取 A-0031-04

Logger version CTD profiler with optional fast DO sensor

RINKO-Profiler

MODEL **ASTD100,101,102,103**
ASTD150,151,152,153

Operation Manual

For the safe use of this measuring instrument.

- After reading the operation manual and before using the measuring instrument, please use it correctly. Improper handling may lead to an accident.
- Please keep this operation manual safe, so it can be used at any time.

JFE Advantech Co., Ltd.

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1. Introduction

1-1. RINKO-Profiler

RINKO-Profiler is a small light water temperature, salinity and depth recorder. It has a small body with 60mm dia., 491mm total length and 1kg weight in water, the titanium case is adopted and the chlorophyll, turbidity and DO (RINKO) sensors are also provided, enabling to measure many water quality parameters. The instrument consists of sensor sonde, interface and transmission cable, and various setups and data processing are done by using a PC.
This RINKO-Profiler has both depth trigger and time trigger functions.
*Depth trigger: Recording into memory every preset depth value according to information from depth sensor.
*Time trigger: Recording into memory every preset interval according to internal timer information.

1-2. Software

This software is designed to be utilized in a series of operations from measurement setup to data post-processing of "RINKO-Profiler".
We recommend you to read this manual in advance for correct use of the instrument.

1-3. Usage environment for software

In order to install this software, the following items are required in hardware and software.

1-3-1. Hardware requirements

CPU: More than Intel Core i5 1.6 GHz
Display Resolution: More than 1024×600
Hard disk drive with spare capacity of more than 1 GB.
Drive capable of reading a CD-ROM.

1-3-2. Software requirements

OS : Windows XP SP3 (32bit/64bit)
Windows Vista SP2 (32bit/64bit)
Windows 7 (32bit/64bit)
Windows 8 (32bit/64bit)
Windows 10 (32bit/64bit)

Memory : Windows XP : More than 512MB
Windows Vista : More than 1GB
Windows 7: More than 1GB(32bit) / more than 2 GB(64bit)
Windows 8: More than 1GB(32bit) / more than 2 GB(64bit)
Windows 10: More than 1GB(32bit) / more than 2 GB(64bit)

Follow the steps below to install the .NET Framework before installing each software so that it will work. This section explains the installation procedure of .NET Framework 2.0, 3.5. It is unnecessary if .NET Framework 2.0, 3.5 is already installed on your computer. Although this procedure manual is for Windows 10, you may need to install .NET Framework under the same procedure in Windows 8.1. It supports Windows 10 Home (32 bit / 64 bit) and Windows 10 Pro (32 bit / 64 bit), but procedures and images may be different depending on OS side change.

This is the procedure to install .NET Framework (2.0, 3.5) on Windows 10 of your computer.

2.1 What to prepare
· Access to the internet.
To install the .NET Framework, you need an internet connection. It cannot be installed offline.

2.2 Installation
(1) Right-click the start button and select [Programs and Functions] from the displayed menu (Fig. 2.1).

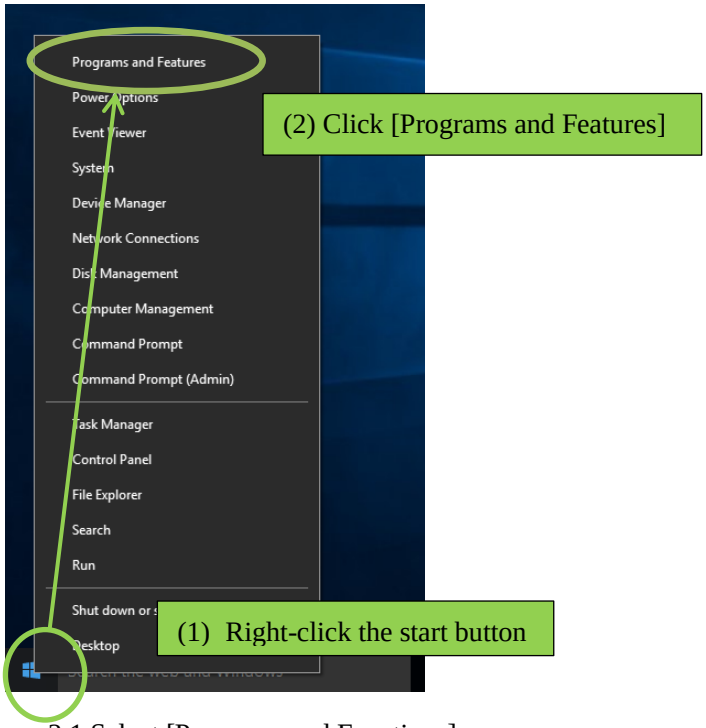


Figure 2.1 Select [Programs and Functions]

(2) Click [Activate or deactivate Windows functions] on the upper left of the window (Figure 2.2)

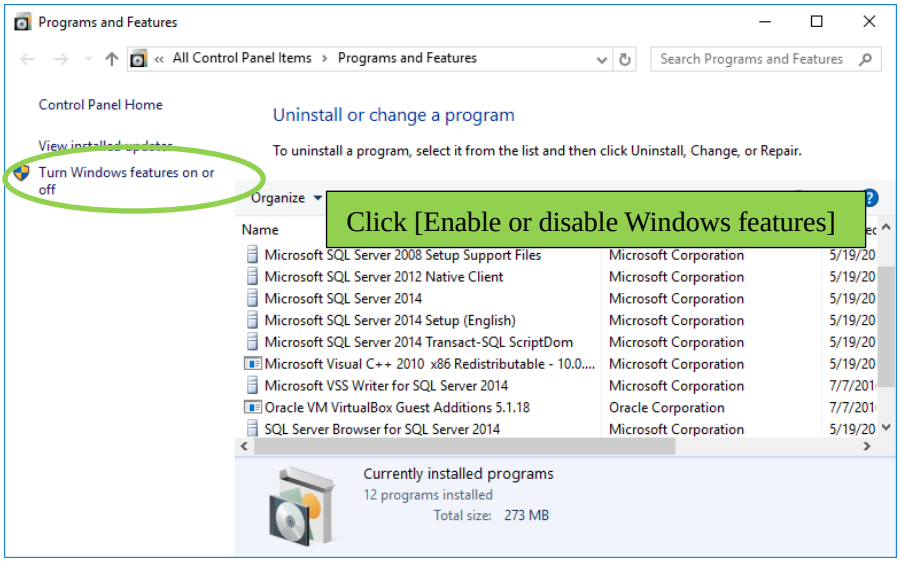


Figure 2.2 Click [Enable or Disable Windows Features]

(3) Check [.NET Framework 3.5 (including .NET 2.0 and 3.0)] and click the [OK] button to start the installation (Fig. 2.3).

· It is not necessary to check all the trees. Please refer to the image.

· If already checked, it is already installed.

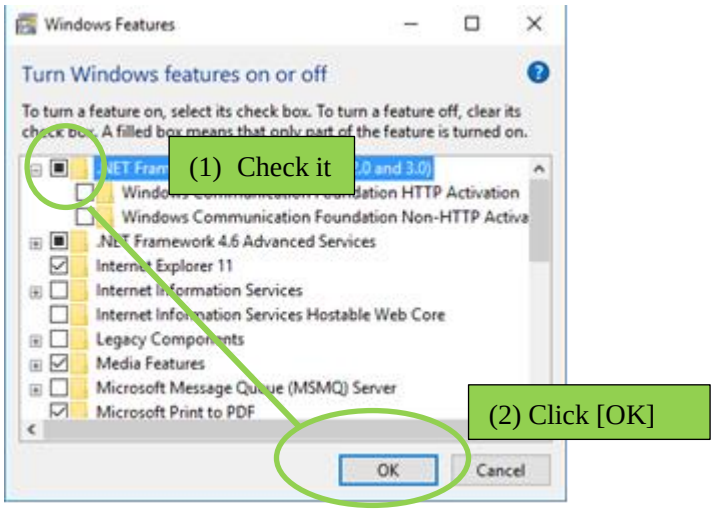


Figure 2.3 Check [.NET Framework 3.5]

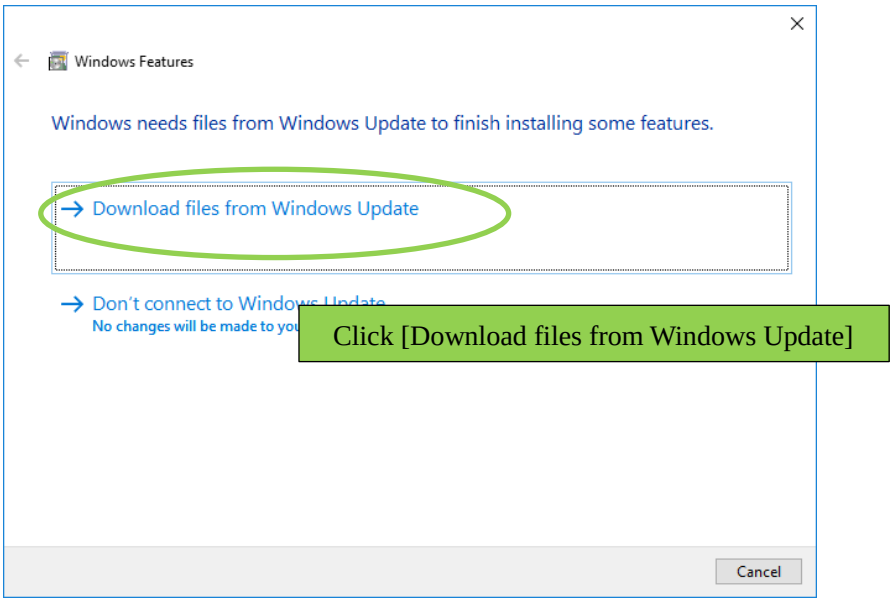


Figure 2.4 Click [Download files from Windows Update]

(4) Please wait until the files are downloaded and installed. You can interrupt at any time with the [Cancel] button (Figure 2.5).

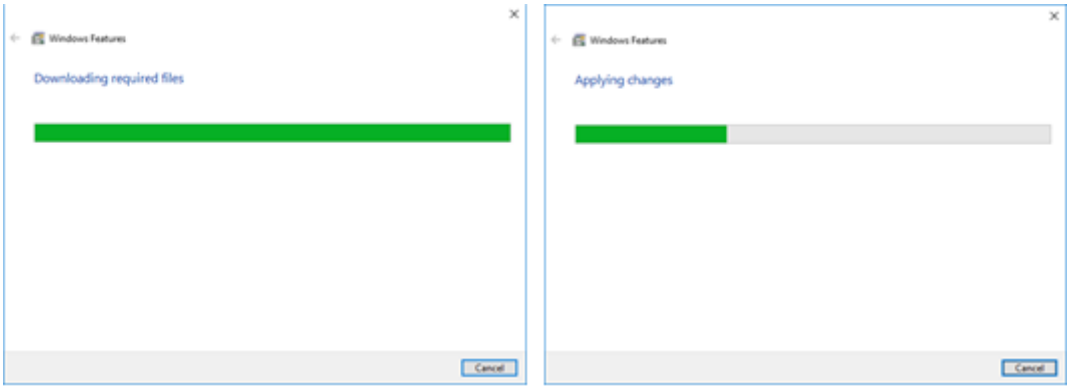
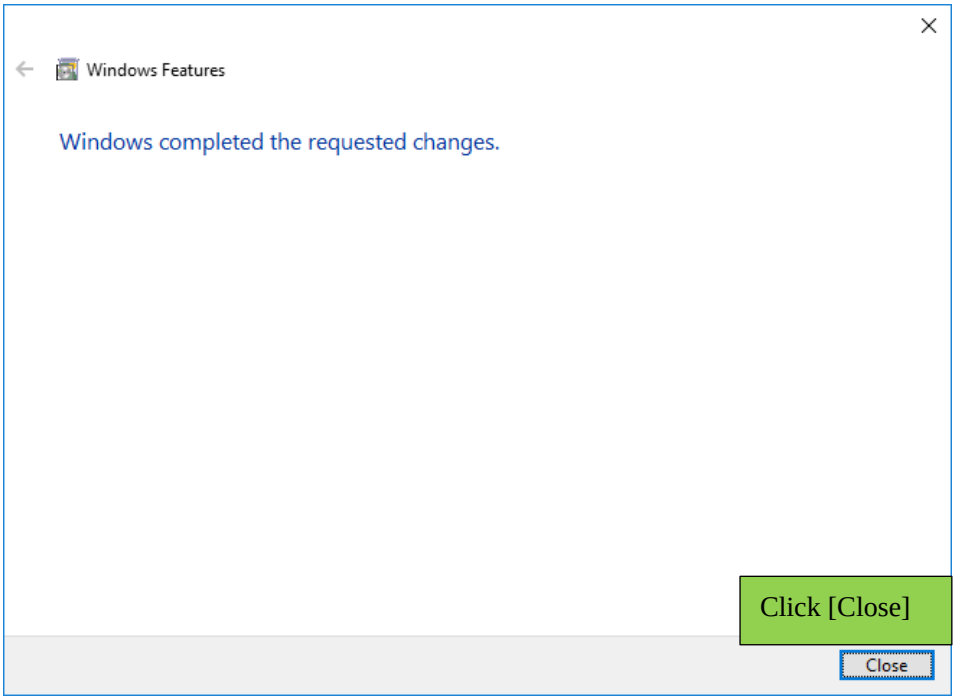


Figure 2.5 Window displayed during installation

.



(5) Click [Close] to complete the installation (Fig. 2.6).

(7) Install the RINKO Profiler software.

1-4. Precautions

- It is prohibited to duplicate and make a copy of this product entirely or partially for commercial purposes.
- The contents and specifications of this product are subject to change without notice for improvement and correction.
- We are not responsible for any effect caused by the use of this software and manual.
- Do not hesitate to contact us in case of unclear points or anything that you need to inform us regarding this product.

2. Notes on use

Danger	If you handle it incorrectly, the user is likely to be at risk of death or serious injury.
Warning	If you handle it incorrectly, the user may be minor or seriously injured.
Important	If you handle it incorrectly, the instrument may be damaged and unrepairable.
Caution	If you handle it incorrectly, it is likely to affect the observed data.

Danger

- Do not repair or disassemble anything beyond of what is written in this manual.
- When working on water, please ensure the safety of working environment.

Warning

- Be careful when cleaning the sensor. Scratches on the sensor may affect its performance
- The operating temperature range of the instrument is -3°C to 45°C, but please do not store in a freezing environment or perform measurements on temperatures below or higher the operating temperature range.
- Do not drop the equipment; and please protect it from mechanical impacts.
- Do not expose the instrument to direct sunlight. Do not leave the instrument in an environment where the ambient temperature is 45°C or above. Please do not store the instrument in a dusty and/or humid environment.
- Please be careful not to hurt yourself when deploying and retrieving the instrument.

Caution

- During deployment and retrieval of the instrument, please avoid mechanical impacts on the instrument.

3. Outline of Instrument

3-1. Instrument specifications & Hardware specifications

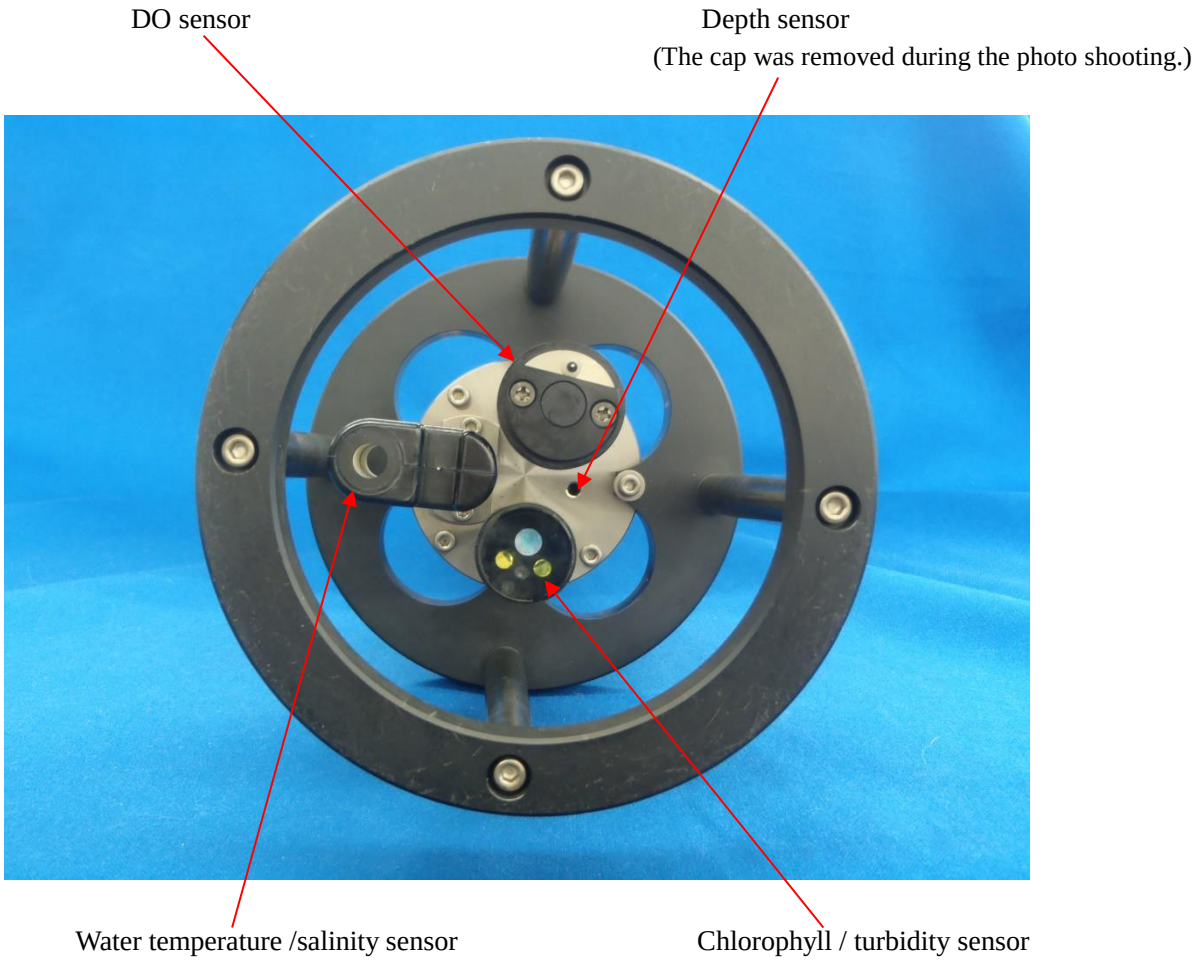
Measurement Mode	Depth Trigger Mode	Time Trigger Mode
Measuring Interval	0.1 m 0.2 m 0.5 m 1 m	0.1 to 600 s
Memory Type	1G byte Built in memory	
Storage Capacity	Approx.1,000 times in 0.1 m pitch 100 m	Approx. 8,000,000 data
Power Source	Lithium-ion rechargeable battery (continuous use for approx. 10 hours).	
Mass	Approx. 2kg in air Approx.1kg in water	
Dimension	ϕ136mm×491mm	
Material	Titanium Grade 2 (Pressure case)	
Pressure Proof	The maximum range of the depth sensor	

3-2. Instrument specifications & Hardware specifications

Measuring Item	Type	Measuring Range	Resolution	Accuracy	([1])Time constant
Depth	Semiconductor pressure sensor	0 to 600 m 0 to 1000 m	0.01 m	±0.3%FS	0.2 s.
Water temp.	Thermistor	-3 to 45°C	0.001°C	±0.01°C (0 to 35°C)	0.2 s.
Conductivity	Electrode	0.5 to 70 mS cm^{-1}	0.001 mS cm^{-1}	([2]) ±0.01 mS cm^{-1} (28 to 65 mS cm^{-1})	0.2 s.
Salinity	Practical salinity	2 to 42	0.001	----------	0.2 s
Turbidity	Backscattered light	0 to 1000FTU (Formazine reference)	0.03 FTU	±0.3 FTU or ±2 % of measured value	0.2 s
Chlorophyll	Fluorometric	0 to 400 ppb (Uranine reference)	0.01 ppb	±1%FS (0 to 200 ppb)	0.2 s
DO	Phosphorimetric	0 to 20 mg l^{-1} (0 to 200%)	0.001 mg l^{-1} (0.01 %)	±2%FS (±2%FS)	([3])0.4 s

([1])63.2% Response time
([2])Use sea water for calibration
([3])63.2% response standard at 1 atm and 25°C
When a new product is shipped or received for inspection and recalibration, the following measurement setup shall be applied for shipment.
① Depth trigger mode
② 0.1 m pitch
③ Density 1.025 (seawater specification)

3-3. Explanation of sensor sonde



Depth sensor

Because the sensor is a pressure detecting type sensor, it detects any fluctuation in the atmospheric pressure. Also, depending on the environment temperature, the zero point shows a slight fluctuation. In this sensor, the Auto-Zero function to adjust the zero point is provided, therefore, it cancels the error caused due to atmospheric pressure and temperature change.

