility for pump-up/pump-down or two-channel switch applications |

## Wiring Diagram

PC-102CICI-DL




PC-102CICI-LT




**For dimensional drawing see: Appendix, page 510, Figure 10.**

## Ordering Information

| MODEL | LINE VOLTAGE | DESCRIPTION |
|---|---|---|
| PC-102CICI-DL | 120VAC nominal | Dual seal-leak detector uses inputs to sense seal failures and energize the output relay. Input logic direct or inverted is DIP switch selectable |
| PC-102CICI-LT | 120VAC nominal | Seal-leak and over-temperature detector uses one input to sense seal failures and the temperature input to detect motor overheating. Configurable to suit various probes. Seal input logic direct or inverted, plus over-temperature trip reset automatic or manual, is DIP switch selectable |

## Specifications

**Input Characteristics**

| | |
|---|---|
| **Frequency** | 50/60Hz |

**Functional Characteristics**

| | |
|---|---|
| **Probe Sense Voltage** | 5vdc pulsed |
| **Sensitivity** | 4.7k-100kΩ |
| **Sensitivity (for temp)** | Selectable 4kΩ with DIP switches |
| **Input Logic** | Direct or inverted |
| **Debounce Time Delay** | 0.5 or 2 seconds |

**Output Characteristics**

| | |
|---|---|
| **Relay Output Rating (2 Form C isolated)** | |
| **Pilot Duty** | 180VA @ 120VAC, C150 |
| **General Purpose** | 5A @ 240VAC |

**General Characteristics**

| | |
|---|---|
| **Temperature Range** | -20° to 55°C (-4° to 131°F) |
| **Maximum Input Power** | 2 W |
| **Depluggable Connector** | Phoenix Contact-Series MSTB plugs |
| **Output Relay Status Indicators** | LEDs |
| **Terminal Torque** | 4.5 in.-lbs. |
| **Wire range** | 12-20 AWG |

**Standards Passed**

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air. |
| **Radio Frequency Immunity (RFI)** | IEC 61000-4-3, Level 3, 10V/m |
| **Fast Transients** | IEC 61000-4-4, Level 3, 4kV input power 2kV inputs/outputs |

**Safety Marks**

| | |
|---|---|
| **UL** | UL508 (File #E68520) |
| **Dimensions** | **H** 88.9 mm (3.5"); **W** 52.93 mm (2.08"); **D** 59.69 mm (2.35") |
| **Weight** | 0.9 lb. (14.4 oz., 408.23 g) |
| **Mounting Method** | 35mm DIN rail or Surface Mount (#6 or #8 screws) |

# PC-105

## Pump controller with duplex, triplex or quadplex functionality or 5-channel relay


## Description

The PC-105 is a 5-channel pump controller designed to handle multiple pump applications. Alternatively, it can operate as a 5-channel switch.

The PC-105's control functions support all of the popular industry-standard multi-pump, pump-up and pump-down configurations.

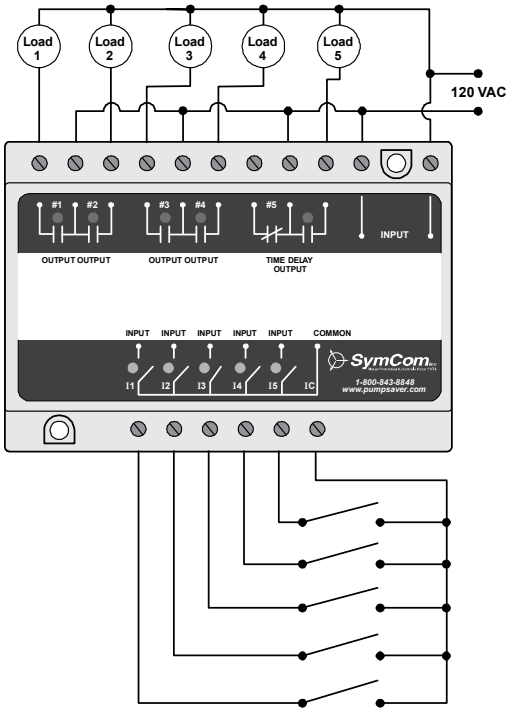
It can indicate low, high and out-of-sequence alarms and use alternating and non-alternating pump control. The non-alternating pump can be used as a jockey pump or emergency pump.

Using the built-in DIP switches, individual pumps can be disabled when taken out of service for repair or maintenance.

## Features

- Compact design
- Low, high and out-of-sequence alarms
- Variable time delay/lag pump delay from 2-255 seconds
- Duplex SPS (separate pump stop) pump control
- Duplex, triplex or quadplex pump control
- Pump-up or pump-down functions
- External silence, reset and alternation configuration
- Five-channel relay configuration
- DIN rail or surface mountable

## Wiring Diagram




**For dimensional drawing see: Appendix, page 511, Figure 12.**

## Specifications

| | |
|---|---|
| **Input Characteristics** | |
| **Supply Voltage** | 120VAC |
| **Frequency** | 50*/60Hz |
| **Functional Characteristics** | |
| **Probe Sense Voltage** | 5vdc continuous |
| **Output Characteristics** | |
| **Relay Output Rating:** | |
| **Pilot Duty** | 480VA @ 240VAC, B300 |
| **General Purpose** | 7A @ 240VAC |
| **General Characteristics** | |
| **Temperature Range** | -20° to 55°C (-4° to 131°F) |
| **Maximum Input Power** | 4 W |
| **Wire range** | 12 to 20 AWG |
| **Terminal Torque** | 4.5 in.-lbs. (max.) |
| **Pump In-rush delay** | 2 seconds |
| **Standards Passed** | |
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air. |
| **Radio Frequency Immunity (RFI)** | IEC 61000-4-3, Level 3, 10V/m |
| **Fast Transients** | IEC 61000-4-4, Level 3, 4kV input power 2kV inputs/outputs |
| **Safety Marks** | |
| **UL** | UL508 (File #E68520) |
| **Dimensions** | **H** 94.06 mm (3.703"); **W** 127.64 mm (5.025"); **D** 59.69 mm (2.35") |
| **Weight** | 1.2 lbs. (19.2 oz., 544.31 g) |
| **Mounting Method** | 35 mm DIN rail or Surface Mount (#6 or #8 screws) |

*Note: 50Hz will increase all delay timers by 20%.

# PC-XXX-LLC-CZ / PC-XXX-LLC-GM SERIES

## Liquid Level Control


## Description

The PC-xxx-LLC-CZ and PC-xxx-LLC-GM Series are liquid level control relays used to control conductive liquid pumping operations in a pump-up or pump-down application. The units come in two different voltage ranges (see specs below).

The units have an adjustable sensitivity knob (4.7k to 100k ohms) that is set according to the resistance level at which you want the probes (sold separately) to sense the conductive liquid. The units have a built-in debounce time delay that prevents the relay from energizing if the probe resistance momentarily goes above or below the sensitivity setpoint (due to liquid splashing in the tank).

The units operate their internal relay based on inputs from a high and low probe and a common reference (when a conductive tank is used) or common probe (when a non-conductive tank is used).

PC-xxx-LLC-CZ

- Compatible with Crouzet's PNR & PNRU series liquid level control

PC-xxx-LLC-GM

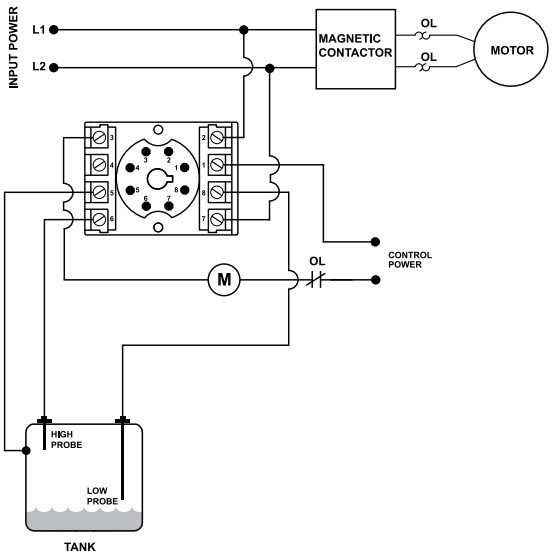
- Compatible with Gems' Series 16M general purpose control

**Must use Model OT08PC or P1011-6 socket for UL Rating!**

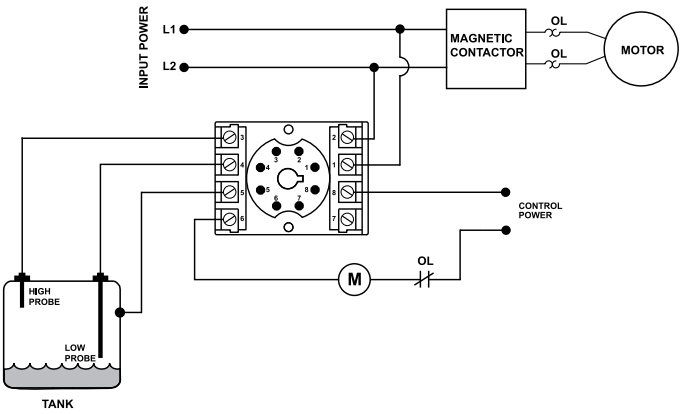
Note: Manufacturer's recommended screw terminal torque for the OT Series Octal Sockets is 12 in.-lbs.

## Wiring Diagram

TYPICAL WIRING DIAGRAM FOR PC-XXX-LLC-CZ




TYPICAL WIRING DIAGRAM FOR PC-XXX-LLC-GM




## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Debounce time delay (2 seconds)** | Prevents rapid cycling of the pump due to turbulance in the tank |
| **Adjustable sensitivity (4.7 to 100Kohms)** | Allows user to fine tune the sensing resistance to prevent false tripping due to foam or debris |
| **Dual probe design (plus a common)** | Allows user the ability to set the level differential required |

## Ordering Information

| MODEL | LINE VOTAGE | DESCRIPTION |
|---|---|---|
| PC-100-LLC-CZ | 95-120VAC | Compatible with Crouzet's PNR & PNRU Series liquid level control |
| PC-200-LLC-CZ | 190-240VAC | Compatible with Crouzet's PNR & PNRU Series liquid level control |
| PC-100-LLC-GM | 95-120VAC | Compatible with Gems' Series 16M liquid level control |
| PC-200-LLC-GM | 190-240VAC | Compatible with Gems' Series 16M liquid level control |

**For dimensional drawing see: Appendix, page 509, Figure 8.**

# PC-XXX-LLC-CZ / PC-XXX-LLC-GM SERIES

## Accessories

**OT08PC 8-pin Octal Socket**
Octal Socket for plug-in units. 8-pin surface & DIN rail mountable. Rated for 10A @ 600VAC.

## Specifications

### Input Characteristics

| | |
|---|---|
| **Supply Voltage** | |
| **PC-100-LLC-CZ** | 95-120VAC |
| **PC-100-LLC-GM** | 95-120VAC |
| **PC-200-LLC-CZ** | 190-240VAC |
| **PC-200-LLC-GM** | 190-240VAC |
| **Frequency** | 50/60Hz |

### Functional Characteristics

| | |
|---|---|
| **Probe Sense Voltage** | 5VDC pulsed |
| **Debounce Time Delay** | 2 seconds |
| **Probe Sensitivity** | 4.7k to 100k Adjustable |

### Output Characteristics

| | |
|---|---|
| **Output Contact Rating** | |
| **Pilot Duty** | 480VA @ 240VAC |
| **General Purpose** | 10A @240VAC |

### General Characteristics

| | |
|---|---|
| **Temperature Range** | -40° to 70°C (-40° to 158°F) |
| **Maximum Input Power** | 5 W |

### Sandards Passed

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air. |
| **Radio Frequency Immunity (RFI)** | 150MHz, 10V/m |
| **Fast Transients** | IEC 61000-4-4, Level 3, 2kV input power and controls |
| **Safety Marks** | |
| **UL (OT08PC octal socket required)** | UL508 (File #E68520) |
| **CE** | IEC60947-6-2 |
| **Dimensions (when installed in socket base)** | **H** 44.45 mm (1.75"); **W** 60.33 mm (2.375"); **D** 104.78 mm (4.125") |
| **Weight** | 0.65 lb. (10.4 oz., 294.84 g) |
| **Mounting Method** | DIN rail or surface mount (plug into OT08PC socket) |
| **Socket Available** | Model OT08PC (UL Rating 600V) |

The 600V socket can be surface mounted or installed on DIN Rail.

# 201-100-SLD

## Single-Channel Seal-Leak Detector

UL listed when used in combination with OT08PC socket only.


