

Warrick® Dual Function Controls

Installation and Operation Bulletin

This bulletin should be used by experienced personnel as a guide to the installation of Dual Function Controls. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Gems Sensors or its representative if further information is required.

Specifications

Control Design: Open circuit board design
Contact Design: SPDT (1 form C): one normally open (N.O.) and one normally closed (N.C.), non powered contacts for limit control and SPDT (1 form C): one normally open (N.O.) and one normally closed (N.C.), non powered contacts for level control

Contact Ratings: 10A @ 120, 208/240, 240 VAC resistive (120°F), 1A @ 120, 208/240, 240 resistive (150°F), 1/3 Hp @ 120, 208/240, 240 VAC

Contact Life: Mechanical - 5 million operations
 Electrical - 100,000 operations minimum at rated load

Supply Voltage: 120, 240, or 24 VAC models, +10%, -15%, 50/60 Hz. 208/240 Model: 187V Min to 255V Max, VAC 50/60 Hz

Power Consumption: 120, 208/240, 240, or 24 VAC both relays energized - 4.4 VA.

Secondary Circuit: 12 VAC RMS voltage on probes, 1.5 milli-amp current.

Sensitivity: Models operate from 0-100K ohms maximum specific resistance (factory set)

Temperature: -40° to 150° F ambient

Terminals: Probe connections 3/16" male quick connects, Line and Power connections 1/4" male quick connects

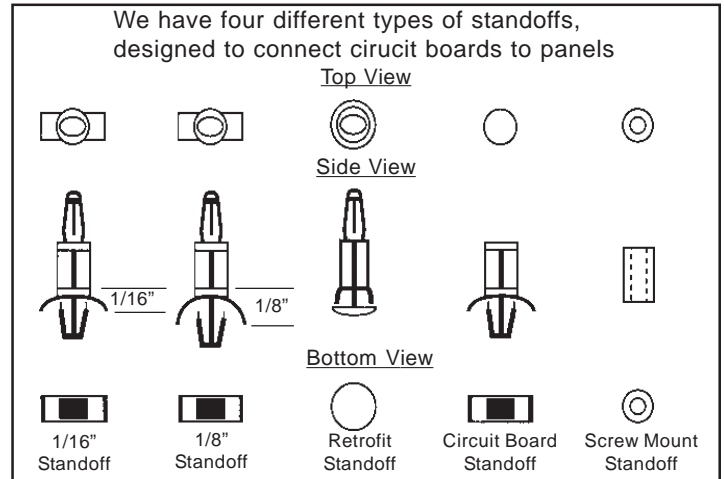
Time Delays: Standard, 0.5 seconds rising level, LLCO probe, 3 seconds standard for lowering level.

Listings: Entire control carries U.L. motor controller recognition (UL 508) and U.L. Limit control recognition (UL 353). 208/240 and 240 VAC models carry only motor controller recognition (UL 508)

