

HESAI

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PandarView 2

Point Cloud
Visualization Software
User Manual

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■ About this manual

Please make sure to read through this user manual before your first use and follow the instructions herein when you operate the product. Failure to comply with the instructions may result in product damage, property loss, personal injuries, and/or a breach of warranty.

Access to this manual

To obtain the latest version, please do one of the following:

- Visit the Download page of Hesai's official website: <https://www.hesaitech.com/downloads/>
- Contact your sales representative of Hesai.
- Contact Hesai technical support at service@hesaitech.com.

Technical support

If your question is not addressed in this user manual, please contact us at:

- service@hesaitech.com
- <https://www.hesaitech.com/technical-support/>
- <https://github.com/HesaiTechnology>

Legends and format



Warnings: Instructions that must be followed to ensure safe and proper use of the product.



Notes: Additional information that may be helpful.

Names of data fields are in monospace font.

For example: **Distance** represents the Distance field.

1 Introduction

PandarView 2 is a second-generation software that displays and records point cloud data from Hesai lidars, available in:

- 64-bit Windows 10/11
- Ubuntu 20.04/22.04/24.04

Current software version: **2.1.9**

Supported product models:

Pandar	OT	QT	XT	AT	FT	JT
Pandar40	OT128	PandarQT	PandarXT	AT128P	FT120	JT16
Pandar40P		QT128C2X	PandarXT-16	ATX	FTX_140	JT32
Pandar64			XT32M2X		FTX_180	JT128
Pandar128E3X						

1.1 Installation

1. Download the installation package from <https://www.hesaitech.com/en/download>
2. Install PandarView 2.



In Ubuntu, run "PandarView.sh" in a file path that only contains ASCII characters.

3. Turn off the computer's firewall for public networks, or add PandarView 2 to firewall exceptions.

1.2 User interface

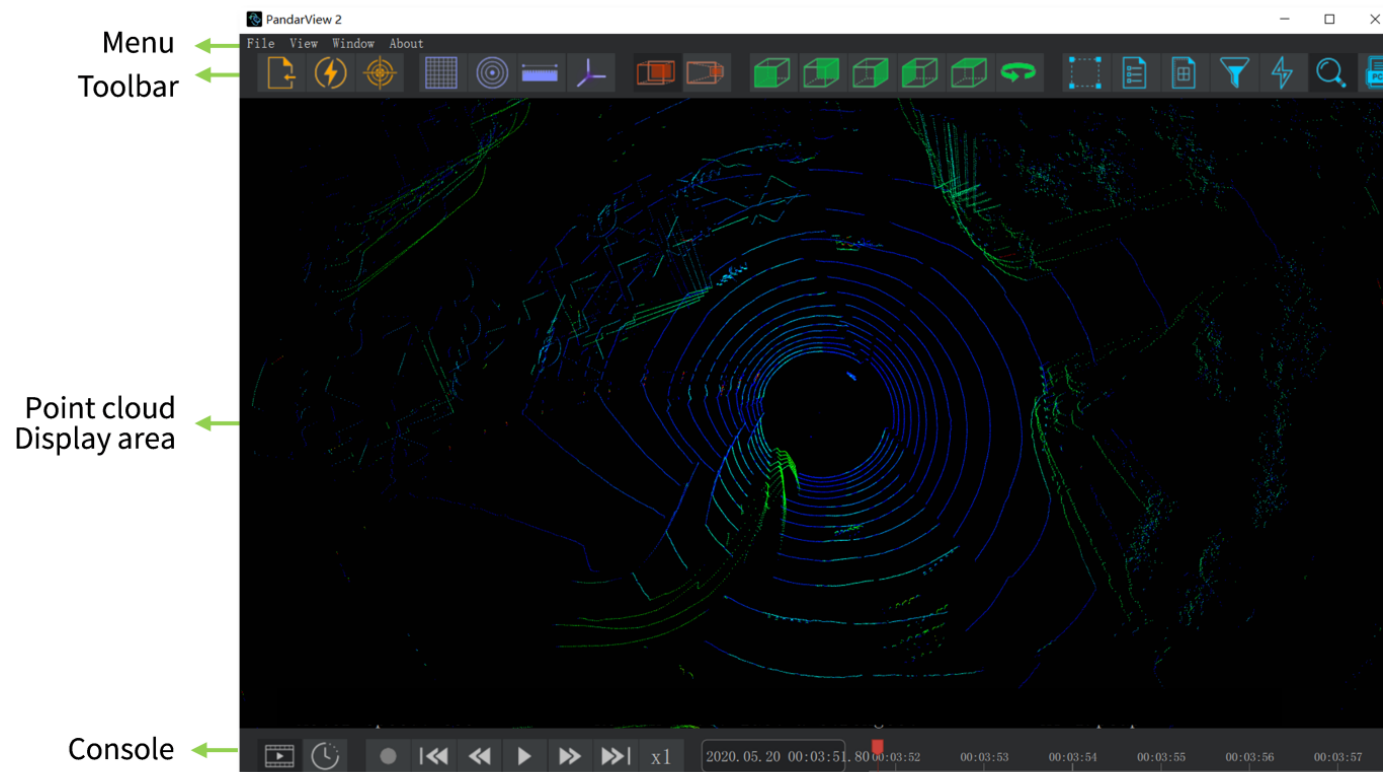


Figure 1. User interface



- User interface can be different for each product model.
- Click [**About**] in the menu bar to find the software version.

2 View live point cloud

2.1 Cybersecurity settings

For the product models supporting cybersecurity, select one of these modes:

Cybersecurity OFF

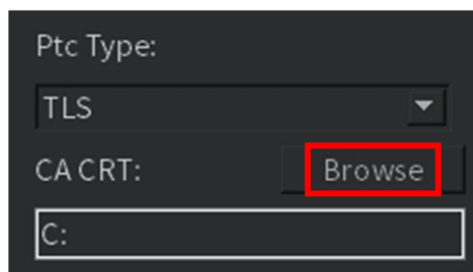
PandarView 2 obtains the lidar unit's correction files using PTC commands.

Security page of web control	Turn OFF the Cyber Security Master Switch.
PandarView 2	- Click the [Listen for Data]  button in the toolbar. - For PTC Type, select Non-TLS.

TLS mode

PandarView 2 obtains the lidar unit's correction files using PTCS (PTC over TLS) commands.

Security page of web control	- Turn ON the Cyber Security Master Switch. - For PTC Connection, select TLS.
PandarView 2	- Click the [Listen for Data]  button in the toolbar. - For PTC Type, select TLS. - Click the [CA CRT] button and specify the file path to Hesai's CA certificate chain (Hesai_Ca_Chain.crt).



mTLS mode

PandarView 2 obtains the lidar unit's correction files using PTCS commands.

Security page of web control	• Turn ON the Cyber Security Master Switch. • For PTC Connection, select mTLS. • Upload user CA certificate chain.
PandarView 2	• Click the [Listen for Data] ⚡ button in the toolbar. • For PTC Type, select mTLS. • Click the [Browse] button for CA CRT; specify the file path of Hesai CA certificate chain (Hesai_Ca_Chain.crt). • Click the [Browse] button for Client CRT; specify the file path of user end-entity certificate. • Click the [Browse] button for RSA Key; specify the file path of the user private key (corresponding to user end-entity certificate).

2.2 Network settings

1. Perform *Network settings on the host computer* in the lidar's User Manual.
2. Click [**Listen for Data**]  in the toolbar and set the network parameters.

If the connection fails, try the following steps:



- For Ethernet communication, ensure the network address of the host computer is correctly configured.
- Ensure the lidar connectors are properly connected.
- Ensure the lidar, adapter, cables, and connection box are intact.
- Turn off the firewall of the domain, private, and public networks, or add PandarView 2 to firewall exceptions.



Your settings are saved in **Documents\PandarViewDataFiles\RecvSettings.ini**.
This file is automatically loaded when PandarView 2 starts.

2.2.1 Ethernet communication

Source Type	Select Listen Net.
UDP Port	Destination port for point cloud data packets
PTC Port (optional)	Destination port for PTC API communication  With PTC API communication enabled, the followings are available: • Lidar's angle correction file when viewing live data. See Section 4.1 Point cloud correction. • Lidar's firetime correction file when viewing live data. See Section 4.1 Point cloud correction (for certain models).

