POWERFLEET

Pedestrian Proximity Detection
Installation Guide

Proprietary and Confidential
Version 085-00001155 rev D
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Table of Contents

This publication is intended to provide the general knowledge needed to install the Pedestrian Proximity Detection system. Since vehicle designs vary widely throughout the industry, this guide focuses on providing comprehensive instruction for a "typical" installation method instead of tailored instructions by vehicle model.

1. Select an appropriate location to perform the vehicle installation. Ideally, a well-lit, open area where the vehicle can be test driven for about 5 seconds forward and then 5 seconds in reverse once the installation is complete.

2. Unbox the components and confirm that the kit is complete.

Component	Description	Qty
I/O Module	Junction box for power conversion, modeling, and communication	1
I/O Module harness	15' cable connecting the I/O module to the vehicle, VAC, and indicators	1
I/O Module mounting bracket	Mounting bracket for securing the I/O Module to the vehicle	1
Camera	Industrial cameras with edge processing artificial intelligence	1 to 3
Camera harness	15' cable connecting the camera to the I/O Module	1 to 3
Camera mounting bracket	Mounting bracket for securing the camera to the vehicle	1 to 3
Indicator light/sounder	Multicolor LED and sounder	1 to 3
Indicator mounting bracket	Mounting bracket for mounting the indicator light	1 to 3
Wi-Fi antenna	Antenna for Wi-Fi connectivity	1
GPS/Cellular antenna	Antenna for cellular connectivity and GPS location	1
Voltage converter	For vehicles with voltage over 36 VDC	1
Current switch	Travel input signal for AC drive vehicles	1
Electrical parts kit	Cable ties, ring terminals, etc.	1
Relays	12, 24, and 48 VDC automotive relays	3

3. Gather recommended installation tools.

Vehicle electrical diagram	17/64" (7mm) drill bit
Multimeter and clip leads	11/32" (9mm) drill bit
Allen wrench set	1-1/4" (32mm) Holesaw
Metric socket set	Wire stripper/cutter
Metric combination wrench set	Utility knife
Phillips and flathead screwdriver set	Pliers
18 AWG wire	Electrical tape
Butt splices	Flashlight
Ethernet cable	Ladder
Drill	Safety cones

NOTE: In addition to the recommended installation tools listed above, tools to be used for dismantling the vehicle body and potentially removing the vehicle battery will be needed.

4. Choose the camera mounting location(s).

Camera Mounting Location Considerations:

- Whenever possible, mount the camera bracket to an available beam, pillar, overhead guard, mast, or cross-member using the provided bracket.
- Vehicle operators must be able to view the warning light and optional display while positioned for normal vehicle operation.
- Do not obscure the operator's line of sight or prohibit accessibility to the vehicle controls.
- Limit the risk of cable damage by routing cables through the vehicle body. Whenever possible, use existing cable paths.
- Keep the camera and bracket inside the overall dimensions of the vehicle to avoid damage.
- Install the camera and cable in a manner that will not interfere with routine vehicle operation.

Camera Mounting Locations

Magnet Mount (Preferred Method)

