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# 1. About the CODESYS Integration manual

## 1.1 Symbols and notation

### Symbols for general notes

**NOTE** This shows general information.



#### More information

This shows where you can find more information.



#### Example

This shows an example.



#### How to ...

This shows a link to a video for help and guidance.

### Symbols for hazard statements



#### DANGER!



#### This shows dangerous situations.

If the guidelines are not followed, these situations will result in death, serious personal injury, and equipment damage or destruction.



#### WARNING



#### This shows potentially dangerous situations.

If the guidelines are not followed, these situations could result in death, serious personal injury, and equipment damage or destruction.



#### CAUTION



#### This shows low level risk situation.

If the guidelines are not followed, these situations could result in minor or moderate injury.

#### NOTICE



#### This shows an important notice

Make sure to read this information.

## 1.2 Intended users of the CODESYS Integration manual

The CODESYS Integration manual is intended for designers and developers who want to integrate CODESYS projects with the DEIF controllers.

## 1.3 Software versions

The information in this document relates to software versions:

Software	Details	Version
iE 250 iE 250 Marine	Controller application	2.0.10.x or later
iE 350 iE 350 Marine	Controller application	2.0.10.x or later
BSP	Board Support Package (Operating System)	5.0.0.x or later
CODESYS libraries	CODESYS	2.0.10.x or later
CODESYS	CODESYS runtime	3.5.20.40 or later
CODESYS IDE	PC software for development of CODESYS applications	3.5.20.40 or later
iE x50 CODESYS TSP	CODESYS Target Support Package (TSP)	1.3.2.2 or later

## 1.4 Data security

While DEIF has taken great attention to data security and has designed the product to be a secure product, we recommend adopting Information Technology (IT) and Operational Technology (OT) security best practices when connecting the controller to a network.

To minimise the risk of data security breaches we recommend:

- Only connect to trusted networks and avoid public networks and the Internet.
- Use additional security layers like a VPN for remote access.
- Restrict access to authorised persons.

## 1.5 Legal information

### Third party equipment

DEIF takes no responsibility for installation or operation of any third party equipment. In no event shall DEIF be liable for any loss of profits, revenues, indirect, special, incidental, consequential, or other similar damages arising out of or in connection with any incorrect installation or operation of any third party equipment.

### Warranty

#### NOTICE

##### Warranty



The warranty will be lost if the warranty seals are broken. The iE 350 racks may only be opened to remove, replace, and/or add a hardware module or the internal RTC battery (if fitted). The procedure in the *Installation instructions* must be followed. If the rack is opened for any other reason, and/or the procedure is not followed, then the warranty is void.

If the iE 7 display or iE 250 controller is opened, then the warranty is void.

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## 2. Prepare and install CODESYS

### 2.1 Essential components

To use CODESYS with your controller you must have installed:

Component	Reason
<b>CODESYS Development System (IDE)</b>	To create and edit your CODESYS projects.
<b>CODESYS licence</b>	A licence to use CODESYS.
<b>DEIF CODESYS TSP package</b>	Support package to access the DEIF specific hardware.
<b>DEIF CODESYS libraries</b>	Functions related to the DEIF applications and features.

### 2.2 CODESYS Development System (IDE)

You can download the **CODESYS Development System (IDE)** free of charge direct from CODESYS by visiting the CODESYS Store: \*

<https://store.codesys.com/en/codesys.html>

**NOTE** \* DEIF is not responsible for any external links or content.



#### More information

See [Download necessary software](#) for links to the software downloads.

### 2.3 Target Support Package (TSP)

The **Target Support Package (TSP)** is a configuration that enables the CODESYS project to communicate with the DEIF hardware.

You must install the CODESYS Development System (IDE) **before** installing the package.



#### More information

See [Download necessary software](#) for links to the software downloads.

### 2.4 DEIF CODESYS libraries

CODESYS libraries are collections of reusable objects. These are typically functions.

Each DEIF library provides you with access to the different controller functions. When you include the library in your CODESYS project you can then access the objects associated.

Libraries must be downloaded and then installed with the **Library Manager** to use them. You can also install them directly from the package (.package) files if the CODESYS Development System (IDE) is both installed and associated to the file type.



#### More information

See [Download necessary software](#) for links to the software downloads.



#### More information

See [DEIF library functions](#) for details of the functions and their use.

## 2.5 Download necessary software

To use CODESYS development you need to download the [CODESYS Development System \(IDE\)](#), [Target Support Package \(TSP\)](#), [DEIF libraries](#), and the latest application software for your controller.

Download the required software from your product's dedicated software page:

Download the software	
iE 250	<a href="https://www.deif.com/software/?product=17655">https://www.deif.com/software/?product=17655</a>
iE 250 Marine	<a href="https://www.deif.com/software/?product=20133">https://www.deif.com/software/?product=20133</a>
iE 350	<a href="https://www.deif.com/software/?product=22285">https://www.deif.com/software/?product=22285</a>
iE 350 Marine	<a href="https://www.deif.com/software/?product=20135">https://www.deif.com/software/?product=20135</a>

## 3. CODESYS features

### 3.1 CODESYS online help

The CODESYS IDE provides online help for more information about the programming environment and how to get started.

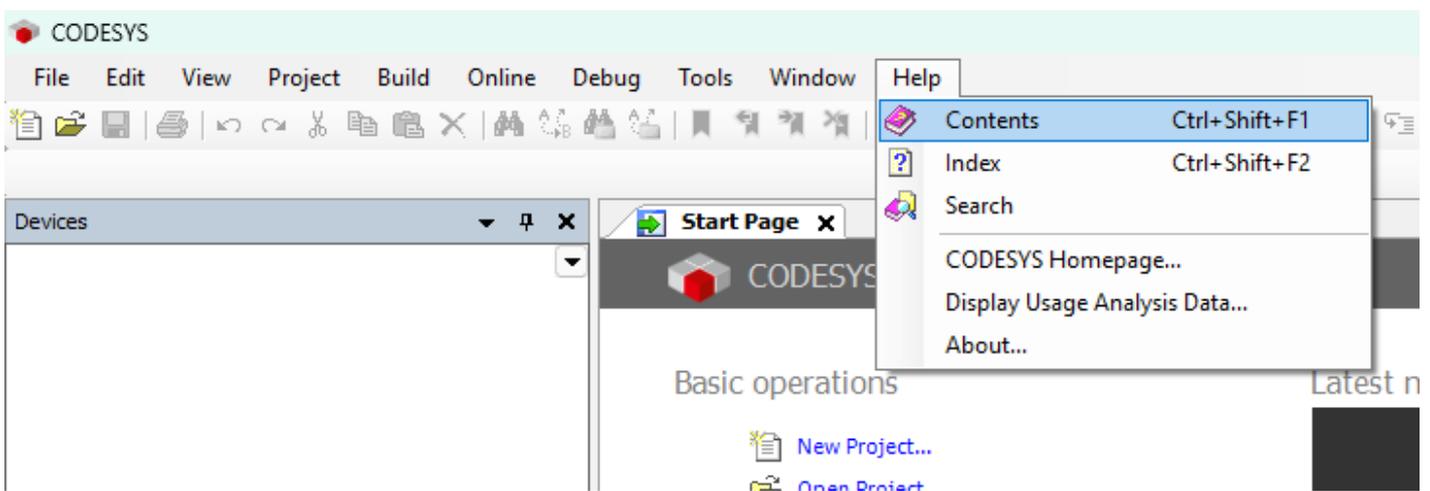
With the **CODESYS Online Help** you can learn about:

- Visualization
- Programming references
- Standard CODESYS libraries \*

**NOTE** \* For information about the DEIF-specific libraries, see [DEIF CODESYS Libraries](#).

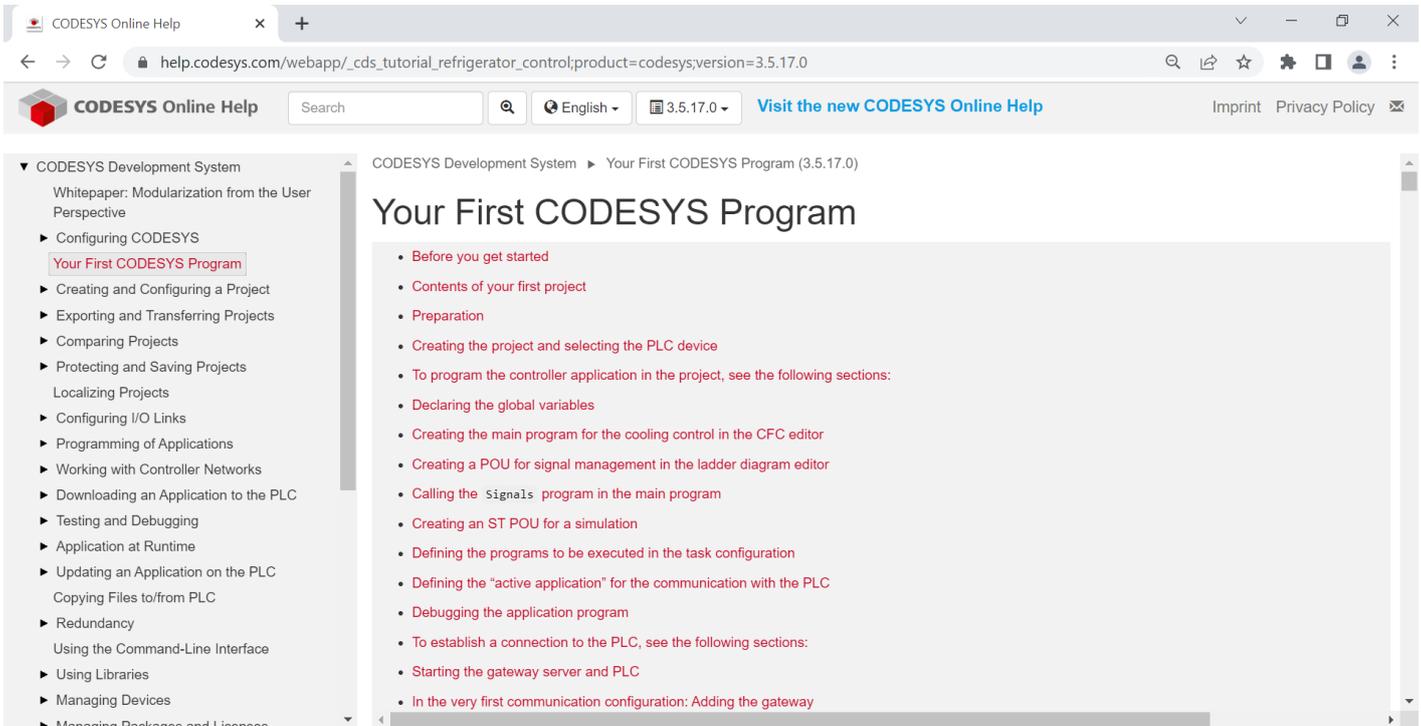
#### Access the CODESYS online help

In the CODESYS IDE, select **Help** > **Contents** from the menu.