A white "DURACON (POM)" resin with a small hole is attached to the depth sensor pressure-receiving part. If the hole is clogged, the pressure transmission is affected, therefore, periodical cleaning is recommended.

Water-temperature sensor

It uses a highly reliable thermistor with fast time response. It is integrated with an electric conductivity sensor, with coinciding time responses, and then preventing salinity spikes.

Since it is a very stable sensor, the measured value is not affected, even if there is any dirt attached or biofouling. However, if the sensor is remarkably dirty, the time response becomes slow, therefore, it should be cleaned periodically. The sensor is thin and care should be taken not to break it during cleaning.

Chlorophyll sensor

The chlorophyll sensor holds a LED (Light Emitting Diode) which has 470 nm peak light-emitting wavelength at the source of the light-emitting part, and the light-receiving part consists of a photodiode and optical filter, and the light-receiving band is approx. 640 to 980 nm. The chlorophyll-a in phytoplankton can have its concentration estimated by fluorescence intensity. However, fluorescence intensity differs depending on the species and growing process of phytoplankton.

If chlorophyll-a concentration is needed in μg L-1, it will be required to analyze water samples by another method (e.g. acetone extraction method), and to prepare a calibration curve. In order to represent the fluorescence intensity, the output signal (N value) from the sensor may be used as it is, and also in place of actual chlorophyll pigment, other fluorescence substance (e.g. uranine reference) may be used for verification, and the value may be represented as a fluorescence intensity value.

In any case, the values are not actual chlorophyll-a concentration, therefore, they can be used as a comparison of relative values, but you are kindly requested to utilize as fluorescence intensity values. If the chlorophyll-a concentration is necessary, you can pour the field water sample into the attached verification pail, and make a regression calculation with the fluorescence intensity and sampling water analysis (obtained in situ) and compensate for use. In addition, if there is an obstruction in front of the light-emitting part, the sensor may be influenced by reflected light and outputting higher than the actual value. If the verification pail is used, the sensor light-emitting part should be kept away from the bottom by more than 10cm. In this case, care should be taken not to allow bubbles to attach onto the sensor surface. Otherwise, it will cause errors.

The chlorophyll sensor is an optical sensor. Therefore, if the sensor surface is dirty, the measured value will be affected. To prevent this from happening, the sensor should be washed with water after use, and cleaned with soft cloth (the use of solvent such as thinner is prohibited).

Turbidity sensor

This sensor is integrated with the chlorophyll sensor. Suspended particles in the water are irradiated with infrared light on 880 nm wavelength, then the reflected/scattered light intensity is measured by the light receiver, that is, the sensor uses backscatter light to measure turbidity. When shipped from the factory, the sensor is comparison-calibrated using a standard Formazine reference based on JIS, and the unit shown is FTU (Formazine Turbidity Units). If the actual suspended particles concentration (SS) is required, it is necessary to prepare a calibration curve using water samples in the same way as chlorophyll. Since dirt affects the measurements, it is required to keep the sensor clean, same as the chlorophyll sensor.

DO sensor (RINKO)

The oxygen detection film is covered with a phosphorescent substance. When the excitation light pulse is radiated from inside, the red phosphorescence is discharged and the phosphorescence time and intensity are inverse correlated to the water oxygen partial pressure (concentration). Under anoxic conditions, the phosphorescence time is long, and on the contrary, when oxygen partial pressure is increased, the phosphorescence time is short.

The phosphorescence time, different from the phosphorescence intensity, is not easily affected by dirt on the sensor surface, therefore, this detection method ensures stable measurements. In addition, during the phosphorescence emitting process, the oxygen is not consumed; therefore, stirring of water sample (which is essential for galvanic electrode sensors) is not necessary. Because the oxygen detection film is very delicate, scrubbing it with hard brush must be avoided. After use, it should be washed with water, and wiped off with a soft cloth, and covered by a protective cap when stored. When measuring, the protective cap needs to be removed.

3-4. Precautions

- Do not place the DO sensor under temperatures higher than 50°C. Otherwise, the sensor sensing foil may be deteriorated. Pay full attention to the ambient temperature for temporary storage (on board or in the car).
- If bubbles are attached in the DO sensor, the data will be affected. When deploying into the water, remove bubbles by swinging the sensor.
- If the DO sensor surface is damaged, the data is not only deteriorated, but the sensing foil needs to be replaced. Pay full attention to any measurement near the bottom.
  For use and recovering, care should be taken to prevent excessive mechanical impact on the instrument.
- Please set the sensor sonde descending speed to less than 50 cm s^{-1}.

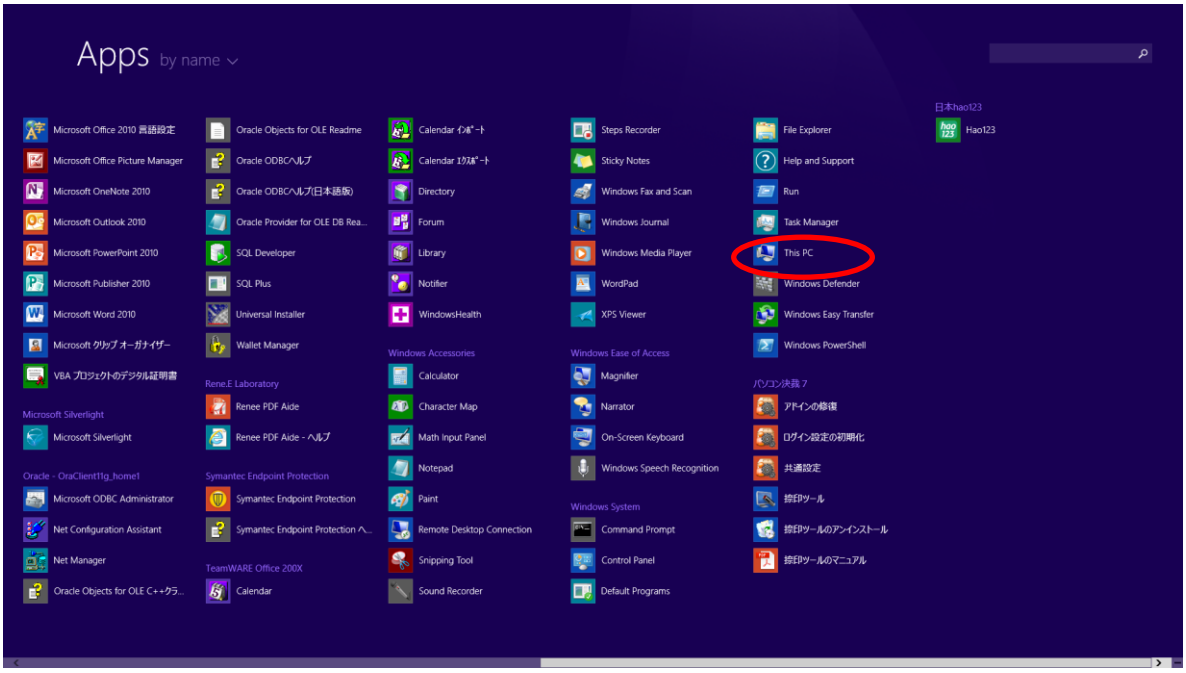
4. Installation & Un-installation of this software

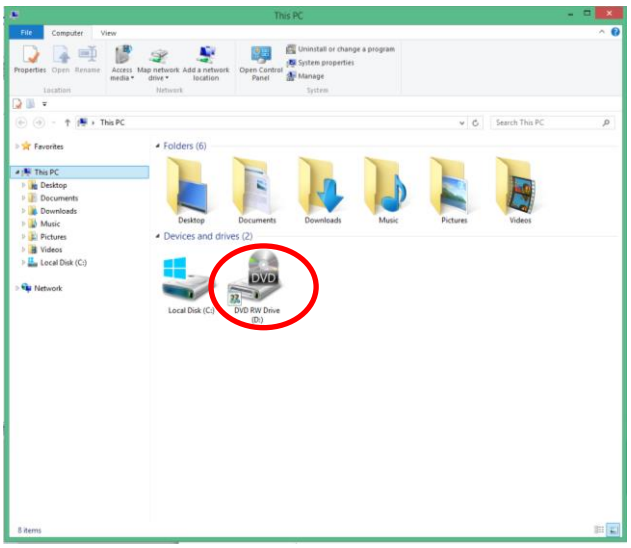
4-1. Installation of this software

The setup.exe included in this software is an installation program. Follow the procedure below for the installation. The screens shown below are for Windows 8 and might be different in case of other Windows OS versions.

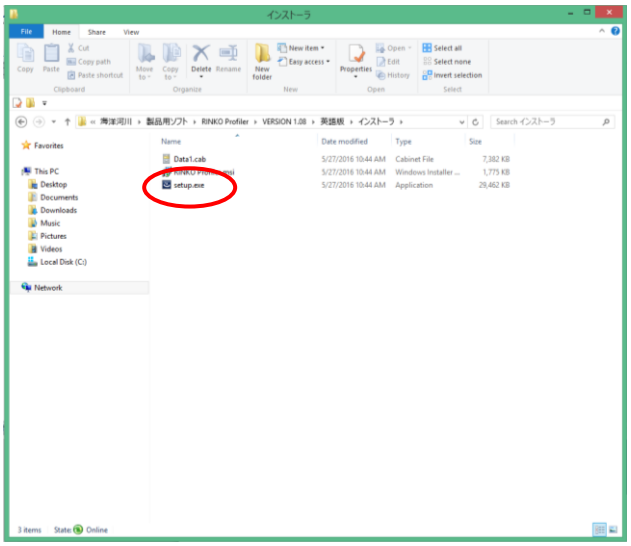
* At least, NET Framework 3.5 SP1 needs to be installed; otherwise the software will not run properly. If NET Framework 3.5 SP1 is not installed, it will be installed automatically during this software installation. In this case, it might take a few minutes to complete installing the software.

1) Boot up the Windows OS.
2) Insert the software disc into the CD drive.
3) Click [START] button on the taskbar and choose [this PC] from the menu.
4) Choose CD-ROM.





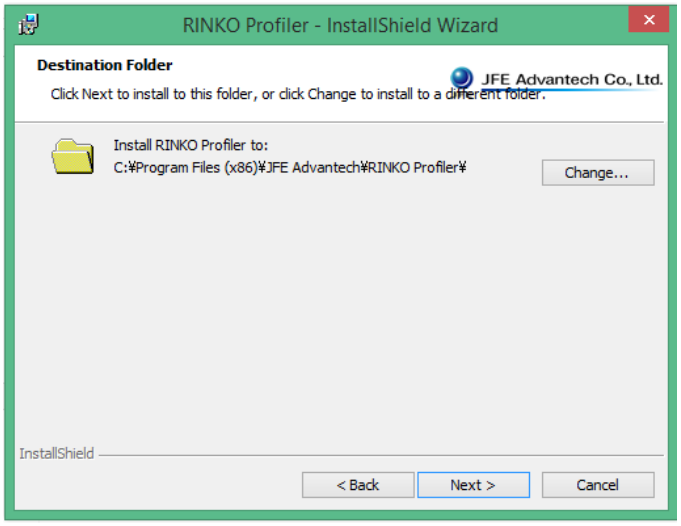
5) Double-click on setup. exe button to start the installation.



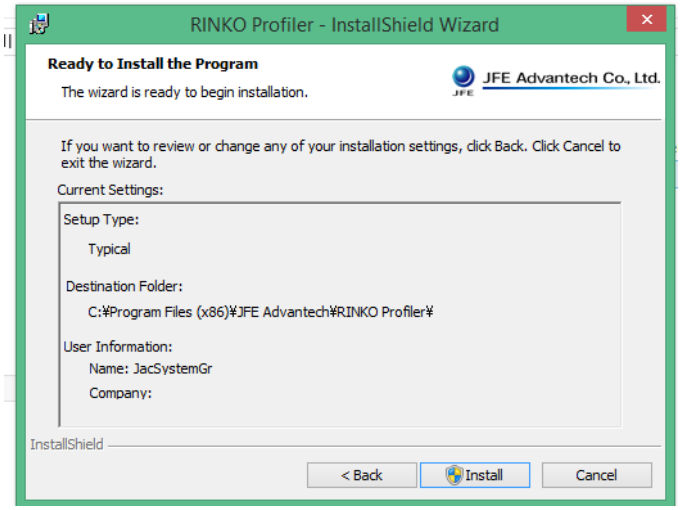
setup.exe

The following screens will appear in the same order as below. Follow the instruction shown on each screen. Click on Cancel button to interrupt the software installation.

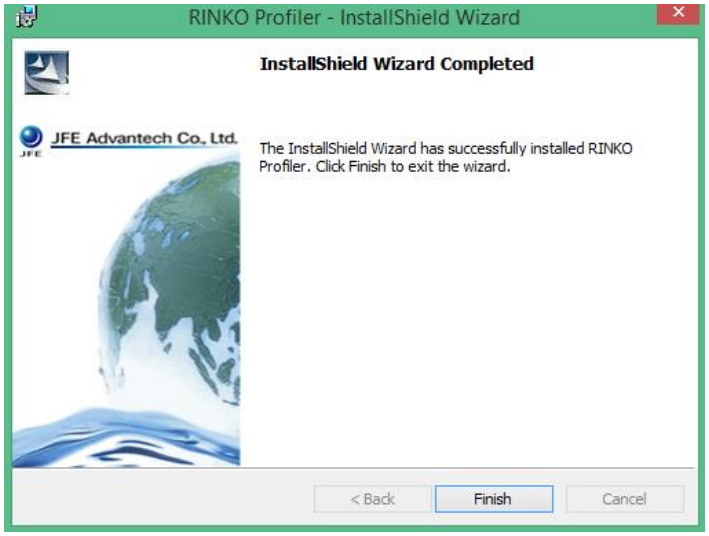
In the [Install Shield Wizard] window, click on Next> button.



By clicking on Change button, you can change the installing path. After deciding in which folder you will install the software, click on Next> button.



Click on <Back button for any configuration modification on the setup. Click on Install button after confirming the installation path and setup settings.
The installation will start automatically.



When the installation is successfully completed, the above screen will appear.
Click on Finish button to end the installation process.

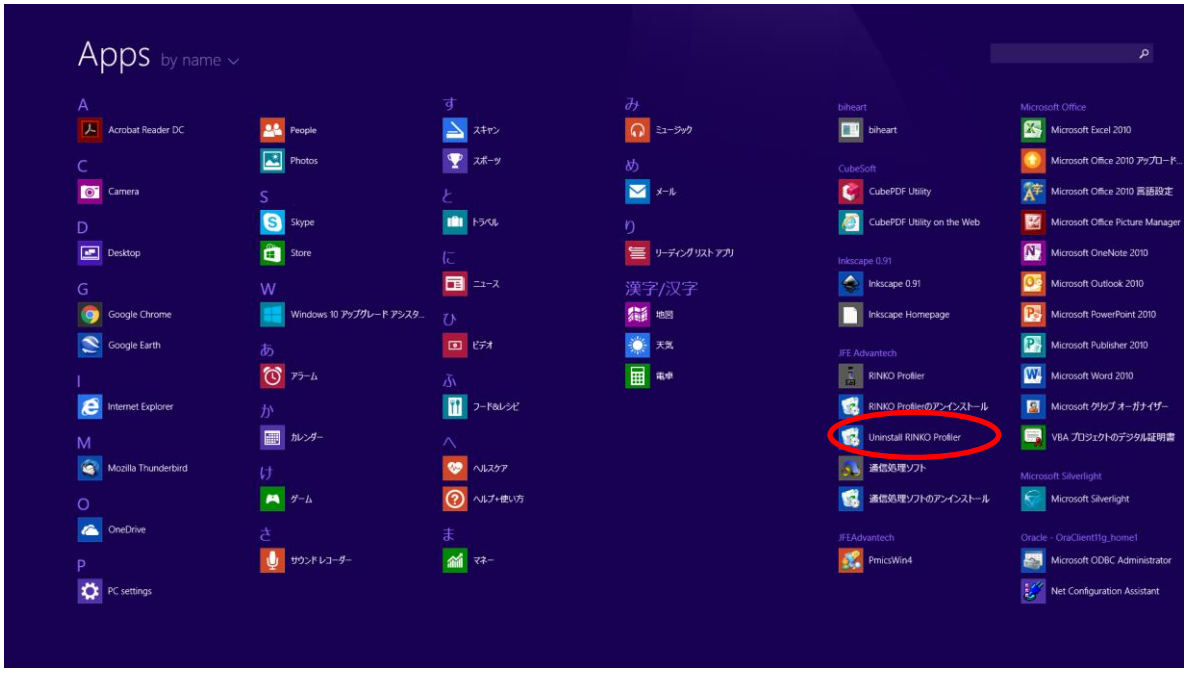
This acquisition tools is installed as default at :

C:¥Program Files¥JFE Advantech¥RINKO Profiler¥RINKO_Profiler.exe (Default)

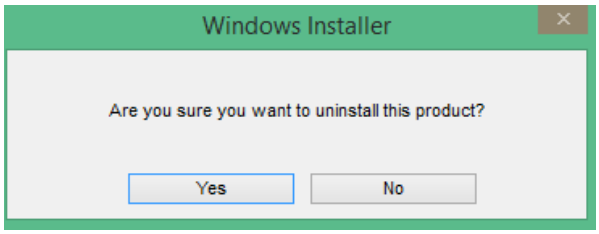
4-2. Uninstalling this software

When this software is not needed anymore, it can be deleted by the uninstalling program.
Also, in case you receive an updated version of this software, you will be asked to install it after deleting the old version.

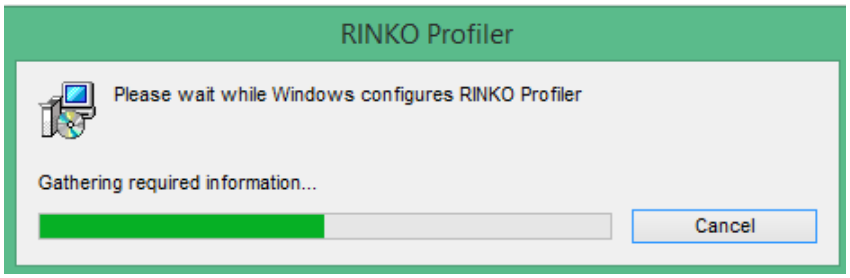
1） "RINKO Profiler uninstall" item is created on the start menu after you have completed the installation.
“Apps” -> [Uninstall RINKO Profiler].



2) When the confirmation message box appears, click on Yes to carry out the uninstallation.



The uninstallation process is then initiated.

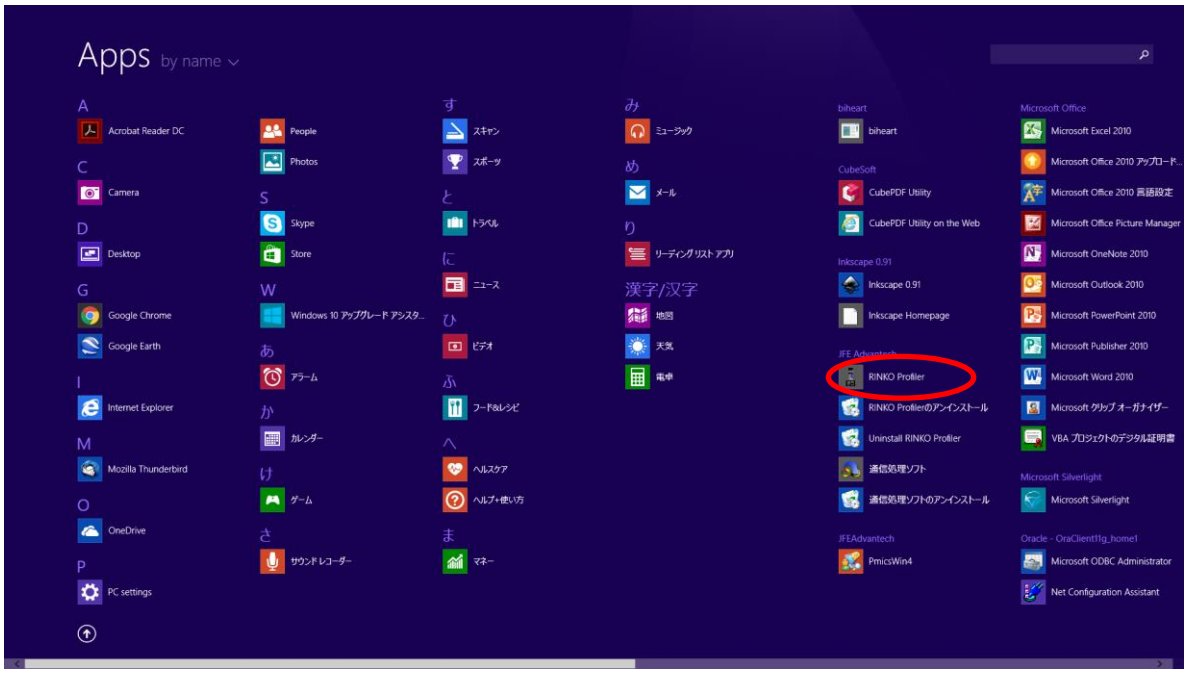


The software uninstallation has been completed when the above screen disappears.
Uninstallation can be carried out by [Add or remove programs] in [Control panel] as well.

