

MEITRACK A91 Passenger Flow Sensor User Guide



Applicable Model: T366G

Change History




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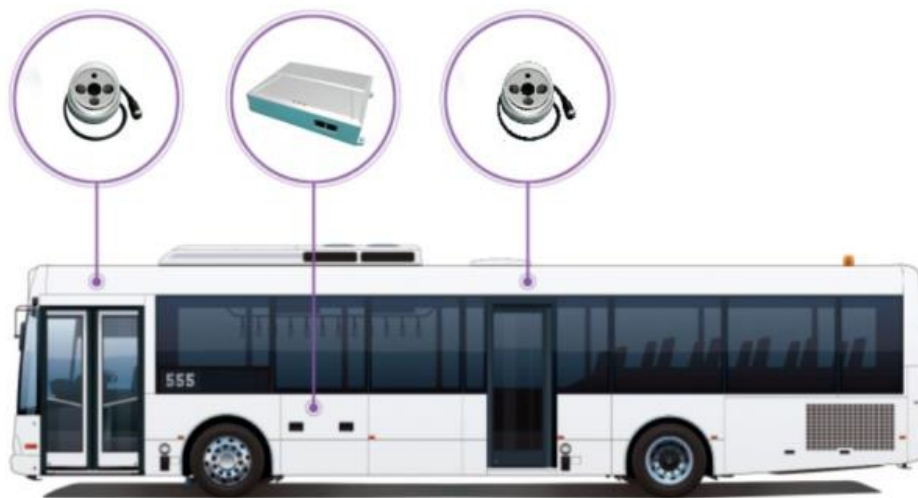
2 Product Introduction

2.1 Product Functions





- Count the number of passengers entering or leaving a vehicle from the front or back door
- Count the total number of passengers entering or leaving a vehicle from the front or back door
- Count the number of remaining passengers inside a vehicle
- Front/back door camera occlusion alert
- Front/back door camera recovery alert
- Front/back door camera abnormal alert (camera disconnected)
- Front/back door camera normal alert (camera connection normal)




2.2 Function Description

Based on the machine vision technology, the A91 passenger flow sensor collects passengers' head and shoulder information by the non-contact model and automotive image sensor. After receiving a door opening signal, the passenger counter starts to count the number of passengers entering and leaving a vehicle by the pattern recognition technology. After the doors are closed, the T366G vehicle tracker will upload the number of passengers and positioning information to the back-end server and platform, which implements statistical analysis of the number of passengers at each station and along each driving route, and provides accurate data for the route configuration and vehicle dispatching. The unit can be installed into buses, subways, trains, ships, shopping malls and buildings.



3 Main Device and Accessories

Name	Quantity	Picture
Passenger counter	1	
Camera	2	
Main wire harness	1	
Power cable	1	

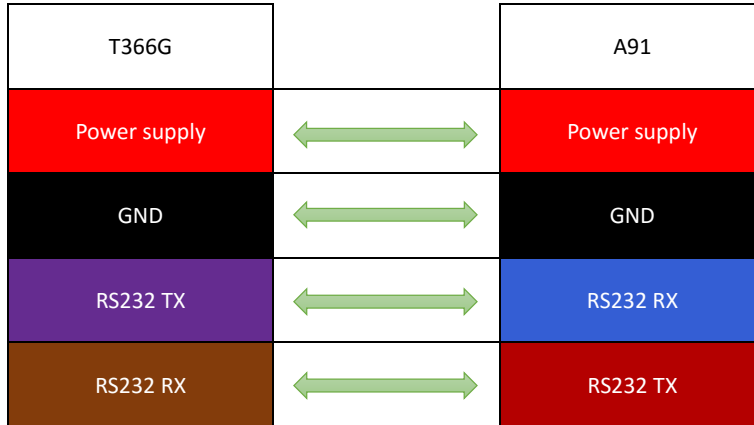
Door opening and closing signal cable	2	
Extension cable with 4-pin aviation connectors (15 meters)	2	
Extension cable with 4-pin aviation connectors (8 meters)	2	

