Communicating between CODESYS V2 and CODESYS V3 via network variables

Level 4	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 German version of this document.

Translation

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

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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

1 General

Some devices only support a CODESYS V2 runtime. To communicate with these devices, network variables are a possible solution.

The following application note covers communication between CODESYS V2 and CODESYS V3 via network variables using the example of an XC300 and an XC-CPU201.

1.1 Function

The values of network variables can be exchanged between different PLCs in a network. The variables must be defined in strict, identical lists on both the sender device and receiver device, and only one device application defines the network variables. The lists can be in one or more projects.

1.2 Field of Application

Communication with network variables does not necessarily have to take place between two devices with CS3 runtime. It can also be between a CS2 runtime and a CS3 runtime.

The following example assumes that a device on the network does not have a CS3 runtime, but only a CS2 runtime. In this case, network variables are a solution to enable communication between the two devices.

1.3 Hardware requirements

Following hardware is the minimum requirement:

- A plc with CS2 runtime, e.g. XC-CPU201
- A plc with CS3 runtime, e.g. XC300 or XV300

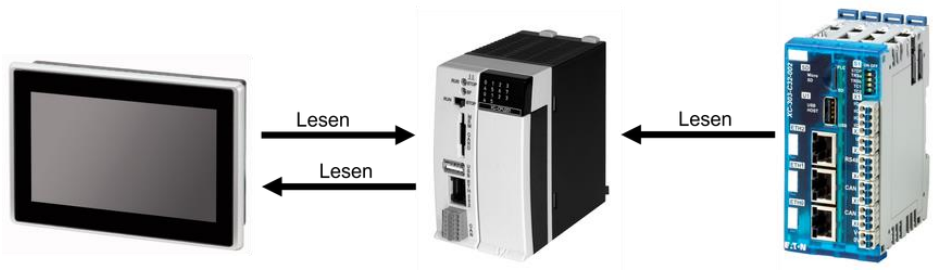

Figure 1: Communication possibilities between the devices

If the PLC with CS2 Runtime should be able to read data from the other PLC with CS3 Runtime, the other PLC must be available in CODESYS V2 and reachable in the network. If this is not the case, the communication works only one-sided. The XC300 could therefore read the network variables of the XC-CPU201, but the XC-CPU201 cannot read network variables of the XC300. This would be different with an XV300, which is available in CODESYS V2 and CODESYS V3 (see figure 1).

1.4 Software requirements

Following software is the minimum requirement:

- XSOFT-CODESYS 3.5 tested on XSOFT-CODESYS 3.5.16 BF4
- XSOFT-CODESYS 2.3.9 SP7

2 Network configuration

The procedure varies depending on the PLC used. The intended procedure for each configuration is shown in the following table.

Table 1: Runtime configuration in the network

Case	CS2 Runtime on both devices	CS3 Runtime on both devices	intended procedure
1	Yes	Yes	preferably use CODESYS V3. procedure described here also possible. Reading possible in both directions.
2	No	Yes	preferably use CODESYS V3. procedure described here also possible. Only reading of network variables on CS3 side possible.
3	Yes	No	Use CODESYS V2.
4	No	No	No communication via network variables possible. Special case: XC-CPU201 is explained in detail here.

3 Settings in CODESYS V3

To exchange network variables between a device with CODESYS V2 and a device with CODESYS V3, a "dummy" device must be inserted in the CODESYS V3 project.

The "dummy" device must be available in CODESYS V2 and CODESYS V3. **An exception is the XC-CPU201 which can be replaced by a XC-CPU202 in CODESYS V3.**

