



Home

General information

Configuration in the EASY Starter

Configuration in the PLC Designer

Troubleshooting

Logic PLC



Integrated in the inverter

General information

Logic PLC

Conventions

Engineering tools

PLC Interface (overview)

Logic PLC

The Logic PLC integrated in the i650 motec frequency inverter allows simple logic applications based on CODESYS to be implemented in accordance with the IEC 61131-3 standard:

- Processing of logical input signals, for example:
 - Digital inputs
 - IO-Link input data
 - Network process input data (RPDOs)
 - Internal states of the inverter
- Setting of logical output signals, for example:
 - Digital outputs
 - IO-Link output data
 - Network process output data (TPDOs)
- Processing/output of inverter values (setpoints)
- Control of inverter functions

Technical data

Space

Program code	192 kB
Data memory	52 kB
Retain data	128 bytes

Memory requirement for approx. 200 program lines

Program code	approx. 40 kB
Data memory	approx. 10 kB

Task runtime (cyclic task)

Minimum task runtime	2 ms, increase in 1-ms steps
----------------------	------------------------------

System requirements for engineering tools:

- EASY Starter from version 1.28 onwards
- PLC Designer from version 4.1

Restrictions:

- No visualization
- No web server
- No online change
- No online boot application
- No Codesys gateway on the inverter
- Only the two function blocks "L_IPAP_ParameterWrite" and "L_IPAP_ParameterRead" from the Lenze library are currently supported. Further function modules will be added at a later date.

General information

Logic PLC

Conventions

Engineering tools

PLC Interface (overview)

Safety instructions

By safety instructions, we mean information for the use of products that serves to warn the user of hazards and to instruct behavior that will not result in harm to people. In this document, these are distinguished as follows according to ANSI Z535.6:

DANGER!

Indicates an extremely hazardous situation. Failure to comply with this instruction will result in severe irreparable injury and even death.

WARNING!

Indicates an extremely hazardous situation. Failure to comply with this instruction may result in severe irreparable injury and even death.

CAUTION!

Indicates a hazardous situation. Failure to comply with this instruction may result in slight to medium injury.

NOTICE

Indicates a material hazard. Failure to comply with this instruction may result in material damage.

Numeric notation

As a rule, a period is used as a decimal separator in this documentation.

Example: 1234.56

General information

Logic PLC

Conventions

Engineering tools

PLC Interface (overview)



Engineering tools

To use the Logic PLC, the appropriate parameters must be set in the inverter. These parameters can be accessed via dialogs in the **EASY Starter** engineering tool.

- A detailed description of the inverter parameters can be found in the commissioning document for the respective inverter.

The Logic PLC is programmed using the engineering tool **PLC Designer** in accordance with the IEC 61131-3 standard.

Tip: All EASY Starter parameterization dialogs are also integrated in the PLC Designer, so that commissioning can also be carried out using the PLC Designer alone.

You will receive the download link for the latest version of the engineering tools free of charge by e-mail after you have completed the download form:

<https://www.lenze.com/en-de/services/software-downloads/easy-engineering-tools>

General information

Logic PLC

Conventions

Engineering tools

PLC Interface (overview)

PLC Interface (overview)

