# Application for Communication between Process Control System PCS 7 and Freelance 800F by ABB

**Process Control System SIMATIC PCS 7 / STEP 7**

**Application Description • November 2009**

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# SIMATIC
# AS-AS Communication

Process Control System SIMATIC PCS 7 and ABB Freelance 800F

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# Table of Contents

# 1 Automation Task Overview

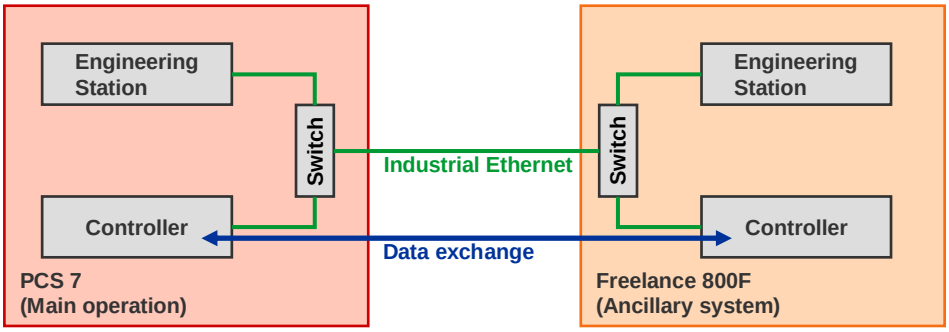
### Introduction

In the case of an expansion or modernization of large plants it is necessary that various process control systems are linked to be able to exchange important data quickly and easily. Linking different process control systems may be very complex due to a big age difference or different manufacturers.

### Overview of the automation task

The figure below provides an overview of the automation task.

Figure 1-1




### Description of the automation task

A plant with the process control system "Freelance 800F" by ABB is to be partly renewed.

The "Freelance 800F" process control system was originally designed in 1994 by Hartmann and Braun under the name "Digimatik". Hartmann and Braun was taken over by Elsag Bailey in 1995 and the system was renamed to "Freelance 2000". After takeover by ABB in 1999 the system got its present name "Freelance 800F" in 2001.

The user decides to modernize the main operation of his/her plant. For economic reasons the controllers in ancillary systems will not be exchanged to maintain the infrastructure.

The SIMATIC PCS 7 process control system is used for the main operation of the plant. Therefore the Freelance 800F process control system in the ancillary system has to be linked with PCS 7 in the new section of the plant, i.e. the process control systems of different manufacturers are linked.

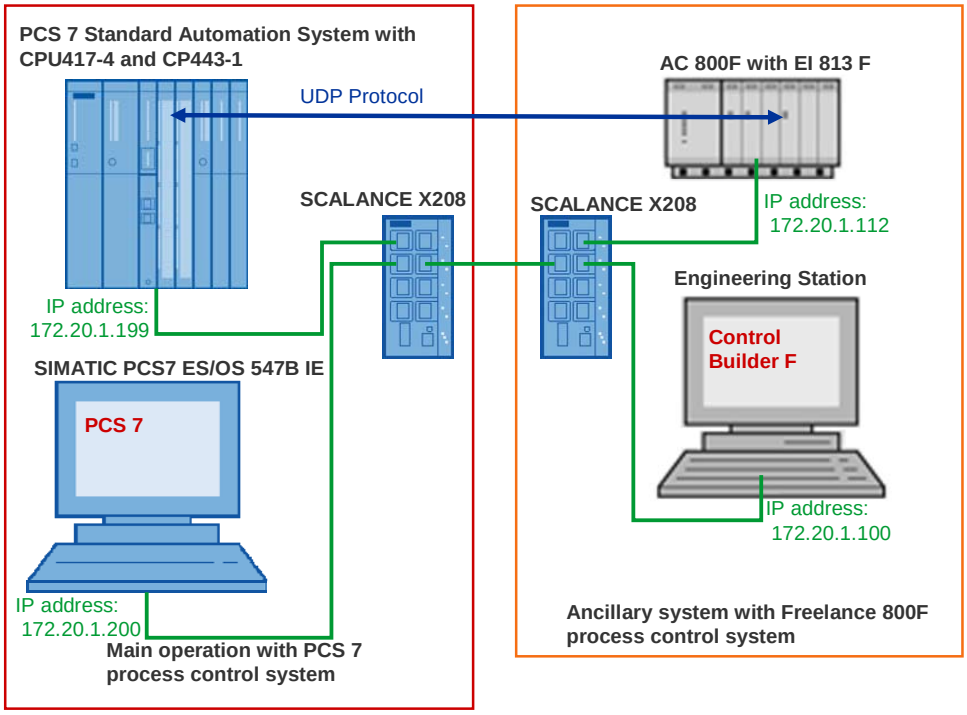
# 2 Automation Solution

## 2.1 Overview of overall solution

### Schematic layout

The following figure displays the most important components of the solution:

Figure 2-1




### Structure

In the ancillary systems, the old part of the plant, the "Freelance 800F" process control system will be continued to be used with the AC 800F controller.

The main operation of the plant will be modernized with the PCS 7 process control system. The PCS 7 process control system uses a standard automation system with CPU417-4 and CP443-1.

Between the SIMATIC PCS 7 system bus and the Freelance system bus a connection has to be made to realize the data exchange between the AC 800F controller and AS 417-4. Both system buses work on the basis of Industrial Ethernet with TCP/IP or UDP.

For the AC 800F controller ABB offers communication modules, communication and function blocks and variables which are used to connect the AC 800F controller to an Industrial Ethernet network and to exchange data via the Industrial Ethernet.

A CP443-1 communication processer is used to connect the AS 417-4 to an Industrial Ethernet network.

Configuration and programming of the AC 800F controller is via the engineering station with the engineering tool "Control Builder F".

Configuration and programming of AS 417-4 is via the SIMATIC PCS 7 ES/OS 547B IE workstation, which has installed PCS 7.

**Topics not covered by this application**

This application does not contain a description regarding set up, commissioning and programming of a complete Freelance 800F process control system.

**Required knowledge**

Basic knowledge regarding setup, commissioning and programming of the Freelance 800F process control system by ABB is assumed.

## 2.2 Description of the core functionality

**Sequence of the core functionality**

This application example shows how the AC 800F controller has to be configured in the Freelance 800F process control system and the AS 417-4 in PCS 7, to allow a data exchange via UDP protocol between the two process control systems.

The configuration of the AC 800F controller comprises:

- configuring the communication module EI 813F, 10BaseT by ABB, to connect the AC 800F controller to the Industrial Ethernet
- configuring the send and receive interface in the Freelance 800F process control system
- programming the send and receive blocks in the Freelance 800F process control system

The configuration of AS 417-4 comprises:

- configuration of the UDP connection
- calling and configuring the communication function blocks FC50 "AG_LSEND" and FC60 "AG_LRCV"
- calling and configuring the function blocks, to convert the variables received by Freelance into PCS 7 readable values
- calling and configuring function blocks to convert the variables to be sent to Freelance 800F

**Advantages of this solution**

The solution introduced here offers you the following advantages:

- Process control systems from different manufacturers can be linked so that a data exchange between the controllers is possible.
- Time and cost savings since only part of the entire plant has to be renewed.
- A plant can be expanded by connecting a new process control system to the old existing plant section.
- The infrastructure of the plant remains.

## 2.3 Hardware and software components used

The application was generated with the following components:

### Hardware components

Table 2-1

| Components | No. | MLFB / order number | Note |
|---|---|---|---|
| Standard automation system with CPU417-4 and CP443-1EX20 | 1 | 6ES7 654-8CK03-3BB0 | |
| SIMATIC PCS 7 ES/OS 547B | 1 | 6ES7 650-0NF17-0YX0 | |
| Ethernet interface:<br>EI 813F, 10BaseT | 1 | 3BDH000021R1 | see: Freelance 800F Product catalog |
| PM 802F | 1 | 3BDH000002R1 | see: Freelance 800F Product catalog |
| SA 811F | 1 | 3BDH000013R1 | see: Freelance 800F Product catalog |

### Standard software components

Table 2-2

| Components | No. | MLFB / order number | Note |
|---|---|---|---|
| Control Builder F Standard | 1 | 3BDS008510R06 | see: Freelance 800F Product catalog |

**Note** The PCS 7 software including SIMATIC CFC is included in the delivery of the SIMATIC PCS7 ES/OS 547B IE.

## 2.4 Basic performance data

Via the CP443-1 in AS 417-4 a max. of 2048 bytes can be transferred via UDP protocol.

In this application example a max. of 507 DWORDs user data can be transferred.