#### New to CODESYS development?

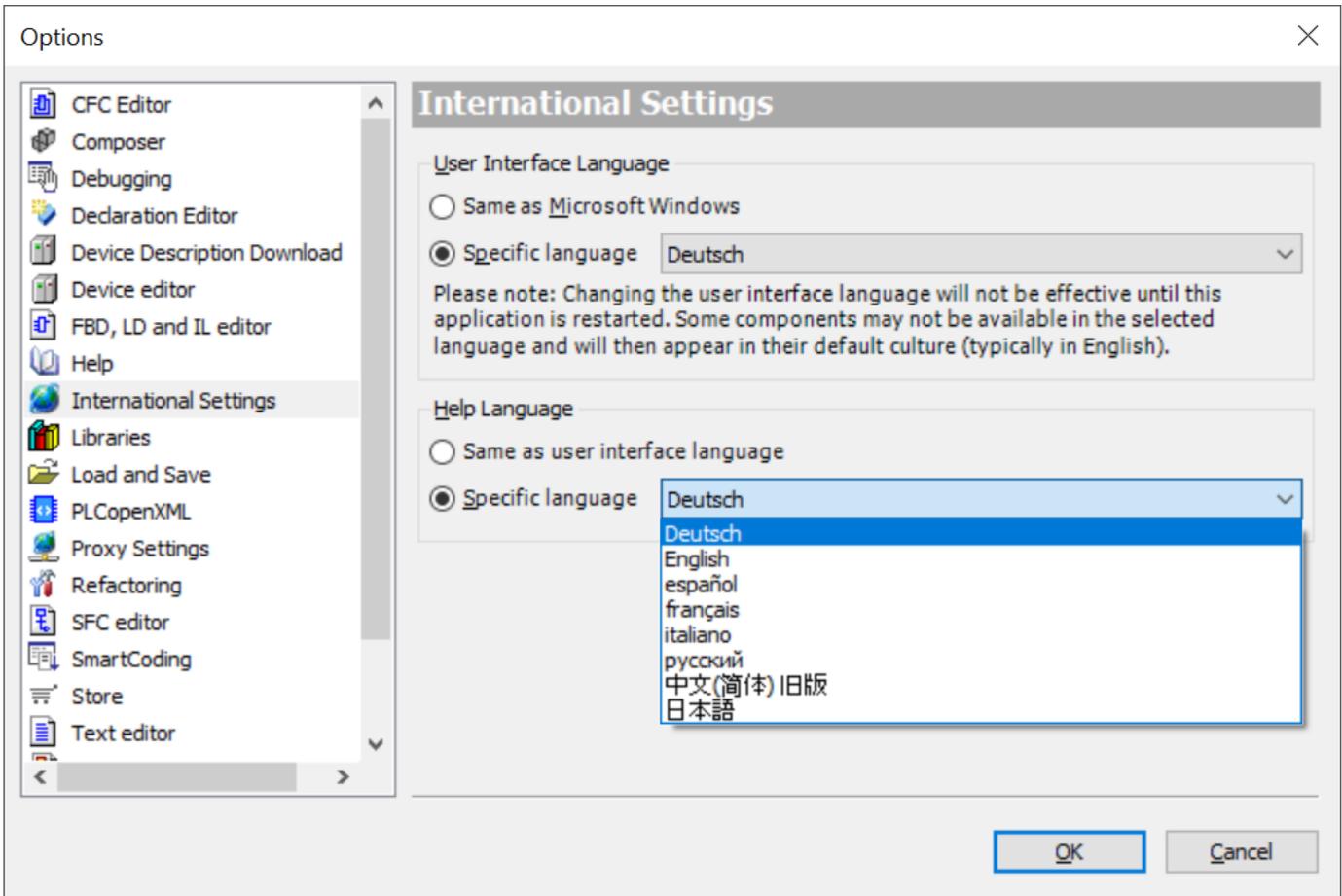
If you are new to CODESYS development, we recommend that you start with the guide under the section: **Your First CODESYS Program**.



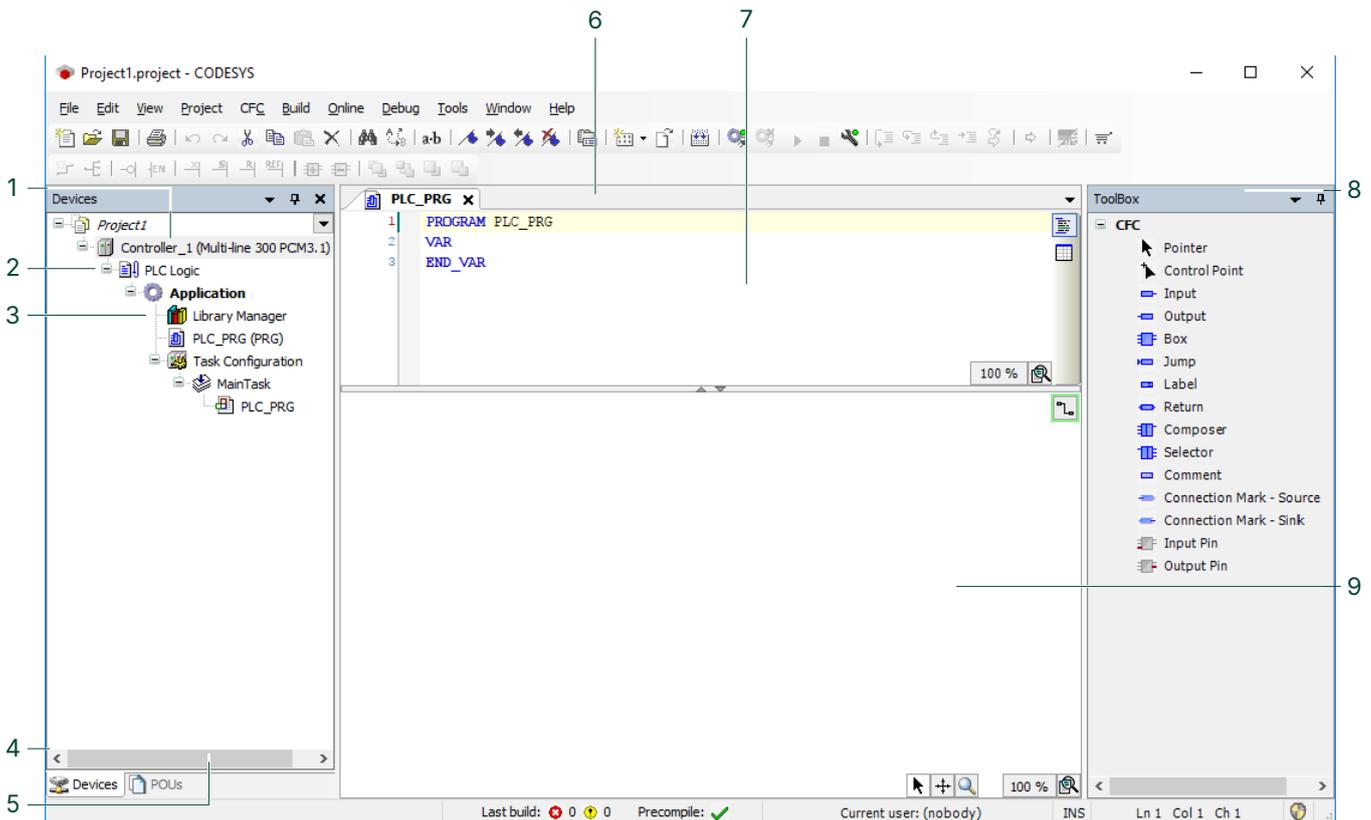
## CODESYS online help in other languages

The help is also available in other languages, and can be changed under:

Tools > Options > International settings



## 3.2 CODESYS Development System (IDE)



No.	Item	Notes
1.	Project tree	The project tree is an overview of your project. A typical project will consist of: <ul style="list-style-type: none"> <li>• One or more devices (controllers).</li> <li>• One or more applications containing the Libraries, POU's and tasks.</li> </ul>
2.	PLC Logic node	A <i>PLC Logic</i> node shows that the device is a programmable device and has no other functions associated to it.
3.	Library manager	The <i>Library manager</i> contains the libraries for the project. Each library consists of functions and function blocks that can be used in your programs.
4.	Devices tab	The <i>Devices</i> tab gives you quick access to the project tree.
5.	POU's tab	The <i>POU's</i> tab gives you quick access to the project settings menu.
6.	Working area	The working area consists of tabs representing different parts of the project. Each tab contains different parts of the project. These project parts can be opened from the project tree.
		The picture above shows the working area for the POU, <b>PLC_PRG</b> . The working area for this POU consists of a declaration workspace, an implementation workspace and a toolbox menu.
7.	Declaration workspace	The declaration workspace consists of the variables for the POU functions.
8.	Additional toolboxes	Some POU's have additional toolboxes that help you to build your program.
9.	Implementation workspace	The implementation workspace is used to program your POU.

## 3.3 Monitor application

### 3.3.1 How it works

While the program is running on the controller and you're connected to it through CODESYS, you can monitor variable values in real time. It is also possible to change the value of some variables while you are monitoring the variable values.

You can monitor the variable values of a specific POU (Program Organization Unit) by opening the POU in the working area.

To monitor variables from multiple POUs simultaneously or to track a specific set of variables, you can create a **Watch window**.