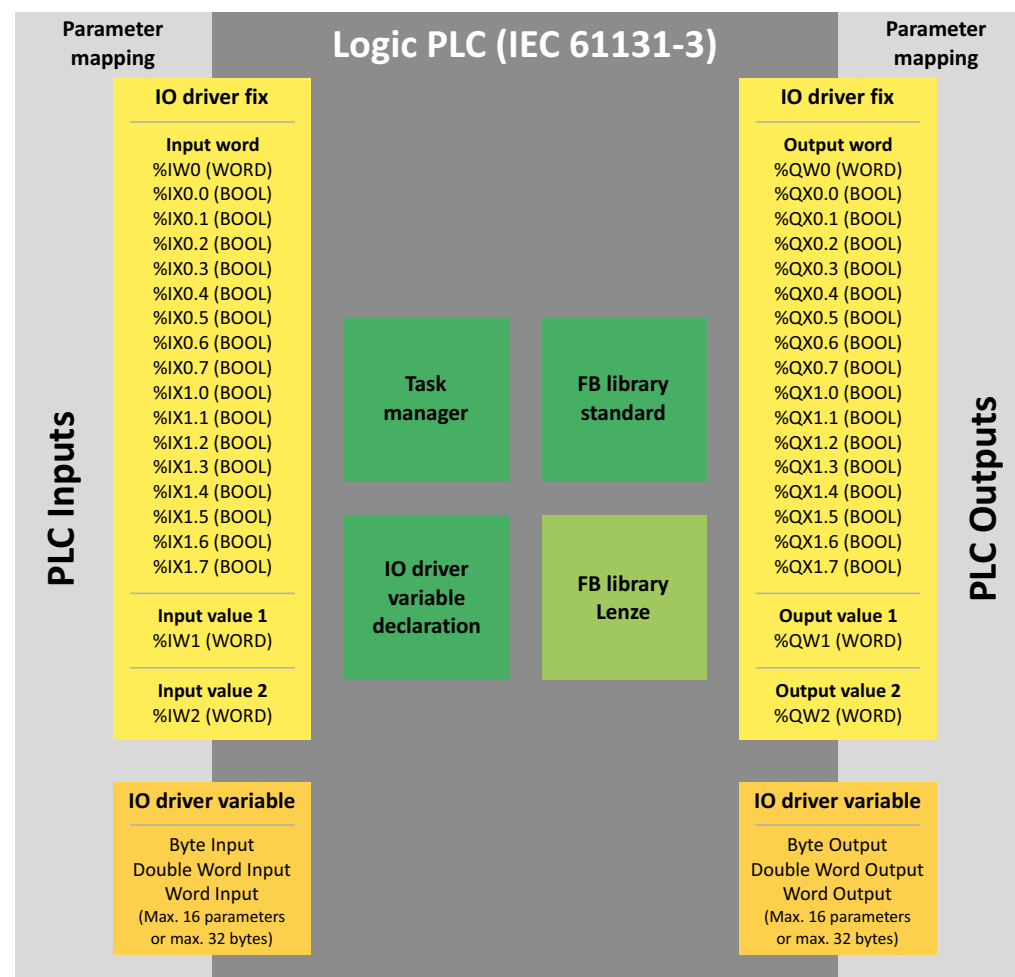
Three permanently assigned data words are available for data exchange between the inverter and the integrated Logic PLC:

- Input word / Output word
- Input value 1 / Output value 1
- Input value 2 / Output value 2

In addition, a maximum of 16 parameters or a maximum of 32 bytes can be configured via mapping for data exchange with the Logic PLC. You can easily configure this mapping via dialogs in the EASY Starter or PLC Designer (see the following pages).

The mapping is carried out from the Logic PLC perspective:

- PLC-RPDO mapping: Data from the inverter to the Logic PLC
- PLC-TPDO mapping: Data from the Logic PLC to the inverter



Configuration in the EASY Starter

General settings

PLC Interface

PLC-RPDO mapping

PLC-TPDO mapping

General settings

In the EASY Starter dialog "PLC configuration", configure the behavior of the Logic PLC in the event of a stop and in the event of an exception error:

Diagnosis Settings Parameter list Trend Oscilloscope

Overview\PLC Configuration Search parameters in dialogs 0/0

Stopp behavior I clear data [1] Project name I

Error response on exception I Fault>inv. disabl. [23] Application state I Unknown/applicat. missing [0]

Triggering a user-defined fault Processor workload I 0.00 %

Parameter	Name
0x5811:001	Configuration of PLC application: Output data with stopped Logic PLC
0x5811:002	Configuration of PLC application: Error response for exception
0x2013:004	Application information: Project name
0x5810:001	Application diagnostics: Application state
0x5810:003	Application diagnostics: Processor load

Tip:

This will provide you with further information on a parameter:

- If you hold the mouse pointer over the **I** in a dialog, further information on the parameter is displayed in a pop-up.
- If you click in a parameter field in a dialog and then press the <F1> function key, the device help opens with further information on the parameter.

