Scope

ATevo Series Chargers.

Summary

Hydrogen gas (H_2) detectors are a tool to help control the risk of unsafe buildup of hydrogen gas released from lead acid batteries being charged in enclosed spaces.

This document will show common examples of how a hydrogen detector can be wired up to an ATevo battery charger for this application so that it provides alarms and initiates charger actions when hydrogen gas levels of 1% and 2% are reached.

Requirements (to use Hydrogen Gas Detector with ATevo Charger)

1. ATevo charger must be equipped with an Auxiliary I/O Board plugged into its Power Board because both binary inputs and relays will be used for this application. Refer to JD5089-00 for details about Auxiliary I/O Board wiring and configuration.
2. If a fan will be used to exhaust hydrogen gas detected and the current needed to power the fan exceeds the 0.5 A relay contact limit for ATevo, an external relay will be required. If the external relay selected has a DC coil, an external freewheeling diode will also be required to protect the ATevo contact (see JD501-00).
3. If the capability to quickly exhaust the environment is desired, then an external relay that is correctly sized to drive a fan will also be needed. ATevo provides a maximum of 0.5 A, which is enough to trigger an external relay, but is not sufficient for such a fan.

Why Use a Hydrogen Gas Detector with an ATevo Charger?

Hydrogen gas (H2) detectors are a tool to help control the risk of unsafe buildup of hydrogen gas released from lead acid batteries being charged in enclosed spaces. Typically, these detectors provide a warning alarm when air concentration reaches 1% H_2 (g) and a danger alarm when it reaches 2% H_2 (g).

ATevo provides convenient means of communicating these alarms and initiating actions from the charger that may be able to mitigate further outgassing and/or lower hazardous concentration. To accomplish these things, it is necessary to wire the hydrogen gas detector to an ATevo that is equipped with an Auxiliary I/O board and to configure the use of binary inputs and relays – which

will be discussed in the rest of this document. An example environment where an ATevo charger is connected to a hydrogen detector is shown in Figure 1 below.

Figure 1 – Example Environment for Hydrogen Detector Use with ATevo Charger

How to Wire a Hydrogen Gas Detector to an ATevo Charger

2 Example Applications – Overview

It is impossible for this document to cover all ways that you can use a hydrogen detector with ATevo chargers, but we will discuss 2 examples that have been employed in the field to illustrate possibilities and the general approach. In both cases the 1% and 2% relay outputs from the detector get wired into ATevo's binary inputs to create alarms on the ATevo:

- Example 1 Wiring – Connection to ATevo DC Output
  Wetting the hydrogen detector from ATevo's output and using the binary inputs to **alarm** when either or both conditions become active.
- Example 2 Wiring – Connection to External DC Power Source & to Exhaust Fan
  Wetting the hydrogen detector from an external source and wiring an ATevo relay to an external relay that has sufficient power to **run a fan** to evacuate hydrogen from the space when the detector gives a 1% alarm. When the 2% alarm becomes active, ATevo will shut down.

Example 1 - Wiring to ATevo DC Output

NOTICE Before wiring the binary inputs, verify the binary input voltage selection jumpers are configured for the correct input voltage. In this example we will wet the hydrogen detector's relay contacts with ATevo's 130 Vdc source, so two (2) of the jumpers must be set to 130 Vdc. However, 24 Vdc, or 48 Vdc are other possibilities that could be used. Incorrect voltage configuration may damage the Auxiliary I/O Board or the hydrogen detector.

NOTICE It is recommended that a fuse be placed as close as possible to the source whenever a wetting voltage is required by a binary input or a relay contact. For our example, a fuse should be placed at the POS (+) DC output.

The basic steps for wiring, as shown in Figure 2 (on next page) are:

1. Connect ATevo's POS (+) DC output to normally open (NO) terminal on both hydrogen gas detector's relays.
2. Connect ATevo's NEG (-) DC output to negative terminals for two (2) binary inputs on ATevo's Auxiliary I/O board (terminals 2 & 4 are shown in Figure 2).
3. Connect Common (C) terminals of both hydrogen gas detector relays to positive terminals for two (2) binary inputs on ATevo's Auxiliary I/O board (terminals 1 & 3 are shown in Figure 2).

