

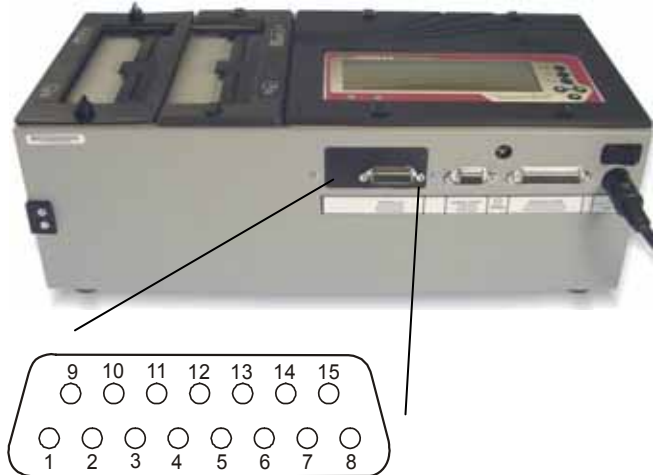
Digital I/O on the 1100H+

The 1100H+ has **Digital I/O** capability, which allows you to set up the tester to control external devices with tester functions. You can also use an input on the tester to start a test.

For example, the tester could be built into a cabinet that does not allow the operator to access the display. By using **External Switch** input, you can allow the operator to start a test with a switch on the outside of the cabinet. Additionally, if the cable doesn't pass the test, you can use two of the tester's outputs to activate a buzzer and a red light.

The digital I/O port is located on the back of the tester. The location and pinout of the connector are as shown.

The table below shows each of the signals on the digital I/O port.



Pin	Explanation
1	Input External Switch
2	Input Hipot Safety Switch
3	Input
4	Input
5	Output
6	Output
7	Output
8	Output
9	Power + 5 VDC, 100 mA max.
10	Output
11	Output
12	Power + 10 VDC, 100 mA max.
14	Ground
15	Ground

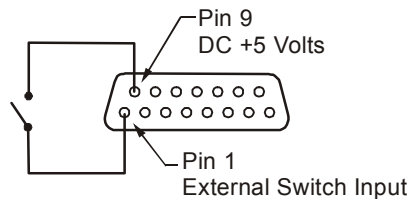
Inputs

There are four inputs in the tester. VDC logic is typically used to control an input; however, any VDC up to a nominal 24 volts may be used. Inputs used for the tester's **External Switch** and **Hipot Safety Switch** capability are described below. If needed, other inputs can be assigned by using the Scripting option.

External Switch Input

The 1100H+ has the ability to start a test based on input from an external switch, such as a foot pedal or sensor in automated test equipment. To use the **External Switch** input, you must set the User Preference **External Switch** to YES. For more information, see **External Switch** on page 37.

The **External Switch** input is on pin 1 of the digital I/O connector. If a DC +5 volt (logic high) is applied to pin 1, the tester behaves as if START TEST were pressed. You can use the DC +5 volts power source on the digital I/O connector to supply the DC +5 voltages through the switch circuit as shown below. Do not apply an AC voltage to the input.



Hipot Safety Switch Input

The 1100H+ allows you to start the hipot test by closing an external hipot safety switch. The safety switch might be dual palm switches wired in series, a foot pedal, or a sensor in automated test equipment. To use the **Hipot Safety Switch** input you need to first, set the User Preference **Safety Switch** to ON. For more information, see **Safety Switch** on page 40.

The **Hipot Safety Switch** input is on pin 2 of the digital I/O connector. If a VDC +5 (logic high) is applied to pin 2, the tester allows the hipot test to proceed. You can use the VDC +5 power source on the digital I/O connector to supply the VDC +5 through the switch circuit. Do not apply a VAC to the input. The schematic above shows how a safety switch could be wired and for the safety switch use pin 2 instead of pin 1.