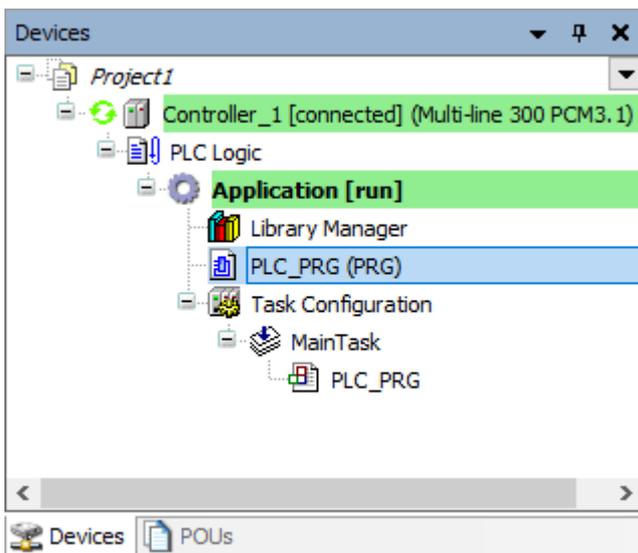
You can modify variable values in the working area or **Watch window** by entering or forcing new values to the controller.

### 3.3.2 Monitor in the working area

When you are connected to the controller through CODESYS, you can open a POU to monitor its variables in the working area. To open the POU in the working area, double-click on the POU from the project tree.

Alternatively, you can select the POU in the project tree and select **Edit object** from the right-click menu.

Open the POU, named `PLC_PRG`, in the working area by double-clicking it.



In the *declaration part* of the open POU in the working area, the variable watch list is shown:

Expression	Type	Value	Prepared value	Address	Comment
ML300_read_write_0	ML300_read_write				
Codesys_application_OK	BOOL	TRUE			
Timeout_cycles	UINT	2			
Link_OK	BOOL	TRUE			
Error_code	INT	0			
Config_conflict_error_count	INT	0			
Config_conflict_errors	ARRAY [0..19] OF D...				
Max_timeout_cycles	UINT	0			
API_version_ml300	UDINT	16777216			
API_version_lib	UDINT	16777216			

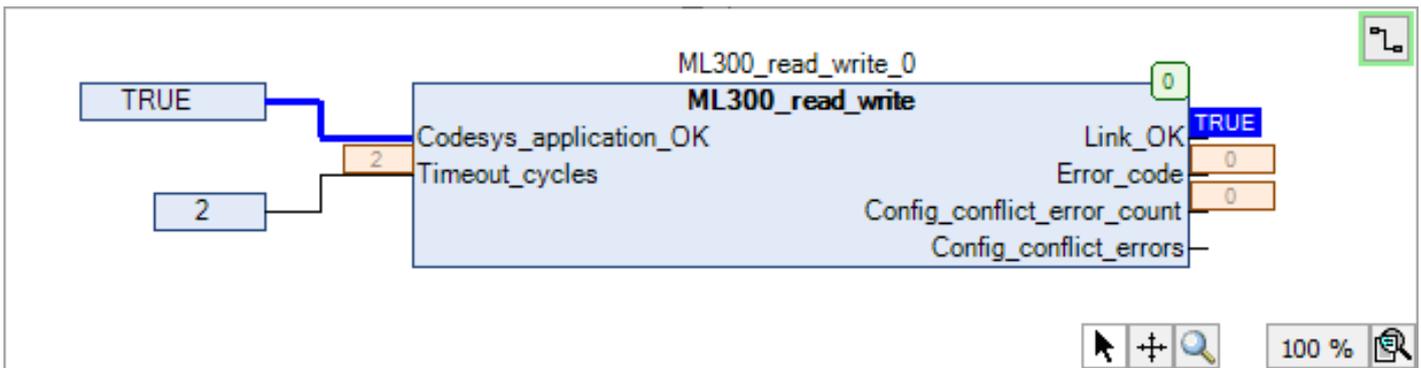
All the variables relating to the open POU are shown in this list. You can change the values of some variables using this table.



**More information**

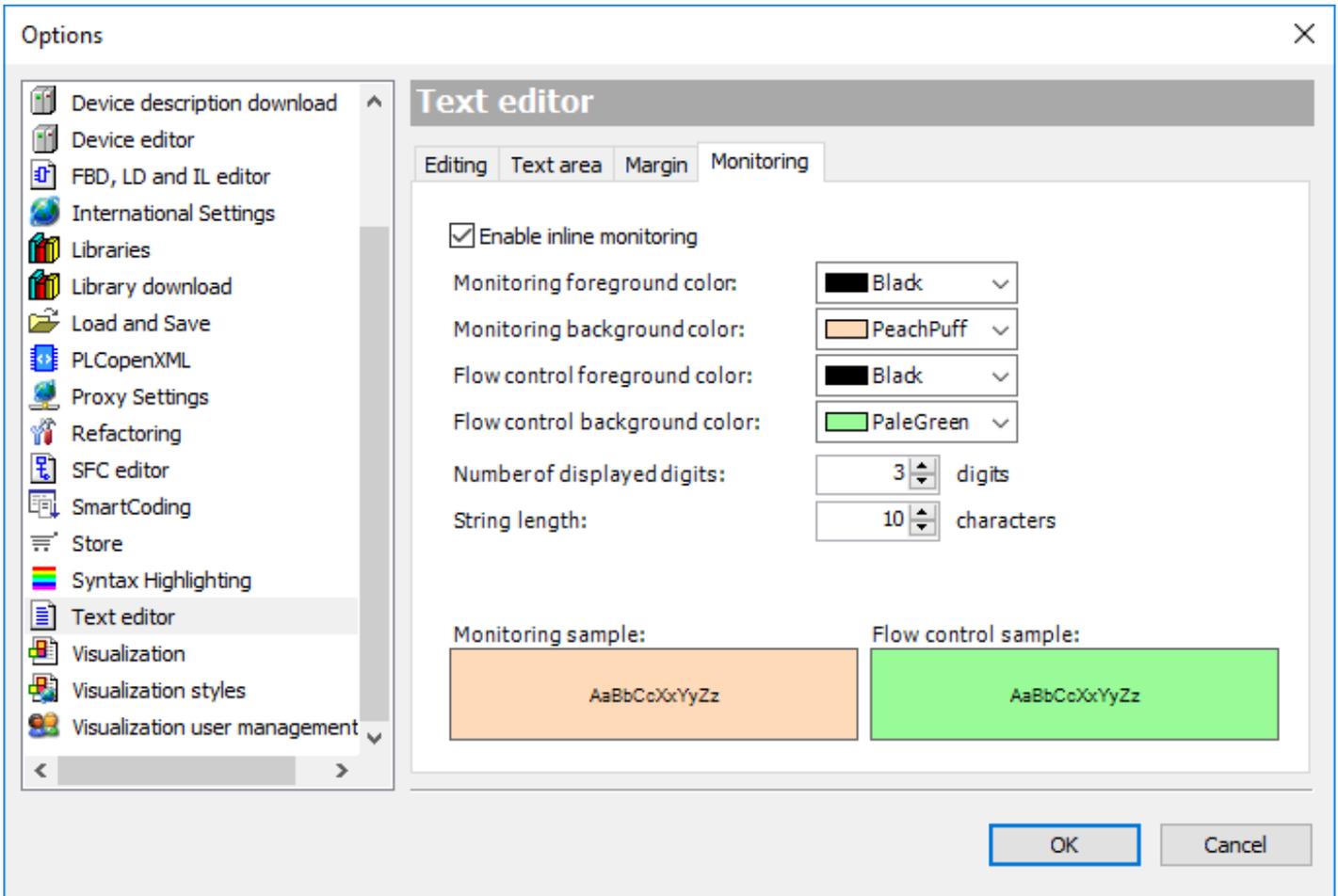
See [Writing and forcing variables](#) for more information about how to change the variables values.

In the *implementation part* of the open POU in the working area, the program function diagram, ladder logic, or code are shown:



If *Inline monitoring* is activated, the inline monitoring boxes are placed behind each variable in the code, or next to the variable in the function block. The inline monitoring boxes shows the actual value of the variable in real-time.

To activate or deactivate *Inline monitoring* go to **Tools > Options** to open the **Options** window. Activate or deactivate the function under **Text editor > Monitoring > Enable inline monitoring**.



### 3.3.3 Monitor in Watch windows

Watch windows are useful to monitor specific variables in a POU, or to monitor variables from different POUs in a single window.

You can also change the values of some variables in the **Watch window**. This is useful, for example, to debug code.

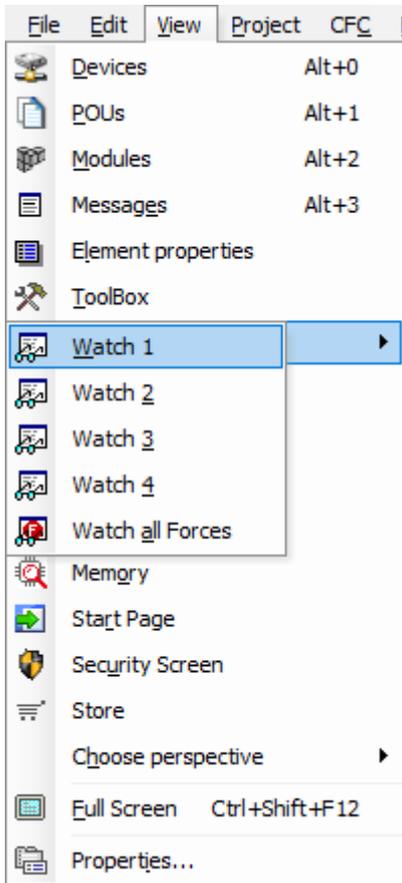


**More information**

See [Writing and forcing variables](#) for more information about how to change the variables values.

