unicore

UPrecise Software

Revision History

Revision	Revision History	Date
R1.0	First release	Sep., 2022
R1.1	Support seven satellite systems; Add 2.2.12 Tools	Mar., 2023
R2.0	Update the number of receivers that can be connected Update section 2.3.3, 2.3.4, 2.3.5 and 2.3.8 to add the messages that need to be enabled Update section 2.3.12 Tools	Jan., 2024

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Foreword

This document gives an introduction of the software UPrecise, including the operations and UI descriptions etc.

Target Readers

This document applies to users or manufactures/companies that use the products from Unicore.

Contents

1 UPrecise Introduction

1.1 Description of UPrecise

UPrecise is a GNSS evaluation software developed by Unicore. It aims to help you conveniently do operations on the receivers with graphical real-time monitoring and playback function.

Using this software, you can interact with receivers by serial ports or Internet and see the status information. After connecting the receivers, UPrecise can automatically identify the baud rates and type of the receivers, and display the specific message configurations and parsed sentences.

1.2 Functions of UPrecise

You can see section 2 for the detailed functions and here just introduces the basic information.

- Interacting with the receivers
  UPrecise can display the raw data in real time or playback, and provides a command input box for real-time interaction with the receivers.

- Showing constellations
  The window "Constellation" can display a general distribution of the visible satellites in real time or playback.

- Showing satellite tracking status
  The window "Tracking Status" displays the change of C/N0 and tracking status in real time or playback, which varies according to the window size (normal size or maximized size).

- Showing the positioning information
  The window "Map" shows the positioning information including the positioning point and the trajectory drawn in real time or playback on the loaded map in the language you select (Baidu map or Google map). The function is particularly suitable for viewing the trajectory of the running cars.

- **Showing the attitude information**

  The window "Attitude" displays the information of positioning and attitude, which enables you to know the receivers' attitude intuitively.

- **Showing discrete degrees**

  The window "Trajectory" shows the longitude and latitude of the positioning point, as well as the horizontal discrete degree in real time or playback. When receiving static signals, it enables you to view the degree in different scales.

- **Parsing messages**

  The window "Message" dynamically displays the parsed NMEA and other messages according to the type of the receivers.

- **Configuring receivers**

  The window "Receiver Configurations" enables you to query and configure the parameters of the receivers according to its type, so that you can interact with the receivers more intelligently.

- **Upgrading receivers**

  UPrecise supports the firmware upgrade of the receivers from Unicore.

- **Replaying**

  With the "replay" function, the software uses the saved data to show the parsed messages and draw visual graphics. Except the data saving and command interaction, other functions can work as same as those in real time.

- **Supporting interference detection, RTCM monitoring and TTFF testing**

  UPrecise provides the tools to detect the interference at 1575.42 MHz, 1227.60 MHz and 1176.45 MHz as well as monitor the RTCM data and test TTFF.

1.3   Preparations

You need to use UPrecise together with the products from Unicore to activate all its functions.

Table 1-1 UPrecise information

Name	Supported Language	Supported System (64-bit)
UPrecise	Chinese/English	Windows 7/Windows 8 /Windows 10

Before using UPrecise, you need to connect the receivers, antenna and PC correctly (see Figure 1-1).
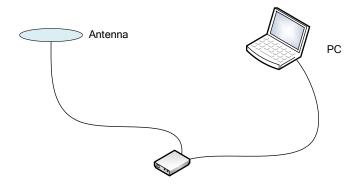

Figure 1-1 Diagram of connections

2 Using UPrecise

To use UPrecise, you can install the software with the installation package, or you can use the green package directly. The former situation can avoid file corruption, and in the latter situation, you just need to place all the files such as DLL, EXE and LIB into the same folder.

☞ If your antivirus software identifies UPrecise as suspicious, choose to trust it.

After installation or copying, double click the icon or UPrecise.exe to run the software and its primary layout is shown in Figure 2-1.

Figure 2-1 UPrecise primary layout

(1) Title bar   (2) Menu bar   (3) Status bar   (4) Working area

The primary layout of UPrecise is divided into four areas:

● Title bar: provides the functions to switch between Chinese/English and reset the layout;

● Menu bar: scalable, providing shortcuts to use the related functions;

● Status bar: connect, disconnect and switch the receivers;

● Working area: used to display the child windows.

