



Getting Started Guide

Proficy CSense 8.5



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Starting with Proficy CSense 8.5

Welcome to Proficy CSense! Proficy CSense is used to monitor both assets and industrial processes, to pinpoint causes of process variation, and to optimize performance. It is used by process engineers, HMI users, production staff and solution engineers.

Proficy CSense makes use of a suite of components to determine and understand the causes of process deviation in industrial environments. This combination provides the capability for complete and integrated process performance enhancements for a given asset or collection of key performance indicators (KPIs) within an industrial process.

With the release of Proficy CSense 8.5, we are bundling these components into three editions of the software, each with a unique focus. Each edition is licensed separately. The following is a brief description of each edition, along with the components included in each edition:

- Troubleshooter Edition, for offline, ad hoc, or on demand process modelling and troubleshooting, which includes the Continuous Troubleshooter and Discrete & Batch Troubleshooter, along with all external connectors, and Action Object Toolkit.
- Run-time Edition, for the online deployment and monitoring environment, which includes Action Object Services, the Architect, Action Object Toolkit.
- Developer Edition, for the expert user, trained in analytics and/or with software development experience. This is used for process modelling and troubleshooting, and designing and implementing online monitoring and control solutions. The Developer Edition includes both the Troubleshooter Edition and Run-time Edition components.

Refer to your purchase documents for the specific edition you are licensed to use. If any of the required execution files are missing or appear to have been damaged in the distribution process, please contact your Proficy CSense agent or distributor. Alternatively, contact GE Digital support.

Before you begin installing our product, please read this Getting Started Guide. It includes information about the following:

- Product information
- Installation requirements and instructions
- Supported regional settings

Proficy CSense Component Suite

Continuous, and Discrete & Batch Troubleshooters

(included in the Troubleshooter and Developer Editions)

The Continuous Troubleshooter and Discrete & Batch Troubleshooter enable you to rapidly troubleshoot time continuous, discrete or batch processes by examining production data from a variety of historical data sources. Data is prepared and visualized, and rules-based and data driven process models can be constructed. The knowledge extracted from these models allows you to estimate the benefit of the proposed process changes, all with a few button clicks. Using this modelled system, root causes of process deviations are identified, so processes can be corrected to produce a consistent product at optimal yield levels.

Architect

(included in the Run-time and Developer Editions)

This comprehensive development platform provides drag-and-drop building blocks to quickly develop scalable, robust solutions. These solutions can then be deployed online, either in real-time or as scheduled events, through the Action Object Manager. A solution is generally developed from a combination of recipes for data preparation, a blueprint of data actions, and a way of sinking data for reuse, either in the Action Object Manager, or a number of third-party applications.

Action Object Services

(included in the Developer and Run-time Editions)

Action Object Services are used to deploy and execute Action Objects. The actual application used for deployment is the Action Object Manager.

The Action Object Manager provides a simple and easy way to deploy and monitor Action Objects. An Action Object (AO) is the name given to an executing configuration, which could have been created and deployed from a number of sources, including Architect and Process+ to name a few. An executing Action Object is an OPC Classic Server and can be connected to from OPC Classic clients.

There are different types of Action Objects that can be deployed:

- Event-based Action Objects
- Process+ Action Objects
- Real-time Action Objects
- Scheduled Action Objects

Data Server

(included in all editions)

The CSense Data Server is provided with all editions and is a set of databases running on Microsoft SQL Server. These databases are used when doing data preparation from the Troubleshooters, as well for storing Action Objects used by the Action Object Services.

Action Object Toolkit

(included in all editions)

The Action Object Toolkit is provided with all editions and is geared for advanced users to programmatically create blueprints and Action Objects. This set of software tools also enables the development of deployable Action Objects, created in any number of third-party applications, that can be integrated into the Proficy CSense software. The Action Object Toolkit includes the following sub-components:

- Blueprint SDK
- COM Wrapper blueprint block

- .NET Wrapper blueprint blocks
- .NET Wrapper Data Recipe operations
- ISV Object

MPC Editor

(included in the Developer Edition)

The MPC (Model Predictive Control) Editor enables engineers to define and configure a model and controller for a Model Predictive Control solution. Once configured, the MPC model and controller can be saved to a file, which is then used to configure the MPC block in the CSense Architect for offline simulation or online real-time execution of the MPC solution.