Outputs

The tester's outputs are "sink" outputs. When activated they will connect (or sink) a voltage to ground, in effect turning ON the output circuit. The outputs are capable of sinking up to a nominal 24 volts and 500 milliamps. To limit the output current, always ensure adequate resistance between power supply and the output. When switching a voltage between 12 and 24 volts, the output will allow a slight current flow (about 1mA at 24 volts) when the output is OFF.

Current cannot flow when the normal state of each output is off. Using the **Digital Outputs** settings in the User Preferences tester interface, you can set up test events to turn an output ON or OFF. One test event sinks the output to ground, thereby allowing current flow through the output circuit. A second event resets the output line to its original OFF state. If you select the same event to set and reset the output, the tester will sink the output for a 10 millisecond pulse. For step-by-step instructions on setting up **Digital Outputs**, see **Setting up the Events Outputs** on page 76.

Each of the test events that change output status are listed below.

Test Event Name	Description
Bad Light Off	The front panel "Bad" light is off.
Bad Light On	The front panel "Bad" light is on.
Cable Attached	The tester sensed a connection between 2 or more test points.
Cable Counted Bad	The tester counted a cable "bad" in the test summary.
Cable Counted Good	The tester counted a cable "good" in the test summary.
Cable Removed	The tester sensed the cable is removed.
Count Intermittent	The tester counted a cable "intermittent" in the test summary.
Failed Self Test	The tester failed self-test when turned on.
Good Light On	The front panel "Good" light is on.
Good Light Off	The front panel "Good" light is off.
HV Delay Started	The tester started the delay before the HV test.
HV Test Delay Done	The tester completed the delay before the HV test.
HV Test Done (P/F)	The tester completed the high voltage test with either pass or fail.
HV Test Failed	The high-voltage test failed.
HV Test Passed	The high-voltage test passed.
HV Test Started	The tester started the high-voltage test.
HV Test Aborted	The tester aborted during the hipot test.
Is Intermittent	The tester detected an intermittent error in the DUT.
Learn Completed	The tester completed the cable learn process.
Learn Started	The tester began the cable learn process.
LV Test Done (P/F)	The tester completed the low-voltage test with either pass or fail.

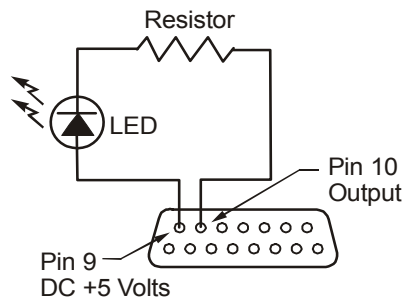
LV Test Failed	The low-voltage test failed.
LV Test Passed	The low-voltage test passed.
LV Test Started	The tester started the low-voltage test.
Ready to Test	The tester is ready to test; the cable may or may not be attached.
Will Count Good	If the cable were removed, it would count as “Good”.
Will Count Bad	If the cable were removed, it would count as “Bad”.

Output Examples

Controlling an LED

Let's say you want to light an LED to warn the operator during the hipot test. In the User Preference **Set Digital Output**, you can choose to configure one of the outputs. In this case, choose output pin 10. For this output pin, select **HV Test Started** to set, and **HV Test Done (P/F)** to reset the output.

In this example, the LED requires only 20 mA, so we can use the +5 DC volt supply on the digital I/O port to power our circuit. Use a resistor in series with the LED to limit the current going through it.



