

NoPileups ADAM Wiring Guide

VERSION 3.8 | REVISED 10/2022

Overview

This guide describes how to wire the ADAM 6060 (ADAM) mini-PLC to a Tunnel Controller so that NoPileups can communicate with the tunnel controller. For a visual reference of this guide, refer to “NoPileups ADAM 6060 Wiring Diagram”, included in this kit.

To operate, NoPileups needs the ability to:

1. Know when the conveyor is on and off.
2. Read the pulse signal.
3. Read the photo/enter eye signal.
4. Stop the conveyor by triggering an emergency stop (e-stop).
5. Start the conveyor OR stop the conveyor while a signal is being sent. (NoPileups “Smart Exit”)

Optionally, NoPileups can be wired to activate a device when NoPileups stops the conveyor, like a notification device.

The wiring specifics will vary based on tunnel controller, but this guidance should apply to any site. Follow all company electrical safety protocols and operating procedures during the installation process.

Required Equipment

The following equipment is required to install the ADAM:

1. DIN Rail (approximately one foot length) – Depends on available space in MCC
2. Stranded copper wire (14-18 gauge)
3. Wire Nuts (14-18 gauge)
4. Extra small flathead screwdriver
5. Philips screwdriver
6. AC/DC Multimeter
7. NoPileups ADAM Kit (Includes the items below)
 - a. 1x ADAM 6060 module (Advantech ADAM 6060 D)
 - b. 1x ADAM Power Supply (Mean Well MDR-20-24)
 - c. 3x Ice Cube Relay Base (OMRON PTF08A-E)
 - d. 3x 24VAC Ice Cube Relay (OMRON LY2-AC24)
 - e. 3x 24VDC Ice Cube Relay (OMRON LY2N-DC24)
 - f. 3x 120VAC Ice Cube Relay (OMRON LY2-AC110/120)
 - g. One of the following kits will be provided, depending on available inventory. Both kits function the same:
 - i. Kit 1
 1. 1x Solid State Relay Base (CRYDOM DRSED)
 2. 1x 24VAC Solid State Relay (CRYDOM ED06E5 or CRYDOM ED10E5)
 3. 1x 24VDC Solid State Relay (CRYDOM ED06C5 or CRYDOM ED10C5)

- ii. Kit 2
 - 1. 1x 24VAC Solid State Relay and Relay Base (OMRON G3RV-SR500-D ACDC24)
 - 2. 1x 24VDC Solid State Relay and Relay Base (Weidmuller 2618730000)
- h. 1x NoPileups ADAM Wiring Guide (this document)
- i. 1x NoPileups ADAM Wiring Diagram

Not all parts in the ADAM kit will be used (relays and power supply). Use the appropriate parts required for your environment.

If the NoPileups ADAM kit or any components are missing, contact NoPileups Support for assistance.

Contacting NoPileups Support

For assistance wiring the ADAM, contact NoPileups support by phone at [\(833\) 667-4538](tel:8336674538) or [\(208\) 789-0405](tel:2087890405); or by email at support@NoPileups.com.

Installation support is available Monday - Friday, 9 AM to 7 PM Eastern Standard Time (EST).

General software support is available Monday - Friday 7 AM to 9 PM Eastern Standard Time (EST), and Saturday and Sunday 9 AM to 6 PM EST.

NoPileups Documentation

To download a digital copy of this manual, or to view the latest NoPileups documentation, visit www.drb.com, select "Support & Training", then "NoPileups Support & Training".

Installation

Power

The ADAM is powered using 24VDC. An existing power source can be used, or the 110-240VAC to 24VDC Power Supply in the ADAM kit can be installed. When the ADAM is powered, the status light will flash red. After the ethernet cable is connected, the Status light will flash green and amber and the Speed/Comm light will flash amber.

If you are using a previously installed power supply **skip to step 2.**

1. Mount the ADAM.
2. Mount the power supply.
3. Connect the **AC hot wire** to **L on the power supply**, **neutral** to **N**, and **Ground** to $\frac{1}{\text{PE}}$.
 - a. When connected properly the **DC OK** light will turn **green**.
4. Run a wire for the following:
 - a. **+V** on the power supply to **(R) +Vs** on the ADAM.
 - b. **-V** on the power supply to **(B) GND** on the ADAM.
5. Verify the ADAM has power. The **Status/Link** on the ADAM should flash **red**.

Networking

A network cable needs to be run between the ADAM module and the NoPileups server. This server is normally installed with other IT equipment, or in the manager's office. For more information about required network connections, see page 10 of the NoPileups Install Guide. This network connection must be completed for NoPileups to verify the ADAM is installed correctly.

