Application Note 07/2025 AP050032EN

SmartWire Integration under Linux: Technical Guide for System Migration

Powering Business Worldwide

Level 2	1 – Fundamental – No previous experience necessary 2 – Basic – Basic knowledge recommended 3 – Advanced – Reasonable knowledge required 4 – Expert – Good experience recommended

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Original Application Note

Original document is the English version of this document.

Translation

All non-English language versions of this document are translations of the original application note.

1. Edition 2025, publication date 07/2025

DANGER!
DANGEROUS ELECTRICAL VOLTAGE!

Before commencing the installation

- Installation requires qualified electrician
- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally retriggered
- Verify isolation from the supply
- Ground and short-circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (IL) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 part 100) may work on this device/ system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE, PES) must be connected to the protective earth (PE) or to the potential equalizing. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 V supply. Only use power supply units complying with IEC 60364-4-41 or HD 384.4.41 S2 (VDE 0100 part 410).
- Deviations of the mains voltage from the nominal value must not exceed the tolerance limits given in the technical data, otherwise this may cause malfunction and dangerous operation.
- Emergency-Stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency switching off devices must not cause restart.
- Built-in devices for enclosures or cabinets must only be run and operated in an installed state, desk-top devices or portable devices only when the housing is closed.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency switching off devices should be implemented
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, etc.).

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Content

General Information

This application note is intended to convert applications from WindowsCE-based HMIs to Linux-based HMIs. Some of the devices with Windows Compact Embedded that have been used so far have an onboard SmartWire interface, which is no longer available with Linux-based HMIs.

1 Nevertheless, communication with the existing SmartWire hardware should still be possible.

This document describes the migration process to a Linux panel with a special focus on the integration of SmartWire. Different methods for mapping the SmartWire participants are taken into account.

1.1 Concept

Windows Compact Embedded:

Some HMIs with the Windows CE operating system have an integrated SmartWire interface. Both the power supply and the communication with the SmartWire fieldbus are implemented via this interface.

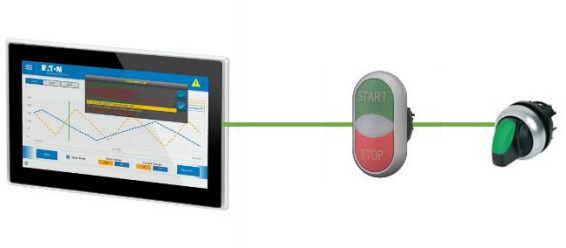


Figure 1: Setup with WindowsCE Panel and SWD Participants

Linux:

HMIs with the Linux operating system do not have an integrated SmartWire interface. Communication with the SmartWire fieldbus takes place through a gateway. In this application note, we use an SWD-CAN gateway, as most HMIs have this interface onboard.

Figure 2: System setup with Linux panel, SWD gateway and SmartWire-DT subscribers

→	**Note** Before switching to a Linux-based system, the specific requirements of the mapping must be considered (see chapter 2.4). In some cases, it is necessary to export certain information in advance.

1.2 Hardware

Designation	Typ
HMI	XV-303-70-CE2-A00-1C XV-303-70-C00-A00-2C
SWD-Gateway	EU5C-SWD-CAN
SWD-Participant	SWD4-8SF2-5 M22-SWD-K22LED-W M22-SWD-K22LED-R M22-SWD-K22LED-B M22-SWD-R M22-SWD-INC

1.3 Software

- XSOFT Codesys 3.5.19 BF1
- SWD-Assist

Exchange in the Codesys project

2

→	**Note** Before transitioning your project, create a full backup (projectarchiv) to prevent data loss and allow for recovery if needed.

There are basically several approaches available for the conversion of the CODESYS project. The choice of the appropriate method depends on whether an SWD assist project already exists or whether the existing hardware can be read (scanned). Depending on the initial situation, the appropriate method is preferable.

2.1 Replacement of the control system

▶ The first step is to replace the control unit.

→	**Note** This replacement removes the existing SWD master because the Linux-based device does not support SWD master functionality. Depending on the mapping method chosen, this can result in the loss of configuration data. Please note the further information in chapter 2.4.