Follow these steps to create a watch window:

1. Select **Watch 1** from `View > Watch` to open a watch window.

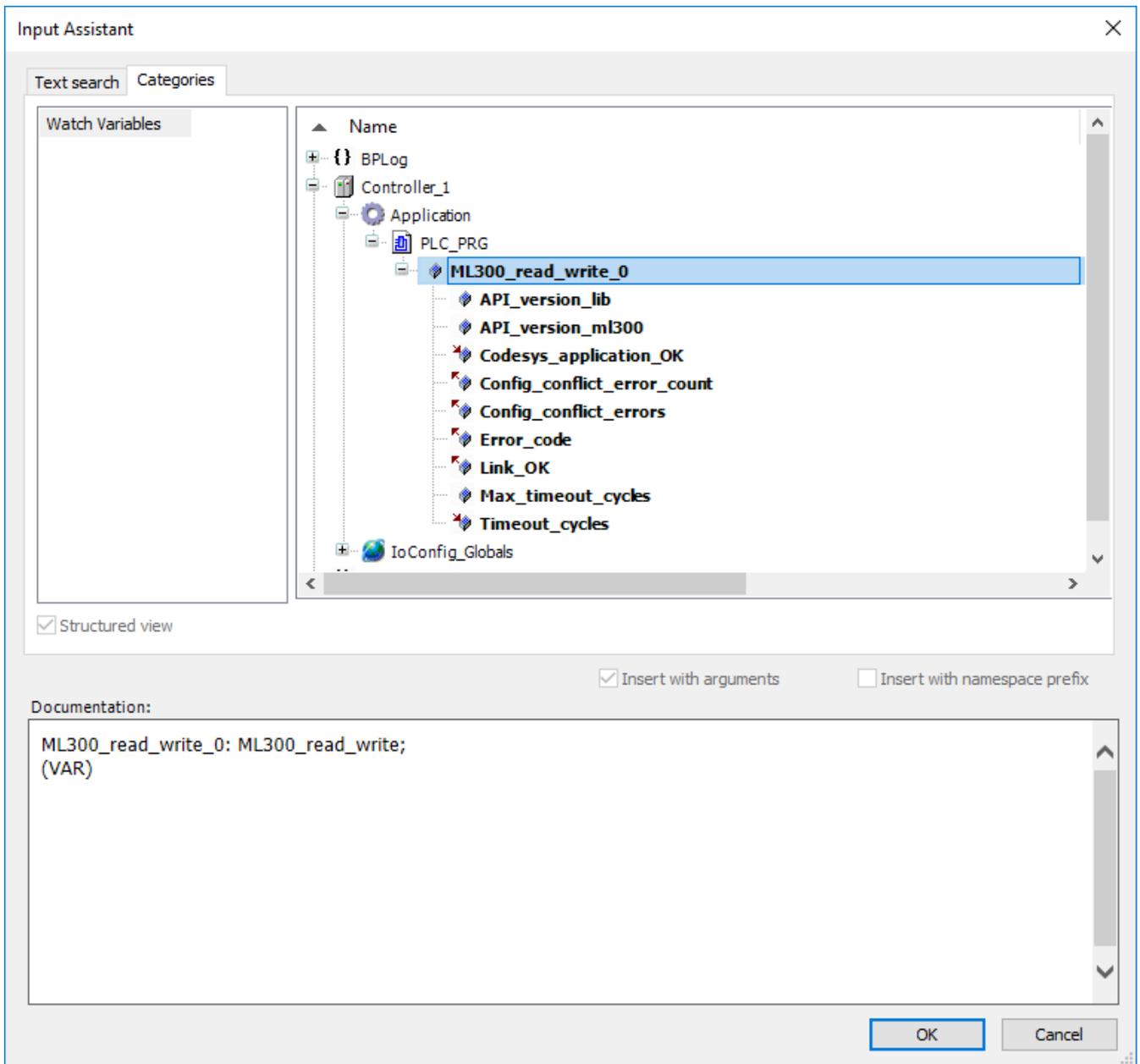


2. Double-click in an empty cell in the **Expression** column.



3. Select the **Input assistant**  to open the **Input assistant** window.

4. Under *Categories > Watch Variables*, select a variable or group of variables (for example ML300\_0) in a POU to watch:



- Select **OK** to confirm your selection and continue.
5. Press the *Return* key to add your selected variable(s) to the watch window.
    - Details for the variable(s) (for example, the application and type) are automatically added to the watch window.
  6. You can monitor the selected variable(s) in the watch window:

Expression	Application	Type	Value	Prepared value	Execution point	Address	Comment
PLC_PRG.ML300_read_write_0	Controller_1.Application	ML300_read_write			Cyclic Monitoring		
Codesys_application_OK		BOOL	TRUE		Cyclic Monitoring		
Timeout_cycles		UINT	2		Cyclic Monitoring		
Link_OK		BOOL	TRUE		Cyclic Monitoring		
Error_code		INT	0		Cyclic Monitoring		
Config_conflict_error_count		INT	0		Cyclic Monitoring		
Config_conflict_errors		ARRAY [0..19] OF DINT			Cyclic Monitoring		
Max_timeout_cycles		UINT	0		Cyclic Monitoring		
API_version_ml300		UDINT	16777216		Cyclic Monitoring		
API_version_lib		UDINT	16777216		Cyclic Monitoring		

- It is also possible to change the values of some variables using this watch window.

### 3.3.4 Write and force variables

Some variables in your program can be changed while the program is running. To change the value of the variables in your program, first prepare a new value for the variable. Then **Write** or **Force** the prepared value to the program.

#### Preparing variables

To change the value of a variable, you must first prepare a replacement value. The new value for the variable is stored in the *Prepared value* column. The new variable remains in the *Prepared value* column until the user chooses to **Write** or **Force** the prepared value to the variable. You can prepare multiple variables and **Write** or **Force** all of the prepared values at the same time.

To prepare a variable of the type *INT*, *DINT*, *UINT*, or *STRING*:

1. Double-click on the field in the *Prepared value* column.
2. Enter the new value.
3. Press the **Return** key or click outside the field.

The *Prepared value* is ready to be written or forced to the program.

To prepare a variable of the type *BOOL*:

1. Click on the field in the *Prepared value* column until the desired value appears.

The *Prepared value* is ready to be written or forced to the program.

 **Example of a UINT and BOOL prepared value**

PLC\_PRG x

Controller\_1.Application.PLC\_PRG

Expression	Type	Value	Prepared value	Address	Comment
ML300_read_write_0	ML300_read_write				
Codesys_application_OK	BOOL	TRUE			
Timeout_cycles	UINT	2	1		
Link_OK	BOOL	TRUE	FALSE		
Error_code	INT	0			
Config_conflict_error_count	INT	0			
Config_conflict_errors	ARRAY [0..19] OF D...				
Max_timeout_cycles	UINT	0			
API_version_ml300	UDINT	16777216			
API_version_lib	UDINT	16777216			

#### Writing variables

When you **Write** a prepared value to the program, the variable updates during the next run cycle. The new value can be updated immediately by the program during the next run cycle.

To **Write** a new variable value to the controller:

1. Prepare the variable value(s).
2. Select **Debug > Write values**.
  - Alternatively press **Ctrl+ F7**.
3. The *Value* column updates and shows the prepared value.

Expression	Type	Value	Prepared value	Address	Comment
ML300_read_write_0	ML300_read_write				
Codesys_application_OK	BOOL	TRUE			
Timeout_cycles	UINT	1			
Link_OK	BOOL	TRUE			
Error_code	INT	0			
Config_conflict_error_count	INT	0			
Config_conflict_errors	ARRAY [0..19] OF D...				
Max_timeout_cycles	UINT	0			
API_version_ml300	UDINT	16777216			
API_version_lib	UDINT	16777216			

Some variables cannot be updated. Typically such variables receive their input from a different source. If you attempt to **Write** a new value to such a variable, then the variable value remains unchanged.

### Forcing variables

When you **Force** a prepared value to the program, the variable updates during the next run cycle. The forced value remains unchanged in the value column, until it is unforced.

Forced variables remain in the system until unforced by the user. The user always receives a warning, when there are forced variables remaining in the application when logging out.

Follow these steps to **Force** a new variable value to the controller:

1. Prepare the variable value(s).
2. Select Debug > Force values.
  - a. Alternatively press **F7**.
3. The *Value* column updates and shows the forced values.
  - The **F** icon to the left of the value indicates that the variable is a forced variable.

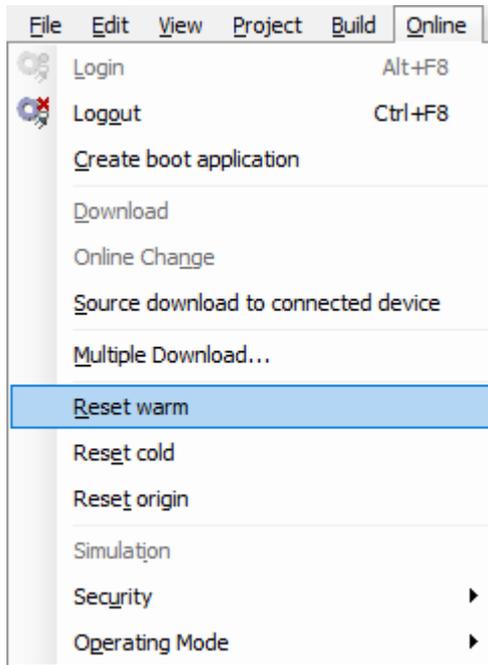
Expression	Type	Value	Prepared value	Address	Comment
ML300_read_write_0	ML300_read_write				
Codesys_application_OK	BOOL	TRUE			
Timeout_cycles	UINT	<b>F</b> 1			
Link_OK	BOOL	<b>F</b> FALSE			
Error_code	INT	0			
Config_conflict_error_count	INT	0			
Config_conflict_errors	ARRAY [0..19] OF D...				
Max_timeout_cycles	UINT	0			
API_version_ml300	UDINT	16777216			
API_version_lib	UDINT	16777216			

Some variables cannot be updated. Typically such variables receive their input from a different source. If you attempt to **Force** a new value to such a variable, then the value in the *Value* column changes to appear as if it is forced, but any outputs connected to it will show the original value.

## 3.4 Other features

### 3.4.1 Warm reset

To perform a warm reset, select `Online > Reset warm`.



After performing a warm reset of the CODESYS program, you must start the CODESYS application again for the application to run on the controller.

## 4. CODESYS in the controller

### 4.1 Extend your application with CODESYS

You can extend your controller's application with a CODESYS license.