## Description

The model 201-100-SLD is an 8-pin plug-in style seal-leak detector to sense seal failures on submersible pumps. A microcontroller-based relay that monitors the shaft seal of a submersible pump motor. A resistive probe is installed in the seal cavity. If water leaks into the pump, the resistance measured by the probe decreases. When the resistance drops below the sensitivity setpoint, the unit will trip and the relay contacts will change state. The unit will automatically reset when a fault is cleared.

## Features & Benefits

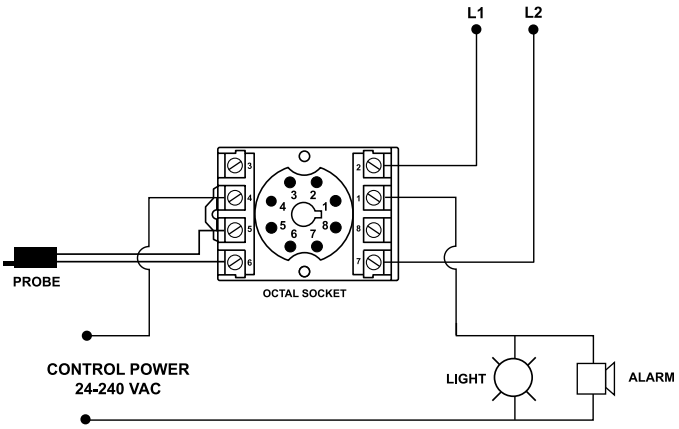
- LED status indicator
- Compact plug-in design
- DIN rail or surface mountable via octal base

## Accessories

**OT08PC 8-pin Octal Socket**
Octal Socket for plug-in units. 8-pin surface & DIN rail mountable. Rated for 10A @ 600VAC.



## Wiring Diagram




For dimensional drawing see: Appendix, page 509, Figure 8.

Note: Manufacturer's recommended screw terminal torque for the RB Series and OT Series Octal Sockets is 12 in.-lbs.

## Specifications

| | |
|---|---|
| **Control Voltage** | 110/120VAC nominal |
| **Frequency** | 50/60Hz |
| **Sensitivity** | 4.7k-100kΩ |
| **Probe Sense Voltage** | 5vdc pulsed |
| **Output contact Rating** | SPDT |
| **Pilot Duty** | 480VA @ 240VAC |
| **General Purpose** | 10A @ 240VAC |
| **Operating Temperature** | -40° to 70°C (-40° to 158°F) |
| **Storage** | -40° to 80°C (-40° to 176°F) |
| **Maximum Input Power** | 5 W |
| **Relative Humidity** | 10-95%, non-condensing per IEC 68-2-3 |
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air |
| **Radio Frequency Immunity, Radiated** | 150MHz, 10V/m |
| **Fast Transient Burst** | IEC 61000-4-4, Level 3, 3.5kV input power and controls |
| **IEC** | IEC 61000-4-5, Level 3, 4kV line-to-line; level 4, 4kV line-to-ground |
| **ANSI/IEEE** | C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line |
| **Hi-Potential Test** | Meets UL508 (2 x rated V + 1000V for 1 min.) |
| **UL*** | UL508 (File #E68520) |
| **CE** | IEC 60947-6-2 |
| **Enclosure** | Polycarbonate |
| **Dimensions** | **H** 44.45 mm (1.75"); **W** 60.325 mm (2.375"); **D** (with socket) 104.78 mm (4.125") |
| **Weight** | 0.7 lb. (11.2 oz., 317.51 g) |
| **Mounting Method** | DIN rail or surface mount (plug into OT08PC socket) |
| **Socket Available** | Model OT08PC (UL Rating 600V) |
| **Approvals** | UL, CE |

*Must use Model OT08PC socket for UL Rating!
The 600V socket can be surface mounted or installed on DIN Rail.

# 460-15-100-LLS

## Single-Channel Liquid Level Sensor


## Description

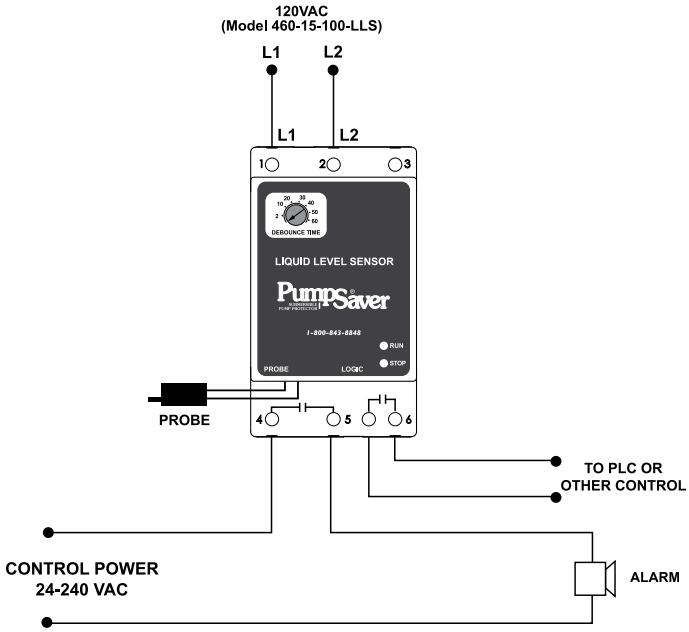
The 460-15-100-LLS is a liquid level sensor to detect the presence of conductive liquids. A probe is mounted at the desired tank level and connected to the PumpSaver®. When the probe is submersed, the relay's output contacts will change state as soon as the debounce time expires. The adjustable debounce timer is intended to prevent nuisance actuating due to waves or splashing in the tank.

Relay logic can be inverted so the relay's output contacts change state when the probe is no longer submersed. This makes the unit versatile for use in pump-up and pump-down applications.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Unique Probe Protection** | Probes are protected from scale build up through pulsed DC signal between the probes |
| **Invertible relay logic** | Allows flexibility to be used in pump-up and pump-down applications |
| **Adjustable debounce timer** | Prevents nuisance actuating caused by waves or splashing in the tank |
| **LED status indicators** | Provides visual indication of the relay status |

## Wiring Diagram




**For dimensional drawing see: Appendix, page 510, Figure 10.**

## Specifications

### Input Characteristics

| | |
|---|---|
| **Control Voltage** | 110/120VAC nominal |
| **Frequency** | 50/60Hz *(Note: 50Hz will increase all delay timers by 20%)* |
| **Sensitivity** | 100kΩ |

### Functional Characteristics

| | |
|---|---|
| **Probe Sense Voltage** | 5vdc pulsed |
| **Debounce Time Delay** | 2-60 seconds |

### Output Characteristics

| | |
|---|---|
| **Output contact Rating – (Two Form A - SPST)** | |
| **Pilot Duty** | 360VA @ 240VAC |
| **General Purpose** | 8A @ 240VAC |

### General Characteristics

| | |
|---|---|
| **Ambient Temperature Range** | |
| **Operating** | -20° to 70°C (-4° to 158°F) |
| **Storage** | -40° to 80°C (-40° to 176°F) |
| **Maximum Input Power** | 2 W |
| **Class of Protection** | IP20, NEMA 1 (finger safe) |
| **Relative Humidity** | 10-95%, non-condensing per IEC 68-2-3 |
| **Terminal Torque** | 4.5 in.-lbs. |
| **Wire** | 12-20 AWG |

### Standards Passed

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air |
| **Radio Frequency Immunity, Radiated** | 150MHz, 10 V/m |
| **Fast Transient Burst** | IEC 61000-4-4, Level 3, 3.5kV input power and controls |

# 460-15-100-LLS

| | |
|---|---|
| **Surge** | |
| **IEC** | IEC 61000-4-5, Level 3, 4kV line-to-line; Level 4, 4kV line-to-ground |
| **ANSI/IEEE** | C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line |
| **Hi-Potential Test** | Meets UL508 (2 x rated V + 1000 V for 1 min.) |
| **Safety Marks** | |
| **UL** | UL508 (File #E68520) |
| **CE** | IEC 60947 |
| **Enclosure** | Polycarbonate |
| **Dimensions** | **H** 88.9 mm (3.5"); **W** 52.93 mm (2.08"); **D** 59.69mm **(**2.35") |
| **Weight** | 1 lb. (16 oz., 453.59 g) |
| **Mounting Method** | 35mm DIN rail or Surface Mount (#6 or #8 screws) |



# 460-15-100-SLD

## Single-Channel Seal-Leak Detector

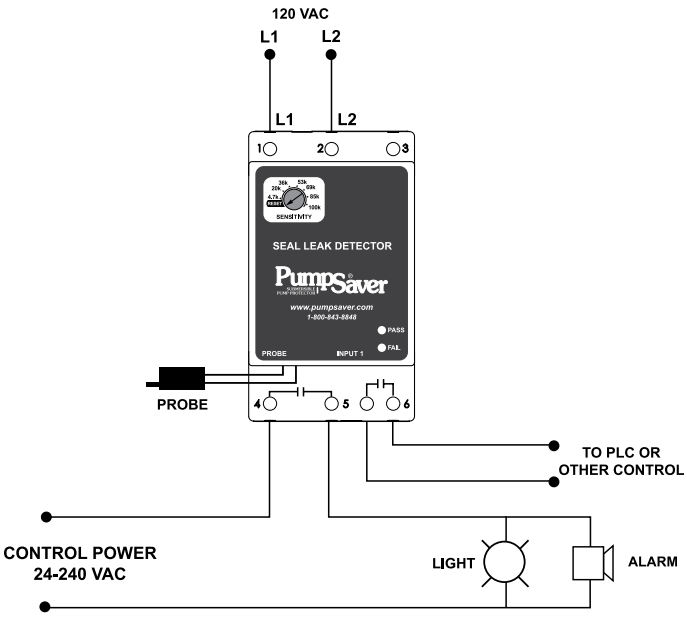

## Description

The 460-15-100-SLD is a seal-leak detector to sense seal failures on submersible pumps. A microcontroller-based relay monitors the shaft seal of a submersible pump motor. A resistive probe is installed in the seal cavity. If water leaks into the pump, the resistance measured by the probe decreases. When the resistance drops below the sensitivity setpoint, the unit will trip and the relay contacts will change state. Output relay logic can be reversed by removing an external jumper. The unit will automatically reset when a fault is cleared.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Unique probe protection logic** | Probes are protected from scale build up through pulsed DC signal between the probes |
| **Invertible relay logic** | Allows flexibility to be used in pump-up and pump-down applications |
| **LED status indicators** | Provides visual indication of the relay status |
| **2 relay contacts** | Control independent loads on different circuits |

## Wiring Diagram




**For dimensional drawing see: Appendix, page 510, Figure 10.**

## Specifications

### Input Characteristics

| | |
|---|---|
| **Control Voltage** | 110/120VAC nominal |
| **Frequency** | 50/60Hz (Note: 50Hz will increase all delay timers by 20%) |

### Functional Characteristics

| | |
|---|---|
| **Sensitivity** | 4.7k-100kΩ |
| **Probe Sense Voltage** | 5vdc pulsed |

### Output Characteristics

| | |
|---|---|
| **Output contact Rating – (Two Form A - SPST)** | |
| **Pilot Duty** | 360VA @ 240VAC |
| **General Purpose** | 8A @ 240VAC |

### General Characteristics

| | |
|---|---|
| **Ambient Temperature Range** | |
| **Operating** | -40° to 70°C (-40° to 158°F) |
| **Storage** | -40° to 80°C (-40° to 176°F) |
| **Maximum Input Power** | 2 W |
| **Class of Protection** | IP20, NEMA 1 (finger safe) |
| **Relative Humidity** | 10-95%, non-condensing per IEC 68-2-3 |
| **Terminal Torque** | 4.5 in.-lbs. |
| **Wire** | AWG 12-20 AWG |

### Standards Passed

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air |
| **Radio Frequency Immunity, Radiated** | 150MHz, 10 V/m |
| **Fast Transient Burst** | IEC 61000-4-4, Level 3, 3.5kV input power and controls |

# 460-15-100-SLD

| | |
|---|---|
| **Surge** | |
| **IEC** | IEC 61000-4-5, Level 3, 4kV line-to-line; Level 4, 4kV line-to-ground |
| **ANSI/IEEE** | C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line |
| **Hi-Potential Test** | Meets UL508 (2 x rated V + 1000 V for 1 min.) |
| **Safety Marks** | |
| **UL** | UL508 (File #E68520) |
| **CE** | IEC 60947 |
| **Enclosure** | Polycarbonate |
| **Dimensions** | **H** 88.9 mm (3.5"); **W** 52.93 mm (2.08"); **D** 59.69 mm (2.35") |
| **Weight** | 1 lb. (16 oz., 453.59 g) |
| **Mounting Method** | 35mm DIN rail or Surface Mount (#6 or #8 screws) |



# LLC1 SERIES

## Open Board Liquid Level Controls

## Description

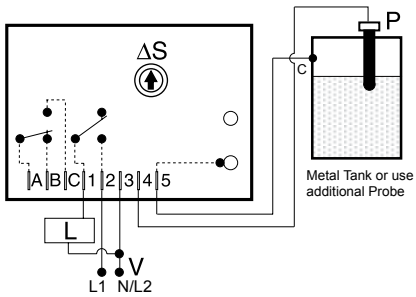
The LLC1 Series is a single probe conductive liquid level control designed for OEM equipment and commercial appliances. This unit may be ordered with fixed fill or fixed drain operation. A time delay (1-60s) prevents rapid cycling of the output relay. On adjustable units, the sensitivity adjustment allows accurate level sensing while ignoring foaming agents and floating debris. Isolated AC voltage is provided at the probe to prevent electrolysis. A trickle current of less than 1mA determines the presence or absence of liquid between the probe and common. The LLC1 Series printed circuit board is conformal coated to resist moisture and corrosion.