D Dashboard

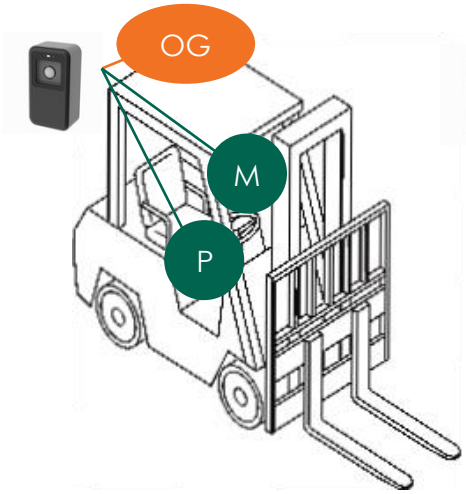
OG Overhead Guard

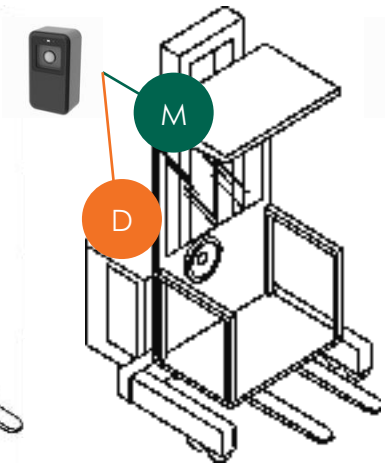
P Pillar

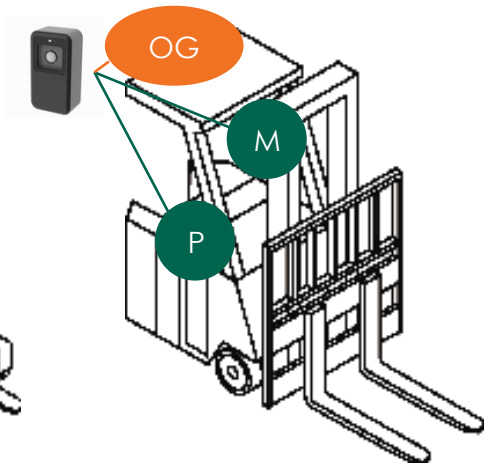
M Mast

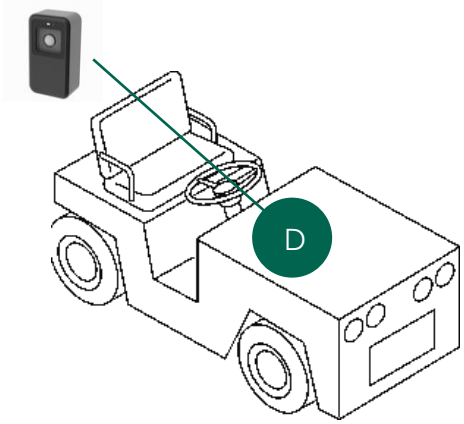
Rear Camera

Front Camera



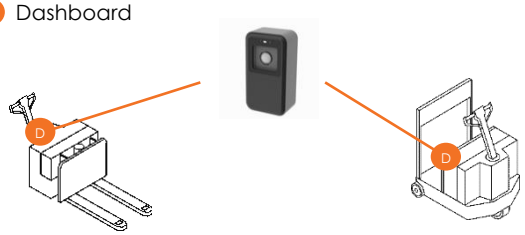




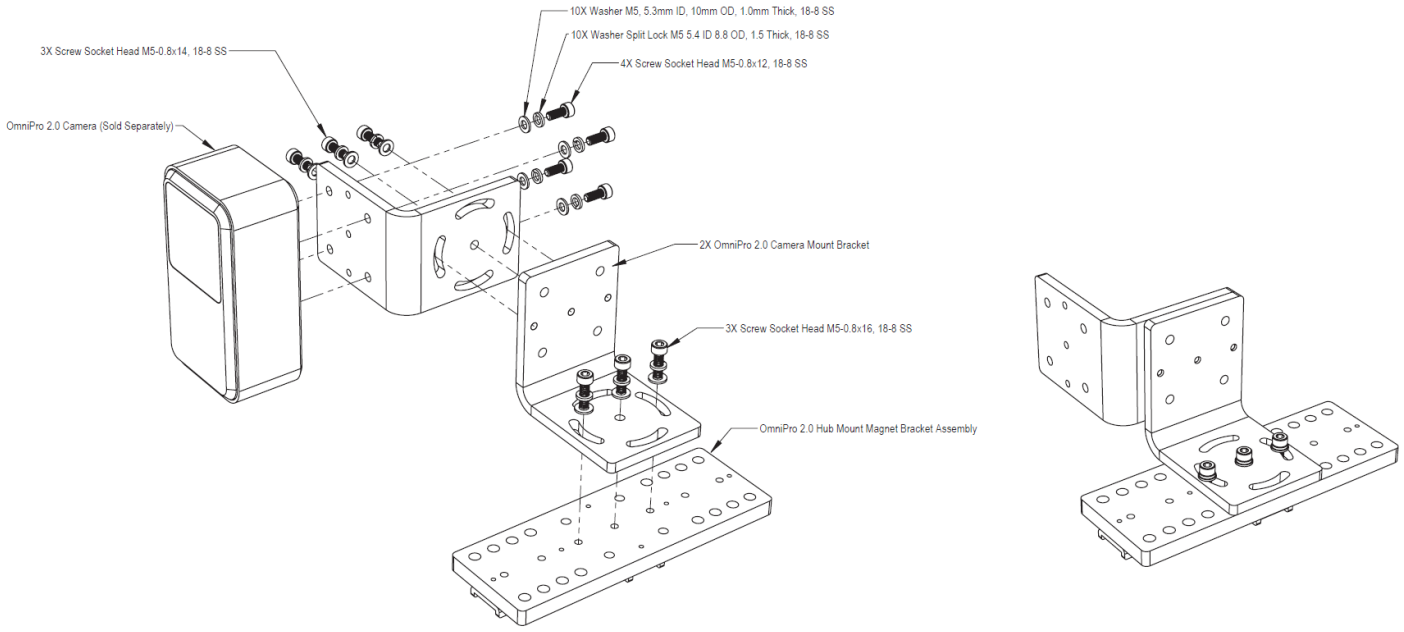


Dash Mount (Alternate Method)

D Dashboard



5. Install the camera(s) assembly to the mounting bracket(s).

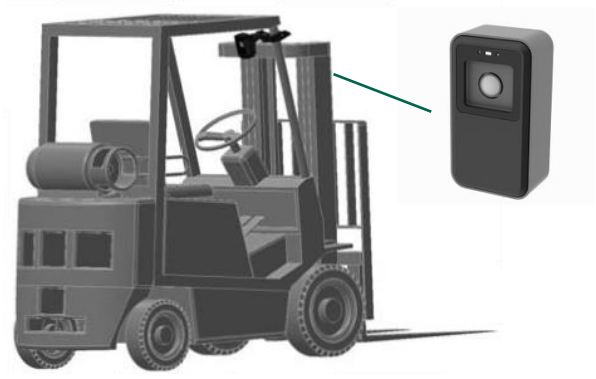


6. Mount the bracket(s) and camera(s) to the vehicle.

For lifting vehicles, be sure the mounting location does not interfere with lifting, lowering, tilting, side-shifting, reaching, etc.

Magnet Mount (Preferred Front Method)

Note: Test the magnet mount to ensure camera with not dislodge before proceeding



Place the short side of the bracket against the back of the mast or overhead guard support.

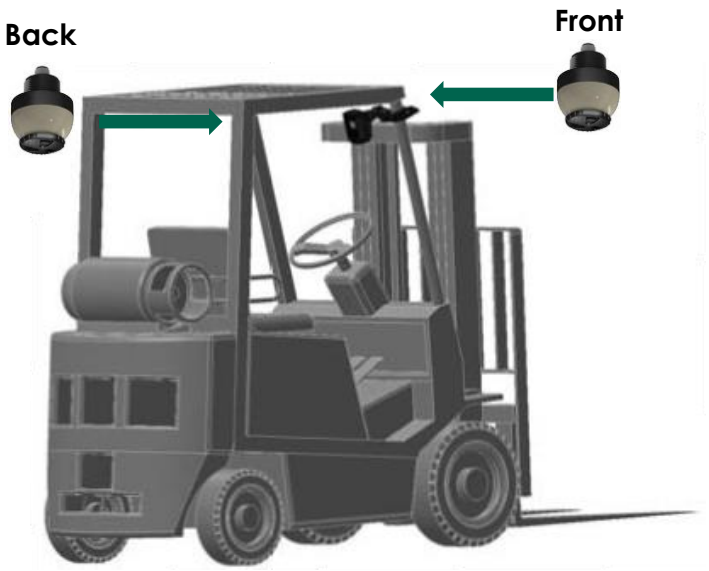
Place the long side of the bracket against the side of the mast of overhead guard support.



7. Choose the indicator light mounting location(s).

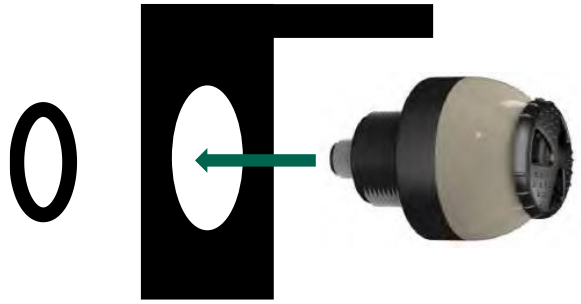
Indicator Mounting Location Considerations:

- Vehicle operators must be able to view the warning light and optional display while positioned for normal vehicle operation.
- Do not obscure the operator's line of sight or prohibit accessibility to the vehicle controls.
- Limit the risk of cable damage by routing cables through the vehicle body. Whenever possible, use existing cable paths.
- Keep the indicator and bracket inside the overall dimensions of the vehicle to avoid damage.
- Install the indicator and cable in a manner that will not interfere with routine vehicle operation.



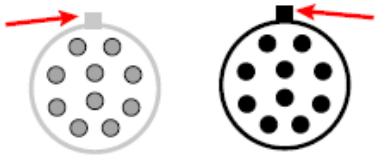
8. Mount the indicator light(s).

- Assemble the indicator light to the indicator light bracket using the provided plastic nut.



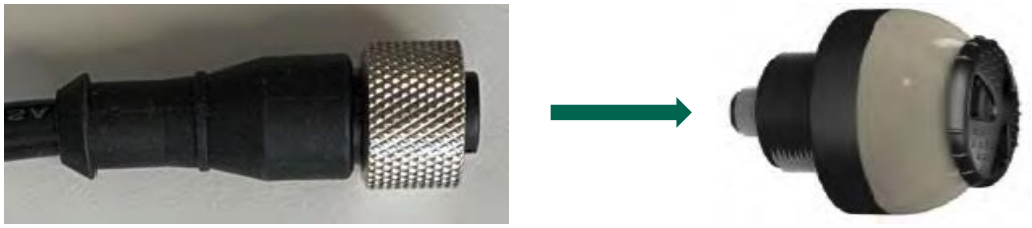
- Mount the indicator light mounting bracket to an existing bracket or accessory on the vehicle using screws or magnets.

9. Connect the camera cable(s) to connection on the back of the camera(s). The straight connector of the cable connects to the camera and the 90-degree connector connects at the I/O module.



10. Connect the indicator cable(s) **CA1** and **CA2** from the I/O Module harness to the connection(s) on the back of the indicator(s).