Installing Proficy CSense Components

This chapter provides general information you need to install Proficy CSense, including hardware and software requirements for each component.

Each licensed edition of the Proficy CSense suite, or component of the suite, also has individual hardware and software requirements. Read below for the specific requirements for your component.

Installation options

Proficy CSense has two options when installing depending on the persona

1. Express installation – Choose this option when installing Proficy CSense if:
 - There is no existing installation of SQL Server on the target machine
 - The target machine will be used exclusively by a single user.
2. Advanced installation - Choose this option when installing Proficy CSense if:
 - Installing on a single machine with an existing installation of SQL Server
 - Installing on a machine that will make use of a centralized SQL Server installed on a different machine.

Before installation

1. Ensure that your environment meets the minimum hardware and software requirements for Proficy CSense.
2. Exit any existing copies of Proficy CSense software you have running.
3. Ensure that you have a valid Proficy CSense license for this

version. (See the Licensing section of this document.)

4. Log in to Windows with an account that has administrator privileges.
 - For Advanced Installation, have login credentials available to log into the existing instance of SQL Server that you wish to use for your CSense Data Server installation. This login must have the following Server Roles:
 - **dbcreator**
 - **securityadmin**
 - **serveradmin**
 - or
 - **sysadmin**

NOTE: For Advanced Installation, where users other than the installing user need to use CSense, additional configuration is needed post installation.

See section [Setting up SQL Server for CSense access](#).

If you are using a local SQL Server, this step is not required.

5. Consider disabling virus-checking software and Internet security applications on your system for the duration of the installation process. These applications may impact on the installation process or cause it to appear unresponsive.

Minimum hardware requirements

	Troubleshooter Edition	Runtime Edition	Developer Edition
Description	Everyday Troubleshooter use on small data sets averaging less than 50 Fields and 50 000 rows	Deployed Action Objects: <ul style="list-style-type: none"> ▪ 50 real-time action objects, ▪ 50 scheduled action objects, ▪ 50 event-based action objects, Or <ul style="list-style-type: none"> ▪ 100 Process+ Control Loops Averaging per Action Object: <ul style="list-style-type: none"> ▪ Average IO count of 40, ▪ Average throughput frequency (or data rate) of 10 seconds 	Everyday Troubleshooter use on small data sets averaging less than 50 Fields and 50 000 rows, + Deployed Action Objects: <ul style="list-style-type: none"> ▪ 10 real-time action objects, ▪ 50 scheduled action objects, ▪ 50 event-based action objects, Averaging per Action Object: <ul style="list-style-type: none"> ▪ Average IO count of 40

Installing Proficy CSense Components

	Troubleshooter Edition	Runtime Edition	Developer Edition
Description		<ul style="list-style-type: none"> ▪ Average input data window size of 10 000 data points 	<ul style="list-style-type: none"> ▪ Average throughput frequency (or data rate) of 10 seconds, ▪ Average input data window size of 10 000 data points
HDD	<p>2 GB free space</p> <p>6 GB when choosing to automatically install Microsoft SQL Express from the CSense installer.</p>	<p>2 GB free space</p> <p>6 GB when choosing to automatically install Microsoft SQL Express from the CSense installer.</p>	<p>2 GB free space</p> <p>6 GB when choosing to automatically install Microsoft SQL Express from the CSense installer.</p>
RAM	<p>8 GB Total System RAM when using Microsoft SQL Express as the CSense database, or</p> <p>12 GB Total System RAM when using non-Express editions of Microsoft SQL Server as the CSense database</p>	16 GB	16GB
CPU	1 core at 2GHz or faster	2 cores at 2GHz or faster	2 cores at 2GHz or faster
Screen	<p>1024x768 Screen Resolution</p> <p>Screen Scaling set at 100%</p>	<p>1024x768 Screen Resolution</p> <p>Screen Scaling set at 100%</p>	<p>1024x768 Screen Resolution</p> <p>Screen Scaling set at 100%</p>