Host PTC Port (optional)	In PTC API communication, if the host port number is specified, fill it in here.  • Port number must not be 0. • If the Host PTC Port is already configured and listening (i.e., a point cloud track of type "Listen Net" exists), right-click to delete the track before listening again or modifying the Host PTC Port configuration.
Fault Message Port (optional)	Destination port for fault message packets  • By specifying the Fault Message Port, users can check fault information. • If the Fault Message Port is the same as the UDP Port, this field is not required.
Multicast IP (optional)	Multicast IP In multicast mode, check this checkbox and input the lidar's destination IP to join the specified multicast group. Range: 224.0.0.0 to 239.255.255.255  In Ubuntu, users need to configure the host's multicast static route.
Host IP (optional)	Host IP address, usually not required.
Device IP (optional)	Lidar IP address, usually not required.

Set Standby Mode (optional)	Lidar's operation mode Enter an operating-mode number so that the lidar switches to the specified mode after PTC communication is established.  Operating-mode numbers: Refer to the Get Config Info or Set Standby Mode command in the PTC API Manual of this product model. Commonly-used numbers are: 0 — Normal operation 1 — Standby
PTC Type	PTC communication mode See Section 2.1 Cybersecurity settings.
Parser Thread Num	Number of threads for multi-threaded parsing  The more threads, the higher the efficiency and frame rate of point cloud data parsing, but the more CPU resources will be occupied. Therefore, the default value (5) is recommended.

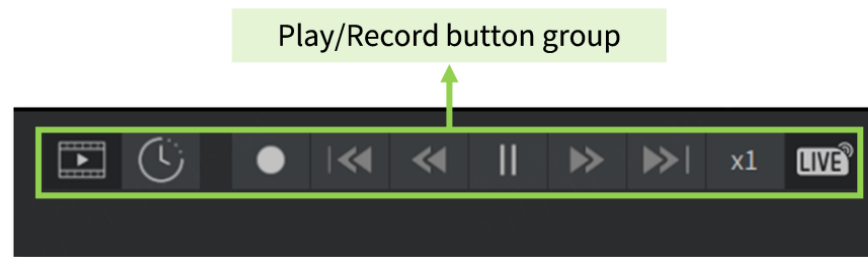
2.2.2 Serial communication

Source Type	Select Serial Port.
RS485 Serial Port	Serial port for receiving point cloud data  Common format of serial port number: • In Windows: COM[number] • In Ubuntu: /dev/ttyUSB[number] (Replace [number] with the actual number.)
UART Serial Port	Serial port for sending commands
Baud Rate	Baud rate for serial communication

Parser Thread Num	Number of threads for multi-threaded parsing See Section 2.2.1 Ethernet communication .
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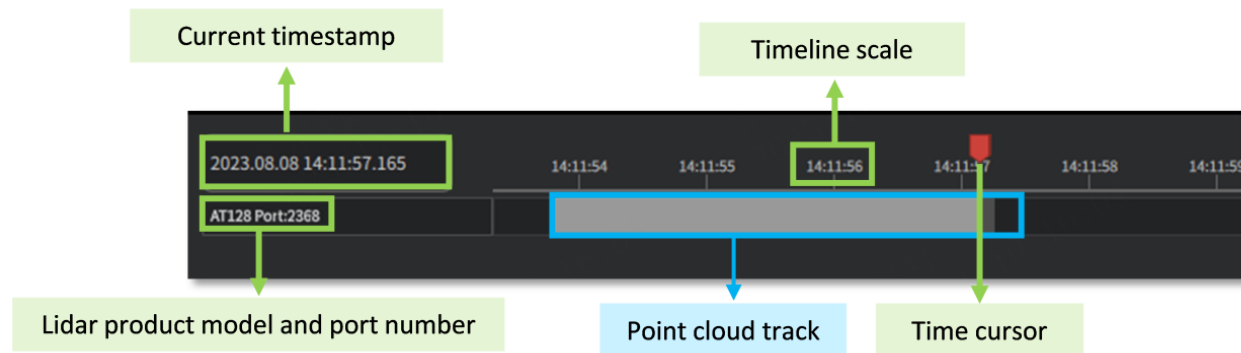
2.3 Play controls (for live streaming)

2.3.1 Button group (for live streaming)



Button	Description	Button	Description
	Start/Resume data streaming and reception.		Stop data streaming and reception.
	Record live data to a PCAP file. After clicking the button, specify a file directory and click [Save]. When naming PCAP files in Ubuntu, include the filename extension (.pcap).		
	Display the current speed.		
	Stream with minimum latency.		

2.3.2 Point cloud track (for live streaming)

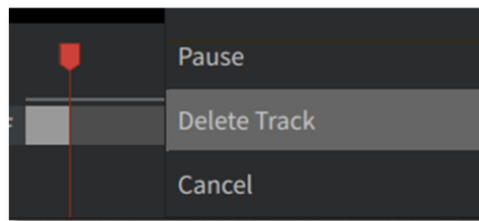


A live-data point cloud track shows the following information and settings:

Information	Description	Supported Action(s)
Current timestamp	Absolute UTC time	-
Lidar product model and port number	If not displayed in full, scroll the mouse wheel.	-
Timeline scale	-	Scroll the mouse wheel to zoom in/out.
Time cursor	-	Drag the cursor to another position, or use the ←/→ keys to move 100 ms backward/forward. <i>i</i> If the LIVE button is enabled, moving the time cursor will disable this button.

Right-click on a track to open this menu:

Pause/Start	Pause/Start the reception of new live point cloud. When paused, playback will continue using the data already received, with behavior depending on the live-streaming setting:  • If the  button is enabled, the already-received point cloud data will be played once. • If the  button is disabled, the point cloud data from the last 3.5 seconds before pausing will be played in a loop.
Delete Track	Delete this track.
Cancel	Close the menu.



3 Play back a point cloud file



Only one file at a time:

During playback, if you open another PCAP/PCD file or switch to receiving live point cloud, the previous file will be unloaded.

3.1 Load a PCAP file

Method 1

1. Click [**Listen for Data**]  in the toolbar.
2. Select "PCAP file" as the Source Type.
3. Upload a PCAP file.
4. (Optional) Upload an angle correction file.
5. (Optional) Upload a firetime file.
6. (Optional) Set the Parser Thread Num (see [Section 2.2.1 Ethernet communication](#)).

Method 2

1. Click [**Open File**]  in the toolbar.
2. Select a PCAP file.

Method 3

Drag a PCAP file into PandarView 2.



- Only tcpdump PCAP format is supported.
- For Methods 2 and 3:
 - To upload an angle correction file or a firetime file, see [angle correction](#).
 - The Parser Thread Num from the previous configuration will be used, see [Section 2.2.1 Ethernet communication](#).

After loading a PCAP file, a point cloud track will appear in the console.

3.2 Load a PCD file

1. Drag a folder with PCD file(s) into PandarView 2.

- The folder should only contain PCD file(s).
- Name the PCD file(s) in one of these formats.



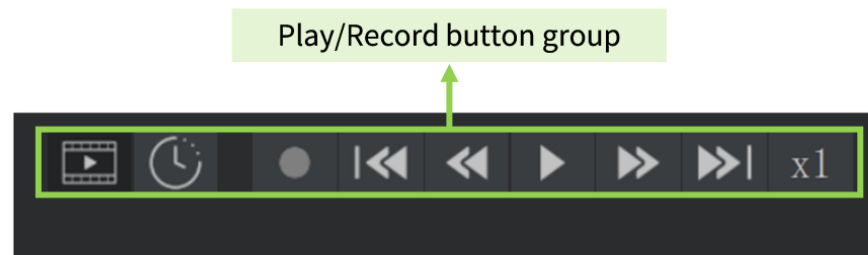
Format	Description	Example
Timestamp in seconds	The decimal point of the timestamp is the first decimal point in the filename.	107530.882.pcd
Timestamp in milliseconds	No decimal point; no other numbers except the timestamp.	107530882.pcd

2. If the PCD file(s) are in an encrypted binary format, follow these steps to prevent playback stuttering.
 - a. Click the [**Save to Data**] button in the toolbar.
 - b. Export all PCD files to .bin files in frames.
 - c. Drag the folder that contains only .bin files into PandarView 2.

After loading a PCD file, a point cloud track will appear in the console.