4 Product Specifications

Item	Description
Passenger counter weight	600g
Passenger counter dimension	200.3 mm x 146.5 mm x 41.3 mm
Passenger counter voltage	9–36 V DC (recommended: 24 V)
Passenger counter current	300 mA
Passenger counter power	7.56 W (input voltage: 24 V)
Camera dimension	38 mm x 38 mm
Camera voltage	12 V
Camera current	40 mA (day); 140 mA (night)
Camera power	0.84 W (day); 3.24 W (night)
Operating temperature	-40°C to 85°C
Operating humidity	0%–95%
Baud rate	115200 bps
Passenger flow speed	< 10 m/s (If the speed is lower than 2 m/s, the accuracy is higher.)
Counting accuracy	92%

5 Installation

5.1 Connecting the A91 to the T366G



5.2 Installing the A91

5.2.1 Installing the Passenger Counter

The installation location varies depending on vehicle types. It is recommended that the passenger counter should be installed behind the driver's seat, be kept away from the humid environment, and be placed in an iron cabinet to prevent unauthorized personnel from touching it. In addition, the counter needs to be connected to the main wire

Rear view of the passenger counter:



Note: At present, we can use the power interface and main wire harness interface of the passenger counter, while other interfaces are reserved.

The passenger counter needs to be connected to the 12 V/24 V DC power supply and connected to the cameras, vehicle doors and T366G's RS232 interface by the main wire harness (labelled with wiring instructions). When the counter detects that a vehicle door is open, it will start counting. When the counter detects that a vehicle door is closed, it will stop counting and upload statistical results to the server. The following table describes the DC power cable and main wire harness:

Interface	Wiring	Description
-----------	--------	-------------

DC power cable	Power cable (red)	The input voltage is 12 V or 24 V. It is used to supply power to the A91.
	GND (black)	Connect to the GND wire.
	ACC (yellow)	Connect to the ACC cable. When the passenger counter detects that the ACC is off, there is a delay of five minutes and it will automatically enter the sleep mode. When the ACC is on, it will enter working mode again, which ensures counting accuracy and reduces power consumption.
Main wire harness	Camera (front door)	Connect to the camera at the front door through the extension cable with 4-pin aviation connectors (8 meters).
	Camera (back door)	Connect to the camera at the back door through the extension cable with 4-pin aviation connectors (15 meters).
	Front door opening and closing signal cable	Connect to the front door opening and closing signal cable through the extension cable with 4-pin aviation connectors (8 meters).
	Back door opening and closing signal cable	Connect to the back door opening and closing signal cable through the extension cable with 4-pin aviation connectors (15 meters).
	RS232 peripheral	Connect to the TX (red), RX (blue) and GND (black) interfaces of the T366G.
	RS485 peripheral	Reserved

5.2.2 Installing Extension Cables

Extension cables are used to connect cameras to the passenger counter, and the door opening and closing signal cable to the passenger counter.

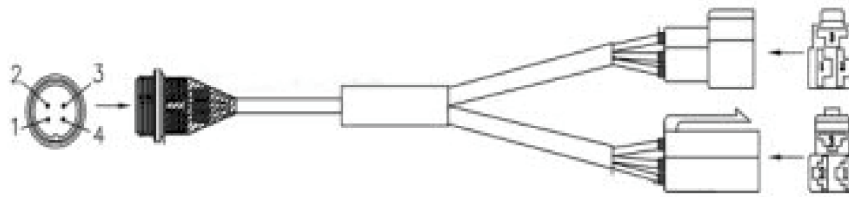
It is recommended that concealed wiring should be done, for example, through the vehicle's ventilation pipes. Do not expose extension cables to the outside. The ventilation pipes of each door have a set of extension cables. One of the extension cables is connected to cameras, and the other is connected to the door opening and closing signal cable. Extension cables are labelled with wiring instructions to avoid wrong wiring.