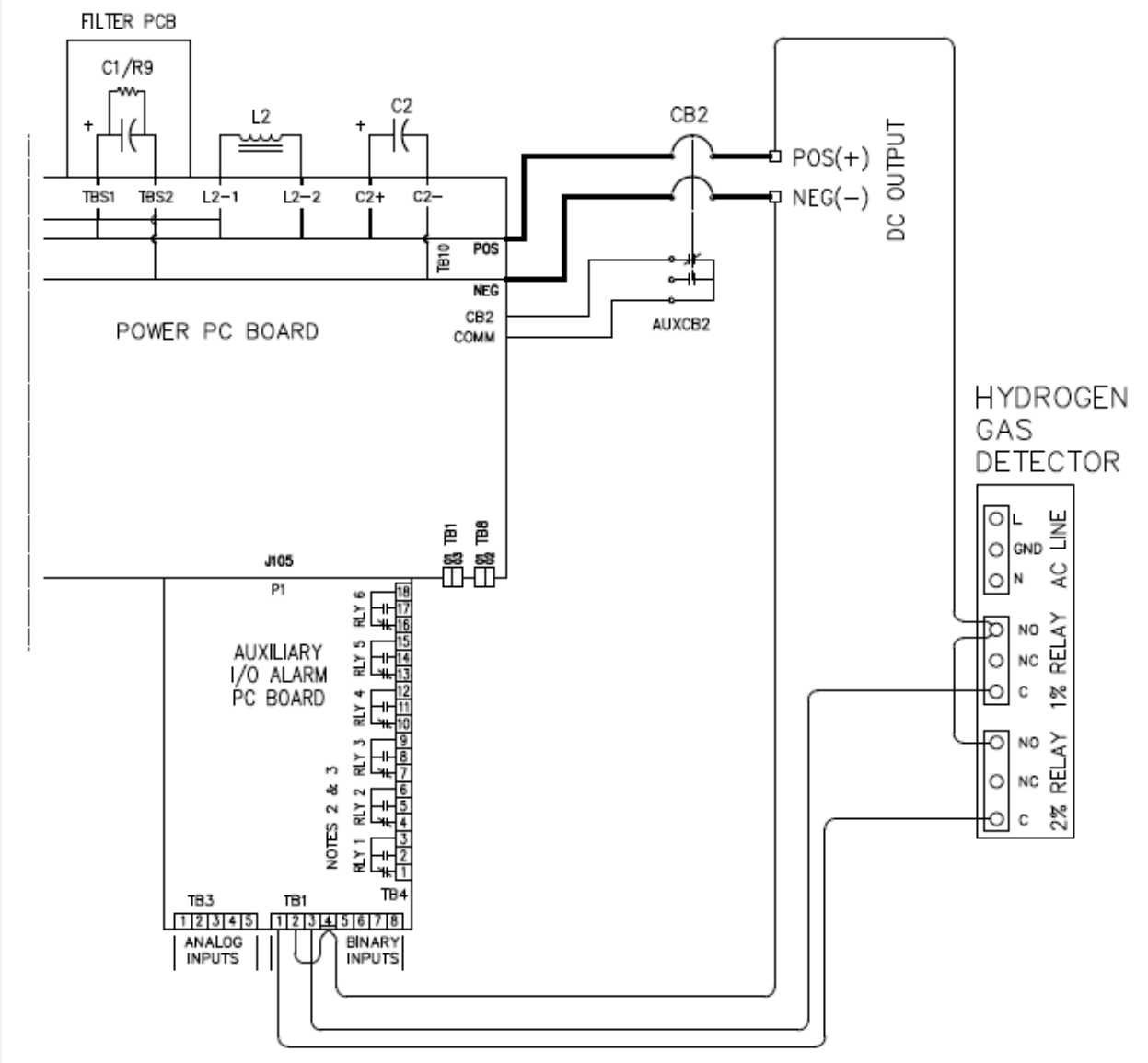

Figure 2– Wiring Hydrogen Detector to ATevo DC Output

NOTICE After wiring according to **Figure 2**, proceed to Binary Input Alarm Configuration (page 7) for instructions on configuring the binary input alarms.