3.3 Play controls (for playback)

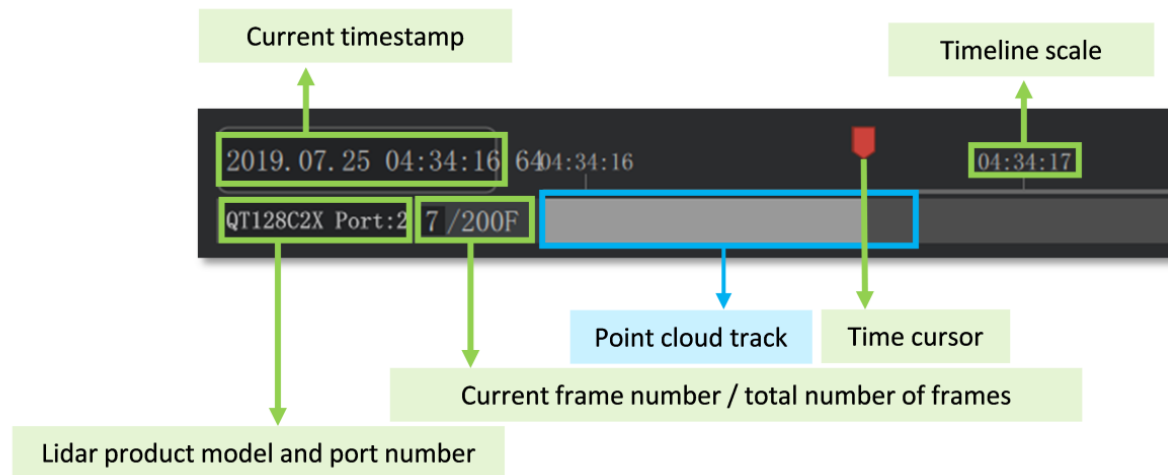
3.3.1 Button group (for playback)



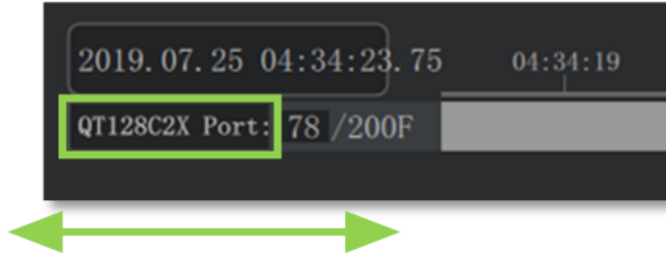
Button	Description	Button	Description
	Play by frame (default).		Play by time.
	Jump to the beginning		Jump to the end of the file.
	Lower the playback speed (1x, 1/2x, 1/4x, 1/8x, ..., 1/64x).		Raise the playback speed (1x, 2x, 4x, 8x, ..., 64x).
	After loading a file, click to play.		Pause playback.

Button	Description
	Display the current speed.
	While loading a large file, click to play at once.
 When file loading is complete, this button will disappear.	

3.3.2 Point cloud track (for playback)



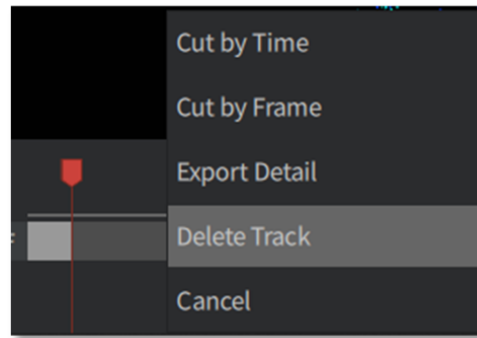
A local-file point cloud track shows the following information and settings:

Information	Description	Supported Action(s)
Current timestamp	Absolute UTC time	-
Lidar product model and port number	If not displayed in full, scroll the mouse wheel. 	-
Current frame number / total number of frames	Available only in the Play by Frame mode.	Input a frame number and jump to that frame.
Timeline scale	-	Scroll the mouse wheel to zoom in/out.
Time cursor	-	Drag the cursor to another position, or use the ←/→ keys to move 100 ms backward/forward.

Right-click on a track to open this menu:

Cut by Time	Specify the starting and end timestamps, cut the current track, and save it to a new PCAP file.
Cut by Frame	Specify the starting and end frames, cut the current track, and save it to a new PCAP file.
Export Detail	Specify the starting and end frames, and export the point cloud data to CSV files (one frame per file).  - By default, all points will be exported; to export only the specific points, click [Select]  in the toolbar to select points (see Section 5.3.5 Point selection and data table). - When naming files in Ubuntu, make sure to include the filename extension (.csv).
Delete Track	Delete this track.

Cancel	Close the menu.
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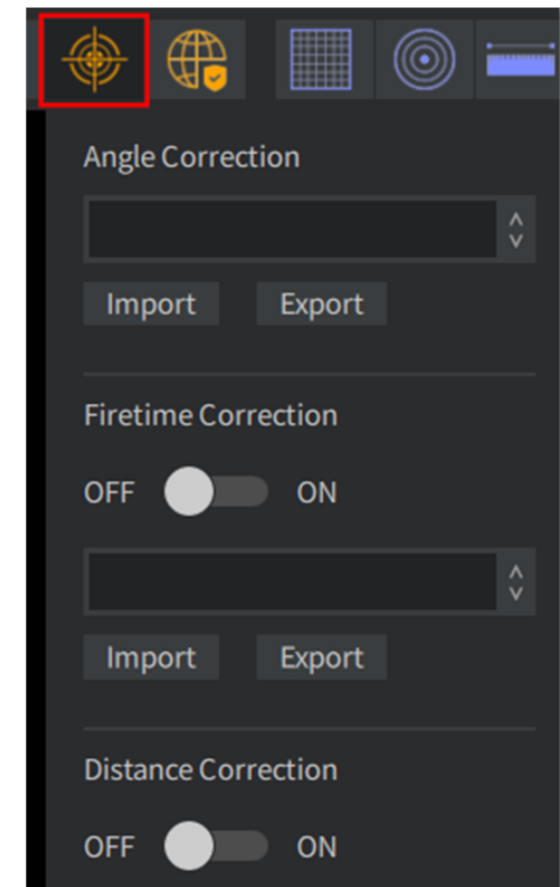
4 Correction and configuration

When viewing live point cloud or playing back recorded point cloud, correction files and configuration files may be used.

4.1 Point cloud correction

[**Correction**]  in the toolbar provides these types of correction:

Correction type	Purpose	Note
Angle correction	To correct the azimuth and elevation of each data point	Refer to the <i>Channel Distribution</i> Section in the lidar's user manual.
Firetime correction	To correct the azimuth and absolute time of each data point	Available only to certain product models.
Distance correction	To correct the distance of each data point	Available only to certain product models.



Angle correction

When viewing live data	During playback
The correction file of this lidar unit will be loaded. Correction takes effect automatically.	- The general correction file for this product model will be loaded. Correction takes effect automatically. - For the best display, click [Import] and upload the correction file of this lidar unit.

Firetime correction

Product model	When viewing live data	During playback
QT128C2X, ATX	The correction file of this lidar unit will be loaded. To begin correction, switch to [ON].	The general correction file for this product model will be loaded. To begin correction, switch to [ON].
Others	- For the best display, click [Import] and upload the correction file of this lidar unit. - If the lidar unit's correction file is not available locally, select a general correction file for this product model in the drop-down menu. To begin correction, switch to [ON].	

Distance correction

Switch to [**ON**] to begin correction.

4.2 Channel config

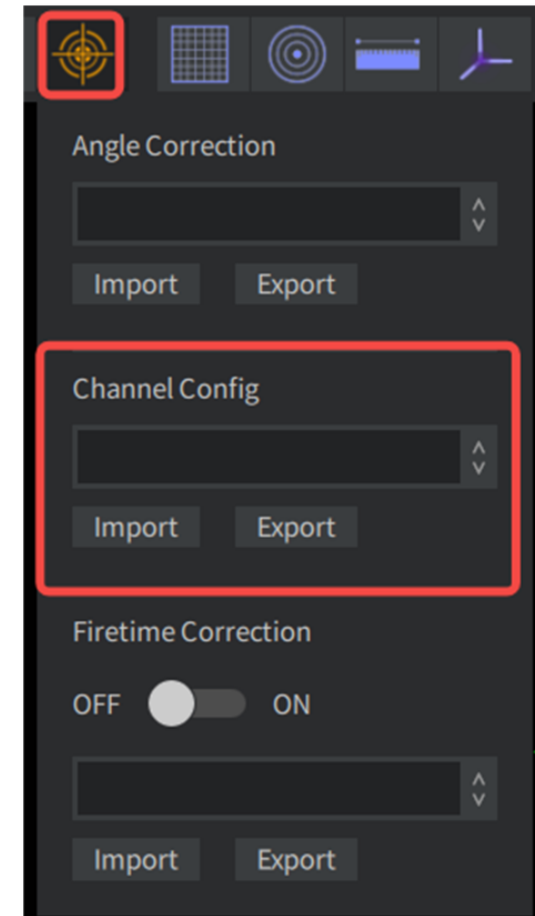
A channel config file selects a subset from all the available channels. Only the point cloud from the selected channels will be generated.