To switch the target system to a Linux panel, please perform the following steps:

1. Right-click on the device in question in the CODESYS project tree.
2. From the context menu, select “Update Device”.

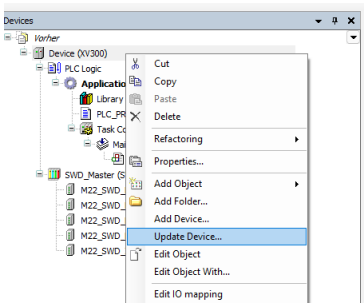


Figure 3: Update Device

3. In the following dialog, select the appropriate Linux panel.
4. Confirm the selection again with **"Update Device"** to perform the update.

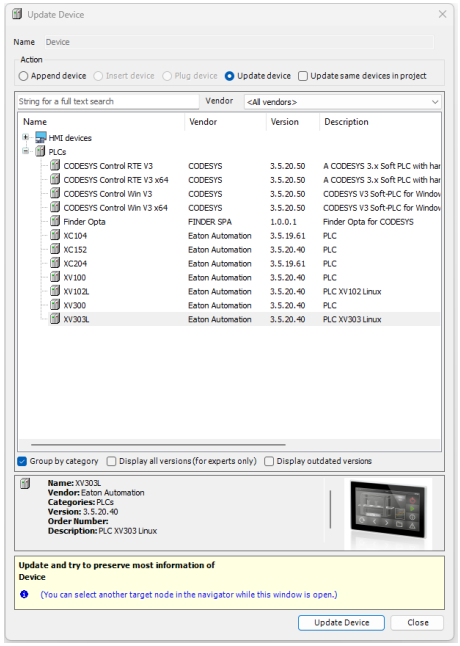


Figure 4: Choose PLC

In the next step, the CAN bus, the CANopen Manager and the gateway (EU5C_SWD_CAN) will be integrated into the project:

5. Select the control in the device tree.
6. Right-click and select "Add Device".

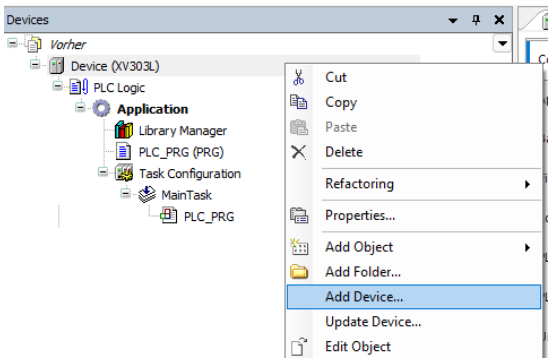


Figure 5: Attach Device

7. In the following dialog, select the CAN bus and add it.

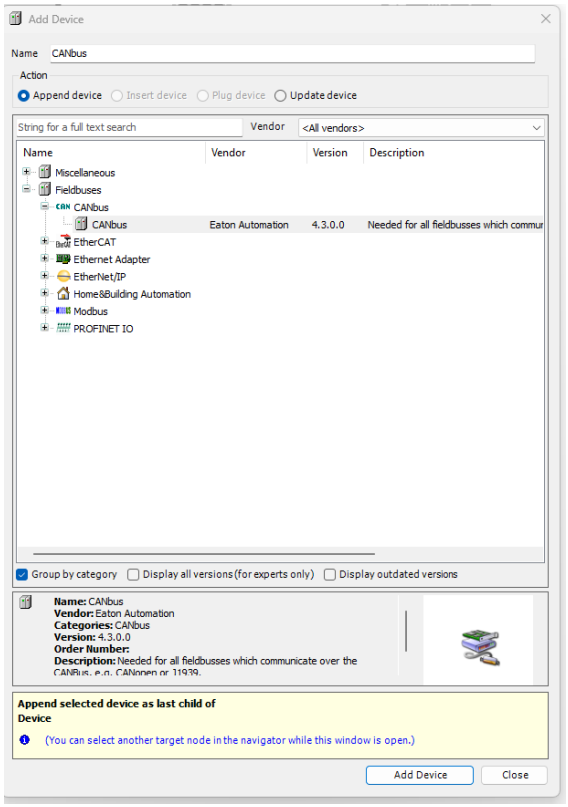


Figure 6: Add CANbus

8. Then click on the added CAN bus in the device tree.
9. In the "Add Device" window, select the CANopen Manager.
10. In the same way, add the gateway EU5C_SWD_CAN.