5.2.3 Installing the Door Opening and Closing Signal Cable

Install the 3-pin door opening and closing signal cable listed in the accessories. The pin definitions are shown in the following figure:

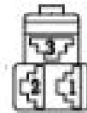
Door opening and closing signal cable with 2 connectors



Pin Number	Pin Definition	Remarks
1		
2	GND	
3	Open the door	
4	Close the door	



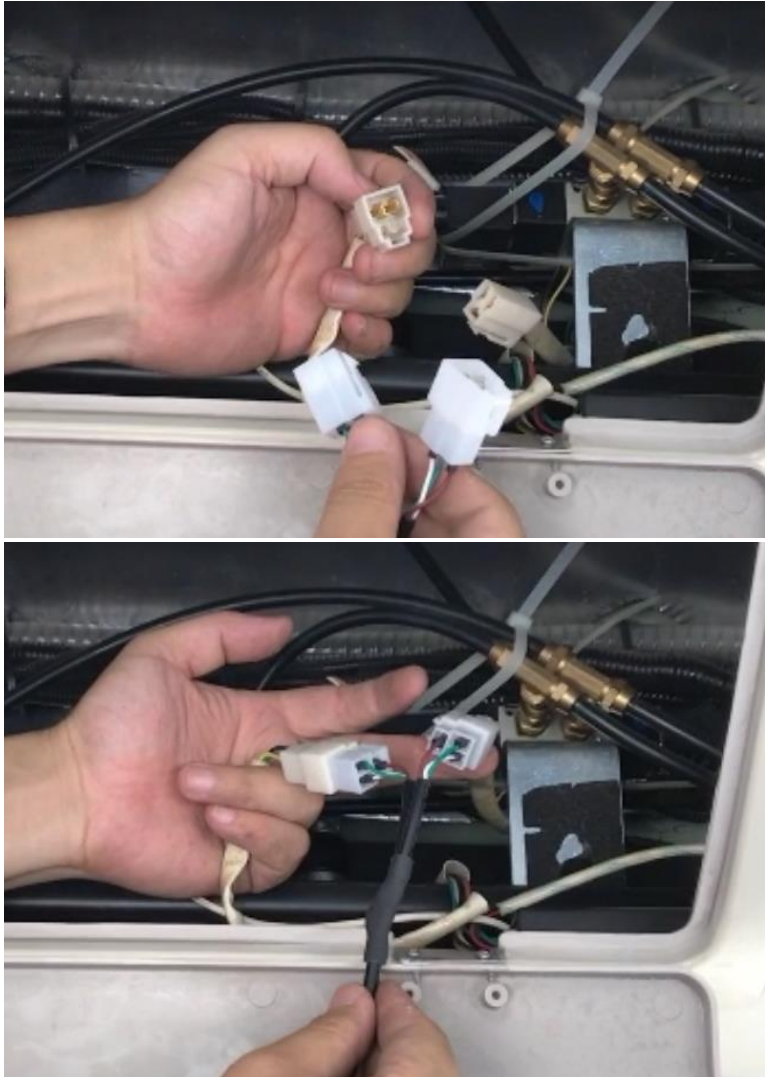
Pin Number	Pin Definition	Remarks
1	Open the door	White
2	Close the door	Green
3	GND	Brown



Pin Number	Pin Definition	Remarks
1	Open the door	White
2	Close the door	Green
3	GND	Brown

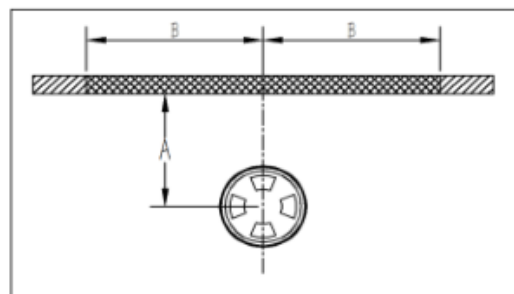
The opening and closing of most vehicles' doors are controlled by an air valve. The control cable of the air valve has three pins, that is, opening the door, closing the door, and GND, which correspond to the three pins of the door opening and closing signal cable. Pull out the 3-pin connector of the air valve control cable, and connect the male and female connectors on both ends of the cable to the male and female connectors on the door opening and closing signal cable, as shown in the following figure:





5.2.4 Installing Cameras

Each camera needs to be installed at the front and back doors. The distance that cameras are above the ground of the vehicle is about 2.2 meters. Meanwhile, the cameras need to be installed in the middle of the upper part of the doors and are about 0.5 meters away from the glass door ($A \approx 0.5$ meters, as shown in the following figure).