- Only available to QT128C2X.
- The channel config file also defines the number of blocks in a Point Cloud Data Packet, and specifies the channels to be stored in each block.

Channel config

When viewing live data	During playback
The channel config file of this lidar unit will be loaded. Channel config takes effect automatically.	Click [Import] and upload the channel config file of this lidar unit. Channel config takes effect automatically.



4.3 File import and export

4.3.1 Import

The imported files in [Section 4.1](#) and [Section 4.2](#) will be added to the bottom of the drop-down menu.



- The imported files can be deleted from the following path: **Documents\PandarViewDataFiles\correction**
- Deletion takes effect after restarting PandarView 2.

4.3.2 Export

To export the correction or configuration file of this lidar unit:

1. When viewing live point cloud, click [**Correction**]  in the toolbar.
2. Keep the drop-down menu empty.
3. Click the [**Export**] button.

To export the correction or configuration file for this product model:

1. When viewing live point cloud or during playback, click [**Correction**]  in the toolbar.
2. Select the product model in the drop-down menu.
3. Click the [**Export**] button.



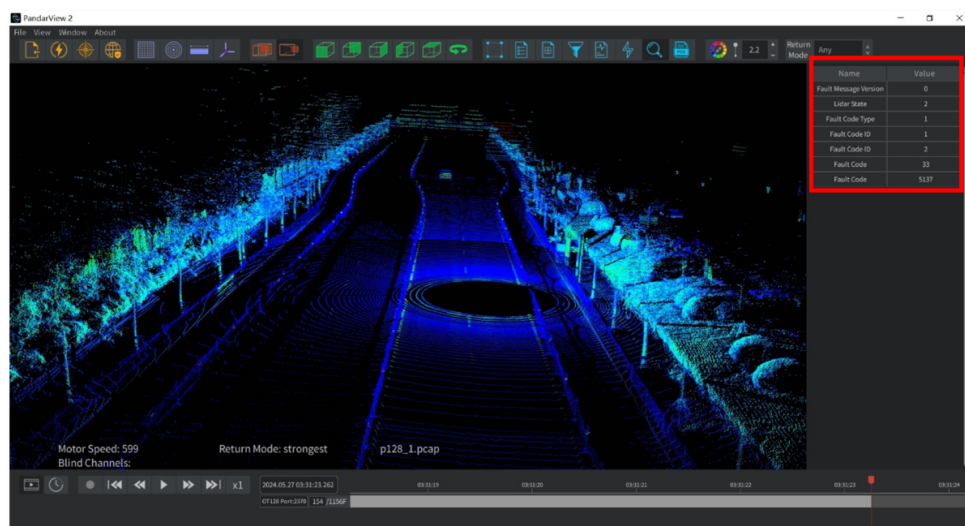
When naming correction or configuration files in Ubuntu, make sure to include the filename extension (.dat or .csv).

5 Other features

5.1 Fault info

To display the fault info of this point cloud frame:

When viewing live data	During playback
1. Make sure to input the fault message port number in Section 2.2 Network settings. 2. Press Ctrl + Alt + F.	Press Ctrl + Alt + F.



Name	Value
Fault Message Version	0
Lidar State	2
Fault Code Type	1
Fault Code ID	1
Fault Code ID	2
Fault Code	33
Fault Code	5137



- Only available to standard models. May be different for customized models.
- Each frame corresponds to multiple Point Cloud Data Packets. A fault code ID or a fault code that appears in multiple packets is only displayed once.
- Fault messages are described in the Safety Manual. For more information, please contact Hesai technical support.

5.2 Mouse shortcuts

Left-button drag	Rotate the point cloud
Right-button drag	Zoom in/out: Drag left to zoom out, and drag right to zoom in.
Scroll the wheel	Zoom in/out: Scroll down to zoom out, and scroll up to zoom in.
Press the wheel and drag	Pan the view.
Shift & left-button drag	Spin the point cloud around the viewing direction (the direction from the viewpoint to the origin of coordinates).
Shift & right-button drag	Pan the view.

5.3 Toolbar

If the toolbar cannot be displayed in full, scroll the mouse wheel to view all the buttons.



5.3.1 Coordinate grids, coordinate system, and distance measurement



Button	Description
Cartesian	Show/Hide the grid. To set the color and spacing, refer to Section 5.3.7 Coordinate grid settings and points coloring .
Polar	Show/Hide the equidistant circles. To set the color and spacing, refer to Section 5.3.7 Coordinate grid settings and points coloring .
Ruler	Left-button drag to measure the distance between two points.
Coordinates	Show the rectangular coordinate system.

5.3.2 Projection modes



Button	Description
Orthographic Projection	Object size does not change with distance; parallel lines remain parallel.
Perspective Projection	Objects appear smaller as they recede into the distance, giving a sense of depth and spatial awareness.

5.3.3 Point of view and spinning



Button	Description
Front/Back/Left/Right/Top	-
Spin	Spin the viewing direction (the direction from the viewpoint to the origin of coordinates) around the Z-axis.

5.3.4 Channel selection



Click [**Channels**]  to view or change the currently displayed channels.

Display or hide channels

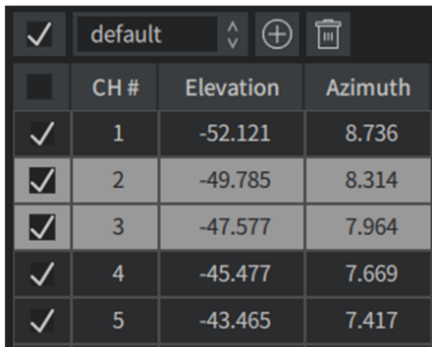
- Check/Uncheck the boxes on the left of each channel to display/hide its point cloud data.
- By default, all channels are displayed.

Select and toggle channels

- Click on a channel (excluding the area of its checkbox) to select this channel.
- Press down Shift while clicking to select multiple neighboring channels.
- Press down Ctrl while clicking to select multiple separate channels.
- Click [**Toggle Selected Channels**]  in the top-left corner to toggle the status of the selected channels (checked/unchecked).

Save channel groups

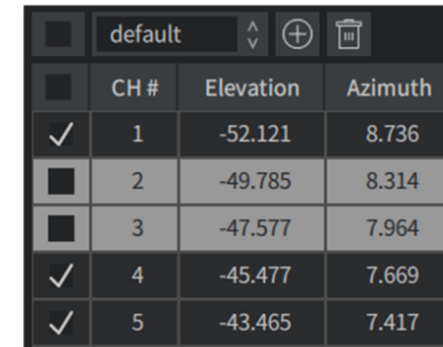
- Click  to save the checked channels as a configuration and name it.
- Previously saved configurations exist after restarting PandarView 2; they can be selected in the  drop-down menu.
- To delete the currently selected configuration, click .



The toolbar shows a checked checkbox, a dropdown menu set to 'default', and icons for adding (+) and deleting (trash) configurations. The table below has five rows, each with a checked checkbox in the first column, followed by columns for CH #, Elevation, and Azimuth.

☒	CH #	Elevation	Azimuth
☒	1	-52.121	8.736
☒	2	-49.785	8.314
☒	3	-47.577	7.964
☒	4	-45.477	7.669
☒	5	-43.465	7.417

Figure 2. Before toggling channels



The toolbar shows an unchecked checkbox, a dropdown menu set to 'default', and icons for adding (+) and deleting (trash) configurations. The table below has five rows, each with an unchecked checkbox in the first column, followed by columns for CH #, Elevation, and Azimuth.

☐	CH #	Elevation	Azimuth
☒	1	-52.121	8.736
☐	2	-49.785	8.314
☐	3	-47.577	7.964
☒	4	-45.477	7.669
☒	5	-43.465	7.417

Figure 3. After toggling channels

5.3.5 Point selection and data table



- Click [**Select**]  and drag the mouse to highlight an area of points.
- Click [**Spread Sheet**]  to view the data of the highlighted points, as shown below.

Points: 112										
Ch^	AziCorr(deg)	Dist(m)	Rfl	Azi(deg)	Ele(deg)	t(us)	x(m)	y(m)	z(m)	field
12	236.10	23.012	0	190.330	10.40	110980	-18.786	-12.624	4.154	0
12	236.00	23.044	1	190.280	10.40	110938	-18.790	-12.674	4.160	0
12	235.90	23.056	3	190.230	10.40	110897	-18.778	-12.714	4.162	0
12	235.80	22.992	4	190.180	10.40	110855	-18.704	-12.711	4.150	0
12	236.40	22.052	4	190.480	10.40	111105	-18.066	-12.003	3.981	0
12	236.30	22.016	1	190.430	10.40	111064	-18.015	-12.015	3.974	0

The name of each column also acts as a button. When double-clicking a column name multiple times, the following actions are performed (one action for each double-click):

- Auto-adjust the column width.