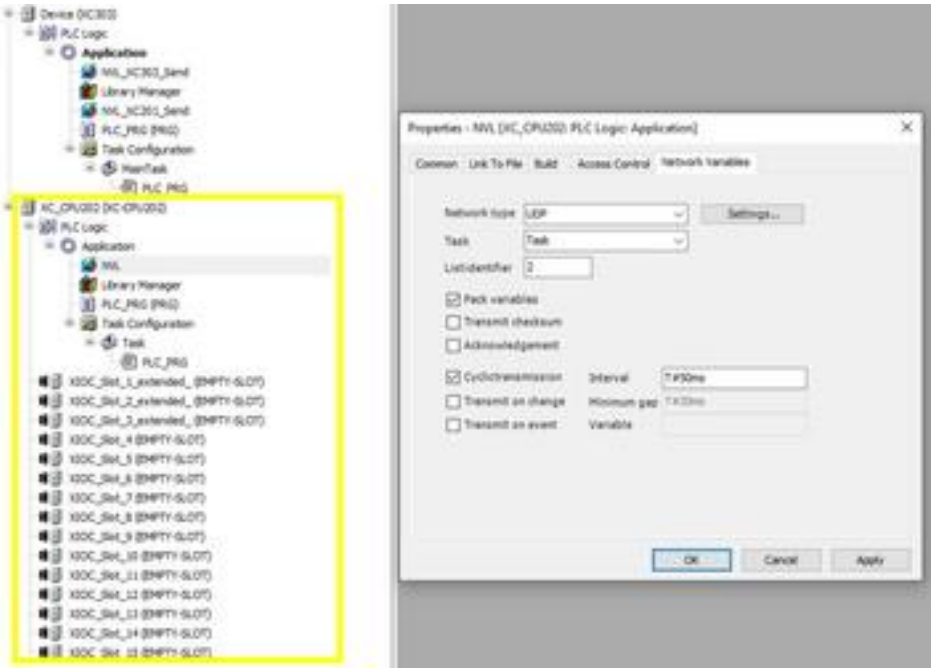

Figure 2: Inserting a "dummy" device

A Network variable list (NVL) can then be added to this device (see figure 2).

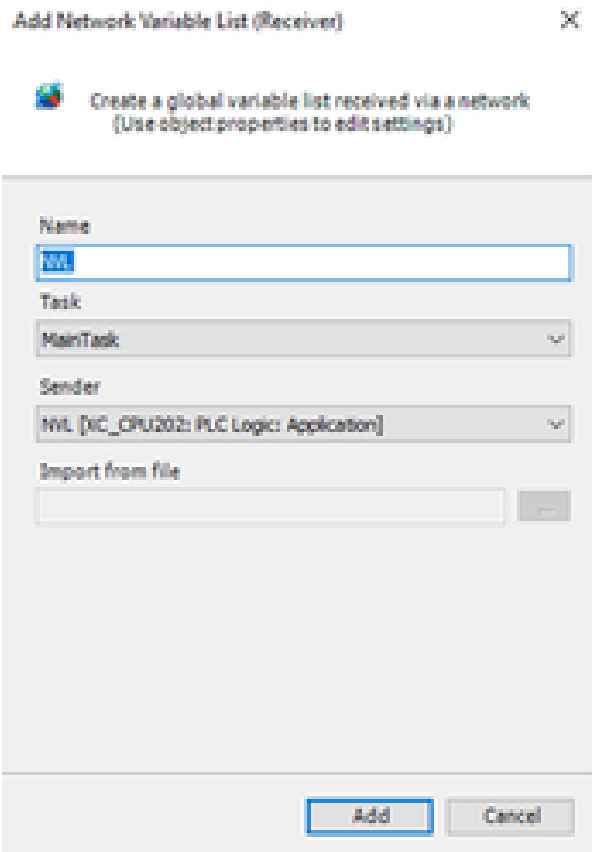

Figure 3: Adding a receiver to the main device

Now a NVL (receiver) can be inserted in the actual device (here: XC303) and the "dummy" device can be specified as the transmitter (see figure 3).

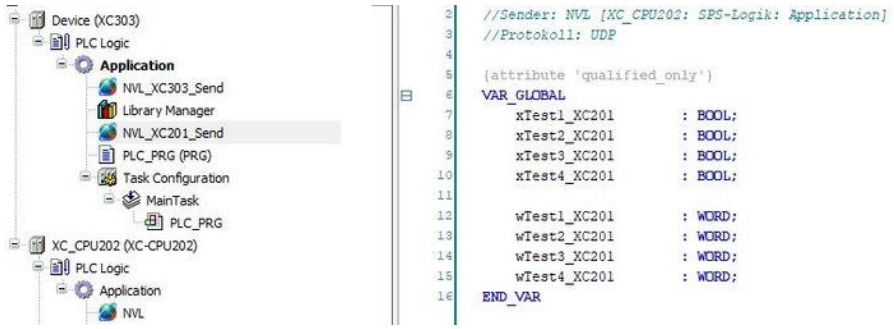

Figure 4: Filling the receiver with variables

The variables to be received from the CODESYS V2 device can be defined in the receiver (see figure 4).

Reading network variables on the CS2 side

If the main device is also available in CODESYS V2 e.g., an XV300, it is also possible to send data to the “dummy” device, that can be read by the CS2 side.