After adding the devices, there are three possible actions:

Option 1: Online scan of the hardware
If the hardware is available, it is recommended to run an online scan. → See Chapter 2.2.1

Option 2: Import of an existing SWD-Assist project
If a project already exists in SWD-Assist, the corresponding INI file can be imported.
→ See Chapter 2.2.2

Option 3: Manual configuration
If neither hardware nor an SWD Assist project is available, the configuration is done manually.
→ See Chapter 2.2.3

2.2 Inserting the CAN Participants

2.2.1 Online scan of hardware

→	**Note** This method is only applicable if there is already an active CAN stack on the panel. If this is not the case, first transfer a project with the CAN bus enabled to the panel to enable communication.

To perform the scan of the connected CAN participants, proceed as follows:

1. Click on the corresponding device in the device tree to set the path correctly.

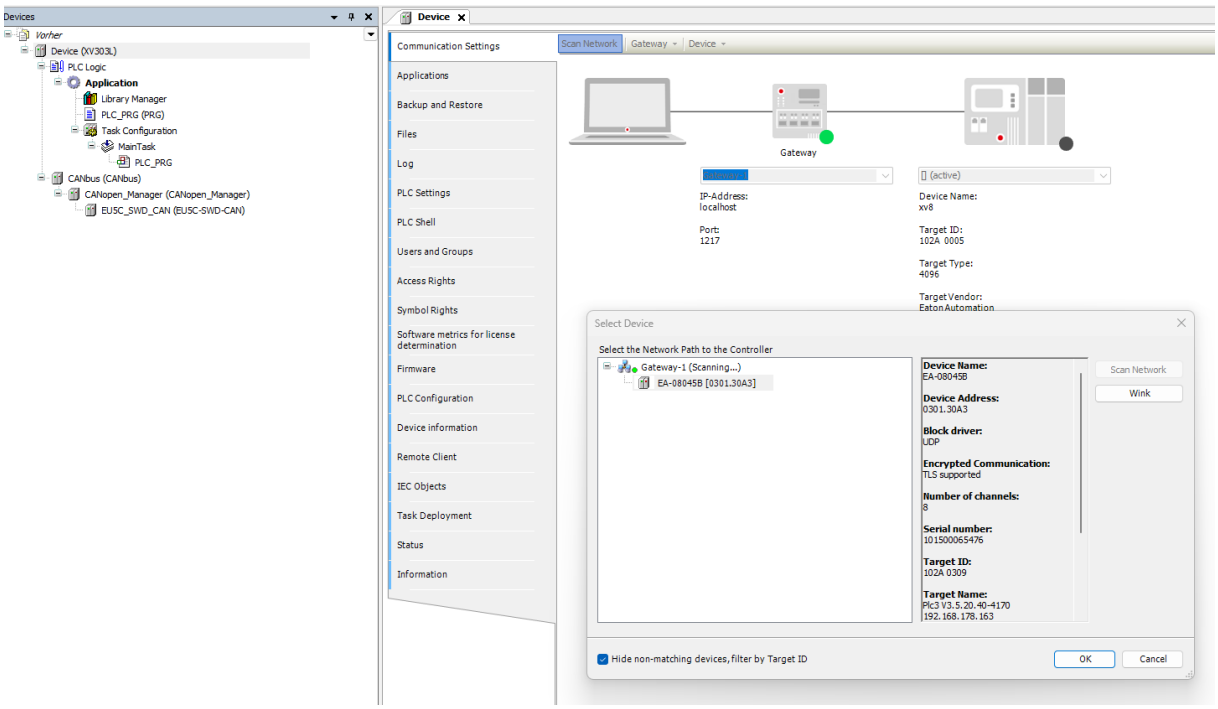


Figure 7: Set Path

2. Then right-click on the CANopen Manager.
3. In the context menu, select the option "Search devices..." to start the scan of the devices connected to the CAN bus.

After the scanning process is complete, a window opens with an overview of the detected devices.