The max. number of user data transferred is calculated as follows:

max. number of user data = 2048 bytes – 20 bytes Freelance frame header = 2028 bytes = 507 DWORD

## 2.5 Alternative solutions

**PCS 7 Standard automation system**

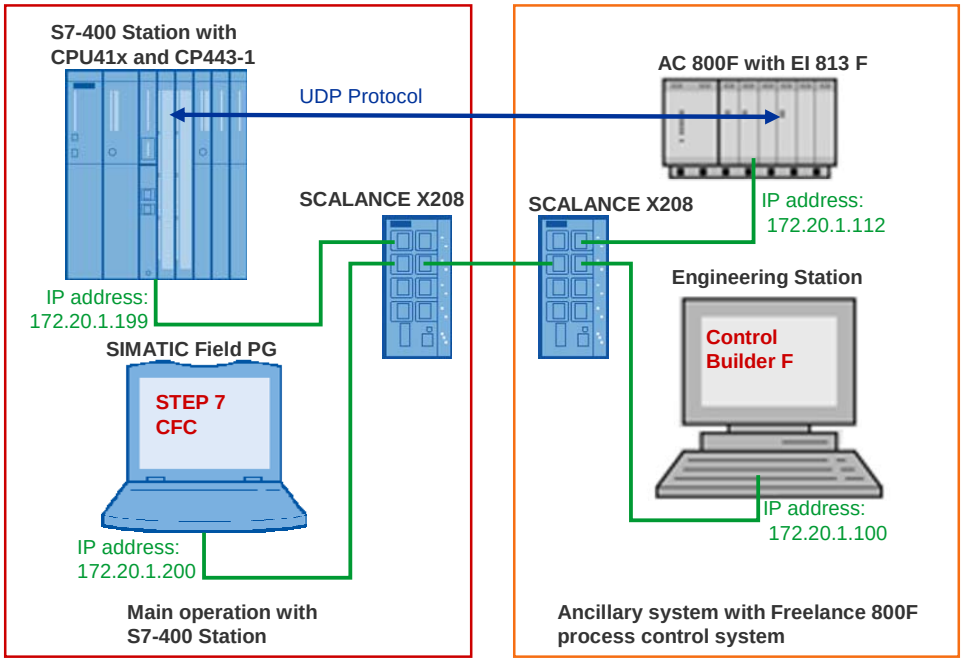
Alternatively to the PCS 7 standard automation system with CPU417-4 and CP443-1EX20 you can use the PCS 7 standard automation system with the following CPU and following CP443-1:

Table 2-3

| CPU | CP443-1 | Note |
|---|---|---|
| CPU414-3 | CP443-1EX20 | from of PCS 7 V7.1 |
| CPU414-3 | CP443-1EX11 | up to PCS 7 V7.0 |
| CPU416-2 | CP443-1EX20 | from PCS 7 V7.1 |
| CPU416-2 | CP443-1EX11 | up to PCS 7 V7.0 |
| CPU416-3 | CP443-1EX20 | from PCS 7 V7.1 |
| CPU416-3 | CP443-1EX11 | up to PCS 7 V7.0 |
| CPU417-4 | CP443-1EX11 | up to PCS 7 V7.0 |

### SIMATIC S7-400 Station and STEP 7

Figure 2-2




If you do not have a PCS 7 process control system you can use a S7-400 station with S7-400 CPU and CP443-1 instead of a PCS 7 standard automation system. Use STEP 7 to configure the S7-400 station instead of PCS 7.

In this case you will additionally need SIMATC CFC.

Under the link below you will find the release for delivery of SIMATIC CFC V7.1:

http://support.automation.siemens.com/WW/view/en/36955720

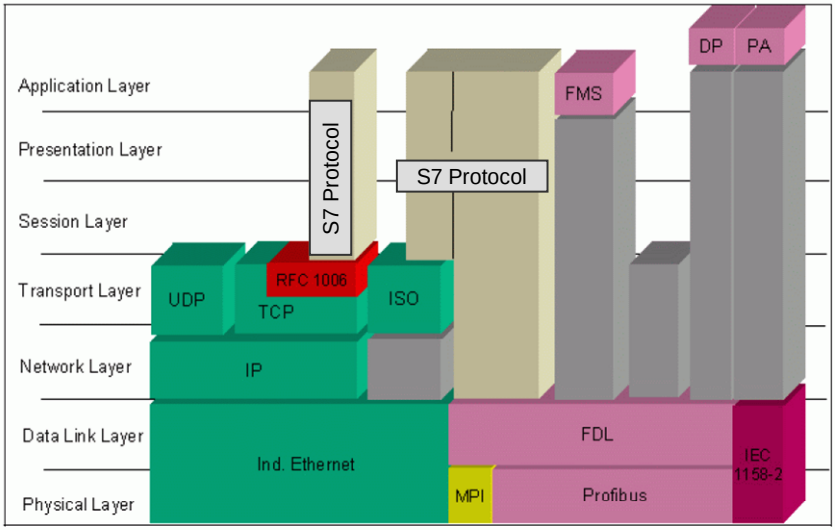
# 3 Basics

## 3.1 UDP protocol

### Classification of UDP protocol in the ISO OSI reference model

The UDP protocol was introduced to transfer data quickly and easily. The UDP protocol is located on level 4 (transport layer) of the ISO OSI reference model and is therefore also based on the IP layer (layer 3). Thus, the receiver of the data is addressed using IP addresses. The data packet to be sent is only made bigger by minimal administration information so that the data throughput is bigger than compared with TCP or ISO-on-TCP (TCP with RFC 1006).

Figure 3-1




### Link types in the configuration of a SIMATIC S7

Table 3-1

| Type of connection | Description |
|---|---|
| Specified UDP connection | • Local node and connection partner are permanently configured.<br>• The connection partner can be located inside or outside the STEP 7 project. |
| Unspecified UDP connection | • Only the local node is specified in the connection configuration.<br>• The partner is addressed via the port and IP address during the block call. |
| Broadcast | An active node transmits data to all other nodes. |
| Muticast | An active node sends data to a permanently configured group of nodes. |

**Basic performance data and quantity framework of the UDP protocol**

Table 3-2

| Criterion | Basic performance data | Comments |
|---|---|---|
| Definition | RFC 768 | Independent of manufacturer |
| Transmission medium | Cable, optical fiber, radio | |
| Transmission rate | Dependent on net physics up to 1GBit | |
| Connectable devices and access methods | • Point-to-Point<br>• Broadcast<br>• Multicast | Permissible methods:<br>• CSMA/CD<br>• CSMA/CA |
| Acknowledgement | The protocol only acknowledges the successful sending of the data into the network and not the arrival of the data at the destination station. The user program has to ensure consistency check and data editing. | |
| Data volume | 1 to 2048 bytes | |
| Number of possible connections | Up to 16 per S7-300 CP<br>up to 64 per S7-400 CP | |



**Properties of the UDP protocol**

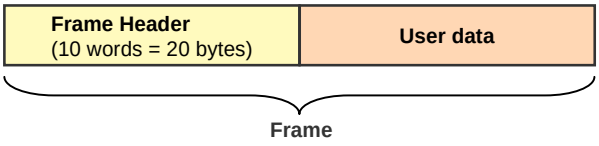
- Very fast data transmission.
- The protocol can be used very flexibly and can be used well with third-party systems.
- The UDP protocol is routing-capable.
- The UDP protocol is multicast- / broadcast-capable.
- Small up to medium-sized data volumes (<=2048 bytes) can be transmitted.
- Lost data packets will not be sent again.
- Data packets with incorrect checksum are rejected and not newly requested.
- Multiple deliveries of individual packets are possible.
- The arrival sequence of the packets at the receiver cannot be predicted.
- The data is transmitted in a packet-oriented way (not stream-oriented).
- The broadcast function can only be used in send direction.

## 3.2 Structure of the frame

The frames exchanged between Freelance 800F and PCS 7 consist of frame header and user data.

The frame header has 10 words = 20 bytes.

Figure 3-2



# 3.3 Structured data type

The user data of the frame is transferred as structured data type.

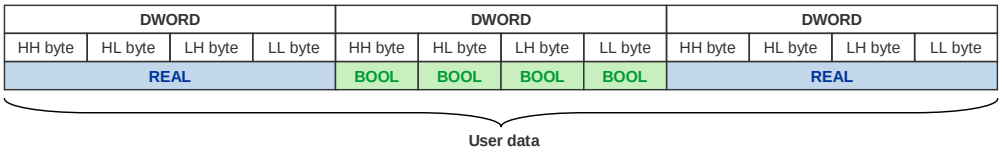
When configuring structured data types for the communication with an automation system in PCS 7 the following rules are to be observed:

- the number of consecutive REAL data type variables is of no significance.
- BOOL data type variables always have to be configured in blocks of four. The number of consequtive blocks is of no significance.

This is because it is always one DWORD, consisting of 4 bytes which is to be transferred.

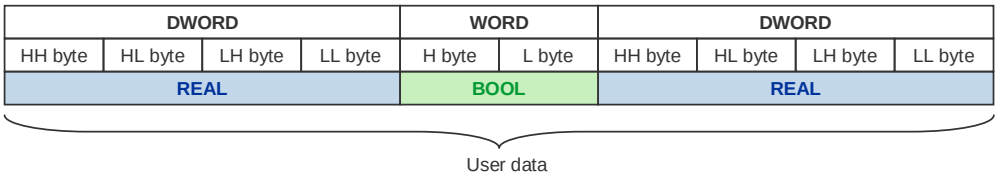
A REAL data type variable occupies 4 bytes whilst a BOOL data type variable only occupies 1 byte.

Figure 3-3




When a BOOL data type variable is to be configured between two variables of the REAL data type, then this changes the assignment within the frame. In this case, it is the REAL data type variable which transfers a DWORD first. Subsequently a WORD is transferred for a BOOL data type variable and again a DWORD for a REAL data type variable.

