



LIC 927730  
805-551-8870  
irarubinson@yahoo.com  
Kestrelectric.com

## 1. NEC 406.4(D)(2)

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Non–Grounding-Type Receptacles. Where attachment to an equipment grounding conductor does not exist in the receptacle enclosure, the installation shall comply with (D)(2)(a), (D)(2)(b), or (D)(2)(c).

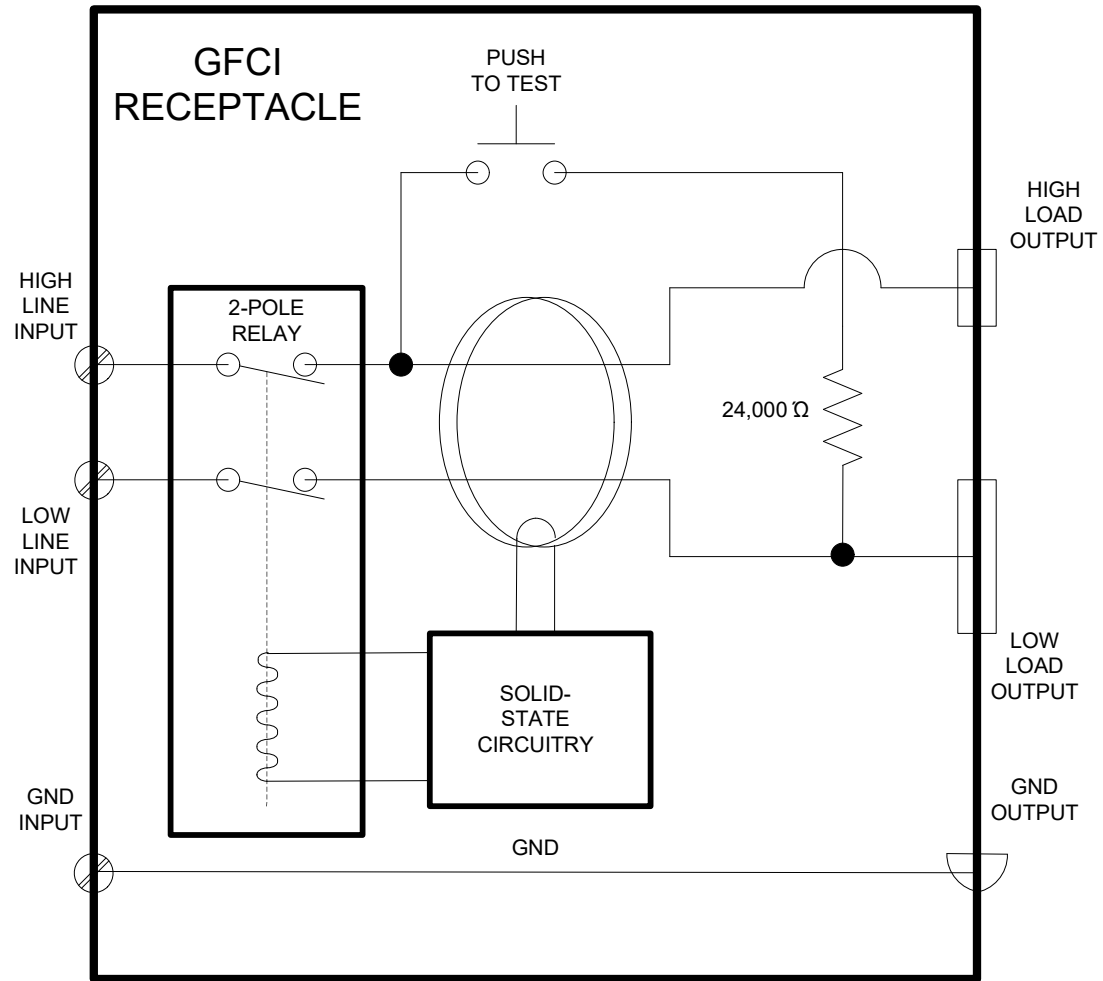
406.4(D)(2)(b) A non–grounding-type receptacle(s) shall be permitted to be replaced with a ground-fault circuit interrupter type of receptacle(s). These receptacles shall be marked “No Equipment Ground.” An equipment grounding conductor shall not be connected from the ground-fault circuit interrupter-type receptacle to any outlet supplied from the ground-fault circuit-interrupter receptacle.