Recommended hardware requirements

	Troubleshooter Edition	Runtime Edition	Developer Edition
HDD	20 GB free space	20 GB free space	40 GB free space
RAM	16 GB	32 GB	32 GB
CPU	2 cores at 2GHz or faster	4 cores at 2GHz or faster	4 cores at 2GHz or faster
Screen	1920x1080 Screen Resolution Screen Scaling set at 100%	1920x1080 Screen Resolution Screen Scaling set at 100%	1920x1080 Screen Resolution Screen Scaling set at 100%

Minimum software requirements

- Microsoft .NET Framework 4.7.x

Supported operating systems

- Microsoft Windows 8.1 or higher (x86 and x64 Platforms)
- Microsoft Windows Server 2016 or higher (x64 Platforms)

Optional Software Requirements

- SQL Server 2014 SP2 or later, Standard and Enterprise (Express editions are also supported, although not recommended for production environments.)
- Proficy Historian OLE DB Provider (required for the Proficy Historian data source)

- OSISoft PI OLE DB Provider (required for the OSISoft PI Historian data source)
- Matlab Compiler Runtime (required when using the Matlab block in CSense blueprints)

Installing Proficy CSense

IMPORTANT:

Proficy CSense requires Administrative rights on the target system in order to be installed.

Upgrading from previous versions of Proficy CSense

Upgrading from CSense 7.0 and later?

Existing CSense 7.0 and later users can run this installer to upgrade an existing installation to CSense 8.5. Simply follow the instructions for installing CSense from an electronic distribution and follow the on-screen prompts. With an upgrade you cannot choose to install a managed SQL Server Express instance with your CSense installation and must choose the Advanced installation option to upgrade the managed SQL Server Express instance.

Upgrading from an earlier version of CSense?

Users upgrading from a version of CSense earlier than CSense 7.0 are required to uninstall such previous versions of CSense before proceeding to install this installation.

Uninstalling previous versions:

1. Open Control Panel > Programs and Features.
2. Select **Proficy CSense** and select **Uninstall** to remove the program.
3. Follow the prompts to uninstall the product.

Installing Proficy CSense from an electronic distribution

Express Installation

This will install a managed instance of SQL Server, that will be configured for Proficy CSense use during installation. In this case you are not required to perform any additional configuration on SQL Server. This option allows users to get up and running with Proficy CSense quickly.

1. Mount or extract the contents of the distributed iso file.
2. Open My Computer and browse to your folder containing the iso contents and run the <Setup.exe> application file located in the root folder.
3. From the Autorun setup menu, start the installation.
4. Choose the Express installation option
5. Follow the on-screen instructions to complete your installation.

NOTE: Should you install a product not supported by your license key, the software will notify you that your product is not licensed when attempting to run an application.

The name of the managed instance of Microsoft SQL Server Express that is installed together with CSense is called “CSENSE”.

Advanced Installation

Proficy CSense requires an existing instance of Microsoft SQL Server that has been installed previously to use as Data Server. This instance can either run locally or remotely. If using a remote instance of SQL Server, a domain environment is required. Setting up the Data Server is a once of process and will require a login on SQL Server with elevated privileges..

1. Mount or extract the contents of the distributed iso file.
2. Open My Computer and browse to your folder containing the iso contents and run the <Setup.exe> application file located in the root folder.

3. From the Autorun setup menu, start the installation.
4. Choose the Advanced installation option
5. Follow the on-screen instructions to complete your installation.

NOTE: Should you install a product not supported by your license key, the software will notify you that your product is not licensed when attempting to run an application.

Silent Installs

CSense supports a silent installation from the command line. An INI file is used to configure the installation options and is specified as a command line argument to the installer.

The INI file must be in the following format:

```
[SetupValues]
<Parameter1>=<value1>
<Parameter2>=<value2>
```

Silent install is run from an Administrator command line using the following format:

```
start /wait Setup.exe "/S:<path to .ini file>"
```

The INI file supports the following parameters:

Parameter Name	Default	Description
%ExpressInstall%	1	“1” for Express installation or “0” for Advanced Installation.
%AppFolder%	C:\Program Files (x86)\Proficy\Proficy CSense	Installation Folder
%CacheFolder%	C:\Proficy CSense Cache	Cache Folder
%DatabaseServer%	(local)	Location of the SQL Database Server that must be used. Ignored when %ExpressInstall% is “1”.
%InstallDataServer%	1	“1” if the CSense Data Server component must be installed or “0” if the CSense Data Server must not be installed. Ignored when %ExpressInstall% is “1”.
%InstallApplicationServer%	1	“1” If the CSense Application Server must be installed or “0” if the CSense Application Server must not be installed. Ignored when %ExpressInstall% is “1”.
%CustomServicesAccount%	0	“1” If the CSense Services must be installed to a custom account. If set to “0” then the Local System Account is used for services. Ignored when %ExpressInstall% is “1”.
%ServicesUser%		The account that must be used for services if the %CustomServicesAccount% is set to “1”. Ignored when %ExpressInstall% is “1”.
%ServicesPassword%		The password for the %ServicesUser% if the %CustomServicesAccount% is set to “1”. Ignored when %ExpressInstall% is “1”.

If the %ExpressInstall% parameter is set to “1” then only the following parameters will be respected and the rest of the parameters from the INI file will be ignored, and their default values as specified will be used:

- %AppFolder%
- %CacheFolder%

If the `%ExpressInstall%` parameter is set to “0” and `%InstallDataServer%` is “1” then the following parameters will be used:

- `%DatabaseServer%`

If the `%ExpressInstall%` parameter is set to “0” and `%InstallApplicationServer%` is “1” then the following parameters will be used:

- `%AppFolder%`
- `%CacheFolder%`
- `%DatabaseServer%`
- `%CustomServicesAccount%`
- `%ServicesUser%` (if `%CustomServicesAccount%` is “1”)
- `%ServicesPassword%` (if `%CustomServicesAccount%` is “1”)

Any parameter not specified or left empty will use the default value.

When specifying a `%CustomServicesAccount%` and the user is a domain user, the domain credentials information must be specified in either User Principal Name (UPN) format or Down-Level Logon Name format.

Example of Express Install into custom locations

.ini file name: `SilentInstallExpress.ini`

.ini file contents:

```
[SetupValues]
%ExpressInstall%=1
%AppFolder%=C:\CSense Install
%CacheFolder%=C:\CSense Cache
```

Command

- `start /wait Setup.exe “/S:C:\SilentInstallExpress.ini”`

Example of Advanced Install installing only the CSense Data Server to the local SQL Database Server

.ini file name: SilentInstallDataServer.ini

.ini file contents:

```
[SetupValues]
%ExpressInstall%=0
%InstallDataServer%=1
%InstallApplicationServer%=0
```

Command

- start /wait Setup.exe “/S:C:\DataServer.ini”

After installation

Licensing your installation of Proficy CSense

Proficy Common Licensing provides an easy-to-use tool to both view and manage software licensing.

To access Proficy Common Licensing, perform the following steps

1. From the desktop, select **Start > Programs > General Electric > License Client**.
2. The Proficy Common Licensing application opens.

To access the help for the Proficy Common Licensing, perform the following steps

3. From the desktop, select **Start > Programs > General Electric > License Help**.
4. The Proficy Common Licensing help opens.

Setting up SQL Server for CSense access

The following section describes the configuration needed for additional users of Proficy CSense and is only applicable if the Advanced installation option was used.

Required user accounts and privileges

The table below describes the privileges needed for the SQL Server and Windows logins needed for each user account that want to make use of CSense. “User Account” is a generic term that satisfy the following conditions:

- Can login to Windows
- The Windows login is mapped to a SQL Server login that has the public Server Role assigned

“User Account” can be implemented using individual user accounts or groups, either on the local machine or on an Active Directory Domain level.

License Type	Windows Privileges	Database	SQL Server Database Roles
CSense Troubleshooter	User	CSenseRecipes	csense_cache
		CSense	csense_troubleshooter
CSense Runtime	Local Machine Administrator	CSenseRuntime	csense_cache csense_admin
		CSense	csense_admin csense_troubleshooter
		CSenseCache	csense_admin
CSense Developer	Local Machine Administrator	CSenseRecipes	csense_cache
		CSenseRuntime	csense_cache csense_admin
		CSense	csense_admin csense_troubleshooter

		CSenseCache	csense_admin
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Adding users for CSense Troubleshooter licenses

1. Identify the Windows user account. Note that all local and domain user accounts may run the Troubleshooter, no special rights and permissions are required.
2. Create a SQL Server login for the Windows user account on the target instance of SQL Server where the CSenseRecipes database exists.
3. Ensure that the created SQL Server Login has at least the public server role assigned.
4. Create a database user on the CSenseRecipes database.
5. Map the created database user to the SQL Server login you created.
6. Assign the csense_cache database role to the database user.
7. If the user would like to use the Control Loop Tuning feature, follow the steps below
 - a) Create a database user on the CSense database.
 - b) Map the created database user to the SQL Server login you created.
 - c) Assign the csense_troubleshooter database role to the database user.