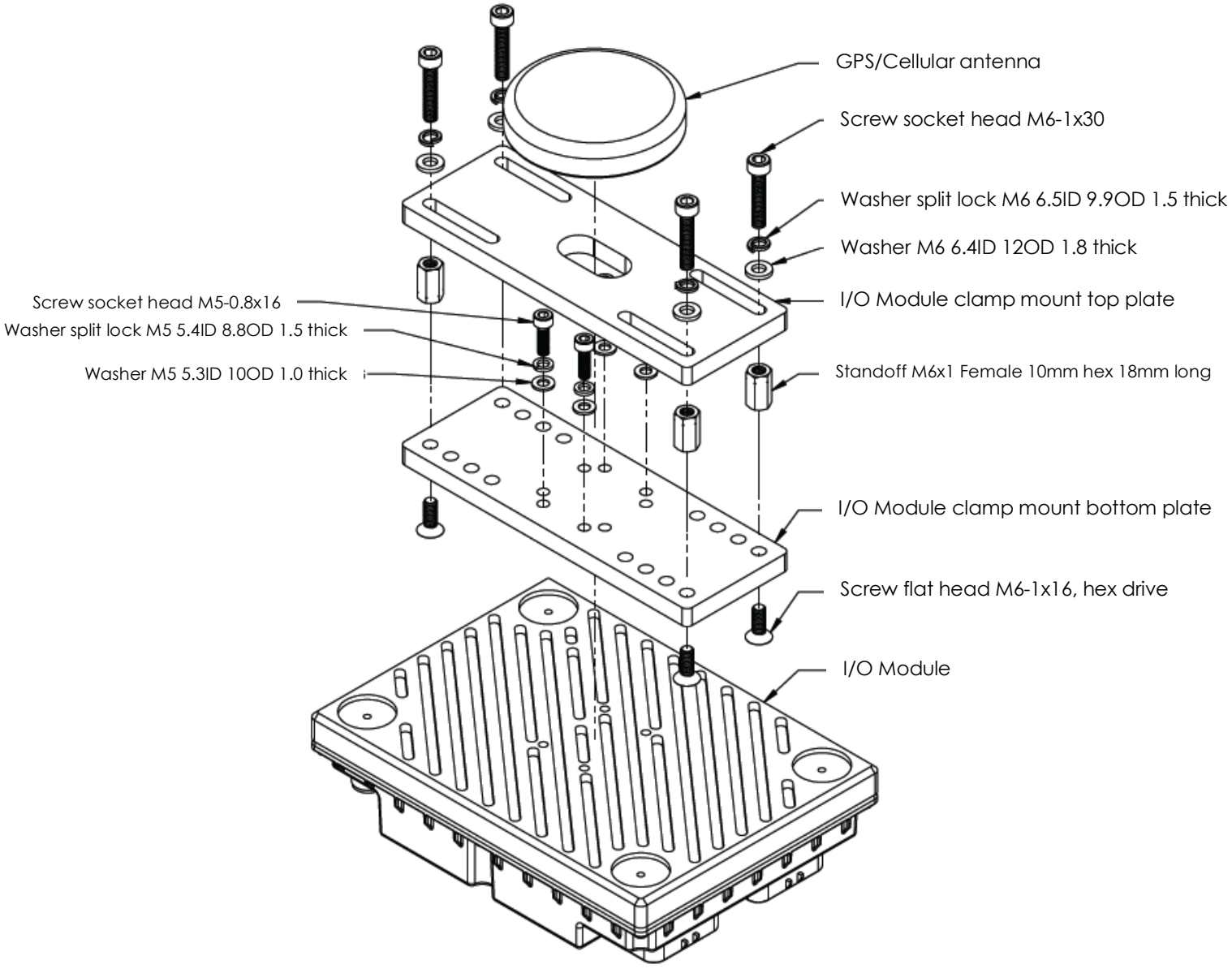
- Align the cable connector with the indicator connector, then press the cable on the indicator and rotate the metal coupling until hand tight.



11. Choose the I/O mounting location(s).

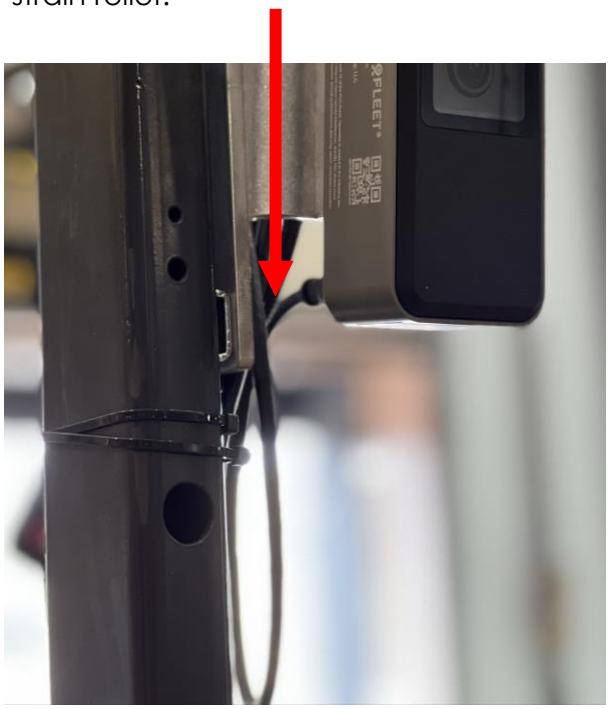
- Avoid areas of excessive heat, vibration or subject to pressured water or chemical washdown.
- Do not mount near moving parts that could interfere with the various cable connections.
- Mount inside the overall dimensions of the vehicle (ideally inside the body of the vehicle and away from access from vehicle operators).

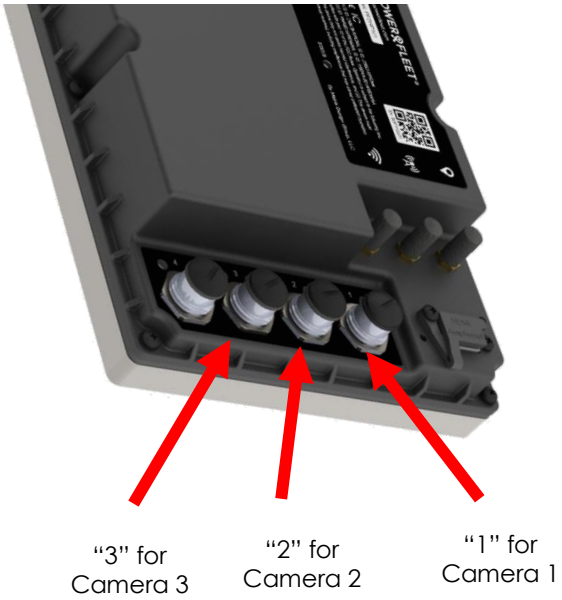
Clamp Mount (Preferred Front Method)

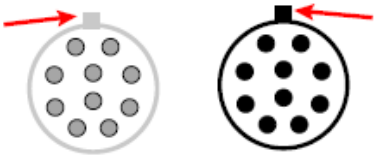


12. Route and secure the camera cable(s) to the I/O module.

- Use existing routing channels available on the vehicle or route inside the vehicle body when possible.
- When routing along the vehicle structure (overhead guard, pillars, etc.), keep the cables inside the overall dimensions of the vehicle to avoid damage.
- Secure the cables with cable ties to prevent wear, pulling, and other damage from moving parts.
- Maintain 2" to 4" of slack in the cables near the camera and indicator to allow for strain relief.