### Operation

**Drain (Pump-Down Mode):** When the liquid level rises and touches the probe, a fixed time delay begins. This time delay prevents rapid cycling of the output relay and its load. At the end of the time delay, the output relay energizes and remains energized until the liquid level falls below the probe. The output relay then de-energizes and remains de-energized until the liquid again touches the probe.

**Fill (Pump-Up Mode):** When the liquid level falls below the probe, a fixed time delay begins. This time delay prevents rapid cycling of the output relay and its load. At the end of the time delay, the output relay energizes and remains energized until the liquid level rises and touches the probe. The output relay then de-energizes and remains de-energized until the liquid level again falls below the probe.

## Wiring Diagram




P = Probe
L = Load
V = Voltage
ΔS = Sensitivity Adjustment

Contacts A, B & C are isolated.

Connect common to conductive tank or an additional probe as required.

**For dimensional drawing see: Appendix, page 514, Figure 40.**

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Isolated AC voltage on probe** | Prevents scale buildup on the probe |
| **Open PCB design** | Cost effective design for OEM equipment and commercial appliances |
| **Conformally coated PCB** | Protects against moisture and corrosion |
| **Sensitivity adjustment** | Provides accurate level sensing while ignoring foam or floating debris |

## Ordering Information

| MODEL | INPUT VOLTAGE | OPERATION | TIME DELAY | SENSE RESISTANCE | MOUNTING |
|---|---|---|---|---|---|
| LLC14A1AX | 120VAC | Drain | 1s | Adjustable | 0.5 in nylon standoffs (3) |
| LLC14A5AX | 120VAC | Drain | 5s | Adjustable | 0.5 in nylon standoffs (3) |
| LLC14B15AX | 120VAC | Fill | 15s | Adjustable | 0.5 in nylon standoffs (3) |
| LLC14B1AX | 120VAC | Fill | 1s | Adjustable | 0.5 in nylon standoffs (3) |
| LLC14B60AX | 120VAC | Fill | 60s | Adjustable | 0.5 in nylon standoffs (3) |
| LLC16A25AX | 230VAC | Drain | 25s | Adjustable | 0.5 in nylon standoffs (3) |
| LLC16A3AX | 230VAC | Drain | 3s | Adjustable | 0.5 in nylon standoffs (3) |

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# LLC1 SERIES

## Accessories

**P1015-13** (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) **Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**PHST-38QTN Electrode**
Designed for a maximum steam pressure of 240 PSI; 400° F. UL353 Recognized.

**LLP-24 Threaded Probe (24")**
Threaded stainless steel probe measuring 24" (61 cm) long. For use with PHST-38QTN liquid level control electrodes.

## Specifications

| | |
|---|---|
| **Control** | |
| **Type** | ON/OFF (single level) resistance sensor with built-in time delay to prevent rapid cycling |
| **Sense Voltage** | Low voltage AC between probe & common. Isolated from input & output. |
| **Sense Resistance** | Fixed or adjustable to 250KΩ |
| **Sense Resistance Tolerance** | Adjustable - guaranteed range<br>Factory fixed ±10% |
| **Time Delay** | |
| **Range** | Fixed 1 - 60s in 1s increments |
| **Input** | |
| **Voltage** | 24, 120, or 230VAC |
| **Tolerance** | |
| **24VAC** | -15% - 20% |
| **120 & 230VAC** | -20% - 10% |
| **AC Line Frequency** | 50/60 Hz |
| **Output** | |
| **Type** | Electromechanical relay |
| **Form** | Non-isolated, SPST & Isolated, SPDT contacts |
| **Rating** | 10A resistive @ 120/240VAC & 28VDC;<br>1/3 hp @ 120/240VAC |
| **Life** | Mechanical - 1 x $10^7$; Electrical - 1 x $10^5$ |
| **Protection** | |
| **Surge** | IEEE C62.41-1991 Level A |
| **Isolation Voltage** | ≥ 1500V RMS between input, output & probe |
| **Mechanical** | |
| **Mounting** | Surface mount to probe common with two #6 (M3.5 x 0.6) screws or 0.50 in. (12.7 mm) nylon standoffs with three #6 (M3.5 x 0.6) screws (use Terminal 5 for probe common) |
| **Termination** | 0.25 in. (6.35 mm) male quick connect terminals |
| **Dimensions (Open Board)** | **H** 88.9 mm (3.5"); **W** 69.9 mm (2.75");<br>**D** 50.8 mm (2.0") |
| **Environmental** | |
| **Operating/Storage Temperature** | -20° to 55°C/-40° to 80°C |
| **Coating** | Printed circuit board is conformal coated to resist moisture and corrosion |
| **Weight** | ≅ 8.7 oz (247 g) |

# LLC2 SERIES

## Open Board Liquid Level Controls

## Description

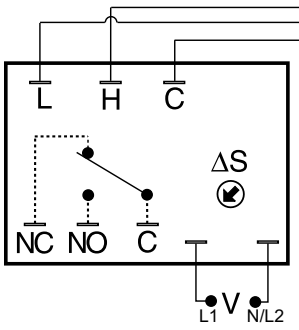
The LLC2 Series is a dual-probe conductive liquid level control designed for OEM equipment and commercial appliance applications. Models are available for fill or drain operation. Transformer isolated 12VAC is provided at the probes to prevent electrolysis. A trickle current of less than 1mA determines the presence or absence of liquid between the probes and common. On adjustable units, the sensitivity adjustment allows accurate level sensing while ignoring foaming agents and floating debris. The LLC2 Series printed circuit board is conformal coated to resist moisture and corrosion.

### Operation

**Drain (Pump-Down Mode):** When the liquid level rises and touches the high probe, the output relay energizes and remains energized until the liquid level falls below the low probe. The output relay then de-energizes and remains de-energized until the liquid again touches the high probe.

**Fill (Pump-Up Mode):** When the liquid level falls below the low probe, the output relay energizes and remains energized until the liquid level rises and touches the high probe. The output relay then de-energizes and remains de-energized until the liquid level again falls below the low probe.

## Wiring Diagram




V = Voltage
L = Low Probe
H = High Probe
C = Probe Common
P = Probe
ΔS = Sensitivity Adjustment
NC = Normally Closed
NO = Normally Open

Connect common to conductive tank. Additional probe is necessary for non-conductive or insulated tanks.

**For dimensional drawing see: Appendix, page 514, Figure 41.**

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Isolated 12VAC probes** | Prevents scale buildup on the probes |
| **Open PCB design** | Cost effective design for OEM equipment and commercial appliances |
| **Conformally coated PCB** | Protects against moisture and corrosion |
| **Sensitivity adjustment** | Provides accurate level sensing while ignoring foam or floating debris |

## Ordering Information

| MODEL | INPUT VOLTAGE | OPERATION | TERMINATION | SENSE RESISTANCE |
|---|---|---|---|---|
| LLC24A2AN | 120VAC | Drain | Terminal block | Adjustable to 100kΩ |
| LLC24A2F50N | 120VAC | Drain | Terminal block | Fixed 50kΩ |
| LLC24B1AC | 120VAC | Fill | 0.25" Quick connect | Adjustable to 100kΩ |
| LLC24B1F26C | 120VAC | Fill | 0.25" Quick connect | Fixed 26kΩ |
| LLC24B2F50N | 120VAC | Fill | Terminal block | Fixed 50kΩ |
| LLC26A1F25C | 230VAC | Drain | 0.25" Quick connect | Fixed 25kΩ |

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## Accessories

**P1015-13** (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) **Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**PHST-38QTN Electrode**
Designed for a maximum steam pressure of 240 PSI; 400° F. UL353 Recognized.

**LLP-24 Threaded Probe (24")**
Threaded stainless steel probe measuring 24" (61 cm) long. For use with PHST-38QTN liquid level control electrodes.

# LLC2 SERIES

## Specifications

### Control

| | |
|---|---|
| **Type** | Resistance sensing for high & low level detection of conductive liquids |
| **Sense Voltage** | 12VAC at probe terminals |
| **Sense Resistance** | Fixed or adjustable to 100KΩ |
| **Sense Resistance Tolerance** | Adjustable: guaranteed range<br>Fixed: ±10% |

### Input

| | |
|---|---|
| **Voltage** | 24, 120, or 230VAC |
| **Tolerance** | |
| **24VAC** | -15% - 20% |
| **120 & 230VAC** | -20% - 10% |
| **AC Line Frequency** | 50/60 Hz |

### Output

| | |
|---|---|
| **Type** | Electromechanical relay |
| **Form** | Isolated, SPDT |
| **Rating** | 10A resistive @ 120/240VAC & 28VDC;<br>1/3 hp @ 120/240VAC |
| **Life** | Mechanical - 1 x $10^7$; Electrical - 1 x $10^5$ |

### Protection

| | |
|---|---|
| **Isolation Voltage** | ≥ 1500V RMS between input, output, & probe |

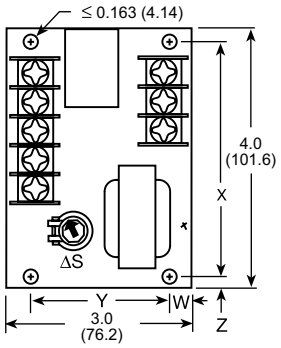
### Mechanical

| | |
|---|---|
| **Mounting** | Surface mount with two or four #6 (M3.5 x 0.6) screws |
| **Termination** | 0.25 in. (6.35 mm) duplex male quick connect terminals. Terminal blocks for up to #14 AWG 2.5 $mm^2$) wire |
| **Dimensions (Open Board)** | **H** 101.6 mm (4.0"); **W** 76.2 mm (3.0");<br>**D** 50.8 mm (2.0") |

### Environmental

| | |
|---|---|
| **Operating/Storage Temperature** | -20° to 55°C / -40° to 80°C |
| **Coating** | Printed circuit board is conformal coated to resist moisture and corrosion |
| **Weight** | ≅ 9 oz (255 g) |

## Mounting Dimensions




| DIAGRAM KEY | MODEL NUMBERS ENDING IN: | |
|---|---|---|
| | N | C |
| W | 0.440" (11.176 mm) | 0.250" (6.350 mm) |
| X | 3.620" (91.948 mm) | 3.500" (88.900 mm) |
| Y | 2.120" (53.848 mm) | 2.500" (63.500 mm) |
| Z | 0.190" (4.826 mm) | 0.250" (6.350 mm) |

# LLC4 SERIES

## Octal Plug-In Liquid Level Controls



8-PIN

## Description

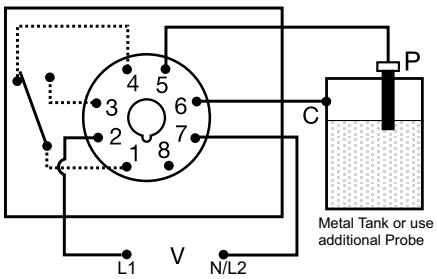
The LLC4 combines resistance sensing circuitry with solid-state timing to provide single probe level maintenance. On adjustable units, the sensitivity adjustment allows accurate level sensing while ignoring foaming agents and floating debris. Isolated 12VAC is provided at the probe to prevent electrolysis. A trickle current of less than 1mA determines the presence or absence of conductive liquid between the probe and common. The LLC4 Series can be used with many types of low voltage (resistance changing) transducers to perform other control functions like temperature limit control, photo limit control, condensation sensing, and ice sensing.