Figure 3-4

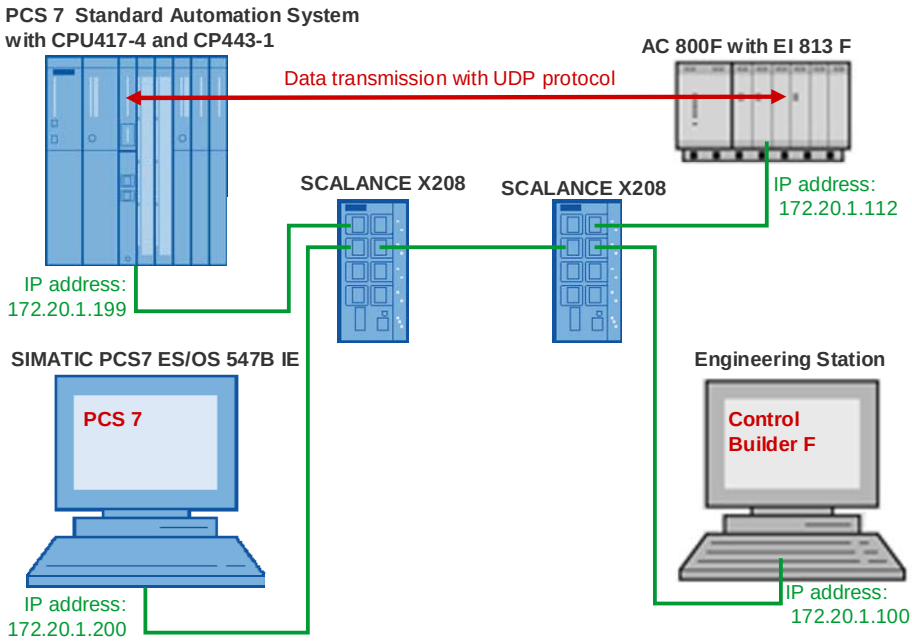



This would have to be evaluated in PCS 7 with great effort and can be avoided by the block by block configuration of variables of the BOOL data type.

# 4 Function Mechanisms of this Application

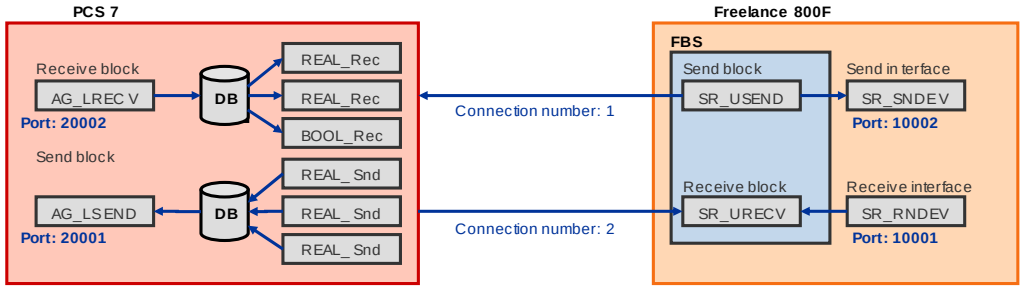
## General overview

Figure 4-1




## Program Overview

Figure 4-2




The AC 800F controller and the AS 417-4 are located in the same IP subnet.

Between AC 800F and AS 417-4 the data exchange is carried out via UDP protocol.

In this application example 184 double word user data is transferred via UDP protocol between AS 417-4 and the AC 800F controller.

In each case there are configured two UDP endpoints in the AC 800F controller and in AS 417-4, one to receive data and one to send data.

The frame which transfers the user data has 756 bytes.

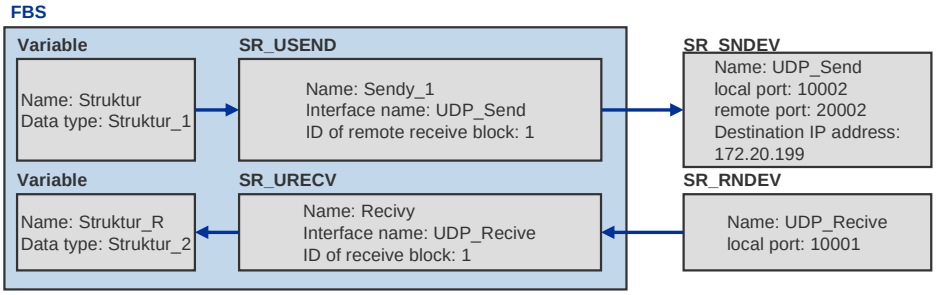
**Frame length = n * 4 + 20 = 184 * 4 + 20 = 756**

n = number of user data (DWORDs)

20 = frame header

# 4.1 Freelance 800F process control system

Figure 4-3




## 4.1.1 Program details of Freelance 800F process control system

In the AC 800F controller you will use the SR_SNDEV send interface with the SR_USEND send block to send data via the communication module EI 813F. In this application example the data is sent via port 10002 to port 20002 of the AS 417-4.

In the AC 800F controller you will use the SR_RNDEV receive interface with the SR_URECV receive block to receive data via the communication module EI 813F. In this application example the data of the AS 417-4 are received via port 10001.

Make the following settings for the send and receive interface:

- a unique name for the send and receive interface has to be assigned.
- activate the UDP protocol
- IP address of the communication partner (destination station)
- local port of send or receive interface
- remote port in communication partner (destination station)

In this application example the following settings are used for the "SR_SNDEV" send interface:

Table 4-1

| Setting | Value | Note |
|---|---|---|
| Name | UDP_Send | Note down the name since it has to be entered as interface name when configuring the "SR_USEND" send block. |
| Local port<br>(Own TCP/IP port) | 10002 | You have to use different local ports for the send and receive interface. The ports have to be > 10000. |
| Remote port (TCP/IP port of destination station) | 20002 | |
| IP address of the communication partner (Internet address of destination station) | 172.20.1.199 | IP address of CP443-1 in AS 417-4 |

In this application example the following settings are used for the "SR_RNDEV" receive interface:

Table 4-2

| Setting | Value | Note |
|---|---|---|
| Name | UDP_Recive | Note down the name since it has to be entered as interface name when configuring the "SR_URECV" receive block. |
| Local port<br>(Own TCP/IP port) | 10001 | You have to use different local ports for the send and receive interface. The ports have to be > 10000. |

In this application example the following settings are used for the "SR_USEND" send block:

Table 4-3

| Setting | Value | Note |
|---|---|---|
| Name | Sendy_1 | use unique name |
| Interface name | UDP_Send | Name of send interface |
| Id of remote receive block | 1 | Connection ID<br>A number between 1 and 255 is requested as ID which clearly assigns the block to the interface. |

In this application example the following settings are used for the "SR_URECV" receive block:

Table 4-4

| Setting | Value | Note |
|---|---|---|
| Name | Recivy | use unique name |
| Interface name | UDP_Recive | Name of receive interface |
| Id of receive block | 1 | Connection ID<br>A number between 1 and 255 is requested as ID which clearly assigns the block to the interface. |

In the AC 800F user program the following variables are created as structured data types:

Table 4-5

| Name of variable | Data type | Note |
|---|---|---|
| Struktur | Struktur_1 | to send data |
| Struktur_R | Struktur_2 | to receive data |

Summerizing the variables to be transferred in a structured variable type, has the advantage that only one send and receive block is needed. This considerably facilitates the evaluation in the PCS 7 process control system.

In the structured data type "Struktur_1", 184 variables of the REAL data type are summarized. These 184 variables are transferred with the SR_USEND send block.

Table 4-6

| Name | Type | Initial value |
|---|---|---|
| sREAL1 | REAL | 1.0 |
| sREAL2 | REAL | 2.0 |
| sREAL3 | REAL | 3.0 |
| sREAL4 | REAL | 4.0 |
| sREAL5 | REAL | 5.0 |
| sREAL6 | REAL | 6.0 |
| sREAL7 | REAL | 7.0 |
| sREAL8 | REAL | 8.0 |
| sREAL9 | REAL | 9.0 |
| sREAL10 | REAL | 10.0 |
| sREAL11 | REAL | 1.0 |
| sREAL12 | REAL | 2.0 |
| … | | |
| sREAL184 | REAL | 4.0 |

In the structured data type "Struktur_2" 184 variables of the data type REAL are also summarized. A variable of the data type REAL requires a data word. This allows 184 data words to be received via a SR_URECV receive block.

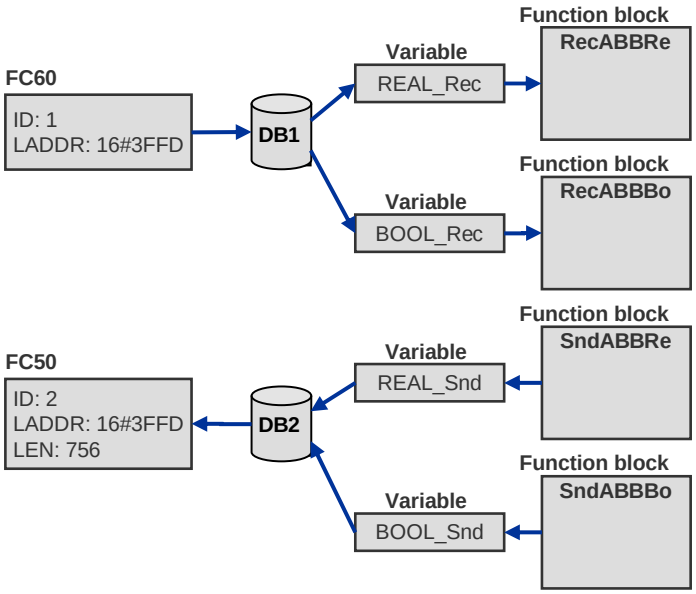
Table 4-7

| Name | Type | Initial value |
|---|---|---|
| rREAL1 | REAL | 1.0 |
| rREAL2 | REAL | 2.0 |
| rREAL3 | REAL | 3.0 |
| rREAL4 | REAL | 4.0 |
| rREAL5 | REAL | 5.0 |
| rREAL6 | REAL | 6.0 |
| rREAL7 | REAL | 7.0 |
| rREAL8 | REAL | 8.0 |
| rREAL9 | REAL | 9.0 |
| rREAL10 | REAL | 10.0 |
| rREAL11 | REAL | 1.0 |
| … | | |
| rREAL184 | REAL | 4.0 |

**Note** In this application example only variables of the REAL and BOOL data types are summarized and transferred in a structured data type.