You can see section 2.1 to 2.3 for the detailed functions of each area.

2.1　Title Bar

The title bar provides the functions to switch between Chinese and English, and reset the layout.
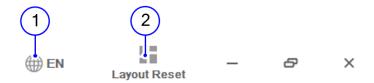

Figure 2-2 Title bar

　(1) Language Switch　　　(2) Layout Reset

2.1.1　Language Switch

You can use "Language Switch" to change the language used by UPrecise. Currently, it supports Chinese and English. The switch takes effect after software restart.

2.1.2　Layout Reset

After connecting with the receivers, UPrecise displays the windows of "Constellations", "Data Stream", "Tracking Status" and "Map" automatically.

The other windows mentioned in section 2.3 can be opened and closed manually. When necessary, you can click the "Layout Reset" button to reset the layout.

2.2　Status Bar

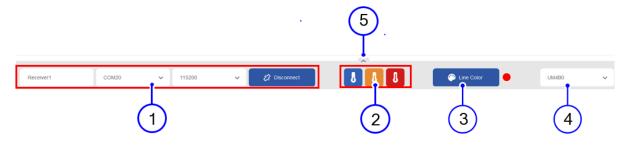At the bottom of UPrecise, it is "Status Bar" (see Figure 2-3).

Figure 2-3 Status bar showing the selected receiver

　(1) Receiver information　　　(2) Start mode　　　　(3) Trajectory color

　(4) Type　　　　　　　　　(5) Expand

● 　Receiver information: Linked to the "Receiver Connection". When the receivers are connected, the information of the selected receiver is automatically displayed here and it controls the disconnection/connection of the receiver;

- Start mode: Cold Start (Blue), Warm Start (Orange), Hot Start (Red);

- Trajectory color: Decides the trajectory color in the window "Map";

- Type: Linked to the "Receiver Connection". When the receivers are connected, the type of the selected receiver is automatically displayed here. If the identification fails, you can disconnect the receiver and then select the type from the drop-down box manually;

- Expand: Click this button to show all the connected receivers (see Figure 2-4). Currently, it supports maximum four receivers.
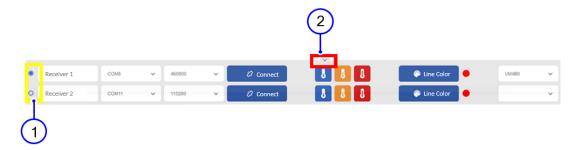

Figure 2-4 Status bar showing all the connected receivers

(1) Switch   (2) Collapse

- Switch: Select the receiver through the radio button;
- Collapse: Click this button to go back to the status as Figure 2-3 shows.

2.3　Menu Bar

This section gives a detailed introduction of the functions supported by UPrecise, which can be accessed through the shortcuts.

Table 2-1 Description of the buttons on the menu bar

No.	Button	Description	No.	Button	Description
1	☰	Scalable Button	9		Attitude
2		Connections	10		Receiver Configurations
3		Data Stream	11		Replay
4		Constellation	12		Receiver Upgrade
5		Tracking Status	13		Tools[1]
6		Map	14		Platform Lock
7		Message	15		Platform Settings
8		Trajectory			

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[1] Includes interference detection, RTCM monitoring and TTFF testing.

2.3.1 Connections

Click the "Connections" button, and the following dialog box appears (see Figure 2-5).

You can connect the receivers through two ways:

- Serial Port: Types in or selects the number of the serial port (check in the device manager) and the baud rate.

  By default, the baud rate is identified automatically, which does not have to be set manually.

- TCP/IP[2]: Types in the IP address of the receiver and the port number.
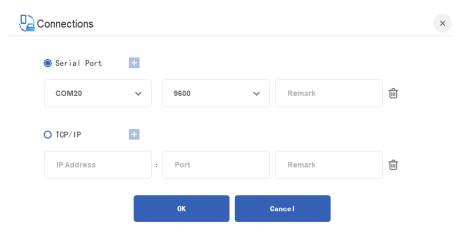

Figure 2-5 Connecting receivers

Thereafter, click "OK" to make the connections succeed. Then the four default windows ("Constellations", "Data Stream", "Tracking Status" and "Map") appear while the port number/IP address and the remark are shown on the status bar.