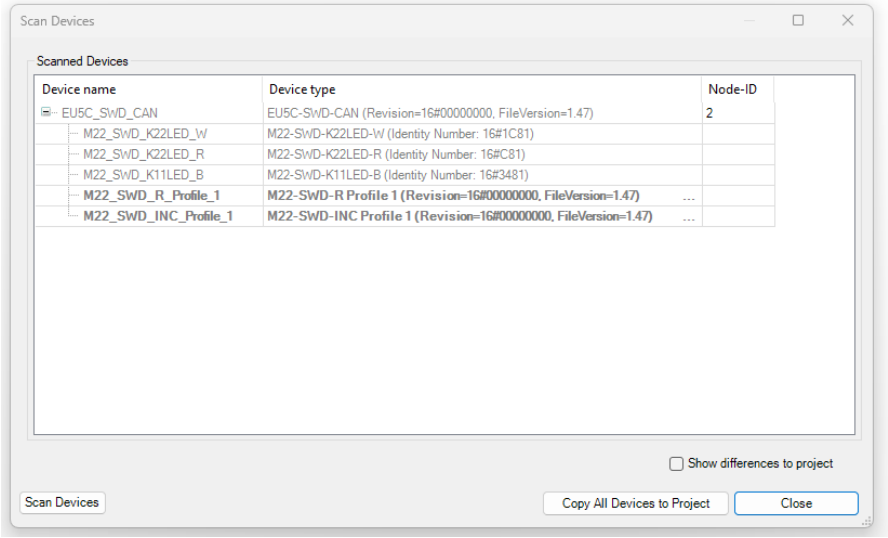


Figure 8: Scanned SWD-Devices

4. In this dialog you can select the desired devices and add them to the project.

The added devices are then automatically transferred to the device tree.

2.2.2 Import of the ini file from SWD-Assist

If a project already exists in SWD-Assist, the existing configuration can be exported and imported into CODESYS.

1. Review of the SWD Master:
Make sure that the correct SWD master is used in the SWD Assist project. If necessary, replace it with the EU5C SWD CAN gateway.

2. Exporting the configuration:
In SWD-Assist, open the "Projekt" menu item and select the option to export the configuration (INI file).

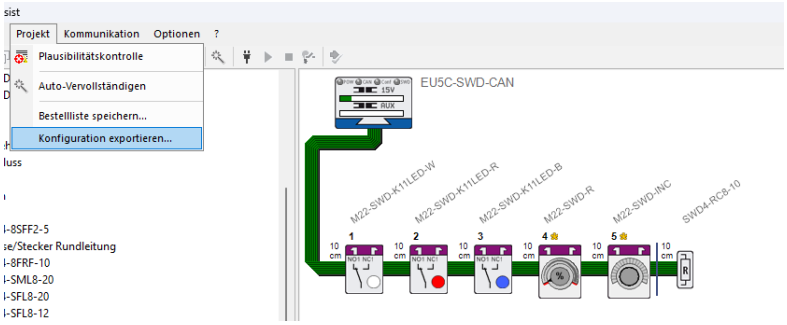


Figure 9: Project in SWD-Assist

3. Import into CODESYS:

In CODESYS, go to the project, right-click on the SWD gateway, and select Import INI File.

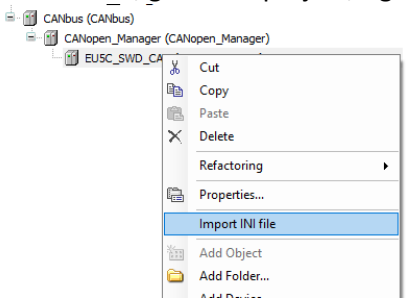


Figure 10: Import INI file

2.2.3 Manual creation of the device tree

Individual SmartWire-DT subscribers can be added to the gateway manually:

1. Right-click the SWD gateway in the device tree.
2. Select the "Add Device" option.
3. A list of all compatible devices will open.
4. Select the desired devices and add them to the project.

2.3 Setting up the CAN gateway

After adding the participants, the gateway must be configured accordingly:

1. Go to the "Additional Settings" tab and activate the "Create SDOs for module list" option.

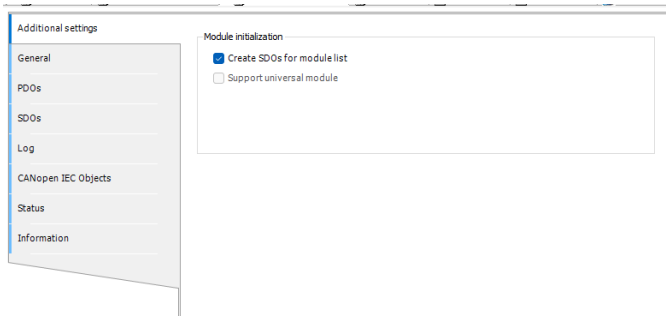


Figure 11: Create SDOs fore modules

2. Under the "General" tab, adjust the node ID to the device's setting (according to the DIP switch configuration on the gateway).