Column width can also be manually adjusted:

1. Place the mouse cursor between two column names (so that the cursor becomes a left-right arrow).
2. Drag the mouse.

- Sort the table in the ascending order of this column. An up arrow  will appear on the right.
- Sort the table in the descending order of this column. A down arrow  will appear on the right.
- Cancel the sort.

The button group on the top-left corner:



Select All	Click to display all points. Click again to display only the selected points.
Export Points Info	Export the current data table to a CSV file.  When naming files in Ubuntu, make sure to include the filename extension (.csv).
Save Column Order	Save the current order of columns.  • This setting remains effective after restarting PandarView 2. • To change the column order, drag the column names.

The column names in the data table are defined below:

Ch	Channel number
AziCorr	Azimuth corrected by the angle correction file
EleCorr	Elevation corrected by the angle correction file
Dist	Distance
RFL	Reflectivity  Same as the Intensity field in PandarView 1.
Azi	Current reference azimuth
Ele	Elevation
t	Timestamp

Field	For the product models in the AT family: the Mirror Surface on which this measurement is made.  Fields 1/2/3 correspond to Mirror Surfaces 0/1/2, respectively.
AziState	Azimuth State Used for calculating the firing time offset of each channel; only available to certain product models.
Confidence	Confidence level
DirtyDegree	Contamination level
EnvLight	Environment light; Only available to OT128 and Pandar family.

5.3.6 Points filtering

Click [**Points Filter**]  and set the allowed range of each parameter. Only the eligible data points will be displayed.

 **Points Filter** ×

Azimuth (deg) Range

Min. − + Max. − +

Elevation (deg) Range

Min. − + Max. − +

Polar Distance (m) Range

Min. − + Max. − +

X (m) Range

Min. − + Max. − +

Y (m) Range

Min. − + Max. − +

Z (m) Range

Min. − + Max. − +

Intensity Range

Min. − + Max. − +

Confidence Range

Min. − + Max. − +

Weight Factor Range

Min. − + Max. − +

Reset ON

For example, discrete noise points (e.g., rain, fog, dust, or exhaust fumes) can be filtered out by setting the range of Weight Factor.

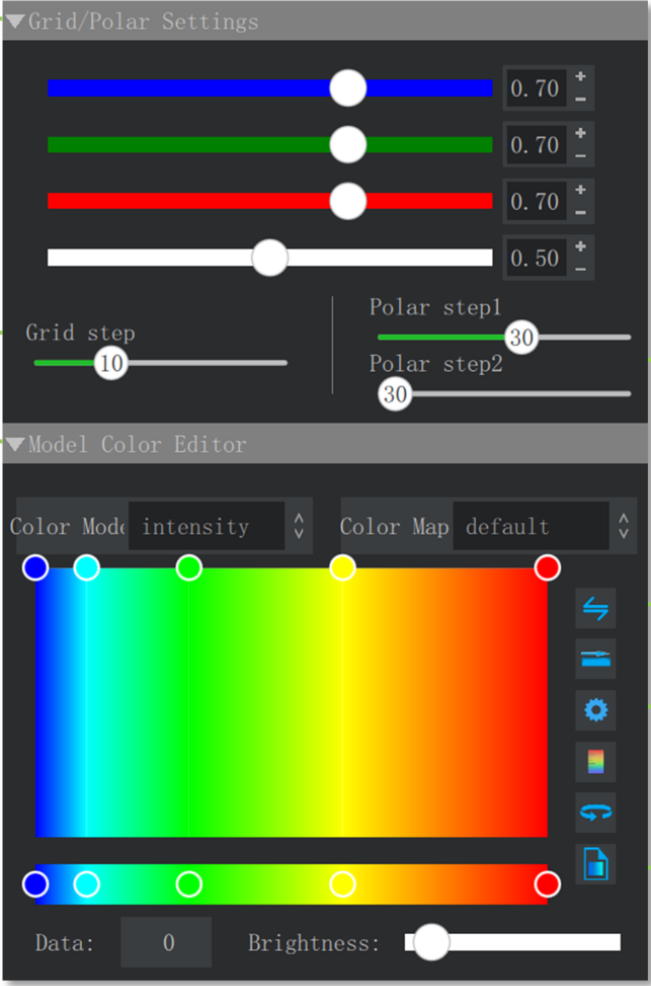


- For each product model, the available parameters may different; Weight Factor is only available to JT128, OT128, and Pandar family.
- The higher the Weight Factor, the more likely this point is a discrete noise point.

5.3.7 Coordinate grid settings and points coloring

Click [**Color Map**]  to perform these settings:

- Set the color and unit distance (m) of coordinate grids.
- Change the colormap of data points.



The screenshot shows the 'Grid/Polar Settings' and 'Model Color Editor' panels. The 'Grid/Polar Settings' panel includes sliders for 'Grid step' (set to 10) and 'Polar step1' (set to 30). The 'Model Color Editor' panel shows a color map with a gradient from blue to red, and a 'Data' field set to 0. The 'Brightness' slider is also visible.

Coordinate grids settings

Unit distance of grid coordinate system

Data points color settings

Polar step 1: Unit distance of the inner 12 circles in the polar coordinate system

Polar step 2: Unit distance of the outer 10 circles in the polar coordinate system

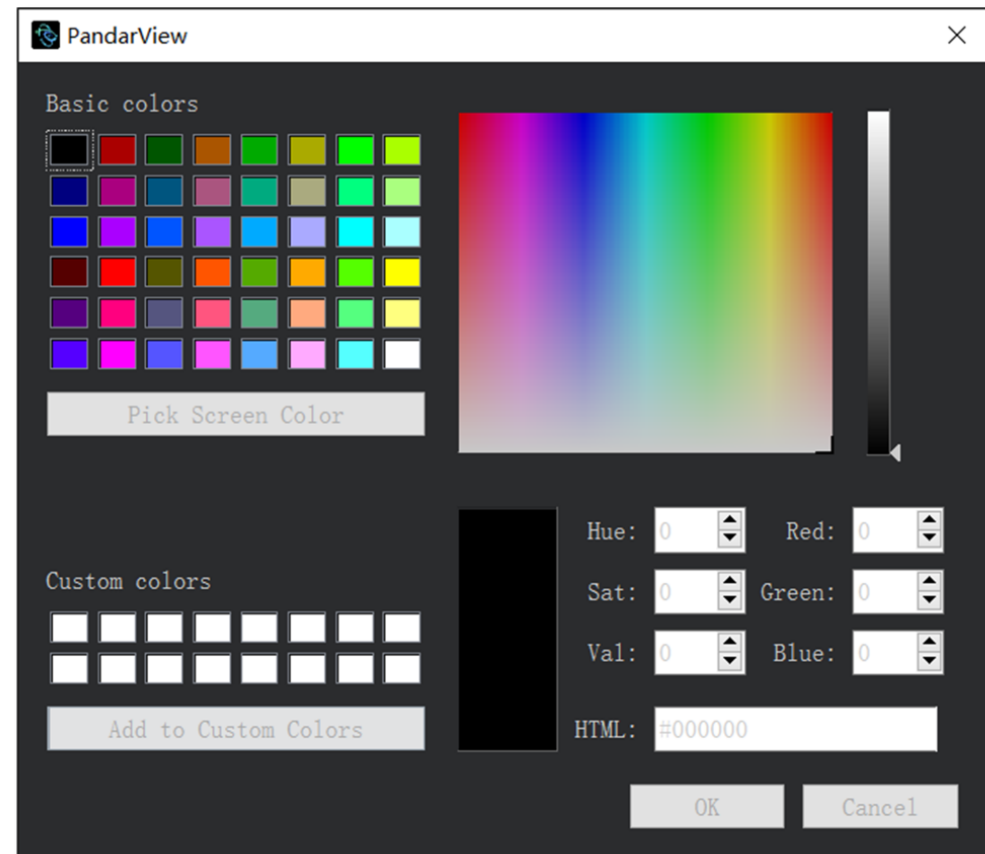
Invert color settings

RGB settings for 5 colors

Save the current color map

For example, discrete noise points (e.g., rain, fog, dust, or exhaust fumes) can be colored differently when using Weight Factor as the color mode.