406.4(D)(2)(c) A non–grounding-type receptacle(s) shall be permitted to be replaced with a grounding-type receptacle(s) where supplied through a ground-fault circuit interrupter. Grounding-type receptacles supplied through the ground fault circuit interrupter shall be marked “GFCI Protected” and “No Equipment Ground.” An equipment grounding conductor shall not be connected between the grounding type receptacles.

The following pages illustrate the difference between the built-in GFCI self-test button and the button on an external GFCI Outlet Tester. The last page shows why an external GFCI Outlet Tester cannot be used to test the functionality of a GFCI receptacle in an un-grounded outlet.

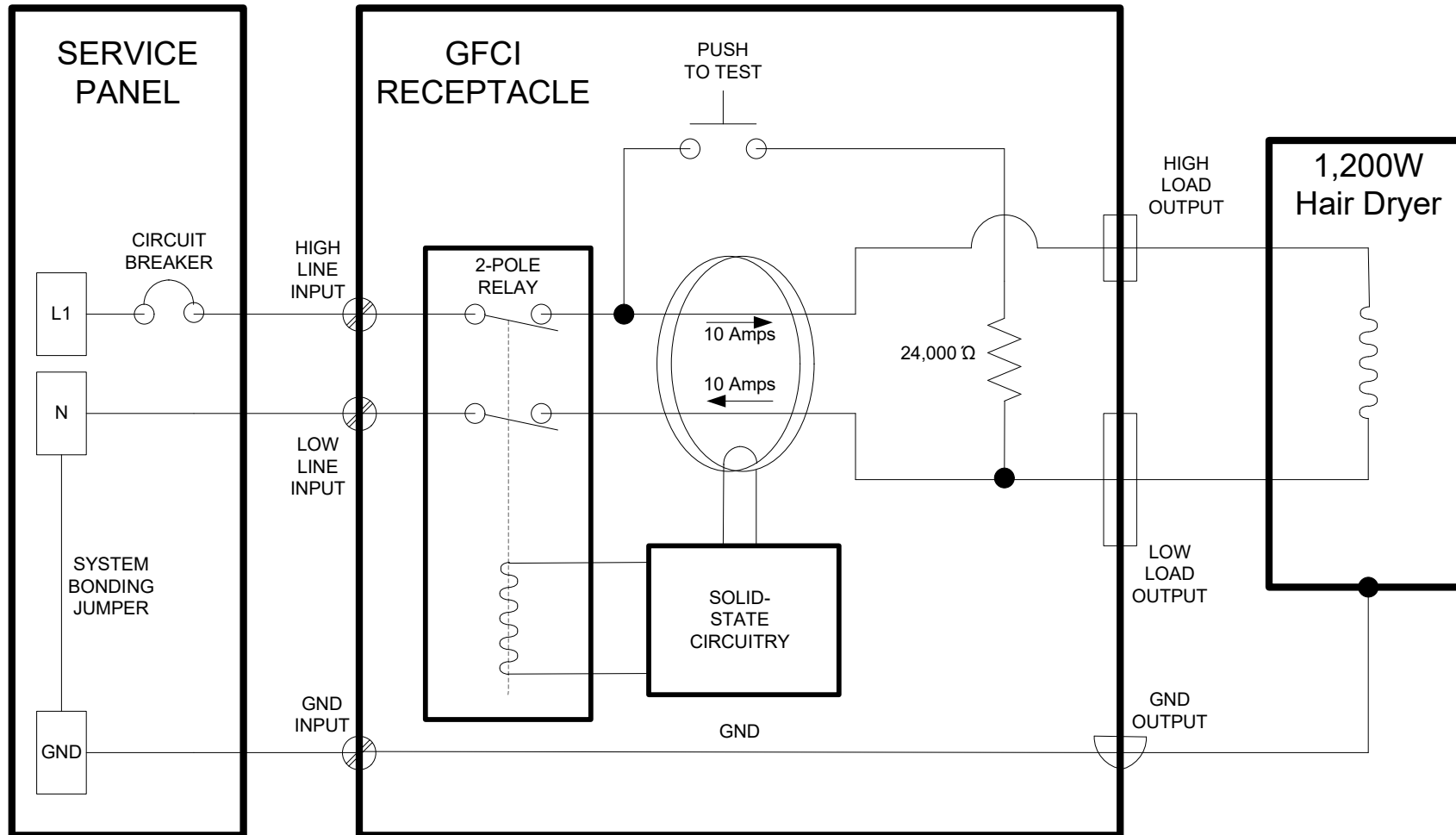
## 2. GFCI RECEPTACLE

SOLID-STATE CIRCUITRY will open the 2-POLE RELAY contacts if the difference between the HIGH LOAD OUTPUT and the LOW LOAD OUTPUT exceeds 0.005 Amps



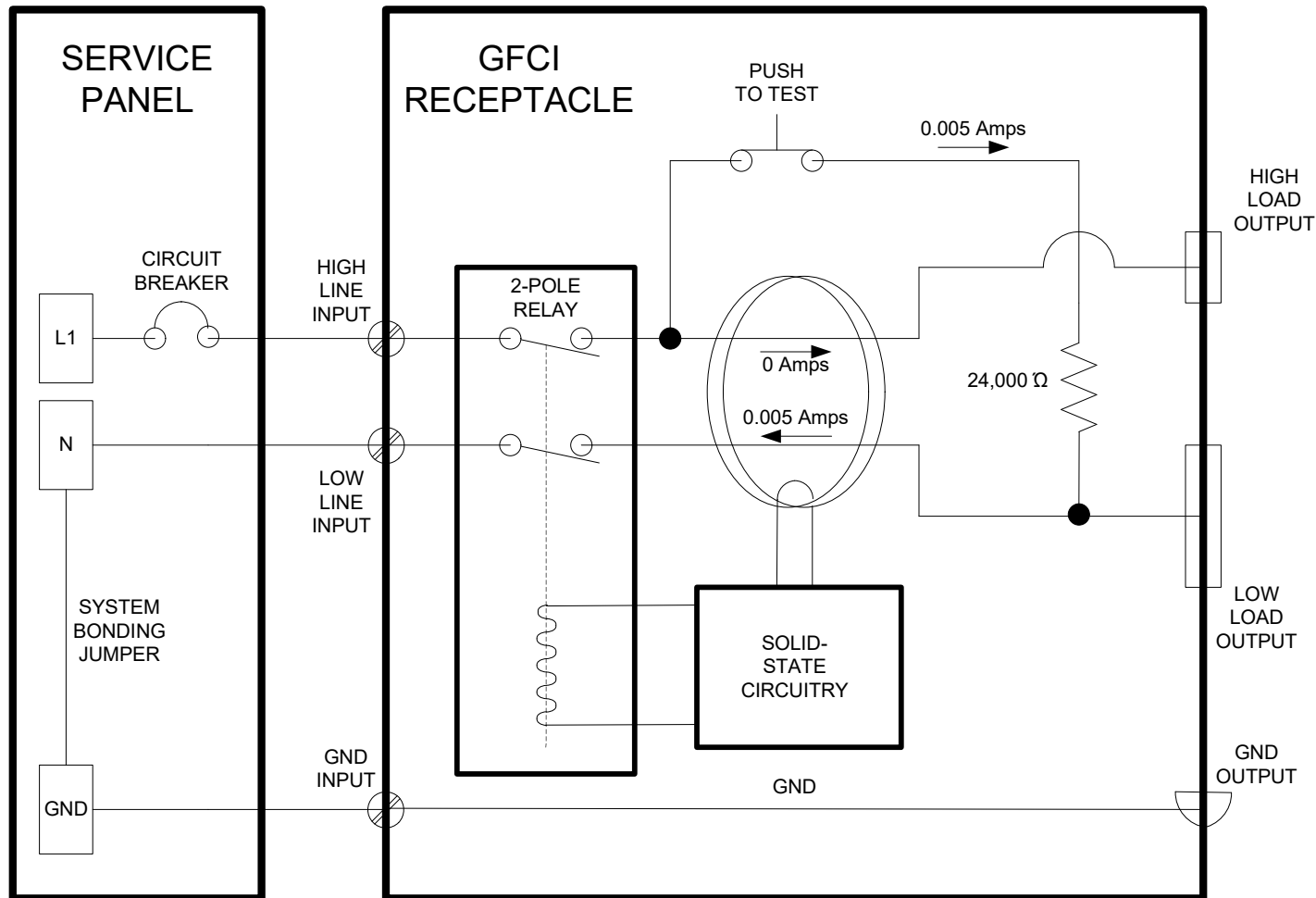
### 3. NORMAL OPERATION IN A GROUNDED SYSTEM