### Operation

**Drain (Pump-Down Mode):** When the liquid level rises and touches the probe, the time delay begins. This time delay prevents rapid cycling of the output relay and its load. At the end of the time delay, the output relay energize and remain energized until the liquid level falls below the probe level. The output relay de-energize and remain de-energized until the liquid rises and touches the probe.

**Fill (Pump-Up Mode):** When the liquid level falls below the probe, the time delay begins. This time delay prevents rapid cycling of the output relay and its load. At the end of the time delay, the output relay energize and remain energized until the liquid level rises and touches the probe. The output relay then de-energize and remain de-energized until the liquid level again falls below the probe level.

## Wiring Diagram




P = Probe
C = Probe Common
V = Voltage

Relay contacts are isolated.

Connect common to conductive tank. Additional probe is necessary for non-conductive or insulated tanks.

**For dimensional drawing see: Appendix, page 513, Figure 33.**

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Isolated 12VAC probes** | Prevents scale buildup on probe |
| **Industry standard 8-pin octal plug connection** | Eliminates need for special connectors |
| **Sensitivity adjustment** | Provides accurate level sensing while ignoring foam or floating debris |

## Ordering Information

| MODEL | INPUT VOLTAGE | OPERATION | TIME DELAY | SENSE RESISTANCE | MODEL | INPUT VOLTAGE | OPERATION | TIME DELAY | SENSE RESISTANCE |
|---|---|---|---|---|---|---|---|---|---|
| LLC42A10A | 24VAC | Drain | 10s | Adjustable 1 - 250kΩ | LLC44B1A | 24VAC | Fill | | Adjustable 1 - 250kΩ |
| LLC42A1A | 24VAC | Drain | 1s | Adjustable 1 - 250kΩ | LLC44A60A | 120VAC | Drain | 60s | Adjustable 1 - 250kΩ |
| LLC42B15A | 24VAC | Fill | 15s | Adjustable 1 - 250kΩ | LLC44B20A | 120VAC | Fill | 20s | Adjustable 1 - 250kΩ |
| LLC44A10A | 120VAC | Drain | 10s | Adjustable 1 - 250kΩ | LLC44B2A | 120VAC | Fill | 2s | Adjustable 1 - 250kΩ |
| LLC44A15A | 120VAC | Drain | 15s | Adjustable 1 - 250kΩ | LLC44B30A | 120VAC | Fill | 30s | Adjustable 1 - 250kΩ |
| LLC44A1A | 120VAC | Drain | 1s | Adjustable 1 - 250kΩ | LLC44B4A | 120VAC | Fill | 4s | Adjustable 1 - 250kΩ |
| LLC44A2A | 120VAC | Drain | 2s | Adjustable 1 - 250kΩ | LLC44B5A | 120VAC | Fill | 5s | Adjustable 1 - 250kΩ |
| LLC44A4A | 120VAC | Drain | 4s | Adjustable 1 - 250kΩ | LLC44B5F100 | 120VAC | Fill | 5s | Fixed 100kΩ |
| LLC44A5A | 120VAC | Drain | 5s | Adjustable 1 - 250kΩ | | | | | |

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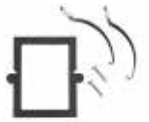
# LLC4 SERIES

## Accessories



**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**PSC8 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use with NDS-8 Octal Socket. Sold in pairs.

**PHST-38QTN Electrode**
Designed for a maximum steam pressure of 240 PSI; 400° F. UL353 Recognized.

**LLP-24 Threaded Probe (24")**
Threaded stainless steel probe measuring 24" (61 cm) long. For use with PHST-38QTN liquid level control electrodes.

## Specifications

### Control

| | |
|---|---|
| **Type** | ON/OFF (single level) resistance sensor with built-in time delay to prevent rapid cycling |
| **Sensing Voltage** | 12VAC |
| **Sensing Resistance** | Fixed or adjustable to 250KΩ |
| **Sensing Resistance Tolerance** | Adjustable: 1K ±500Ω at low end; 250K ±25% at high end<br>Factory fixed: ±10% or 500Ω, whichever is greater |

### Input

| | |
|---|---|
| **Voltage** | 24, 120, or 230VAC |
| **Tolerance** | |
| **24VAC** | -15%, +20% |
| **120 & 230VAC** | -20%, +10% |
| **AC Line Frequency** | 50/60 Hz |

### Output

| | |
|---|---|
| **Type** | Electromechanical relay |
| **Form** | Isolated, SPDT |
| **Rating** | 4A resistive @ 240VAC;<br>1/10 hp @ 240VAC |

### Protection

| | |
|---|---|
| **Surge** | IEEE C62.41-1991 Level A |
| **Isolation Voltage** | ≥ 1500V RMS between input, output & probe |

### Mechanical

| | |
|---|---|
| **Mounting** | Plug-in socket |
| **Termination** | Octal 8-pin plug-in |
| **Dimensions** | **H** 73.9 mm (2.91"); **W** 60.7 mm (2.39");<br>**D** 45.2 mm (1.78") |

### Environmental

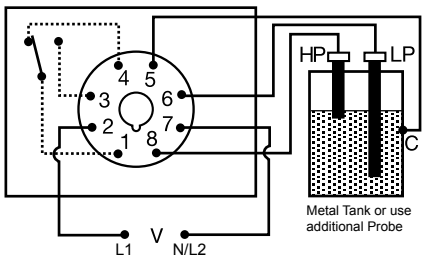
| | |
|---|---|
| **Operating/Storage Temperature** | -20° to 60°C/-40° to 80°C |
| **Weight** | ≅ 6 oz (170 g) |

# LLC5 SERIES

## Liquid Level Controls


8-PIN

## Wiring Diagram




HP = HIGH LEVEL PROBE
LP = LOW LEVEL PROBE
C = PROBE COMMON
V = VOLTAGE

Relay contacts are isolated. Connect common to conductive tank. Additional probe is necessary for non-conductive or insulated tanks.

**For dimensional drawing see: Appendix, page 514, Figure 43.**

## Ordering Information

| MODEL | LINE VOLTAGE | DESCRIPTION |
|---|---|---|
| LLC52AA | 24VAC | For Drain (pump-down) operation with adjustable sense resistance |
| LLC52BA | 24VAC | For Fill (pump-up) operation with adjustable sense resistance |
| LLC54AA | 120VAC | For Drain (pump-down) operation with adjustable sense resistance |
| LLC54AAS | 120VAC | For Drain (pump-down) operation with adjustable sense resistance and reverse connection (#8 low, #6 high) |
| LLC54AF10 | 120VAC | For Drain (pump-down) operation with fixed sense resistance of 10 kΩ |
| LLC54BA | 120VAC | For Fill (pump-up) operation with adjustable sense resistance |
| LLC54BAS | 120VAC | For Fill (pump-up) operation with adjustable sense resistance and reverse connection (#8 low, #6 high) |
| LLC56AA | 230 VAC | For Drain (pump-down) operation with adjustable sense resistance |

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## Description

The LLC5 provides dual probe conductive liquid level control in a convenient octal plug-in package. Models are available for fixed fill or drain operation. Isolated, pulsed DC voltage on the probes prevents electrolytic plating. Less than 1 mA of current is used to sense the presence of conductive liquid between the probes and common. On adjustable units, the sensitivity adjustment eliminates false tripping caused by floating debris and foaming agents.

### Operation

**Drain (Pump-Down Mode):** When the liquid level rises and touches the high level probe, the output relay and LED energize and remain energized until the liquid level falls below the low level probe. The output relay and LED de-energize and remain de-energized until the liquid rises and touches the high level probe.

**Fill (Pump-Up Mode):** When the liquid level falls below the low level probe, the output relay and LED energize and remain energized until the liquid level rises and touches the high level probe. The output relay and LED de-energize and remain de-energized until the liquid level again falls below the low level probe.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Unique Probe Protection logic** | Probes are protected from scale build up through pulsed DC signal between the probes. |
| **LED status indicator** | Visual indication of relay engagement in pump-up or pump-down activity |
| **Isolated 5A SPDT contacts** | Allows control of loads for AC voltage |

## Accessories

**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**PSC8 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use with NDS-8 Octal Socket. Sold in pairs.

**Note:** use of the PSC8 clips partley covers the LED window of the LLC5 unit. Use of alternative socket base P1011-6 with its corresponding hold down clips PSCRB8 do not cover up the LED window, but the socket base is not DIN rail mountable.

# LLC5 SERIES

## Accessories

**PHST-38QTN Electrode**
Designed for a maximum steam pressure of 240 PSI; 400° F. UL353 Recognized.

**LLP-24 Threaded Probe (24")**
Threaded stainless steel probe measuring 24" (61 cm) long. For use with PHST-38QTN liquid level control electrodes.

## Specifications

| | |
|---|---|
| **Control** | |
| **Type** | Resistance sensing for high & low level detection of conductive liquids |
| **Sensing Voltage** | Pulsed DC at probe terminals |
| **Sensing Resistance** | Factory fixed or adjustable to 100KΩ |
| **Sensing Resistance Tolerance** | Adjustable: 1K ±500Ω at low end; 100KΩ ±25%, 0% at high end<br>Factory fixed: ±10% or 500Ω whichever is greater |
| **Response Time** | Debounce time delay <1s |
| **Input** | |
| **Tolerance** | |
| **24VAC** | -15%, +20% |
| **120 & 230VAC** | -20%, +10% |
| **AC Line Frequency** | 50/60 Hz |
| **Output** | |
| **Type** | Electromechanical relay |
| **Form** | Isolated, SPDT |
| **Rating** | 5A resistive @ 240VAC, 1/10 hp @ 240VAC |
| **Protection** | |
| **Isolation Voltage** | ≥ 1500V RMS between input, output, & probe |
| **Mechanical** | |
| **Mounting** | Plug-in socket |
| **Dimensions** | **H** 60.7 mm (2.39"); **W** 45.2 mm (1.78");<br>**D** 76.5 mm (3.01") |
| **Termination** | Octal 8-pin plug-in |
| **Environmental** | |
| **Operating/Storage Temperature** | -20° to 60°C / -40° to 80°C |
| **Weight** | 6 oz (170 g) approx. |



# LLC6 SERIES

## Low Level Cutoff Liquid Level Controls



11-PIN

## Description

The LLC6 Series is a plug-in, single-probe conductive liquid level control designed for low liquid level cutoff protection. It offers a factory fixed time delay of 1 - 60s and is available in input voltages of 24, 120, or 230VAC. LED indicator illuminates whenever the LLC6's 10A, SPDT output relay is energized. Available with automatic/manual reset or a special manual reset with power outage feature, which auto resets the unit when power is restored and the water level is acceptable. 24VAC and 120VAC units are recognized as limit switches under UL353 (230VAC units are UL508) and CSA certified under Standard 14.

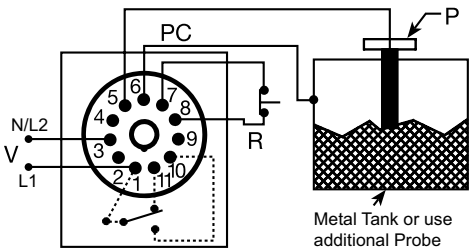
### Operation

**Automatic Reset (Reset terminals not connected):** When liquid rises to the low level cutoff probe, the output relay and the LED indicator energize. When the liquid falls below low level cutoff probe, the output relay and the LED indicator de-energize after a fixed time delay.

**Manual Reset (Reset switch connected):** When the liquid level falls below the low level probe, the output relay and LED de-energize after a fixed time delay. When the liquid level rises to the low level probe, the output relay and LED indicator remain de-energized until the manual reset switch is opened; then they energize immediately.

**Power Outage Manual Reset (Reset switch connected):** A power outage causes the output relay and LED indicator to de-energize. Upon restoration of power, if the liquid level is above the low level probe, the output relay and LED indicator will re-energize. If the liquid level is below the low level probe, the output relay and LED indicator remain de-energized until the Normally Closed (NC) reset switch is opened.

## Wiring Diagram




PC = Probe Common
P = Probe
V = Voltage
R = Optional NC Reset Switch

Connect common to conductive tank. Additional probe is necessary for non-conductive or insulated tanks.

