

Contents

◆	Introduction.....	2
	Safety Precautions.....	3
1.	How to install	6
1.1	Data required for AI analysis	6
1.2	Download software/initial free trial license.....	6
1.3	Performing an Installation	6
2.	Initial Installation	7
2.1	Activation of initial free trial license	7
2.2	Confirmation of operation.....	8
	2.2.1 Confirmation of health diagnosis operation	8
	2.2.2 Operation check of the resolution prediction function	10
2.3	Check items before moving to the paid version.....	11
3.	Paid License.....	12
3.1	Paid License Usage Notes	12
3.2	Types of Paid Licenses.....	12
3.3	Purchase Flow of Paid Licenses	13
	Revision Information	16



Introduction

This manual provides technical information for the initial software installation and renewal methods for Gas Chromatograph AI Maintenance Support (hereinafter referred to as GCAI): a support software for gas chromatograph GC8000 (hereinafter referred to as GC).

A free trial license of this software allows you to check compatibility with the individual applications you need. After confirming that it is applicable, refer to “Gas Chromatograph AI Maintenance Support Handbook” (TI 11B06H01-02EN) and perform a detailed setup for more accurate detection.

The relevant documents are as follows:

Contents	Document number	Note
Gas Chromatograph AI Maintenance Support	GS 11B06H01-01EN	General specifications Online manual
Gas Chromatograph AI Maintenance Support Installation and License Guide	TI 11B06H01-01EN	License guide Online manual (this manual)
Gas Chromatograph AI Maintenance Support Handbook	TI 11B06H01-02EN	Online manual
Gas Chromatograph AI Maintenance Support Operation Manual	IM 11B06H01-01EN	Online manual
GC8000 Process Gas Chromatograph	IM 11B08A01-01E	Online manual
ASET Analyzing Server Engineering Terminal Software	IM 11B06C01-01E	Online manual
PCAS PC Analyzer Server Software	IM 11B06B01-01E	Online manual

■ Prerequisites for this document

- Ability to read and interpret chromatograms to determine if they are normal or not.
- Knowledge of PCAS operations and the construction of stored data.
- Knowledge of Windows software installation and use.

■ Notes

- Please read the documents above mentioned (GS, TI, IM) carefully and understand the contents before operating this product.
- The manual is intended to describe the functions of the product and does not guarantee its suitability for your particular purpose.
- No part of the user's manuals may be transferred or reproduced without prior written consent from YOKOGAWA.
- The contents of this manual are subject to change without notice.
- If you have any questions, or you find mistakes or omissions in the user's manuals, please contact our sales representative or your local distributor.

● Product Disclaimer

- We make no warranties with respect to the products except as set forth in the warranty terms.
- We are not responsible for any damages incurred by you or any third party as a result of the use of this product, or for any damages or indirect damages of any kind incurred by you or any third party due to defects in this product that we cannot foresee or predict.

Safety Precautions

■ Precautions for the product's protection, safety, and modification

- In order to protect the system controlled by the product and the product itself and ensure safe operation, observe the safety precautions described in this user's manual. We assume no liability for safety if users fail to observe these instructions when operating the product.
- Use of the product in a manner not specified in this manual may impair its protective functions.
- When installing protection or safety circuits for this product or the system it controls, install them separately outside of this product.
- When replacing parts or consumables of this product, be sure to use our specified products.
- Modification of this product is strictly prohibited.

■ Notes on Handling User's Manuals

- Please hand over the user's manuals to your end users so that they can keep the user's manuals on hand for convenient reference.
- Please read the information thoroughly before using the product.
- The purpose of these user's manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.
- No part of the user's manuals may be transferred or reproduced without prior written consent from YOKOGAWA.
- YOKOGAWA reserves the right to make improvements in the user's manuals and product at any time, without notice or obligation.
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■ Warning and Disclaimer

YOKOGAWA make no guarantee of any kind with respect to this product, except as stated in the warranty statement.

We shall not be liable for any damages or for any indirect damages incurred by you or any third party as a result of the use of this product or for any unforeseeable defect in this product.