5. Boot-up & exit of this software

5-1. Boot-up of this software

In order to boot up this software, find [RINKO Profiler] on “Apps”.

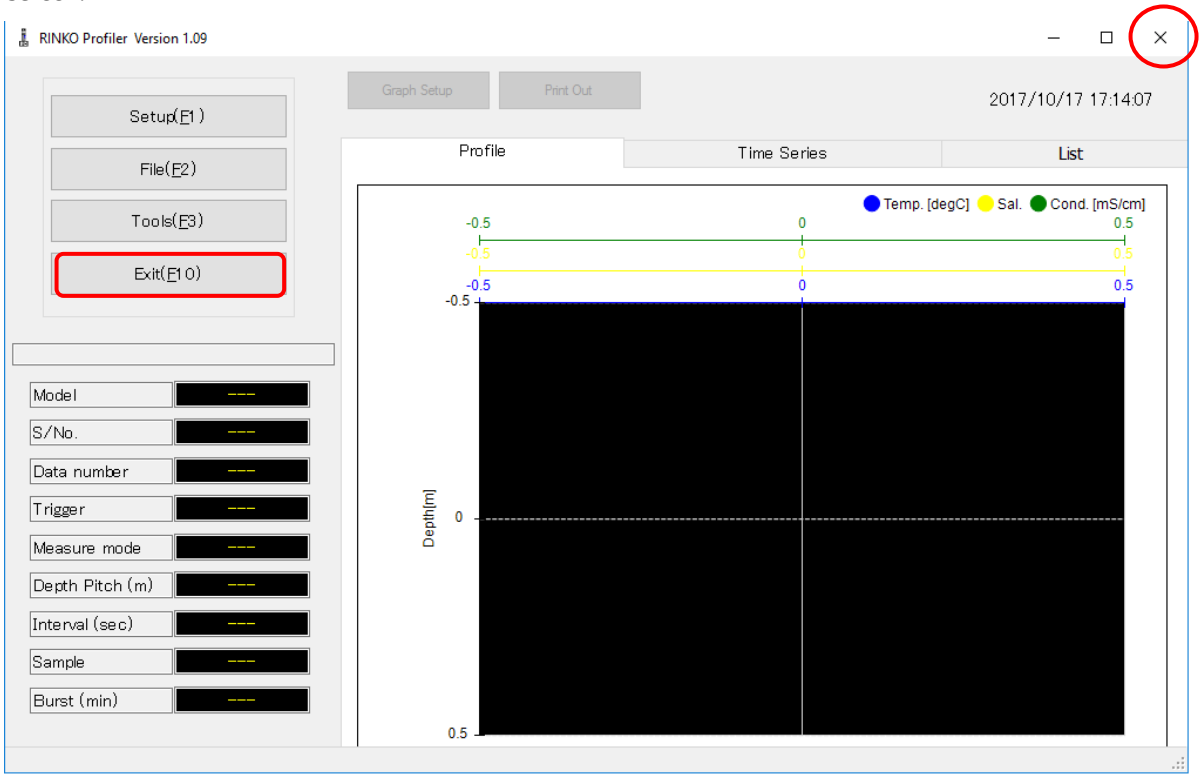


Or, double-click on the following icon on the desktop.

RINKO Profiler software will be initiated.

5-2. Exit out of this software

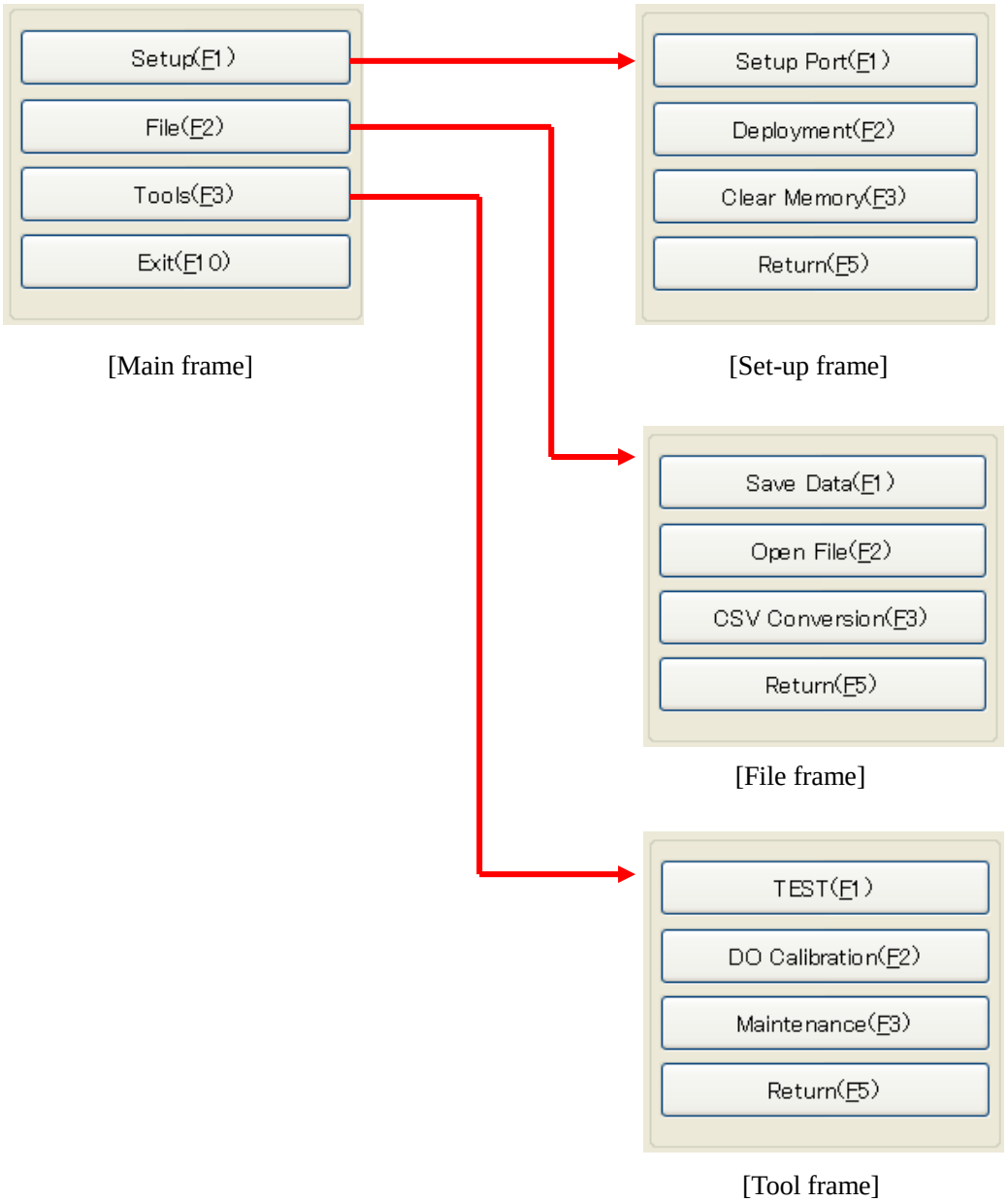
In order to quit the software, click on [X] button or click on Exit (F10) button located on the left in the screen.



6. Description of frames

6-1. Outline of frames

All functions from this software are operated from the buttons located to upper-left frame.
You can see the whole schematic functions of RINKO Profiler software below.



[Main frame]

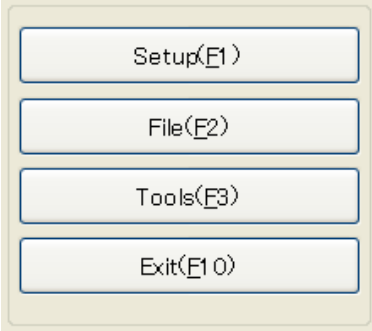
[Set-up frame]

[File frame]

[Tool frame]

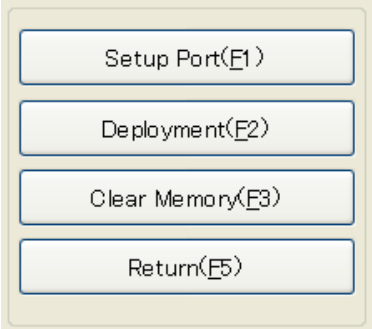
6-1-1. Detailed explanation of each frame

(1) Main frame



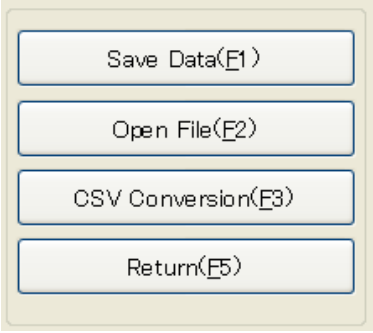
Setup	-to move to [Set-up frame]
File	-to move to [File frame]
Tools	-to move to [Tool frame]
Exit	-to quit the program

(2) Set-up frame



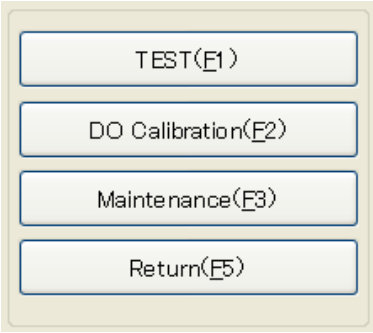
Setup Port	-to set serial ports
Deployment	-to set and input measurement settings on the instrument
Clear Memory	-to format the instrument memory.
Return	-to return to [Main frame]

(3) File frame



Save Data	-to transfer data from the instrument to a PC
Open File	-to read out the measurement data and Display them the graph or their list.
CSV Conversion	-to convert the measurement data (RAW file) into physical unit file (CSV file)
Return	-to return to [Main frame]

(4) Tool frame



TEST	-to communicate with the instrument and to confirm N-value / physical value output from each sensor.
DO Calibration	-to calibrate DO sensor
Maintenance	-to confirm coefficients and firmware version for instrument maintenance
Return	-to return to [Main frame]

7. Measurement

Follow the procedure below to set up the instrument for observation.

7-1. Preparation of instrument and interface

(1) In case AC power is supplied, connect the power cable to the Connector (2 pins) where is written "AC100 to 240V" on the back of the interface (IF).

⋆ Use batteries (AA battery × 4) when AC power source is not available (it is not possible to charge the instrument when using batteries)

Connect RS-232C cable with the connector indicated as "RS-232C" on the back of the IF and with the serial port in your PC.

Plug the communication cable in the connector where is written "SENSOR" at the front panel of the IF and connect the other end with the upper connector in the instrument (3 pins).

(2) Push POWER button to power up the interface.

(3) Turn on the wheeling switch on the top of the instrument, so that you can communicate with the instrument.

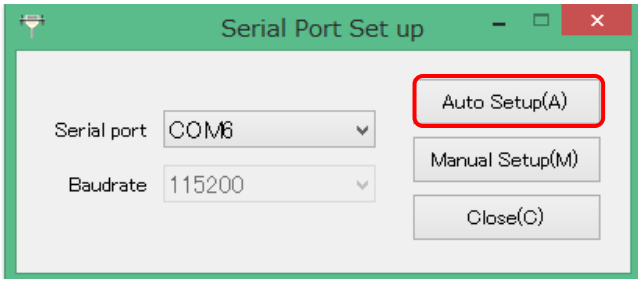
Note: Be sure to power IF first and then to turn the wheel switch on. If the order is in reverse, you will not be able to communicate with the instrument.

7-2. Serial port setting up

Move to set-up frame by clicking on Setup in the main frame at the top left of the software window. Then, click on Setup Port(F1) [port setting] in the set-up frame (or click F1 key) to open a serial port setting window. The serial port number in use of your PC is recognized automatically and it is shown in the Serial Port Combo-box. Click on Close button to close the Serial Port setting window.

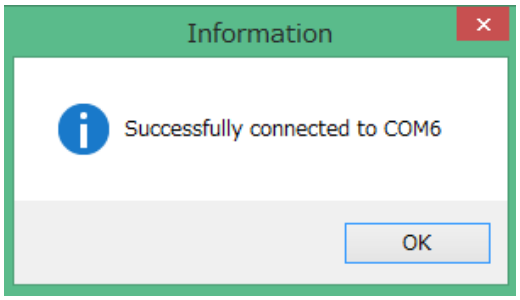
7-2-1. Automatic connection

The serial port number connected to the instrument is searched by pressing the Auto setup button



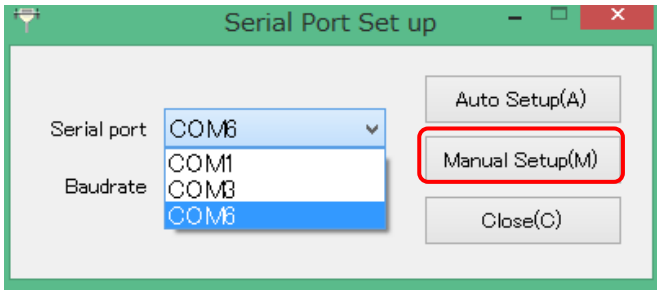
- Baud rate is fixed at 115200 bps

Connect your PC with the instrument and make it available for communication.
Click on Auto Setup to search the COM number being connected with the instrument (COM1 to COM32).
When automatic searching is completed, message box below appears.

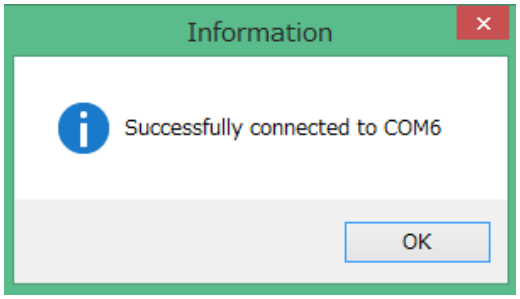


7-2-2. Manual connection

In case that the above auto searching fails, select manually the port number to be connected with the instrument and click on [Manual Setup] button.



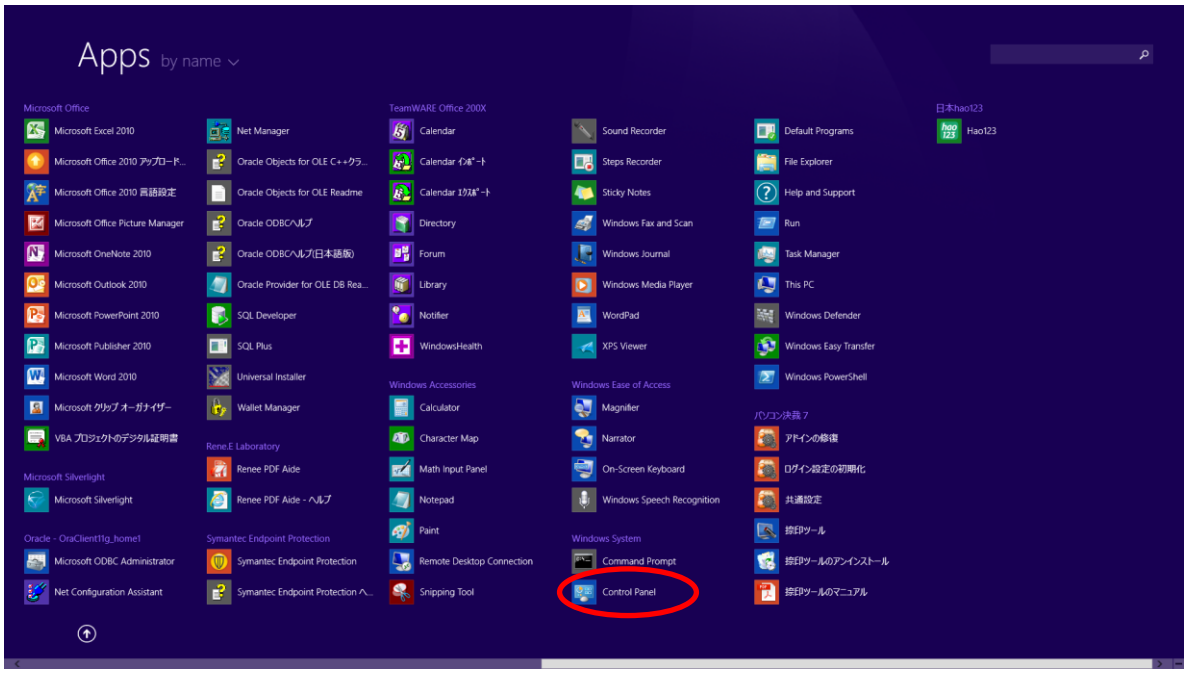
When the connection succeeds, the box below appears and the designated port number used for communication is displayed.

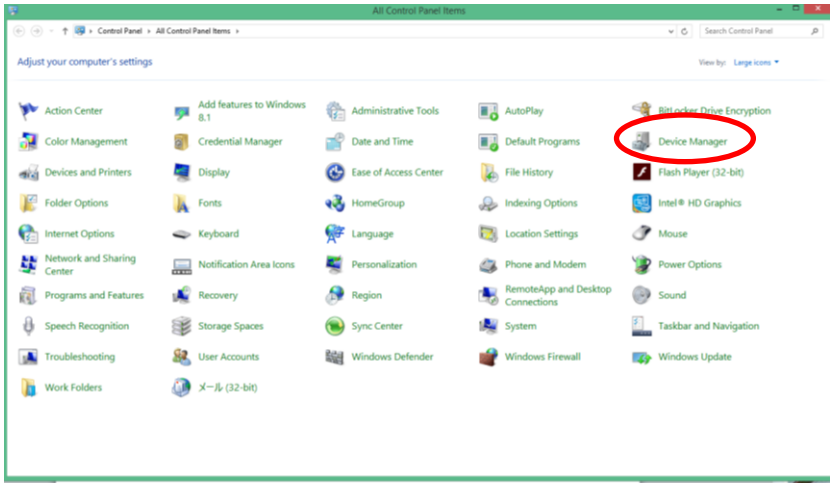


7-2-3. Confirm the port number by device manager

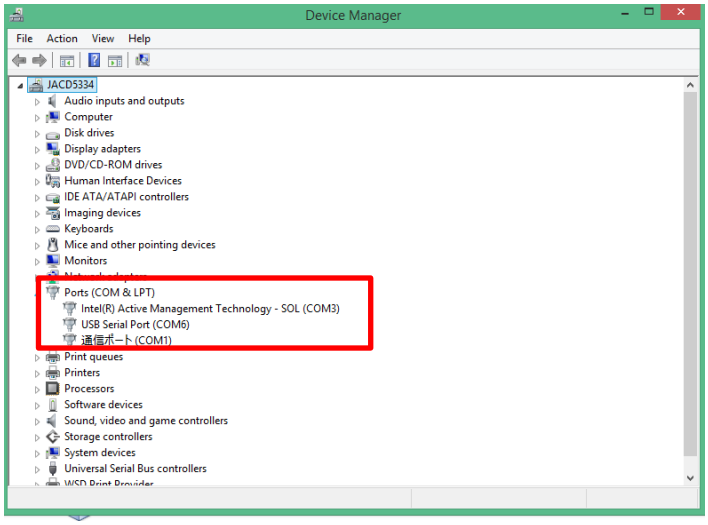
When you are unaware of the serial port number connected with the instrument, right-click on "My Computer" and select properties from the output menu.

In the system properties window, select the hardware tab and click on <device manager>.



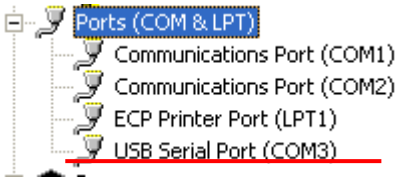


In the device manager window, check the COM & LPT ports.



In case you are using USB serial port, you may see a yellow question mark in the device manager window. That means USB Serial Port Adapter driver could not be installed correctly.
Therefore, you are asked to install the attached driver into your PC in accordance with the instruction handbook.