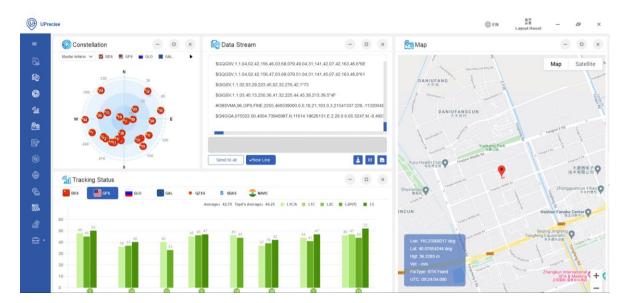[2] Supported by the receivers that have network functions.

Figure 2-6 Default layout

Currently, UPrecise supports connecting one to four receivers simultaneously.

2.3.2 Data Stream

The window "Data Stream" displays the raw data in real time and playback, providing a command input box to have a real-time interaction with the receivers.
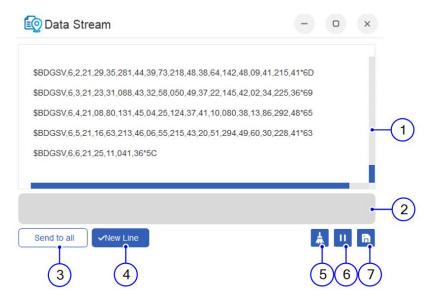

Figure 2-7 Raw data interaction

(1) Raw Data Output Window   (2) Command Input Box   (3) Send to All   (4) New Line
(5) Clear   (6) Pause Updating   (7) Save File

The descriptions of the buttons in Figure 2-7 are as follows:

- Raw Data Output Window[3]: Outputs the raw data of the receivers;
- Command Input Box: Inputs a command to interact with the receivers; you can use ⬆ ⬇ on the keyboard to check the historical commands.
- Send to All[4]: Sends the command to all the connected receivers;
- New Line: Creates a new command, where adding the CRLF automatically;
- Clear: Clears all the contents displayed in the output window;
- Pause Updating: Stops the contents updated in the output window;
- Save File: Saves the raw data of the receivers.

Refer to the corresponding protocol specifications for the commands supported by the receivers.

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[3] To output in Binary, you need to configure an ASCII output together.

[4] Currently, UPrecise can connect at most four receivers.

2.3.3 Constellation

After successful connections, UPrecise analyzes the received data and displays all satellites parsed by the receivers in the "Constellation" window (See Figure 2-8).

The window shows a general distribution of the visible satellites in real time or playback. Currently, it supports displaying seven navigation systems: GPS, BDS, GLONASS, Galileo, QZSS, SBAS and NavIC, which can be selected or deselected by clicking the national flags. The system a satellite affiliates with can be distinguished by the flag icon.

For the products with dual antennas, you can choose to display the information received from the master antenna (by default) or the slave antenna through the drop-down box.
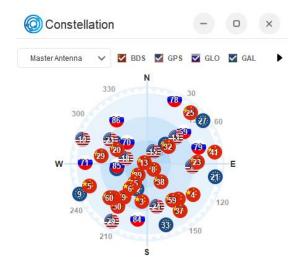

Figure 2-8 Constellation

To see the visible satellites, you must enable at least one of the following messages according to the protocols supported by the receivers.

- GSV(GSVH)[5];
- SATVISA;
- SATVIS2A;
- SATELLITE;
- SATSINFO.

---

[5] Used together with GGA or RMC.

2.3.4 Tracking Status

This window "Tracking Status" displays the changes and tracking status of the visible satellites and C/N0 value in real time or playback. It can display multiple frequencies of multiple systems including GPS, BDS, GLONASS, Galileo, QZSS, SBAS and NavIC.

With the normal size, this window just displays the satellite numbers of one system and C/N0 values at different frequencies, and displays the average C/N0 value of the current system and the average of the top four C/N0 values. You can switch between different systems by clicking the flag icons (See Figure 2-9).

When the window is maximized, it can display maximum four satellite systems and their C/N0 values at different frequencies at the same time, as well as the average C/N0 values and the average of the top four C/N0 values (see Figure 2-10).

Figure 2-9 Tracking status view (1) (Abscissa: Satellite number; Ordinate: C/N0 value)

Figure 2-10 Tracking status view (2) (Abscissa: Satellite number; Ordinate: C/N0 value)

To see the tracking status, you must enable at least one of the following messages according to the protocols supported by the receivers.