Configuration in the EASY Starter

General settings

PLC Interface

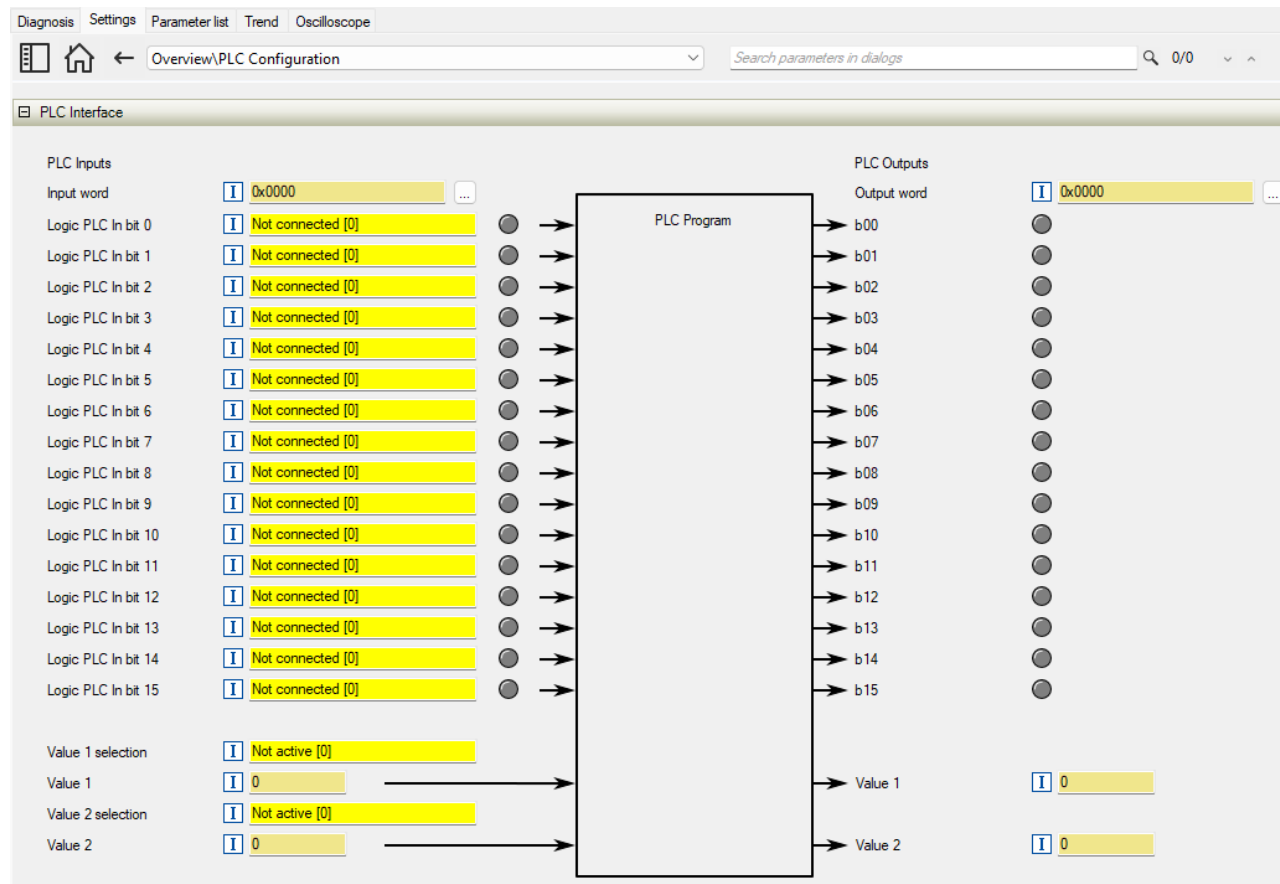
PLC-RPDO mapping

PLC-TPDO mapping

PLC Interface

Configure the signals to be transferred from the inverter to the Logic PLC in the "PLC Interface" area of the "PLC Configuration" EASY Starter dialog.