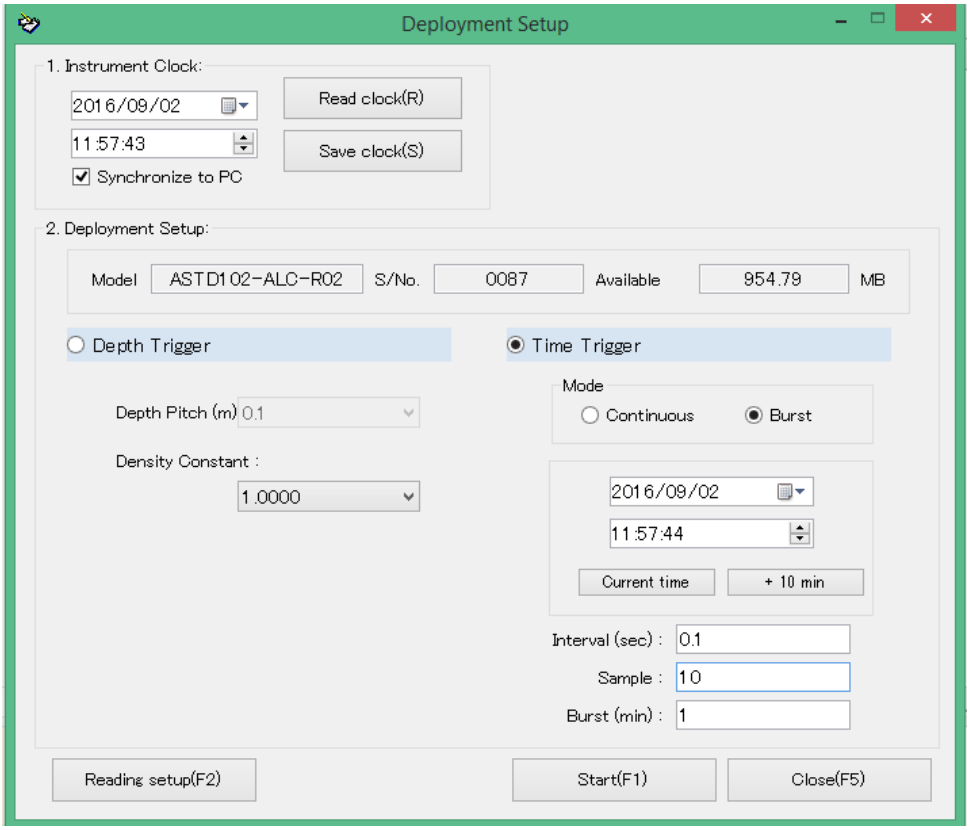
(the driver is not installed yet)



(the driver is installed correctly)

7-3. Deployment Setup

Click on Setup at the upper left on the software window to move to the setup frame.
Then, click on Deployment and the following window will show up.



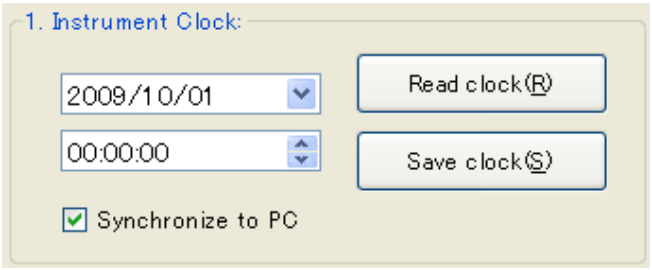
The setup window, while communicating with the instrument, shows the previous deployment plan (when the communication fails, the default values will be shown instead)

Clicking on Reading setup, the system information as well as registered deployment plan will be shown.

◆ System information	
Model	Instrument model is shown
S/No.	Serial number of the instrument is shown
Available	Remaining capacity (MB) of the internal memory is shown

7-3-1. Calendar setting

In the [1. Instrument Clock :] frame, the detailed calendar information (date/time information) stored in the instrument can be read and re-written.

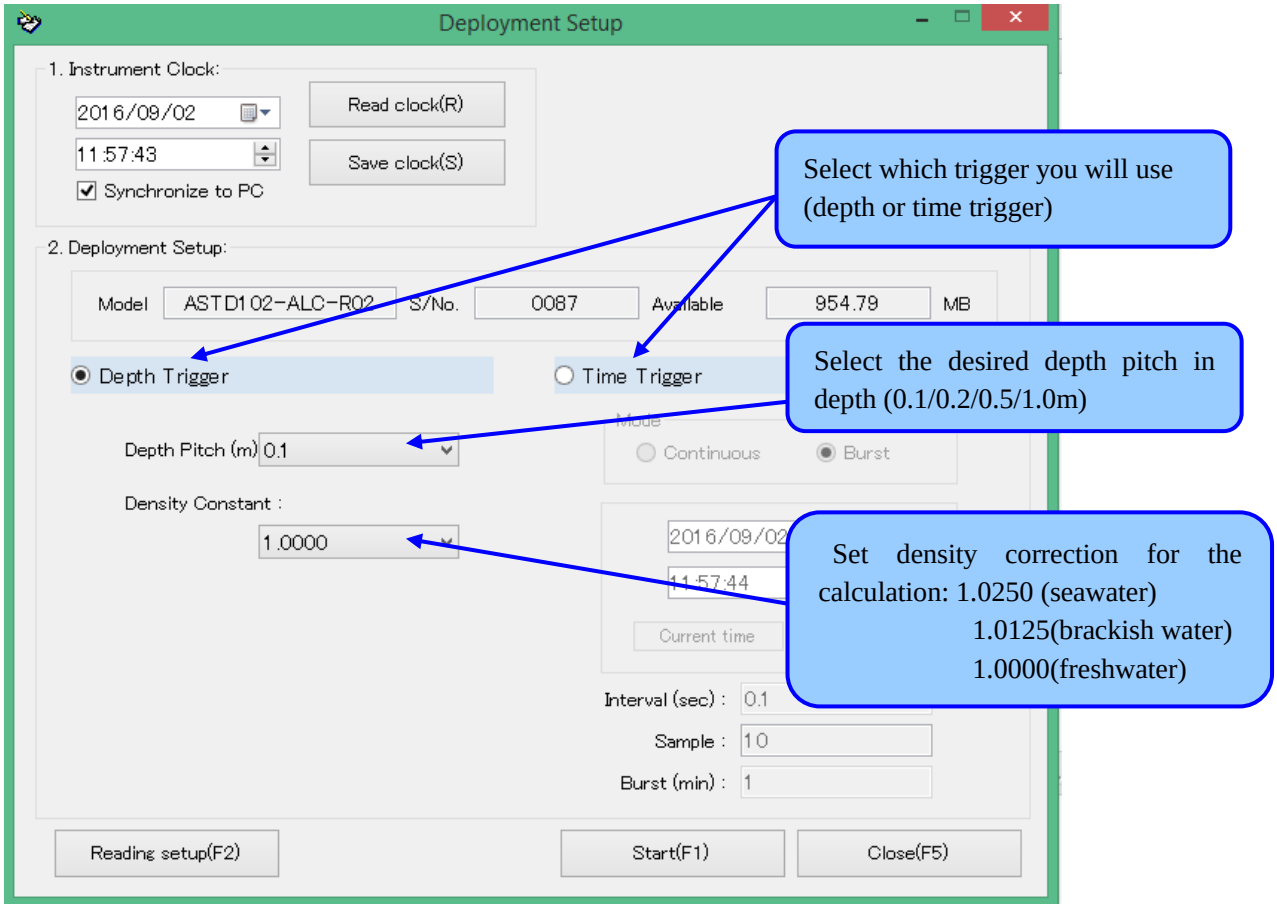


While "Synchronize to PC" is checked, click on Save clock button so that the time synchronized to the PC is written into the instrument. In case an arbitrary calendar information is needed to be registered into the instrument, uncheck "Synchronize to PC", and manually input the date/time on the "Instrument Clock", then click on Save clock button. The date/time information you have set up will be written into the built-in calendar of the instrument.

Click on Read clock button to read the calendar information in the instrument, which is related to the frame above. Always, verify whether the calendar of the instrument is correct before starting an observation.

7-3-2. Depth trigger setting

This instrument has two types of measuring mode, [depth trigger] and [time trigger].
Using the [depth trigger] you can measure every datum at designated depth rate (m) for vertical profiling.
Checking the mark of [depth trigger] allows you to change the depth pitch rate (m).



Depth pitch setting (m)

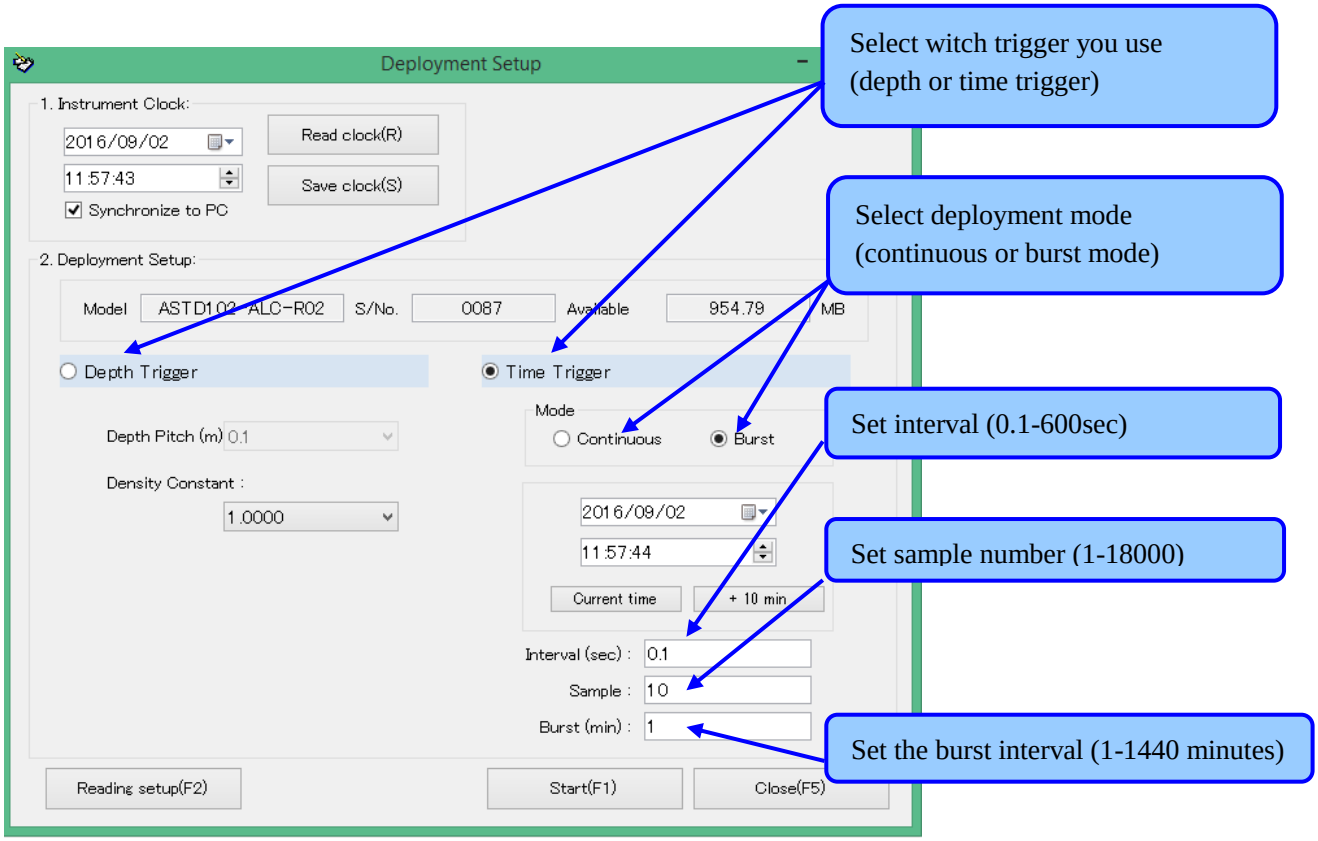
Depth pitch (m) can be selected among 0.1m/0.2m/0.5m/1.0m. Select desired depth pitch rate.

Density correction value for depth calculation

You can select among 1.0250/1.0125/1.0000. Apply 1.0250 when the deployment is in the sea, 1.0125 for brackish water and 1.0000 for freshwater measurements.

7-3-3. Time trigger setting

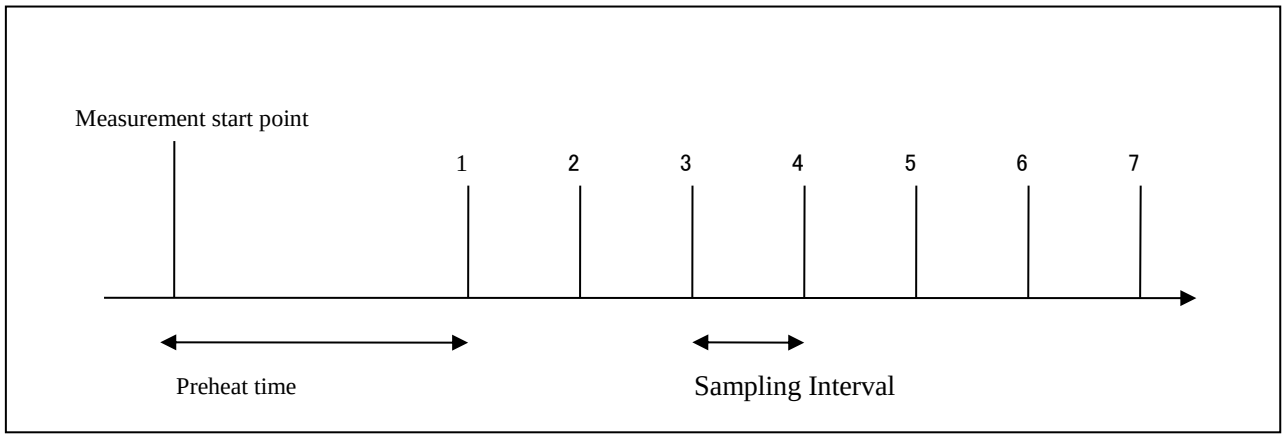
Time trigger mode allows you to collect the data during designated start time to end time. By checking [time trigger], you will be allowed to insert the desired time.


Deployment Setup
1. Instrument Clock:
2016/09/02
11:57:43
Synchronize to PC
Read clock(R)
Save clock(S)
2. Deployment Setup:
Model
ASTD102 ALC-R02
S/No.
0087
Available
954.79
MB
Depth Trigger
Time Trigger
Depth Pitch (m) 0.1
Density Constant :
1.0000
Mode
Continuous
Burst
2016/09/02
11:57:44
Current time
+ 10 min
Interval (sec) :
0.1
Sample :
10
Burst (min) :
1
Reading setup(F2)
Start(F1)
Close(F5)
Select witch trigger you use (depth or time trigger)
Select deployment mode (continuous or burst mode)
Set interval (0.1-600sec)
Set sample number (1-18000)
Set the burst interval (1-1440 minutes)

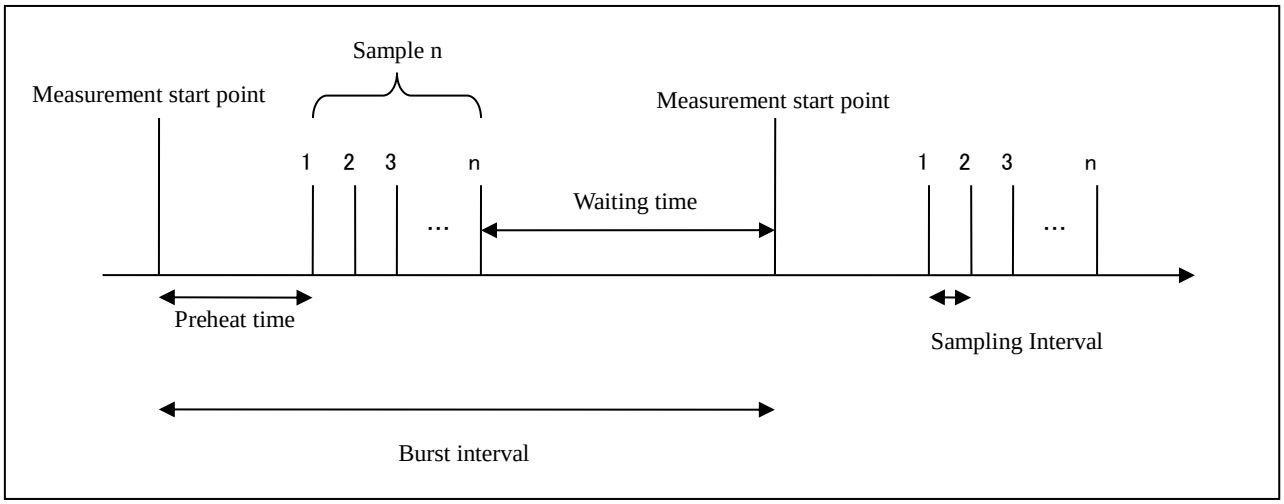
Measurement Mode

There are two types of measurement modes in this instrument, Continuous and Burst modes. Continuous mode allows you to do measurements at the interval being set by you. Burst mode allows you to do measurements at every burst interval (minute) that you have set.

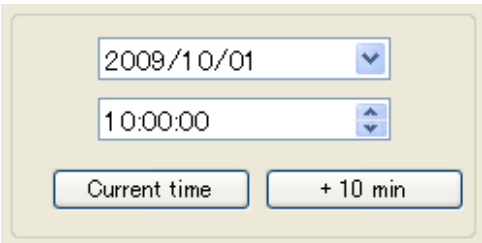
[Continuous mode]



[Burst mode]



Measurement start time



Measurements start at the time you have set in the window showed in the left. (The instrument is powered at the pre-heat time earlier than the time you have set and it will start at the appointed time). Minimum 1 minute time allowance is recommended before start measuring.

Clicking on [Current time] button allows you to change the displayed time to current time and [+10 min] button allows to advance the current time by 10 minutes.

For example, the time is shown as 12:34:56, if you click on [+10 min] button, time will show 12:40:00. Another click will advance more 10 minutes and so on, 12:50:00, 13:00:00, 13:10:00.

Sampling Interval setting (seconds)

You can select the interval from 0.1 seconds to 10 minutes.
. For less than 1 second interval; input the value at every 0.1 second (e.g.0.1 or 0.2).
(×0.12 second is not valid)
. For more than 1 second; input the value at every 1 second. 100 ms setting is not accepted.
(×10.5 second is not valid)

Sample setting

Sample number can be selected from 1 to18000. (Only available on burst mode)

Burst setting (min)

Burst interval can be selected from 1 to 1440 minutes (only available on burst mode).

Density correction for depth calculation

Density correction is also available as in depth trigger mode.

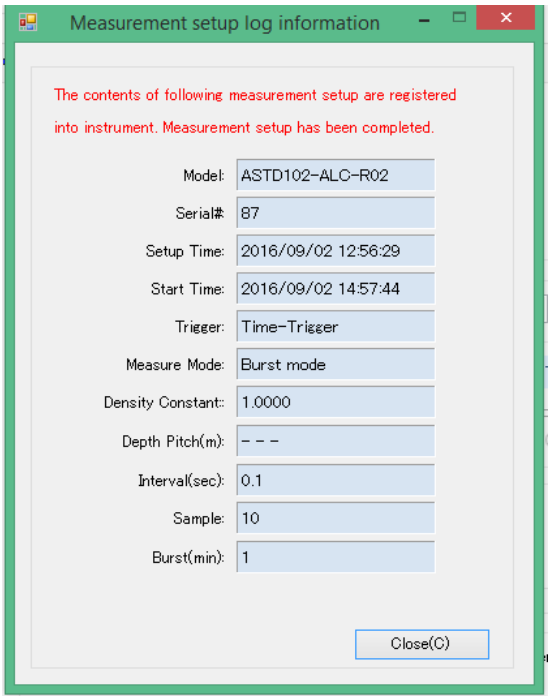
7-3-4. Start the measurement

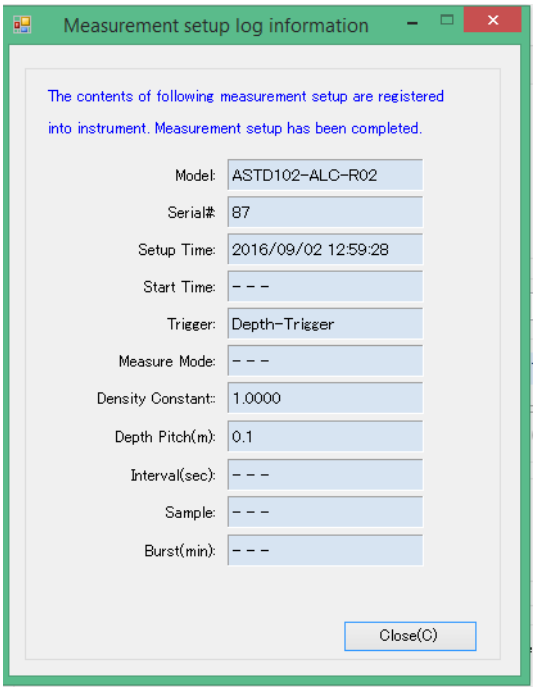
Once the setup by depth trigger mode or time trigger mode is completed, you can start measuring by clicking on [Start] button. After the measuring parameter settings are transferred to the instrument, the confirming pop-up windows below will appear. Verify and confirm the contents and click on [exit] button.

Now that you have completed the deployment setup, the measurements will start at the previously designated time.