## 4.2 PCS 7 process control system

Figure 4-4



### 4.2.1 Program details on user program of AS 417-4

Call the FC50 "AG_LSEND" send block in the user program of AS 417-4 to be able to send data via CP443-1.
In this application example the data is send via port 20001 to port 10001 of the AC 800F controller.

Call the FC60 "AG_LRECV" receive block in the user program of AS 417-4 to be able to receive data via CP443-1.
In this application example the data from the AC 800F controller is received via port 10002.

The received data is stored in DB1. The data to be sent is stored in DB2.

To make the frame of the Freelance 800F process control system readable in PCS 7, four function blocks have to be created. They contain conversion functions and convert:

- data received by Freelance 800F into readable data for PCS7
- data to be sent into data readable to Freelance

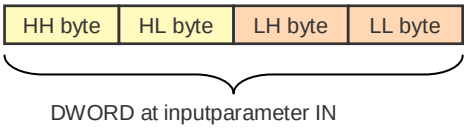
When converting, attention needs to be paid that a data word (DWORD) may constist of a variable by data type REAL or of 4 variables by data type BOOL.

**"RecABBRe" function block**

The "RecABBRe" function block converts a received variable of data type REAL.

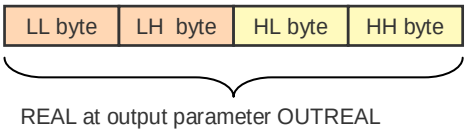
The variable of the REAL data type has the following structure in Freelance 800F and is read at the IN input parameter of the "RecABBRe" function block:

Figure 4-5




The variable is converted into a format readable to PCS 7. The converted REAL value is transferred at the OUTREAL output.

Figure 4-6



In the "RecABBRe" function block, the following variables are defined:

Table 4-8

| Interface | Name | Data type |
|---|---|---|
| IN | IN | DWord |
| OUT | OUTREAL | Real |
| STAT | WORD1 | Word |
| | WORD2 | Word |
| | LL_Byte | Byte |
| | LH_Byte | Byte |
| | HL_Byte | Byte |
| | HH_Byte | Byte |

The received DWORD, a variable of the REAL data type, is divided into four bytes for further processing.

```
L   #IN                 // load DWORD at IN input parameter
T   #LL_Byte            // store LL byte of DWORD
L   DW#16#FFFFFF00
UD
SRD 8
T   #LH_Byte            // store LH byte of DWORD

L   #IN
L   DW#16#FFFF0000
UD
SRD 16
T   #HL_Byte            // store HL byte of DWORD

L   #IN
L   DW#16#FF000000
UD
SRD 24
T   #HH_Byte            // store HH byte of DWORD
```

The received DWORD is converted into a format readable to PCS 7.

```
L   #LL_Byte
SLD 8
L   #LH_Byte
OW
T   #WORD1              // LL byte and LH byte are stored in WORD1

L   #HL_Byte
SLD 8
L   #HH_Byte
OW
```

```
T   #WORD2              // HL byte and HH byte are stored in WORD2

L   #WORD1
SLD 16
L   #WORD2
OD
T   #OUTREAL
BEA
```

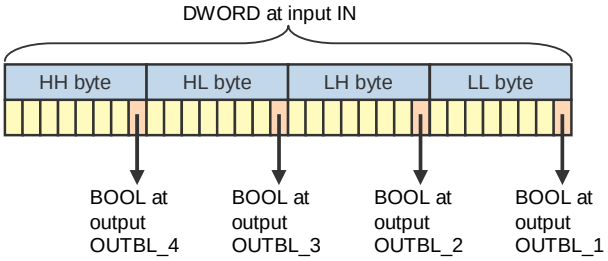
The REAL value of the OUTREAL output parameter is now composed as follows: LL byte, LH byte, HL byte, HH byte.

**"RecABBBo" function block**

Four variables of the BOOL data type are transferred as DWORD. The "RecABBBo" function block converts the DWORD into PCS 7 readable BOOL values.

In Freelance 800F the DWORD is structured as follows. The DWORD is read at the IN input parameter of the "RecABBBo" function block:

Figure 4-7




The BOOL values filtered out of the DWORD are transmitted at the OUTBL_1, OUTBL_2, OUTBL_3 and OUTBL_4 outputs.

In the "RecABBBo" function block, the following variables are defined:

Table 4-9

| Interface | Name | Data type |
|---|---|---|
| IN | IN | DWord |
| OUT | OUTBL_1 | Bool |
| | OUTBL_2 | Bool |
| | OUTBL_3 | Bool |
| | OUTBL_4 | Bool |
| STAT | WORD1 | Word |
| | WORD2 | Word |
| | LL_Byte | Byte |
| | LH_Byte | Byte |
| | HL_Byte | Byte |
| | HH_Byte | Byte |

The DWORD, in which four variables of the BOOL data type are transferred byte by byte, is divided into four bytes for further processing.

```
L   #IN                 // load DWORD at input parameter
T   #LL_Byte            // store LL byte of DWORD
L   DW#16#FFFFFF00
UD
SRD 8
T   #LH_Byte            // store LH byte of DWORD

L   #IN
L   DW#16#FFFF0000
UD
SRD 16
T   #HL_Byte            // store HL byte of DWORD

L   #IN
L   DW#16#FF000000
UD
SRD 24
T   #HH_Byte            // store HH byte of DWORD
```

The received DWORD is converted into PCS 7 readable BOOL values.

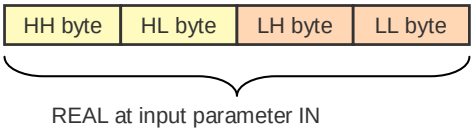
```
L   1
L   #LL_Byte
==I
=OUTBL_1

L   1
L   #LH_Byte
==I
=OUTBL_2

L   1
L   #HL_Byte
==I
=OUTBL_3

L   1
L   #HH_Byte
==I
=OUTBL_4
BEA
```

### "SndABBRe" function block

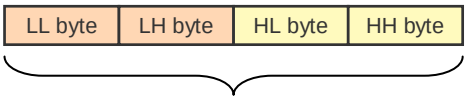
The "SndABBRe" function block converts a variable of the REAL data type, which is sent to Freelance 800F.

The variable of the REAL data type has the following structure in Freelance 800F and is read at the input parameter IN of the "SndABBRe" function block:

Figure 4-8




The variable is converted into a format readable to PCS 7. The converted REAL value is transferred at the OUTWORD output.




In the "SndABBRe" function block, the following variables are defined:

Table 4-10

| Interface | Name | Data type |
|---|---|---|
| IN | IN | Real |
| OUT | OUTDWORD | DWord |
| STAT | WORD1 | Word |
| | WORD2 | Word |
| | LL_Byte | Byte |
| | LH_Byte | Byte |
| | HL_Byte | Byte |
| | HH_Byte | Byte |

The REAL value to be sent is divided into four bytes for further processing.

```
L   #IN                 // load REAL at input parameter IN
T   #LL_Byte            // LL byte of REAL value is stored
L   DW#16#FFFFFF00
UD
SRD 8
T   #LH_Byte            // LH byte of REAL value is stored

L   #IN
L   DW#16#FFFF0000
UD
SRD 16
T   #HL_Byte            // HL byte of REAL value is stored
```

```
L   #IN
L   DW#16#FF000000
UD
SRD 24
T   #HH_Byte              // HH byte of REAL value is stored
```

The REAL value to be sent is converted into a format readable to PCS 7.

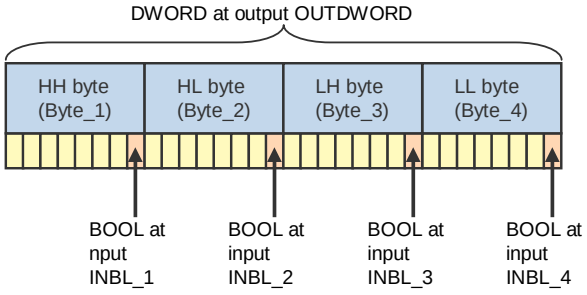
```
L   #LL_Byte
SLD 8
L   #LH_Byte
OW
T   #WORD1                // LL byte and LH byte are stored in WORD1

L   #HL_Byte
SLD 8
L   #HH_Byte
OW
T   #WORD2                // HL byte and HH byte are stored in WORD2

L   #WORD1
SLD 16
L   #WORD2
OD
T   #OUTREAL
BEA
```

The REAL value of OUTDWORD output parameter is now composed as follows: LL byte, LH byte, HL byte, HH byte.

**"SndABBBo" function block**

The "SndABBBo" function block converts four variables of the BOOL data type into a PCS 7 readable format. The variables of the BOOL data type are read at the input parameters INBL_1, INBL_2, INBL_3, INBL_4 of the function block and are each transferred as byte in output parameter OUTDWORD. Four variables of the BOOL data type are altogether summarized as byte and transferred together in the output parameter OUTDWORD as DWORD.