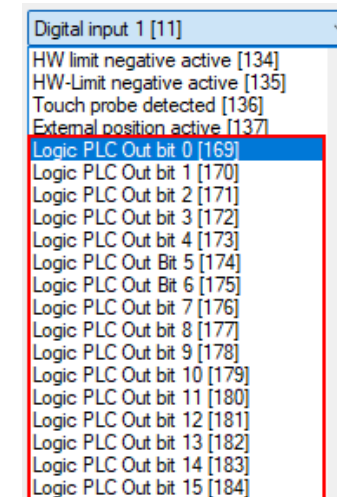
- You can assign "triggers" to the 16 input bits. For example, the digital inputs and internal statuses of the inverter can be selected as triggers.
- You can also transfer two analog actual values of the inverter to the Logic PLC.



Output signals of the Logic PLC

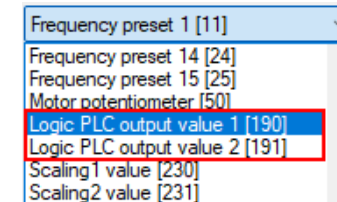
- The 16 output bits are available for selection as triggers for inverter functions.

Example: Selection for parameters 0x2631:xxx and 0x2634:xxx



- The two analog output values of the Logic PLC can be assigned to frequency control, torque control or PID control as setpoint values.

Example: Selection for parameter 0x2860:xxx



Configuration in the EASY Starter

General settings

PLC Interface

PLC-RPDO mapping

PLC-TPDO mapping

PLC-RPDO mapping

Further parameters of the inverter can be transferred to the Logic PLC via the PLC-RPDO mapping.

Press the **Edit** button to select the parameters.

A maximum of 16 parameters or a maximum of 32 bytes can be mapped within the Logic PLC.

Configuration in the EASY Starter

General settings

PLC Interface

PLC-RPDO mapping

PLC-TPDO mapping



PLC₄



PLC-TPDO mapping

Other output signals from the Logic PLC can be transferred to the inverter parameters via the PLC-TPDO mapping. Configuration is carried out in the same way as for PLC-RPDO mapping.

A maximum of 16 parameters or a maximum of 32 bytes can be mapped within the Logic PLC.

Configuration in the PLC Designer:

Create project

PLC Interface

PLC PDO mapping

Create program

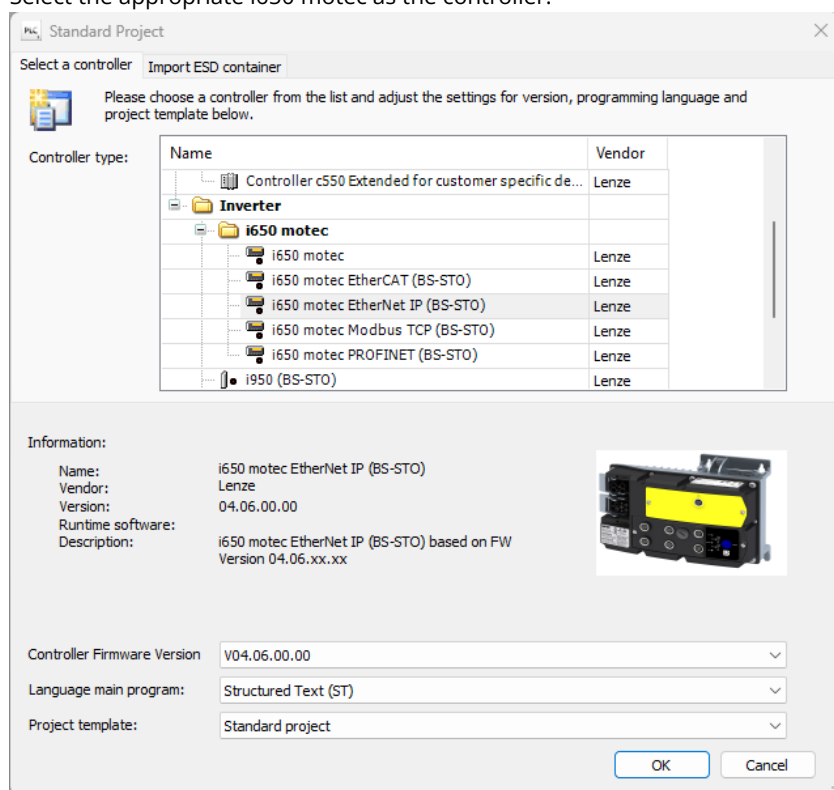
Establish a connection to the inverter

Load program into inverter and start

Create project

Once you have used the EASY Starter to configure the input and output signals for the Logic PLC, you can continue with the PLC Designer to create a PLC project.