**For dimensional drawing see: Appendix, page 513, Figure 33.**

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Isolated 12VAC on probe** | Prevents electrolysis |
| **Industry standard 11-pin octal plug connection** | Eliminates need for special connectors |
| **LED indication** | Visual indication output relay is energized |
| **Power outage protection (see ordering table for models)** | Automatically resets the unit when power is restored and the water level is acceptable |

## Ordering Information

| MODEL | INPUT VOLTAGE | TIME DELAY (FIXED) | SENSE RESISTANCE | RESET |
|---|---|---|---|---|
| LLC6210F10M | 24VAC | 10s | 10kΩ | Manual/Automatic |
| LLC6410F10M | 120VAC | 10s | 10kΩ | Manual/Automatic |
| LLC643F26M | 120VAC | 3s | 26kΩ | Manual/Automatic |
| LLC6610F5P | 230VAC | 10s | 5kΩ | Power Outage Manual Reset |

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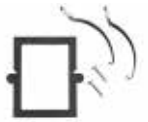
# LLC6 SERIES

## Accessories



**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-11 11-pin Socket**
11-pin 35mm DIN rail or surface mount. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

**PSC11 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use with NDS-11 Socket. Sold in pairs.

**PHST-38QTN Electrode**
Designed for a maximum steam pressure of 240 PSI; 400° F. UL353 Recognized.

**LLP-24 Threaded Probe (24")**
Threaded stainless steel probe measuring 24" (61 cm) long. For use with PHST-38QTN liquid level control electrodes.

## Specifications

### Control

| | |
|---|---|
| **Type** | ON/OFF (single level) resistance sensor with built-in time delay to prevent rapid cycling |
| **Sense Voltage** | 12VAC nominal at probe terminals |
| **Sense Resistance** | Fixed 5K - 250KΩ |
| **Sense Resistance Tolerance** | Fixed ±10% |

### Time Delay

| | |
|---|---|
| **Range** | 1 - 60s in 1s increments |
| **Tolerance** | ±20% |
| **Repeat Accuracy** | ±10% |
| **Time Delay vs Temp. & Voltage** | ±10% |
| **Power Outage Reset Delay** | ≤ 1s |

### Input

| | |
|---|---|
| **Voltage** | 24, 120, or 230VAC |
| **Tolerance** | |
| **24VAC** | +20% to -15% |
| **120 or 230VAC** | +10% to -20% |
| **AC Line Frequency** | 50/60 Hz |

### Output

| | |
|---|---|
| **Type** | Electromechanical relay |
| **Form** | Non-isolated, SPDT |
| **Rating** | 10A resistive @ 240VAC; 1/4 hp @ 125VAC; 1/2 hp @ 250VAC |

### Protection

| | |
|---|---|
| **Surge** | IEEE C62.41-1991 Level A |
| **Isolation Voltage** | ≥ 2500V RMS between input & output terminals |

### Mechanical

| | |
|---|---|
| **Mounting** | Plug-in socket |
| **Termination** | 11-pin relay type |
| **Dimensions** | **H** 73.9 mm (2.91"); **W** 60.7 mm (2.39"); **D** 45.2 mm (1.78") |

### Environmental

| | |
|---|---|
| **Operating/Storage Temperature** | -40° to 60°C / -40° to 80°C |
| **Humidity** | 95% relative, non-condensing |
| **Weight** | ≅ 7.3 oz (207 g) |

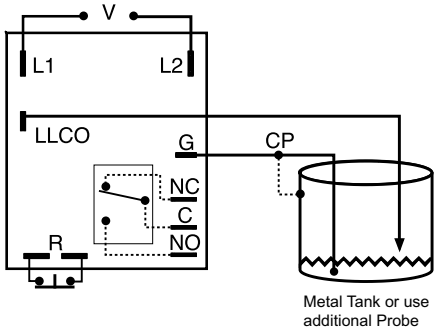


# LLC8 SERIES

## Low Level Cutoff Liquid Level Controls

## Wiring Diagram




V = Voltage
LLCO = Low Level Probe
G, CP = Ground or Common (Reference) Probe
R = Optional NC Reset Switch (not included)
NO = Normally Open
NC = Normally Closed
C = Common or Transfer Contact

Relay contacts are isolated. Connect common to conductive tank. Additional probe is necessary for non-conductive or insulated tanks.

**For dimensional drawing see: Appendix, page 514, Figure 42.**

## Ordering Information

| MODEL | INPUT VOLTAGE | TIME DELAY (FIXED) | SENSE RESISTANCE | RESET |
|---|---|---|---|---|
| LLC825F5M | 24VAC | 5s | 5kΩ | Manual/automatic |
| LLC842F103M | 120VAC | 2s | 10kΩ | Manual/automatic |
| LLC843F10M | 120VAC | 3s | 10kΩ | Manual/automatic |
| LLC843F10P | 120VAC | 3s | 10kΩ | Power outage manual reset |
| LLC843F26M | 120VAC | 3s | 26kΩ | Manual/automatic |
| LLC843F26P | 120VAC | 3s | 26kΩ | Power outage manual reset |
| LLC845F25P | 120VAC | 5s | 25kΩ | Power outage manual reset |
| LLC8430F250P | 120VAC | 30s | 250kΩ | Power outage manual reset |
| LLC8430F26P | 120VAC | 30s | 26kΩ | Power outage manual reset |
| LLC8610F12M | 230VAC | 10s | 12kΩ | Manual/automatic |
| LLC863F26P | 230VAC | 3s | 26kΩ | Power outage manual reset |

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## Description

The LLC8 Series is a low cost, single-probe conductive liquid level control designed for low liquid level cutoff protection. It offers a factory fixed time delay of 1 - 60s and is available for input voltages of 24, 120, or 230VAC. LED indicator illuminates whenever the LLC8's isolated, 10A, SPDT output relay is energized. Sense resistance is fixed from 5K - 250KΩ. Available with manual/automatic reset or a special manual reset with a power outage feature that auto resets the unit when power is restored and the water level is acceptable. 24 and 120VAC units are UL recognized as limit switches under UL353 (230VAC units are UL 508) and CSA certified under Standard 14.

### Operation

**Automatic Reset (Reset switch not connected):** When liquid rises to low level cutoff probe, output relay and LED indicator energize. When liquid falls below the low level cutoff probe, the output relay and LED indicator de-energize after a fixed time delay.

**Manual Reset (Reset switch connected):** When the liquid level falls below low level probe, the output relay and LED de-energize after a fixed time delay. When the liquid level rises to low level probe, the output relay and LED indicator remain de-energized until the NC manual reset switch is opened; then they energize immediately.

**Power Outage Manual Reset (Reset switch connected):** A power outage causes the output relay and LED indicator to de-energize. Upon restoration of power, if the liquid is touching the low level probe, the output relay and LED indicator will re-energize. If the liquid level is below the low level probe, the output relay and LED indicator remain de-energized until the NC reset switch is opened.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Isolated 12VAC probes** | Prevents scale buildup on probe |
| **Open PCB design** | Cost effective design for OEM low liquid level cutoff protection |
| **Conformally coated PCB** | Protects against moisture and corrosion |
| **LED indication** | Visual indication output relay is energized |
| **Power outage protection (see ordering table for models)** | Automatically resets the unit when power is restored and the water level is acceptable |
| **24VAC & 120VAC models meet UL353** | Required for use as a low level limit switch |

# LLC8 SERIES

## Accessories

**P1015-13** (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) **Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**PHST-38QTN Electrode**
Designed for a maximum steam pressure of 240 PSI; 400° F. UL353 Recognized.

**LLP-24 Threaded Probe (24")**
Threaded stainless steel probe measuring 24" (61 cm) long. For use with PHST-38QTN liquid level control electrodes.

## Specifications

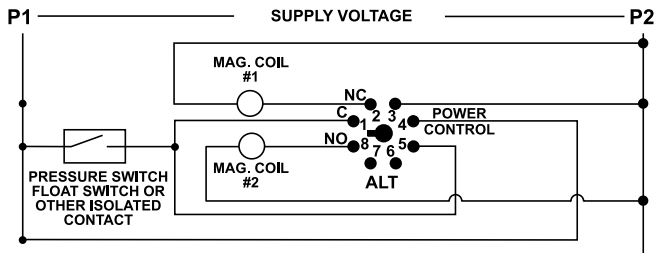
| | |
|---|---|
| **Control** | |
| **Type** | Resistance sensing for conductive liquids with time delay |
| **Sense Voltage** | 12VAC nominal at probe terminals |
| **Sense Resistance** | Fixed 5K - 250KΩ |
| **Sense Resistance Tolerance** | ±10% |
| **Time Delay** | |
| **Tolerance** | ±20% |
| **Repeat Accuracy** | ±10% |
| **Time Delay vs Temp. & Voltage** | ±10% |
| **Power Outage Reset Delay** | ≤1s |
| **Input** | |
| **Voltage** | 24, 120, or 230VAC |
| **Tolerance** | |
| **24VAC** | -15% - 20% |
| **120 or 230VAC** | -20% - 10% |
| **AC Line Frequency** | 50/60 Hz |
| **Output** | |
| **Type** | Electromechanical relay |
| **Form** | Isolated SPDT |
| **Rating** | 10A resistive @ 120/240VAC; 1/4 hp @ 125VAC; 1/2 hp @ 250VAC |
| **Protection** | |
| **Surge** | IEEE C62.41-1991 Level A |
| **Isolation Voltage** | ≥ 2500V RMS input to output terminals |
| **Mechanical** | |
| **Mounting** | 0.5 in. (12.7 mm) x .187 (4.76 mm) dia. nylon standoffs (3) |
| **Termination** | |
| **Dimensions** | **H** 63.5 mm (2.5"); **W** 55.6 mm (2.19"); **D** 47.8 mm (1.88") |
| **Electrical** | 0.25 in. (6.35 mm) male quick connect terminals |
| **Reset Switch & Probe(s)** | 0.187 x 0.03 in. (4.75 x 0.76 mm) male quick connect terminals |
| **Environmental** | |
| **Operating/Storage Temperature** | -40° to 60°C / -40° to 80°C |
| **Coating** | Printed circuit board is conformal coated to resist moisture & corrosion |
| **Humidity** | 95% relative, non-condensing |
| **Weight** | ≅ 5 oz (141.7 g) |

# ALT SERIES

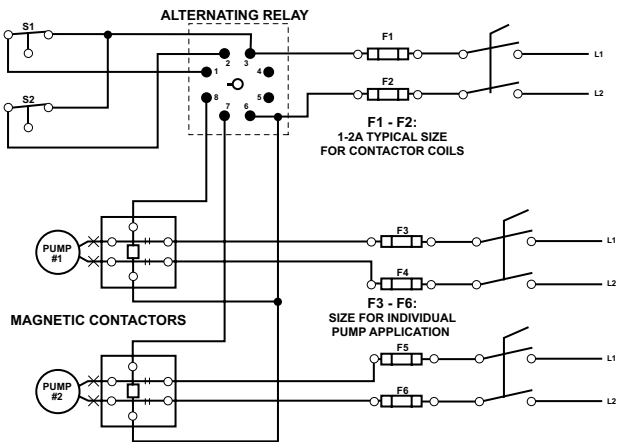
## 8-pin Plug-in Alternating Relay


## Wiring Diagram

TYPICAL WIRING DIAGRAM FOR THE ALT-S




TYPICAL WIRING DIAGRAM FOR THE ALT-X (CROSS CONNECTED)




**For dimensional drawing see: Appendix, page 509, Figure 8.**

## Accessories

**OT08PC Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Rated at 10A @ 600VAC. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail.

## Description

The ALT alternating relays are used to alternate between two loads. The ALT is commonly used in duplex pumping applications to balance the runtime of both pumps.

The **ALT-S** is used in single high-level float applications. When the float switch opens, the alternating relay changes state, forcing the other pump to run the next time the float closes. All ALT relays have a built-in debounce feature that prevents the relay from changing state if the switch or float contact bounces momentarily.

The **ALT-X** has an internal cross-connected relay and is used in dual high-level float applications. These floats are commonly referred to as lead and lag floats.

The pumps alternate as in the ALT-S version but the cross-connected relay configuration allows both pumps to run simultaneously when both the lead and lag floats are closed.

These relays are also available with a built-in switch (SW option) that is used to manually force one of the pumps to run every time the float switch is closed. This is helpful when a pump has been removed for repair or for test purposes. In the case of the **ALT-X-SW,** the switch essentially forces one pump to be the lead pump, while still allowing the second to run when both floats are closed.