Figure 4-9



In the "SndABBBo" function block, the following variables are defined:

Table 4-11

| Interface | Name | Data type |
|---|---|---|
| IN | INBL_1 | Bool |
| | INBL_2 | Bool |
| | INBL_3 | Bool |
| | INBL_4 | Bool |
| OUT | OUTDWORD | DWord |
| STAT | WORD1 | Word |
| | WORD2 | Word |
| | Byte_1 | Byte |
| | Byte_2 | Byte |
| | Byte_3 | Byte |
| | Byte_4 | Byte |

```
// Initialization
L   B#16#10
T   #Byte_1
T   #Byte_2
T   #Byte_3
T   #Byte_4
```

When the input has the value "false" the initial value remains.
When the input has the value "true" the new value is set.

```
UN      #INBL_4
SPB JMP1
L       DW#16#1
T       #Byte_1

JMP1:   UN      #INBL_3
        SPB JMP2
        L       DW#16#1
        T       #Byte_2

JMP2:   UN      #INBL_2
        SPB JMP3
        L       DW#16#1
        T       #Byte_3

JMP3:   UN      #INBL_1
        SPB JMP4
        L       DW#16#1
        T       #Byte_4
```

```
JMP4:   L       #Byte_1
        SLD 8
        L       #Byte_2
        OW
        T       #WORD1          // Byte_1 and Byte_2 are stored in WORD1
        L       #Byte_3
        SLD 8
        L       #Byte_4
        OW
        T       #WORD2          // Byte_3 and Byte_4 are stored in WORD2

        L       #WORD1
        SLD 16
        L       #WORD2
        OD
        T       #OUTDWORD  // WORD1 and WORD2 are stored in output
                           OUTDWORD
BEA
```

The OUTDWORD output parameter is now composed as follows: Byte_1, Byte_2, Byte_3, Byte_4.

# 5 Configuration Process

## 5.1 Configuration of the AC 800F controller

### Configuring of the EI 813F communication module

Open the project that contains the configuration of the AC 800F controller in the "Control Builder F" engineering tool.

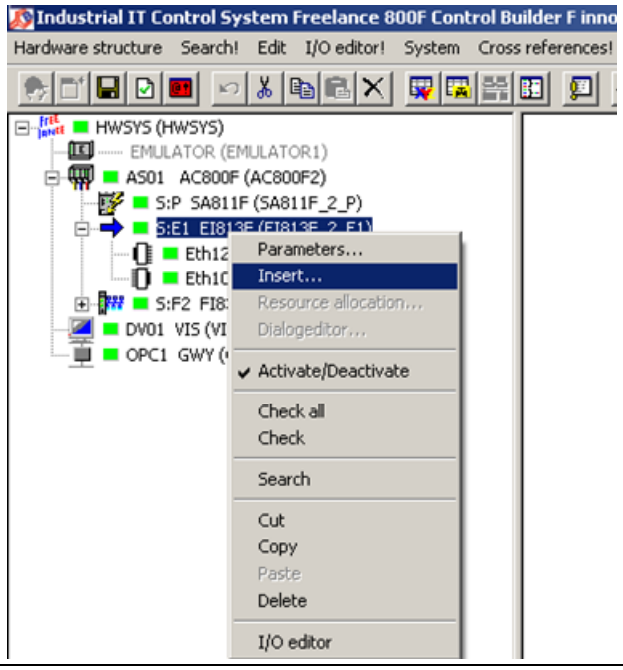
The EI 813F communication module is configured with the following settings at slot E1 of the AC 800F controller.

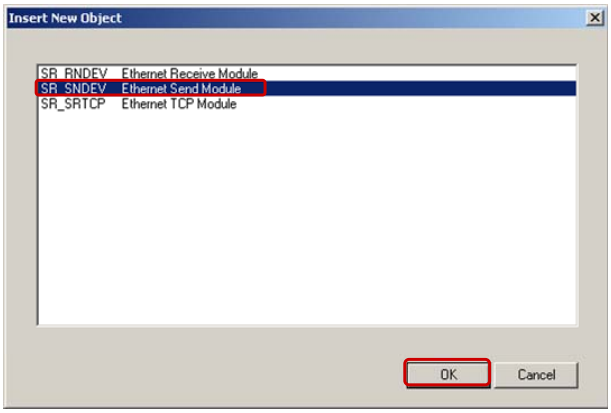
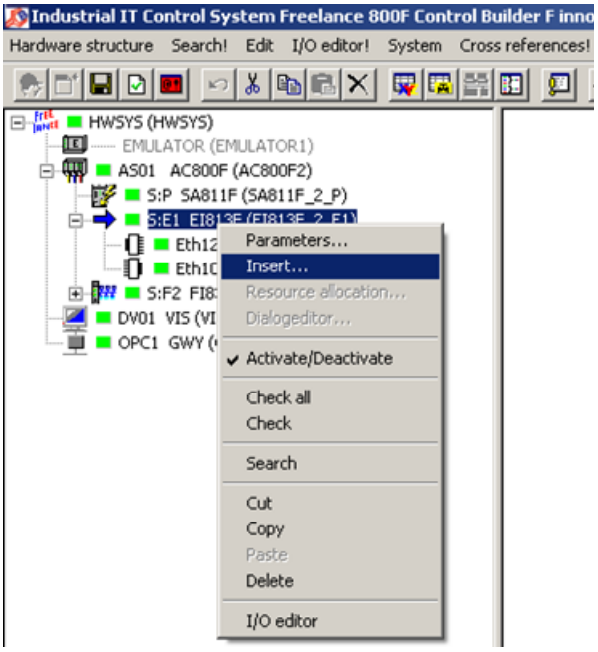
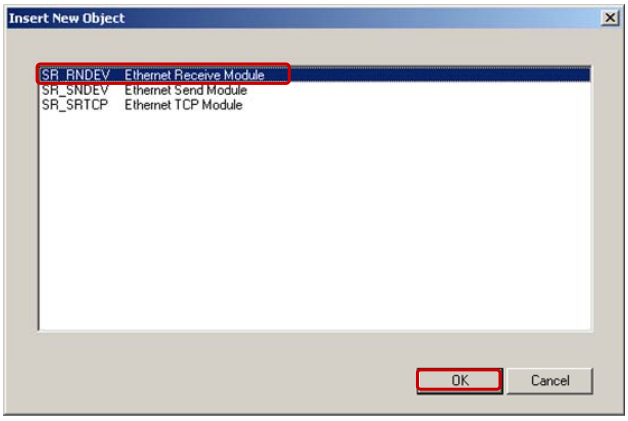
Table 5-1

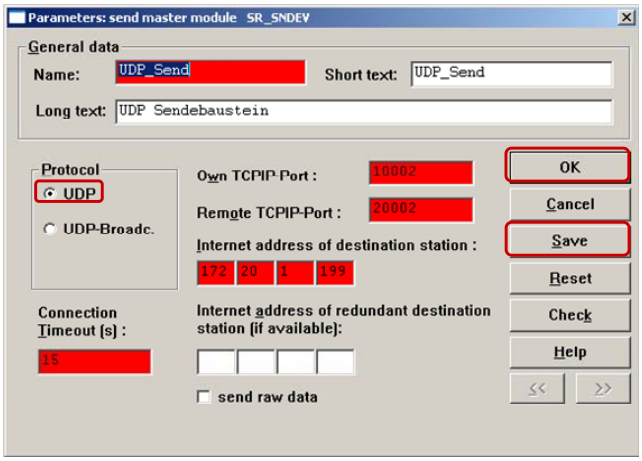
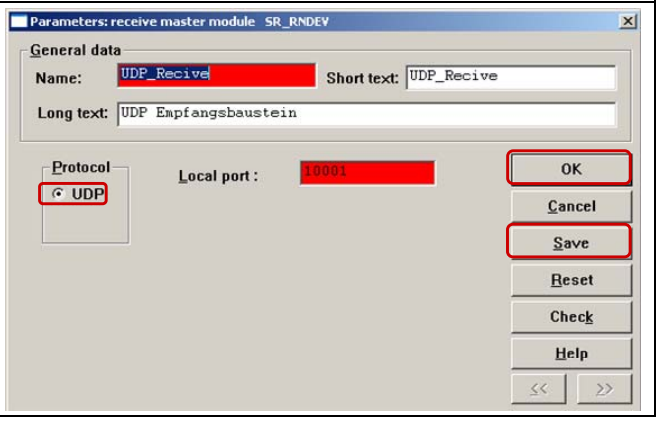
| Setting | Value |
|---|---|
| Brief Description | Ethernet module 10BaseT |
| Module type | EI813F |
| Tag name | EI813F_2_E1 (Default tag name) |
| Station position | 2 |
| Slot | E1 |

### Inserting and configuring send and receive interface

Table 5-2

| No. | Instruction | Comment |
|---|---|---|
| 1. | When you have opened the project with the configuration of the AC 800F controller in the "Control Builder F" engineering tool, then right click the EI 813F communication module and select the `Insert` menu. The `Insert New Object` dialog is opened. |  |

| No. | Instruction | Comment |
|---|---|---|
| 2. | Select the "SR_SNDEV" Ethernet send interface.<br>Confirm your selection with "OK". |  |
| 3. | Right click the EI 813F communication module and select the `Insert` menu. The dialog "Insert New Object" is opened. |  |
| 4. | Select the "SR_RNDEV" Ethernet receive interface.<br>Confirm your selection with "OK". |  |

