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Introduction

This guide describes how to install and use the inView 360-Fusion Around Vehicle Monitoring (AVM) system. inView 360-Fusion provides drivers with a real-time, 360-degree picture of the area around their vehicle to eliminate blind spots, help improve pedestrian safety, prevent vehicle damage, and avoid liability costs.

Installation Principles

Installation of the inView 360 Around Vehicle Monitoring system is for certified personnel only. For more information on the certification process, please contact the FRC Service Team (please see the back of this guide for details).

The installation process involves drilling into the exterior of a vehicle to mount cameras. Ensure you read this document carefully, and verify the correct mounting locations prior to drilling.

NOTE: The installed system will not operate correctly until it has been calibrated. For more information, see the inView 360 Calibration Guide included in the Calibration Kit.

System Components

The inView 360-Fusion installation package contains the following components:

<table>
<thead>
<tr>
<th>Electronic Control Unit (ECU) Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x ECU (Electronic Control Unit)</td>
</tr>
<tr>
<td>1x ECU Mounting</td>
</tr>
<tr>
<td>Bracket w/ 4x Screws</td>
</tr>
</tbody>
</table>
## Power & Interface Components

- **1x Power & Interface Harness**
- **1x Reverse Signal Wire**
- **2x In-line Fuses (1A & 3A)**
- **1x Left (Orange) & 1x Right (Brown) Signal Wires**
- **1x Button Extension Cable & 1x Driver Button**

## Video Components

- **1x Video Harness**
- **2x Video Output Extension Cables**
- **4x Camera Extension Cables**
- **4x Camera Mounting Kits (Each kit incl. 1x Cover, 1x Bracket, 2x Camera Screws, 2x Bracket Screws)**
- **4x Cameras**
- **4x Drilling Templates & 8x Screw Covers**
Recommended Tools

The following is a list of recommended tools for installing the inView 360-Fusion:

- Multimeter
- Electrical tape
- Soldering iron and solder
- Cordless Drill
- Phillips screwdrivers
- Phillips drill attachments
- Wire cutters
- Zip ties
- 1/8", 1/16" Drill bits
- 3/4" Stepbit (Unibit)
- Crimpers
- Wire fish tape
Installation Diagram

The inView 360-Fusion comes with two main connection harnesses, one for **Power & Interface**, and one for **Video**. The following diagram provides a breakdown of each.

### Power & Interface Harness Legend

- VBAT - Yellow - Battery
- GND - Black - Ground
- VOUT - White - Not Used
- GEAR - Blue - Reverse Signal
- ACC - Red - Ignition
- TOUCH - Not Used

### Video Harness Legend

- OBD - Not Used
- IrDA - Remote Control Sensor
- Flasher - Orange (Left), Brown (Right) Signal
- BUTTON - Driver Button
- SPEAKER - Not Used
- CVBS1 - Monitor
- CVBS2 - DVR
- DVR - Not Used
ECU Installation

Selecting a Mounting Location

The inView 360-Fusion ECU needs to be installed in a dry, covered location with easy access to the SD card port. Here are a few idea locations for mounting the ECU in a vehicle:

Installing the ECU

Once you’ve determined your ECU mounting location, you’re ready to install it in the vehicle.

1. Place the ECU and mounting bracket in position. The bracket can be mounted on either side of the ECU.
2. Mark your drill positions.
3. Drill the screw holes.
4. Mount the ECU and bracket.
ECU Installation Requirements

Ventilation

• Install the ECU away from any sort of heat outlet, heater, or AC blower.

• Do not operate the ECU in a closed-in area or restrict ventilation in any way. The ECU requires air circulation to maintain optimum operating temperature and provide best performance.

• Do not expose the ECU to moisture.

Secure Surfaces

• Do not mount the ECU to a plastic panel or other surface that cannot support the ECU’s weight or is subject to constant vibration.

Mounting Orientation

• The ECU can be installed horizontally, vertically, or upside down.

Clearance Around the ECU and (optional) DVR

• Allow sufficient clearance: at least 6” in front of the ECU and 2” on each side for removal of the security front cover and easy access to the hard drive and USB ports.

