Thank you for purchasing the Combustion Pressure Analysis Software.
This user’s manual explains how to install the Combustion Pressure Analysis Software.
This software application can be used to analyze the combustion pressure of gasoline engines, diesel engines, and gas engines.
The user’s manuals for each type of engine are included in the accompanying CD.
• Gasoline engine IM 720340-01EN.pdf
• Diesel engine IM 720340-02EN.pdf
• Gas engine IM 720340-03EN.pdf

 Trademarks
• Microsoft, Internet Explorer, Windows, Windows 7, Windows 8, Windows 8.1, and Windows 10 are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
• Adobe and Acrobat are registered trademarks or trademarks of Adobe Systems Incorporated.
• In this manual, the ® and TM symbols do not accompany their respective registered trademark or trademark names.
• Other company and product names are registered trademarks or trademarks of their respective holders.

 Revisions
• 1st Edition: December 2012
• 2nd Edition: February 2014
• 3rd Edition: March 2015
• 4th Edition: October 2017
• 5th Edition: July 2019

 Package Contents
The following items are included in the package. If the wrong items have been delivered, if items are missing, or if there is a problem with the appearance of the items, contact your nearest YOKOGAWA dealer.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Pressure Analysis Software setup disk</td>
<td>1</td>
<td>Medium: CD-ROM</td>
</tr>
<tr>
<td>This manual</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>USB license key</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

 PC System Requirements
OS: Windows 7, Windows 8, Windows 8.1, Windows 10
CPU: Core 2 Duo 2 GHz or higher
Memory: 2 GB or more
HDD: 2 GB free space or more
USB port: 1 port or more (for USB license key)
NOTICE - PLEASE READ CAREFULLY BEFORE USE

Thank you very much for purchasing this medium containing a software program and related documentation provided by Yokogawa Test & Measurement Corporation (hereinafter called “Yokogawa”), and the program contained, embedded, inserted or used in the medium (hereinafter called the “Yokogawa Software Program”).

By opening this package or plastic wrapping (hereinafter called “Package”) enclosing the Yokogawa Software Program, you acknowledge that you understand and agree to the Terms and Conditions of the Software License (hereinafter called “Terms and Conditions”) which is written in the documentation and separately attached. Accordingly, the terms and Conditions bind you.

The Yokogawa Software Program and its related documentation including ownership of copyright shall remain the exclusive property of Yokogawa or those third parties from whom sublicensed software in the Yokogawa Software Program is licensed.

Yokogawa hereby grants you permission to use the Yokogawa Software Program on the conditions that you agree to the Terms and Conditions before you open the Package and/or install it in or onto a computer.

IF YOU DO NOT AGREE TO THE TERMS AND CONDITIONS, YOU CANNOT OPEN THE PACKAGE, AND MUST IMMEDIATELY RETURN IT TO YOKOGAWA OR ITS DESIGNATED PARTY.

Terms and Conditions of the Software License

Yokogawa Test & Measurement Corporation, a Japanese corporation (hereinafter called “Yokogawa”), grants permission to use this Yokogawa Software Program (hereinafter called “Licensed Software”) to the Licensee on the conditions that the Licensee agrees to the terms and conditions stipulated in Article 1 hereof.

You, as the Licensee (hereinafter called “Licensee”), shall agree to the following terms and conditions for the software license (hereinafter called the “Agreement”) based on the use intended for the Licensed Software.

Please note that Yokogawa grants the Licensee permission to use the Licensed Software under the terms and conditions herein and in no event shall Yokogawa intend to sell or transfer the Licensed Software to the Licensee.

Licensed Software Name: Combustion Pressure Analysis Software

Number of Client License: 1

Article 1 (Scope Covered by these Terms and Conditions)

1.1 The terms and conditions stipulated herein shall be applied to any Licensee who purchases the Licensed Software on the condition that the Licensee consents to agree to the terms and conditions stipulated herein.

1.2 The “Licensed Software” herein shall mean and include all applicable programs and documentation, without limitation, all proprietary technology, algorithms, and knowledge such as a factor, invariant or process contained therein.

Article 2 (Grant of License)

2.1 Yokogawa grants the Licensee, for the purpose of single use, non-exclusive and non-transferable license of the Licensed Software with the license fee separately agreed upon by both parties. Yokogawa allows the Licensee to use only one instance of the software for use on one device, whether that device is physical or virtual. If the Licensee want to use the software on more than one virtual device, the Licensee must obtain a separate Licensed Software for each instance.