HIGH LOAD OUTPUT current equals LOW LOAD OUTPUT current so the SOLID STATE CIRCUITRY allows the 2-POLE RELAY to remain closed.



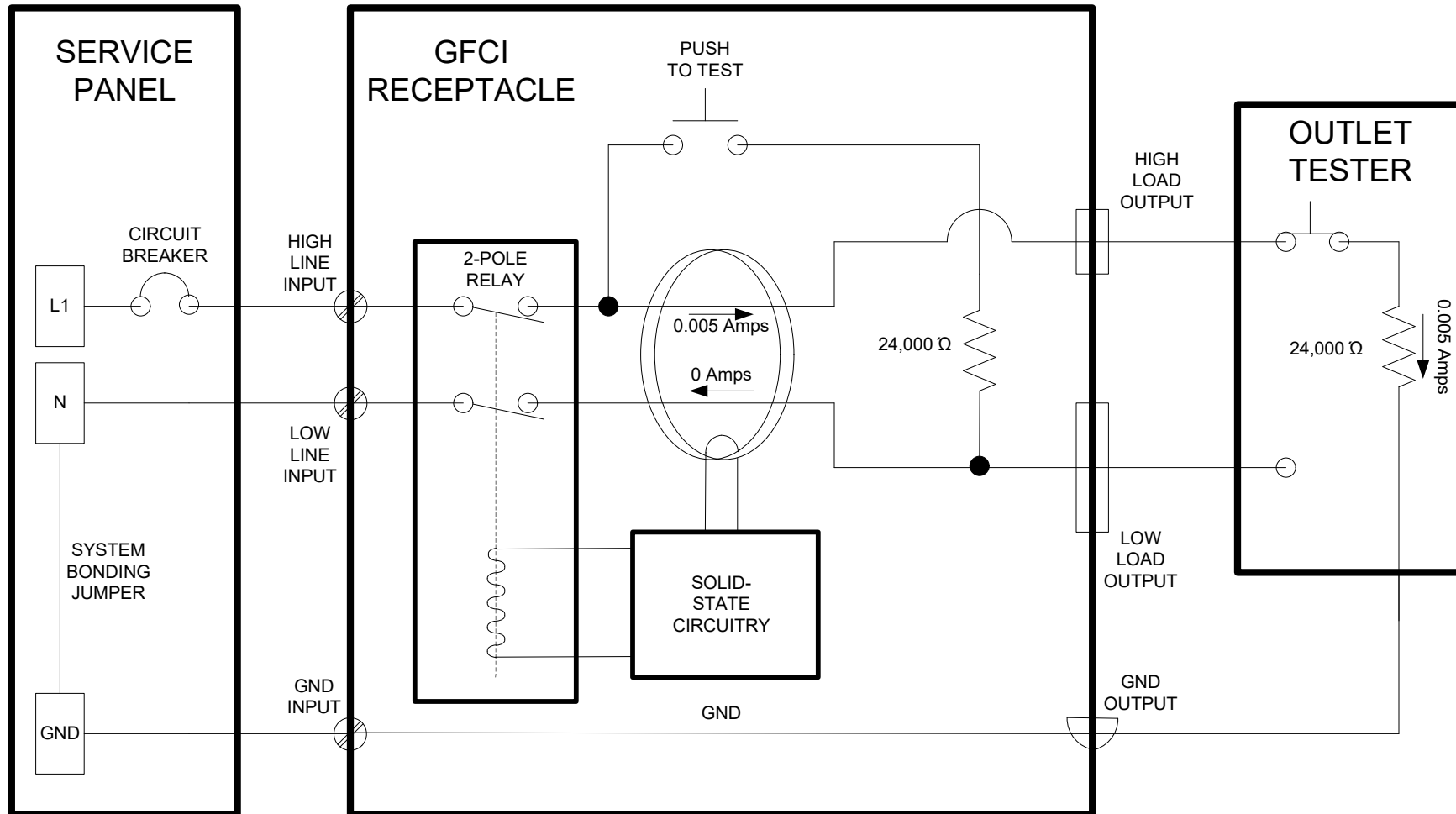
## 4. TEST BUTTON OPERATION IN A GROUNDED SYSTEM