3. Disable the "Heartbeat Producing" option.

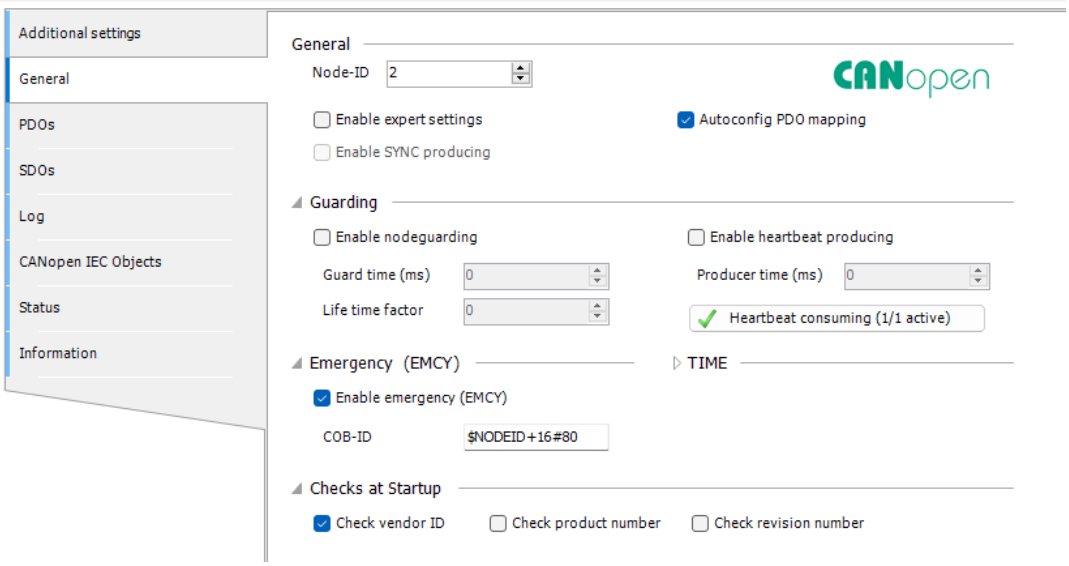


Figure 12: General settings CAN-Gateway

Note
The CAN gateway uses the default profiles of the connected devices at startup.
If a different profile is to be used for a device, this must be stored manually in the SDO settings of the gateway.

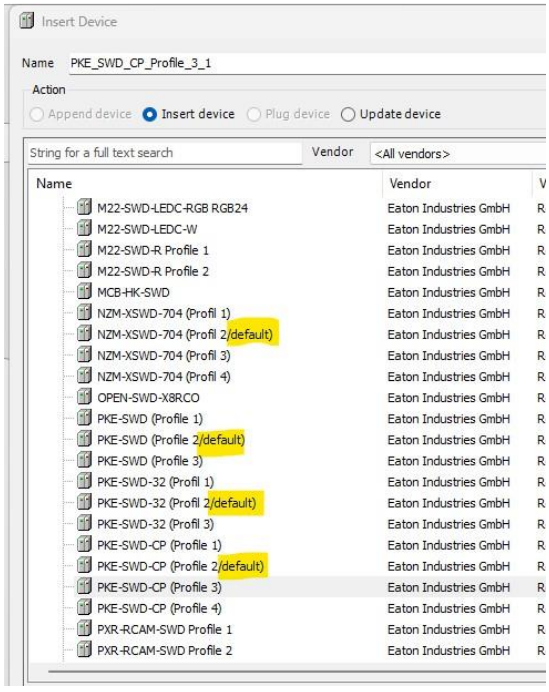


Figure 13: SWD Devices

To configure a different device profile correctly, do the following:

1. Open the "SDOs" tab in the gateway.
2. There, add the SDO with index 2102.

3. If there are several entries under this index, all entries must be selected.

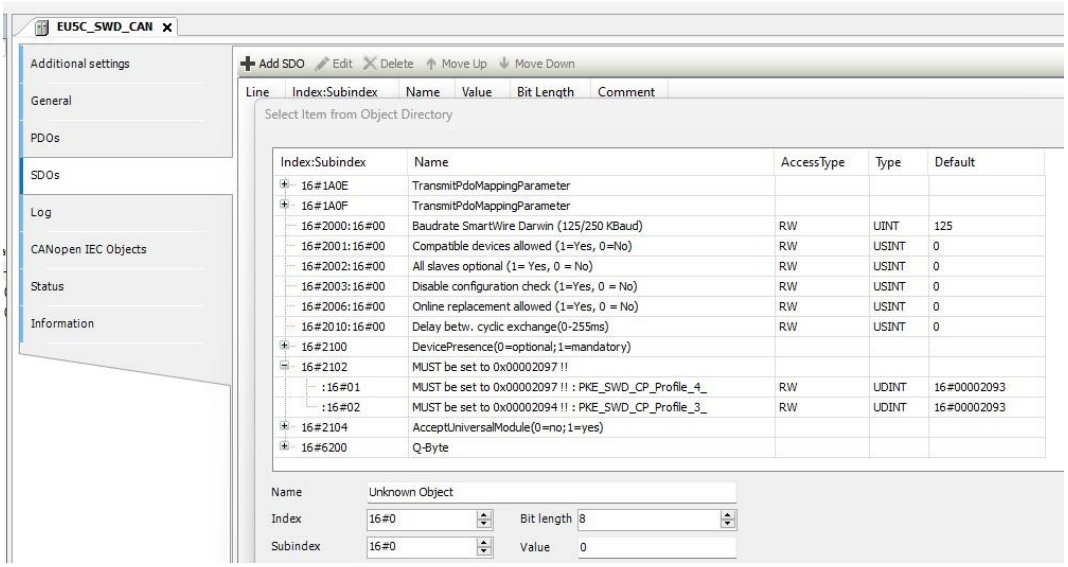


Figure 14: SDOs for not default profiles

4. To activate the desired profile, set the value according to the profile name (as indicated in the name).

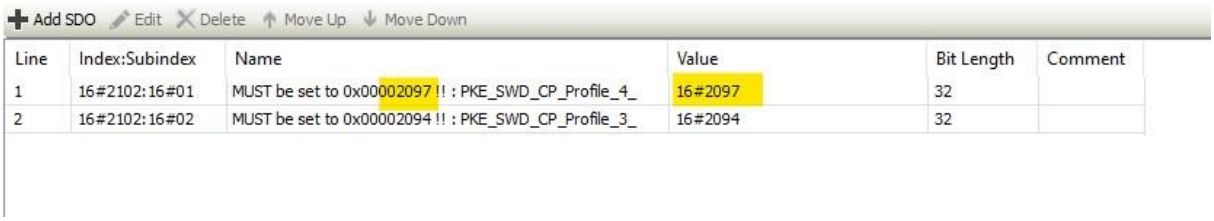


Figure15: SDOs for not default profiles

After configuration:

1. Power the connected devices.
2. Press the "Config" button on the gateway to read the SWD bus.

→	**Note** If you need further help on how to put the SWD bus into operation, you will find a detailed description in the manual.

2.4 Adopting the Variable Mapping

After the device tree has been fully created, the inputs and outputs of the SWD devices must be linked to the user program. The procedure depends on how the link was implemented in the original project.

Below you will find an overview of the most common mapping methods, as well as the recommended procedure for each.

2.4.1 Mapping via direct hardware addresses

In this method, the inputs and outputs in the program are assigned via direct hardware addresses. The associated variables are declared in a global variable list (GVL) or in the declaration part of a program. The link is made at an appropriate point in the code, e.g. in a separate mapping program (mapping PRG).

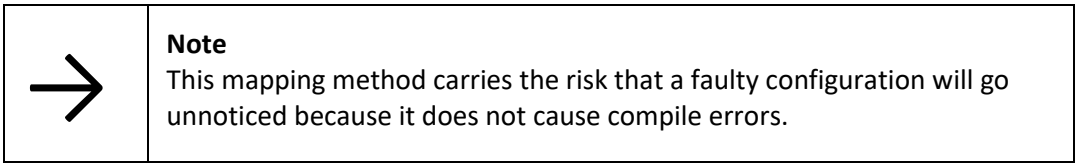
Example:

byDigInput_1 := %IB0;

Behavior during system transition:

The switch from SmartWire to communication via CAN can lead to changes in hardware addresses – especially if CAN communication was already implemented in the machine.

After the conversion, the project may be able to compile without errors, because the new addresses may be formally valid but functionally incorrect.



Recommended Practice:

Identify all places in the program where hardware addresses are directly assigned. After the changeover, check these assignments carefully for correctness. If necessary, adapt the addresses to the new CAN configuration.