2.2 The Licensee is, unless otherwise agreed in writing by Yokogawa, not entitled to copy, change, sell, distribute, transfer, or sublicense the Licensed Software.

2.3 The Licensed Software shall not be copied in whole or in part except for keeping one (1) copy for back-up purposes. The Licensee shall secure or supervise the copy of the Licensed Software by the Licensee himself with great, strict, and due care.

2.4 In no event shall the Licensee, reverse assemble, reverse compile, or reverse engineer the Licensed Software so that the Licensee may translate the Licensed Software into other programs or change it into a man-readable form from the source code of the Licensed Software. Unless otherwise separately agreed by Yokogawa, Yokogawa shall not provide the Licensee the source code for the Licensed Software.

2.5 The Licensed Software and its related documentation shall be the proprietary property or trade secret of Yokogawa or a third party which grants Yokogawa the rights.

2.6 Yokogawa may use or add copy protection in or onto the Licensed Software. In no event shall the Licensee remove or attempt to remove such copy protection.

2.7 The Licensed Software may include a software program licensed for re-use by a third party (hereinafter called “Third Party Software”, which may include any software program from affiliates of Yokogawa made or coded by themselves.) In the case that Yokogawa is granted permission to sublicense to third parties by any licensors (sub-licensor) of the Third Party Software pursuant to different terms and conditions than those stipulated in this Agreement, the Licensee shall observe such terms and conditions of which Yokogawa notifies the Licensee in writing separately.

2.8 Additional software products may contain open source software (hereafter referred to as OSS). For the OSS, terms and conditions provided separately apply with higher precedence than those of this agreement.

Article 3 (Restriction of Specific Use)

3.1 The Licensed Software shall not be intended specifically to be designed, developed, constructed, manufactured, distributed or maintained for the purpose of the following events:

a) Operation of any aviation, vessel, or support of those operations from the ground;

b) Operation of nuclear products and/or facilities;

c) Operation of nuclear weapons and/or chemical weapons and/or biological weapons;

or d) Operation of medical instrumentation directly utilized for human or the human body.

3.2 Even if the Licensee uses the Licensed Software for the purposes in the preceding Paragraph 3.1, Yokogawa has no liability to or responsibility for any demand or damage arising out of the use or operations of the Licensed Software, and the Licensee is solely responsible for the use of the Licensed Software. In case of the use of the Licensed Software, Yokogawa does not grant indemnity or hold Yokogawa totally harmless, from or against any liabilities, losses, damages and expenses (including fees for recalling the Products and reasonable attorney’s fees and court costs), or claims arising out of and related to the above-said claims and damages.

Article 4 (Warranty)

4.1 The Licensee shall agree that the Licensed Software shall be provided to the Licensee on an “as is” basis when delivered. If defect(s), such as damage to the medium of the Licensed Software, attributable to Yokogawa is found, Yokogawa agrees to replace, free of charge, any Licensed Software on condition that the defective Licensed Software shall be returned to Yokogawa’s specified authorized service facility within seven (7) days after opening the Package at the Licensee’s expense. As the Licensed Software is provided to the Licensee on an “as is” basis when delivered, in no event shall Yokogawa warrant that any information on or in the Licensed Software, including without limitation, data on computer programs and program listings, be completely accurate, correct, reliable, or the most updated.

4.2 Notwithstanding the preceding Paragraph 4.1, when third party software is included in the Licensed Software, the warranty period and terms and conditions that apply shall be those established by the provider of the third party software.

4.3 When Yokogawa decides in its own judgement that it is necessary, Yokogawa may from time to time provide the Licensee with Revision upgrades and Version upgrades separately specified by Yokogawa (hereinafter called “Updates”).

4.4 Notwithstanding the preceding Paragraph 4.3, in no event shall Yokogawa provide Updates where the Licensee or any third party conducted renovation or improvement of the Licensed Software.

4.5 THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY AND PERFORMANCE, WRITTEN, ORAL, IMPLIED, OR IMPLIED, AND ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED BY YOKOGAWA AND ALL THIRD PARTIES LICENSING THIRD-PARTY SOFTWARE TO YOKOGAWA.