The default configuration (see later step) assumes:

CAMERA 1 = FRONT FACING
CAMERA 2 = REAR FACING

Note: For cameras mounted on the lifting mast, tilt the mast in the furthest position from the vehicle body to extend the cable before securing it with cable ties.

13. Identify a signal on vehicle that indicates either direction forward or reverse.

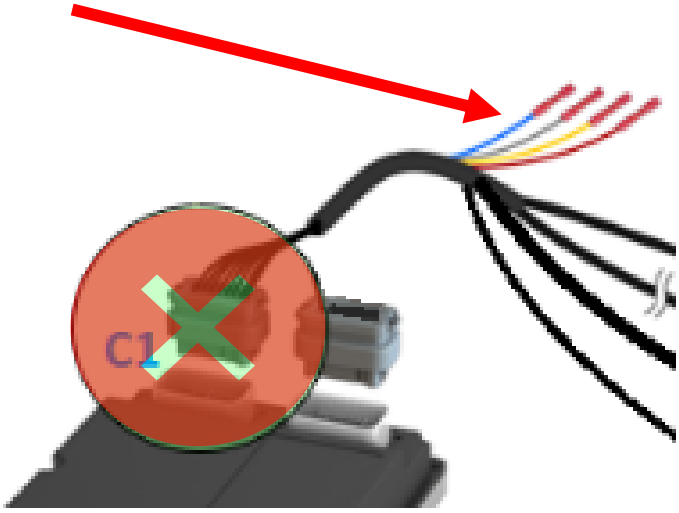
DO NOT CONNECT THE C1 PLUG TO THE I/O MODULE YET

For connections that provide **up to 80VDC** when in reverse (0 VDC when not in reverse), connect the input to the **Blue wire (C4)** butt splice of the I/O Module harness.

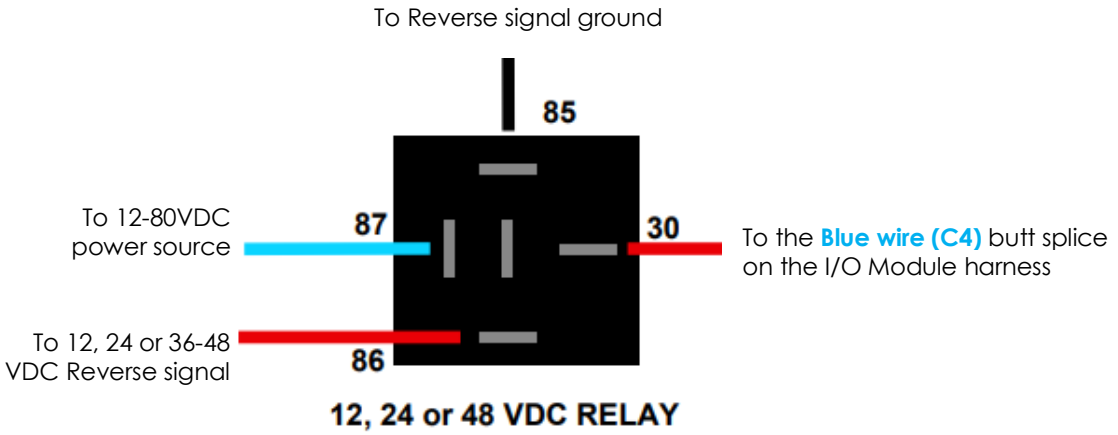
Common Connection Points

Reverse sounder or safety light
Reverse gear signal

Maximum current = 5A



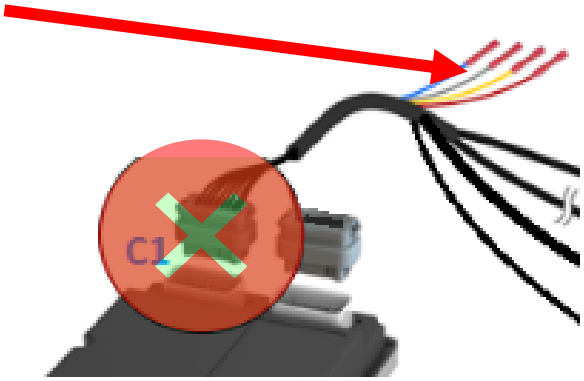
For connections that provide a **ground signal** when in reverse, connect a relay per the below.



14. Identify a signal on vehicle that indicates the vehicle is moving (one of the following 3 options).

DO NOT CONNECT THE C1 PLUG TO THE I/O MODULE YET

For connections that provide **up to 80VDC** when moving (0 VDC when not moving), connect the input to the **Grey wire (C5)** butt splice of the I/O Module harness.

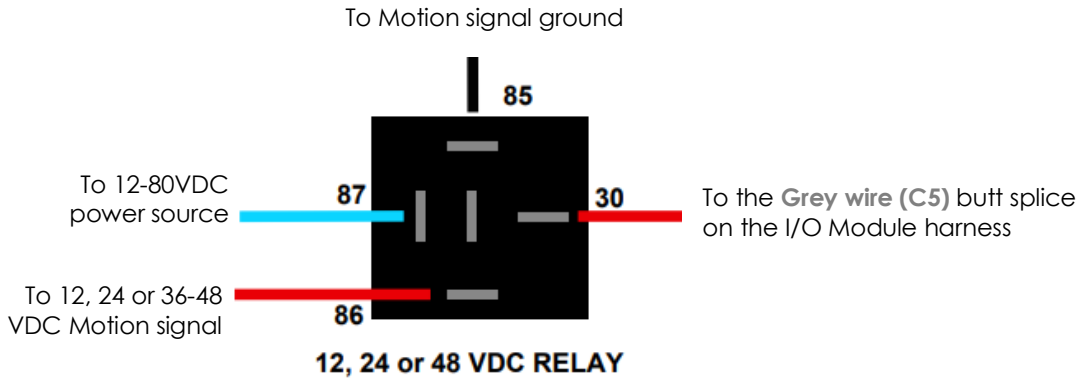


Common Connection Points

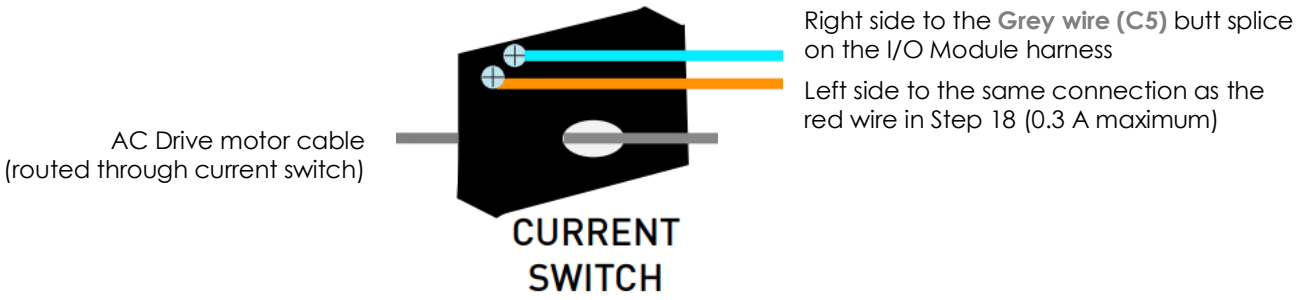
Travel control throttle
Traction motor controller

Maximum current = 5A

For connections that provide a DC **ground signal** when in motion, connect a relay per the below.