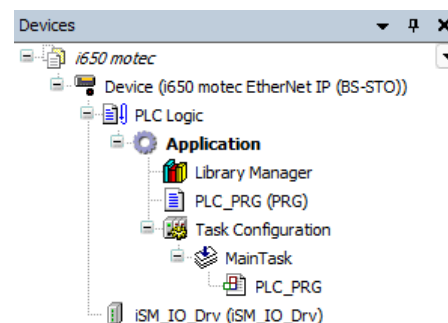
1. Start PLC Designer
2. Create new project (File → New project...) with "Standard project" template.
3. Select the appropriate i650 motec as the controller:



4. Adjust other project settings as required and apply with OK.

Example

Device view in the PLC Designer after creating the project:



Configuration in the PLC Designer:

Create project

PLC Interface

PLC PDO mapping

Create program

Establish a connection to the inverter

Load program into inverter and start

PLC Interface

For processing the input signals from the inverter in the PLC program, it is advisable to assign meaningful names to these variables. The same applies to the output signals from the Logic PLC to the inverter.

1. In the device view, double-click on the "iSM_IO_Drv" entry to open the following dialog:

Variable	Mapping	Channel	Address	Type	Unit	Description
		Digital input word	%IW0	WORD		
		Bit 00	%IX0.0	BOOL		
		Bit 01	%IX0.1	BOOL		
		Bit 02	%IX0.2	BOOL		
		Bit 03	%IX0.3	BOOL		
		Bit 04	%IX0.4	BOOL		
		Bit 05	%IX0.5	BOOL		
		Bit 06	%IX0.6	BOOL		
		Bit 07	%IX0.7	BOOL		
		Bit 08	%IX1.0	BOOL		
		Bit 09	%IX1.1	BOOL		
		Bit 10	%IX1.2	BOOL		
		Bit 11	%IX1.3	BOOL		
		Bit 12	%IX1.4	BOOL		
		Bit 13	%IX1.5	BOOL		
		Bit 14	%IX1.6	BOOL		
		Bit 15	%IX1.7	BOOL		
		Input value 1	%IW1	WORD		
		Input value 2	%IW2	WORD		
		Digital output word	%QW0	WORD		
		Output value 1	%QW1	WORD		
		Output value 2	%QW2	WORD		

In the "Internal I/O Mapping" area, the input and output signals for data exchange with the inverter are listed.

2. In the "Variable" column, assign meaningful names to the variables according to the configuration in the EASY Starter.

Example

Configuration of the "Input word" in the EASY Starter (in this example, only the first three of the total of 16 bits are configured):

PLC Inputs	Input word
Logic PLC In bit 0	Digital input 1 [11]
Logic PLC In bit 1	Digital input 2 [12]
Logic PLC In bit 2	Ready for operation [51]
Logic PLC In bit 3	Not connected [0]

Adaptation of the variable names in the PLC Designer according to the previously performed configuration of the "Input word" in the EASY Starter:

Variable	Mapping	Channel	Address	Type
		Digital input word	%IW0	WORD
DigitalInput1		Bit 00	%IX0.0	BOOL
DigitalInput2		Bit 01	%IX0.1	BOOL
ReadyForOperation		Bit 02	%IX0.2	BOOL
		Bit 03	%IX0.3	BOOL

Configuration in the PLC Designer:

Create project

PLC Interface

PLC PDO mapping

Create program

Establish a connection to the inverter

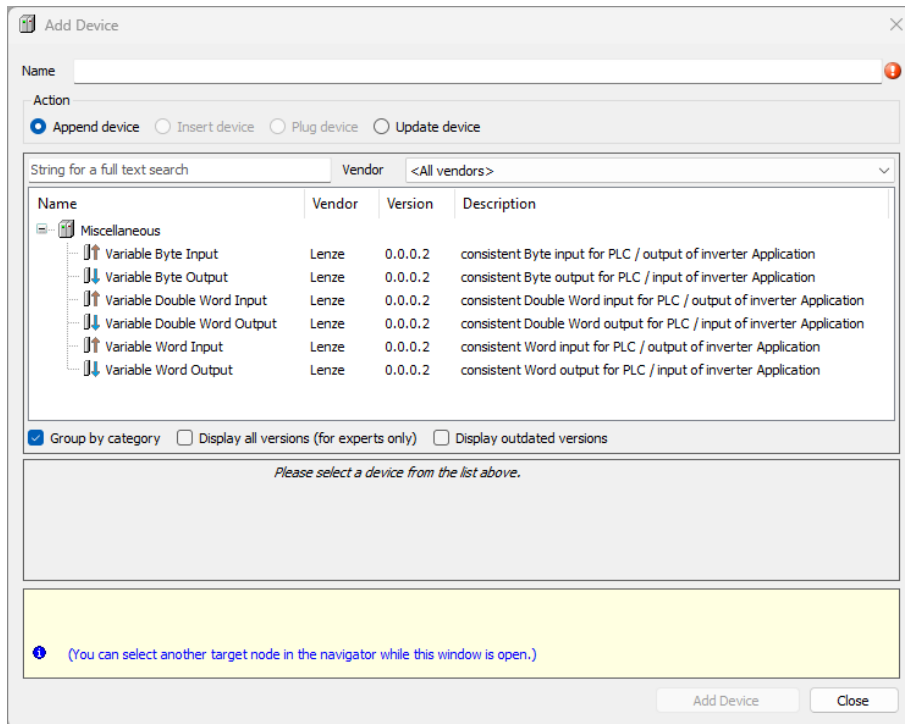
Load program into inverter and start

PLC PDO mapping

If you have configured a PLC-RPDO mapping or a PLC-TPDO mapping in the EASY Starter, you also make this mapping in the PLC Designer:

1. In the device view, right-click on the "iSM_IO_Drv" entry to open the context menu.
2. Execute the command **Add device** in the context menu.

The "Add device" dialog is displayed:



3. Add the corresponding variables one after the other so that the **sequence and data type correspond 1:1 to the mapping configured in the EASY Starter**. Assign a meaningful name to the respective variable using the **Name** input field.

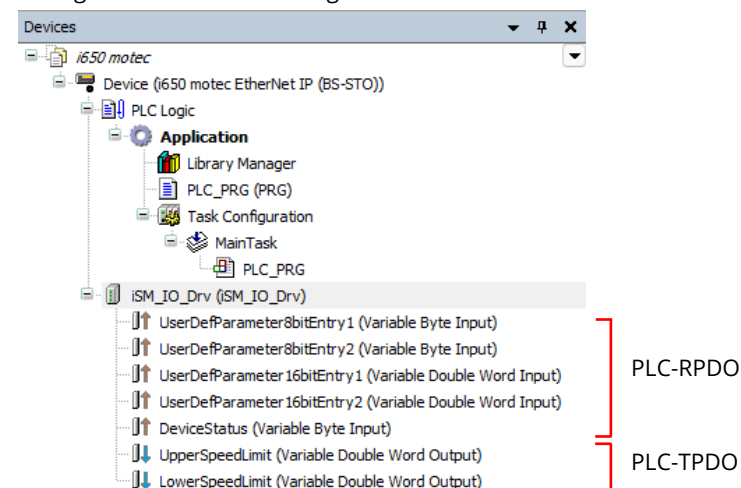
Example

Configuration in the EASY Starter:

Parameter	Active value	Unit	Length (Bit)
0x2664:001 User def. parameter 8-bit: Entry 1	0		8
0x2664:002 User def. parameter 8-bit: Entry 2	0		8
0x2665:001 User def. parameter 16-bit: Entry 1	0		16
0x2665:002 User def. parameter 16-bit: Entry 2	0		16
0x282A:005 (P126:005) Status words: Device status	Initialisation [0]		8

Parameter	Active value	Unit	Length (Bit)
0x2946:001 (P340:001) Speed limitation: Upper speed limit	0	rpm	32
0x2946:002 (P340:002) Speed limitation: Lower speed limit	0	rpm	32

Configuration in the PLC Designer:



Tip: The order of the variables can be changed using drag & drop.