4.6 Correction of nonconformity in the manner and for the period of time provided above shall be the Licensee's sole and exclusive remedy for any failure of Yokogawa to comply with its obligations and shall constitute fulfillment of all liabilities of Yokogawa and any third party licensing the Third Party Software to Yokogawa (including any liability for direct, indirect, special, incidental or consequential damages) whether in warranty, contract, tort (including negligence but excluding willful conduct or gross negligence by Yokogawa) or otherwise with respect to or arising out of the use of the Licensed Software.
Article 5 (Infringement)

5.1 If and when any third party should demand injunction, initiate a law suit, or demand compensation for damages against the Licensee under patent right (including utility model right, design patent, and trade mark), copy right, and any other rights relating to any of the Licensed Software, the Licensee shall notify Yokogawa in writing to that effect without delay.

5.2 In the case of the preceding Paragraph 5.1, the Licensee shall assign to Yokogawa all of the rights to defend the Licensee and to negotiate with the claiming party. Furthermore, the Licensee shall provide Yokogawa with necessary information or any other assistance for Yokogawa's defense and negotiation. If and when such a claim should be attributable to Yokogawa, subject to the written notice to Yokogawa stated in the preceding Paragraph 5.1, Yokogawa shall defend the Licensees and negotiate with the claiming party at Yokogawa's cost and expense and be responsible for the final settlement or judgment granted to the claiming party in the preceding Paragraph 5.1.

5.3 When any assertion or allegation of the infringement of the third party's rights defined in Paragraph 5.1 is made, or when at Yokogawa's judgment there is possibility of such assertion or allegation, Yokogawa will, at its own discretion, take any of the following countermeasures at Yokogawa's cost and expense:

a) To acquire the necessary right from a third party which has lawful ownership of the right so that the Licensee will be able to continue to use the Licensed Software;

b) To replace the Licensed Software with an alternative one which avoids the infringement;

c) To remodel the Licensed Software so that the Licensed Software can avoid the infringement of such third party's right.

5.4 If and when Yokogawa fails to take either of the countermeasures as set forth in the preceding subparagraphs of Paragraph 5.3, Yokogawa shall indemnify the Licensee only by paying back the price amount of the Licensed Software which Yokogawa has received from the Licensee. THE FOREGOING PARAGRAPHS STATE THE ENTIRE LIABILITY OF YOKOGAWA AND ANY THIRD PARTY LICENSING THIRD PARTY SOFTWARE TO YOKOGAWA WITH RESPECT TO INFRINGEMENT OF THE INTELLECTUAL PROPERTY RIGHTS INCLUDING BUT NOT LIMITED TO, PATENT AND COPYRIGHT.

5.5 Regardless of this article, the terms and conditions provided separately apply to demands for compensation or the like arising from the use of the Third-Party Software or OSS.

Article 6 (Liabilities)

6.1 If and when the Licensee should incur any damage relating to or arising out of the Licensed Software or service that Yokogawa has provided to the Licensee under the conditions herein due to a reason attributable to Yokogawa, Yokogawa shall take actions in accordance with this Agreement. However, in no event shall Yokogawa be liable or responsible for any special, incidental, consequential and/or indirect damage, whether in contract, warranty, tort, negligence, strict liability, or otherwise, including, without limitation, loss of operational profit or revenue, loss of use of the Licensed Software, or any associated products or equipment, cost of capital, loss or cost of interruption of the Licensee's business, substitute equipment, facilities or services, downtime costs, delays, and loss of business information, or claims of customers of Licensee or other third parties for such or other damages. Even if Yokogawa is liable or responsible for the damages attributable to Yokogawa and to the extent of this Article 6, Yokogawa's liability for the Licensee's damage shall not exceed the price amount of the Licensed Software or service fee which Yokogawa has received. Please note that Yokogawa shall be released or discharged from part or all of the liability under this Agreement if the Licensee modifies, remodels, combines with other software or products, or causes any deviation from the basic specifications or functional specifications, without Yokogawa's prior written consent.

6.2 All causes of action against Yokogawa arising out of or relating to this Agreement or the performance or breach hereof shall expire unless Yokogawa is notified of the claim within one (1) year of its occurrence.

6.3 In no event, regardless of cause, shall Yokogawa assume responsibility for or be liable for penalties or penalty clauses in any contracts between the Licensee and its customers.

Article 7 (Limit of Export)

Unless otherwise agreed by Yokogawa, the Licensee shall not directly or indirectly export or transfer the Licensed Software to any countries other than those where Yokogawa permits export in advance.