1. Select [**Weight Factor**] in [**Color Mode**].
2. Click [**Set Data Range**]  and set a range for Weight Factor.
 - The data points whose Weight Factor fall within the specified range are colored according to the mapping from Weight Factor to the colormap.
 - The data points with Weight Factor below Min or above Max default to blue or red, respectively. To customize these two colors, tick [**Reset color out of range**], click [**Below range color**] and [**Above range color**], and select colors.





- The [**Color Mode**] options may differ for each product model; Weight Factor is only available to OT128.
- The higher the Weight Factor, the more likely this point is a discrete noise point.

5.3.8 Background coloring

1. Click the [**Background Color**]  button in the toolbar and set a color.
2. Click the [**Save**] button in the top-left corner.



This setting remains effective after restarting PandarView 2.

5.3.9 Other display controls



Button	Description
Laser Tracing	Display laser beams in the point cloud. To visualize the scanning pattern, gray lines are drawn from the origin of the lidar's coordinate system to the data points in the first Point Cloud Data Packet of the current frame.  • Supported only during playback and in play-by-time mode; see Section 3.3 Play controls (for playback). • To better view the laser beams, a slow playback speed is recommended.

Button	Description
2D View	Show 2D image. Click "Camera View" to view the 2D image of the current point cloud.  • The view can be moved. • The ET product family does not support this function.
State Info	Display state information at the bottom-left corner of the point cloud display area, such as motor speed, return mode, and PCAP filename.  The available state info can be different for each product model.
Dump PCD	Dump the current frame into a .pcd (Point Cloud Data) file.  • By default, all point cloud data are exported. • Users can also select a group of data points through the [Select]  button (see Section 5.3.5 Point selection and data table).
Point Size	Set the display size of data points.
Return Mode	Select the returns to be displayed.
Frame Mode	Select odd/even frames to display. • Frame-by-frame: Play single frames in sequence • Odd only: Play odd frames only • Even only: Play even frames only • Odd–Even Pairs: Play odd and even frames simultaneously

5.4 Common toolbox

5.4.1 Hide selected point cloud in the current frame

To clearly display the region of interest without visual distraction, you can hide the point clouds in other regions.

Steps:

1. Rotate the view to a suitable angle (see [Section 5.3.3 Point of view and spinning](#)).
2. Click the [**Select**]  button in the toolbar.
3. Drag to select the data points to hide.
4. Click the [**Hide Selected Area**] button in the toolbox.
5. Repeat Steps 1 to 4 until no more data points need to be hidden.

Other buttons	Description
Undo Last Hide	Undo the most recent hide action.
Show All	Undo all hide actions, i.e., show all data points.
Show/Hide Selected Areas	Reverse the setting: show all previously hidden data points and hide all others.  Click this button again to restore the previous setting.

5.4.2 IMU Data

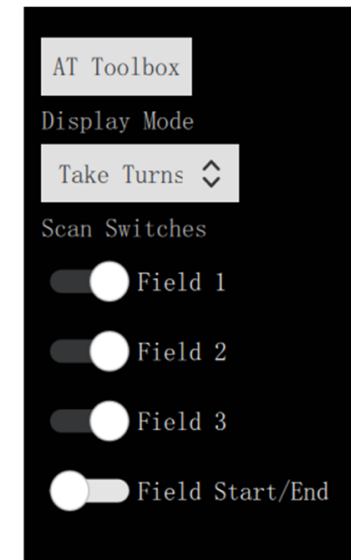
For product models that output IMU data, turning on the Show IMU Data switch provides these effects:

- A red arrow is displayed in the point cloud to indicate the current acceleration direction.
- The current acceleration and angular velocity are shown as [state information](#) at the bottom-left corner of the point cloud display area.

5.5 Toolbox for certain product models

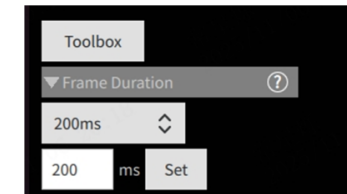
5.5.1 For the AT family

Display Mode	• Take Turns (default): The measurements from Mirror Surfaces 0/1/2 are output to Frames 0/1/2, respectively. The frames are not stitched. • Combination: The measurements from Mirror Surfaces 0/1/2 are output to one frame. That is, three frames are stitched as one. • Tradition: The measurements from Mirror Surfaces 0/1/2 are output to one frame according to their encoder angles in Point Cloud Data Packets. No angle correction is performed.
Scan Switches	Display/Hide the measurements from each mirror surface. Fields 1/2/3 correspond to Mirror Surfaces 0/1/2, respectively.
Field Start/End	Specify the start/end encoder angles of each Mirror Surface.



5.5.2 For JT16

Time-Based Accumulation	Display the point cloud data accumulated over a specified time window. Only supported during playback. Steps: 1. Select [play by time] (refer to Section 3.3 Play controls (for playback)). 2. Click the up/down arrow buttons , or enter a time window. 3. Click the [Set] button.
Show Cover Lens Contamination Level	For data points with specific Contamination Levels (0/1/2/3), the Reflectivity field in the data table can be used to display the Contamination Level $\times$ 64 (i.e., 0/64/128/192), instead of the actual reflectivity value. Steps: 1. Turn on the switch. 2. Check the contamination level(s) to be displayed. For example, if Contamination Level 1 is selected, the data points with Contamination Level 1 will show 64 in the Reflectivity field. • Refer to Section 5.3.5 Point selection and data table. • In each round of firing, data points from all channels are saved in one data block in a Point Cloud Data Packet; these points share the same contamination level. This pattern can be easily observed in the data table.



6 LidarUtilities

6.1 Introduction

Use the LidarUtilities module to retrieve lidar information, configure and upgrade the lidar.

Click [**Tool**] in the top menu to enter LidarUtilities.



6.1.1 Applicability

Product models that use the AUTOSAR system architecture are supported, such as:

OT	AT	FT	JT
OT128	AT128P	FT120	JT16
	ATX	FTX	JT32
			JT128

6.1.2 System requirements

Supported operating systems:

- 64-bit Windows 10/11
- Ubuntu 20.04/22.04/24.04

6.1.3 User interface

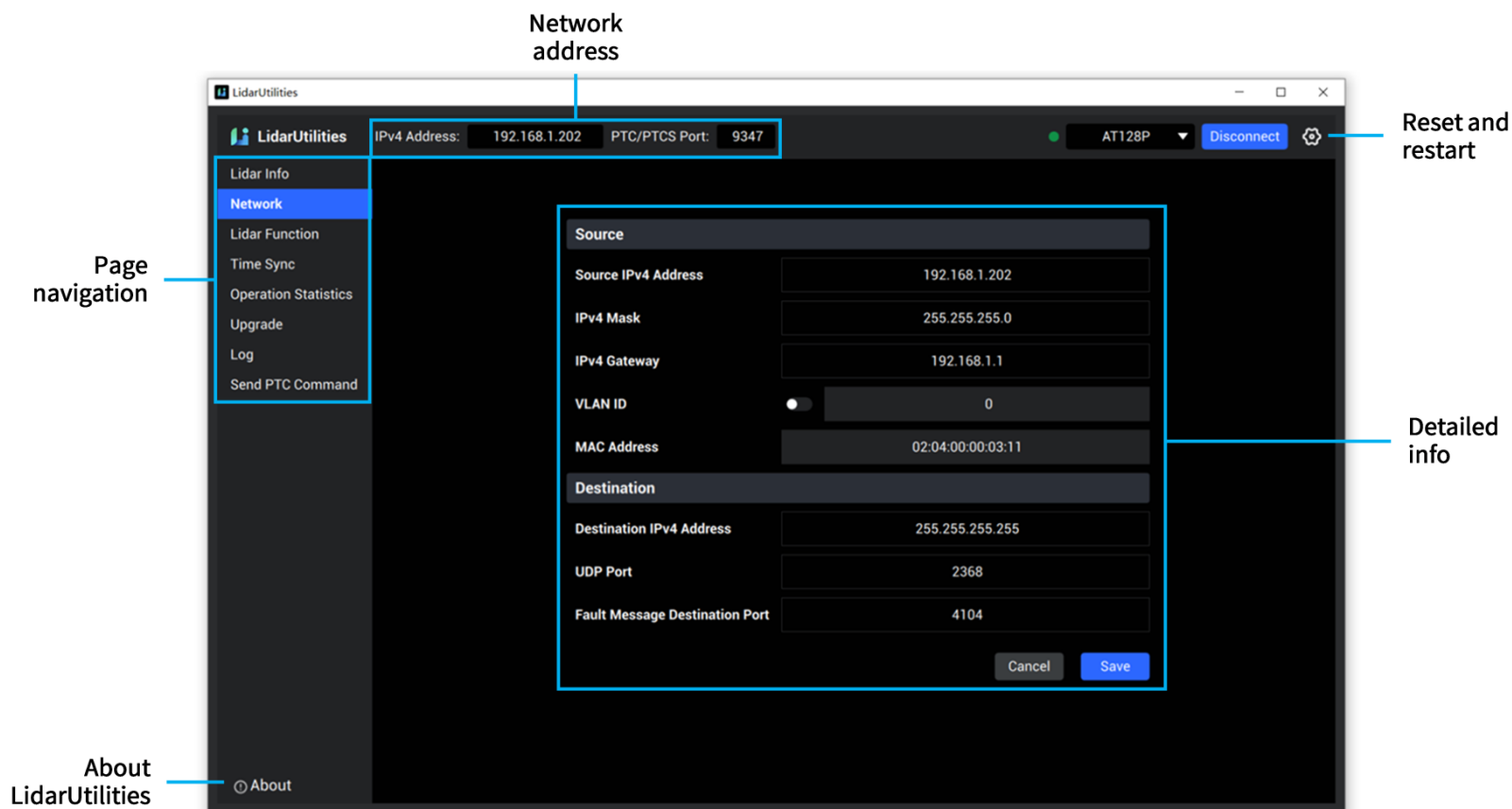


Figure 4. User interface



- "Reset" is only available to OT128.
- The information shown in the user interface may differ for each product model.
- The fields in gray background are read-only.

6.2 Connect the lidar

Click [**Connect**].

When the connection is established, the red dot in the figure below turns green.

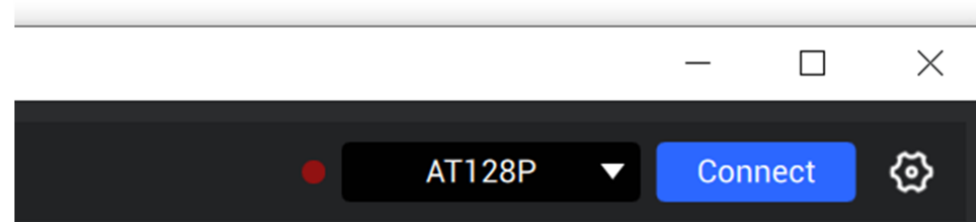


Figure 5. Connection

When the source IPv4 address is changed (see [Section 6.4 Network](#)), the lidar will be disconnected.

Follow these steps to reconnect:



1. For AT128P, restart the lidar; for the other product models, skip this step.
2. Input the new source IP address.
3. Click [**Connect**].

6.3 Lidar info

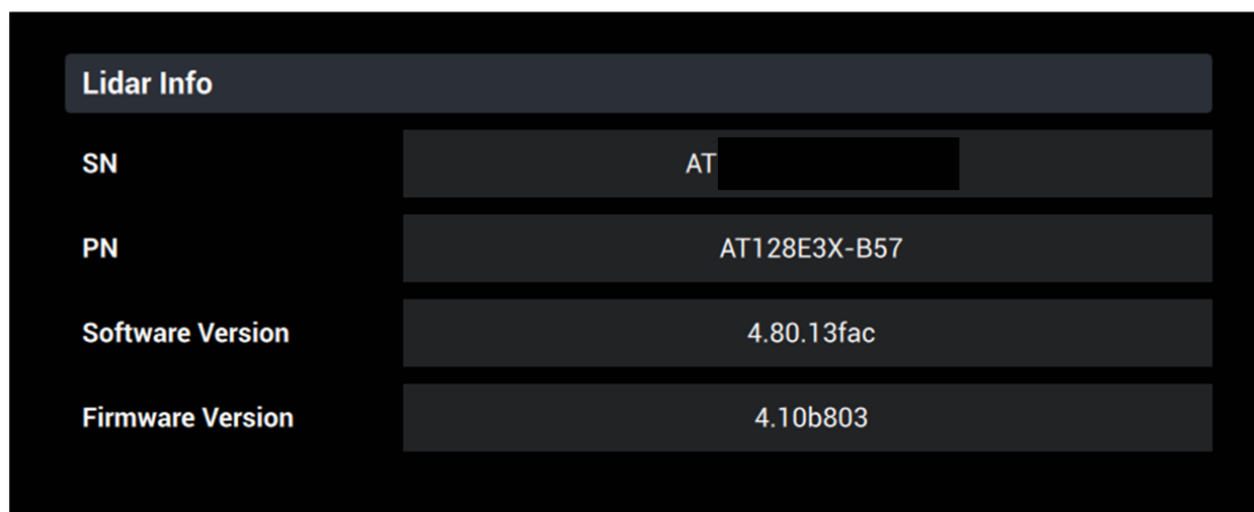


Figure 6. Lidar info

Field	Description
SN	Serial Number
PN	Part Number

6.4 Network

The image shows a network configuration form with a dark theme. It is divided into two main sections: 'Source' and 'Destination'. The 'Source' section includes fields for Source IPv4 Address (192.168.1.202), IPv4 Mask (255.255.255.0), IPv4 Gateway (192.168.1.1), VLAN ID (a toggle switch is turned off, and the value is 0), and MAC Address (02:04:00:00:03:11). The 'Destination' section includes fields for Destination IPv4 Address (255.255.255.255), UDP Port (2368), and Fault Message Destination Port (4104). At the bottom right, there are 'Cancel' and 'Save' buttons.

Source	
Source IPv4 Address	192.168.1.202
IPv4 Mask	255.255.255.0
IPv4 Gateway	192.168.1.1
VLAN ID	☐ 0
MAC Address	02:04:00:00:03:11

Destination	
Destination IPv4 Address	255.255.255.255
UDP Port	2368
Fault Message Destination Port	4104

Cancel Save

Figure 7. Network page

6.5 Lidar function

Lidar Function

Return Mode	Last Return
Spin Rate	200 rpm
Sync Angle	☒ 30
Trigger Method	Angle-based
Reflectivity Mapping	Linear mapping
Standby Mode	In operation
Rotation Direction	

Cancel

Save

Figure 8. Lidar function page

6.5.1 Set the azimuth FOV



This feature is available to OT128 only.

- To set **one** range that applies to all channels:
 1. Click [**For All Channels**].
 2. Input a start angle and an end angle.
 3. Click [**Save**].

Azimuth FOV

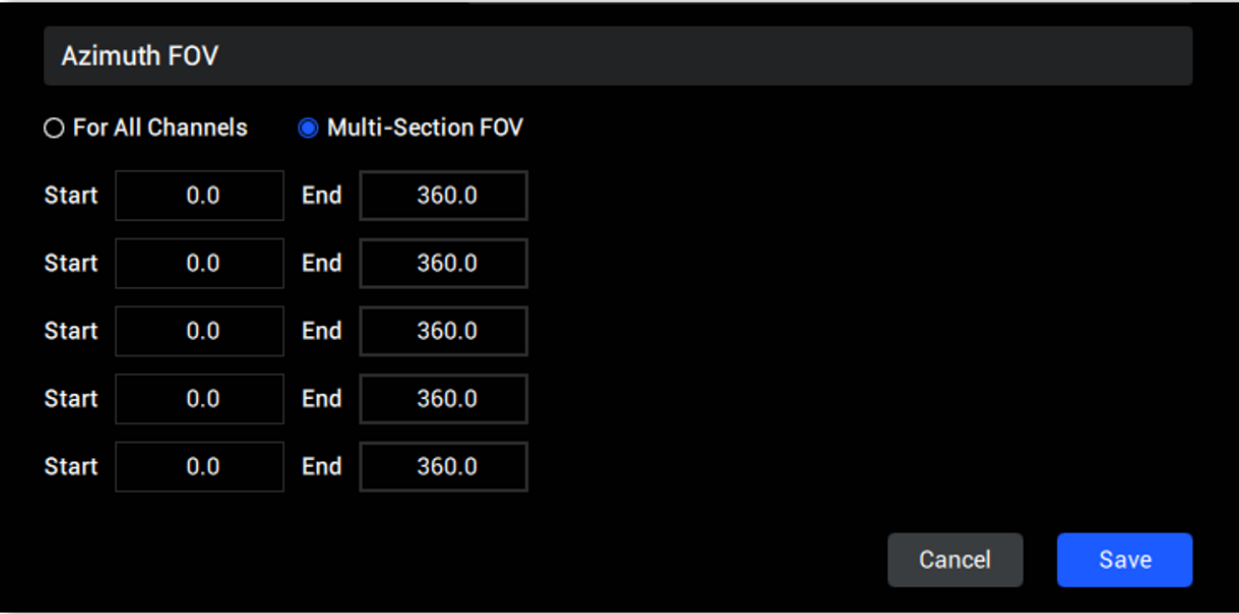
☒ For All Channels ☐ Multi-Section FOV

Start End

Cancel Save

Figure 9. For all channels

- To set **one to five** continuous ranges that apply to all channels:
 1. Click [**Multi-section FOV**].
 2. Input start angles and end angles.
 3. Click [**Save**].