For connections that on **AC drive motor** vehicles when in motion, connect the AC current switch per the picture below.



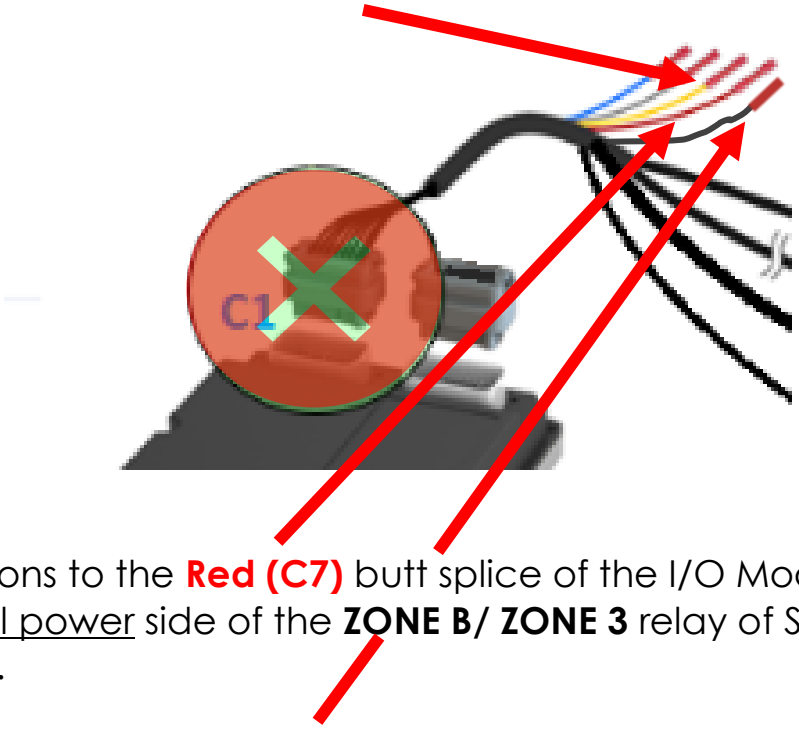
15. Route the 4-PIN C3 connector of the I/O Module harness to the VAC Sensor hub and connect to VIM 10/11.

Skip this step for systems not integrated with Forklift Gateway (VAC).

16. [Optional] Connect the Speed Manager to the I/O Module harness for speed control during area breaches.

Skip this step for systems not integrated with Speed Manager.

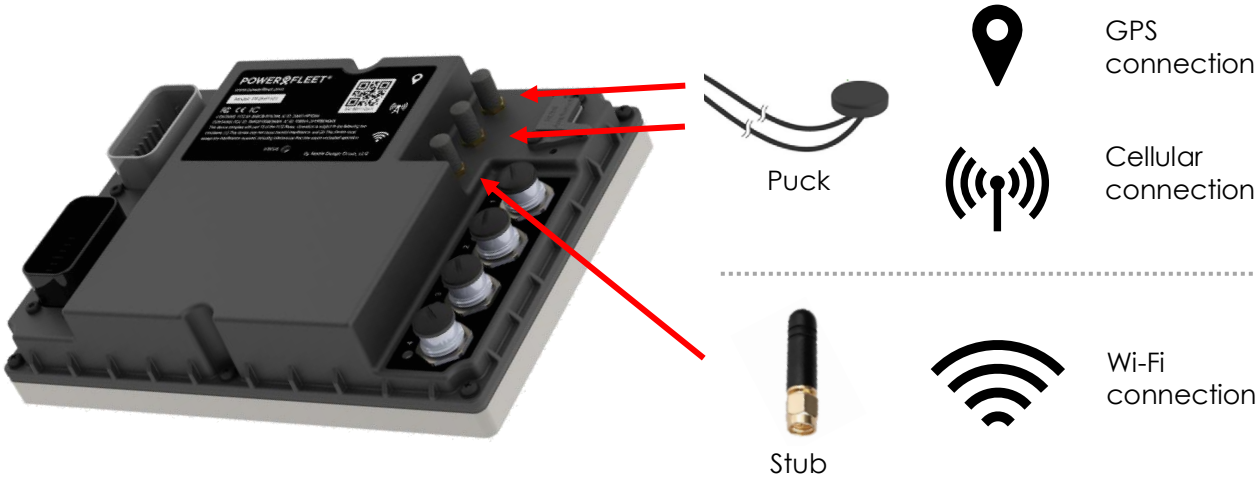
Connections to the **Yellow (C6)** butt splice of the I/O Module harness to the coil power side of the **ZONE A/ ZONE 2** relay of Speed Manager.



Connections to the **Red (C7)** butt splice of the I/O Module harness to the coil power side of the **ZONE B/ ZONE 3** relay of Speed Manager.

Connections the **Black (C8)** butt splice of the I/O Module harness to the coil ground side of the **ZONE A** and **ZONE B** relays of Speed Manager.

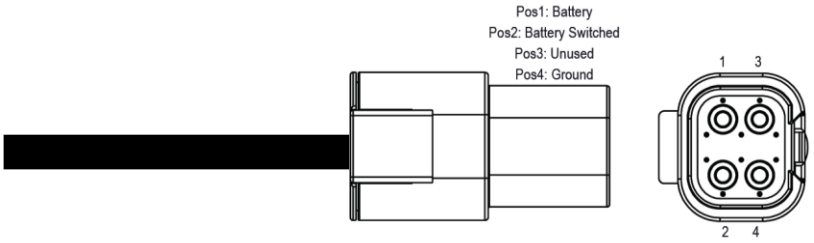
17. Connect the wireless connectivity antenna(s) to the I/O Module.



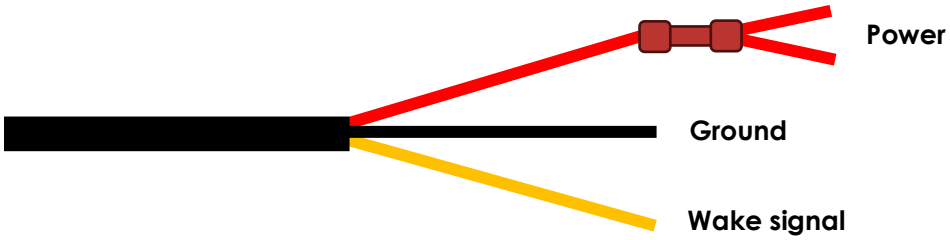
18. Connect the I/O Module harness to a power source.

DO NOT CONNECT THE C1 PLUG TO THE I/O MODULE YET

1. Cut the connector off the **C2 cable** of the I/O Module harness.

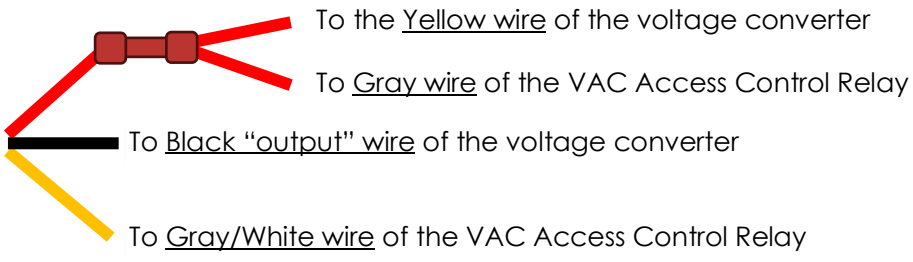


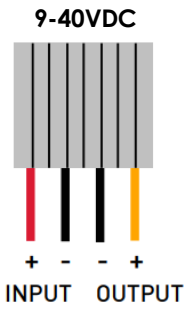
2. Strip back the wires and split the RED wire into 2 legs.