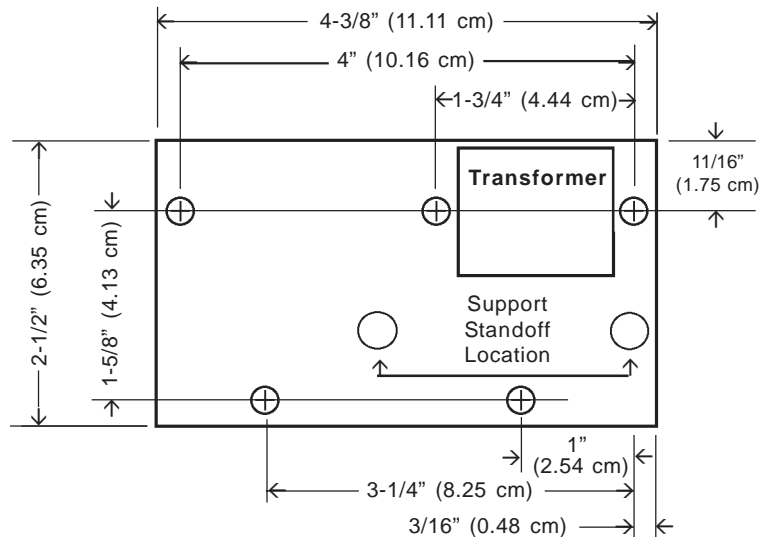
Installation

1. Drill five .187 holes in customer supplied back plate using stick on template supplied with control. Standard standoffs are designed for back plate thickness of 0.062 (1/16"). Standoffs are available for back plates of 0.125 (1/8") nominal thickness. If retrofit plate standoffs are used, drill 5 (five) 0.250 dia. Holes in proper locations.
2. Install five standoffs into back plate. Install two support standoffs into circuit board. Snap circuit board onto standoffs. See sketch for proper installation. Install control in an appropriate enclosure.
3. Wire control per wiring diagram, following N.E.C. and local codes. Use appropriately sized spade terminals.

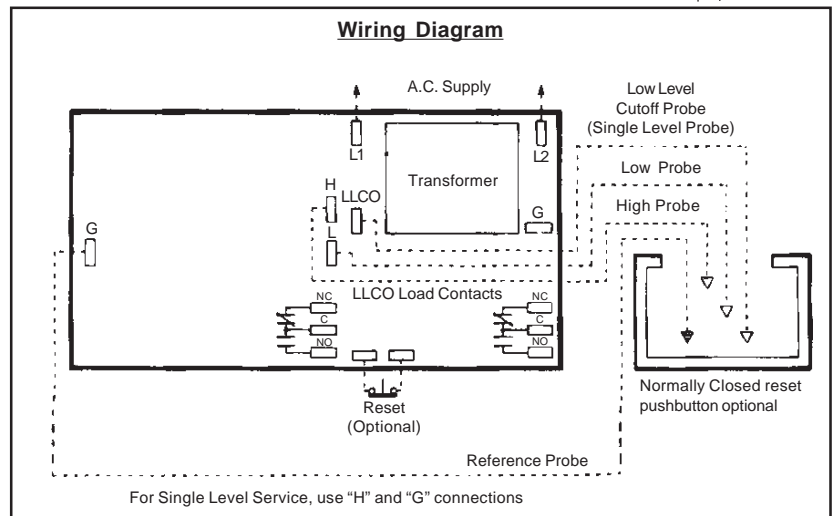
Standoffs



Dimensional Drawing



Wiring Diagram



Operation

DIRECT MODE BOTH FUNCTIONS

LLCO Function: When the liquid rises to the electrode on terminal LLCO, the relay associated with terminal LLCO energizes, changing state of the load contacts. (LED will be lit). The relay remains energized until the liquid level recedes below electrode on terminal LLCO. The associated relay then de-energizes, (LED will not be lit) returning load contacts to original state. Unless otherwise specified, there is a three-second time delay on decreasing level. Liquid must be below probe on terminal LLCO for full three seconds before control de-energizes.

H-L Function: When the liquid rises to the electrode on terminal H, the associated relay energizes, changing the state of the load contacts. (LED will be lit). The relay remains energized until the liquid level recedes below electrode on terminal L. The associated relay then de-energizes, (LED will not be lit) returning load contacts to original state. Unless otherwise specified, there is a one half second time delay on increasing level. Liquid must be in contact with probe on terminal H for a full half second before control energizes. This function can be wired for single level service by using only the H terminal.

INVERSE MODE

LLCO Function: LLCO always functions in direct mode only see above for operation.

H-L Function: Associated relay energizes with power, (LED will be lit) changing the state of the load contacts. When the liquid rises to the electrode on terminal H, the relay de-energizes, returning load contacts to shelf state. (LED will not be lit). The associated relay remains de-energized until the liquid level recedes below electrode on terminal L. The relay then energizes.

Options

Optional Manual Reset (Normally closed pushbutton across reset terminals. Pushbutton ordered separately): Manual reset only applies to the function associated with terminal LLCO. When the liquid rises to the electrode on terminal LLCO, the control will remain de-energized (load contacts in original state) until the pushbutton is depressed. The control will then energize, (LED will be lit) changing the state of the contacts. The control remains energized until the liquid level recedes below electrode on terminal LLCO. The control then de-energizes, (LED will go off) returning load contacts to their original state. Unless otherwise specified, there is a three second time delay on decreasing level. Liquid must be below probe on terminal LLCO for full three seconds before control de-energizes.