CODESYS is a widely adopted IEC 61131-3 programming environment that enables powerful, flexible, and scalable control system development. You can use instruction lists, structured text, ladder diagrams, function block design, and sequential function charts. Use the CODESYS Visualisation to even create your own HMI visualisations for your project.

With CODESYS, you can create and integrate your own CODESYS project with the controller's application. This both extends the logic and operation of your system, and eliminates the need for an additional external and expensive PLC.

By using CODESYS, you gain a reliable and efficient development platform that aligns perfectly with our product's capabilities.

Contact DEIF to order a CODESYS licence for your controller.

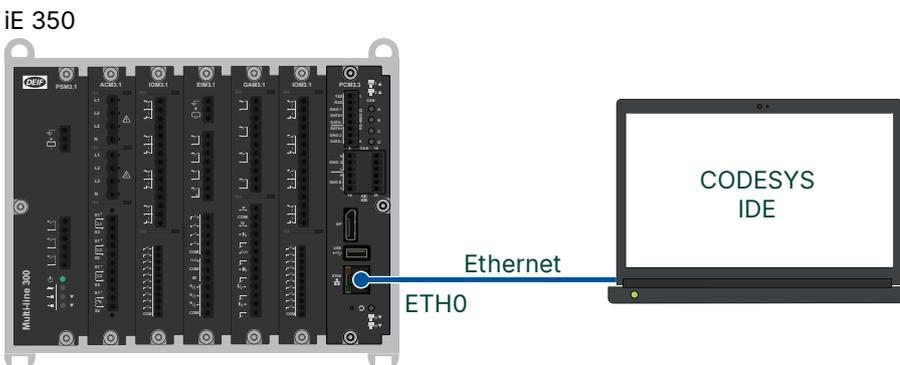
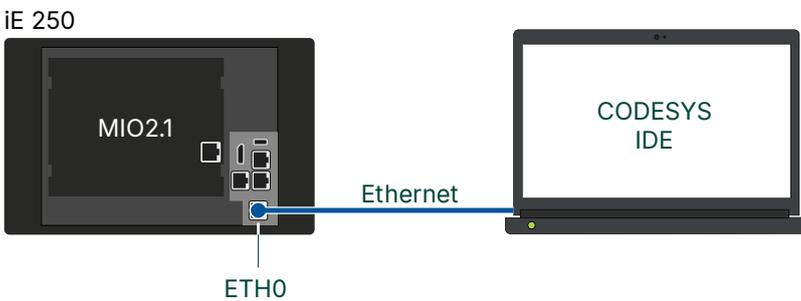
### 4.2 How it works

You create and edit your CODESYS projects locally on your computer using the CODESYS IDE (Integrated Development Environment). The project can be tested locally and then deployed to the controller and activated.

The controller must be connected to the development computer directly with an Ethernet cable or over an Ethernet network.

#### Ethernet connection to controller

When programming for the first time, you must use an Ethernet cable connected to Ethernet port **ETH0**.



#### A typical development workflow for your projects

1. Create your project on your local computer:
  - You start by launching the CODESYS IDE on your computer, select the target device, and choose the programming language (for example: Ladder, Structured Text, and so on).

## 2. Create and simulate your logic locally:

- This includes creating visualisations, configuring inputs and outputs, and testing logic in the simulation mode before deploying.

## 3. Transfer (deploy) your project to the controller:

- Once the project is ready, it is downloaded to the controller over the Ethernet connection.
- This is done by logging into the controller from the IDE and transferring the compiled project.

## 4.3 DEIF library functions

Each DEIF library provides you with access to different controller functions. When you include the library in your CODESYS project you can then access the objects associated.

### 4.3.1 Common libraries (all products)

Library	Used for
iE Custom_parameters	Configuration of your custom parameters. Includes both simple and extended settings.
iE IO	The Input/output interface between CODESYS and the DEIF application.
iE Main	Information about the controller's processor module, versions HMI popup, and status texts.
iE Priority data	Fast prioritised readings like selected Live data and [source] breaker signals.  <b>NOTE:</b> This function block has a high CPU load.
iE UP [UP]	Internal libraries for integration between CODESYS and the DEIF application.

### 4.3.2 Controller libraries

Controller libraries allow you to access and use the controller functions. Download and use the controller libraries that match your application.

#### Controller libraries (LF)

Library	Used for
iE LF - Bustie [BTB]	BTB controller functions.
iE LF - Genset [GB]	GENSET controller functions.
iE LF - Mains [MB]	MAINS controller functions.
iE LF - Mains [MB TB]	MAINS controller with TB functions.
iE LF - Single genset [GB]	SINGLE genset controller functions.
iE LF - Single genset [GB MB]	SINGLE genset with MB controller functions.

#### Controller libraries (LC)

Library	Used for
iE LC - Bustie [BTB]	BTB controller functions.
iE LC - Genset [GB]	GENSET controller functions.
iE LC - Mains [MB]	MAINS controller functions.
iE LC - Mains [MB TB]	MAINS controller with TB functions.

Library	Used for
iE LC - Single genset [GB]	SINGLE genset controller functions.
iE LC - Single genset [GB MB]	SINGLE genset with MB controller functions.
iE LC - Single genset [GB NO-MAINS]	SINGLE genset controller with no mains functions.

#### Controller libraries (MS)

Library	Used for
iE MS [BTB]	BTB controller functions.
iE MS [GB]	GENSET controller functions.
iE MS [HYBRID]	HYBRID controller functions.
iE MS [IO]	IO controller functions.
iE MS [SC]	SHORE connection controller functions.
iE MS [SG]	SHAFT generator controller functions.

#### Controller libraries (MP)

Library	Used for
iE MP [BTB]	BTB controller functions.
iE MP [GB]	GENSET controller functions.
iE MP [HYBRID]	HYBRID controller functions.
iE MP [EDG]	EMERGENCY genset controller functions.
iE MP [SC]	SHORE connection controller functions.
iE MP [SG]	SHAFT generator controller functions.

## 4.4 Enable CODESYS

To use your CODESYS project with your controller, CODESYS must be enabled in the parameters. If it's not enabled, the CODESYS project cannot run.

#### CODESYS > Configuration > CODESYS

Parameter	Range	Notes
Enable	Not enabled, Enabled	Enabled allows the CODESYS application to be active.

## 4.5 Users

Use the **admin** user to access the WebConfig and configure the controller settings initially. New users must have the **Provisioner** permission to access the WebConfig features.

You can configure new users directly with WebConfig or by using PICUS.

#### CODESYS Localaccessuser

The *Localaccessuser* is a built-in user that can access the system through the local computer (localhost). It can send API requests from the command line or the CODESYS application, and is used to show parts of the web interface inside CODESYS, like viewing logs or setting the time.

You can manage the *Localaccessuser* like any other user. If you don't need it, you can delete it. If it's deleted by mistake, you can create it again, but make sure the password is left empty.

The *Localaccessuser* is restored when a factory reset is done.

## 4.6 Communication

You can configure the communication settings for the Ethernet ports and VLANs. VLANs are used to manage the Ethernet traffic routing on the built-in managed switch. On each physical Ethernet port it is possible to assign the behaviour either as **Port Access** or **Trunk**.

By default, all switch ports are configured as access ports with VLAN 1. VLAN 1 is configured with **mDNS** enabled (for example, Bonjour service) and IPv4 and IPv6 in mode Link-local only.

We recommend the tool Bonjour service as your **mDNS** service. Download Bonjour service from the official website:

[https://support.apple.com/kb/DL999?locale=en\\_US](https://support.apple.com/kb/DL999?locale=en_US) \*

**NOTE** \* DEIF is not responsible for any external links or content.



### More information

Use [WebConfig](#) to configure the communication settings with any HTML-capable browser.

## 4.7 HTML browser access (WebConfig)

Use [WebConfig](#) to configure and manage the controller system-settings directly with any HTML-capable browser. You can use *Hostname*, *IPv6*, or *IPv4* (if configured) to access the controller.

The application-related settings, such as parameter settings, need to be configured with PICUS.

### NOTICE



#### Certificate security-warning

Access to the controller with a browser requires you to accept a browser security-warning. The controller certificate is only local and therefore not published online.



### More information

See [WebConfig](#) for how to access WebConfig and use the features.

## 4.8 Inputs and outputs

### 4.8.1 Inputs and outputs

Assign the CODESYS inputs and outputs with the I/O configuration. These inputs and outputs must first be defined in the CODESYS program, and written to the controller before they can be used.

Function	I/O	Type	Details
Local > CODESYS > Custom digital input (× 40)	Digital input	Pulse/continuous	If this input is activated, then the controller activates the corresponding CODESYS digital input function.
Local > CODESYS > Outputs > Custom digital output (× 40)	Digital output	Pulse/continuous	If CODESYS activates the digital output function, then the controller activates the digital output.
Local > CODESYS > State > CODESYS application OK	Digital output	Continuous	If the <b>CODESYS_application_OK</b> output value is "True" and there are no communication errors, then the controller activates the digital output.

Function	I/O	Type	Details
Local > CODESYS > Custom analogue input (× 40)	Analogue input	-	As the value of this input changes, the corresponding CODESYS analogue input value changes.
Local > CODESYS > Custom analogue output (× 40)	Analogue output	-	As CODESYS changes the value of this analogue output, the corresponding analogue output value on the controller changes.

## 4.8.2 Activating controller outputs

CODESYS cannot activate controller outputs that are configured for controller functions. CODESYS can activate external commands. The controller only follows the command if the controller is in remote control.

 **Example**

CODESYS cannot activate the digital input:

```
Breakers > [Breaker] > Controls > [*B] open
```

CODESYS can activate the command:

```
[Breaker] > Open
```

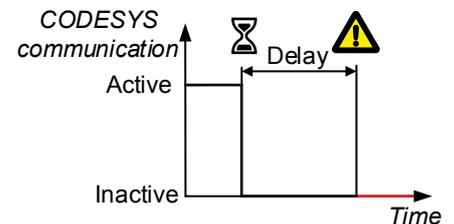
Where **[Breaker]** could be *Generator breaker*, and **[\*B]** could be *GB*.