Example 2 – Wiring to External DC Power Source & to Exhaust Fan

NOTICE Before wiring the binary inputs, verify the binary input voltage selection jumpers are configured for the correct input voltage. In this example we will wet the hydrogen detector's relay contacts with a 24 Vdc source external to the charger, so two (2) of the jumpers must be set to 24 Vdc. However, 12 Vdc, 48 Vdc, or 130 Vdc are other possibilities that could be used. Incorrect voltage configuration may damage the Auxiliary I/O Board or the hydrogen detector.

NOTICE It is recommended that a fuse be placed as close as possible to the source whenever a wetting voltage is required by a binary input or a relay contact. For our example, a fuse should be placed on the positive wire off the V+ output of the external power supply.

The basic steps for wiring, as shown in Figure 3 (on next page) are:

1. Connect positive (V+) output from external power source to normally open (NO) terminal on both hydrogen gas detector's relays.
2. Connect negative (V-) output from external power source to negative terminals for two (2) binary inputs on ATevo's Auxiliary I/O board (terminals 2 & 4 are shown in Figure 3).
3. Connect Common (C) terminals of both hydrogen gas detector relays to positive terminals for two (2) binary inputs on ATevo's Auxiliary I/O board (terminals 1 & 3 are shown in Figure 3).
4. Wire an available relay on ATevo's Auxiliary I/O board to an external relay that will power on a fan when its state is active.