The built in PUSH TO TEST button connects a 24,000 ohm resistor between HIGH LOAD OUTPUT and LOW LOAD OUTPUT. This causes the SOLID STATE CIRCUITRY to detect a 0.005 Amp difference between HIGH LOAD OUTPUT AND LOW LOAD OUTPUT. This causes the SOLID STATE CIRCUITRY to open the 2-POLE RELAY contacts.



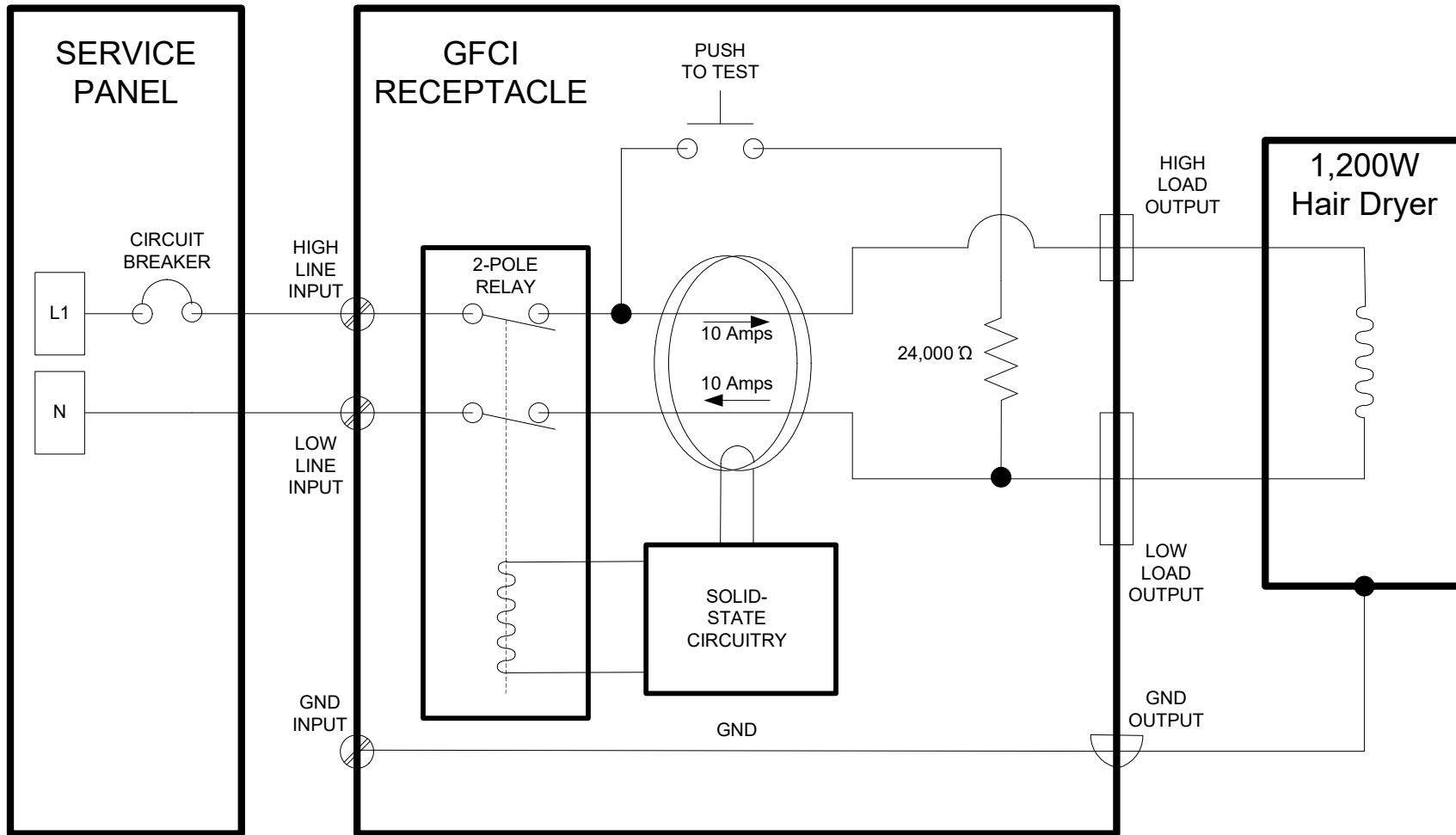
## 5. GFCI OUTLET TESTER OPERATION IN A GROUNDED SYSTEM

The external OUTLET TESTER connects a 24,000 ohm resistor between HIGH LOAD OUTPUT and GND OUTPUT. A current of 0.005 Amps flows because the SYSTEM BONDING JUMPER connects GND to NEUTRAL in the SERVICE PANEL. The SOLID STATE CIRCUITRY detects a difference of 0.005 Amps and opens the 2-POLE RELAY contacts.