## 4.9 CODESYS alarms

### 4.9.1 CODESYS application not OK

This alarm alerts the operator that there is a communication problem between CODESYS and the controller.

If communication between CODESYS and the controller was active and became inactive, the delay timer starts. If the communication does not become active within the delay period, the alarm is triggered.



Controller types: This alarm is present in all controllers that have CODESYS installed.

**CODESYS > Monitoring > Application not OK**

Parameter	Range
Startup time	0 to 600 s
Delay	0.00 s to 5 min

### 4.9.2 CODESYS configuration conflict

If the same input/output function is configured in CODESYS and the controller *at the same time*, this alarm is triggered.

The conflict sets the **Link\_OK** output on the controller function block in the program to **FALSE**.

Controller types: This alarm is present in all controllers that have CODESYS installed.

**CODESYS > Monitoring > I/O config conflict**

This alarm is always enabled.

To clear the alarm, you can either:

- Remove the conflicting function from the CODESYS project, and update the CODESYS application on the controller.
- Remove the conflicting function from the controller, and perform a warm reset of the CODESYS application.

## 5. WebConfig

### 5.1 About WebConfig

You can configure and manage the controller system-settings direct with any HTML-capable browser. With WebConfig you can configure both advanced settings and see more detailed logs and information.

Use the **Admin** user to access and configure the WebConfig. To use a different user, that user must have the **Provisioner** role.

Application-related settings, such as parameter settings, need to be configured with PICUS.

Access to the controller with a browser requires you to accept a browser security-warning, as the controller certificate is only local and therefore not published.

### 5.2 Connect to the controller

While DEIF has taken great attention to data security and has designed the product to be a secure product, we recommend adopting Information Technology (IT) and Operational Technology (OT) security best practices when connecting the controller to a network.

#### NOTICE



##### Initial access

If your controller has not yet been configured, you must use the default access address and permissions. We strongly recommend that you change the default configuration to protect your system.

You can connect to the controller with *Hostname*, *IPv6*, or *IPv4* (if configured):

- **Hostname**
  - Example: `https://ie250-079562.local`
- **IPv4 address**
  - Example: `https://192.168.142.6`
- **IPv6 address**
  - Example: `https://[fe80::226:77ff:fe07:9562]`

#### How to identify the controller's Hostname

You can identify your controller's **Hostname** by using the Bonjour service and a command prompt. Connect your PC directly to the **ETH0** Ethernet port and run the command:

```
dns-sd -B _http._tcp local
```

```
Command Prompt
Microsoft Windows Version [10.0.26100.3775]
(c) Microsoft Corporation. All rights reserved.

C:\
C:\>dns-sd -B _http._tcp local
Browsing for _http._tcp local
Timestamp      A/R  Flags  if Domain          Service Type      Instance Name
7:42:33.715    Add   3 12 local.          _http._tcp.       Brother QL-580N
7:42:33.715    Add   3 12 local.          _http._tcp.       iE250-074854
```

Hostname

This displays all the devices located on your connected network. The **Hostname** includes the product together with a serial code.

Examples:

- ie250-076244.local
- ie350-067215.local
- ie650-071522.local

You can then use this Hostname directly in your HTML-capable browser to access the controller configuration.

### **Username and password**

Access the controller with the same username and password as configured on the controller.

## **5.3 Users**

Use the **admin** user to access the WebConfig and configure the controller settings initially. New users must have the **Provisioner** permission to access the WebConfig features.

You can configure new users directly with WebConfig or by using PICUS.



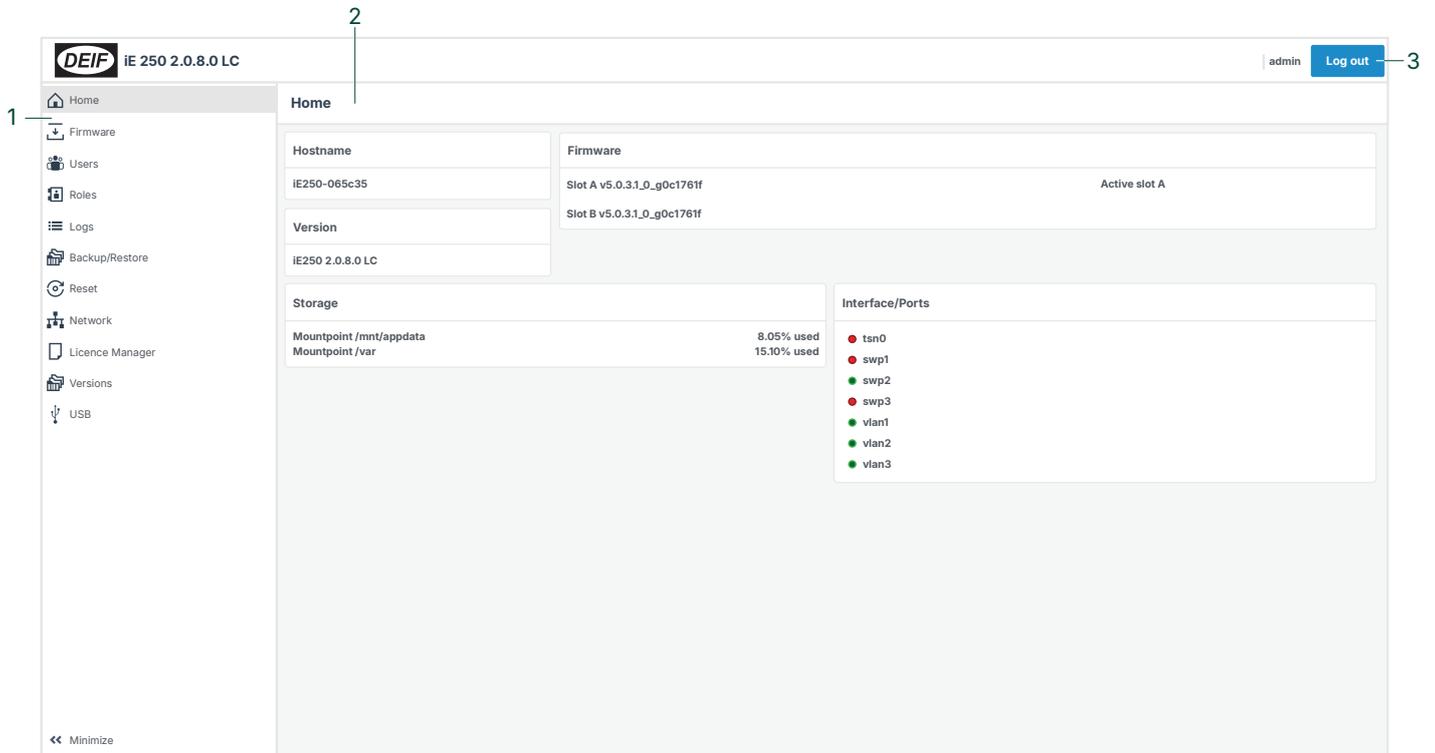
### **More information**

See [About Permissions](#) in [Cybersecurity](#).

## 5.4 Configuration

### 5.4.1 Home

The **Home** page provides a quick overview of the firmware, Ethernet ports and VLAN status. This information can be useful when troubleshooting or contacting DEIF support.

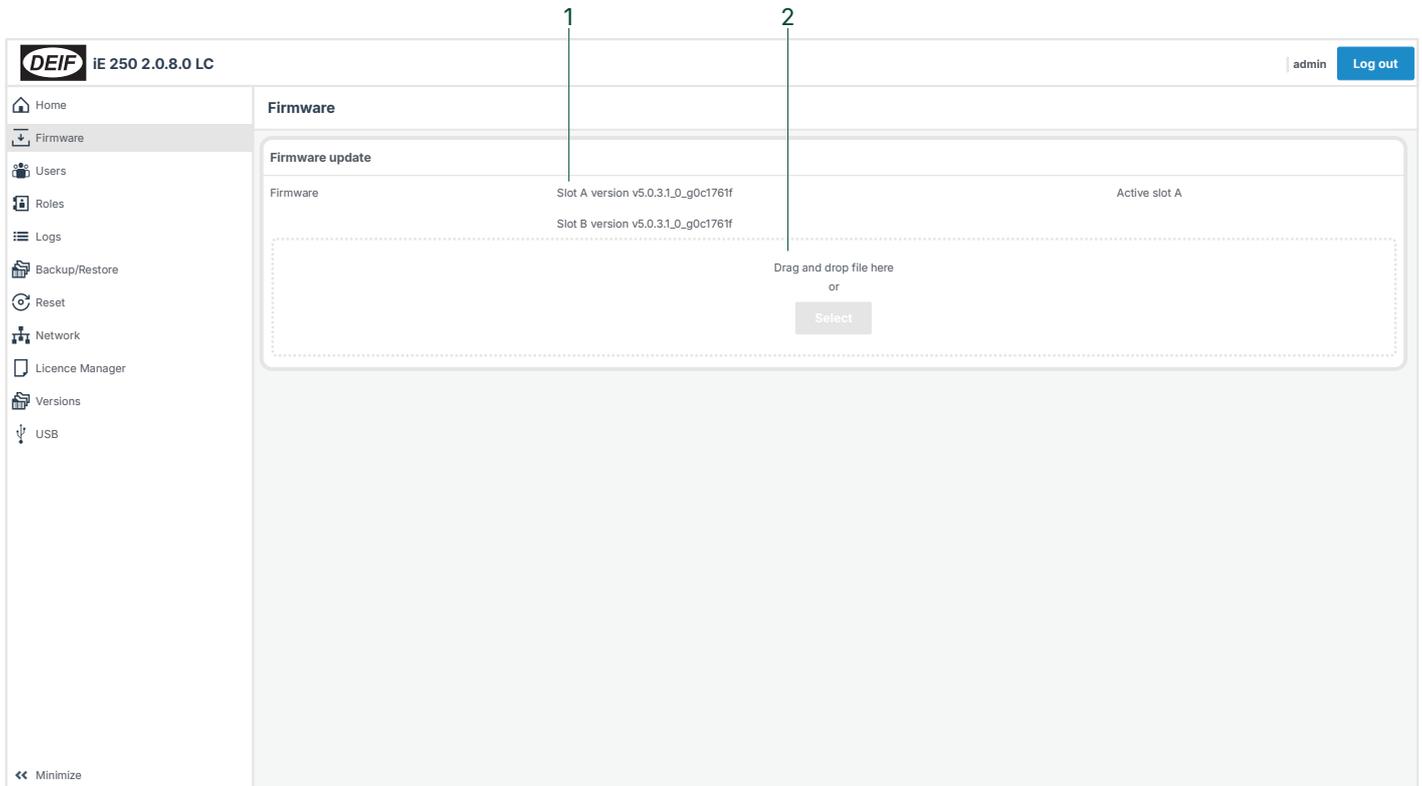


No.	Item	Notes
1	Features	Available features and pages.
2	Page	Selected page.
3	User	Log in / Log out. Logged in user is shown.