■ Notes on Software

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- It is strictly prohibited to reproduce the product except for the purpose of backup.
- It is strictly prohibited to perform any reverse-engineering operation, such as reverse compilation or reverse assembling on the product.
- No part of the product may be transferred, converted or sublet for use by any third party, without prior written consent from YOKOGAWA.

■ Documentation Conventions

● Symbol Marks

Throughout this user's manual, you will find several different types of symbols are used to identify different sections of text. This section describes these icons.

SEE

ALSO

Indicates references.

CAUTION

Indicates that operating the hardware or software in this manner may damage it or lead to system failure

TIP

Gives information that complements the present topic.

● Keyboard Inscriptions

Characters enclosed by brackets [], greater-than sign >, Bold Italic font

When characters are enclosed by brackets in the description of a key or button operation, it indicates a key on the keyboard, a button name in a window, or an item in a list box displayed in a window. The Bold Italic font indicates the file name.

(Inscription example)

Select [License Activation] > [***First-trial.lic***]

(Meaning)

This indicates that on the confirmation screen for the first-time use, on the license activation screen, click [License Activation], then select the [***First-Trial.lic***] file.

● Drawing Conventions

Some drawings may be partially emphasized, simplified, or omitted, for the convenience of description.

Some screen images depicted in the user's manual may have different display positions or character types (e.g., the upper / lower case). Also note that some of the images contained in this user's manual are display examples.

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1. How to install

1.1 Data required for AI analysis

To install the software, a stable chromatogram of GC measurement results and at least one day of data on the analysis results are required.

For more accurate settings, we recommend at least 1 month of data. Configuration data can be added or changed later.

**SEE
ALSO**

Refer to Gas Chromatograph AI Maintenance Support Handbook (TI 11B06H01-02EN) for more information.

1.2 Download software/initial free trial license

Download the GCAI software from the YOKOGAWA website. Consult a YOKOGAWA sales representative in charge for the URL.

After registering as a member, you can download it from the product page.

CAUTION

- A separate license purchase is required for continued use after the end of the free period.
- If you cannot download directly to PCAS, please use the appropriate recording media to migrate to a PC with PCAS installed.

1.3 Performing an Installation

Download the software from our dedicated website. After extracting the zip file (*.zip) of the software, execute the installer (GCAI_Install.exe) on the PC on which PCAS is installed.

Follow the instructions on the startup screen to proceed with the installation.

- Agree to the license agreement and proceed to the next step.
- The software is installed by default in C:\GCAI. To change the installation location, click "Change" and specify the folder.

After installation is complete, a storage folder where a shortcut icon is stored will appear on the desktop.



Figure 1 GCAI shortcut icon

TIP

Once GCAI is installed, it will be stored in a startup program. GCAI will automatically start when the PC starts up.

2. Initial Installation

Some applications may not be compatible with this software due to GC measurement specifications. Please use the initial free trial license in accordance with this manual, and purchase a paid license after confirming compatibility.

In addition, as the number of monitored units increases, depending on the processing power of the PCs used, the system may in rare cases exceed the specifications. Please check back during the free trial license period.

CAUTION

- The free trial license is intended to ensure compatibility with the application. We also do not extend the free period for any reason.
- The software notifies anomalies only if a threshold exceedance event occurs during the period.

2.1 Activation of initial free trial license

The initial free trial license file is “First-trial.lic”, being enclosed with the downloaded compressed file.

The following screen for the first-time use will be displayed when the system is started for the first time.

Select “License Activation” and activate the free trial license according to the instructions on the screen.

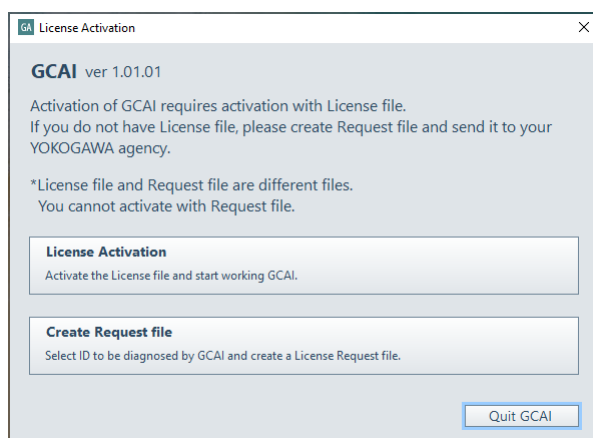


Figure 2 Initial startup screen

● How to Start Free trial licensing

On the Initial startup screen, select [License Activation] > [**First-trial.lic**] > click check-box to start for trial ID-Tag> [Activate the selected ID]

CAUTION

If PCAS folder's setup is not C:\PCAS, select on the startup for the first-time use [License Activation] or [create request file] and follow the pop-up instructions to specify a PCAS folder and change the setting.