Drill four holes 3.0 mm in diameter on the cameras, and fasten the camera base by using self-tapping screws 4.0 mm in diameter. Do not expose the camera cable to the outside. Adjust the cameras facing downwards and the light sensor facing towards the inside of the vehicle.



5.2.5 Installing All Parts

Connect all parts mentioned in the section 5.2 to the passenger counter, as shown in the following figure.



6 A91 Debugging

6.1 A91 Running Status

Red LED Indicator	
Steady on	The A91 is connected to an external power supply.
Off	The A91 is disconnected from an external power supply or enters the sleep mode.
Yellow LED Indicator	
Blink	The A91 is being started.
Steady on	The A91 is started.
Off	The A91 is disconnected from an external power supply or enters the sleep mode.
Green LED Indicator	
Blink	The ACC is on.
Off	The ACC is off.

Before the A91 is powered on, its red, green, and yellow LED indicators are off. After the A91 is powered on, the red LED indicator is on, and green and yellow LED indicators are off. After it is connected to the ACC cable, the red LED indicator is on, and green and yellow LED indicators blink. Wait for one minute, then red and yellow LED indicators are continually on, and the green LED indicator blinks. After the ACC cable is disconnected from the A91, the green LED indicator is off, and red and yellow LED indicators are continually on. Wait for five minutes, then cameras are turned off. After 15 minutes, all LED indicators are off, and the A91 will enter the sleep mode.

Note: If the three LED indicators of the A91 are continually off (not lit), it means that the A91 is not powered on. Please check the power supply wiring.