• Allow sufficient clearance behind the DVR for power, signal, and camera cables.

Power, Signal & Camera Cables

• Provide enough slack on the power cable to prevent any force from being exerted on the connectors.

• A single 4-inch diameter loop is sufficient.

• Avoid right angle bends in the Ethernet cables.
Installing Power & Interface Components

Installing the harness

The Power & Interface harness connects the ECU to the vehicle’s power, ignition, ground, and directional signals (left, right, reverse). In addition, the harness provides power to the AVM’s remote control sensor and driver button.

To install the harness properly:

- Connect the **GND** (Black) wire to an appropriate vehicle ground source.
- Connect the **VBAT** (Yellow) wire to the vehicle’s constant power source via the 3A fuse.
- Connect the **ACC** (Red) wire to the vehicle’s ignition source via the 1A fuse.
• Connect the **GEAR** (Blue) wire to the vehicle’s reverse signal source (via extension wire). This source must be positive (12v when the vehicle is put in reverse).

• Connect the **FLASHER** connector (via extension cable) to the vehicle’s front turn signal sources (Orange for left, Brown for right). These sources must also be positive (12V when the left or right turn signals are on).

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**Connecting the Driver Button**

The Driver Button lets the operator switch between the front, rear, left, and right camera views on the in-cab monitor.

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To install the driver button:

1. Choose a location in the vehicle. Ideally, the location should be within arm’s reach of the driver.
2. Drill a 7/16” hole.
3. Thread the button through the hole.
4. Tighten the nut to the underside of the button.
5. Connect the button to the extension cable.
6. Run the extension cable to the ECU.
7. Connect the extension cable to the **BUTTON** connector on the Power & Interface harness.
Connecting the Remote Control Receiver

The receiver allows the 360 remote control to communicate with the ECU.

To install the receiver:

1. Remove the remote control receiver from the inView 360-Fusion Calibration Kit.
2. Find an optimal position to place the receiver.
3. Run the receiver cable to the ECU and connect it to the IrDA (Black/Green/Red) connector.

Installing Video Components

Installing the harness

The video harness connects the ECU to the cameras and monitor. There are 4 camera inputs, and 2 video outputs. The camera inputs are labeled Front, Right, Rear, Left, and must be connected to the corresponding cameras. The 2 outputs are for monitor and a DVR connection.
Mounting the Monitor

When mounting the monitor, ensure that it is in a location that doesn’t obstruct the driver’s view. To install the monitor:

1. Choose a mounting location for the monitor. When in place, the monitor is supported between the vertical arms of the mounting bracket.

2. Position the bracket and use the 2 self-tapping screws from the hardware kit to attach the bracket to the mounting surface.

3. Install the “L” brackets on the back of the monitor housing (one bracket on each side):
   a. As shown in the following diagram, position the “L” bracket so the holes line up with the holes in the housing. The bracket only fits one way, and you’ll need to slide the inner edge slightly toward the center and underneath the slot in the housing.
   b. Use 2 countersunk screws to attach each bracket to the housing.

4. Attach the sun shade:
   a. Position the sun shade frame around the front of the monitor, with the shade at the top.
   b. Fit the bottom of the monitor into the shade frame first, then snap the rest of the frame onto the monitor housing until it fits snugly.

5. Use 4 knob-head screws through the “L” brackets to attach the monitor to the mounting bracket.

6. Adjust the monitor tilt as required and tighten the mounting screws.
Connecting the Monitor

Once the monitor is mounted in position, you'll need to connect its harness to power, then connect it to the ECU's video harness. To do this:

1. Connect the **black** wire to an appropriate **ground** source.
2. Connect the **yellow** and **red** wires to the vehicle's **ignition** source.
3. Connect the **AV1** cable (with yellow connector) to the **AV adapter**.
4. Connect the **video** (yellow) connector of the AV adapter to the **CVBS** connector on the ECU video harness (via extension cable).
## Monitor Settings