A measurement setup log file is created at the same time and its information is stored at

C:¥Documents and Setting¥Username¥My Documents¥JFE Advantech¥RINKOProfiler¥DEPLOY¥yyyymmdd.log


Measurement setup log information
The contents of following measurement setup are registered into instrument. Measurement setup has been completed.
Model: ASTD102-ALC-R02
Serial#: 87
Setup Time: 2016/09/02 12:56:29
Start Time: 2016/09/02 14:57:44
Trigger: Time-Trigger
Measure Mode: Burst mode
Density Constant:: 1.0000
Depth Pitch(m): - - -
Interval(sec): 0.1
Sample: 10
Burst(min): 1
Close(C)


Measurement setup log information
The contents of following measurement setup are registered into instrument. Measurement setup has been completed.
Model: ASTD102-ALC-R02
Serial#: 87
Setup Time: 2016/09/02 12:59:28
Start Time: - - -
Trigger: Depth-Trigger
Measure Mode: - - -
Density Constant:: 1.0000
Depth Pitch(m): 0.1
Interval(sec): - - -
Sample: - - -
Burst(min): - - -
Close(C)

8. Start Measuring

Measuring by Depth Trigger

Disconnect the communication cable from the Interface unit while the instrument power is ON. The LED (red) will flash for 20 seconds and then remain lit. The measurement will start as soon as the LED stops flashing.

*Please note that zero adjustment has started when the LED starts flashing. Therefore, please keep the instrument at the sea surface until the LED stops flashing. The measurement can be started as soon as the LED stops flashing.

・Please set sensor sonde descending speed to (less than 50 cm s^{-1}).

*Turn off the instrument power after the observation is completed. If you will conduct the next observation with the same measuring settings, turn on the instrument power and wait for 20 seconds, until the LED stops flashing.

Measuring by Time Trigger

Disconnect the communication cable from the Interface unit while the instrument power is ON. The red LED will turn off automatically and it will remain in this condition until the exact time you have set for start the measurements. When the time for starting measurements has come, the LED starts lightening and the measurements start.

・Please set sensor sonde descending speed to (less than 50 cm s^{-1}).

If you would like to start to measure immediately, turn off the instrument power and turn it on again after you setup the measuring condition. The instrument will start measuring after 5 s of pre-heating time.

The time trigger measurement requires 5 seconds of pre-heating time after the lightening starts. The optional Chlorophyll/Turbidity sensors require 10 seconds of pre-heating time. On the other hand, the pre-heating time is included in the LED flashing duration (20 seconds) when the measuring is conducted by depth trigger method.

Max Recordable Data

The max recordable data vary depending on the interval/sampling/Burst setting condition.

Max Burst Cycles = Battery Capacity × 3600 / {(Interval × Sampling Number+10) × Consumption A when active + (Burst - Interval × Sampling Number - 10) × Consumption Amp while stalling}
(Example)
Interval: 0.5s, Sampling Number: 20, Burst Time: 1 hour(3600s)
Consumption Amp when active: 120 mA, Consumption Amp while stalling: 1.8 mA
Battery Capacity: 1500 mAh, Safety Factor: 0.8
Max Burst Cycles =1500 × 0.8 × 3600 / {(0.5 × 20 + 10) × 120 + (3600 - 0.5 × 20 – 10) × 1.8} = 610
So 610 hours deployment can be conducted from this calculation, however, please note that this cannot be guaranteed due to battery deterioration.

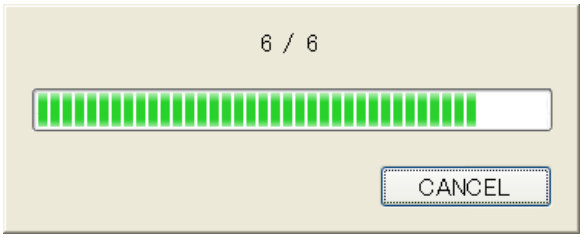
9. Data Transfer

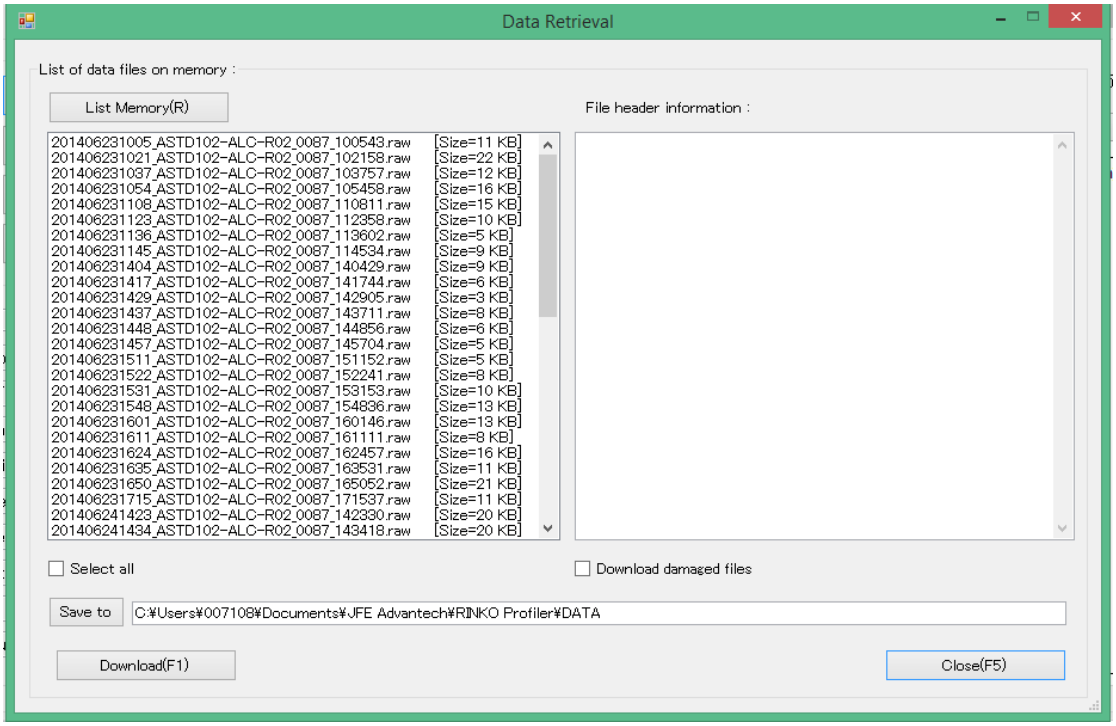
This section describes how to transfer the measured data from the instrument to your PC.

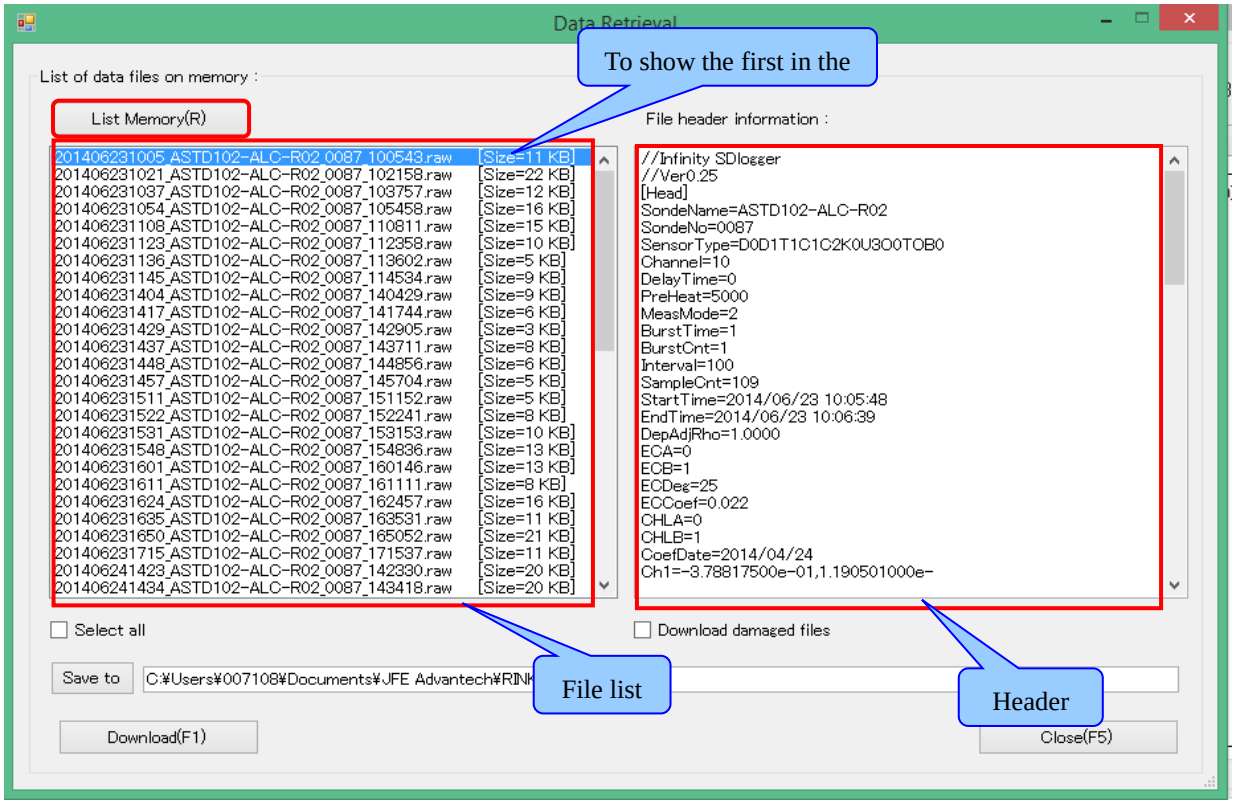
9-1. File List in the instrument

Click on [File] button in the main frame on the upper-left side of the software window to move to the file frame. Next, click on [Save Data] in the file frame to show the data transfer window.

When you click on [Save Data] button while the instrument is communicating with the PC, the data retrieval window appears and shows the data logged in the instrument automatically.





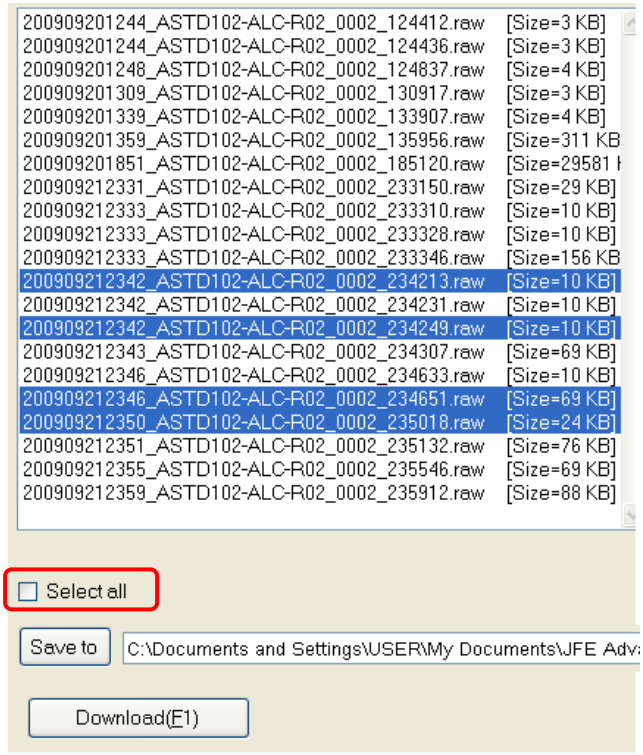


By clicking on List Memory , you can read out the file list in the instrument. If the instrument is not connected to your PC, you will see a blank file list. Click on List Memory button after confirming that the communication with the instrument has been established. The file list in the instrument is shown as above.

A double click on a file in the list shows you the file header information on the right screen.

9-2. File Selection

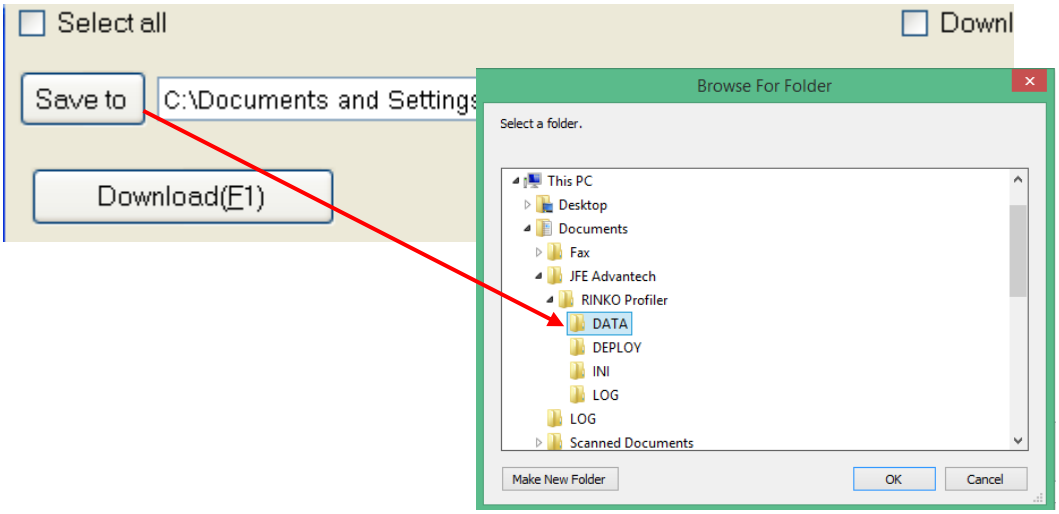
Choose a data file to be transferred from the file list. Only the chosen file will be transferred to your PC. (For multi-file selection, choose while pressing the Ctrl key)



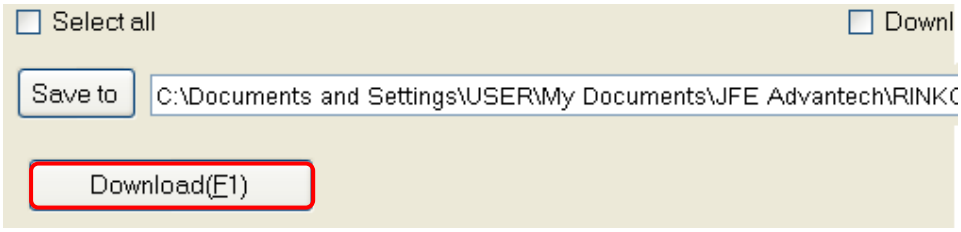
If you want to have the entire set of files in the file list to be transferred to your PC, put a check-mark on “Select all” and execute the data transfer procedure.

9-3. Download path

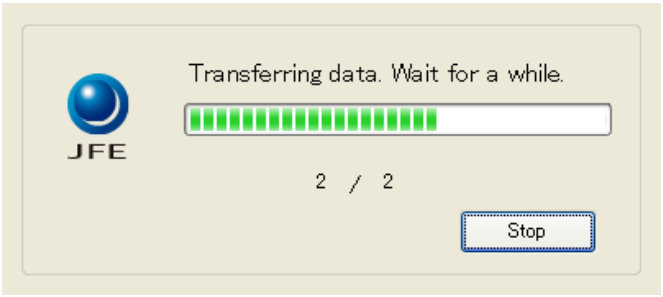
The file transfer path can be changed with the Save to button.
Clicking on Save to button will open the “Browse For Folder” dialog box . Choose the destination where the selected file is to be transferred. The path information of current destination is shown at the right side of the “Save to” button.



9-4. Download



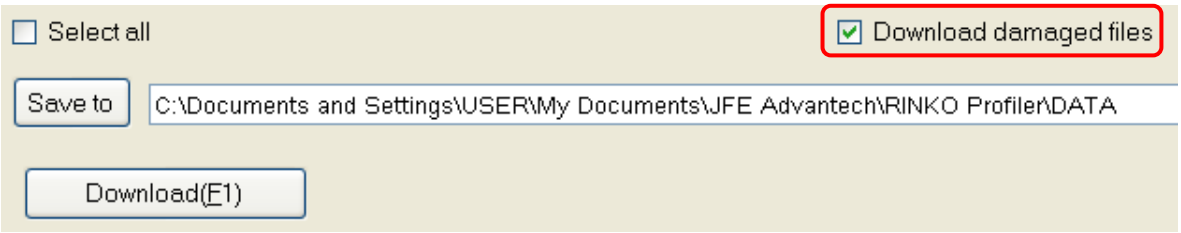
When the file and the path are decided, click on Download button.



The “download” procedure will start. To cancel it, click on Stop button.

9-5. Download damaged files

When the file transfer fails, the data file may be damaged. In this case, put a checkmark on “Download damaged files” to force the transfer procedure. Since the data are forced to be transferred per block unit in the memory media, the format of the transferred RAW file may be damaged as well.

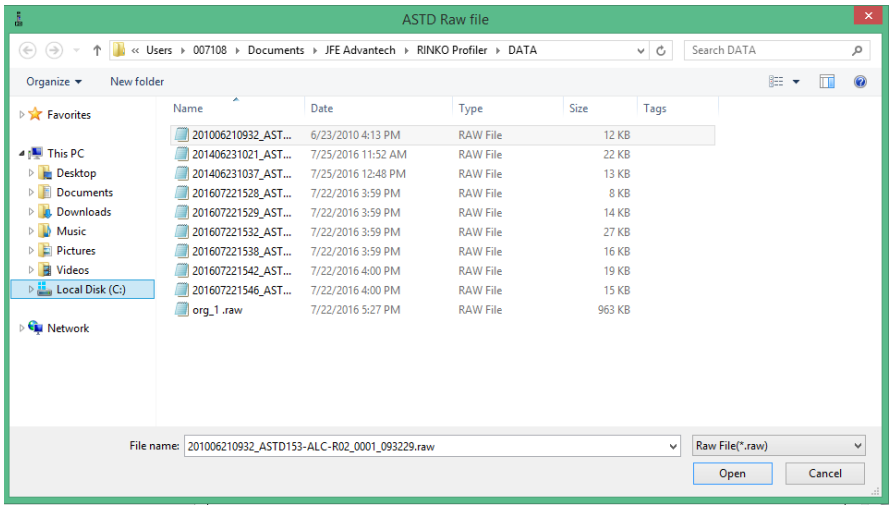


In case of downloading only the successful data files, uncheck “Download damaged files” before starting the data transfer, otherwise, there might be a possibility of damaging the .RAW data files.

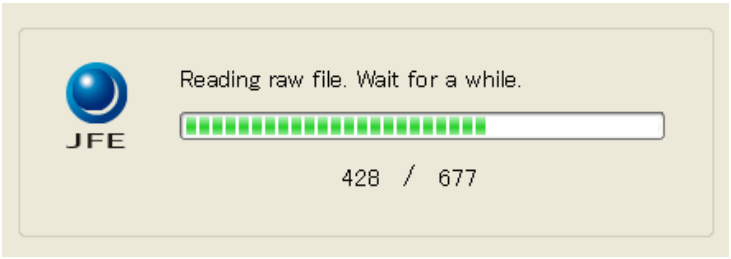
10. Opening a file

10-1. Open file

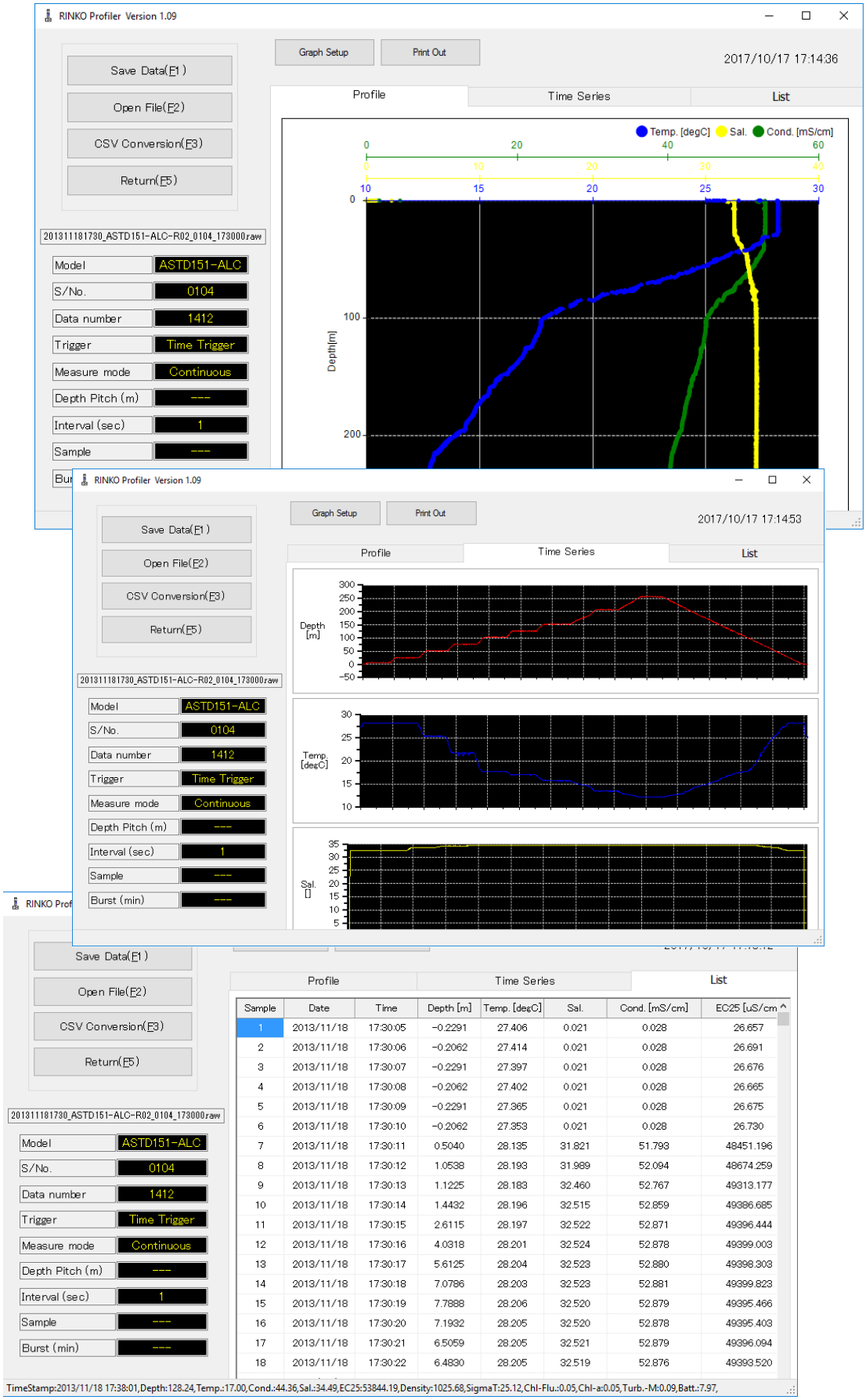
Here we open the retrieved RAW file and display data through graphs.
Click on File on main frame located at the upper left of the software window to shift to file frame.
Next, click on Open File.