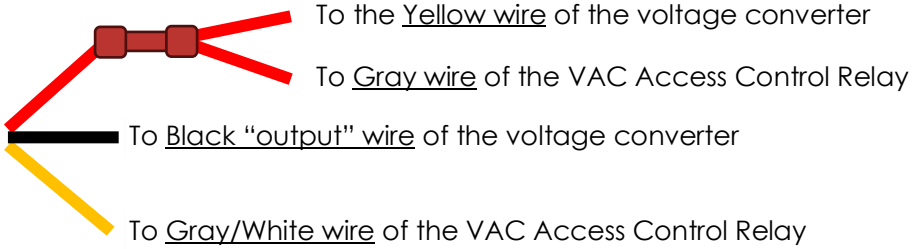
3. Connect the wires to the appropriate voltage converter and VAC relay.

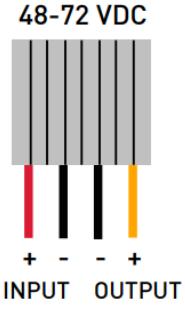
For 12VDC, 24VDC, and 36VDC vehicles, connect to the 9-40VDC converter



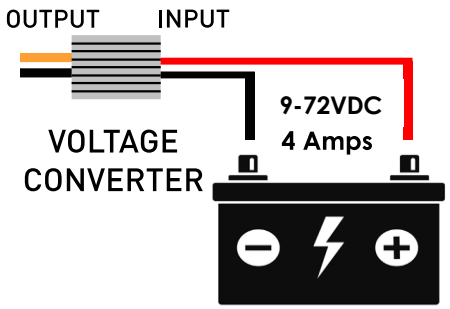


For 48VDC, 60VDC, and 72VDC vehicles, connect to the 48-72VDC converter





4. Connect the voltage converter wires to the vehicle. The voltage converter inputs must be the same source as the VAC power input (B+ & Ground).

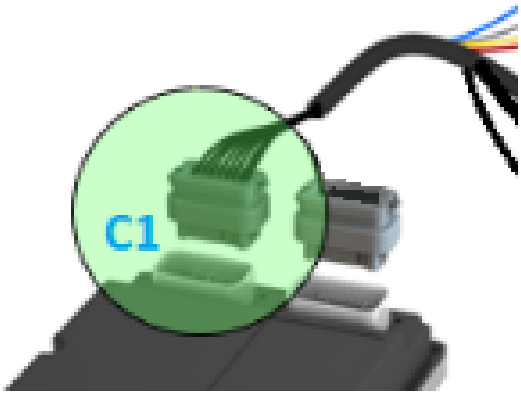


This configuration will power the solution when the VAC is powered but enable hibernate mode on the solution 1 hour after the driver logs off, waking on login.

19. Make sure all antenna, wires and plugs are connected to the I/O Module harness as prescribed in previous steps.

- Make sure wire connections are secure.
- Avoid exposed wires or connections from shorting between each other.

20. Plug connector C1 of the I/O Module harness into the I/O Module.



21. After connecting C1 to the I/O Module, switch the power on using the switch method wired (vehicle key, etc.)

- The **I/O Module** with power up with LEDs as follows:

Color	Pattern	Meaning
Green	Solid	Functioning properly
Amber	Solid	Minor diagnostic error – contact Support
Amber	Blinking	Software update in progress – do not power down
Red	Solid	Not functioning- contact Support
Off		Not powered on

- The **camera(s)** will boot up (may take up to 45 seconds) with LEDs as follows:

Color	Pattern	Meaning
Blue	Blinking	Connected to I/O module but not configured yet
Green	Solid	Connected to I/O module and functioning properly
Amber	Solid	Minor diagnostic error – contact Support
Amber	Blinking	Software update in progress – do not power down
Red	Solid	Not functioning- contact Support
Off		Not powered on

22. Connect a notebook computer to the I/O module.

- Open your notebook computer's Wi-Fi connection.
- Select the wireless network corresponding to the I/O module serial # (printed on the label) you want to connect to.
- When prompted for the network security key, enter **Matrixdg!**
- After the connection is made, go to 10.10.10.1 on a web browser.
- Login credentials
  - Username: support
  - Password: mdgsupport!help

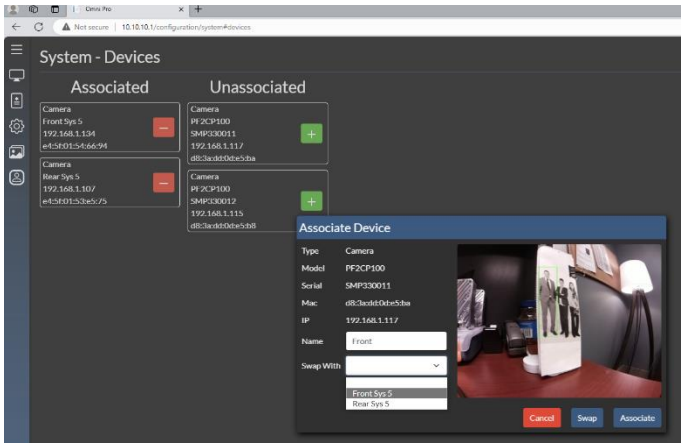
23. Install default configuration file (while I/O module connected).

- Select **Configuration** from the left menu.
- Select **Import** from the left sub-menu.
- Navigate and select the config file you would like to use on the computer.
- A "Success" confirmation should appear.
- Refresh the browser.
- Log in again using the credentials from the previous step.
- Default settings:

I/O Module	Reverse camera State	Reverse signal input (C4)
Image capture	Areas	Alert, Warning
	Period	1 second before, 1 second after
	Frequency	0.5 seconds (2x per second)
Inputs	Digital In 0 (Grey wire C5)	Forward signal (Motion)
	Digital In 1 (Blue wire C4)	Reverse signal (Direction)
	Digital In 2 (N/A)	Not used
	Digital In 3 (N/A)	Not used
	Digital In 4 (N/A)	Not used
	Analog In 0 (N/A)	Not used
	Analog In 1 (N/A)	Not used
Outputs	Digital Out 0 (Red wire C7)	Alert area, constant on when active
	Digital Out 1 (Yellow wire C6)	Warning area, constant on when active
	Digital Out 2 (N/A)	Not used
	Digital Out 3 (N/A)	Not used
	Digital Out 4 (N/A)	Indicator Green Fault light
Direction	Forward motion	Digital In 0 is > 0 VDC
	Reverse motion	Digital In 1 is > 0 VDC
Zones	Front camera	Alert and Warning, for people and vehicles
	Rear camera	Alert and Warning, for people and vehicles