Manual Reset with optional Power Outage Feature: Reset (Normally closed pushbutton across reset terminals. Pushbutton ordered separately) Control will ignore power loss to control. With liquid in contact with electrode on terminal LLCO, a power outage of less than 250 m sec. Will cause the control to de-energize, but will automatically energize upon return of power. However, loss of liquid will cause control to de-energize and remain so until liquid again rises to electrode and pushbutton is depressed.

Time Delays associated with terminals H and L : With time delay on increasing level, the liquid must be in contact with the high electrode for the full duration of the time delay before control will operate. With delay on decreasing level, the liquid must be below the low electrode for the full duration of the time delay before control will operate. In single level service, terminals 3 and 4 must be jumpered together to achieve time delays on both increasing and decreasing levels or just decreasing level.

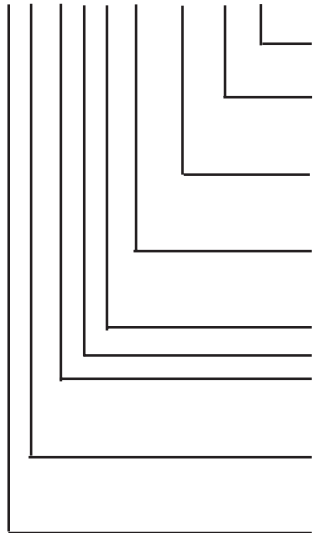
Time Delays associated with terminal LLCO: 3 Second time delay on decreasing level is standard. Delay up to 90 seconds, can be specified and would act in the same manner as listed above.

Dirty Electrode Detection: The LED will flash every half-second once the probe resistance reaches a value greater than the nominal control sensitivity rating. The relay state will not change until it exceeds the nominal sensitivity by more than 25% (typically) at nominal input voltage. At which time the LED and relay contact return to the dry state. Such a condition may suggest electrode maintenance is required.

Time Out Option: The latching circuit for the high and low electrode has an optional timer. In some applications the High or Low electrode may become short circuited or disconnected. Such an occurrence may potentially over fill in fill applications, or cause the pump to run dry in pump down applications. The time option is custom programmed up to 3 minutes. When a fault condition occurs, the Fill LED will have a blink sequence of .5 seconds on 2 seconds off. See Chart A-1 for time delay options.

Test Feature: Allows LLCO circuit to be tested. Holding down the reset button for 3 seconds will allow the LLCO circuit to trip which simulates the loss of water, without the need of draining the water level in the boiler. The control will return to normal operation once the reset button is pressed a second time. (Test feature option only available with the manual reset function.)

DF X X X X XX XX XX X



Dirty Probe/Timeout Timer Option:
(See Chart A-1)

Time Delay Decreasing Level:
LLCO function 3-90 seconds,
blank = 3 seconds

Time Delay Decreasing Level:
H/L function 0-90 seconds,
blank = 0 seconds

Time Delay Increasing Level:
H/L function 0-90 seconds,
blank = 0 seconds

Optional Character: (See Chart B-1)

Enclosure: 0-None, 1-Nema 1, 4-Nema 4

Standoff Style/Socket Type:

A - 1/16" Panel C - Screw Mount
B - 1/8" Panel D - Retrofit

Supply Voltage:

1 - 120 VAC 3 - 24 VAC
2 - 240 VAC 8 - 208/240 VAC

Mode/Sensitivity:

Direct Inverse
A - 4.7K K - 4.7K
B - 10K L - 10K
C - 26K M - 26K
D - 50K N - 50K
E - 100K P - 100K

Chart A-1

	OPTIONAL CHARACTER	DIRTY PROBE	25% OF RANGE	30 SEC	60 SEC	80 SEC	90 SEC	120 SEC	150 SEC	180 SEC
A	X									
B	X	X								
C	X		X							
D	X			X						
E	X				X					
F	X						X			
G	X							X		
K		X								X
L			X							
M				X						
N					X					
P						X				
Q							X			

Chart B-1

	Reset Function	N.C. Pushbutton	Power Outage	Retrofit Plate	Test Feature
A	x	x	x		x
B	x				x
D	x				
G	x	x	x		
J	x	x	x	x	
K	x		x		
L	x		x	x	
R				x	
S	x	x			
T	x	x		x	
W	x			x	
Y	x	x			x
Z	x		x		x
X	No Option				



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