**Must use the OT08PC socket for UL Rating!**

*Note: Manufacturer's recommended screw terminal torque for the OT Series Octal Sockets is 12 in.-lbs.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Debounce time delay** | Prevents nuisance actuating causes by waves or spashing in the tank |
| **Built-in manual/ auto switch** | Force lead pump operation when a pump is removed for repair or testing (on select models) |

## Ordering Information

| MODEL | LINE VOLTAGE | DESCRIPTION |
|---|---|---|
| ALT024-S | 20-26VAC or VDC | For single high-level float applications |
| ALT024-S-SW | 20-26VAC or VDC | For single high-level float applications with built in manual switch |
| ALT115-S | 95-125VAC | For single high-level float applications |
| ALT115-S-SW | 95-125VAC | For single high-level float applications with built in manual switch |
| ALT115-X | 95-125VAC | For dual high-level (lead and lag) float applications |
| ALT115-X-SW | 95-125VAC | For dual high-level (lead and lag) float applications with built in manual switch |
| ALT230-S | 195-250VAC | For single high-level float applications |
| ALT230-S-SW | 195-250VAC | For single high-level float applications with built in manual switch |
| ALT230-X | 195-250VAC | For dual high-level (lead and lag) float applications |
| ALT230-X-SW | 195-250VAC | For dual high-level (lead and lag) float applications with built in manual switch |

# ALT SERIES

## Specifications

### Input Characteristics

| | |
|---|---|
| **Supply Current** | 40mA |

### Functional Characteristics

| | |
|---|---|
| **Debounce Time Delay** | 0.5 second |
| **Control Input Impedance (min)** | |
| **24** | 10kΩ |
| **115** | 56kΩ |
| **230** | 100kΩ |

### Output Characteristics

| | |
|---|---|
| **Output Contact Rating** | 480VA @ 240VAC |

### General Characteristics

| | |
|---|---|
| **Temperature Range** | -40° to 50°C (-40° to 122°F) |
| **Maximum Input Power** | 5 W |

### Safety Marks

| | |
|---|---|
| **UL (OT08PC octal socket required)** | UL508 (File #E68520) |
| **CSA** | C22.2 No. 14 (File #46510) |
| **Dimensions (with socket)** | **H** 44.45 mm (1.75"); **W** 60.33 mm (2.375"); **D** 104.78 mm (4.125") |
| **Weight** | 0.38 lb. (6.08 oz., 172.67 g) |
| **Mounting Method** | DIN rail or surface mount (plug into OT08PC socket) |
| **Socket Available** | OT08PC (UL Rating 600V) |

The 600V socket can be surface mounted or installed on DIN Rail.



# ALT-XXX-1-SW / ALT-XXX-3-SW SERIES

## Alternating Relay


## Description

The ALT-xxx-1-SW/ALT-xxx-3-SW Series are used to alternate between two loads and are commonly used in duplex pump-up and pump-down applications to balance the runtime of both pumps.

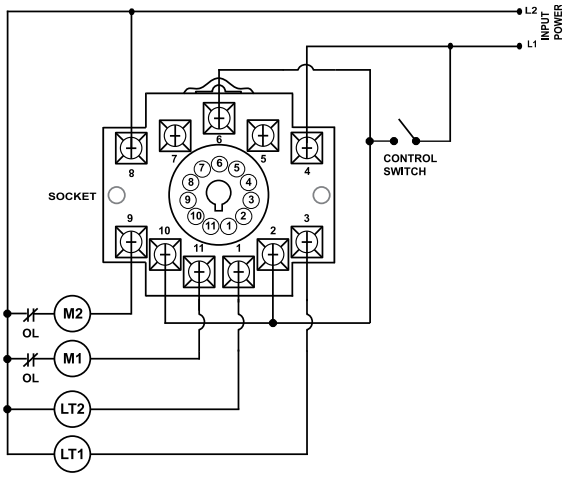
The ALT relays have a built-in debounce time delay that prevents the relay from changing state if the float momentarily bounces, and they have a built-in switch to manually force a specific load (pump) to operate each time the input float closes. This is helpful when performing periodic maintenance or pump repair.

**Must use the OT08PC socket for the 8-pin models, and the OT11PC socket for the 11-pin models, for UL Rating!**

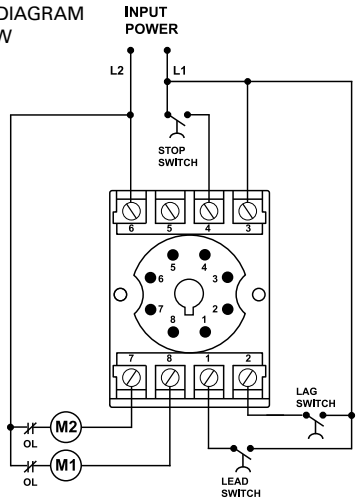
*Note: Manufacturer's recommended screw terminal torque for the OT Series Octal Sockets is 12 in.-lbs.

## Wiring Diagram

TYPICAL WIRING DIAGRAM FOR ALT-XXX-1-SW




TYPICAL WIRING DIAGRAM FOR ALT-XXX-3-SW




## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Debounce time delay** | Prevents rapid cycling caused by waves or splashing in the tank |
| **LED indicators** | Visual indication of load operation in duplex application |
| **Built-in manual switch to force load operation** | Helpful to control load operation when performing periodic maintenance or pump repair |
| **ALT-xxx-3-SW offers duplexing** | Allows lag pump to energize if lead pump can't handle current demand |

## Accessories

**OT08PC 8-pin Octal Socket**
Octal Socket for plug-in units. 8-pin surface & DIN rail mountable. Rated for 10A @ 600VAC.

**OT11PC 11-pin Magnal Socket**
11-pin surface & DIN rail mountable. Rated for 10A @ 300VAC

## Ordering Information

| MODEL | LINE VOTAGE | MOUNTING | DESCRIPTION |
|---|---|---|---|
| ALT-100-1-SW | 95-120VAC | 11-pin magnal | Single float input, two isolated Form C relays (DPDT), 2 LEDs for load indication |
| ALT-100-3-SW | 95-120VAC | 8-pin octal | Three float inputs (lead, lag, stop floats), actuating latching relays on lead/lag floats, 2 LEDs for load indication |
| ALT-200-3-SW | 190-240VAC | 8-pin octal | Three float inputs (lead, lag, stop floats), actuating latching relays on lead/lag floats, 2 LEDs for load indication |

**For dimensional drawing see: Appendix, page 509, Figure 8.**

# ALT-XXX-1-SW / ALT-XXX-3-SW SERIES

## Specifications

### Input Characteristics

| | |
|---|---|
| **Supply Voltage** | |
| **ALT-100-1-SW, ALT-100-3-SW** | 95-120VAC |
| **ALT-200-3-SW** | 190-240VAC |
| **Frequency** | 50/60Hz |

### Functional Characteristics

| | |
|---|---|
| **Debounce Time Delay** | |
| **ALT-100-1-SW,** | 1 second |
| **ALT-100-3-SW, ALT-200-3-SW** | 5 seconds |

### Output Characteristics

| | |
|---|---|
| **Output Relay (DPDT)** | |
| **Pilot Duty** | 480VA @ 240VAC |
| **General Purpose** | 10A @ 240VAC |

### General Characteristics

| | |
|---|---|
| **Temperature Range** | -40° to 70°C (-40° to 158°F) |
| **Maximum Input Power** | 5 W |

### Standards Passed

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air |
| **Radio Frequency, Radiated** | 150MHz, 10V/m |
| **Fast Transient Burst** | IEC 61000-4-4, Level 3, 3.5kV input power and controls |
| **Safety Marks** | |
| **UL (OT08PC or OT11PC octal socket required)** | UL508 (File #E68520) |
| **CE** | IEC 60947-6-2 |
| **Dimensions** | **H** 44.45 mm (1.75"); **W** 60.33 mm (2.375"); **D** 104.78 mm (4.125") (with socket) |
| **Weight** | 0.65 lb. (10.4 oz., 294.84 g) |
| **Mounting Method** | DIN rail or surface mount (plug into OT08PC or OT11PC socket) |
| **Sockets Available** | |
| **Model OT08PC** | UL Rating 600V |
| **Model OT11PC** | UL Rating 300V |

The sockets can be surface mounted or installed on DIN Rail.



# ARP SERIES

## Alternating Relay



8-PIN


11-PIN

## Description

The ARP Series is used in systems where equal run time for two motors is desirable. The selector switch allows selection of alternation or for continuous operation of either load. LED's indicate the status of the output relay. This versatile series may be front panel mounted (BZ1 accessory required) or 35 mm DIN rail mounted with an accessory socket.

### Operation

**Alternating:** When the rotary switch is in the "alternate" position, alternating operation of Load A and Load B occurs upon the opening of the control switch S1. To terminate alternating operation and cause only the selected load to operate, rotate the switch to position "A" to lock Load A or position "B" to lock Load B. The LEDs indicate the status of the internal relay and which load is selected to operate.

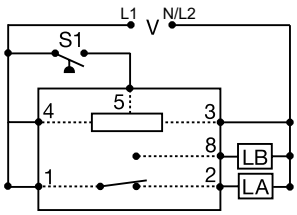
**Note:** Input voltage must be applied at all times for proper alternation. The use of a solid-state control switch for S1 may not initiate alternation correctly. S1 voltage must be from the same supply as the unit's input voltage (see connection diagrams). Loss of input voltage resets the unit; Load A becomes the lead load for the next operation.

**Duplexing (Cross Wired):** Duplexing models operate the same as alternating relays and when both the Control (S1) and Lag Load (S2) Switches are closed, Load A and Load B energize simultaneously.

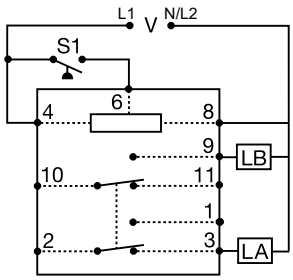
The DPDT 8-pin, cross-wired option, allows extra system load capacity through simultaneous operation of both motors when needed. Relay contacts are not isolated.

## Wiring Diagram

SPDT 8-PIN

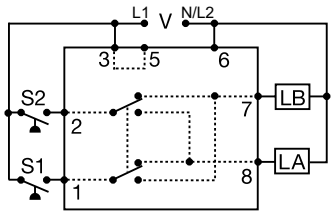



DPDT 11-PIN




Relay contacts in above are isolated.

DPDT 8-PIN CROSS WIRED




V = VOLTAGE
LA = LOAD A
LB = LOAD B
S1 = PRIMARY CONTROL SWITCH
S2 = LAG LOAD SWITCH

**For dimensional drawing see: Appendix, page 514, Figure 46.**

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Alternating or electrically locked operation** | Flexibility to run unit alternating between the two loads as normal or lock the relay to one specific load. |
| **Low profile selector switch** | Prevents accidental actuation |
| **LED status indication** | Visual indication of which load is engaged |
| **Industry standard base connection** | Flexibility to use in many applications |

## Ordering Information

| MODEL | LINE VOLTAGE | OUTPUT FORM | DESCRIPTION |
|---|---|---|---|
| AR120A-3095 | 120VAC | SPDT | 8 pin for alternating applications. Rotary switch allows user to lock internal relay to one specific load. |
| ARP23S | 24VAC | DPDT | 8 pin cross wired for duplexing applications. Rotary switch allows user to lock internal relay to one specific load. |
| ARP41 | 120VAC | SPDT | 8 pin for alternating applications. |
| ARP41S | 120VAC | SPDT | 8 pin for alternating applications. Rotary switch allows user to lock internal relay to one specific load. |
| ARP42S | 120VAC | DPDT | 11 pin for alternating applications. Rotary switch allows user to lock internal relay to one specific load. |
| ARP43 | 120VAC | DPDT | 8 pin cross wired for duplexing applications. |
| ARP43S | 120VAC | DPDT | 8 pin cross wired for duplexing applications. Rotary switch allows user to lock internal relay to one specific load. |
| ARP61S | 230VAC | SPDT | 8 pin for alternating applications. Rotary switch allows user to lock internal relay to one specific load. |
| ARP62S | 230VAC | DPDT | 8 pin cross wired for duplexing applications. Rotary switch allows user to lock internal relay to one specific load. |
| ARP63S | 230VAC | DPDT | 8 pin cross wired for duplexing applications. Rotary switch allows user to lock internal relay to one specific load. |

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# ARP SERIES

## Accessories

**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**NDS-11 11-pin Socket**
1-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

**PSC8 or PSC11 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in pairs.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

## Specifications

**Input**

| | |
|---|---|
| **Tolerance** | |
| **24VAC** | -15% to 20% |
| **120 & 230VAC** | -20% to 10% |
| **AC Line Frequency** | 50/60Hz |

**Output**

| | |
|---|---|
| **Type** | Electromechanical relay |
| **Form** | SPDT, DPDT, or cross wired DPDT |
| **Rating** | 10A resistive @ 120/240VAC & 28 VDC; 1/3 hp @ 120/240VAC |
| **Maximum Voltage** | 250VAC |
| **Life** | Mechanical - 1 x $10^7$; Electrical - 1 x $10^6$ |
| **Protection** | |
| **Isolation Voltage** | ≥ 1500V RMS input to output |

**Mechanical**

| | |
|---|---|
| **Mounting** | Plug-in socket |
| **Dimensions** | **H** 81.3 mm (3.2"); **W** 60.7 mm (2.39"); **D** 45.2 mm (1.78") |
| **Termination** | Octal 8-pin or magnal 11-pin |

**Environmental**

| | |
|---|---|
| **Operating/Storage Temperature** | -20° to 60°C / -30° to 85°C |
| **Weight** | 5.6 oz (159 g) approx. |

NOTE: Unit does not have debounce time delay.