Configuration in the PLC Designer:

Create project

PLC Interface

PLC PDO mapping

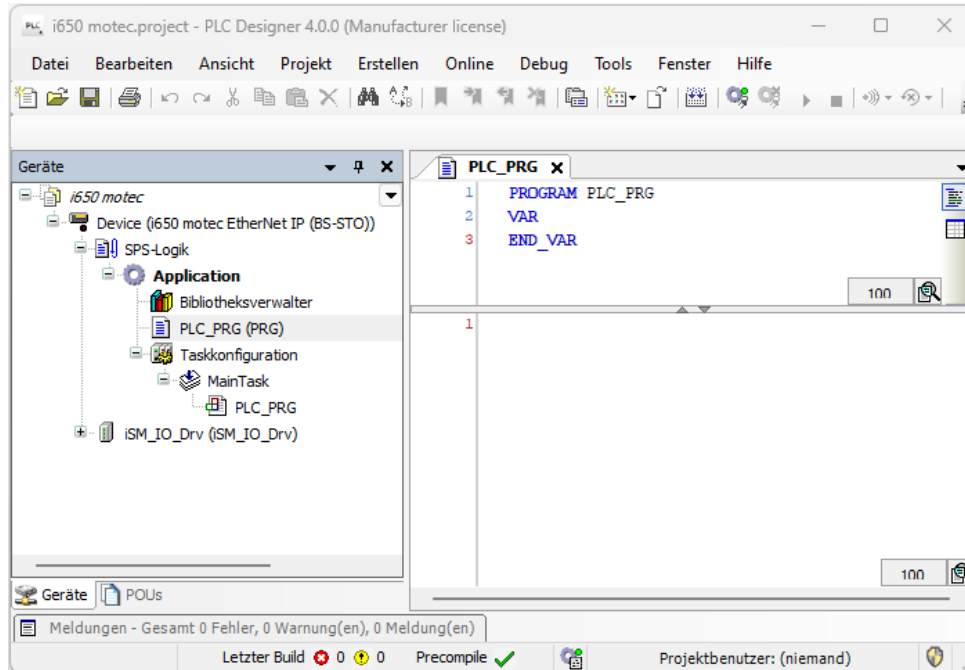
Create program

Establish a connection to the inverter

Load program into inverter and start

Create program

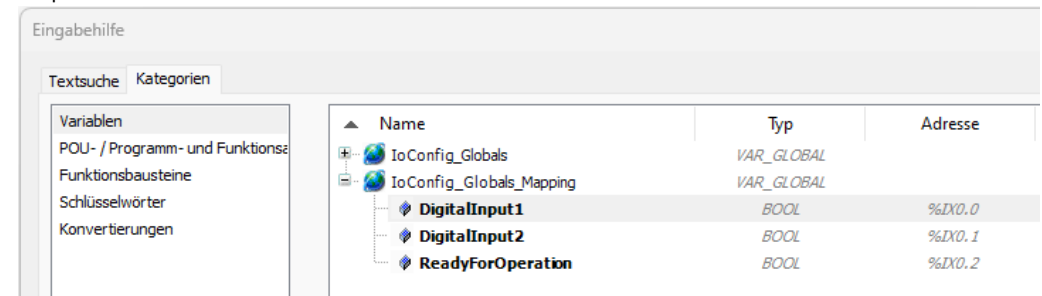
1. Double-click on the "PLC_PRG" entry in the device view to open the program window.



2. Create a program in the programming language selected for the project.
 - Detailed information on program creation can be found in the PLC Designer online help.
 - Tip: Use the "Input help" available in the context menu to insert variables, function calls or function blocks into the program.