- GSV(GSVH)[6];
- OBSVMA;
- OBSVHA;
- SATSINFO.

2.3.5 Map

This window "Map" shows the positioning information including the positioning point and the trajectory (the latest 3000 Epochs) drawn in real time or playback on the loaded online map (see Figure 2-11).

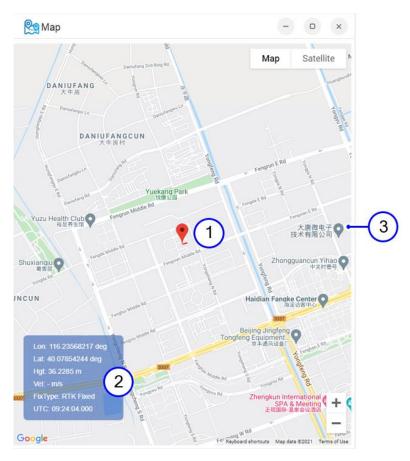The function is particularly suitable to view the positioning trajectory for the driving test.

Figure 2-11 Map

(1) Positioning point   (2) Positioning information   (3) Loaded map

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[6] Used together with GGA or RMC.

To see the positioning information, you must enable at least one of the following messages according to the protocols supported by the receivers.

- GST (GSTH);
- GGA (GGAH);
- RMC (RMCH);

2.3.6 Message

After connections, UPrecise parses the data received by the receiver and dynamically displays the results matched with the type of the receiver in the window "Message".

UPrecise supports parsing the common commands. Refer to the related protocol manuals for the details.
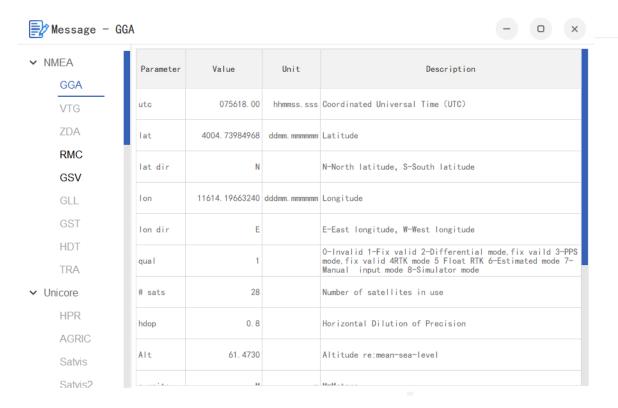

Figure 2-12 Example of parsed message

2.3.7 Trajectory

The window "Trajectory" shows the longitude and latitude of the positioning point, as well as the horizontal discrete degree in real time or playback.

The positioning points can be displayed in a view of "Center on the current point" or "Tracking the positioning points". When receiving static signals, it enables you to view the horizontal discrete degree in different scales.
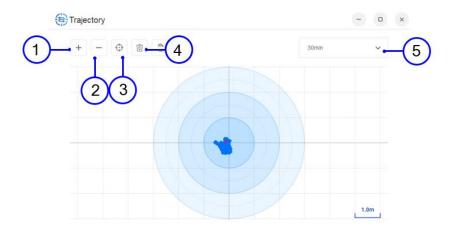

Figure 2-13 Discrete trajectory tracking

(1) Zoom in	(2) Zoom out	(3) Center on the current point
(4) Clear	(5) Show duration	

2.3.8 Attitude

The window "Attitude" displays the information of positioning and attitude, including position, velocity, angle, acceleration, angular acceleration and positioning/INS status.

In the normal size, this window just shows the attitude information, namely direction information (see Figure 2-14).

Figure 2-14 Attitude view – normal size

In the maximum size, this window displays the positioning and attitude information simultaneously. The left figure is that showed in the normal size providing the attitude information, and the right information provides the positioning and attitude values (see Figure 2-15).

Figure 2-15 Attitude view – maximum size

To see the information of positioning and attitude, you must enable at least one of the following messages according to the protocols supported by the receivers.

- HDT;
- INSPVAA;
- RAWIMUXA;
- UNIHEADING.