# 50R-400-ALT

## 480VAC Application, Panel Mount

## Description

The 50R-400-ALT alternating relays are used to alternate between two loads, most commonly in duplex pumping and compressor applications to balance the runtime of both loads.

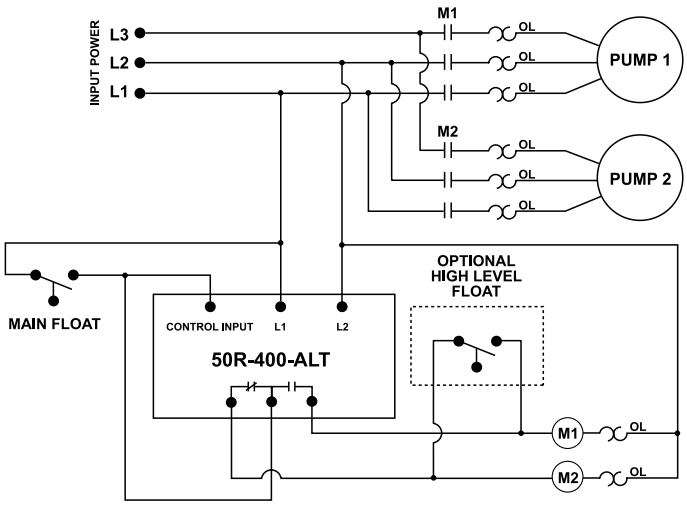
When used in single float applications, the alternating relay changes state after the float switch opens*, forcing the other pump to run the next time the float closes. When used in dual float applications, the alternating relay will allow both pumps to run simultaneously when the lead and lag floats are both closed.

An adjustment knob provides the option to force one pump to run every time the float switch is closed. This is helpful when one pump has been removed for repair or for test purposes.

A built-in debounce feature prevents the alternating relay from changing state if the float contact bounces momentarily.

*The alternating relay will not switch states while current is flowing. Switching will only occur after current has been sensed, followed by loss of current for the duration of the debounce time delay.

## Wiring Diagram




For dimensional drawing see: Appendix, page 509, Figure 6.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Debounce time delay** | Prevents rapid cycling caused by waves or splashing in the tank |
| **LED indicators** | Visual indication of load operation in duplex application |
| **Built-in manual switch to force load operation** | Helpful to control load operation when performing periodic maintenance or pump repair |
| **Operates from 380 - 480VAC** | No transformer required to provide 120 - 240V for control circuit |

## Specifications

**Input Characteristics**

| | |
|---|---|
| **Supply Voltage** | 380-480VAC |
| **Supply Current** | 40mA |

**Functional Characteristics**

| | |
|---|---|
| **Control Input Impedance (min)** | 1MΩ |

**Output Characteristics**

| | |
|---|---|
| **Output Contact Rating** | |
| **Pilot Duty** | 470VA @ 600VAC |
| **General Purpose** | 10A |
| **Debounce Time Delay** | 1 second |

**General Characteristics**

| | |
|---|---|
| **Maximum Input Power** | 5 W |
| **Terminal** | |
| **Torque** | 7 in.-lbs. |
| **Wire Size** | 12-18AWG |
| **Safety Marks** | |
| **UL** | UL508 (File #E68520) |
| **CE** | IEC 60947 |
| **Dimensions** | **H** 74.4 mm (2.93"); **W** 133.9 mm (5.27"); **D** 74.9 mm (2.95") |
| **Weight** | 0.98 lb. (15.68 oz., 444.52 g) |
| **Mounting Method** | #8 screws |

# ISS-100

## Single-Channel Intrinsically Safe Switch


## Description

The ISS-100 switches are UL 913 listed as an associated apparatus for interfacing between hazardous and non-hazardous areas. These units must be installed in a non-hazardous area.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Finger-safe terminals** | Meets IEC 61000 safety requirements |
| **Compact design for DIN rail or surface mount** | Allows flexiblility in panel installation |
| **LED Status Indicator** | Visual indication of relay engagement |
| **Isolated output relay** | Allows connection to PLC or control voltage |

## Specifications

**Input Characteristics**

| | |
|---|---|
| **Supply Voltage** | 90-120VAC |

**Functional Characteristics**

| | |
|---|---|
| **Probe Sense Voltage** | 5vdc continuous |

**Output Characteristics**

| | |
|---|---|
| **Output Contact Rating** | |
| **Pilot Duty** | 180VA @120VAC, C300 |
| **General Purpose** | 8A @120VAC |
| **Relay Contact Life (Electrical)** | 100,000 cycles min. @ rated load |
| **Relay Contact Life (Mechanical)** | 10,000,000 cycles |

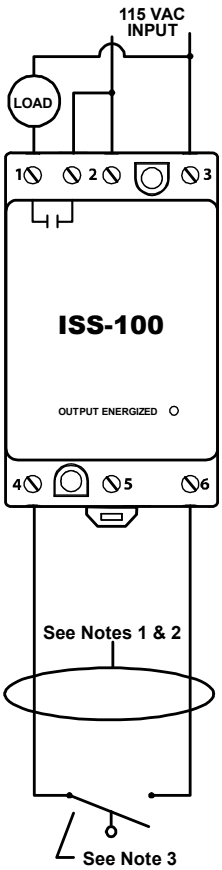
**General Characteristics**

| | |
|---|---|
| **Temperature Range** | -20° to 55°C (-4° to 131°F) |
| **Maximum Input Power** | 1.5 W |
| **Wire range** | 12 to 20 AWG |
| **Terminal Torque** | 3.5 to 4.5 in.-lbs. (max. 4.5 in.-lbs.) |
| **Provides Intrinsically-Safe Circuits in the following locations:** | Division 1 and 2<br>Class I, Groups A,B,C,D;<br>Class II, Groups E,F,G;<br>and Class III |
| **Entity Parameters** | $V_{oc}$ = 16.8V  Po=$\frac{Voc*Isc}{4}$<br>$I_{sc}$ = 1.2mA<br>$L_a$ = 100mH<br>$C_a$= 0.39uF |

**Standards Passed**

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air |
| **Radio Frequency Immunity (RFI)** | IEC 61000-4-3, Level 3, 10V/m |
| **Fast Transients** | IEC 61000-4-4, Level 3, 4kV input power |
| **Safety Mark** | |
| **UL** | UL913 Sixth Edition (File #E233355) |
| **Dimensions** | **H** 88.9 mm (3.5"); **W** 52.93 mm (2.08");<br>**D** 59.69 mm (2.35") |
| **Weight** | 0.5 lb. (8 oz., 226.8 g) |
| **Mounting Method** | 35mm DIN rail or Surface Mount<br>(#6 or #8 screws) |

## Wiring Diagram




1. Maximum distance between unit and switch contact is 10,000 feet.
2. All non-intrinsically safe wiring shall be separated from intrinsically safe wiring. Description of special wiring methods can be found in the National Electrical Code ANSI/NFPA 70, Article 504 Intrinsically Safe Systems. Check your state and local codes for additional requirements.
3. All switch contacts shall be non-energy storing, containing no inductance or capacitance.

For dimensional drawing see: Appendix, page 510, Figure 10.



# ISS-101

## Single-Channel Intrinsically Safe Switch


## Description

The ISS-101 switches are UL 913 listed as an associated apparatus for interfacing between hazardous and non-hazardous areas. These units must be installed in a non-hazardous area.

**Must use Model OT08PC socket for UL Rating!**

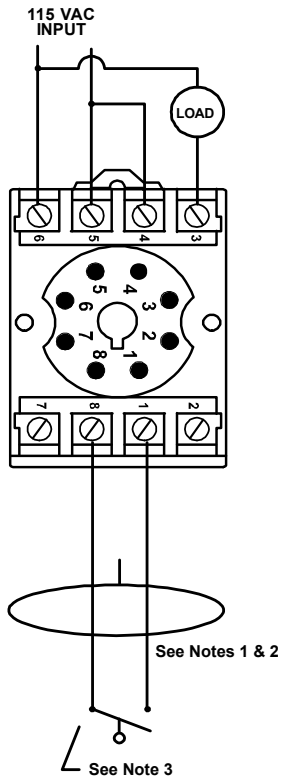
Note: Manufacturer's recommended screw terminal torque for the OT Series Octal Sockets is 12 in.-lbs.

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Compact design for DIN rail or surface mount via octal base** | Allows flexibility in panel installation |
| **LED status indicator** | Visual indication of relay engagement |
| **Isolated output relay** | Allows connection to PLC or control voltage |
| **Standard 8-pin socket** | Pop-in replacement for other manufacturers' parts |

## Wiring Diagram

CONTROL DRAWING ISS-101




**NOTES:**
1. Maximum distance between unit and switch contact is 10,000 feet.
2. All non-intrinsically safe wiring shall be separated from intrinsically safe wiring. Description of special wiring methods can be found in the National Electrical Code ANSI/NFPA 70, Article 504 Intrinsically Safe Systems. Check your state and local codes for additional requirements.
3. All switch contacts shall be non-energy storing, containing no inductance or capacitance.

**See Install Bulletin for full instructions and Hazardous Location information.**

**For dimensional drawing see: Appendix, page 509, Figure 8.**

## Accessories (included)

**OT08PC 8-pin Octal Socket**
Octal Socket for plug-in units. 8-pin surface & DIN rail mountable. Rated for 10A @ 600VAC.

## Specifications

| | |
|---|---|
| **Input Characteristics** | |
| **Supply Voltage** | 90-120VAC |
| **Functional Characteristics** | |
| **Probe Sense Voltage** | 5VDC continuous |
| **Output Characteristics** | |
| **Output Contact Rating** | |
| **Pilot Duty** | 180VA @120VAC, C300 |
| **General Purpose** | 8A @120VAC |
| **Relay Contact Life (Electrical)** | 100,000 cycles min. @ rated load |
| **Relay Contact Life (Mechanical)** | 10,000,000 cycles |
| **General Characteristics** | |
| **Temperature Range** | -20° to 55°C (-4° to 131°F) |
| **Maximum Input Power** | 1.5 W |
| **Wire range** | 12 to 20 AWG |
| **Terminal Torque** | 3.5 to 4.5 in.-lbs. (max. 4.5 in.-lbs.) |
| **Provides Intrinsically-Safe Circuits in the following locations:** | Division 1 and 2<br>Class I, Groups A,B,C,D;<br>Class II, Groups E,F,G;<br>and Class III |
| **Entity Parameters** | $V_{OC}$ = 16.8V Po=$\frac{Voc*Isc}{4}$<br>$I_{SC}$ = 1.2mA<br>$L_a$ = 100mH<br>$C_a$= 0.39uF |

# ISS-101

**Standards Passed**

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air |
| **Radio Frequency Immunity (RFI)** | IEC 61000-4-3, Level 3, 10V/m |
| **Fast Transients** | IEC 61000-4-4, Level 3, 4kV input power |
| **Safety Mark** | |
| **UL** | UL913 Sixth Edition (File #E233355) |
| **Dimensions** | **H** 44.45 mm (1.75"); **W** 60.33 mm (2.375"); **D** 104.78 mm (4.125") |
| **Weight** | 0.5 lb. (8 oz., 226.8 g) |
| **Mounting Method** | DIN rail or surface mount (plug into OT08PC socket) |



# ISS-102 SERIES

## Two-Channel Intrinsically Safe Switch


## Description

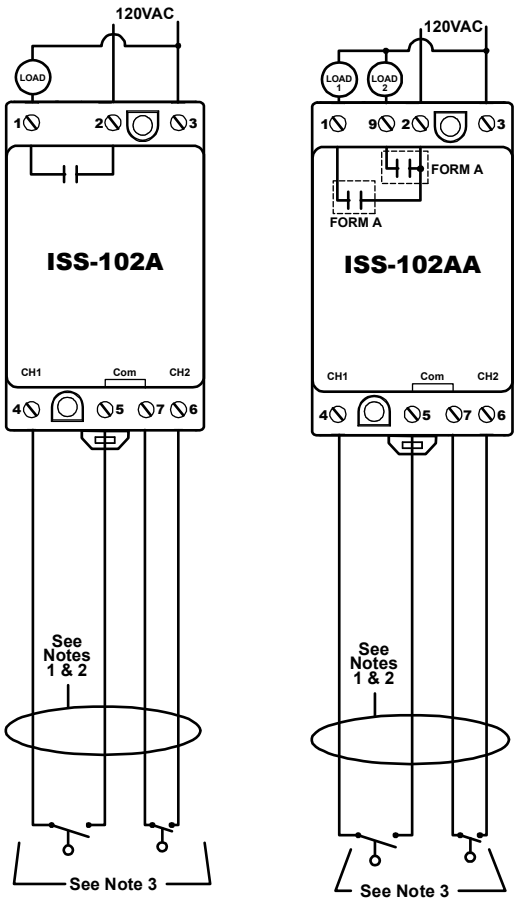
The ISS-102 is a two-channel, intrinsically-safe switch designed for multiple uses including a pump-up/pump-down (latching) controller or two-channel switch. LEDs indicate the state of the intrinsically-safe inputs and output relays and user-selectable options are available including a variable resistance threshold for float inputs. The ISS-102 enclosure is surface or DIN rail mountable.