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Options</th>
<th>Description</th>
<th>Value Range (Default in bold)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brightness</td>
<td>AV1, AV2, AV3</td>
<td>Adjust image property</td>
<td>0–50–100</td>
</tr>
<tr>
<td>Contrast</td>
<td>AV1, AV2, AV3</td>
<td>Adjust image property</td>
<td>0–50–100</td>
</tr>
<tr>
<td>Saturation</td>
<td>AV1, AV2, AV3</td>
<td>Adjust image property</td>
<td>0–50–100</td>
</tr>
<tr>
<td>Sharpness</td>
<td>AV1, AV2, AV3</td>
<td>Adjust image property</td>
<td>0–50–100</td>
</tr>
<tr>
<td>Picture Adjust</td>
<td>AV1, AV2, AV3</td>
<td>Stretch image horizontally: if the value is &lt;50, the left side of image is expanded; if value is &lt;50, right side is expanded</td>
<td>0–50–100</td>
</tr>
<tr>
<td>Video Control</td>
<td>AV1, AV2, AV3</td>
<td>Switch selected channel on/off so only connected channels are displayed</td>
<td>ON, OFF</td>
</tr>
<tr>
<td>Turn</td>
<td>AV1, AV2, AV3</td>
<td>Toggle between mirror/normal image for selected channel</td>
<td>MIRROR, NORMAL</td>
</tr>
<tr>
<td>Day/Night</td>
<td>OFF, ON</td>
<td>Turn on back-lit buttons</td>
<td>OFF, ON</td>
</tr>
<tr>
<td>Name</td>
<td>AV1, AV2, AV3</td>
<td>Change the name displayed for each channel</td>
<td>&lt;Text&gt;</td>
</tr>
<tr>
<td>Trigger Source</td>
<td>LINE1, LINE2, LINE3</td>
<td>Change the channel destination for each trigger</td>
<td>AV1, AV2, AV3, SKIP AV1, AV2, AV3, SKIP AV1, AV2, AV3, SKIP</td>
</tr>
<tr>
<td>Trigger Delay</td>
<td>LINE1, LINE2, LINE3</td>
<td>Adjust the time delay on each trigger</td>
<td>0–6–100</td>
</tr>
<tr>
<td>Distance Grid</td>
<td>AV1, AV2, AV3, OFF</td>
<td>Control display of the distance grid</td>
<td>ON, OFF</td>
</tr>
<tr>
<td>Grid Position</td>
<td>LEFT-RIGHT, UP-DOWN, WIDTH</td>
<td>Adjust grid lines</td>
<td>0–50–100</td>
</tr>
<tr>
<td>Auto Power</td>
<td>OFF, ON, AUTO</td>
<td>Off: monitor only turns on when triggered</td>
<td>OFF, ON, AUTO</td>
</tr>
<tr>
<td>Reset</td>
<td>NO, YES</td>
<td>Return settings to factory default</td>
<td>NO, YES</td>
</tr>
</tbody>
</table>
Assembling the Cameras

The inView 360-Fusion system comes equipped with 4 camera kits. Each kit includes a camera (labeled Front, Left, Rear, or Right), mounting bracket, camera cover, and screws (2x bracket screws, 2x mounting screws).

Before mounting to the vehicle, you'll need to assemble each camera. To do this, you'll need to attach each camera to its bracket using the bracket screws (x2). Ensure the camera is aligned properly by matching the camera's tab with the bracket's slot.
Soft-Mounting Cameras

When installing the cameras, it's important to always "soft-mount" them in order to test for functionality before you begin drilling into the vehicle.

“Soft-mounting” means connecting power to the cameras, putting them in position, and securing them with tape or other temporary adhesive, so that you can perform a full calibration. If calibration is successful, then you can drill into the vehicle to secure the cameras. If not, you can easily reposition the cameras without damaging the exterior of the vehicle.

Installing the Cameras

The inView 360-Fusion cameras are labeled as Front, Left, Right, and Rear. You'll need to ensure the cameras are connected to the correct input on the video harness, otherwise calibration may fail.

IMPORTANT! DO NOT drill into the vehicle until you've done a soft-mount and calibration of the system.