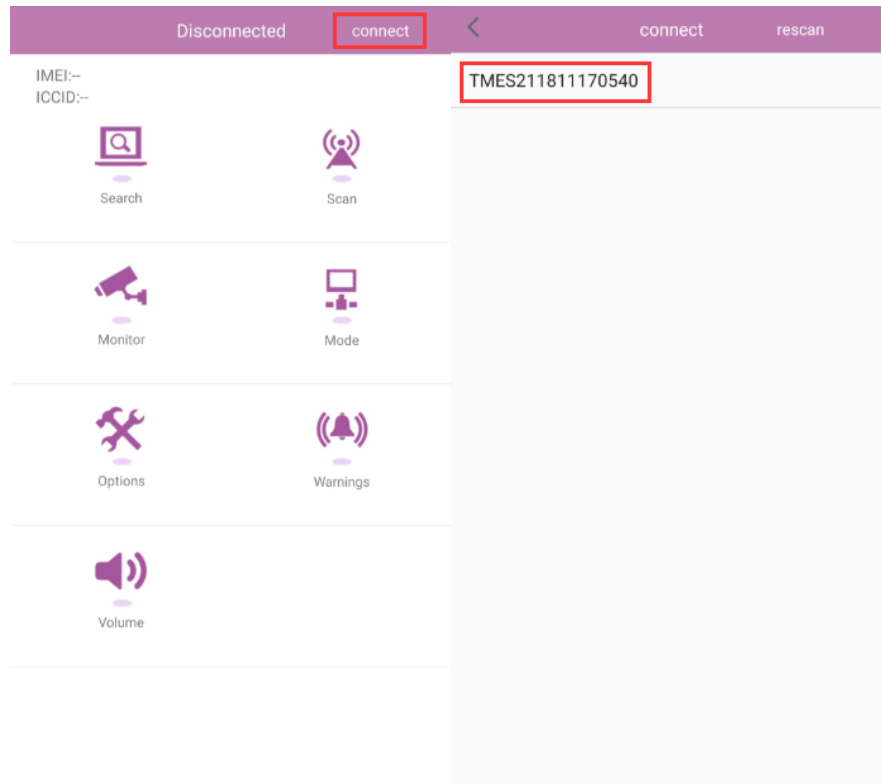
6.2 APC Assistant Debugging Tool

Device configuration requirement: Android phone with the WiFi function

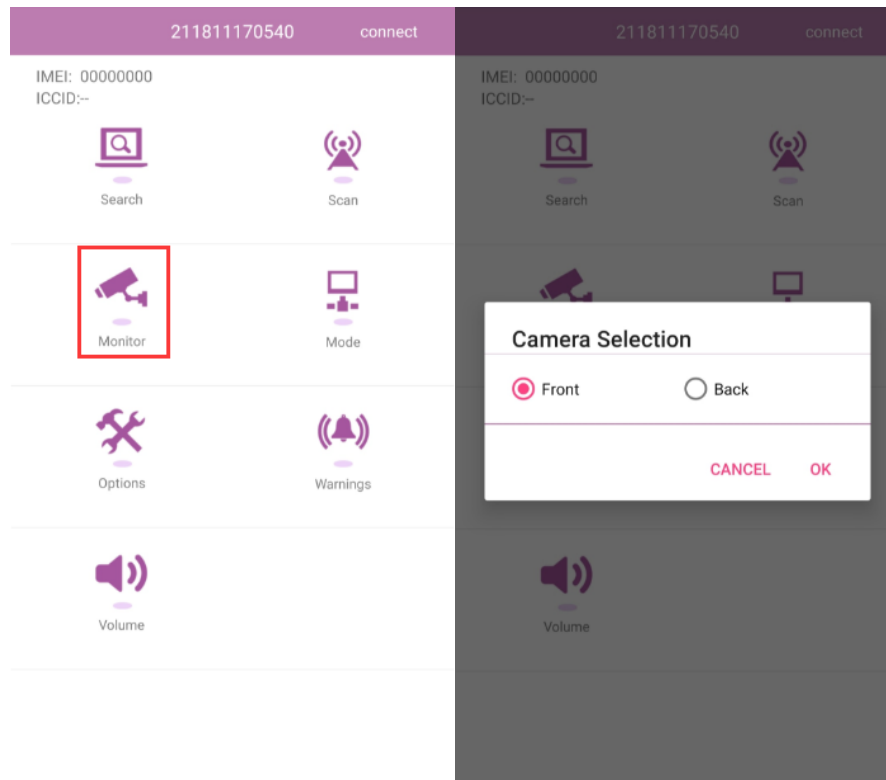
A91 working status: The passenger counter is connected to related cables and accessories, and ensure the A91 works normally.

Perform the following operations to obtain images:

1. After the device is powered on for about one minute, the WiFi function will be enabled automatically. (By default, the WiFi function will be disabled automatically after the program operates for two minutes.)
2. Click **Connect** in the upper right corner, and select related device number.



3. After the connection is successful, the app will jump back to the main page automatically. Click **Monitor**. Then you can obtain images from the cameras at the front and back doors to debug the device.

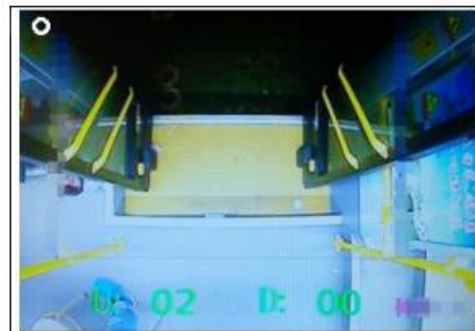


6.3 Adjusting the Angle of Cameras

If the device runs normally, there will be images on the app. As shown in the following figures, the vehicle door is in the upper part of the image, and the interior of the vehicle is in the lower part of the image.



When all images are normal, adjust the angle of cameras. Press the door opening and closing buttons near the driver to open the front and back doors. Then a white circle will appear in the upper left corner of the app screen. Adjust the installation location of cameras.



After the angle of cameras is adjusted, press the door opening and closing buttons near the driver to close the front and back doors. Wait for 5–10 seconds, and then the white circle in the upper left corner of the app screen will disappear. If the white circle disappears successfully, it means that the system can obtain door opening and closing signals. If not, it means that the system fails to obtain door opening and closing signals.

7 Configuring the A91 on Meitrack Manager

7.1 Selecting a Peripheral

On the **Peripheral** tab page, set **RS232 EXT** to **Customized** and **Baud Rate** to **115200**.

Peripheral

RS232 EXT Setting

7.2 Setting the GPRS Event

The People Counter event is selected by default. When the A91 detects a vehicle door is closed, it will send a GPRS

event to the platform.