As the [ASTD RAW file] dialog box appears, specify the file and click on Open . The reading of the RAW file will start and plots as well as data list will be displayed.



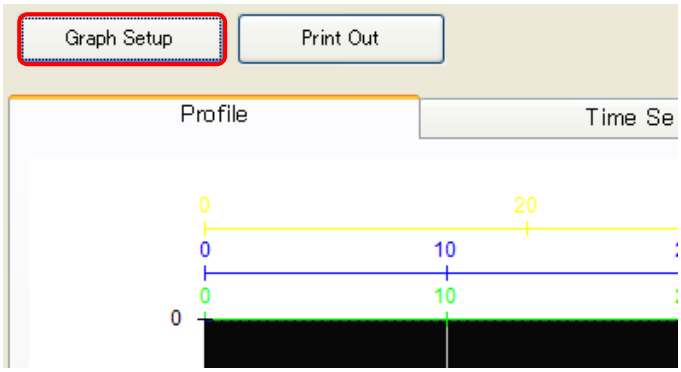
In case of time trigger measurements, vertical profiling plot time series plot and data list are shown. If depth trigger measurement is applied, vertical profiling plot and data list are shown.Click on each tab to shift between the options.


RINKO Profiler Version 1.09
Save Data(F1)
Open File(F2)
CSV Conversion(F3)
Return(F5)
Graph Setup
Print Out
2017/10/17 17:14:36
Profile
Time Series
List
Temp. [degC]
Sal.
Cond. [mS/cm]
Depth[m]
201311181730_ASTD151-ALC-R02_0104_173000.raw
Model ASTD151-ALC
S/No. 0104
Data number 1412
Trigger Time Trigger
Measure mode Continuous
Depth Pitch (m) ---
Interval (sec) 1
Sample ---
RINKO Profiler Version 1.09
2017/10/17 17:14:53
Depth [m]
Temp. [degC]
Sal. []
Burst (min) ---
Sample Date Time Depth [m] Temp. [degC] Sal. Cond. [mS/cm] EC25 [uS/cm
1 2013/11/18 17:30:05 -0.2291 27.406 0.021 0.028 26.657
2 2013/11/18 17:30:06 -0.2062 27.414 0.021 0.028 26.691
3 2013/11/18 17:30:07 -0.2291 27.397 0.021 0.028 26.676
4 2013/11/18 17:30:08 -0.2062 27.402 0.021 0.028 26.665
5 2013/11/18 17:30:09 -0.2291 27.365 0.021 0.028 26.675
6 2013/11/18 17:30:10 -0.2062 27.353 0.021 0.028 26.730
7 2013/11/18 17:30:11 0.5040 28.135 31.821 51.793 48451.196
8 2013/11/18 17:30:12 1.0538 28.193 31.989 52.094 48674.259
9 2013/11/18 17:30:13 1.1225 28.183 32.460 52.767 49313.177
10 2013/11/18 17:30:14 1.4432 28.196 32.515 52.859 49386.685
11 2013/11/18 17:30:15 2.6115 28.197 32.522 52.871 49396.444
12 2013/11/18 17:30:16 4.0318 28.201 32.524 52.878 49399.003
13 2013/11/18 17:30:17 5.6125 28.204 32.523 52.880 49398.303
14 2013/11/18 17:30:18 7.0786 28.203 32.523 52.881 49399.823
15 2013/11/18 17:30:19 7.7888 28.206 32.520 52.879 49395.466
16 2013/11/18 17:30:20 7.1932 28.205 32.520 52.878 49395.403
17 2013/11/18 17:30:21 6.5059 28.205 32.521 52.879 49396.094
18 2013/11/18 17:30:22 6.4830 28.205 32.519 52.876 49393.520
TimeStamp:2013/11/18 17:38:01,Depth:128.24,Temp.:17.00,Cond.:44.36,Sal.:34.49,EC25:53844.19,Density:1025.68,SigmaT:25.12,Chl-Flu.:0.05,Chl-a:0.05,Turb.-M:0.09,Batt.:7.97,

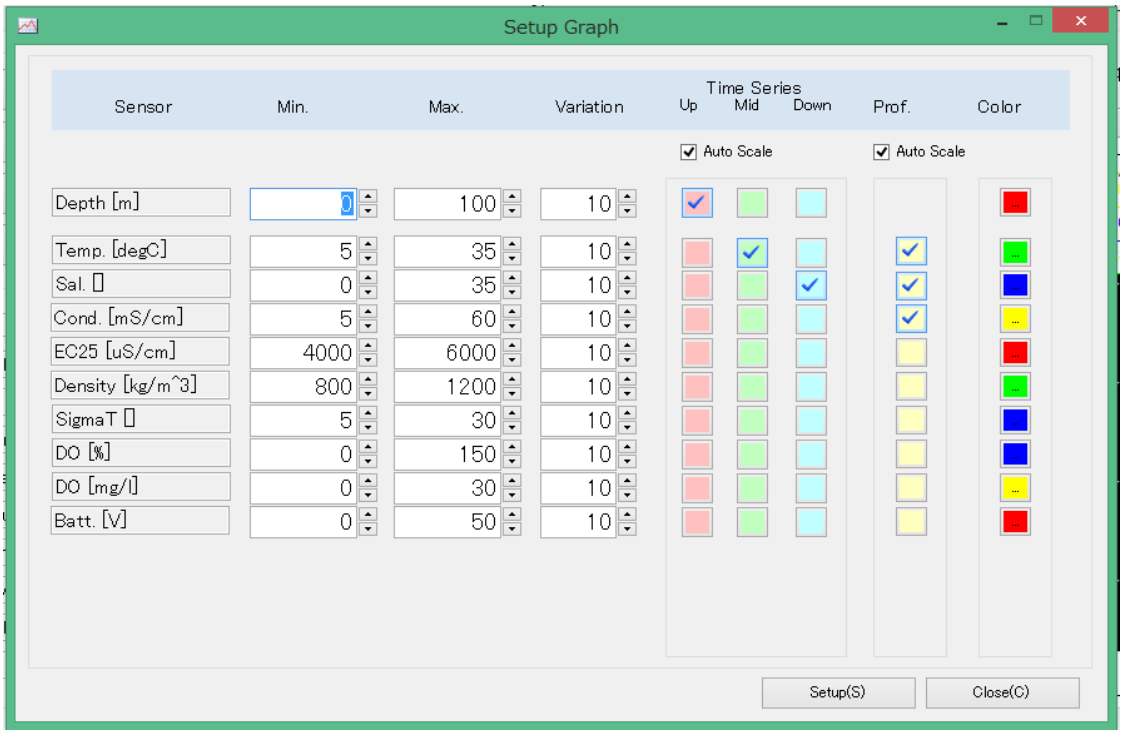
11. Graph Settings

11-1. Graph settings

Displayed vertical graphs as well as time series graphs RAW can be specified by the graph settings window in order to adjust the plot max & minimum values, color and sensors.



Click on [Graph Setup] to open graph settings window.

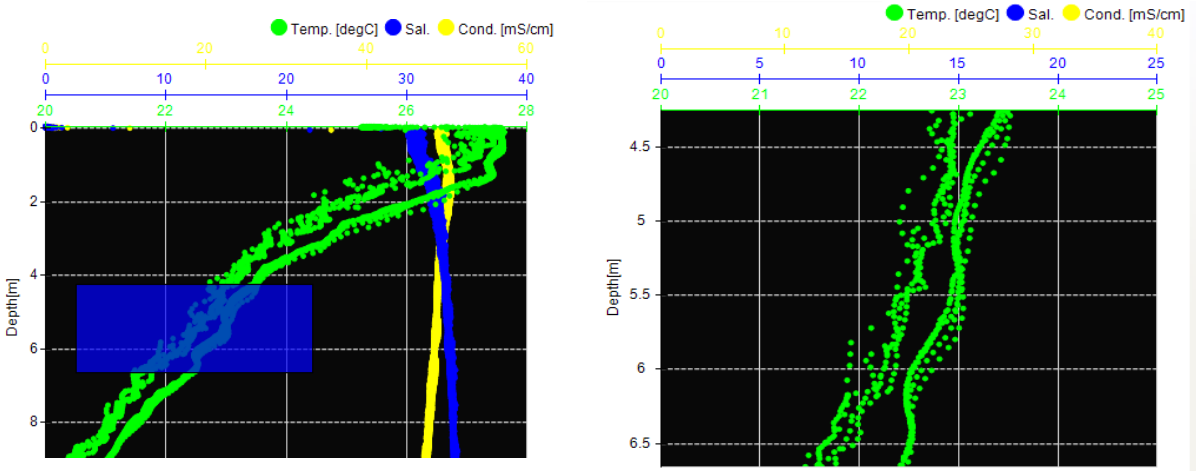


Min. value	Set up minimum value of the graph. Directly input the value to be set or set it up scrolling the Up Down button located on the right.
Max. value	Set up maximum value of the graph. Directly input the value to be set or set it up scrolling the Up Down button located on the right.
Variation	Increase or decrease the value scrolling the Up Down button on the right side. After setting up min. & max. values, set the steps to be used in the graph.
Up, Mid, Down	Check-mark the graph you desire to be shown. Three types of graph display are available in the time series graph settings.
Vertical Profiling	Check-mark the graph you desire to be shown. Three types of graph display are available in vertical profiling graph settings.
Color	Set up color for each parameter plotted in the graph. Click on the color button to set it up. As “color setup” dialog box is shown, select a preferred color.
Auto Scale	If [Auto Scale] is check-marked in time series graph or in vertical profiling graph settings, maximum and minimum values are automatically detected and graph ranges are shifted so that all data points can be displayed.

11-2. Zoom and un-zoom

11-2-1. Zoom on a vertical profile graph

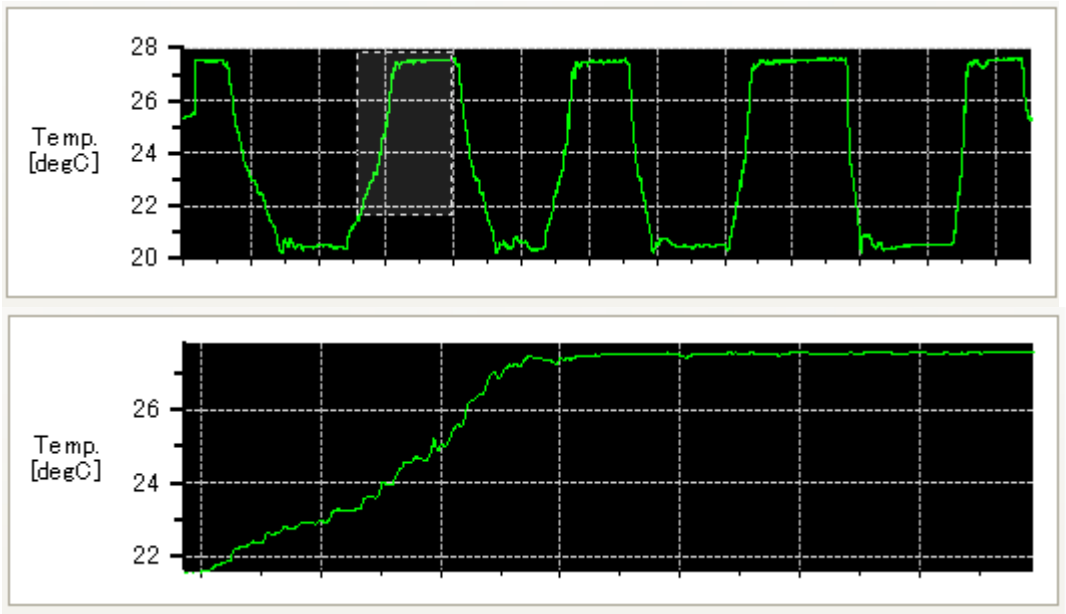
If you want to zoom a certain part on a vertical profiling graph, drag your mouse to specify the region you want to zoom. (You must drag your mouse from upper right to lower left)



When the selected area is zoomed up, right click on the graph to return to the original range.

11-2-2. Zoom on a time series graph

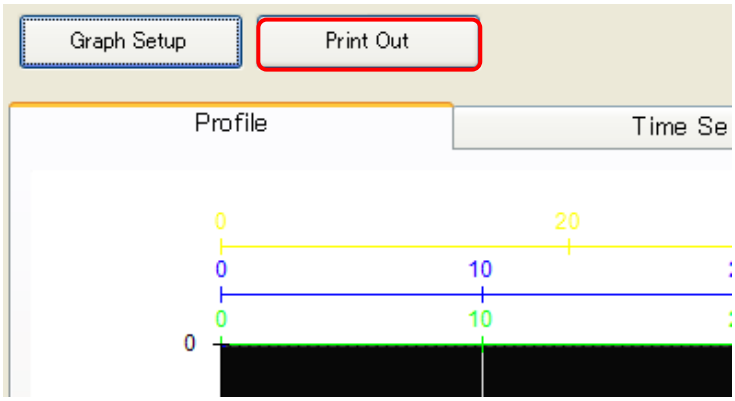
You can also zoom on a time series graph by specifying the region you want. In this case there is no restriction to move your mouse for selecting the area to be zoomed.



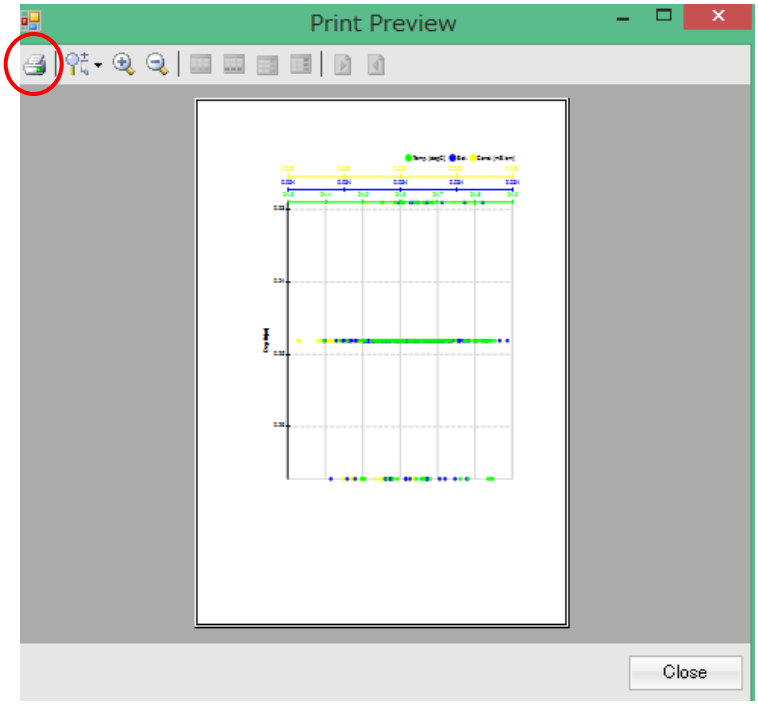
When the selected area is zoomed, right click on graph to return to the original range.

12. Print

Here you are instructed how to print vertical profiling and time series graphs. First, open the RAW file and display the desired graph. Then, click on [Print out] button.

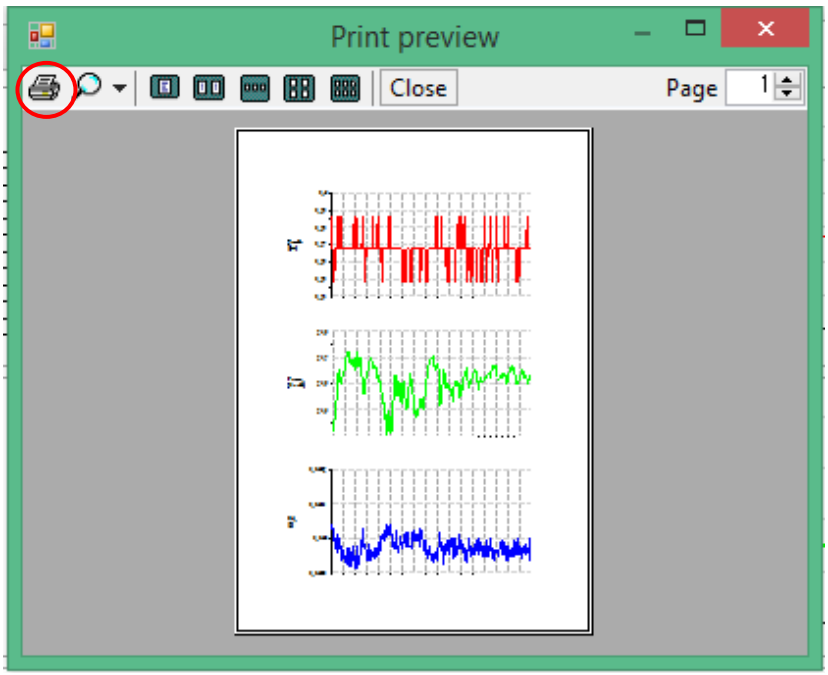


When you click on Print Out button while displaying a vertical profiling graph (the vertical profiling tab is being selected), the print-preview window of vertical profiling graphs appears, as shown below.



By clicking on the printer-icon so you can start printing.

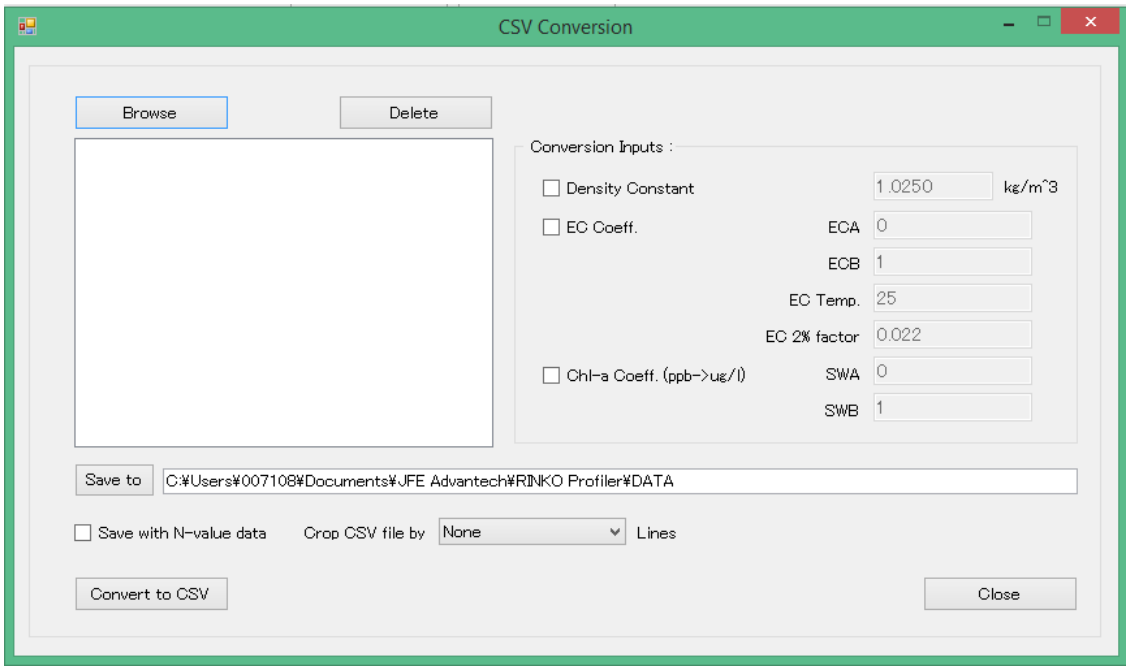
A time series graph is displayed (time series graph tab is being selected).