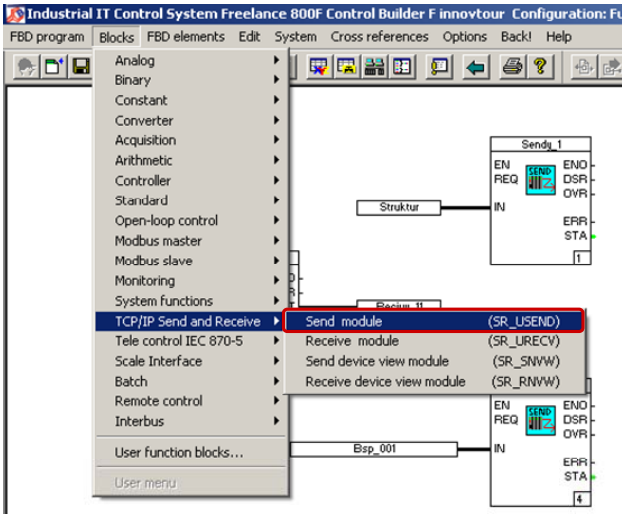
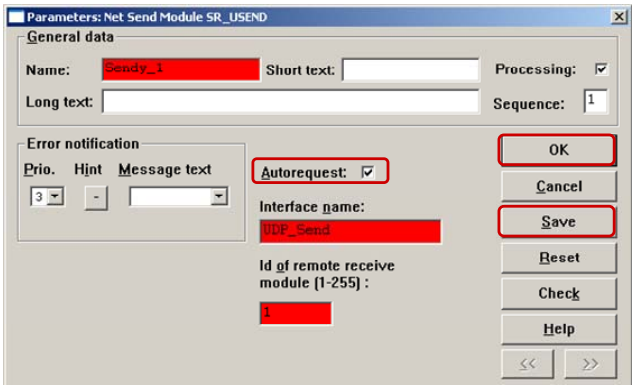
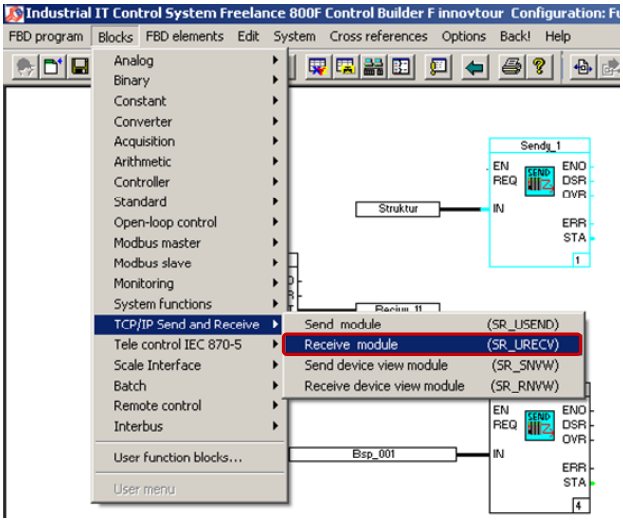
| No. | Instruction | Comment |
|---|---|---|
| 5. | Configure the send interface.<br>Enter the values according to Table 4-1 and activate the UDP protocol.<br>Click the Save button to accept the settings and exit the configuration with OK. |  |
| 6. | Configure the receive interface.<br>Enter the values according to Table 4-2 and activate the UDP protocol.<br>Click the Save button to accept the settings and exit the configuration with OK. |  |

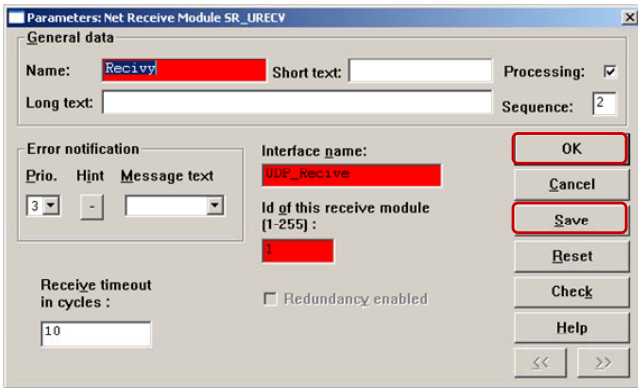
**Note** The input fields shaded in red are "required entry fields". Those fields have to be filled in.

The settings in the hardware are completed once you have inserted and configured the send and receive interface.

### Creating and configuring send and receive block

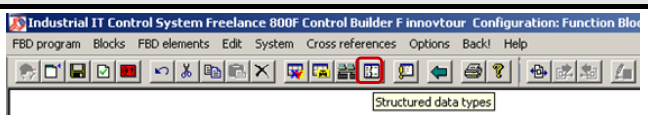
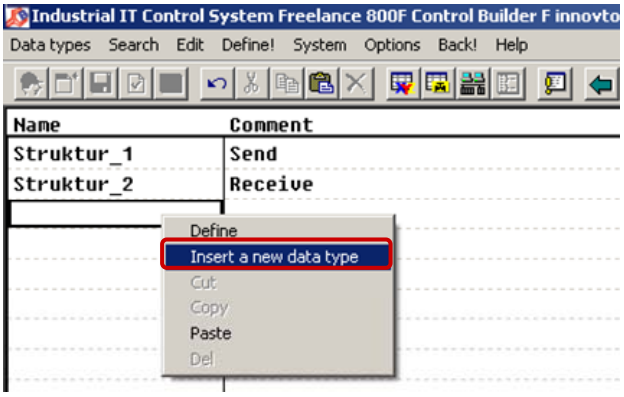
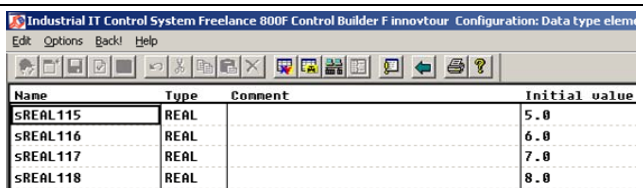
Table 5-3

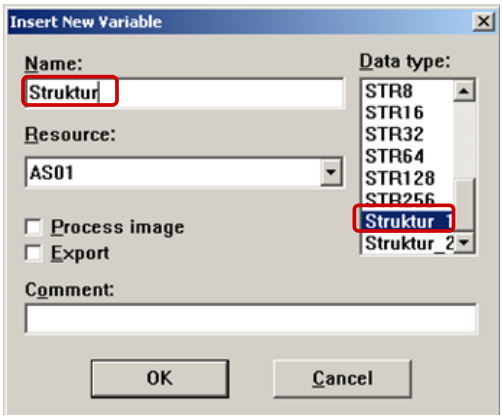
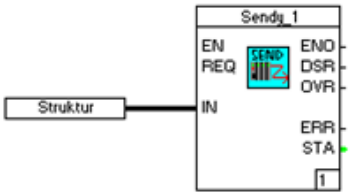
| No | Instruction | Comment |
|---|---|---|
| 1. | Create a plan in the FBS program (function block). | |
| 2. | Create a SR_USEND send block via `Blocks` menu → `TCP/IP Send and Receive` → `Send module`. |  |
| 3. | Configure the send block.<br>Enter the values according to Table 4-3 and activate the `Autorequest` function (automatic processing).<br>In addition, you can configure an alarm message.<br>Click the `Save` button to accept the settings and exit the configuration with `OK`. |  |
| 4. | Create a SR_URECV receive block via `Blocks` menu → `TCP/IP Send and Receive` → `Receive module`. |  |

| No | Instruction | Comment |
|---|---|---|
| 5. | Configure the send block.<br>Enter the values according to Table 4-4.<br>In addition, you can configure an alarm message.<br>Click the Save button to accept the settings and exit the configuration with OK. |  |

## Creating structured data types

Table 5-4

| No. | Instruction | Comment |
|---|---|---|
| 1. | Create a structured data type to send values.<br>Click the Structured data types button in the menu bar. |  |
| 2. | Right click an empty field and select the menu entry Insert a new data type. |  |
| 3. | Subsequently select the Define menu entry and configure the values in the structure. |  |

| No. | Instruction | Comment |
|---|---|---|
| 4. | Define a variable in the plan of the FBS program and interconnect it with the "IN" pin of the "SR_USEND" send block.<br>Doubleclick the variable to open the `Insert New Variable` dialog. Here you enter a name for the variable and assign the variable to the already specified data type "Struktur_1".<br>Apply the settings with OK. |  |
| 5. | Now the structured data type is transferred via the send block. |  |

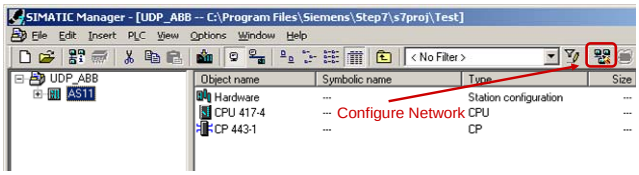
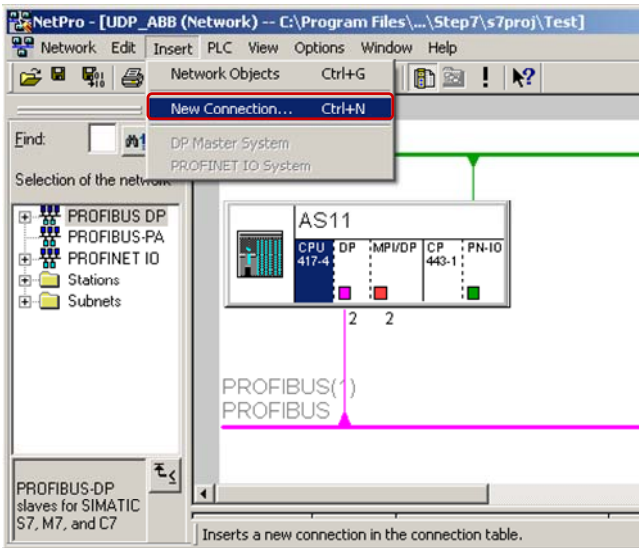
**Note** Creating and assigning a structured data type for the receive block is carried out the same way as for the send block. The variable is interconnected with the "OUT" pin of the "SR_URECV" receive block.