2.3.9 Receiver Configurations

UPrecise enables you to configure the parameters of the receivers according to its type (See Figure 2-16). Different receivers have different configurations. Refer to the related protocol manuals for the configuration details.
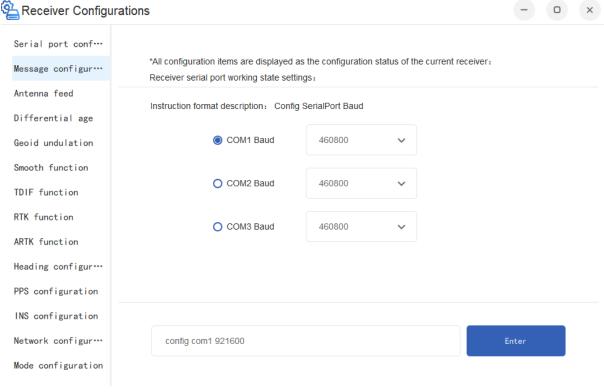

Figure 2-16 Example of receiver configurations

2.3.10   Replay

UPrecise can replay the saved data for products of Unicore. When the receivers are connected, do the following steps to use this function:

1. Click the "Replay" icon on the menu bar, and click "Ok" in the dialog box in Figure 2-17; Then UPrecise exits from the real-time monitoring and cuts the connection with the receivers, and the dialog box (Figure 2-18) appears.

Figure 2-17 Confirmation of replay

☞ Replay and real-time monitoring cannot exist at the same time.

2. Click "File selection", and select the file path and file name in the "Open File" dialog box (see Figure 2-18 and Figure 2-19)
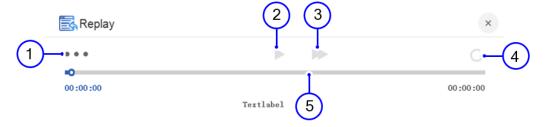

Figure 2-18 Replay

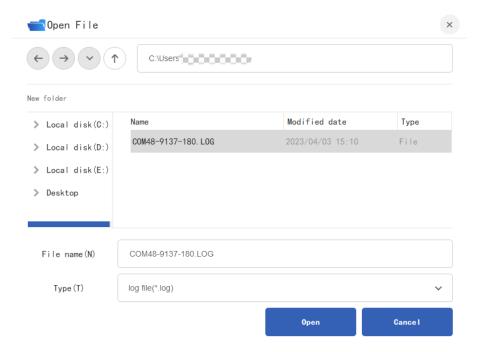(1) File selection   (2) Start   (3) Forward   (4) Replay   (5) Progress bar

Figure 2-19 "Open File" dialog box

3. Click "Open" in Figure 2-19 to start the replay.

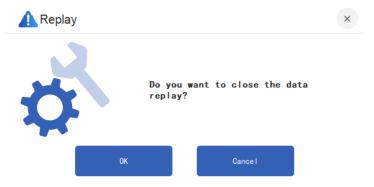4. If necessary, click "×" button in Figure 2-18 and click "Ok" in Figure 2-20 to quit from replay.

Figure 2-20 Closing replay

2.3.11   Receiver Upgrade

UPreicse provides the "Receiver Upgrade" function for the receivers from Unicore.

The upgrade steps are as follows:

1. Click the "Receiver Upgrade" on the menu bar and the upgrade dialog box (see Figure 2-21) appears.
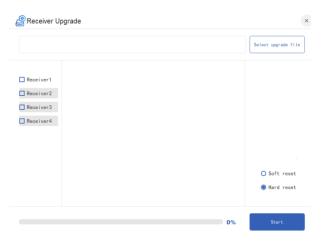2. Click "Select upgrade file" in the dialog box;

Figure 2-21 Receiver upgrade

3. Select the check box about receiver name in Figure 2-21;
    The same type of receivers can be upgraded simultaneously.
4. Select "Soft reset" or "Hard reset";
    The receivers need to be reset during the upgrade, and the reset method is decided by what you select. The "Hard reset" needs a manual operation.
5. Click "Start";

☞ Pay attention to the progress bar, and do not interrupt the upgrade as it can cause failure of the upgrade.

6. After finishing the upgrade, click the "×" button in Figure 2-21.

2.3.12   Tools

Interference Detection (CWOUT)[7]

This tool is used to detect the interference strength at the frequency of 1575.42 MHz (L1), 1227.60 MHz (L2) and 1176.45 MHz (L5).