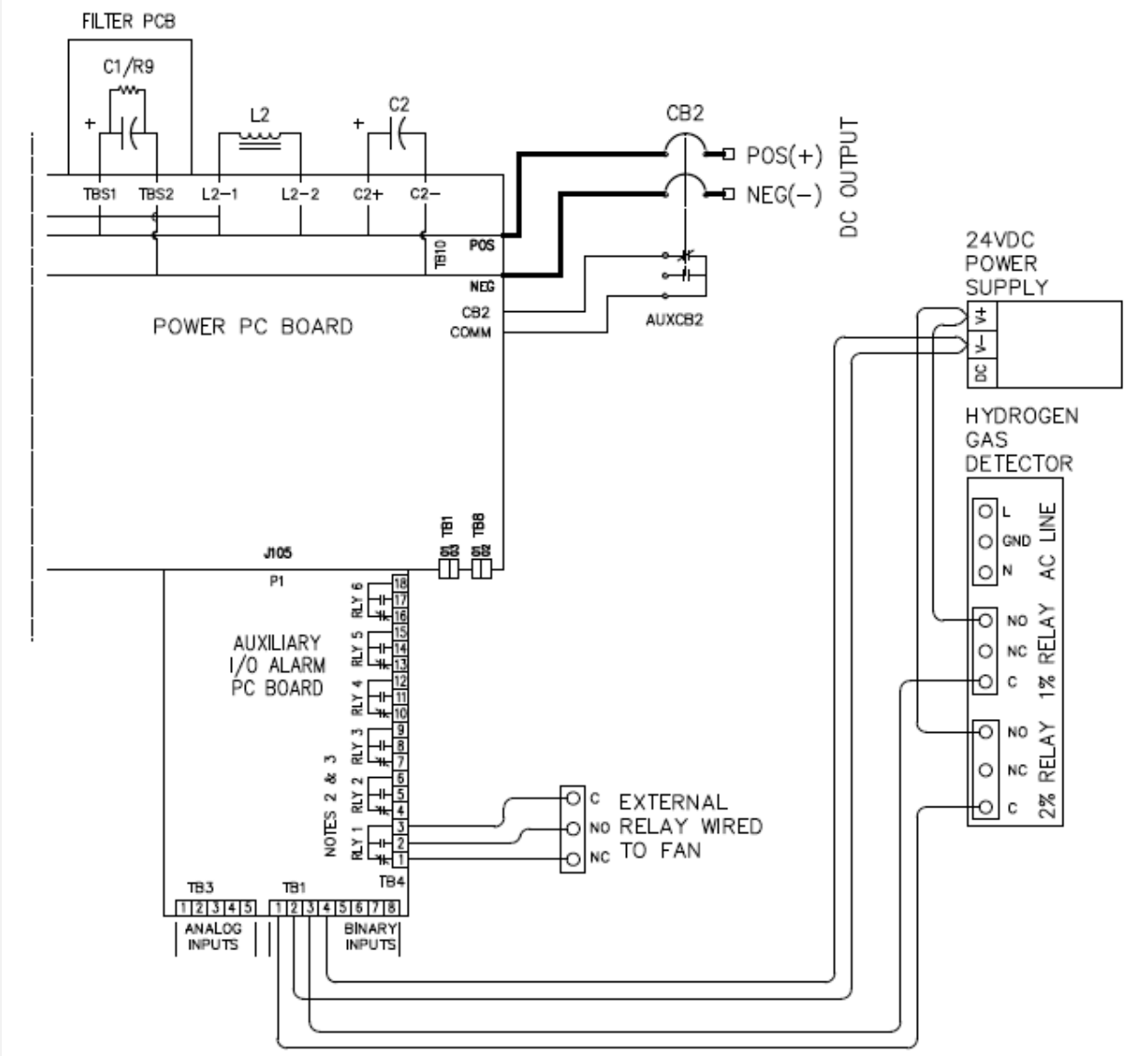

Figure 3– Wiring ATevo to Hydrogen Detector, including External Power Source and External Relay to Start Exhaust Fan When 1% Hydrogen Alarm Becomes Active

NOTICE After wiring according to **Figure 3**, the following configuration instructions are needed:

1. Binary Input Alarm Configuration (page 7) for instructions on configuring the binary input alarms.
2. Relay Configuration for Exhaust Fan (page 10) for instructions on configuring the ATevo relay that is connected to an external relay that powers a fan.

Configuration

Binary Input Alarm Configuration

In both example applications discussed (see Figure 2 and Figure 3), we must configure binary inputs connected to the 1% and 2% relays on the hydrogen gas detector. We will set these to produce alarms on ATevo and execute charger actions to help mitigate elevated hydrogen concentration.

This will require that the following steps be done for both binary inputs:

1. Select binary input.
2. Enable alarm.
3. Name binary input. (Suitable names for inputs could be 1% H2 and 2% H2).
4. Set alarm to execute charger action to mitigate elevated hydrogen concentration.
5. Set binary input to alarm when relay closes or goes into high state.

In our examples, we wired 1% on the hydrogen detector to Aux 1 input B2, and 2% to Aux 1 input B1. So, we select Aux 1 input B2 as shown in Figure 4, then proceed through the steps shown in Figure 5 through Figure 8 to configure an alarm for the detection of 1% hydrogen. We then repeat the process for Aux 1 input B1 for 2% hydrogen.

To Select Binary Input to Configure

MENU > AUX INPUTS > 'Binary Input Configuration' > select input from options.

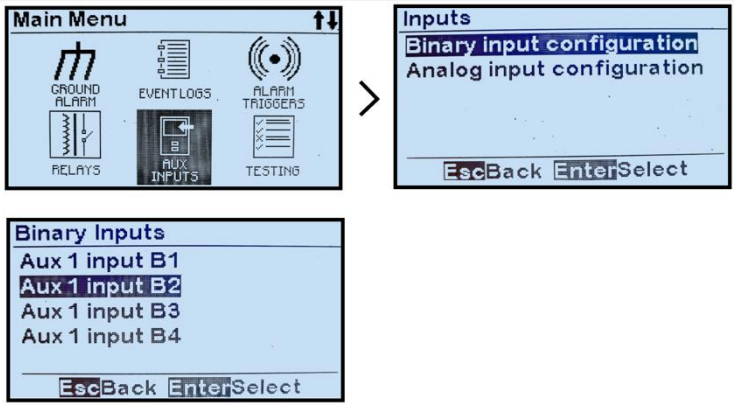

Figure 4 – Selecting Binary Input to Configure

To enable an alarm for a selected input, use the steps illustrated in **Figure 5**. Once an alarm is enabled, it will appear in the alarm list which makes it available for relay configuration.

To Enable a Binary Input as an Alarm

MENU > AUX INPUTS > 'Binary Input Configuration' > select input from options (see Figure 4) > 'Alarm:' > select 'enabled'.