**SEE
ALSO**

For details on how to authorize licenses other than the free trial license, see Chapter 1 of IM 11B06H01-01EN.

To continue to use the software after the free trial license expires, you will need to apply for a paid license, for which you will need to create a request file.

**SEE
ALSO**

See “3.3 Purchase Flow of Paid Licenses” for details on how to create a request file.




2.2 Confirmation of operation

2.2.1 Confirmation of health diagnosis operation

After the license activation, it automatically loads the chromatograph data from a previous day stored in PCAS and starts training. The training may take several minutes.

When the chromatogram of the first GC analysis result is output after the training is completed, the classification starts. Follow the procedure below to check if the training has been completed successfully and the classification has been made.

Click “All GCs” tab on the main screen to see the list of GCs to which licenses have been assigned.

If the icon preceding the ID number is any one of the followings:  Good  Pre-anomaly  Anomaly training/classification has been successfully performed in default mode.

The icon of the ID number indicates a status of Untrained until the initial classification has been made.

GCAI

File
Setting Reload
Configuration
License
Help

Dashboard

All GCs

All GC Health Status [ID-Tag]


Good
Pre-anomaly
Anomaly
Un-Classified
Cause No-Check


Pre-anomaly 001-AABCCDDEE			
Good 002-FFGGHHIIJJ			
Anomaly 003-KKLLMMNNOO			
Good 004-PPP			
Cause No-Check Good 005-QQQ			
Good 006-RRR			
Un-Classified 007-SSS			
Good 008-TTT			
Cause No-Check Anomaly 009-UUU			
Good 010-VVV			

License expiration date: 2023/03/31

Figure 3 All GCs tab

When a training failed

ID number indicates  : a status of Untrained, even after a new chromatogram is generated, check the following items.

1. The health diagnose setting screen is not automatically updated. You need to display the List tab again after displaying another screen. The display is updated.
2. Health diagnose is performed by using PCAS chromatogram. Therefore, if the PCAS folder name is different from the one in the setting, the chromatogram is not read.
Check the PCAS folder name as follows.
Select [Configuration] > [Set PCAS Folder] on the menu bar.
Check the folder name there matches the directory of the actual PCAS folder that GCAI refers to.
3. Check if the folder with the corresponding ID in the PCAS folder contains chromatograms for the previous day's date. If the chromatogram of the previous day is not stored, the training cannot be performed in the default mode.
4. After training is completed,  remains displayed until a first result comes out.
Check whether a new chromatogram is generated in the folder of the corresponding ID in PCAS folder.
5. If there are no problems after checking the above items and the automatically region setting is conducted, check the each region of the chromatogram file shows stable value. If the value is not stable, it is possible that the default region is not set properly. From each ID's health diagnose settings screen, go to the region setting screen and check to see if there is at least one region that is enabled.
If all are disabled, you need to set up a region and start training.
6. Otherwise, if you do not identify the source of the problem, review the logs in the dashboard, and system messages as well.

SEE ALSO

For more information on the region setting, refer to the following documents:

- "Gas Chromatograph AI Maintenance Support Handbook" (TI 11B06H01-02EN) Chapter 2
- "Gas Chromatograph AI Maintenance Support Operating Manual" (IM 11B06H01-01EN) Chapter 3

TIP

If you do not use the health diagnose function, disable all regions.

TIP

<How to generate Pre-anomaly or Anomaly artificially (reference)>

By generating historical chromatograms in PCAS chromatogram folder for

(Installation folder) \ PCAS \ data \ (applicable ID) \ (applicable sensor) \ FullCro \ (any date)

you can simulate the situation where a chromatogram is generated. To check the objective, copy the data with differences or previous chromatograms of dates far enough from the training dates (= the previous day) against the training data in the default mode, and duplicate them in the same folder.