## 5.4.2 Firmware

### 5.4.2.1 About firmware

Use the firmware feature to update your controllers and displays.



No.	Item	Notes
1	Firmware installed	Shows the firmware installed in Slot A and Slot B.
2	Upload	Drag and drop the firmware file or use the Select.

**NOTE** Alternatively, use PICUS ([Tools > Firmware](#)) to update the controllers and displays.

### 5.4.2.2 Firmware constraints

#### Controller prerequisites

Before you can apply a firmware update, the controller must meet certain prerequisites. If the controller is in Emulation mode, or has an ID of **0** (and not part of the system), these constraints do not apply.

#### Breaker constraint

All controlled breaker(s) must be opened.

#### Equipment constraint (if controlled)

The controlled equipment must be stopped.

#### Mode constraint (Marine applications)

The controller must be in Switchboard control.

### 5.4.2.3 Download firmware

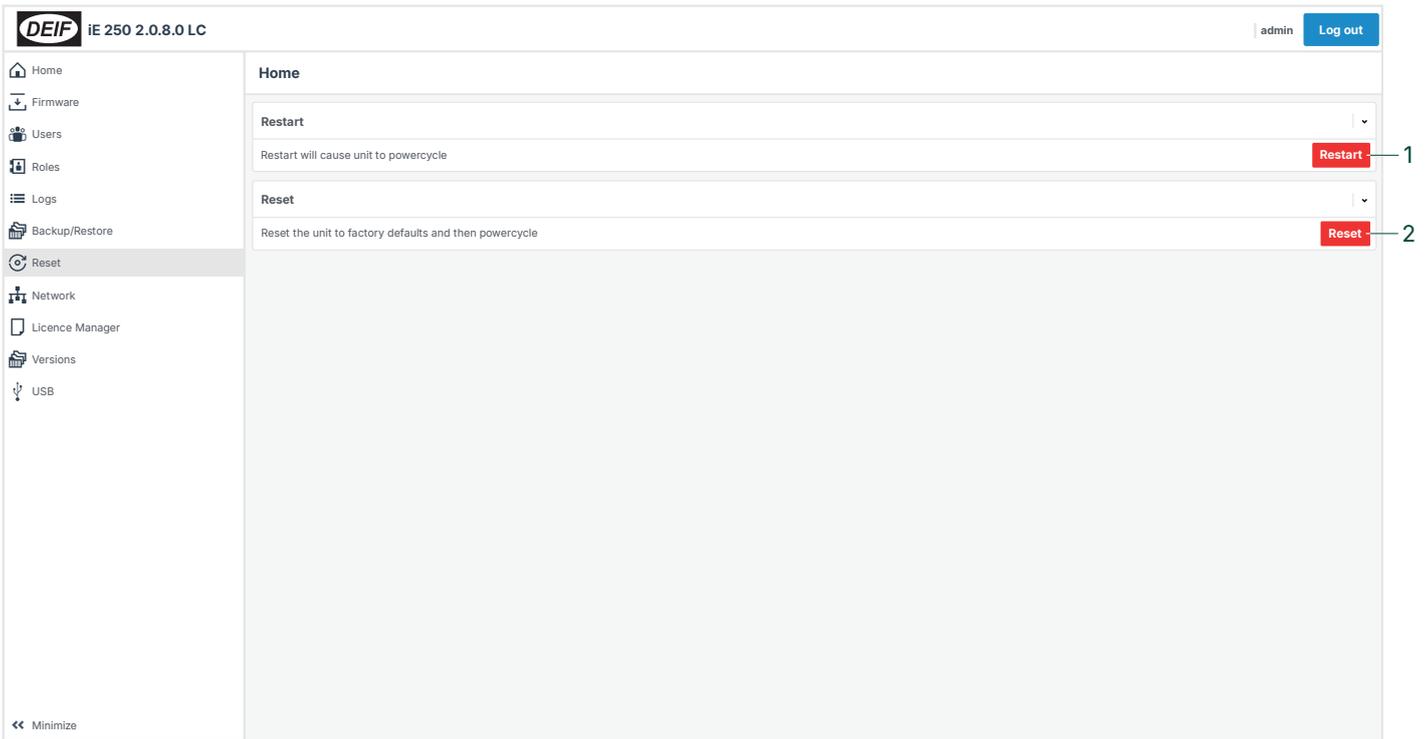
Firmware for your product is available on [www.deif.com](http://www.deif.com).

## Download the software

iE 250	<a href="https://www.deif.com/software/?product=17655">https://www.deif.com/software/?product=17655</a>
iE 250 Marine	<a href="https://www.deif.com/software/?product=20133">https://www.deif.com/software/?product=20133</a>
iE 350	<a href="https://www.deif.com/software/?product=22285">https://www.deif.com/software/?product=22285</a>
iE 350 Marine	<a href="https://www.deif.com/software/?product=20135">https://www.deif.com/software/?product=20135</a>

### 5.4.3 Reset (Factory reset)

You can **Restart** or **Factory reset** the controller. Before using either feature, the controller must not be in operation or controlling any equipment.



No.	Item	Notes
1	Restart	This restarts the controller and is the same as powercycling the unit.
2	Reset	This does a <i>Factory reset</i> of the controller. All settings, including Ethernet configuration and passwords, are reset to their defaults.

### DANGER!

#### **Controller must not be in operation**



The controller must not be in operation or controlling any equipment when you Restart or Factory reset the controller.

Make the controller safe for commissioning to avoid equipment damage, personal injury, or unexpected critical system operations.

### NOTICE

#### **A factory reset deletes all controller information**



You cannot recover any controller information after a factory reset. All settings, including Ethernet configuration and passwords, are reset to their defaults.

Make sure that you want to do a factory reset. Create a full controller backup, and store it safely on your computer. Make sure that you have the information that you will need after the factory reset. This should include the default passwords, along with the new user and password configuration, and the Ethernet communication settings.



### More information

See the [PICUS manual](#) for how to create backups from your controller.



### More information

See [Factory reset](#) for the location of the **Factory reset** button.

## 5.4.4 Network communication

### 5.4.4.1 Network settings

You can configure the communication settings for both Ethernet and VLAN configuration.

No.	Item	Notes
1	Network	Network settings page.
2	Port #	Configuration for each port.
3	State	Log in / Log out.  Logged in user is shown.
4	Description	Description for the port configuration.
5	Apply / Write	Apply the changes immediately.  Write the changes to the controller.

## 5.4.4.2 Ethernet ports

You can configure how the Ethernet ports are allowed to operate.

This is for ring topology networks and uses the Media Redundancy Protocol (MRP). The network master is connected to both ends of the network, forming a loop. This configuration allows the master to send and receive data from both directions, which is essential for detecting and compensating for a cable break.

With Auto discover selected, the devices connected in the loop are automatically discovered. It is not possible to connect multiple rings together.

DEIF recommends that you do not use Port 0 (Eth 0) for Auto discover. This is because Auto discover is for ring protocols.

**Network > Port settings > Port # \***

Parameter	Range	Notes
State	<ul style="list-style-type: none"><li>Auto discover</li><li>Bridge</li><li>Standalone</li><li>Off</li></ul>	<p><b>Auto discover</b></p> <ul style="list-style-type: none"><li>This is for ring topology networks and uses the Media Redundancy Protocol (MRP).</li><li>The network master is connected to both ends of the network, forming a loop. This configuration allows the master to send and receive data from both directions, which is essential for detecting and compensating for a cable break.</li><li>Automatically detects and uses the network settings. Ideal for environments where devices need to be quickly and easily connected without manual configuration.</li></ul> <p><b>Bridge</b></p> <ul style="list-style-type: none"><li>Connects two network segments, allowing them to function as a single network. Useful for extending networks or connecting different network types.</li><li>The Ethernet port is associated to one or more VLAN IDs depending on the VLAN port mode. Access mode uses a specific VLAN ID. Trunk mode uses one or more VLAN IDs.</li></ul> <p><b>Standalone</b></p> <ul style="list-style-type: none"><li>Operates independently with its own network settings. Suitable for isolated networks or when specific configurations are needed for a particular device.</li></ul> <p><b>Off</b></p> <ul style="list-style-type: none"><li>No Ethernet traffic is allowed to or from the port. The port is not active. This can be useful for <a href="#">Cybersecurity</a> purposes to prevent unnecessary Ethernet ports being used.</li></ul>
Description	-	A descriptive name for the Ethernet port.

**NOTE** \* # is 0 to 3.

**NOTE** \* # is 0 to 4.

## 5.4.4.3 VLAN configuration

Virtual Local Area Networks (VLANs) allow you to segment a physical network into multiple logical networks. This helps improve network management, security, and performance.

Use VLANs to manage the Ethernet traffic routing through the controller's switch. You can configure which VLAN used for on each Ethernet port.

For Ethernet ports that are configured as **Bridge**, you configure the VLAN port mode. This can be Access or Trunk.

#### Access

- Use Access for end devices, like a PC or HMI device. These are typically devices that do not need to be aware of VLAN configurations.
- The VLAN configured then allows traffic for that specific VLAN only.
- **Example:** If an Ethernet port is configured as Access mode for VLAN 10, any device connected to that port will be part of VLAN 10.

#### Trunk

- Use Trunk for inter-switch links or connections to routers and servers that need to handle multiple VLANs. A trunk port can carry traffic for multiple VLANs simultaneously. It tags frames with VLAN identifiers to distinguish between different VLANs.
- Configure which VLANs are used on the Ethernet port.
- **Example:** A trunk port might carry traffic for VLANs 10, 20, and 30, tagging each frame with the appropriate VLAN ID.