To install the cameras:

1. Connect each camera (with mount) to an extension cable.

2. Connect the extension cables to the matching inputs on the video harness. The extension cables are not direction-labeled, and therefore can be used between any camera and harness.

3. Attach the cameras to the vehicle using tape or temporary adhesive.
Determining Camera Locations

When installing the cameras, a general rule of thumb is to have the cameras mounted in a position that is above 1/3 of the vehicle height, and as close to the centers (of each side) as possible, without any obstructions. Ideally, it is recommended to mount the cameras as high as possible. However, this does not work for every vehicle.

To help illustrate this, it's important to understand that the cameras have a 148° vertical field of view.

Notice that in the above diagram, the camera is placed at the top of the vehicle. While it is optimal to place the camera as high as possible, this position would not work because the top and the hood of the vehicle are obstructing the camera. In this scenario, it would be better to mount the camera on the front grill or in a similar position that is above 1/3 of the vehicle’s height.
For smaller vehicles like cars and vans, mounting the camera high on each side can sometimes result in undesired shadows from the mirrors. In these cases, you might need to lower the cameras below the mirror line.

In a vehicle with a flat front profile (like a fire truck or transit bus), mounting it high and center is (often) optimal. Ultimately, as long as the camera can see the ground (on all sides of the vehicle) without obstruction, then it’s in a good mounting location.

Keep in mind that large bumpers or accessories like snow plows and winches can obstruct the camera view. This is why it’s important to always soft-mount and calibrate before securing the cameras. If there’s an obstruction, move the camera and calibrate again to see if the obstruction disappears from the image.
Once you’ve determined your camera mounting locations, hold the cameras in position (with tape or temporary adhesive), and perform a calibration. To learn about the calibration process, download a copy of the inView 360 Calibration Guide from the FRC inView 360 Fusion website page. (Please see the links on the left side of this website page for both the Installation and Calibration guides.)

**Hard-Mounting Cameras**

If you’re happy with the calibration images, then you can begin hard-mounting the cameras to the vehicle. To do this:

1. Use the supplied camera drill templates to mark the drill holes. Ensure that the template is placed in the right direction.

![Template Image]

2. Drill the holes and remove the template.
3. Feed the camera cord through the center hole.
4. Remove the adhesive from the back of the camera bracket and place it on the vehicle surface. Align to the drilled holes.
5. Remove the adhesive on the camera lens.
6. Place the cover over the camera.
7. Fasten the cover to the vehicle with the two black screws.
8. Cover the screws with the black round adhesive screw covers.

![Screw Cover Image]

9. Seal the camera base with waterproof caulk.
10. Inside the vehicle, connect the camera to the extension cable, then to the appropriate connector on the video harness.
11. Repeat for each camera.
Test and Calibrate

Once you've installed the cameras, you'll need to do a final function test to ensure that the installation was successful.

1. Power up the system and verify that the monitor turns on.

2. Using the driver button, cycle between the different camera views. Each time you click the button, the view should change. You should have views for the following:
   - 360 + Front
   - 360 + Right
   - 360 + Rear
   - 360 + Left
   - Full Front
   - Full Rear

3. Repeat calibration if there are issues with the images.
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Support Information

Contacting FRC (Fire Research Corporation)

FRC Customer Service and Product Support:

(8am to 5pm EST weekdays)

- Main Phone: 631.724.8888
- Fax: 631.360.9727 (24 hours)
- Website: Contact FRC

If your 360 Fusion system needs to be returned, please contact FRC Technical Support, and provide the model and/or serial number of your unit. Ask for a Return Merchandise Authorization (RMA) number. An RMA number allows the Service Technicians to better track your product when it comes in for service. Please show the RMA number on the outside of the package. ANY RETURNED PRODUCT WITHOUT AN RMA NUMBER MAY BE REFUSED.

Product Information

For product information and documentation related to the 360 Fusion system, please visit the inView 360 Fusion product page on the FRC Website.

Or, for additional information, you may wish to visit Safe Fleet Community’s 360 Fusion product page. Please contact FRC Service for the username and password to this online help community website.

Warranty

Complete warranty details are available online on the FRC Limited Warranty Page.