Article 8 (Term)

This Agreement shall become effective on the date when the Licensee receives the Licensed Software and continues in effect unless or until terminated as provided herein, or the Licensees cease using the Licensed Software by itself or with Yokogawa's thirty (30) days prior written notice to the Licensee.

Article 9 (Injunction for Use)

During the term of this Agreement, Yokogawa may, at its own discretion, demand injunction against the Licensee in case that Yokogawa deems that the Licensed Software is used improperly or under severer environments other than those where Yokogawa has first approved, or any other condition which Yokogawa may not permit.

Article 10 (Termination)

Yokogawa, at its sole discretion, may terminate this Agreement without any notice or reminder to the Licensee if the Licensee violates or fails to perform this Agreement. However, Articles 5, 6, and 11 shall survive even after the termination.

Article 11 (Jurisdiction)

Any dispute, controversies, or differences between the parties hereto as to interpretation or execution of this Agreement shall be resolved amicably through negotiation between the parties based on the basis of mutual trust. Should the parties fail to agree within ninety (90) days after notice from one of the parties to the other, both parties hereby irrevocably submit to the exclusive jurisdiction of the Tokyo District Court (main office) in Japan for settlement of the dispute.

Article 12 (Governing Law)

This Agreement shall be governed by and construed in accordance with the laws of Japan. The Licensee expressly agrees to waive absolutely and irrevocably and to the fullest extent permissible under applicable law any rights against the laws of Japan which it may have pursuant to the Licensee's local law.

Article 13 (Severability)

In the event that any provision hereof is declared or found to be illegal by any court or tribunal of competent jurisdiction, such provision shall be null and void with respect to the jurisdiction of that court or tribunal and all the remaining provisions hereof shall remain in full force and effect.

Article 14 (Change in Agreement)

The contents of this contract, contents of this product, specifications of the licensed software, related support and other related services can be changed at Yokogawa's discretion.
Installing the Software Programs

Installation Procedure

1. **Install the USB license key driver**
2. **Install the Combustion Pressure Analysis Software**
   - Using the SL1000?
     - No (using the DL850 series)
     - Yes
     - **Install the SL1000 Acquisition Software**
     - **Install the USB driver for the instruments**

The installation procedure will be explained for the Windows 7 environment.

Installing the Combustion Pressure Analysis Software

If a previous version of the software is already installed, you must remove it before installing this version. If you are using Windows 7 or later and install the Combustion Pressure Analysis software under “Program Files,” system files will be stored in Virtual Store. These files will not be deleted when you uninstall the software. Please delete them manually as necessary.

1. Insert the CD into the CD drive. The installer starts.
   - If the installer does not start, open the CD-ROM drive in Explorer, and run Setup.exe, which is in the root folder.
2. The Installer starts. Click **Next**.
3. The Agreements screen is displayed and prompts you to indicate whether you agree with the conditions of use for the software. Once you have read and agreed to the conditions of use, place select **I accept the terms in the license agreement** option and then click **Next**.

4. Input the name and organization, and then click **Next**.

5. Select the setup type, and then click **Next**.

6. Click **Install**.
7. When the installation is complete, click Finish.

Installing the USB License KeyDriver
Install the USB license key driver.

1. Open the CD-ROM drive in Explorer, and run HASPUserSetup.exe in the "Driver\HASP" folder.

2. Click Next.

3. The Agreements screen is displayed and prompts you to indicate whether you agree with the conditions of use for the software. Once you have read and agreed to the conditions of use, place select I accept the license agreement option, and click Next.
4. Click Next.

5. The USB key driver is installed. Click Finish.

Installing the SL1000 Acquisition Software

To connect the SL1000 to a PC, you need the SL1000 Acquisition Software (supplied with the SL1000 unit).

Use the Acquisition Software to configure the SL1000 unit.

Insert the Acquisition Software installation disk into the CD-ROM drive. The installer starts automatically, and setup begins.

For details on the installation procedure, see chapter 2, “Installation,” in the SL1000 Acquisition Software User’s Manual (IM 720120-61EN).

Note

In the case of the DL850 series, configure the network from the DL850 series setup menu.
Installing the USB Driver for the Instruments

You need to install a dedicated USB driver if you want to connect a measuring instrument to a PC through the USB interface. The USB driver is in the "Driver¥YKMUSB" folder of the CD-ROM.

You can download the latest USB driver from the following web page.

https://tmi.yokogawa.com/library/

Installing the USB Driver

Run Setup.exe in the "Driver¥YKMUSB" folder of the CD-ROM. The installation wizard starts. For details on the installation procedure, see the manual (IM B9852UT-01E) in the YKMUSB folder.