### 5.4.4.4 Default VLANs

The controller is supplied with three default VLANs preconfigured:

- VLAN for default service communication with unknown devices.
- VLAN for display and remote management communication.
- VLAN for sub-ring process communication.

You can edit the preconfigured VLANs and additionally add more VLANs as needed.

Setting	Notes
ID	1
Description	VLAN for default service communication with unknown devices.
Interface	vlan1
Unit type	Unknown unit.
mDNS	Enabled.
IPv6	Controller IPv6 address and mask.
IPv4	DHCP enabled. Controller IPv4 address and mask.

Setting	Notes
ID	2
Description	VLAN for display and remote management communication.
Interface	vlan2
Unit type	Display unit.
mDNS	Not enabled.
IPv6	Controller IPv6 address and mask.
IPv4	DHCP not enabled. Controller IPv4 address, mask, gateway, DNS settings.

Setting	Notes
ID	3
Description	VLAN for sub-ring process communication.
Interface	vlan3
Unit type	Base unit.
mDNS	Not enabled.
IPv6	Controller IPv6 address and mask.
IPv4	DHCP not enabled. Controller IPv4 address, mask, gateway, DNS settings.

## 5.4.5 USB communication

### 5.4.5.1 Allow or restrict USB access

You can allow or restrict access to the USB port on the controller (where fitted). This can prevent unwanted or unauthorised direct access to the controller using the USB port.

#### USB

Setting	
<b>Enabled</b>	The USB port can communicate and transfer data with any USB peripheral that is connected.
<b>Not enabled</b>	<ul style="list-style-type: none"> <li>The USB port can not communicate or transfer any data with any USB peripheral that is connected.</li> <li>Any devices already connected will no longer be allowed to access the USB port.</li> </ul>

#### How to enable or not enable the USB port

1. Launch your browser and enter your controller's address.
2. Open the **USB section** and toggle the USB setting.
3. The USB setting is immediately applied to the controller.

### NOTICE



#### **iE 7 display uses USB port**

The iE 7 display uses both the USB and DisplayPort for communication with the base mounted controller. If the USB port is not enabled, the display cannot send control signals to the controller.

## 5.4.6 Versions

The versions page can be useful if you need to contact [DEIF support](#) for assistance.

The screenshot shows the DEIF iE 250 2.0.8.1 MP interface. The top bar includes the DEIF logo, the model name 'iE 250 2.0.8.1 MP', the user 'admin', and a 'Log out' button. A left sidebar contains navigation options: Home, Firmware, Users, Roles, Logs, Backup/Restore, Reset, Network, Licence Manager, Versions, and USB. The main content area is titled 'Versions' and displays a table of components and their versions. A dropdown menu is open, showing a list of components and their versions. A red '1' points to the dropdown menu, and a red '2' points to the three-dot menu icon in the top right corner of the page.

Component	Version
REST	10.5.0
BSP - Operating system	5.0.3.4 (rev. ge4d25ce)
IE 250 - MIO21 - Software	1.0.0.2 (rev. g2edad12)
IE 250 - MIO21 - Hardware	NA
IE 250 - MIO21 - Interface	NA (rev. 1.0.0.0)
IE 250 - Controller - Software	2.0.8.1-MP
IE 250 - Controller - Hardware	NA
IE 250 - Controller - Interface	NA
Engine Control Unit - Caterpillar generic - Software	NA
Engine Control Unit - Caterpillar generic - Hardware	NA
Engine Control Unit - Caterpillar generic - Interface	NA
DEIF DVC 550 - DEIF DVC 550 - Software	NA
DEIF DVC 550 - DEIF DVC 550 - Hardware	NA
DEIF DVC 550 - DEIF DVC 550 - Interface	NA
CODESYS - CODESYS-add-on	0.0.0.0-Unknown (rev. 0)
CODESYS - CODESYS-runtime environment	V3.5.20.40
Engine Communication - Database	10.3.0
Engine Communication - Protocol	1.0.4.0

No.	Item	Notes
1	Version information	Shows the version information.
2	More options	Include or exclude extra information: <ul style="list-style-type: none"> <li>Revisions</li> <li>Modules</li> </ul>

## 6. Cybersecurity

### 6.1 About Cybersecurity

While DEIF has taken great attention to data security and has designed the product to be a secure product, we recommend adopting Information Technology (IT) and Operational Technology (OT) security best practices when connecting the controller to a network.

To minimise the risk of data security breaches we recommend:

- Only connect to trusted networks and avoid public networks and the Internet.
- Use additional security layers like a VPN for remote access.
- Restrict access to authorised persons.

#### Admin password

To ensure security, change the administrator (User: admin) password the first time that you log in to the controller.

### 6.2 Permissions

#### 6.2.1 About permissions

The controllers' configuration and functionality is protected with permission access. Only users with the correct permission may access, configure, or update the configuration or controller settings.

#### Permission structure

The permissions consist of **Roles** and **Users** in each controller configuration. These are stored locally on each controller, or can be written to all connected and logged in controllers.

Each **user** is a member of a **role**. The **role** gives the **user** permissions to associated features or functions of the controller. You can also remove access from a user as required.

Permissions access enables you to easily control which user can access which function. This provides a layer of control for the operation of the controller.

#### NOTICE



#### Permissions access

You can only access the user permissions option if you are a member of a role that has access to that function.

#### 6.2.2 Role settings

Role settings include both **Role information** and **Role permissions**.

#### Role information

The **Role information** contains the name and automatically recorded changelog.

Setting	Type	Format	Notes
Name	Manual	Text	The Role name.
Created	Automatic	Date	Date the role was created.
Changed	Automatic	Date	Date the role was changed.
Editor	Automatic	Text	The user who created or changed the role.

## Role permissions

The **Role permissions** allow or remove access to features in the software.

Parent permissions are required for any child permissions. For example, to allow access to the feature **Emulation** (a child), the role must also have access to **Application** (the Parent). If you remove a parent permission, all child permissions are automatically removed.

Some features can be configured for **Read** and/or **Write** access. With **Read** only access the user cannot write or update any information. **Read** access is mandatory if you allow **Write** access.

Feature permissions	
Live Data	Live Data
Application	Plant configuration Emulation Supervision
Alarms	Alarms Alarm acknowledge Alarm reset latch Alarm out of service Alarm shelve
Log	Event log Engine interface J1939 DM2 Engine interface J1939 DM2 clear
I/O status	I/O status
Tools	Print setup Backup restore Backup Restore Restore configuration Trending Regulator status Alarm test Firmware User management Role management
Configure	Date and time Communication Input/output configuration Parameters Counters CustomLogic Modbus Fieldbus configuration Fieldbus supervision Dashboard configuration Header configuration
Not assigned a category	Feature toggle Notification configuration

## 6.2.3 User settings

Setting	Type	Notes
User name	Required	Minimum 2 characters.
Organisation	Optional	
Roles	Required	Selectable from list.
Mobile number	Optional	
Direct number	Optional	
Email (primary)	Optional	
Email (secondary)	Optional	
Password	Required	Minimum 8 characters.

## 6.2.4 Default user

The default administration user is **admin**. Only **admin** can access WebConfig.

User	Password	Role
admin	admin	Admin

### NOTICE



#### Secure your system

Ensure that all default passwords are changed to reduce the security risk to your system. Additionally, it is recommended to adjust or edit the role and user permissions according to your own operational needs.

### NOTICE



#### Lost passwords

Lost passwords cannot be recovered. If you have lost your password you can not configure your controller or system.

If you have lost your password, then you must use the Factory reset and reconfigure your controller.

## 6.3 Network communication

### 6.3.1 Network configuration

The default is to use DHCP to obtain the IP address, subnet, netmask and DNS servers. If you use a manually configured (static) IP, be careful to make sure that the selected values match the network to which the controller is connected.

Inbound port 443 is opened to allow communication with PICUS.

Inbound port 502 is opened to allow Modbus TCP communication.

Inbound port 80 is opened and re-directed to port 443.

In addition, the controller may use the following ports for application and PLC communication: 123, 5353, 11740, 1217, 12345, 4321, 12346, 12350, 12351, 503, 1740, 1741, 1742, 1743, 4840, 8000, 8443.

## 6.3.2 Untrusted networks

Connections to untrusted networks may require additional equipment and/or security counter-measures that are not included in the product.

## 6.4 CODESYS

If you have a CODESYS license you must connect to the controller and log in using the CODESYS IDE. You can then create a user account and set the password.

## 6.5 Activity logs

### 6.5.1 About activity logs

Each controller records activity of both the system and operational events.

These are recorded in logs:

- Event log
- Live system log

### 6.5.2 Event log

This can be accessed with PICUS or the display.

All activities that require a user login are logged with the username. The user can also use the controller for some actions without logging in (for example, selecting breaker open). These actions are logged without a username.

The controller stores a maximum of 2000 event log entries. When the log is full, the controller discards the excess log entries using first in, first out.

If an ECU has been configured, you can also switch to see the DM2 logs.



#### More information

See the [PICUS manual](#) or [Operator's manual](#) for how to view the Event log.

### 6.5.3 System log

This can only be accessed with WebConfig and the **admin** user.

The *Live system log* records all different system-related events that occur. These logs can be useful for cybersecurity control, troubleshooting issues, and also for product support.

These logs include:

- System events and journal.
- Connected session access with WebConfig.
- CODESYS related information.

#### Download logs

You can select and download the system logs directly from the controller as text files.

1. Select **Download** from **Logs**.
2. Select the **Duration** (period) you want to download.
  - This can be **Latest**, **Day**, **Week**, or **All**.
3. Select the **Type** of log to download.
  - This can be **SYSLOG** or **RLOG**.

4. Select **Download** to create a ZIP archive with the log files included.
5. Locate your browser's download location to access the ZIP archive.

## **SYSLOG**

The system log (SYSLOG) archive includes:

- Authentication journal.
  - *Connected sessions with WebConfig.*
- Reliability log.
  - *Operational values and performance information.*
- System journal.
  - *System operations.*