Example

You can also insert the input signals from the inverter (variables) into the program via the "Input help":



Configuration in the PLC Designer:

Create project

PLC Interface

PLC PDO mapping

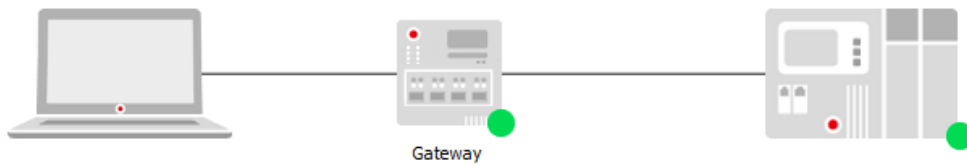
Create program

Establish a connection to the inverter

Load program into inverter and start

Establish a connection to the inverter

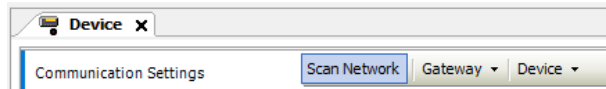
Double-click on the "Device" entry in the device view to check whether the inverter is ready to "go online". This is indicated by a green dot on both the gateway and device symbols:



If this is the case, you can transfer the program to the inverter (see next page).

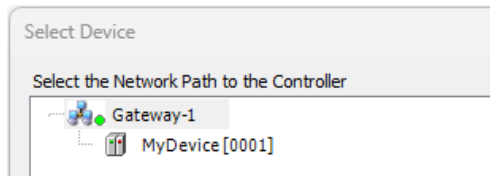
Otherwise, update the gateway configuration:

1. In the PLC Designer, execute the command **Online → Configure iSeries USB communication**.
2. After updating, the CODESYS Gateway must be stopped and restarted once for the changes to take effect:
Windows Taskbar → Button  → **Stop Gateway / Start Gateway**
3. Once the CODESYS Gateway has been restarted, a search for connected devices can be started: In the PLC Designer on the "Device" tab, execute the command **Search network...**:



The "Select device" dialog is displayed and the search is started.

4. After a successful search, select the inverter (here: "MyDevice") and confirm with **OK**:



Configuration in the PLC Designer:

Create project

PLC Interface

PLC PDO mapping

Create program

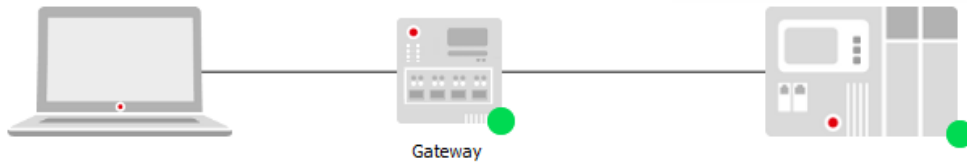
Establish a connection to the inverter

Load program into inverter and start

Load program into inverter and start

Preconditions:

- The program was compiled without errors.
- There is a connection to the inverter:



1. **Online > Log in** (<Alt> + <F8>)
2. Confirm with **Yes** when asked whether the application should be loaded into the device.
3. After successful transfer, the program can be started in the integrated Logic PLC:

Debug > Start (<F5>)

- "RUNNING" should now be displayed in the lower status bar instead of "STOP".
- In the "Device" dialog window under "Parameter list", the following parameters can be used to check whether the integrated Logic PLC is running and with which program:

Parameter	Name
0x2013:004	Application information: Project name
0x5810:001	Application diagnostics: Application state

Troubleshooting

Diagnostics

Event IDs



Diagnostics

The inverter provides many diagnostic parameters which are helpful for operation, maintenance, error diagnosis, error correction, etc.

In the EASY Starter you have access to the diagnostic parameters of the inverter via the "Diagnostics" tab.

Reset error via EASY Starter

Errors can be reset with the "Reset" button ("Diagnostics" tab).

- Precondition: Cause of error has been eliminated and no blocking time is active.



Event ID	Event	Classification	Remedy	Blocking time [s]
0x6080	Logic PLC exception error	Error > inverter disabled	– Update PLC application. – Restart the device (recommended).	0
0x6081	Logic PLC infinite loop	Error	– Load a new PLC application into the device. – Restart the device (recommended).	0