By clicking the icon of the printer you can start printing.

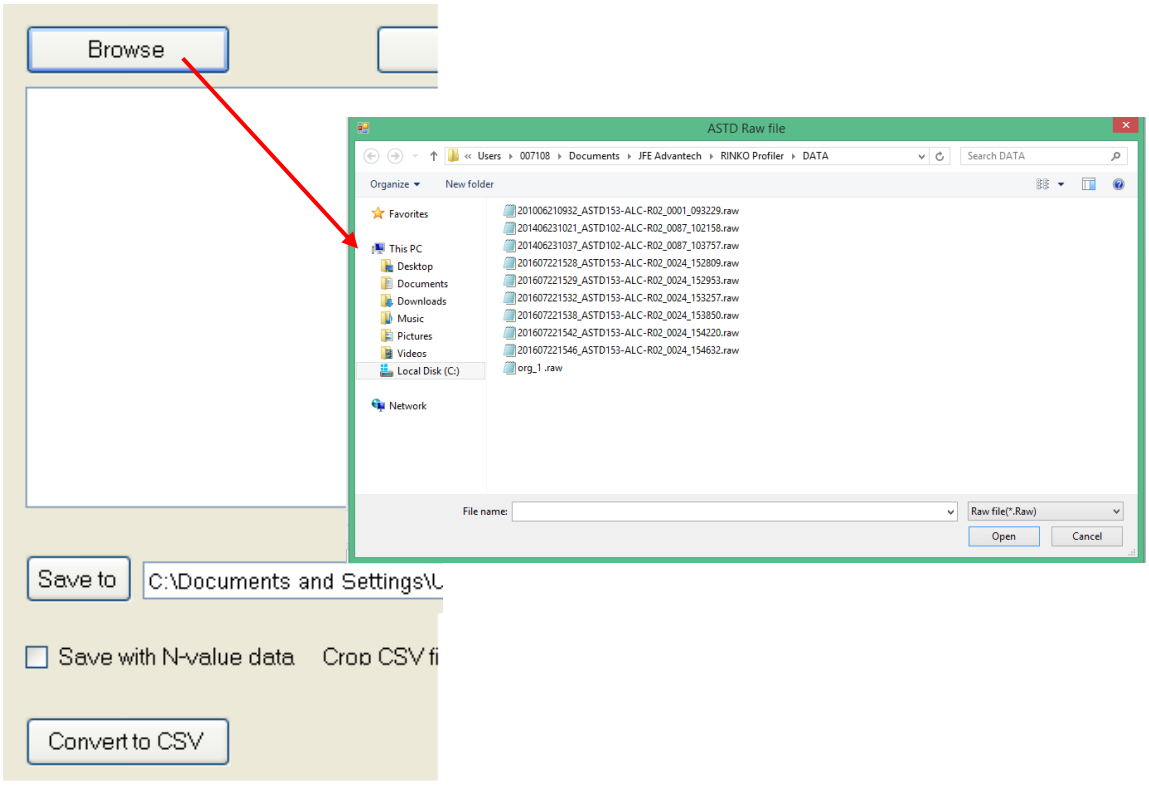
13. Converting to CSV files

This chapter describes how to convert the measured data (RAW file) into the physical data (CSV file). Click on File button at main frame located in the upper left on the software window, shifting to the file frame. Then, click on Convert to CSV button on the file frame to open the CSV conversion window.

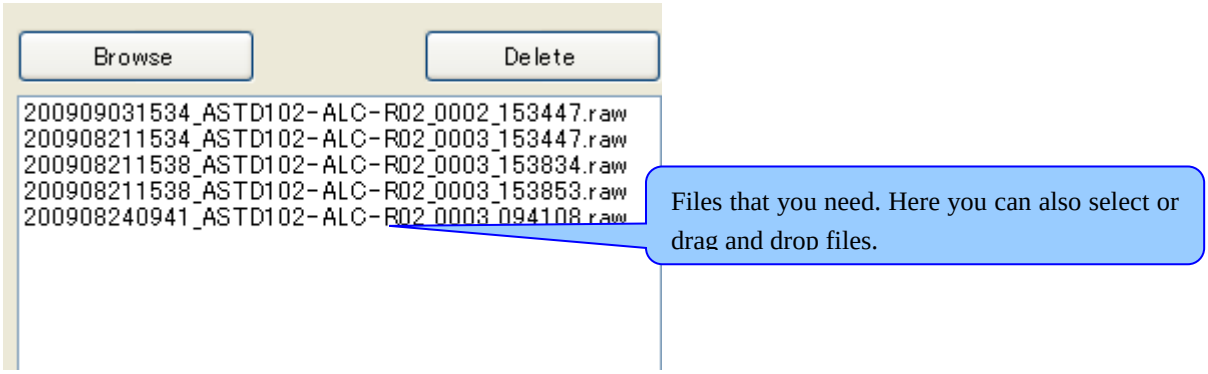


13-1. Selecting RAW files

Choose the RAW file to be converted into CSV format by click on Browse button.

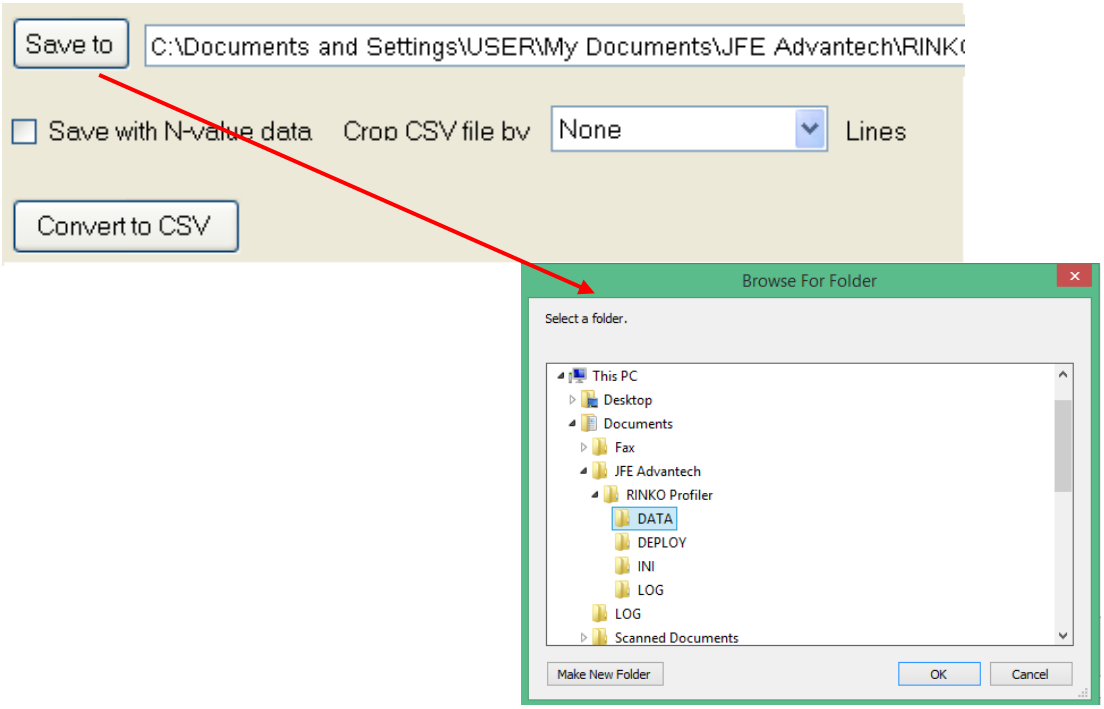


In the “Open” dialog box, choose the desired RAW file. Multiple files can also be chosen. Click on Open button to add the into the file conversion list. Drag and drop files also allows you to add them into the file conversion list.



13-2. Destination path of CSV files

Here we describe how to choose the destination path to save the CSV files.

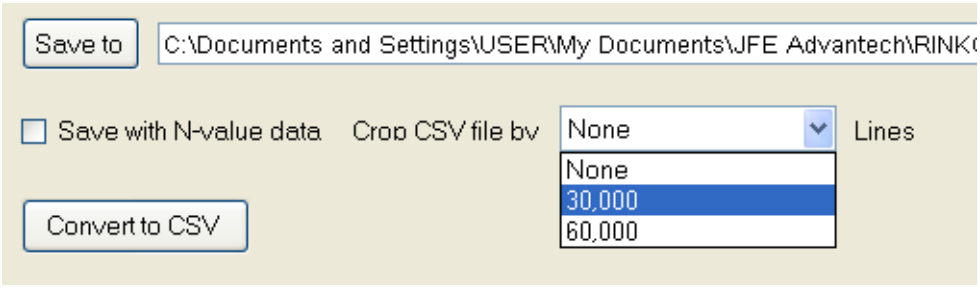


Click on Save to button to show "Browse For Folder" dialog box and specify the destination path to save the CSV file. The chosen save path will appear on the right side of the save button.

13-3. Conversion to CSV format

When the CSV conversion is carried out while check marking the "Save with N-value data", the CSV file includes the physical value and N-value information.

In case of "Crop CSV file" is set, the CSV file is divided per the specified number of lines.



After the setup above is completed, click on Convert to CSV button. The CSV file will be created and saved in the specified folder.

13-3-1. CSV Export of DO Value

DO values will be exported along when exporting CSV files (1) using the software version 1.09 or later if instruments with RINKO sensor was used.
Please refer to "16-2. DO post processing selection" for changing [mg/l] and [µmol/l].

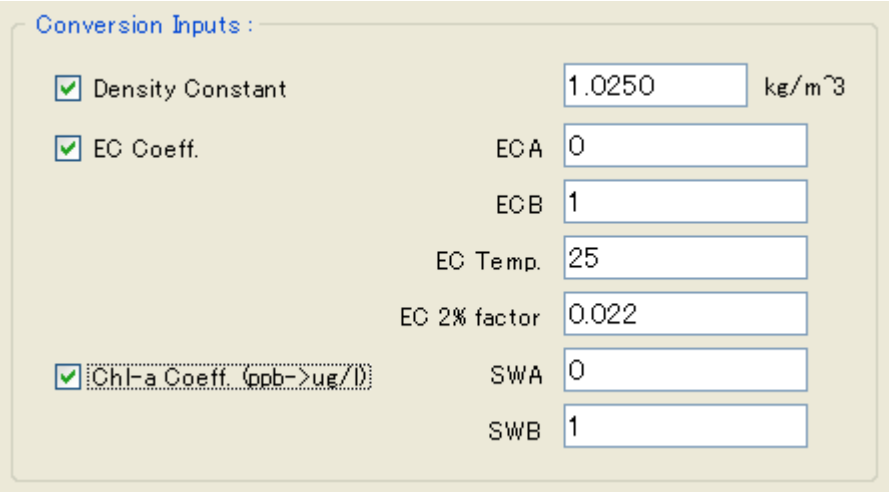
Line Name	Description
Weiss-DO[mg/l] Weiss-DO [µmol/l]	Ordinary DO value. Calculate using Weiss equation.
G&G-DO[mg/l] G&G-DO [µmol/l]	Added as new feature from Ver.1.09 Calculate using Garcia & Gordon equation.
B&K-DO[mg/l] B&K-DO [µmol/l]	Added as new feature from Ver.1.09 Calculate Benson & Krause equation.

(1) Above will be exported as CSV files but only Weiss values will be displayed.

[Output Example]: In case of using ASTD102
[Item]
Depth [m],Temp. [deg C],Sal. [ ],Cond. [mS/cm],EC25 [µS/cm],Density [kg/m^3],SigmaT [ ],Chl-Flu. [ppb],Chl-a [µg/l],Turb-M [FTU],DO [%],Weiss-DO [mg/l],Batt. [V],G&G-DO [mg/l],B&K-DO [mg/l],Pressure,Temp. for depth,Temp.,Cond.,Cond1,Cond2,Chl-Flu.,Turb. -M,DO,Temp. for DO,Battery,

13-4. Conversion input

Here we describe how to set up the conversion inputs for physical values. Please put a checkmark on the necessary items. When the data are converted to the physical values, the coefficient factors set up herewith are applied for the check marked items.
In case of no checkmark, the conversion is made by the default factors that are registered in the instrument.



13-4-1. Density compensation constant

The density compensation constant is applied when converting from pressure (MPa) to depth (m).

For measurements in sea water : 1.0250
For measurements in brackish water : 1.0125
For measurements in fresh water : 1.0000

As an approximated standard, input one of these density compensation constants.

$$Dep = \frac{MPa \times 101.9716}{\rho_D}$$

Dep : Depth (m)
MPa : Pressure (MPa)
ρ_D : Density compensation constant

13-4-2. EC compensation coefficient

The EC compensation coefficient is applied to estimate EC at standard water temperature.

$$EC = \frac{COND \times ECB \times 1000}{(TEMP - TEMP_{EC}) \times EC2P} + ECA$$

EC : EC value at standard water temperature (μS/cm)
COND : Electric conductivity (mS/cm)
ECA : Compensation factor (Default factor : 0)
ECB : Compensation factor (Default factor : 1)
TEMP : Water temperature value (°C)
$TEMP_{EC}$: Standard water temperature (°C) (Default factor : 25)
EC2P : EC2% factor (Default factor : 0.022)

13-4-3. Chl-a Conversion Coefficient (ppb→μg/l)

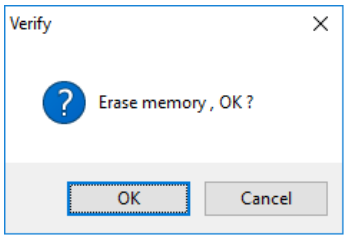
The coefficient is applied when fluorescence intensity is converted from ppb to μg/l of chlorophyll-a (Chl-a).

Chl-a = SWA + Chl-Flu. × SWB

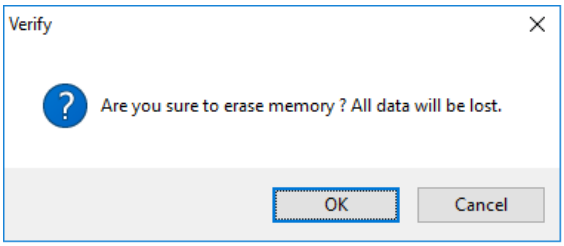
SWA : Conversion coefficient A / SWB : Conversion coefficient B

14. Cleaning memory

Click on Setup of the main frame on upper-right in the software window, shifting to the setup frame. Next, click on Clear Memory and then, the following window will show up. Click on OK button. (Click on Cancel button if you want to stop the procedure)

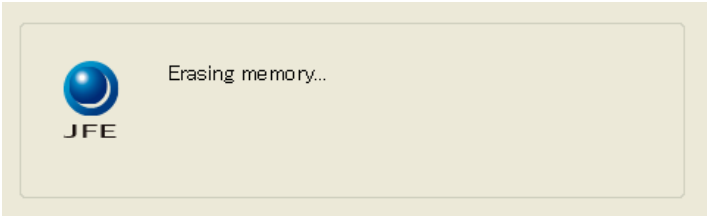


A second verification window will appear, click on OK to continue. If you want to stop the procedure, click on Cancel .



When the cleaning memory process starts, the following pop-up window appears.

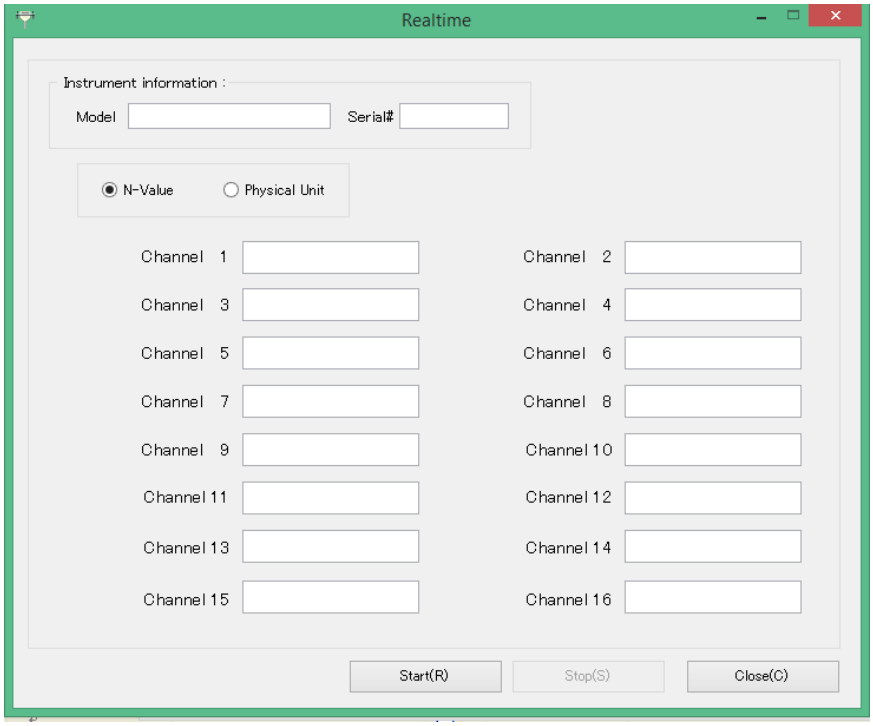
.



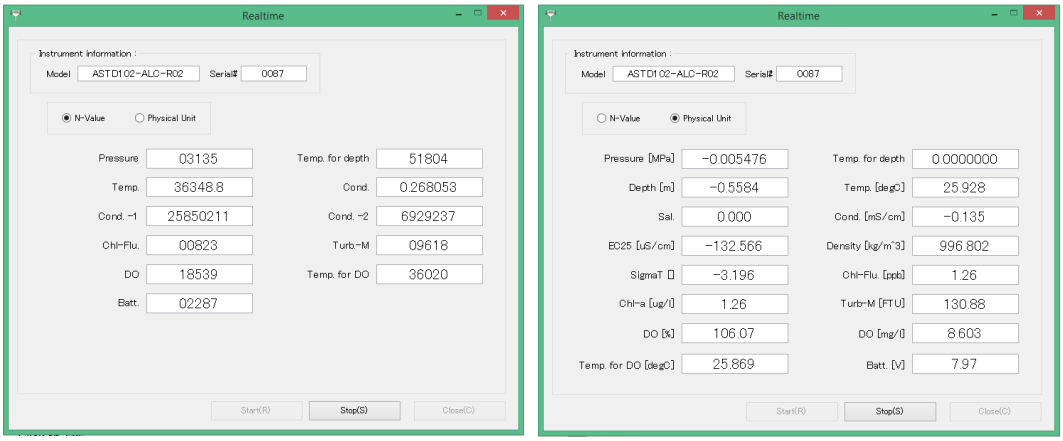
After the memory is completely erased, the following window and message appears.

15. Real-time communication

You can display the information from all sensors in real-time and verify if there is any abnormal indication on the sensors before starting a deployment.
Click on Tools button on the upper-right main frame of the software to shift to the tool frame. Click on TEST to open the real-time communication window.



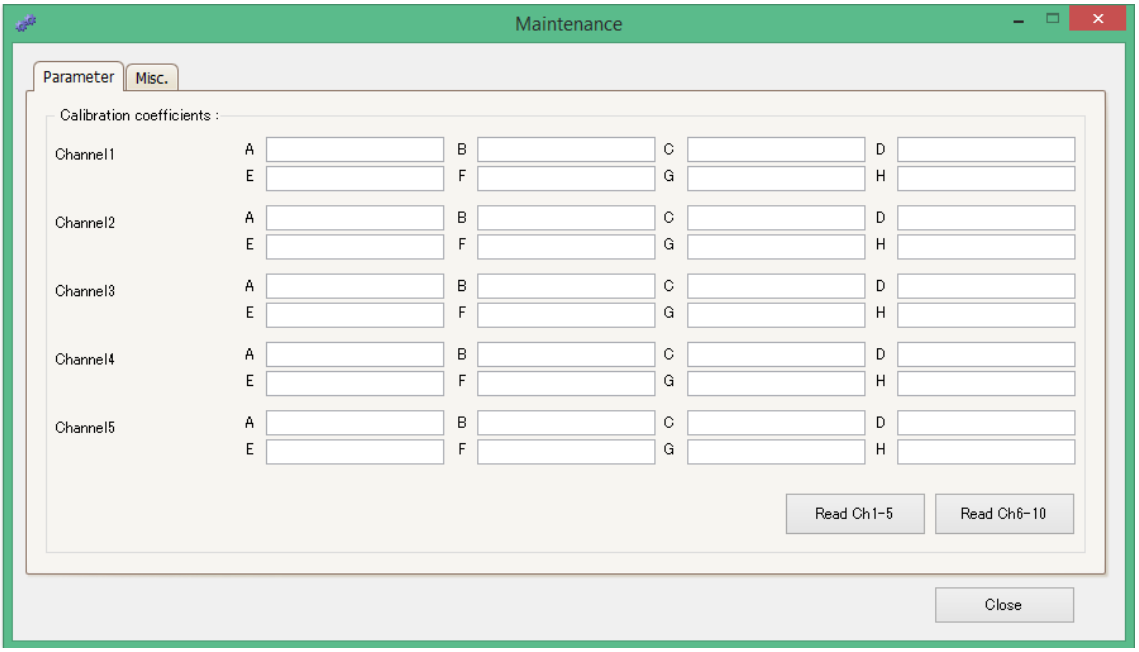
When the communication with the instrument is established, click on Start button to obtain the instrument information (model/serial number). In case of [N-value] is check-marked, N values of each sensor are displayed in real-time and in case of [Physical Unit] is check-marked, the physical values are displayed in real-time.