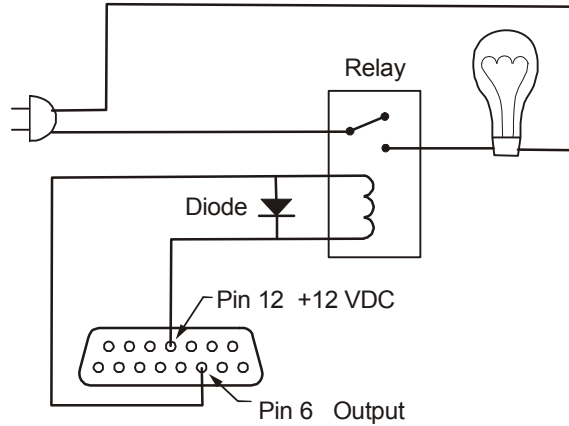
How do you choose the resistor? The LED in this instance has a forward bias voltage drop of two volts; therefore, three volts must drop across the current limiting resistor. Knowing voltage drop and current through the circuit, Ohms Law can be used to determine the resistor value.

$$R = \frac{V}{I} = \frac{3 \text{ Volts}}{0.020 \text{ Amps}} = 150 \text{ Ohms}$$

When the hipot test starts, the tester will pull the output to ground allowing current to flow in the circuit, and the LED will turn on. When the hipot test completes, current through the output will stop, and the LED will turn off.

Turning on a Light Bulb

Let's say instead of an LED, you want to turn on a light bulb powered from a 120 VAC wall outlet; a relay can be used to control the light bulb. In this example, we select a relay that has a coil voltage of 12 volts and draws less than 100 milliamps so we can use the +12 volt DC power supply on the tester. The relay circuit is as shown.



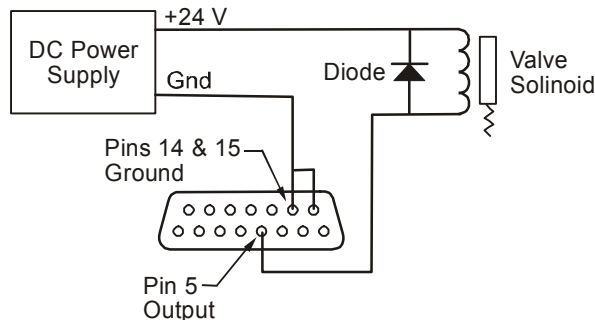
A diode, such as a 1N4002, is added across the relay to protect the digital I/O port from the reverse current created from the coil when the output turns off.

Activating an Air Valve

Let's say you want to control an air valve for equipment that will automatically stamp "tested good" on each assembly that passes a test. In the User Preference **Set Digital Output**, you can select **Cable Counted Good** to both set and reset the output. Remember, if the same event is selected for set and reset, the tester will sink the output for a 10-millisecond pulse. In this case, a pulse is all we need to make our stamp mechanism function.

In this example, the solenoid for the air piston requires DC 24 volts and 300 milliamps (the coil resistance is 80 ohms).

Note: The digital I/O port can only supply 100 milliamps at either DC 5 or 10 volts; however, the output can sink up to 24 DC volts. In this case, you can use an external power supply for the valve circuit as shown below.



In this example, a 1N4002 is added across the relay to protect the digital I/O port from the reverse current created from the coil when the output turns off.

Setting up the Events Outputs

The 1100H+ has six outputs that can drive an external device according to various “events” in the tester. These events occur as the tester powers up, learns a cable, tests a cable, and displays the test results. Controlling an output line requires two triggering events.

1. From main menu, press **Set Preferences**.

2. Scroll down ▼ to **Set Digital Output**.

3. Scroll up or down ◆ to the digital output pin you want to set up.

4. Press **S** (set).



The S event sets (or sinks) the output pin to ground thereby allowing current to flow through the output circuit.

5. Scroll up or down ◆ to the test event needed to start the operation of the output device; press **Accept**.

6. Press **R** (reset).



The R event resets the output pin to the original no current flowing state.

7. Scroll up or down ◆ to the event needed to stop the operation of the output device; press **Accept**.

8. Press back ◀ to return from the **Digital Output** selection menu.

Note: Two of the outputs are factory enabled with default triggers. The pin 7 output is set with **Good Light On** and reset with **Good Light Off**. Pin 8 is set with **Bad Light On** and reset with **Bad Light Off**.