1. Plug the **Ethernet cable** that connects to the NoPileups Server into the RJ-45 port on the **ADAM**.
2. Verify network connectivity. The **Status/Link** light should **flash green and amber**. The **Speed/Comm** light should **flash amber**.

Conveyor Running Status

NoPileups needs to know when the conveyor turns on and off. Use the **normally open** contacts on a **mechanical relay** and the ADAM DI0 and ISO GND to accomplish this.

1. In the Tunnel Controller/PLC, locate the leads that energizes when the conveyor is on and de-energizes when the conveyor is off.
2. Determine the voltage (AC or DC) and mount the corresponding **mechanical relay base**.
3. Run a wire for the following:
 - a. The **positive/hot** lead in the **Tunnel Controller/PLC** to **contact 8** on the relay.
 - b. The **negative/common** lead in the **Tunnel Controller/PLC** to **contact 7** on the relay.
 - c. **Contact 3** on the relay to **DI0** on the ADAM.
 - d. **Contact 5** on the relay to **ISO GND** on the ADAM.
4. Insert the relay into the relay base.
5. Verify the relay is working. The mechanical relay should change states (audible click) when the conveyor changes states (turns on and off).

Pulse Signal

NoPileups reads the same pulse signal that the Tunnel Controller uses to determine conveyor speed and vehicle location. Use the appropriate **solid-state relay** and the ADAM's DI1 and ISO GND to make the connection.

Important Note: The ADAM kit provided by DRB may have Weidmuller and Omron, or Crydom Solid State relays. Identify which solid-state relays were included and follow the appropriate instructions below.

1. In the Tunnel Controller/PLC, locate the pulse signal.
2. Determine the voltage and select the appropriate **solid-state relay**.
3. If the signal is **DC**, use one of the following:
 - a. Crydom ED06C5
 - b. Crydom ED10C5
 - c. Omron G3RV-SR500-D AC/DC24.
4. If the signal is **AC**, use one of the following:
 - a. Crydom ED06E5
 - b. Crydom ED10E5
 - c. Weidmuller 2618730000.

How to use the table below:

- d. Determine if you will be using an AC or DC relay based on the pulse signal.
- e. Determine what brand/model of relay you received (Crydom, Omron, Weidmuller)
- f. Use the “Connection” column in combination with the appropriate “Relay – Brand/Model” Column to determine what connections should be made.

Connection	DC Pulse Signal			AC Pulse Signal		
	Relays – Brand/Model			Relays – Brand/Model		
	Crydom ED06C5	Crydom ED10C5	Omron G3RV-SR500-D AC/DC24	Crydom ED06E5	Crydom ED10E5	Weidmuller 2618730000
ADAM DI 1	Contact 3	Contact 3	Contact 13	Contact 3	Contact 3	Contact 11
ADAM ISO GND	Contact 4	Contact 4	Contact 14	Contact 4	Contact 4	Contact 14
Pulse Signal (-/Neutral)	Contact 1	Contact 1	Contact A1-	Contact 1	Contact 1	Contact A2-
Pulse Signal (+/Hot)	Contact 5	Contact 5	Contact A1+	Contact 5	Contact 5	Contact A1+

Example of table usage: Using DC Pulse, with Crydom ED06C5 relay: Contact 3 on the relay will connect to DI 1 on the ADAM. Contact 4 on the relay will connect to ISO GND on the ADAM. Contact 1 on the relay will connect to negative/neutral on the Pulse signal. Contact 5 will connect to positive/hot on the Pulse signal.

5. Mount the **solid-state relay base**.
6. **Referencing the table above, run a wire for each of the following:**
 - a. The appropriate relay contact to **DI 1** on the ADAM.
 - b. The appropriate relay contact to **ISO GND** on the ADAM.
 - c. The Pulse’s **negative/neutral** wire to the appropriate relay contact.
 - d. The Pulse’s **positive/hot** wire to the appropriate relay contact.
7. Insert the relay into the base.
8. Verify the relay is working properly. When the conveyor is on, the Input Status LED on the solid-state relay will flash on and off with the pulse.

Enter Eye Signal

NoPileups uses the photo-optic sensor, gate, or other vehicle sensor wired to the Tunnel Controller to detect vehicle length at the entrance. Use a **mechanical relay** and the ADAM’s DI2 and ISO GND to connect to the enter eye signal.

1. In the Tunnel Controller/PLC, locate the enter eye signal.
2. Determine the voltage type of the device (AC or DC) and mount a corresponding **mechanical relay base**.
3. Run wire for the following:
 - a. The **positive/hot** lead of the sensor to **contact 8** on the relay.