Adding users for CSense Runtime licenses

1. Identify the Windows user account. Note that all users of the CSense runtime edition require administrative rights on the local machine.
2. Create a SQL Server login for the Windows user account on the target instance of SQL Server where the CSenseRuntime database exists.
3. Ensure that the created SQL Server Login has at least the public server role assigned.
4. Create a database user on the CSenseRuntime database.
5. Map the created database user to the SQL Server login you created.
6. Assign the csense_cache database role to the database user.

7. Assign the csense_admin database role to the database user.
8. For additional Process+ users, follow the steps below
 - a) Create a database user on the CSense database.
 - b) Map the created database user to the SQL Server login you created.
 - c) Assign the csense_admin database role to the database user.
 - d) Create a database user on the CSenseCache database.
 - e) Map the created database user to the SQL Server login you created.
 - f) Assign the csense_admin database role to the database user.

Adding users for CSense Developer licenses

1. Identify the Windows user account. Note that all users of the CSense developer edition require administrative rights on the local machine.
2. Create a SQL Server login for the Windows user account on the target instance of SQL Server where the CSenseRuntime and CSenseRecipes databases exist.
3. Ensure that the created SQL Server Login has at least the public server role assigned.
4. Create a database user on the CSenseRecipes database.
 - a) Map the created database user to the SQL Server login you created.
 - b) Assign the csense_cache database role to the database user.
5. Create a database user on the CSenseRuntime database.
 - a) Map the created database user to the SQL Server login you created.
 - b) Assign the csense_cache database role to the database user.
 - c) Assign the csense_admin database role to the database user.
6. For additional Process+ users, follow the steps below

-
- a) Create a database user on the CSense database.
 - b) Map the created database user to the SQL Server login you created.
 - c) Assign the csense_admin database role to the database user.
 - d) Create a database user on the CSenseCache database.
 - e) Map the created database user to the SQL Server login you created.
 - f) Assign the csense_admin database role to the database user.
7. If the user would like to use the Control Loop Tuning feature, follow the steps below
- a) Create a database user on the CSense database if you have not done so for the current user already.
 - b) Map the created database user to the SQL Server login you created.
 - c) Assign the csense_troubleshooter database role to the database user.

Enabling CSense data to be read by third party applications

To enable reading of data by external applications you must enable the csense_db_user login by following these steps:

1. Start Action Object Manager
2. Select Action
3. Select Proficy CSense Run-time Properties
4. Choose Enable SQL Login and select Set Password
5. Provide a strong password.

For a managed instance this will also enable SQL Server Authentication. For a non-managed instance SQL Server Authentication must be enabled on the server by a Database Administrator. See the Secure Deployment Guide for more information.

NOTE: For a third-party application to access the CSense database from a remote

machine, an exception will need to be added to the firewall for the SQL Server TCP port number.

Deploying the Process+ app to Operations Hub

The following instructions will describe how to deploy the Control Loop Performance application on Operations Hub depending on the type of Operations Hub license.

NOTE: The procedure for importing the Process+ app into Operations Hub depends on your Operations Hub license. Please take careful note of your Operations Hub license type before proceeding to attempt to import the app.