Authorize							
Event	SMS Header	Setting	SMS		Call		GPRS
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fuel Filling	Fuel Filling		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ult-Sensor Drop	Ult-Sensor Drop		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sharp Turn to Left	Harsh Cornering	...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sharp Turn to Right	Harsh Cornering	...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Output 1 Active	Out1 Active		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Output 2 Active	Out2 Active		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Output 1 Inactive	Out1 Inactive		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Output 2 Inactive	Out2 Inactive		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People Counter							<input checked="" type="checkbox"/>
Harsh Braking	Harsh Braking	...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8 Clearing the Counter

8.1 Clearing Method

There are three clearing methods:

1. Restart the T366G. Then the counter will be cleared.
2. Send the BAE command to clear the counter.
3. Send the BAE command to clear the counter at the specific time every day (default time: 24:00). You can set the time by the BAE command. Before sending the command, you need to set the device's GPRS time zone by Meitrack Manager software or B36 command.

8.2 Setting A91 Parameters – BAE

Sending: BAE,A,B

Reply: BAE,OK/<Error code>

Description:

1. Decimal
2. **A**: Select a function.
 - **0**: Clear the total number of passengers entering and leaving a vehicle.
 - **1**: Set daily timing clearing for the total number of passengers entering and leaving a vehicle.
 - **2**: Read door status information.

B: indicates the parameter value. You only need to set the parameter value for function 1. Value range: 0–23.
3. After the command with function 2 is sent and read successfully, **c,d** will be received.

c: indicates the front door status. **d**: indicates the back door status. (**1**: Open the door; **0**: Close the door)
4. If you want to obtain timing clearing parameters, send **BAE**.

Example:

Sending: @@\28, 353358017784062,0BAE,0*3B\r\n

Reply: @@\28,353358017784062,BAE,OK*3D\r\n

The command on the MS03 platform:

T366G_9050 ⊞ ⊞ ⊞

Search key eg : GPRS,fences,A10 ...

Command:

Select roaming table:

Select a function:

Clear the total number of people getting on and off the vehicle

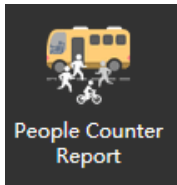
Set daily timing clearing for the total number of people getting on and off the vehicle

Read door status information

9 Querying Reports from the MS03 Platform

9.1 Querying Passenger Counter Reports

To view alert statistics information during different time periods, choose **Reports**, and click **People Counter Report**.



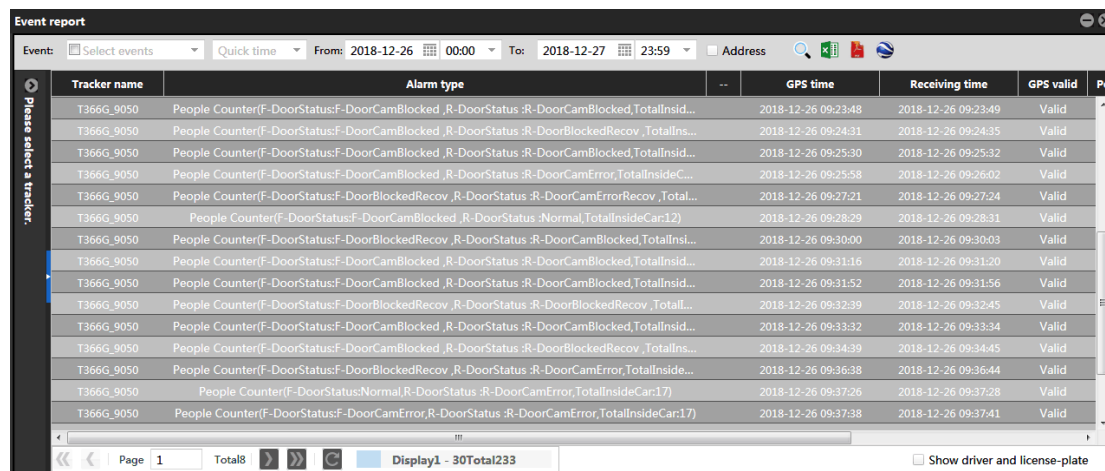
When a vehicle door is closed, a piece of data will be uploaded to the platform.