- b. The **negative/neutral** lead of the sensor to **contact 7** on the relay.
 - c. **Contact 3** on the relay to **DI 2** on the ADAM.
 - d. **Contact 5** on the relay to **ISO GND** on the ADAM.
4. Insert the relay into the base.
5. Verify the relay is working. The mechanical relay should change states (click) as the enter eye state changes.

Emergency Stop

When NoPileups detects there is a risk of a collision it will request an emergency stop. This connection uses a **mechanical relay's** normally closed contacts and the ADAM's RL 0+/- contacts. 24VDC will be required to trigger the relay. You can use the existing 24VDC connection that powers the ADAM.

1. Determine the emergency stop contacts in the Tunnel Controller/PLC.
2. Mount a 24VDC **mechanical relay**.
3. Run wire for the following:
 - a. The **positive** lead on the **24VDC power supply** to **RL 0-** on the ADAM.
 - b. **RL 0+** on the ADAM to **contact 8** on the relay.
 - c. **Contact 7** on the relay to the **negative/common** lead on the power supply.
 - d. **Contact 5** on the relay to **an e-stop lead**.
 - e. **Contact 1** on the relay to **the other e-stop lead**.

This must be a latching/sealing contact. The conveyor should not restart until an employee turns it back on manually.

Smart Exit

NoPileups is configured to function like a traditional exit anti-collision system at the end of the tunnel. When the distance between cars at the end of the conveyor drops below a set number of feet, the conveyor is stopped. When the front car pulls ahead more than a set distance, NoPileups restarts the tunnel without any staff action required. At exits where stalled customers are frequent, this improves staff attentiveness and reduces stop duration when compared to manually starting the tunnel. Loaders are notified that the conveyor is paused and have a live view of the exit through the Load-on Monitor when Smart Exit is engaged. **Smart Exit is only available at the conveyor exit, all other NoPileups stops will require manual input to restart the conveyor.**

Smart Exit (Conveyor Stop and Restart)

When Smart Exit triggers, a signal will be sent from the ADAM to shut off the conveyor until the signal is disengaged. Wire Smart Exit using **either** stop and start circuits **or** by wiring and configuring a Tunnel Controller input.

Smart Exit - Stop and Start Circuits (primary method)

When Smart Exit engages, RL 0 (e-stop) on the ADAM will close, triggering an e-stop. When Smart Exit disengages it will open RL 0 (e-stop) and close RL 1 momentarily, releasing the e-stop and sending a conveyor start signal. Before following these steps, the ADAM should be connected to the e-stop circuit. Run wire for the following:

1. **RL 1+** on the ADAM to the **Tunnel Controller Start circuit**.

2. **RL 1-** on the ADAM to the **Tunnel Controller Start circuit**.

A 24VDC mechanical relay may be required.

Smart Exit - Wire and Configure via Tunnel Controller Input (alternative method)

When Smart Exit engages, NoPileups will close RL 1 on the ADAM. RL 1 will open when Smart Exit disengages. The conveyor must stop and stay stopped when the contact closes and start when the contact opens again. This is achieved by using an input on the Tunnel Controller that is programmed to stop and start the conveyor when the status changes.

1. Run wire for the following:
 - a. **RL 1+** on the ADAM to the **positive side of an input in the tunnel controller**.
 - b. **RL 1-** on the ADAM to the **negative side of an input in the tunnel controller**.
2. Configure the tunnel controller to pause the conveyor when the input is on and start the conveyor when it turns off.

Optional Wiring (Accessories)

Horn, Light, or Notification Device

NoPileups can optionally be configured to activate a horn, light or other devices when NoPileups triggers an e-stop. This is achieved by wiring the power supply for the device through RL 2+ and RL 2- on the ADAM module. The ADAM is rated up to 30VDC and 120VAC.

1. Run a wire for the following:
 - a. The **positive lead on the device's power supply** to **RL 2+** on the ADAM.
 - b. **RL 2-** on the ADAM to the **positive lead on the device**.
 - c. The **negative lead on the device** to the **negative lead on the device's power supply**.

Testing Functionality

NoPileups will verify the functionality of all ADAM connections during the NoPileups installation process.

For assistance, [contact NoPileups support](#).

Additional Information

Please refer to the NoPileups ADAM Wiring Diagram for visual instructions that complement this document.

For assistance, [contact NoPileups support](#).

Patent Information

NoPileups is patented technology, covered by patent number 11,127,283. For more information, please visit www.drb.com/patents.