Freemium licensed users of Operations Hub (also known as Operations Hub Add On for Historian)

Follow this procedure if you have an Operations Hub Freemium license to deploy the Process+ app in Operations Hub:

1. Install Operations Hub 2.0 or later, **DO NOT APPLY THE OPERATIONS HUB LICENSE**. If the license has already been applied, remove it, it can be added again later.
2. Ensure that Operations Hub is in demo/trial mode. This can be seen by the notice appearing in Operations Hub that typically includes a countdown timer. If the trial period has expired, restart the machine to reset the trial countdown timer.
3. Ensure that you have followed the steps above for Enabling CSense data to be read by third party applications.
4. Locate the Control Loop Performance application (Process+) in one of the following places
 - a) CSense ISO
 - i. Mount GE_CSense_v8.5.iso.
 - ii. Navigate to the mounted iso\Components\Operations Hub 2.0\Control Loop Performance-v1.0.zip.
 - b) Installed with CSense

-
- i. Install CSense 8.5
 - ii. Navigate to the CSense installation folder\Operations Hub 2.0\Control Loop Performance-v1.0.zip.
 5. Copy Control Loop Performance-v1.0.zip to the Operations Hub machine.
 6. Login to the Operations Hub application as the Operations Hub Administrator.
 7. On the APPS page, click Import App and select Control Loop Performance-v1.0.zip.
 8. Click DATASOURCES > CSense
 - a) Enter the following to connect to CSense
 - i. Host: The CSense host name.
 - ii. Port: The SQL Server TCP port number.
 - b) Under SQL Authentication settings
 - i. Password: Enter the password set for csense_db_user in the steps under Enabling CSense data to be read by third party applications.
 - c) Click Test. If the connection is successful, click Save and Exit.
 9. The following steps will describe how to make the Control Loop Performance application accessible to users who's not the Operation Hub Administrator.
 - a) Click MANAGE > Users.
 - b) Create a new user and assign the following
 - i. Group: iqp.user
 - ii. Apps: CSense Process+
 - iii. Do this for as many users needed.
 - c) Click APPS and the  button for CSense Process+.
 - d) Copy the URL presented and share with the new users.
 10. The new users can browse to the shared URL and login with their credentials.
 11. Apply the Operations Hub license to exit the demo/trial mode for Operations

Hub.

Premium licensed users of Operations Hub

Follow this procedure if you have an Operations Hub Premium license to deploy the Process+ app in Operations Hub:

1. Install Operations Hub 2.0 or later and apply the Operations Hub license.
2. Ensure that you have followed the steps above for Enabling CSense data to be read by third party applications.
3. Locate the Control Loop Performance application in one of the following places
 - a) CSense ISO
 - i. Mount GE_CSense_v8.5.iso.
 - ii. Navigate to the mounted iso\Components\Operations Hub 2.0\Control Loop Performance-v1.0.zip.
 - b) Installed with CSense
 - i. Install CSense 8.5
 - ii. Navigate to the CSense installation folder\Operations Hub 2.0\Control Loop Performance-v1.0.zip.
4. Copy Control Loop Performance-v1.0.zip to the Operations Hub machine.
5. Login to the Operations Hub application as the Operations Hub Administrator.
6. On the APPS page, click Import App and select Control Loop Performance-v1.0.zip.
7. Click DATASOURCES > CSense
 - a) Enter the following to connect to CSense
 - i. Host: The CSense host name.
 - ii. Port: The SQL Server TCP port number.
 - b) Under SQL Authentication settings

-
- i. Password: Enter the password set for csense_db_user in the steps under Enabling CSense data to be read by third party applications.
 - c) Click Test. If the connection is successful, click Save and Exit.
 8. The following steps will describe how to make the Control Loop Performance application accessible to users who's not the Operation Hub Administrator.
 - a) Click MANAGE > Users.
 - b) Create a new user and assign the following
 - i. Group: iqp.user
 - ii. Apps: CSense Process+
 - iii. Do this for as many users needed.
 - c) Click APPS and the  button for CSense Process+.
 - d) Copy the URL presented and share with the new users.
 9. The new users can browse to the shared URL and login with their credentials.

Installing Optional requirements

- Proficy Historian OLE DB Provider (required for the Proficy Historian data source)
- OSIsoft PI OLE DB Provider (required for the OSIsoft PI Historian data source)

Supported Regional Settings

Proficy CSense 8.5 supports the same regional settings as Windows.

Localized Operating Systems

Proficy CSense 8.5 is supported by most localized operating systems.

We are aware of the following issues:

1. Special language characters are not supported in path names. An example of these characters includes those used to denote the desktop in Chinese.
2. For certain regions, certain text displayed on user interfaces may display incorrectly.