Duplicating chromatograms have no effect on PCAS

2.2.2 Operation check of the resolution prediction function

Upon activation of the license, GCAI automatically reads the data of the analysis results stored in PCAS and starts training. Training may take several minutes.

1. After training is completed, select [All GCs] > [ID-Tag] > [Resolution Pred.] on the main screen.

If the “Day Before” and “30days Prediction” are displayed, the operation is normal.

If you do not want to use the resolution prediction function, change the setting from “Monitoring” to “Disabled”.

The threshold is set to the default value (1.5); refer to Chapter 3 of TI 11B06H01-02EN to change to the appropriate threshold.

2. If they are not displayed, check the following items.
 - a. Numbers in the screen are not automatically updated. After displaying another screen, display the list tab again. The display is updated. Confirm again that the resolution-predictive function is working properly.
 - b. Select [Configuration] > [Set PCAS Folder] on the menu bar. Make sure that it matches the actual PCAS folder directory.
 - c. Check whether the analysis result file (*.anx) is stored in the folder of the corresponding ID of the PCAS folder. The analysis result is shown as below according to the corresponding file.

“Day Before”	Displayed when files from the previous day are stored
“30days Prediction”	Displayed when files have been stored for 14 consecutive days up to the previous day

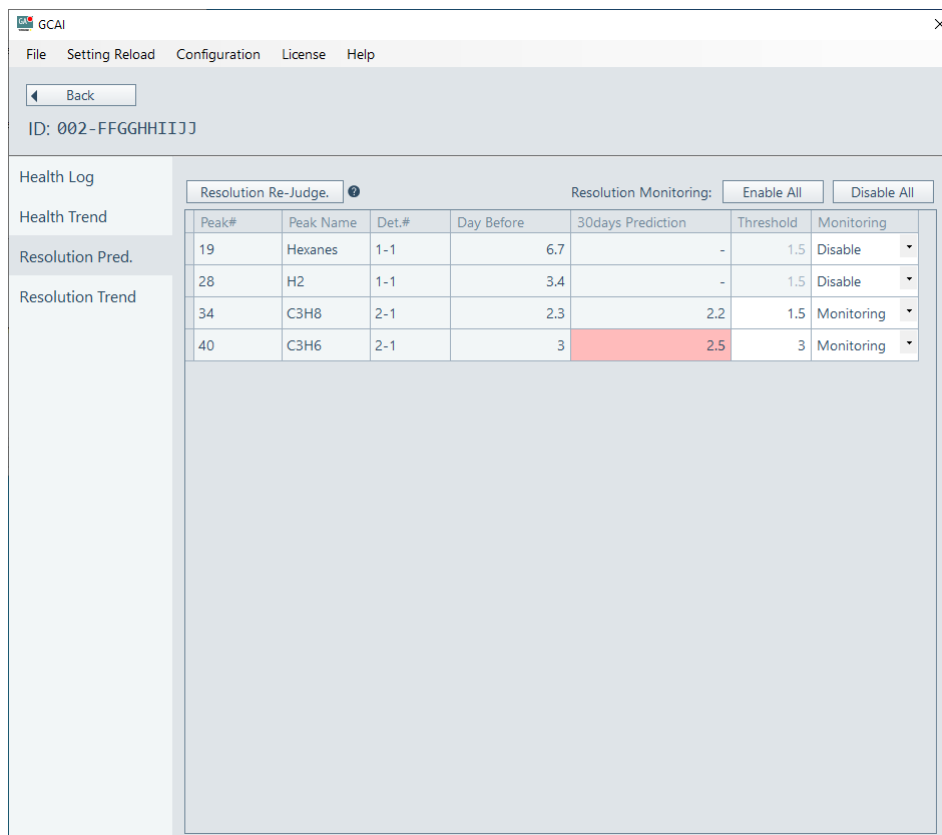


Figure 4 Resolution prediction screen

2.3 Check items before moving to the paid version

Purchasing a paid license allows you to use GCAI even after the free period ends. Prior to purchasing, make sure that all of the following items apply:

- ☐ Confirmation of normal operation of the monitored GC as described in “2.2 Confirmation of operation”.
- ☐ Data has been stored for more than a day.
- ☐ The desired monitoring region setup of the anomaly detection function is set to enable.
- ☐ The results of the classification of the desired monitoring measuring stream/detector of the anomaly detection function can be confirmed.
- ☐ The prediction results of the resolution prediction function can be checked.
- ☐ The error log “The number of operation requests exceeds the processing limit” that occurs due to insufficient PC specifications is not generated. (This may occur due to the increased load at the time of training, but you can use the software if no error logs are generated during normal operation.) Or, the software stops or other malfunctions occur.

**SEE
ALSO**

If “The number of operation requests exceeds the processing limit” error log occurs, see the chapter 4 of IM 11B06H01-01EN

When the above conditions are met, you may continue to use the service after the free period by purchasing a paid license. Track long-term trends to help maintain your GC.

If you cannot confirm the above items and your free period has expired, please try during the paid period.

3. Paid License

This section describes the usage considerations, types, and purchase flow for paid licenses.

3.1 Paid License Usage Notes

- A license for this software can be purchased for each monitored GC.
- This service is not available for GCs with an ID different from that of the contract at the time of purchase.
- Renew the paid license before the license expiration date to continue to use.
- The license period is continuous from the start of use to the end of use, and cannot be stopped or canceled in the middle of the license period due to any reason such as stoppage of GC main unit, PCAS, GCAI.
- On the quotation, licenses for more than 12 months are split into 12 months (suffix code for 12 months) + 1 to 11 months (suffix code for 1 to 11 months), but are delivered as a single license.

(Example)

If you want to purchase a license for 22 months:

22 months (single license) = 12 months + 10 months (two suffix codes on the quotation)

No configuration changes are required to use the license.

3.2 Types of Paid Licenses

The paid licenses include “New License”, “Additional license”, which add GC to be monitored, and “Renewal License”, which extends an existing license period.

The expiration date of a paid license depends on the type of license/situation as follows;

Table 1 Types of paid licenses

Type*1	Before purchase the license	Effective
New licence (Additional)*2	No paid license is applied	From the start month to the end of the purchased license period
Renewal license	When one or more paid licenses are applied and their usage period needs to be extended	Valid until the extension period expires which was added to an existing license period.
Additional license	When one or more paid licenses are already applied and when you need to add a new license	Valid until the same month as the end of the existing license

*1: Additional license and Renewal licenses can be purchased as a single license in a single order/single request file.

*2: The system automatically selects “New” or “Add” when you purchase a new license or an additional license according to your order.

3.3 Purchase Flow of Paid Licenses

The flowchart for purchasing a paid license is shown below.

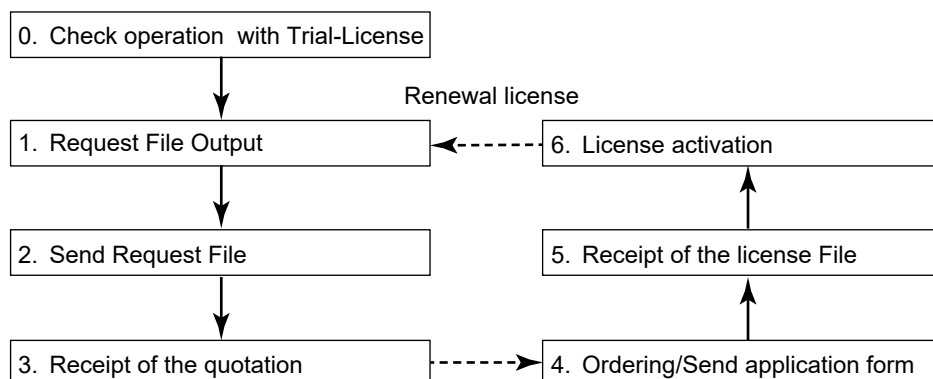


Figure 5 Flow from license purchase to activation

The procedure for purchasing a paid license

1: Request File Output

For new/additional licenses only:

Select [License]> [Prepare for Adding a License] on the menu bar of the main screen. Follow the on-screen instructions to select GC you want to monitor, and then create a license file.