**-LC** Each input channel is active when the corresponding switch is closed. When the lag input (CH2) is activated, the output closes. Applying latching logic, the output contact remains closed until the lead (CH1) and the lag (CH2) inputs are deactivated. Sensitivity is fixed at 100kOhms with a debounce time delay of 2 seconds.

**-DCS** This dual-channel switch has two Form A output relays. Two LEDs illuminate the output state of their respective Form A relay. Resistance probes or switches can be used on its inputs. Sensitivity is fixed at 100kOhms with a debounce time delay of 0.5 seconds.

**-MC** By selecting the proper functionality through the DIP switches, you can define a pump-up or pump-down, single or dual channel non-latching switch. The sensitivity adjustment (4.7k-100kOhms) allows you to define the input impedance at which the output relays (one Form A & one Form C) will change state, with a debounce time delay of 0.5 or 2 seconds.

## Wiring Diagrams




**For more wiring diagrams and notes, see next page.**

**For dimensional drawing see: Appendix, page 510, Figure 10.**

## Features & Benefits

| FEATURES | BENEFITS |
|---|---|
| **Finger-safe terminals** | Meets IEC 61000 safety requirements |
| **Compact design for DIN rail or surface mount** | Allows flexiblility in panel installation |
| **LED status indicator** | Visual indication of relay engagement |
| **Two input channels** | Flexibility for pump up/pump down latching controller or two-channel switch applications |

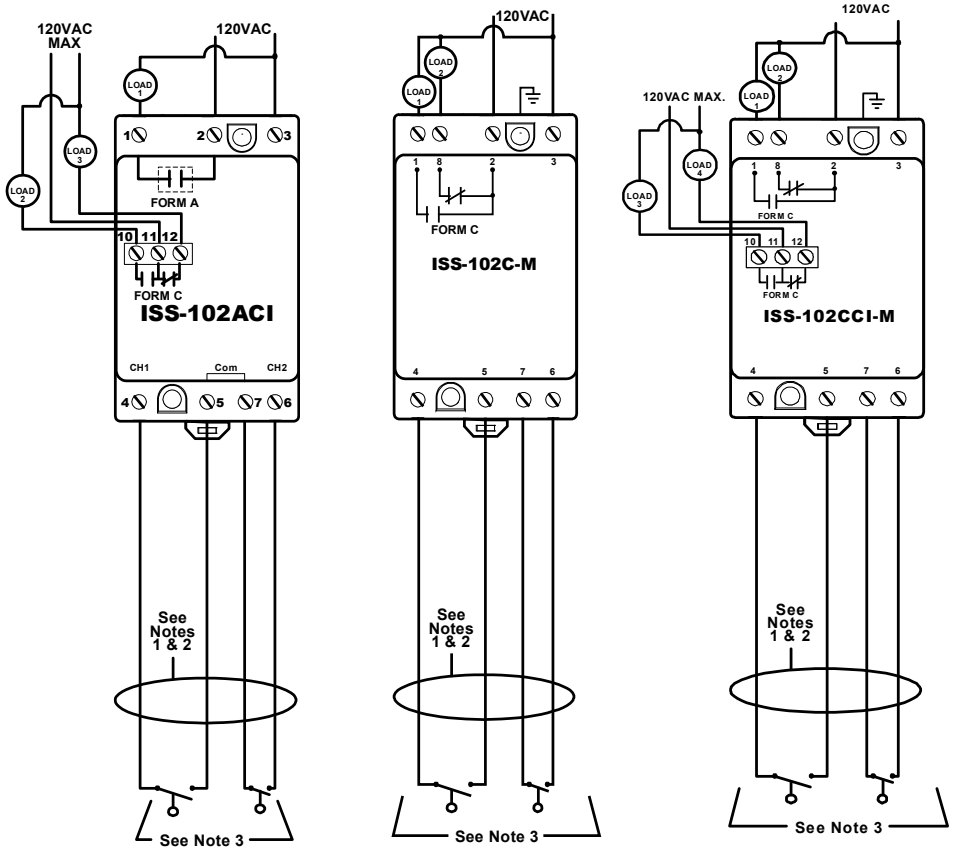
## Ordering Information

| MODEL | LINE VOLTAGE | DESCRIPTION |
|---|---|---|
| ISS-102A-LC | 120VAC | Latching Controller |
| ISS-102AA-DCS | 120VAC | Dual Channel Switch |
| ISS-102ACI-MC | 120VAC | Multi-function Controller |
| ISS-102C-M-LC | 120VAC | MSHA* evaluated |
| ISS-102CCI-M-MC | 120VAC | MSHA* evaluated |

* Mine Safety and Health Administration

# ISS-102 SERIES

## Wiring Diagrams (continued)




**NOTES:**

1. Maximum distance between unit and switch contact is 10,000 feet.
2. All non-intrinsically-safe wiring shall be separated from intrinsically-safe wiring. Description of special wiring methods can be found in the National Electrical Code ANSI/NFPA 70, Article 504 Intrinsically-Safe Systems. Check your state and local codes for additional requirements.
3. All switch contacts shall be non-energy storing, containing no inductance or capacitance.

## Specifications

### Functional Characteristics

| | |
|---|---|
| **Debounce Time** | 0.5 or 2 seconds |
| **Probe Sense Voltage** | 5vdc pulsed |

### Output Characteristics

| | |
|---|---|
| **Output Contact Rating** | |
| **Pilot Duty** | 180VA @120VAC, C150 |
| **General Purpose** | 5A @120VAC |
| **Relay Contact Life (Electrical)** | 100,000 cycles min. @ rated load |
| **Relay Contact Life (Mechanical)** | 10,000,000 cycles |
| **Output Relay Type** | |
| **ISS-102A-LC** | One Form A |
| **ISS-102AA-DCS** | Two Form A |
| **ISS-102ACI-MC** | One Form A & One isolated Form C |
| **ISS-102C-M-LC** | One Form C |
| **ISS-102CCI-M-MC** | Two Form C (one isolated) |

### General Characteristics

| | |
|---|---|
| **Temperature Range** | -20° to 55°C (-4° to 131°F) |
| **Maximum Input Power** | 2 W |
| **Wire Range** | 12 to 20 AWG |
| **Terminal Torque** | 3.5 to 4.5 in.-lbs. (max. 4.5 in.-lbs.) |

### Provides Intrinsically-Safe Circuits in the following locations:

Division 1 and 2
Class I, Groups A,B,C,D;
Class II, Groups E,F,G;
Class III

**Entity Parameters**

$V_{oc}$ = 16.8V
$I_{sc}$ = 1.2mA
$L_a$ = 100mH
$C_a$ = 0.39uF

$Po = \frac{Voc * Isc}{4}$

### Standards Passed

| | |
|---|---|
| **Electrostatic Discharge (ESD)** | IEC 61000-4-2, Level 3, 6kV contact, 8kV air. |
| **Radio Frequency Immunity (RFI)** | IEC 61000-4-3, Level 3, 10V/m |
| **Fast Transients** | IEC 61000-4-4, Level 3, 4kV input power |

### Safety Mark

| | |
|---|---|
| **UL** | UL913 Sixth Edition (File #E233355) (except Models ISS-102C-M-LC & ISS-102CCI-M-MC which have been evaluated by MSHA) |
| **Dimensions** | **H** 88.9 mm (3.5"); **W** 52.93 mm (2.08"); **D** 59.69 mm (2.35") |
| **Weight** | 0.7 lb. (11.2 oz., 317.51 g) |
| **Mounting Method** | 35mm DIN rail or Surface Mount (#6 or #8 screws) |

# ISS-105 SERIES

## Five-Channel Intrinsically Safe Switch

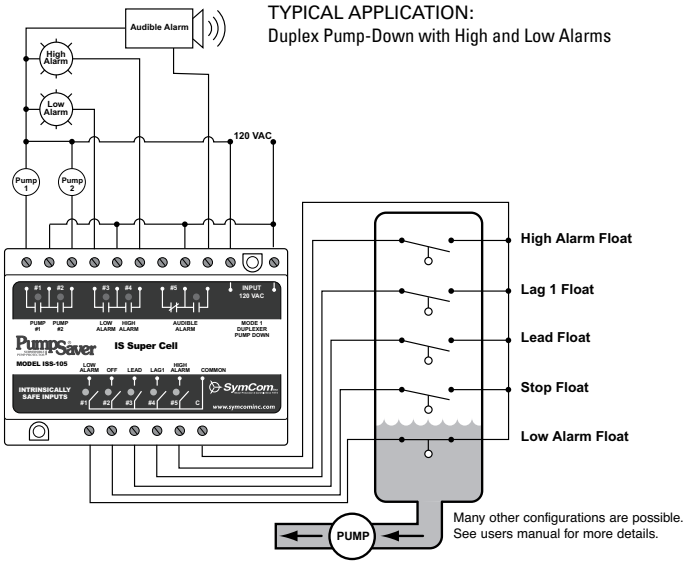

## Description

The ISS-105 is a "smart" five-channel intrinsically safe relay and pump controller. The ISS-105 can be configured for pump-up or pump-down applications or as a five-channel relay covering a wide variety of applications.

The ISS-105 has a long list of features that are needed for multiple pump applications and can indicate low, high and out-of-sequence alarms. If an out-of-sequence alarm occurs, the skipped pump(s) will be started as intended.

The Model ISS-105 can be set-up to do non-alternating control, alternating control and alternating control with one non-alternating pump. The non-alternating pump is intended for use with an emergency or jockey pump. The ISS-105 can start an emergency pump once every 50 cycles to keep it working freely. Using the built-in DIP switches, individual pumps can be disabled when taken out of service for repair or maintenance.

## Wiring Diagram




**For dimensional drawing see: Appendix, page 511, Figure 12.**

## Features & Benefits

- 5 intrinsically-safe input channels meeting UL913 Sixth Edition
- 4 normally open output relays and 1 SPDT output relay
- Field selectable pump control options
- Monitors float sequencing and sends signal to alarm if out-of-sequence condition occurs
- High and/or low alarm options depending on the number of pumps and settings
- Output contacts for audible alarm
- Meets IEC EMC standards for Electrical Fast Transients (EFT), Electrostatic Discharge (ESD) and Radio Frequency Immunity (RFI)
- DIN rail or surface mountable allows flexibility in panel installation
- User-selectable alternator/non-alternator option
- Non-alternating pump option for emergency or jockey applications
- Pump disable switches make it easy to disable individual pumps when they are out for service or repair
- Adjustable lag pump delay for all pumping modes
- Adjustable delay-on-make/break timer in five-channel relay mode
- Finger-safe terminals meet IEC 61000 safety requirements

## Ordering Information

| MODEL | LINE VOLTAGE | DESCRIPTION |
|---|---|---|
| ISS-105 | 120VAC | Intrinsically-Safe & Pump Controller |
| ISS-105-ISO | 120VAC | Intrinsically-Safe Only |
| ISS-105-ISO-3 | 120VAC | 3-Channel Intrinsically-Safe Only |
| ISS-105-ISO-4 | 120VAC | 4-Channel Intrinsically-Safe Only |
| ISS-105-ISO-F | 120VAC | ISO with Fast Trip Relays |