2.4.2 Direct Variable Mapping in Hardware Manager

In this method, mapping is done by manually entering variables directly in the Hardware Manager. The variables are instantiated at the same time.

Example:

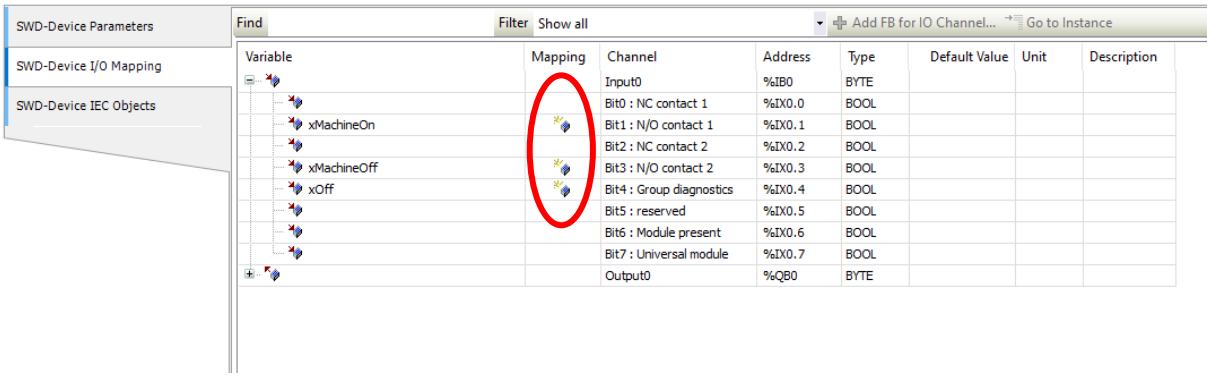


Figure 16: Mapped variables that are instantiated

Behavior during system transition :

After switching to a Linux-based system, the project cannot be compiled without errors because the variables used in the code are no longer automatically instantiated. The original links are lost.

Recommended Practice:

1. Before the changeover:

- Export the existing shortcuts from the Windows CE project.
- To do this, right-click on the SWD master and select "Export mappings to CSV...".

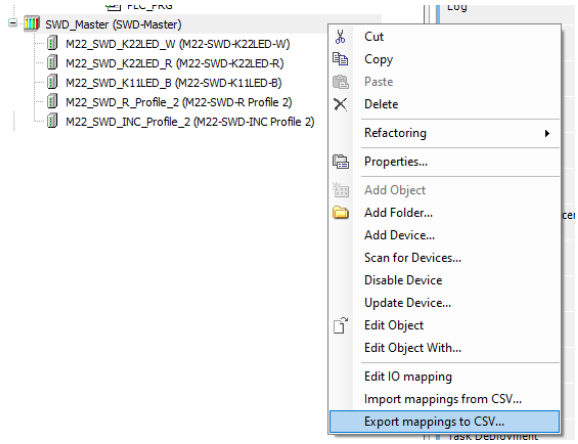


Figure 17: Export mappings

2. After switching to Linux:

- Create the new device tree using the SWD gateway.
- Again, export the current mappings as a CSV file.

3. Merge CSV files:

- Open both CSV files.
- From the Windows CE file, copy the first, third and fourth columns to the exported file of the Linux system.