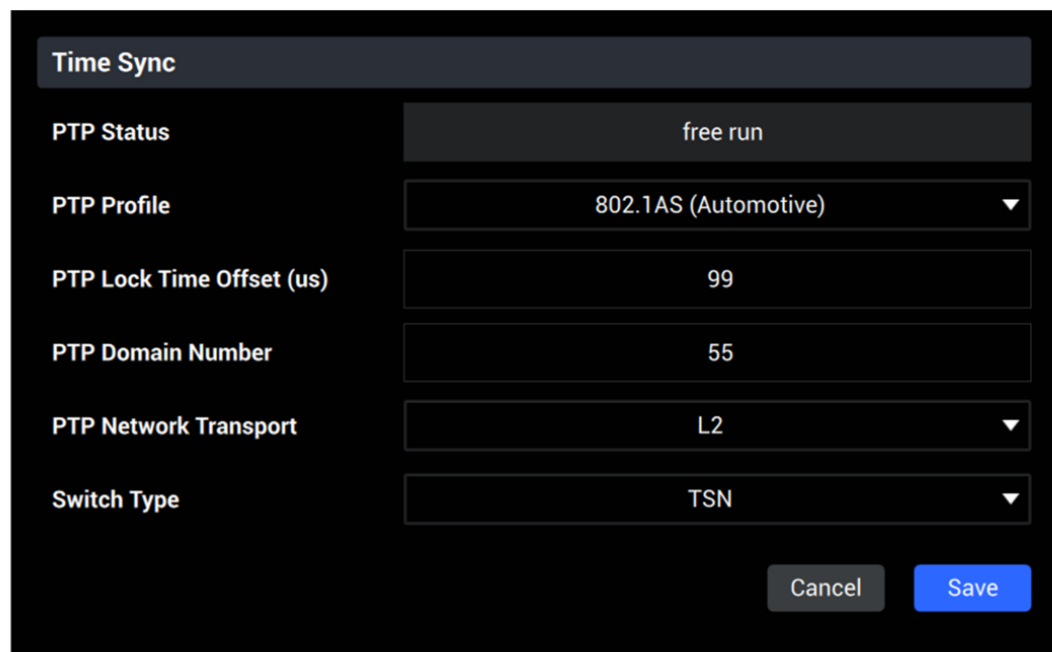


The screenshot shows a configuration window titled "Azimuth FOV". It has two radio buttons: "For All Channels" (unselected) and "Multi-Section FOV" (selected). Below the radio buttons, there are five rows of input fields. Each row has a "Start" label followed by a text box containing "0.0", and an "End" label followed by a text box containing "360.0". At the bottom right of the window, there are two buttons: "Cancel" and "Save".

Start	End
0.0	360.0
0.0	360.0
0.0	360.0
0.0	360.0
0.0	360.0

Figure 10. Multi-section FOV

6.6 Time sync



The image shows a 'Time Sync' configuration window with a dark theme. It contains several settings: 'PTP Status' is set to 'free run'; 'PTP Profile' is a dropdown menu showing '802.1AS (Automotive)'; 'PTP Lock Time Offset (us)' is a text input field with the value '99'; 'PTP Domain Number' is a text input field with the value '55'; 'PTP Network Transport' is a dropdown menu showing 'L2'; and 'Switch Type' is a dropdown menu showing 'TSN'. At the bottom right, there are 'Cancel' and 'Save' buttons.

Time Sync	
PTP Status	free run
PTP Profile	802.1AS (Automotive) ▼
PTP Lock Time Offset (us)	99
PTP Domain Number	55
PTP Network Transport	L2 ▼
Switch Type	TSN ▼
Cancel Save	

Figure 11. Time sync page

6.7 Operational statistics

Climate	
Internal Temperature	28.8°C
Availability	
Start-Up Times	354
System Uptime	0 h 0 min 23 s
Total Operation Time	428 h 46 min 27 s

Figure 12. Operational statistics page

6.8 Upgrade



- Before upgrading, please contact Hesai technical support to obtain the .patch file.
- It is recommended to place a protective cover or other opaque material over the lidar's optical window or cover lens when upgrading.
- The instructions for downgrading are the same as those for upgrading.

Upgrade steps

1. Upload the .patch file in the dashed box to start upgrade.
2. Wait for the process to be 100% complete. If the lidar does not reboot, please reboot it manually.
3. After reconnection, the latest software version will display in "Lidar Info" and "Upgrade" pages.



If the upgrade fails, hard restart the lidar and try again.

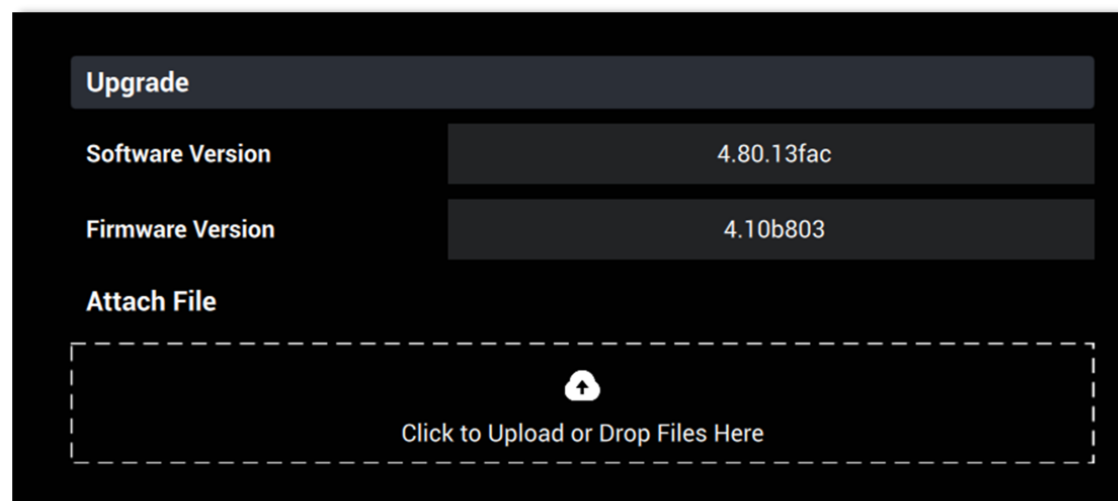


Figure 13. Upgrade page

6.9 Log

View real-time log on this page, or download the Operation Log and Freeze Frames.

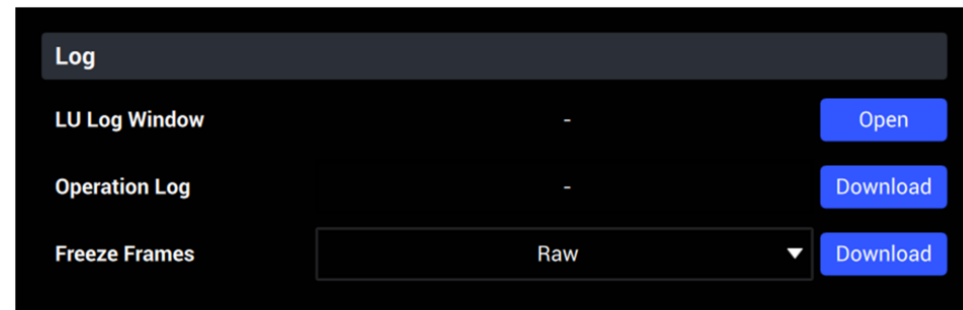


Figure 14. Log page



Operation log download is not available to FT120.

6.10 Send PTC commands

Send Command

Command Code

8D

Payload

Send

Return

Header

47 74 8D 00 00 00 00 02

Payload

01 00

Command Log

Time	Command Code	Payload
2024-07-19 15:42:35	8D	
2024-07-19 15:42:06	38	
2024-07-19 15:41:13	ff	00 00 00 70

Figure 15. Send PTC commands page



- The command code and payload are both hexadecimal digits; the prefix "0x" is not required.
- Each byte in the payload is separated by a space.

Appendix A: Legal notice

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