24. Associate the installed cameras (while I/O module connected).

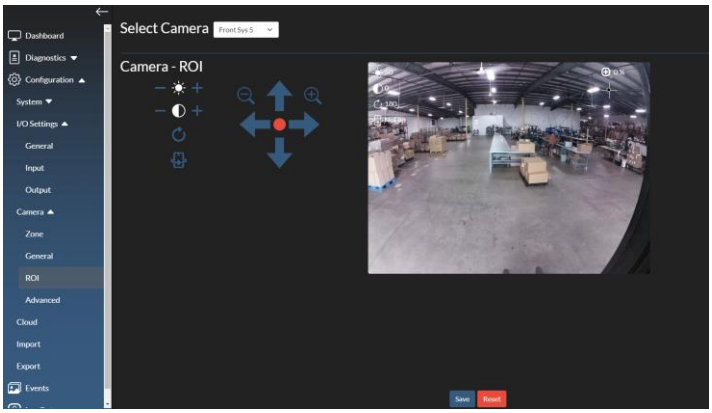
- Select **Configuration > System > Devices** from the left menu.
- The Associated devices are the profiles from the imported file in step 23, the unassociated devices are the cameras connected to the I/O Module.
    - If you do not have any unassociated devices, check that the connected cameras have an illuminated BLUE LED. NOTE: This can take up to 15 minutes and may require a reboot.
- Click the **+** for the Front unassociated camera.
- Enter a new Name.
- Select the **Front** profile in the associated list from the "Swap With" dropdown to apply the default Front configuration.
- Click **Swap**.
- Click the **+** for the Rear unassociated camera.
- Enter a new Name.
- Select the **Rear** profile in the associated list from the "Swap With" dropdown to apply the default Rear configuration.
- Click **Swap**.
- Click **Save**.



25. Verify each camera field of view meets your criteria.

- Select **Configuration > ROI** from the left menu.
- Check the view from each camera (swap using the top drop-down). To adjust the field of view.
  - Adjust the mounting position.

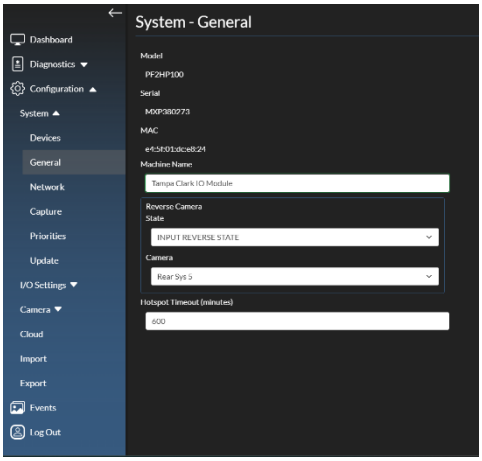
    OR
  - Zoom in on the view you have and pan (←↑→↓) using the UI.
  - Use the ↻ to rotate the camera 90° with each click.
- Click **Save**.



⚠ **For front facing cameras on a mast, adjust the mast to the normal driving position before continuing.**

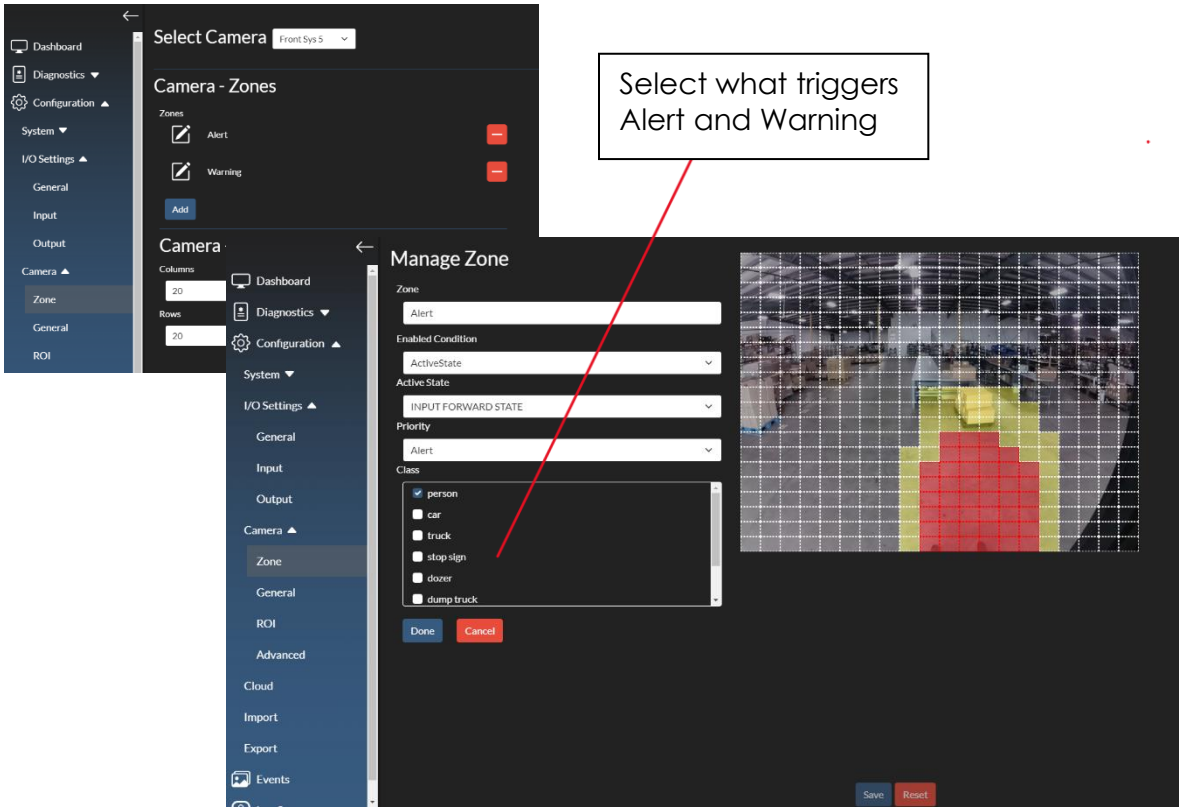
26. Configure the I/O Module.

- Select **Configuration > System > General** from the left menu.
- Change the **Machine Name** to something meaningful to the vehicle (ideally the vehicle ID).
- [Option] If you have a display you want to show the rear camera any time the vehicle is in reverse, select the rear-facing camera as the **Reverse Camera**.
- Click **Save**.