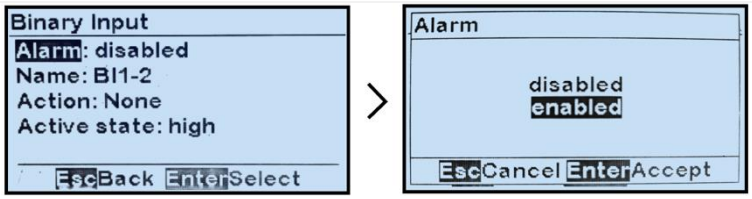

Figure 5 – Enabling Alarm for Binary Input

For easy recognition, it is best if we rename Aux 1 input B2 as "1% H2" and Aux 1 input B1 as "2% H2". To do so, use the steps shown in **Figure 6**:

To Assign a Name for a Binary Input

MENU > AUX INPUTS > 'Binary Input Configuration' > select input from options (see Figure 4) > 'Name:' > set characters as desired.

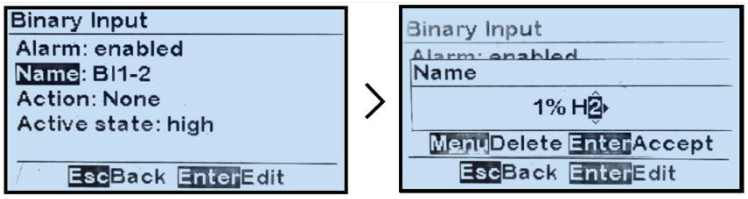

Figure 6 – Assigning Name for Binary Input Alarm

It is advisable to not only produce an alarm on ATevo when a hydrogen detector relay closes, but also to have ATevo execute an action to mitigate the elevated hydrogen level. The action taken for 1% H2 could be, for example, to 'Disable Equalize' since equalize mode produces more off-gassing. For 2%, a stronger action such as charger 'Shutdown' could be executed. In both cases, the steps would be performed as shown in Figure 7.

To Execute a Charger Action when a Binary Input is Active

MENU > AUX INPUTS > 'Binary Input Configuration' > select input from options (see Figure 4) > 'Action:' > select from 3 options.

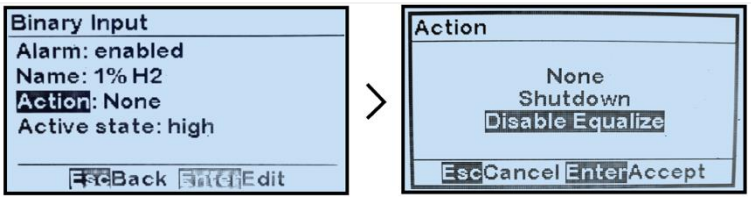

Figure 7 – Executing Charger Action when Binary Input is Active

Because each hydrogen detector relay closes – goes into a high (active) state – when its respective concentration is detected, we need to ensure that ATevo's active state is high using the steps shown in **Figure 8**.

To Set Which State is Active State

MENU > AUX INPUTS > 'Binary Input Configuration' > select input from options (see Figure 4) > 'Active state:' > select 'high'.

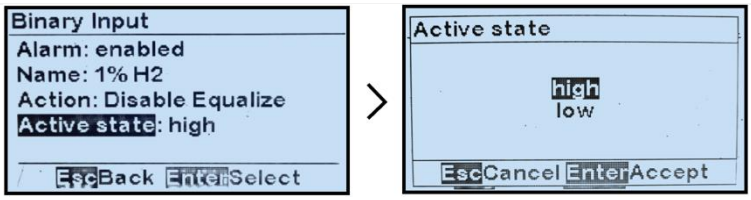

Figure 8 – Setting the Active State

After completing all wiring and configuration steps shown in Example 1, ATevo will disable equalize charging after 1% hydrogen has been reported to it by the hydrogen detector, and it will shut down if 2% hydrogen is reported.

Relay Configuration for Exhaust Fan

Configuration for Example 2 as wired in Figure 3 also requires setting a relay on ATevo's Auxiliary I/O board to become an output that reports the 1% H2 alarm to an external relay that drives an exhaust fan.

To begin doing so, select the ATevo relay on the Auxiliary I/O board that has been wired to the external relay that drives the exhaust fan. You can do so using the steps shown in **Figure 9**.

To Select Relay to Configure

MENU > RELAYS > 'Relay Configuration' > select relay from options.