The indicators are as follows:

- Green – No CWOUT

- Orange –CWOUT exists

- Red – Strong CWOUT

Figure 2-22 Interference detection

The figure above shows the real-time interference strength at the three frequencies.

The three figures below record the variation of the interference strength from the start of the detection to the current state. The abscissa is the detection times and the ordinate is the interference strength with a range of 0 to 255.

The larger the interference is, the more effect it has on the positioning.

---

[7] The receivers need to support the message FREQJAMSTATUS.

RTCM Monitoring

This tool is used to monitor the RTCM data.

The steps are as follows:

1. Set the "Input", supporting serial port and Ntrip Client.

2. Set the "Output", supporting serial port and Ntrip Server.

Table 2-2 Input/Output configuration

	Input	Output
Receiver as base station	Serial Port	Ntrip Server
Receiver as rover	Ntrip Client	Serial Port

It supports outputting to maximum four receivers through serial port.

3. Click "Connect" to use.

4. If necessary, tick "Hex" (hexadecimal). The RTCM data appears in the dialog.

Figure 2-23 RTCM monitoring

TTFF Testing

This tool is to test the TTFF of cold start and hot start, and for the receivers supporting RTK positioning, it can also output the RTK Fix time.

Figure 2-24 TTFF testing

Place the receiver at a known position.

This tool supports RX Service, Self-Built Ntrip Service and Import local ephemeris files to get Ephemeris, and it also supports No Input.

Ntrip Service only supports Version 1.0. When using this service, make sure that the uploading frequency of the source Ephemeris is 1 Hz. It does not support sending the position and TCP.

When using RX Service, you need to enable the AGNSS function. Refer to *AGNSS Instructions* for more information.

Select a serial port not used by other programs and input the true positioning information including latitude, longitude and height.

Furthermore, you can select the "Send time simultaneously" or "Send location simultaneously" to send the time or position information to the receiver. Select the "RTK" to test the RTK fix time of the receiver with RTK positioning capability.

The file path is used to save the test log, including the Ephemeris and the data sent by the receiver.

After setting, click the button "Start" to begin your test. The right area shows the test result and the indicator is blinking during the test. If an error occurs, the indicator becomes gray. After a normal test, the indicator keeps green.

If you want to stop the test in the progress, press the button "Stop" to exit.

2.3.13   Platform Lock

Considering the information security, UPrecise provides "Platform Lock" function. When the platform is locked, any operation to the software is not allowed.

To use this function, you need set a password first (see Section 2.3.14), and then just click the "Platform Lock" icon on the menu bar.

Figure 2-25 Platform lock

To unlock the software, click the lock button in Figure 2-25 and type in the password, then the software is operational and configurable again.
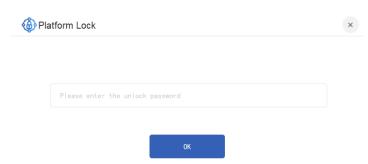
Figure 2-26 Platform Unlock

2.3.14 Platform Settings

This window "Platform Settings" is used to set platform lock and the save path of the operating log, as well as displaying the version information (see Figure 2-27).
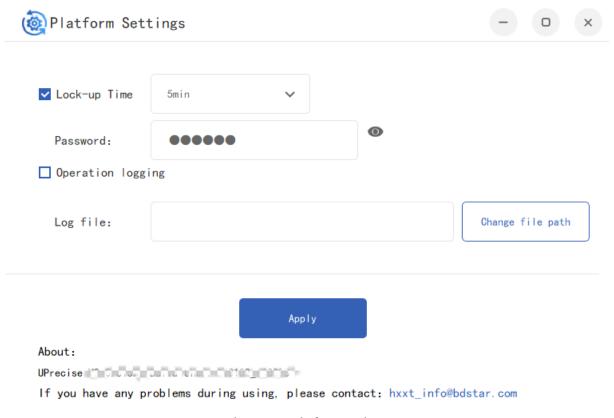

Figure 2-27 Platform Settings

- Platform lock: Sets the password and specifies how long it takes to enter the locked state. After setting, if you click the "Platform Lock" button on the menu bar, the software enters the locked state directly. Otherwise, it waits until the specified time to enter the locked state.

☞ There is no limit on the setting of the password. The password is automatically invalid after UPrecise is closed. To lock the platform in your next open, you need to set the password again.

- Operating log save: Selects the "Operation logging", and further specifies the save path.

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