**Note**

Install the driver when you connect the DL850 series or SL1000 unit to the PC for the first time. If the driver is already installed, you do not need to install it again.
Initial Measuring Instrument Setup

DL850 Series

DL850 Series Version

Check the that the DL850 series firmware version is 2.10 or later. You can check the firmware version on the Overview screen of the DL850 series. (See “Checking the Serial Number” on the next page.)

If the firmware version is earlier than 2.10, download the latest firmware from the YOKOGAWA website (https://tmi.yokogawa.com/library/documents-downloads/firmware/dl850-series-scopecorder/), and update the firmware. For the updating procedure, see the manual that is downloaded along with the firmware.

Connecting a DL850 Series to a PC over a LAN

- Setting the IP Address
  
  Select UTILITY > Network > TCP/IP > DHCP:OFF.
  
  Set the IP address and Net mask.

![Setting the IP Address](image)

**Note**

If you are using DHCP to connect the DL850 series, check the IP address that has been assigned to the DL850 series, and set the connection settings of the software accordingly.
Connecting a DL850 Series to a PC over a USB

• Remote Control Device Setup
  Select UTILITY > Remote Ctrl > Device > USB.
  Set USB Function to TMC.

• Checking the Serial Number
  Press UTILITY > Overview. Note the serial number. You will use this number when you connect from the application. Also you can check the firmware version (Firm Version).
Connecting an SL1000 to a PC over a LAN

To connect the SL1000 unit to a PC over Ethernet, you must set the SL1000 unit’s communication settings. You do not have to configure these settings if you are connecting over a USB or if you are connecting over Ethernet with the default SL1000 unit settings (DHCP is ON). Configure the settings while the SL1000 is connected to the PC through a USB.

• Configuring Communication Settings from the Acquisition Software

1. Double-click the desktop icon to start the Acquisition Software. The system configuration screen appears. Select USB, and click the Search button.

2. When the SL1000 unit that you want to connect to is found, click the OK button.

3. On the Environment menu, click Communication Settings. In the disconnection dialog box, click Yes.

The communication settings screen appears.
4. Set the group ID and unit ID of the network-connected SL1000 that you want to set.

Select the group ID and unit ID of the SL1000 unit that you want to configure the communication settings for.

No need to set these items

Turn on or off DHCP. If you set it to ON, you are finished with the settings.

Set the IP address, subnet mask, and default gateway (when DHCP is set to OFF).

You cannot set these.

No need to set these items

Setting the IP Address

If you set the DHCP server feature to ON, you do not have to set the IP address, subnet mask, or default gateway. If you set the DHCP server feature to OFF, set the appropriate IP address, subnet mask, and default gateway for the network that you want to connect to. On a network with a DHCP server, you can turn on the DHCP server feature. If you do, the IP address and other network settings will be assigned automatically when you connect the SL1000 to the network.

Connecting an SL1000 to a PC over a USB

If you are connecting over a USB, you do not have to configure any settings.
Connecting the Signals to the Measuring Instrument

The Combustion Pressure Analysis Software uses angular pulses as an external clock signal to make measurements in line with the angular resolution. Measurements start according to the TDC pulse signal trigger setting. Examples of how to connect signals to the measuring instrument are provided below.

**DL850 series example**

![DL850 series example](image)

- **Angular pulse signal (TTL level signal)**
- **EXT CLK IN**
- **CH1: Cylinder pressure signal**
- **CH2: TDC pulse signal**

**SL1000 example**

![SL1000 example](image)

- **CH1: Cylinder pressure signal**
- **CH2: TDC pulse signal**
- **EXT CLK IN**
- **Angular pulse signal (TTL level signal)**

**Note**

- For a multi-cylinder engine, apply the cylinder pressure signals to consecutive channels starting with CH1.
- On the DL850 series, install the measurement modules consecutively from the first slot, without empty slots in the middle. Do not install modules that are not supported.
USB Key

To run the Combustion Pressure Analysis Software, insert the accompanying USB license key to a USB port on the PC.

**Note**

If you run the software without the USB license key, it will run as a 30-day trial version. The remaining trial days will appear every time you start the software.

If the trial period expires, the following message will appear, and the software will not run.

If you remove the USB license key when the software is running, the following message will appear.
Connect the USB license key, and click **Retry**.
To close the application, click **Cancel**.