People Counter Report											
Quick time From: 2018-12-26 00:00 To: 2019-01-27 23:59 Address											
Tracker name	GPS time	Position	Total Inside Th	Front Door		Rear Door		Total Thru Front Door		Total Thru Rear Door	
				Up	Down	Up	Down	Up	Down	Up	Down
T366G_9050	2018-12-26 09:19:45		4	1	0	1	0	3	1	2	
T366G_9050	2018-12-26 09:20:21		6	2	0	0	0	5	1	2	
T366G_9050	2018-12-26 09:22:34		7	0	0	1	0	5	1	3	
T366G_9050	2018-12-26 09:23:01		8	0	0	1	0	5	1	4	
T366G_9050	2018-12-26 09:23:48		8	0	0	0	0	5	1	4	
T366G_9050	2018-12-26 09:24:31		8	0	0	0	0	5	1	4	
T366G_9050	2018-12-26 09:25:30		8	0	0	0	0	5	1	4	
T366G_9050	2018-12-26 09:25:58		8	0	0	0	0	5	1	4	
T366G_9050	2018-12-26 09:27:21		12	2	0	2	0	7	1	6	
T366G_9050	2018-12-26 09:28:29		12	0	0	0	0	7	1	6	
T366G_9050	2018-12-26 09:30:00		14	2	0	0	0	9	1	6	
T366G_9050	2018-12-26 09:31:16		14	0	0	0	0	9	1	6	
T366G_9050	2018-12-26 09:31:52		14	0	0	0	0	9	1	6	
T366G_9050	2018-12-26 09:32:39		15	1	0	0	0	10	1	6	

9.2 Querying Alert Reports

To view all alert events detected by the A91, choose **Reports**, and click **Event Report**. The alert events are as follows:

1. Front/back door camera occlusion alert
2. Front/back door camera recovery alert
3. Front/back door camera abnormal alert (camera disconnected)
4. Front/back door camera normal alert (camera connection normal)



The screenshot shows the 'Event report' window with a table of alert events. The table has columns for Tracker name, Alarm type, GPS time, Receiving time, GPS valid, and Po. The data is filtered for tracker T366G_9050 and shows various camera-related alerts from 2018-12-26 09:23:48 to 2018-12-26 09:37:38.

Tracker name	Alarm type	GPS time	Receiving time	GPS valid	Po
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorCamBlocked,TotalInsid...	2018-12-26 09:23:48	2018-12-26 09:23:49	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorBlockedRecov ,TotalIns...	2018-12-26 09:24:31	2018-12-26 09:24:35	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorCamBlocked,TotalInsid...	2018-12-26 09:25:30	2018-12-26 09:25:32	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorCamError,TotalInsideC...	2018-12-26 09:25:58	2018-12-26 09:26:02	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorBlockedRecov ,R-DoorStatus :R-DoorCamErrorRecov ,Total...	2018-12-26 09:27:21	2018-12-26 09:27:24	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :Normal,TotalInsideCar:12)	2018-12-26 09:28:29	2018-12-26 09:28:31	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorBlockedRecov ,R-DoorStatus :R-DoorCamBlocked,TotalInsid...	2018-12-26 09:30:00	2018-12-26 09:30:03	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorCamBlocked,TotalInsid...	2018-12-26 09:31:16	2018-12-26 09:31:20	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorCamBlocked,TotalInsid...	2018-12-26 09:31:52	2018-12-26 09:31:56	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorBlockedRecov ,R-DoorStatus :R-DoorBlockedRecov ,Total...	2018-12-26 09:32:39	2018-12-26 09:32:45	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorCamBlocked,TotalInsid...	2018-12-26 09:33:32	2018-12-26 09:33:34	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamBlocked ,R-DoorStatus :R-DoorBlockedRecov ,TotalIns...	2018-12-26 09:34:39	2018-12-26 09:34:45	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorBlockedRecov ,R-DoorStatus :R-DoorCamError,TotalInside...	2018-12-26 09:36:38	2018-12-26 09:36:44	Valid	
T366G_9050	People Counter(F-DoorStatus:Normal,R-DoorStatus :R-DoorCamError,TotalInsideCar:17)	2018-12-26 09:37:26	2018-12-26 09:37:28	Valid	
T366G_9050	People Counter(F-DoorStatus:F-DoorCamError,R-DoorStatus :R-DoorCamError,TotalInsideCar:17)	2018-12-26 09:37:38	2018-12-26 09:37:41	Valid	