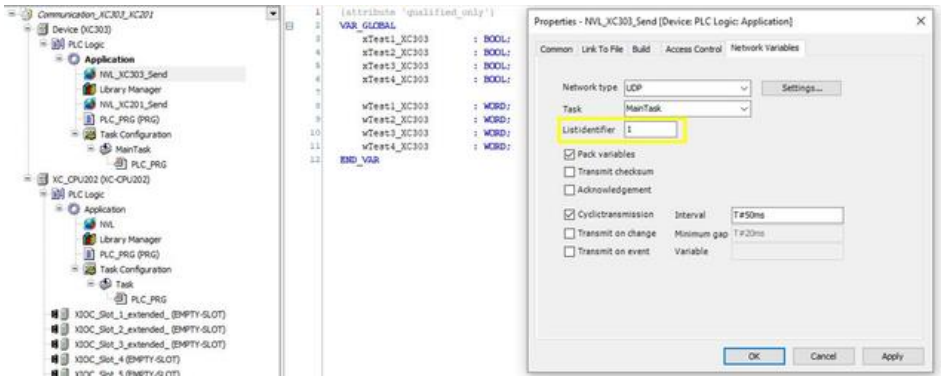

Figure 5: Implementation of a sender to the main device

Therefore, another NVL to has to be created and specified as sender (see figure 5).

4 Settings in CODESYS V2

In CODESYS V2, the Network variable lists must then be created accordingly. It must be ensured that the same identifier (variable list identifier COB-ID) is used as in CODESYS V3.

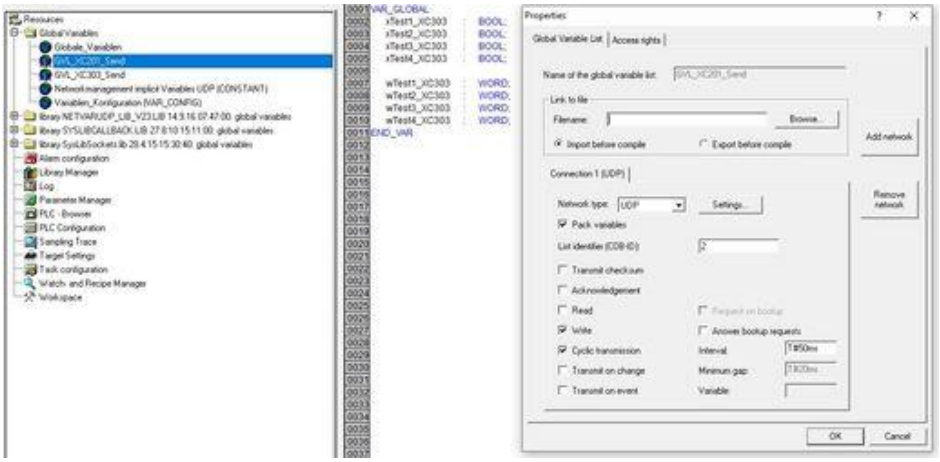

Figure 6: NVL properties for sending from CODESYS V2

The variables in the NVL in CODESYS V2 should be identical to those in the receiver in CODESYS V3 (see figure 6).

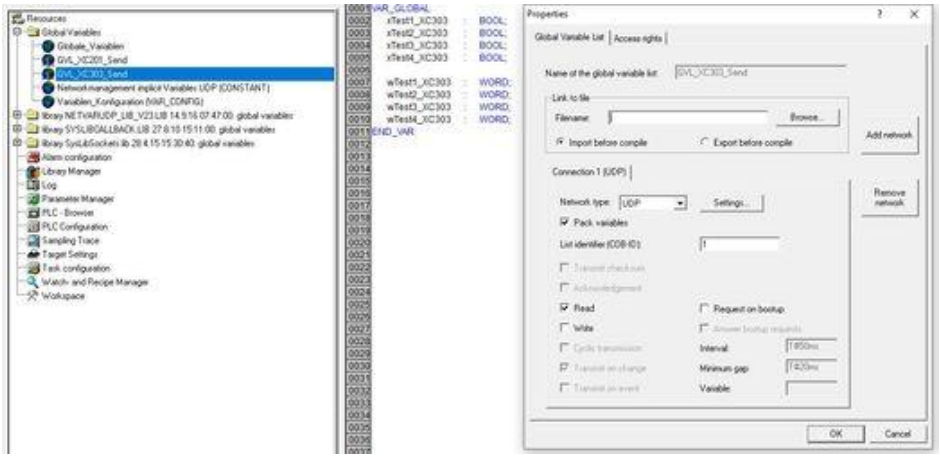

Figure 7: NVL properties for receiving in CODESYS V2

This NVL is only necessary when there is a sender in the main device. The variables in the NVL in CODESYS V2 should be identical to those in the sender in CODESYS V3 (see figure 7).

5 Example project

https://eaton-corp.atlassian.net/wiki/download/attachments/8017518/Communication_C2_C3_NetworkVariables.zip?api=v2

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