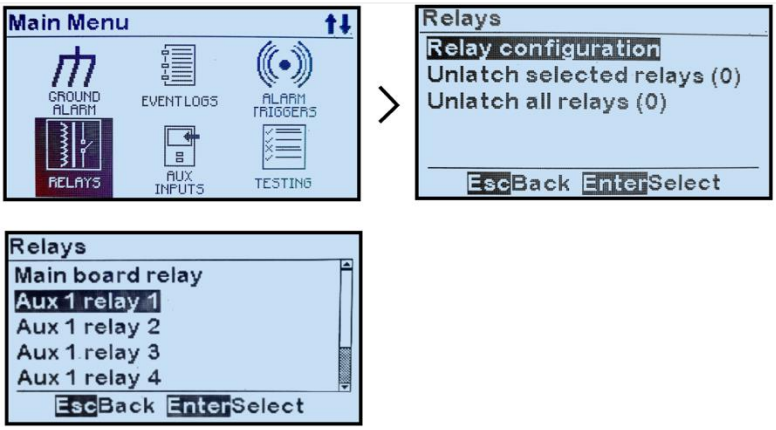

Figure 9 – Selecting Relay to Configure

Next, set the alarm or 'Fault' for that relay to be '1% H2' using the steps shown in Figure 10.

To Set Alarm Condition Assigned to Relay

MENU > RELAYS > 'Relay Configuration' > select relay from options (see Figure 9) > 'Fault:' > select condition from list.

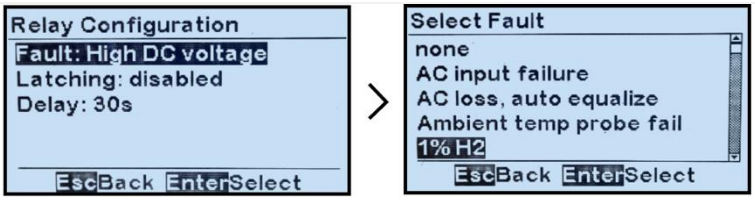

Figure 10 – Assigning Fault Condition for Relay

According to your preference, you can select whether the ATevo relay assigned to the 1% H2 alarm should latch. Your decision may depend on the latching behavior of the relays for the hydrogen detector. Consult the documentation from the detector manufacturer if necessary. After deciding which latching configuration you want, follow the steps shown in **Figure 11**.

To Change a Relay's Latching Control Configuration

MENU > RELAYS > 'Relay Configuration' > select relay from options (see Figure 9) > 'Latching:' > select from 2 latching options.

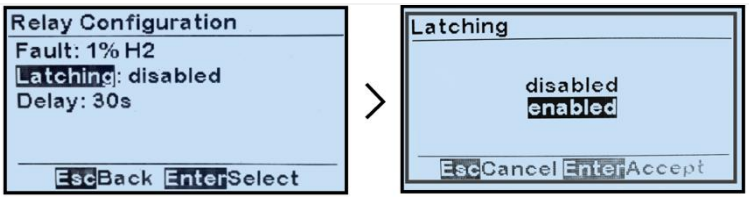

Figure 11 – To Latch or Not to Latch?

Finally, you might wish to set a specific time delay for the ATevo relay assigned to the 1% H2 alarm to become active after the detector reports 1% concentration. To do so, follow the steps shown in Figure 12.

To Change a Relay's Time Delay Configuration

MENU > RELAYS > 'Relay Configuration' > select relay from options (see Figure 9) > 'Delay:' > set digits as desired.

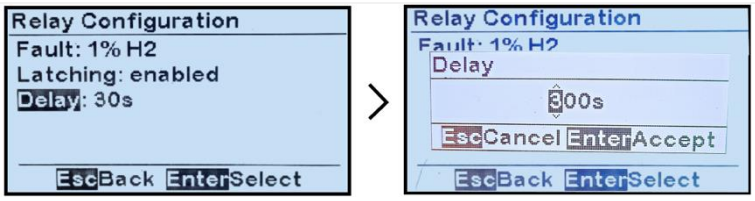

Figure 12 – Setting Relay Time Delay

After completing all wiring and configuration steps for Example 2, ATevo will disable equalize charging and cause a fan to go on to exhaust the space after 1% H2 has been reported to it by the hydrogen detector. It will shut down if 2% H2 is reported.

References

More information is available from the following sources:

- JD5086-00 – Wiring & Configuration – Relays & Inputs to Auxiliary IO Board
- JD5011-00 – Battery Charger Alarm Contact External Free-Wheeling Diode

Version History

Date	Firmware Version	Changes
05/24/2024	3.1.3	Date document originated.