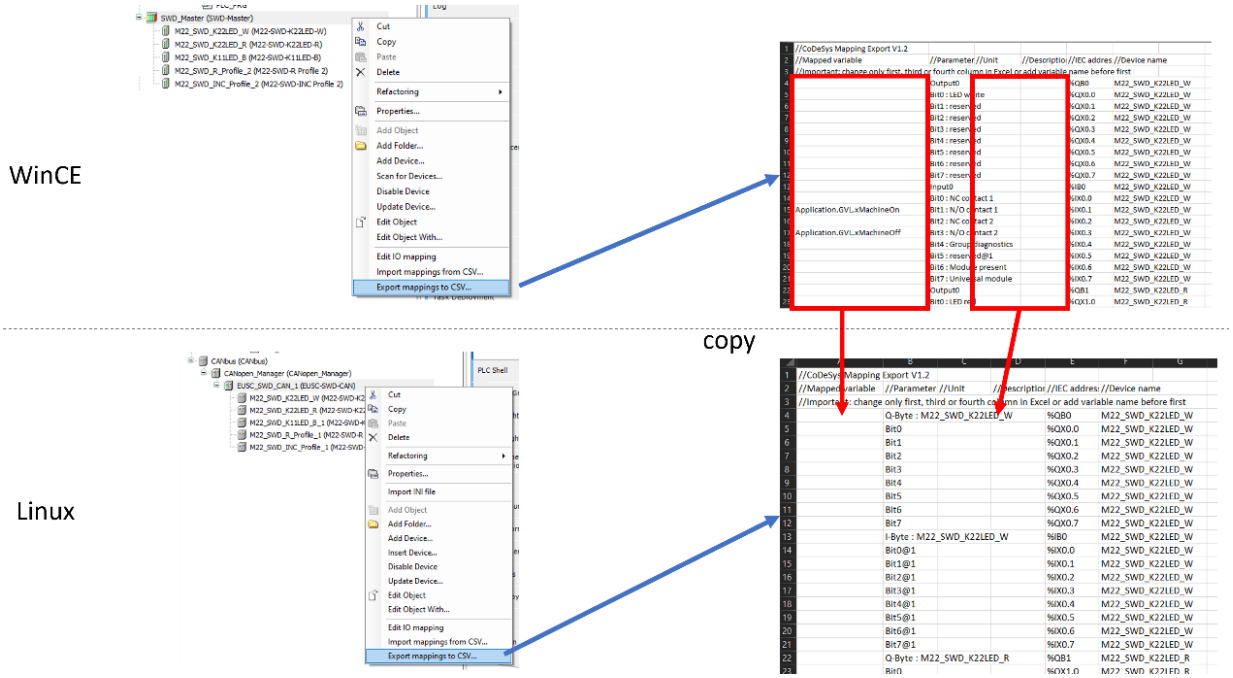


Figure 18: Transfer mappings

4. Import of the customized file:

- Import the edited CSV file into the new project to restore the original links.

2.4.3 Declaration in GVL, assignment in the Hardware Manager

With this method, the input and output variables are declared, for example, in a global variable list (GVL). The link to the hardware is then manually established in the Hardware Manager by entering the variables.

→	**Note** Even if there is no full linking, the project can compile without errors because the variables are already declared. However, this can lead to runtime errors or unexpected behavior.

Example:

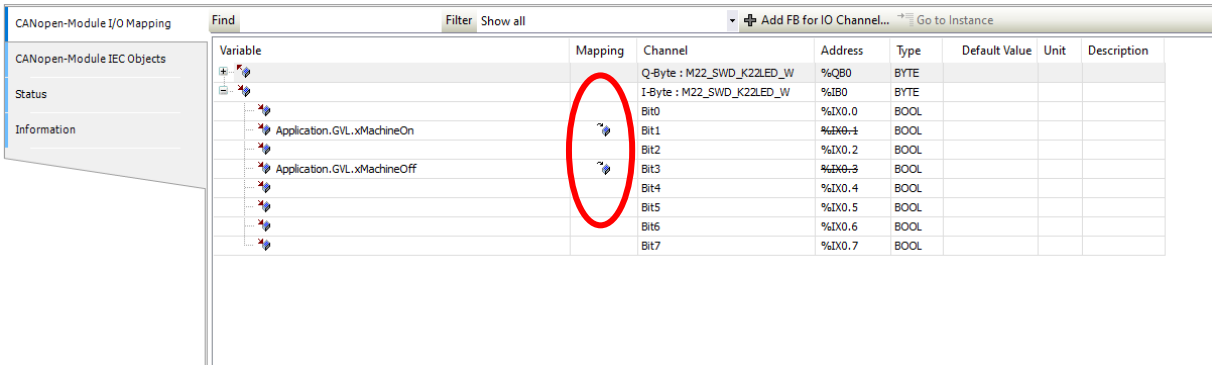


Figure 19: Linked variables in mapping table

Recommended Practice:

The procedure corresponds to the procedure described in Chapter 2.4.2 (Mapping Method 2):

1. Export of the existing links before the conversion.
2. Building the new device tree after the changeover.
3. Export of the new mappings.
4. Merge the CSV files.
5. Import of the customized file to restore the original association.

3 References

Documentation			
	RAM05		LINK
Manual EU5C-SWD-CAN	MN120002		Download
Manual SmartWire-DT Gateways	MN05013002		Download

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