For renewal licenses only, and for renewal and additional licenses:

Select [License] > [Prepare for Renewing a License /License info...] on the menu bar of the main screen.

Follow the on-screen instructions to select GC you want to monitor, and then create a license file.

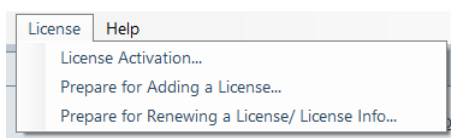


Figure 6 [License] on the menu bar is selected

Request File Output Conditions

Table 2 License Types and Request File Output Conditions

Type	Request file Output conditions	Request file output available period
New (Add *)	A new paid license is purchased or the latest paid license has expired for more than 1 month.	No restrictions.
Renewal	A valid paid license exists, or the most recent paid license expired within one month	No restrictions.
Additional	If a valid paid license exists and the paid license for the subject ID has expired for more than one month.	Available up to 2 months prior to the expiration of existing paid licenses If within the free trial license expiration date, the free trial license expiration date must be at least two months shorter than the paid license expiration date.
Renewal + Additional	ID must meet the above renewal and addition requirements.	Until the expiration date of the existing license

*: The system automatically selects "New" or "Add" when you purchase a new license or an additional license according to your order.

2: Send request file

Send the request file created in 1 to a local YOKOGAWA sales representative.

- 3: Receipt of the quotation
Depending on the contents of your request file, the YOKOGAWA sales representative in charge will send you a quotation.
- 4: Ordering
Check the contents before placing your order with the application form at that time.
- 5: Receipt of the license file
After the order is confirmed, a license file which is made according to the quotation is sent from the YOKOGAWA representative.
- 6: License activation
Select [License] > [License Activation] on the menu bar, select the license file that was received in 5. Verify that the license has the correct license details. After the verification, follow the on-screen instructions to activate the license.

**SEE
ALSO**

For details on how to authorize licenses, refer to Chapter 1 of the “Gas Chromatograph AI Maintenance Support Operation Manual” (IM 11B06H01-01EN)

License activation validity**Table 3 License Types and Request File Output Conditions**

Type	Activation validity	License validity period
New (Add)	Until the month in which the purchased license expires.	From the start month to the end of the purchased license period
Renewal	Until the month in which the purchased license expires.	Valid until the extension period expires which was added to an existing license period.
Add	Activate before the expiration date of the existing license. Activation is not possible after the expiration date.	Valid until the same month as the end of the existing license
Renewal + Additional	Activate during the month prior to the expiration date of the existing license until the expiration date. Activation is not possible after the expiration date.	Valid until the extension period expires which was added to an existing license period.

■ Validity of free trial licenses when purchasing paid licenses

You can renew a free trial license to a paid license following a free trial license period. (Case.1)
In this case, the license fee will be charged after the free trial license expires.

Case1 When purchasing an additional license for a free trial license ID6.

Year	20XX/								20XY/	
Month	4	5	6	7	8	9	...	12	1	2
ID:1										
ID:3										
ID:6										

Be aware of the following case. (Case2)

If the expiration date of the existing license ID is earlier than the expiration date of the free trial license, the free trial license will expire at the same time as the existing license expiration date. In the system, the free trial license expiration date will be overwritten.

To prevent this, be sure to renew only the existing license ID first. Then order the license ID you are assigned for the free trial license. That way, the free period will not be overwritten and the maximum period will be valid.

Case2 When a free trial license ID:6 is expected to expire beyond the existing paid license expiration date.

Year	20XX/								20XY/	
Month	4	5	6	7	8	9	...	12	1	2
ID:1										
ID:3										
ID:6										



Overwrite

Legend:

	Existing license
	Newly purchasing license
	Free trial license

If multiple free trial licenses with different expiration dates are converted to paid licenses at once, the expiration date of all licenses will be 12 months from the expiration date of the earliest expiring free trial license. Therefore, to maximize your free trial period, please purchase one ID first and then order additional remaining IDs.

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