27. Adjust the breach areas as required.

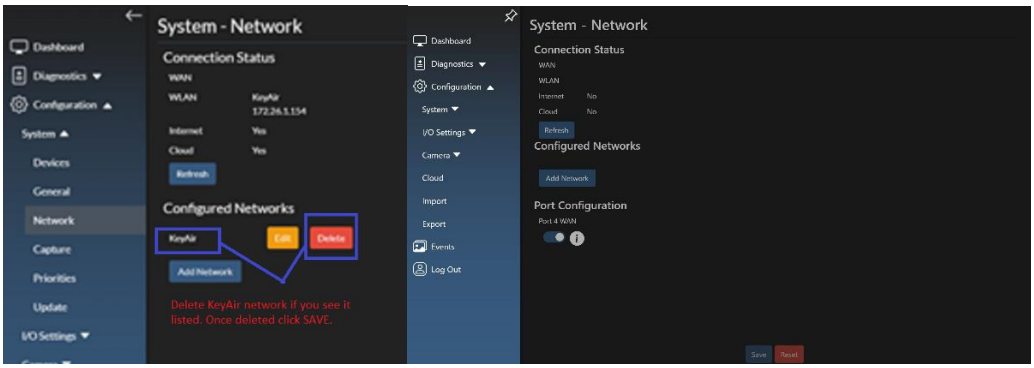
- Select **Configuration > Camera > Zone** from the left menu.
- Select the ✎ icon for the **Alert** area.
- Areas are drawn by selecting the Priority and then clicking the boxes you want covered by that area.
    - Highest priority needs to be closest to the vehicle, meaning lower priority cannot be inside the area of higher priority.
    - Overlapping priorities are not allowed.
    - To remove a color from a box, select the same priority as the box and click on it.
- **Repeat** those steps for **all priorities** you want.
- Click **Save**.
- By default:
    - Alert (highest) priority – saves images, activates the red LED and sounder, and activates the output on the red wire (C7).
    - Warning (High) priority - saves images, activates the yellow LED, and activates the output on the yellow wire (C6).
    - Normal, Low and Lowest priorities – do not take any actions.



28. [OPTIONAL] Connect the I/O Module to Wi-Fi.

Skip this step if you do not want to connect to cameras on your VLAN.

- Select **Configuration > System > Network** from the left menu.
- If you see the network "KeyAir", delete and save. (See below for before and after.)
- Select the network from the list (or select Add Network if you don't see the one you want in the list).
- Enter the network credentials and verify connectivity by seeing a **Yes** next to **Internet**.
- Click **Save**.



29. Configure the VAC for the yellow and red breach areas.

Skip this step for systems not integrated with Forklift Gateway (VAC).

- Log into the VAC as a Maintenance Operator (for instructions on this, please see the VAC installation guide)
- Navigate to the **Install > Sensors** wizard. Do not enter the Basic wizard if you are only configuring the pedestrian warning system.

- Assign **WarnArea** to VIM 110
- Assign **AlertArea** to VIM 111

- Navigate to the **Warn Area (110)** configuration screen and select **Edit**

- Set the following parameters

  Id1 = 0000
  Th1 = 050
  Id2 = 0000
  Th2 = 050

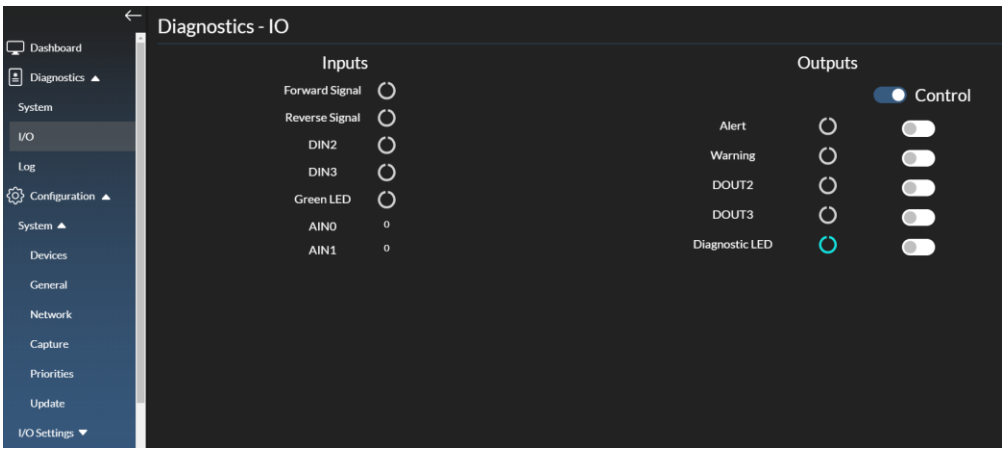
- Select **OK**. The screen will display Area Clear when no objects are in the yellow area.
- Navigate to the **Alrt (111)** configuration screen and select **Edit**
- Set the following parameters

  Id1 = 0000
  Th1 = 050
  Id2 = 0000
  Th2 = 050

- Select **OK.** The screen will display Area Clear when no objects are in the red area.
- Complete the sensor wizard.

30. Test the indicators and VAC breach areas are configured correctly.

- Select **Diagnostics > I/O** from the left menu.
- Slide the **Control** button on (so it shows blue).
- Turn the **Alert** button on. The Red LED and Sounder will turn on, and the VAC Alrt screen will display a breach in progress.
- Turn the **Alert** button off.
- Turn the **Warning** button on. The Yellow LED will turn on, and the VAC Warn screen will display a breach in progress.
- Turn the **Warning** button off.
- Slide the **Control** button off (so it shows white).

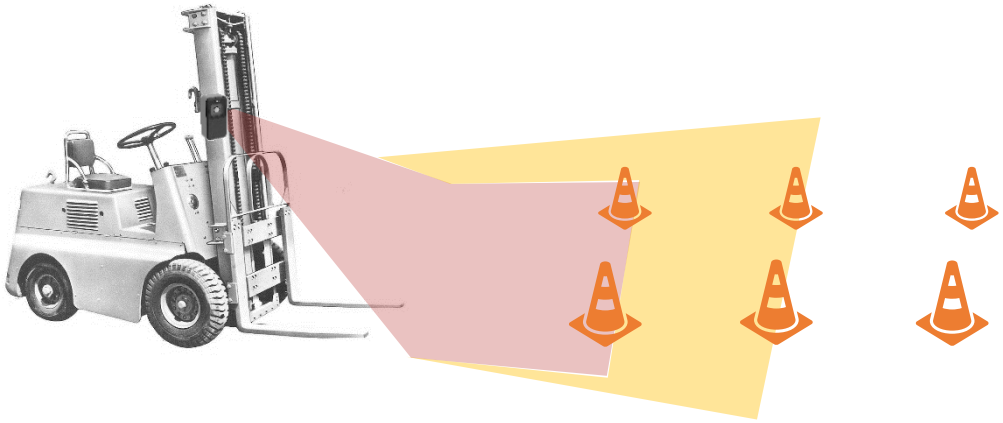


If either test fails, check your wiring and/or contact Support.

31. Test the camera breach area configuration.

- Arrange the vehicle on blocks or some means to have the vehicle safely in forward activity.
- While the vehicle is in forward simulation (the forward camera is active), test the yellow area is defined how you want it.
  - Walk outside the perimeter where you want yellow warnings; the yellow LED should not turn on.
  - Walk just inside the perimeter where you want yellow warnings; the yellow LED should turn on.
- **Repeat** the test process for the red area by monitoring the red light in and outside the red perimeter.
- **Repeat the whole process for any additional cameras.**

Many installers use cones or tape measured out to set the distance from the forks to zones.



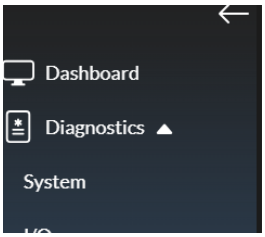
32. Disconnect the notebook computer from the I/O Module.

INSTALLATION & CONFIGURATION COMPLETE

33. Troubleshooting

Accessing Real-Time Diagnostics (as requested by Powerfleet Support)

- Go to **Diagnostics > System**
- Provide the details requested by Powerfleet Support to the support personnel.



Exporting System Logs (as requested by Powerfleet Support)

- Go to **Diagnostics > Log**
- Choose the device to export logs from.
- Choose the log type.
- Select **Download Logs**