10 GPRS Protocol About A91 on T366G

\$\$<Data identifier><Data length>,<IMEI>,<Command type>,<Event code>,<(-)Latitude>,<(-)Longitude>,<Date and time>,<Positioning status>,<Number of satellites>,<GSM signal strength>,<Speed>,<Direction>,<Horizontal dilution of precision (HDOP)>,<Altitude>,<Mileage>,<Run time>,<Base station info>,<I/O port status>,<Analog input value>,<**A91 Info(Assisted event info)**>,<Customized data>,<Protocol version>,<Fuel percentage>,<Temperature sensor 1 value|Temperature sensor 2 value|.....Temperature sensor n value>,<Max acceleration value>,<Max deceleration value>,<*Checksum>\r\n

Note:

- For detailed protocol out of A91 Info, please refer to MEITRACK_T366G_GPRS_Protocol
- A91(Passenger Flower Sensor) info only appears when Event code is 117
- A comma (,) is used to separate data characters. The character type is the American Standard Code for Information Interchange (ASCII). (Hexadecimal is represented as 0x2C.)
- Symbols "<" and ">" will not be present in actual data, only for documentation purpose only.
- All multi-byte data complies with the following rule: High bytes are prior to low bytes.
- The size of a GPRS data packet is about 160 bytes.

Descriptions about A91 info from the tracker are as follows:

Event	Description	Example
Passenger flow alert (event code 117). For detailed protocol out of A91 Info, please refer to MEITRACK_T366G_GPRS_Protocol	A91, Passenger flow alert Format:A B C D E F G H I J K L , Hexadecimal A: indicates the A91 version. The parameter value is 01 B: indicates the state of front door. <ul style="list-style-type: none"> • 00: normal • 01: Front door camera occlusion alert • 02: Front door camera recovery alert • 03: Front door camera abnormal alert (camera disconnected) • 04: Front door camera normal alert (camera connection normal) C: indicates the number of passengers entering a vehicle from the front door 0001: the number of passengers entering a vehicle is 1 D: indicates the number of passengers leaving a vehicle from the front door 0001: the number of passengers leaving a vehicle is 1 E: indicates the total number of passengers entering a vehicle from the front door 0002: the number of passengers entering a vehicle is 2 F: indicates the total number of passengers leaving a vehicle from the front door 0002: the number of passengers leaving a vehicle is 2 G: indicates the state of back door 00: normal	01 00 0002 0001 000 2 0001 01 0000 0000 0000 0000 0001 indicates : Version 01 The state of the front door is normal The number of passengers entering a vehicle from the front door is 2 The number of passengers leaving a vehicle from the front door is 1 The total number of passengers entering a vehicle from the front door is 2 The total number of passengers leaving a vehicle from the front door is 1 Back door camera occlusion alert The number of passengers entering a vehicle from the back

	<ul style="list-style-type: none"> • 01: back door camera occlusion alert • 02: back door camera recovery alert • 03: back door camera abnormal alert (camera disconnected) • 04: back door camera normal alert (camera connection normal) <p>H: indicates the number of passengers entering a vehicle from the back door 0001: the number of passengers entering a vehicle is 1</p> <p>I: indicates the number of passengers leaving a vehicle from the back door 0001: the number of passengers leaving a vehicle is 1</p> <p>J: indicates the total number of passengers entering a vehicle from the back door 0002: the number of passengers entering a vehicle is 2</p> <p>K: indicates the total number of passengers leaving a vehicle from the back door 0002: the number of passengers leaving a vehicle is 2</p> <p>L: indicates the number of remaining passengers inside a vehicle 0002: the number of remaining passengers inside a vehicle is 2</p>	<p>door is 0 The number of passengers leaving a vehicle from the back door is 0 The total number of passengers entering a vehicle from the back door is 0 The total number of passengers entering a vehicle from the back door is 0 The number of remaining passengers inside a vehicle is 1</p>
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If you have any questions, do not hesitate to email us at info@meitrack.com.