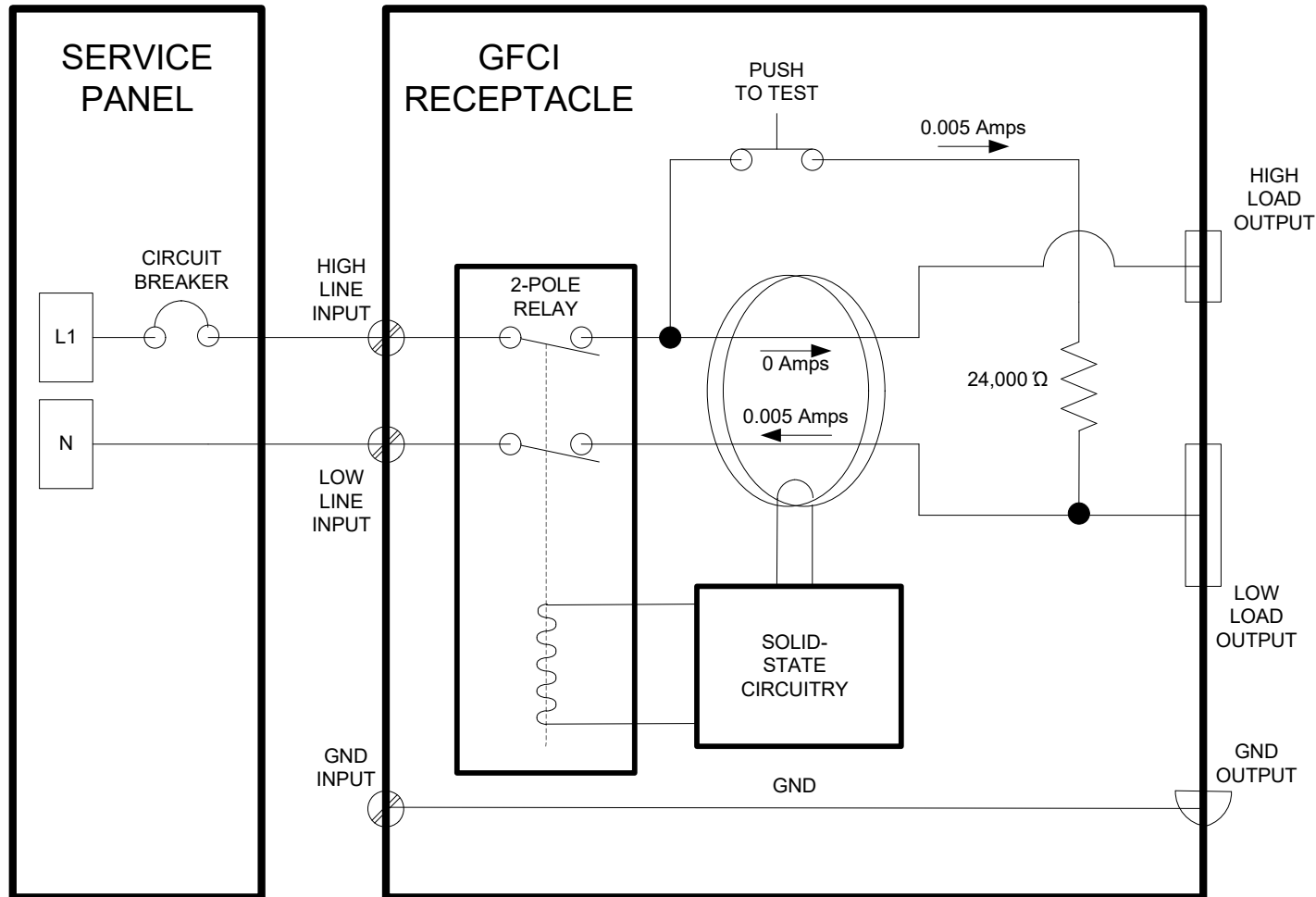
## 6. NORMAL OPERATION IN AN UN-GROUNDED SYSTEM

Same as NORMAL OPERATION IN A GROUNDED SYSTEM. HIGH LOAD OUTPUT current equals LOW LOAD OUTPUT current so the SOLID STATE CIRCUITRY allows the 2-POLE RELAY to remain closed.



## 7. TEST BUTTON OPERATION IN AN UN-GROUNDED SYSTEM

Same as TEST BUTTON OPERATION IN A GROUNDED SYSTEM. The built in PUSH TO TEST button connects a 24,000 ohm resistor between HIGH LOAD OUTPUT and LOW LOAD OUTPUT. This causes the SOLID STATE CIRCUITRY to detect a 0.005 Amp difference between HIGH LOAD OUTPUT AND LOW LOAD OUTPUT. This causes the SOLID STATE CIRCUITRY to open the 2-POLE RELAY contacts.



# 8. GFCI OUTLET TESTER OPERATION IN AN UN-GROUNDED SYSTEM

The external OUTLET TESTER connects a 24,000 ohm resistor between HIGH LOAD OUTPUT and GND OUTPUT. No current flows because there is no connection between the GND INPUT in the GFCI RECEPTACLE and NEUTRAL in the SERVICE PANEL. The SOLID STATE CIRCUITRY detects no difference between HIGH LOAD OUTPUT and LOW LOAD OUTPUT. The 2-POLE RELAY contacts remain closed. The push-button on the OUTLET TESTER cannot test GFCI functionality in an UN-GROUNDED SYSTEM.