Click on Stop button to stop the real-time communication.

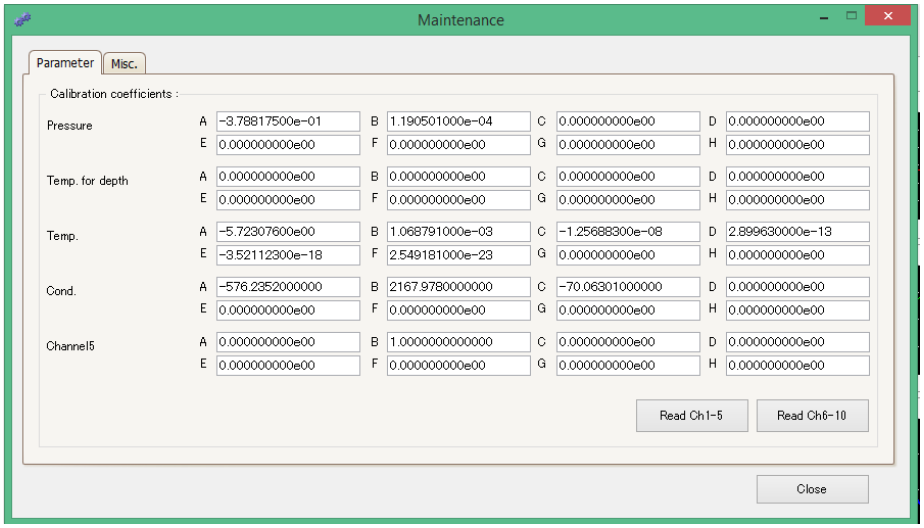
16. Maintenance

You can verify the calibration coefficients of the sensors, select DO concentration output (mg/l or µmol/l) and update the instrument firmware.
Click on [Tools] button of the main frame located at upper right of the software window to shift to tools frame. Then, click on [Maintenance] button in the tools frame to open the maintenance window.



16-1. Verifying the calibration coefficients

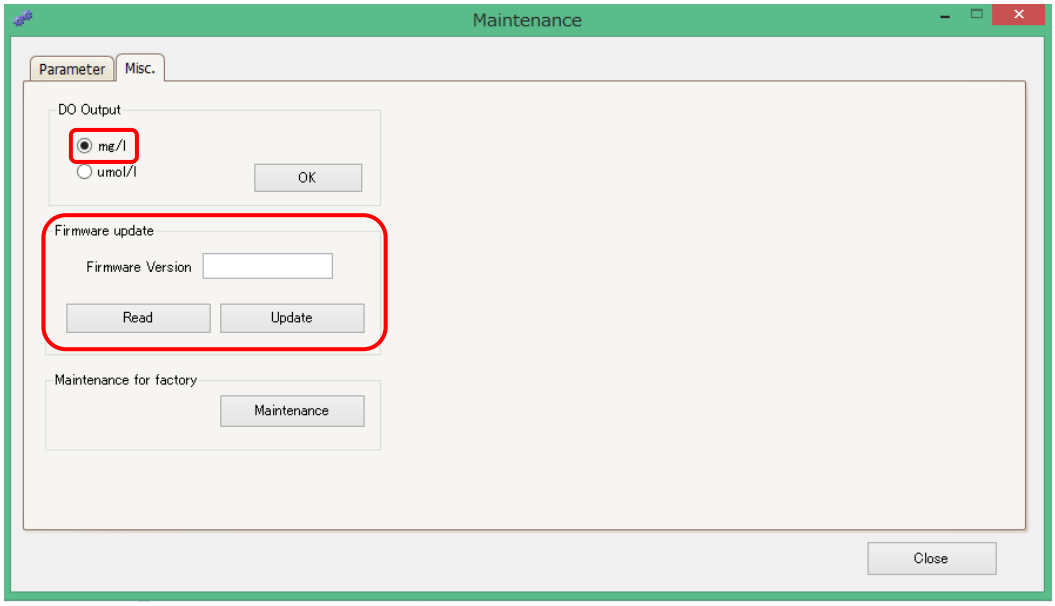
Select the [Parameter] tab.



The calibration coefficients from channel 1 to 5 are displayed by clicking on [Read Ch1-5], and from channel 6 to 10 by clicking on [Read ch6-10]

16-2. DO post processing selection

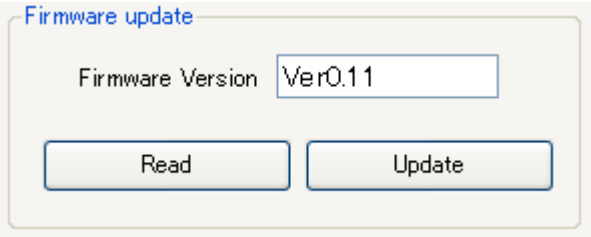
Press [Misc] tab on Maintenance window.



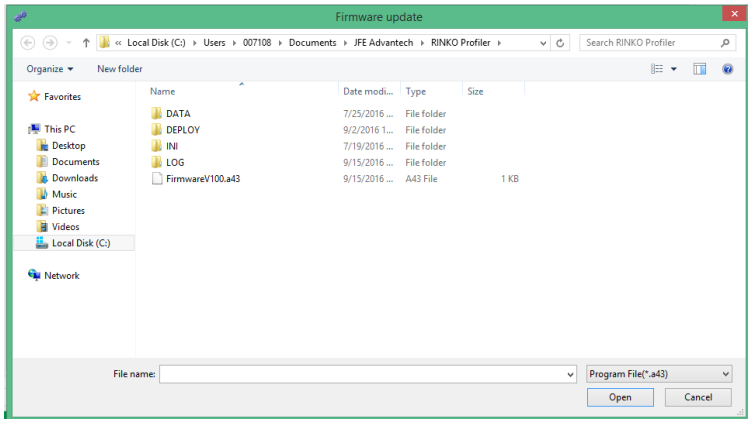
You can select which post processing unit will be displayed, mg l^{-1} or µmol l^{-1}. Check the desired unit to be displayed and click on OK.
Once you open a RAW file, the selected unit will be applied.

16-3. Firmware update

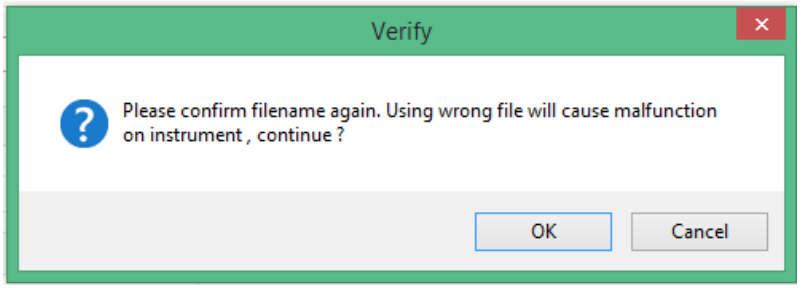
The firmware update procedure can be done by “Firmware update” frame in the [Misc.] tab.



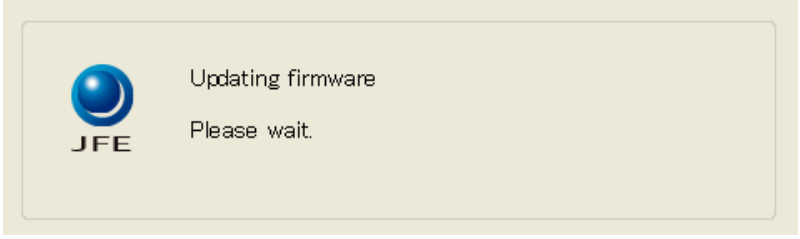
Click on Read button to read and display the firmware version of the instrument.
Click on Update button to display a dialog box that allows you to select the firmware file.



Click on Open button.



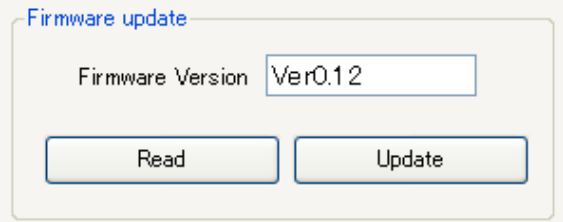
A confirmation message will appear and prompt you to select OK or Cancel. Click on OK button if you have selected the correct firmware file for RINKO Profiler.



The firmware update starts.

- Never interrupt the communication during the update. It may cause problems on your instrument.

The message above appears when update process is completed and informs you the updated firmware version.
We recommend you to verify if the displayed firmware version is updated.



17. DO Calibration

17-1. Calibration

We highly recommend having the DO output checked in 0 and 100% of DO saturation before and after deployments.

17-2.Calibration preparation

We recommend conducting two points calibration (0 and 100% of DO saturation). However, one point calibration (0 or 100% of DO saturation) is also acceptable.

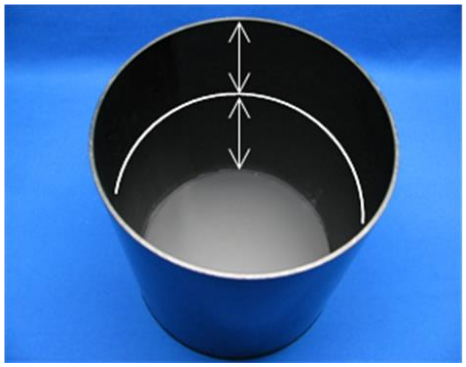
0%: Sodium sulfite solution
100%-oxygen water: Air-saturated solution (air-bubbled water)

17-3. Calibration Procedure

1. Preparation

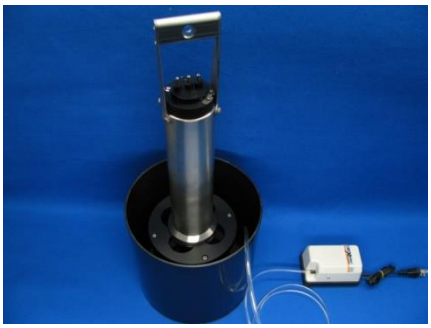
Open the bubbling set and connect each component

Fill the calibration pale with tap water.
.
(Fill up to almost half of the pale)



Put the bubbling head into the pale.

Put the sonde into the pale slowly.
Turn on the bubbling kit.
Start the measurements after 30 minutes.



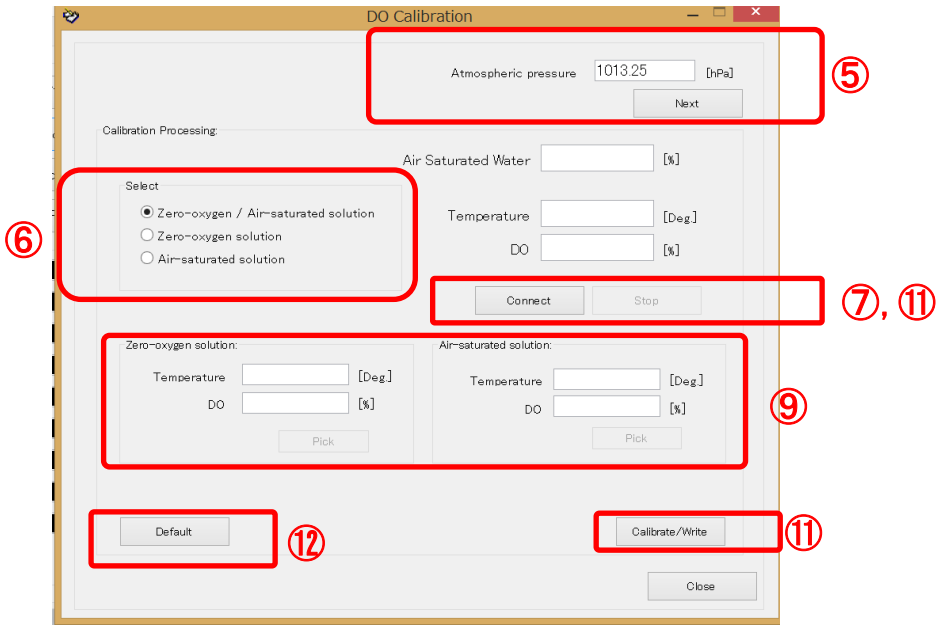
① Connect the instrument and the interface with the transfer cable.

② Connect the interface and PC with the dedicated cable.

③ Start the software.

④ Click on Tools button and DO Calibration button. A new pop-up window will appear (see below).

⑤ Input the atmospheric pressure (default: 1013.25hPa). Click on Next to proceed.
* In case the value is unknown, use the default value. However, we recommend to measure the actual atmospheric pressure in order to achieve accurate data.



⑥ Select the calibration process to be performed (zero, span or zero and span)

⑦ Connect to the instrument with the Connect button.

⑧ Insert the instruments into the pale to perform the span calibration and wait until the value stabilizes.
Please stop bubbling during measuring. Also measure just after bubbling for more than 30 minutes.
Please homogenize the water during bubbling (use of stirrer is recommended).

⑨ When the value has stabilized, click Pick button.

⑩ Next, for zero calibration, insert the sensor into the sodium sulfite aqueous solution and obtain the value in the same way.

A 500ml beaker

⑪ When all the values are acquired, a new coefficient is calculated. After ending the communication clicking on Stop button, write the coefficient in the instrument by clicking on the Calibration / Write button.

⑫ Return to the initial settings by clicking on Default.

Warning

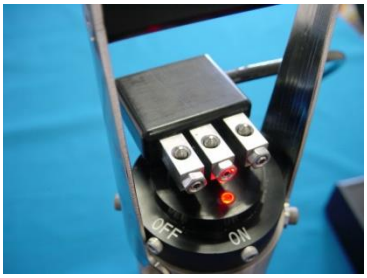
- When using sodium sulfite, do it using impervious gloves and safety goggles.
- If your eyes have contact with sodium sulfite wash your eyes with clean water for at least 15 minutes and consult a physician immediately.
- If you swallowed sodium sulfite, you should wash your mouth with water and consult a physician immediately.
- If your skin has contact with sodium sulfite, please wash it immediately by pouring plenty of water.
- Please read the MSDS (Material Safety Data Sheet).

Caution

- After zero calibration, please rinse off from the sensor the sodium sulfite aqueous solution thoroughly with tap water.

18. Charging

The instrument unit has a built in rechargeable lithium-ion battery. If this battery is fully charged, continuous measurement are allowed for approx. 10 hours using the depth trigger mode. The instrument and interface (charger) should be connected by the communication cable. The power switch of the instrument should be turned “OFF”. (Although recharging can be done even when the instrument is switched “ON”, it will take longer and we recommend you to switch power off while recharging the battery.



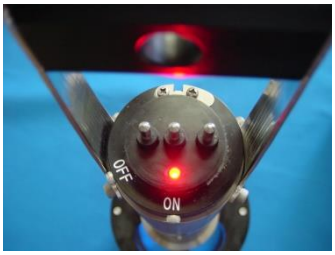
During recharging, the LED lamp of the sensor unit is turned ON (when the battery is fully charged the LED turns OFF). If the battery is completely discharged, complete recharging will take about 3 hours.
After recharging the instrument, turn OFF the interface “CHARGE” switch. However, even if the “CHARGE” switch is kept ON, the instrument will not be overcharged.

If the sensor unit is not used for a long period, the built-in battery may discharge. Therefore, recharging the batteries at least every 6 months is required. If a fully charged battery can be used only for a short time, it should be considered that the battery life has ended, and you should send the instrument to the manufacturer in order to replace the battery.

*The battery capacity deteriorates to approx. half (1/2) after 300 recharging and discharging cycles. You can plan a battery replacement based on that information.

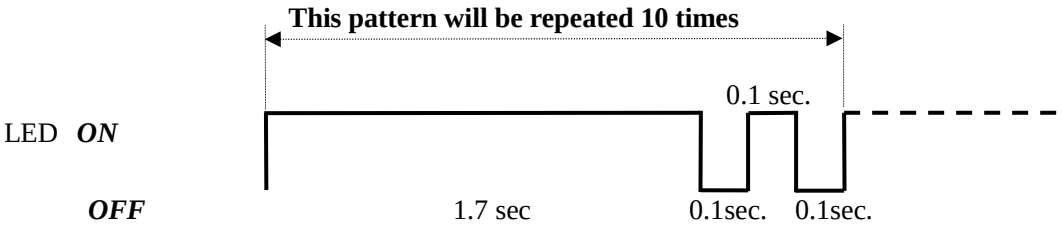
19. Pilot Lamp

The red LED (pilot lamp) has the following flashing patterns shown below.



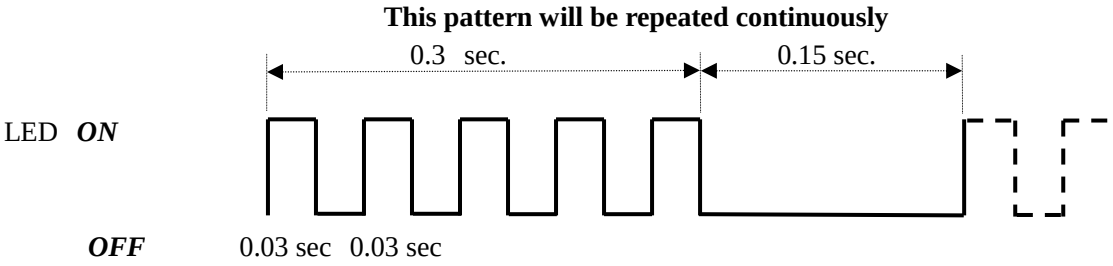
1. For Depth trigger mode settings:

There will be a 20 seconds period before starting measurements, where the flickering pattern below will be repeated.



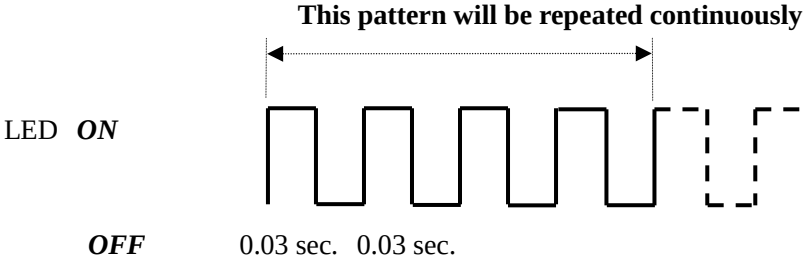
2. When the memory is full:

When the internal memory is full and do not accept data recording, the LED repeats the following flickering pattern.



3. When there is a voltage drop:

When the battery voltage is less than 7.0V, the LED repeats the following quick flickering pattern.



20. After Use

① After using the instrument, clean the sensors with freshwater such as tap water.
② Clean the sensor side of the transmission cable with water and remove any salt content.

***Care should be taken not to allow the connector side of the cable transmission cable to be wet.**

Attach the DO sensor protective cap, and store the instrument where there is no direct exposition to sunlight.

21. Warranty

The following warranty is provided for this product.

(1) The warranty period is defined to be **1 year** after the delivery of the product. During this period, if a problem is considered to be a design or manufacturing defect or malfunction upon a normal condition, JFE Advantech will repair the product free of charge.
(2) Scratches, stain, rust etc. on accessories, expendables, package, and exterior are out of warranty.
(3) Note that fees are applied in the cases listed below even within the warranty period.
    a. Damage during installment, mooring, and storage
    b. Malfunction and damage caused by wrong operation or carelessness
    c. Malfunction and damage caused by improper repair and modification
    d. Malfunction and damage caused by shipment, fall, and impact after purchase
    e. Malfunction and damage due to external causes such as fire, earthquake, flood, lightening, other natural disasters, public nuisance, and abnormal voltage.
    f. Malfunction and damage caused by abnormality in other devices connected to the product.
    g. For replacing the expendables
(4) Note that JFE Advantech will not be held liable for damage caused by the use of the product, profit loss, or any claim by a third party.
(5) Damage during installment or shipment is out of warranty. Consider obtaining insurance if such damage is of concern.

取A-0031-04

Manufacturer

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