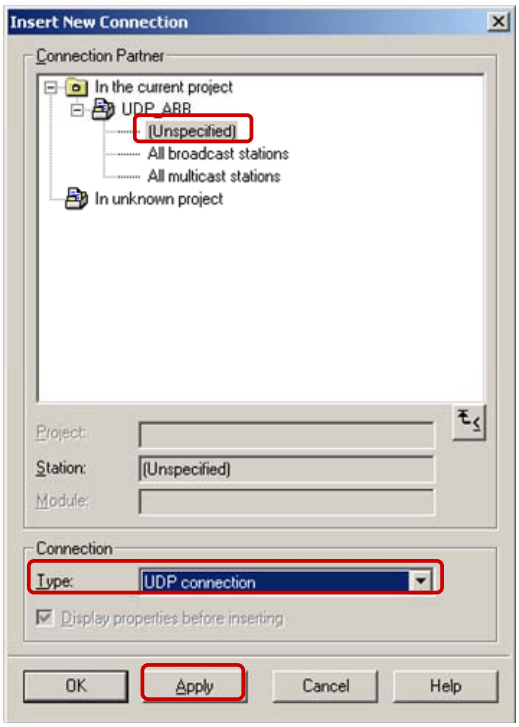
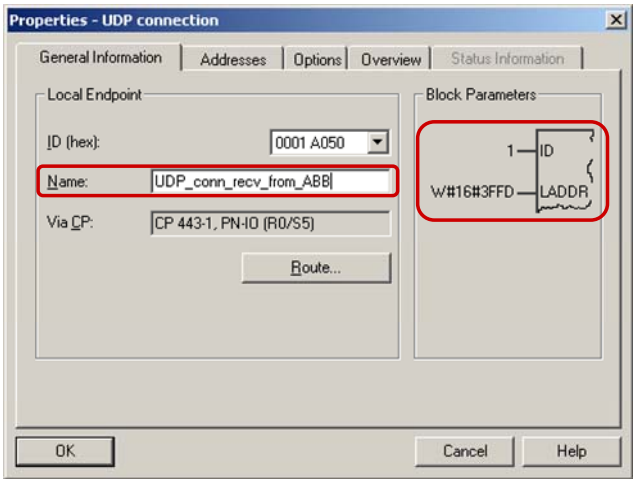
# 5.2 Configuration of the AS 417-4 in PCS 7

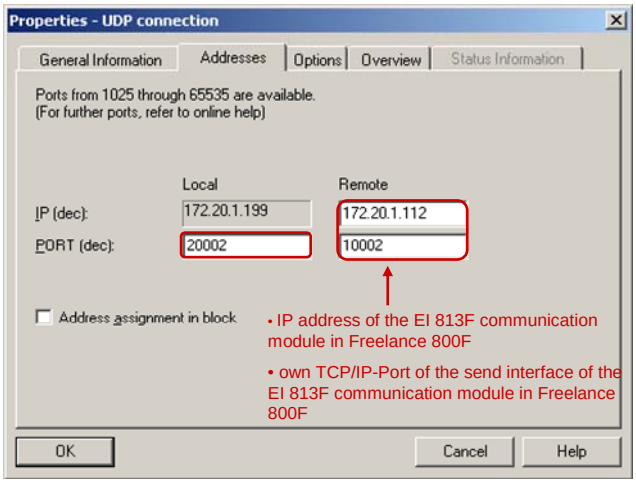
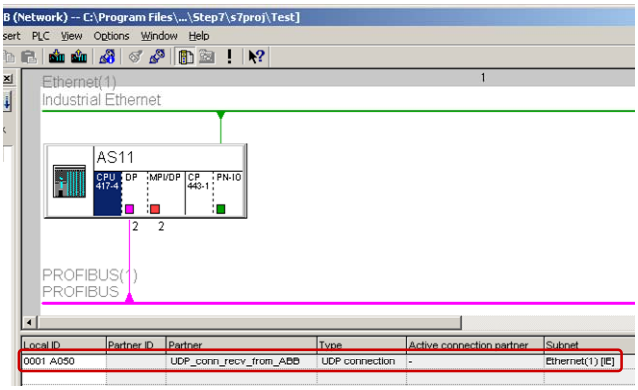
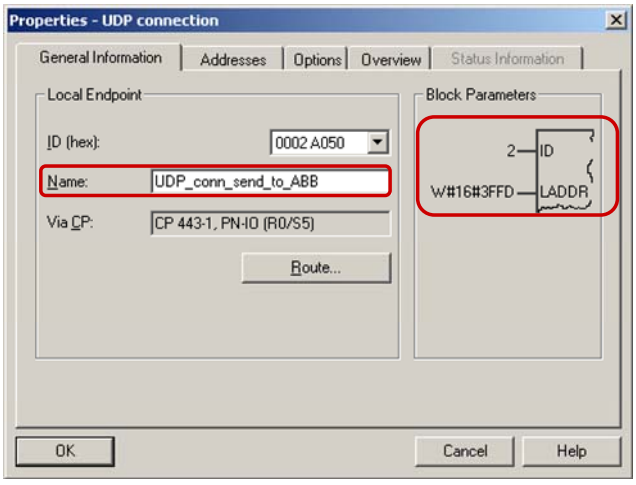
## 5.2.1 Configuring an UDP connection

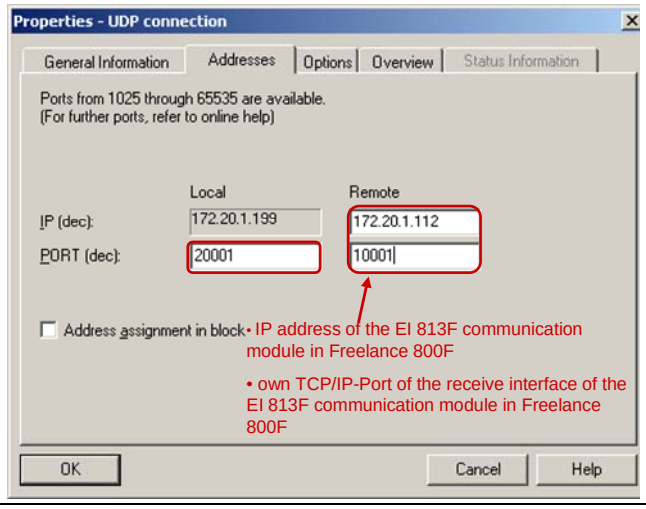
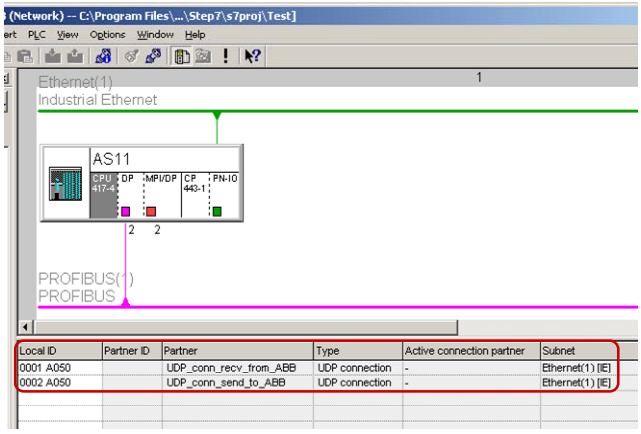
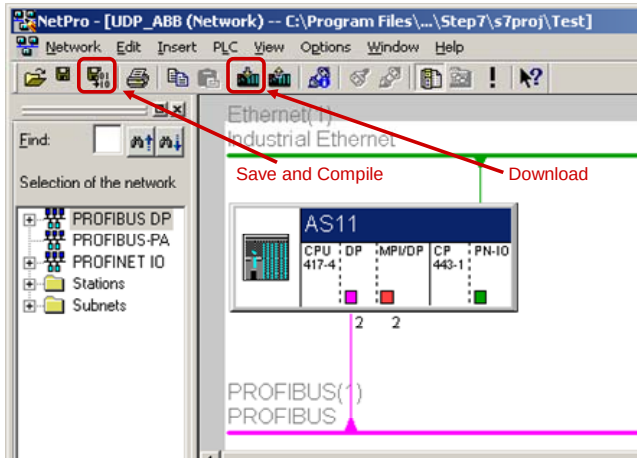
In AS 417-4 you configure two UDP connections. Data is received via the first UDP connection. Via the second UDP connection the data is sent. For the configuration of the UDP connections, proceed as laid down below:

Table 5-5

| No. | Instruction | Comment |
|---|---|---|
| 1. | Open the project in the SIMATIC PCS7 OS/ES 547B IE workstation in the SIMATIC Manager which contains the configuration of the AS 417-4.<br>Click the `Configure Network` button to open NetPro. |  |
| 2. | In Netpro you select the CPU 417-4 in object "AS11" and via the `Insert` menu → New `Connection` you insert a new connection.<br>The dialog box "Insert New Connection" appears. |  |

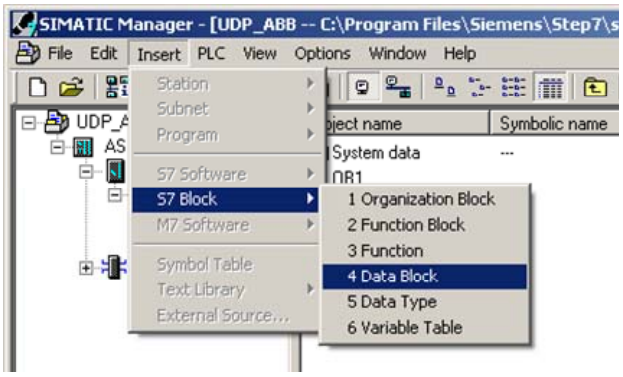
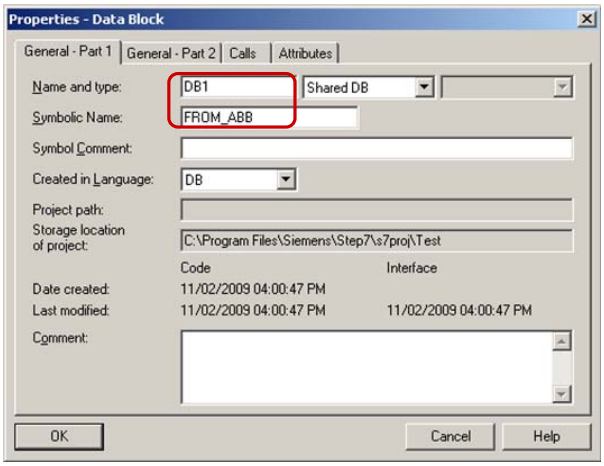
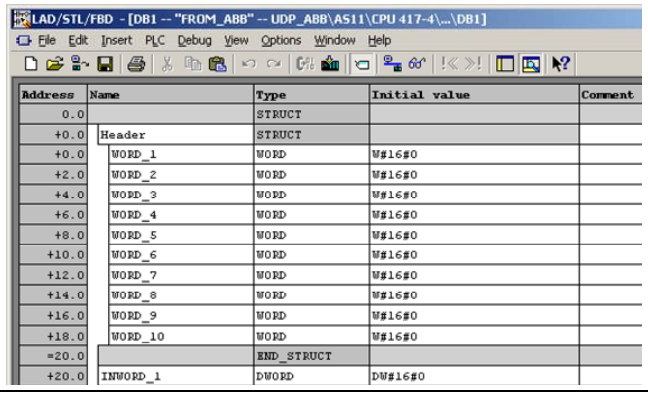
| No. | Instruction | Comment |
|---|---|---|
| 3. | Add an unspecified UDP connection by selecting "Unspecified" as connection partner and "UDP connection" as connection type.<br>Click the "Apply" button to accept the settings and to open the properties dialog of the unspecified UDP connection. |  |
| 4. | Go to the "General Information" tab in the properties dialog of the UDP connection. Enter the name for the UDP connection, e.g. UDP_conn_recv_from_ABB<br>The values of the block parameters "ID" and "LADDR" are specified later at the input parameters of the "AG_LSEND" communication function block.<br>Subsequently go to the "Addresses" tab. |  |

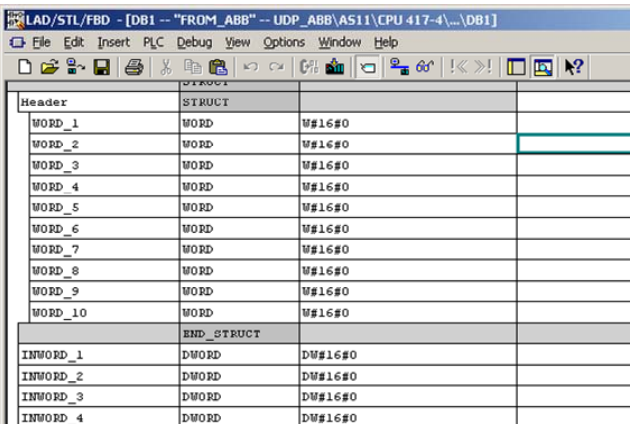
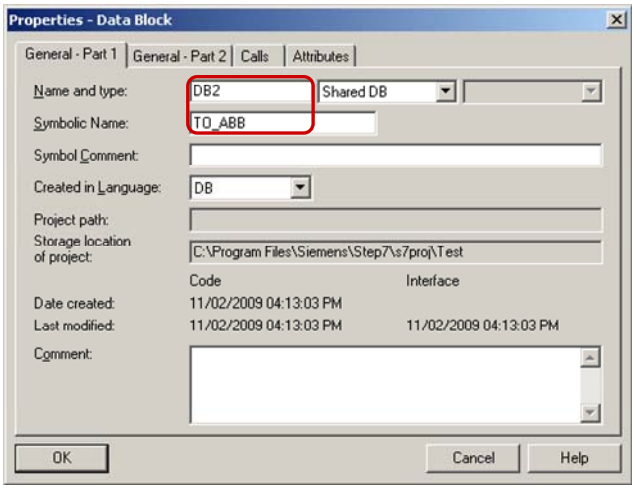
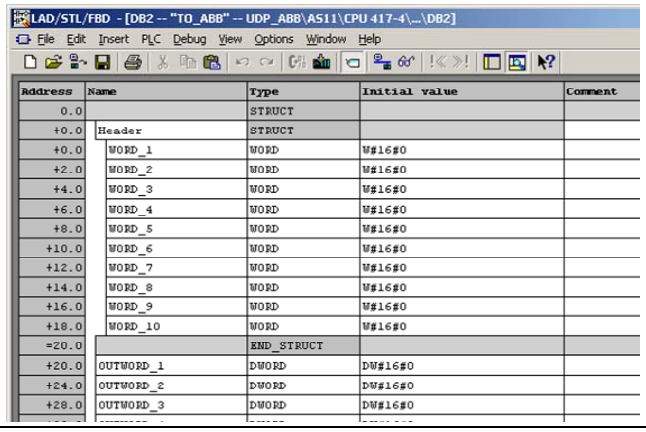
| No. | Instruction | Comment |
|---|---|---|
| 5. | Under Remote IP address enter the IP address 172.20.1.112 of the EI 813F communication module in Freelance 800F.<br>Under Remote port, enter port 10002 that you have defined for the send interface of the EI 813F communication module under "Own TCP/IP-Port".<br>As local port, enter port 20002 which you have already defined for the send interface of the EI 813F communication module under "TCP/IP port of destination station".<br>Confirm the input with OK. |  |
| 6. | Mark the CPU 417-4 in object "AS11". In the connection table you will see the UDP connection "UDP_conn_recv_from_ABB" to receive the data. |  |
| 7. | Add another unspecified UDP connection.<br>Go to the "General Information" tab in the properties dialog of the UDP connection. Enter a sensible name for the UDP connection,<br>e.g. UDP_conn_send_to_ABB<br>The values of the block parameters "ID" and "LADDR" are specified later at the input parameters of the FC60 "AG_LRECV" communication function block.<br>Subsequently go to the "Addresses" tab. |  |

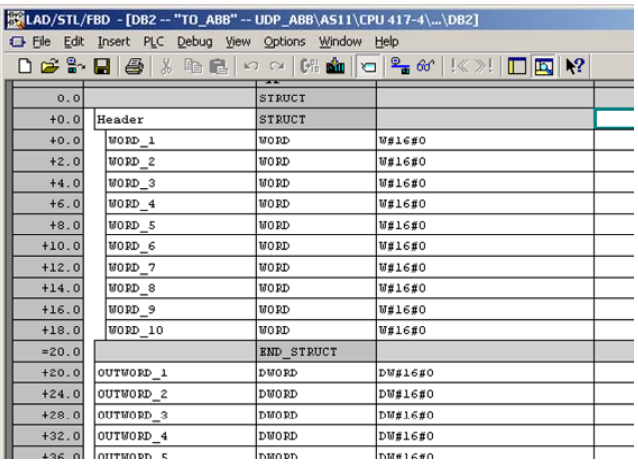
| No. | Instruction | Comment |
|---|---|---|
| 8. | Under Remote IP address enter the IP address 172.20.1.112 of the EI 813F communication module in Freelance 800F.<br>Under Remote port, enter port 10001 which you defined for the receive interface of the EI 813F communication module under "Own TCP/IP-Port".<br>Enter port 20001 as local port.<br>Confirm the entry by clicking "OK". |  |
| 9. | Mark the CPU 417-4 in object "AS11". In the connection table you will see two UDP connections:<br>• UDP_conn_recv_from_ABB to receive data<br>• UDP_conn_send_to_ABB to send data |  |
| 10. | Mark the "AS11" object and click the "Save and Compile" button. Subsequently click the "Download" button to load the configuration of the AS 417-4 including the UDP connections into the CPU. |  |

### 5.2.2 Inserting data blocks

Table 5-6

| No. | Instruction | Comment |
|---|---|---|
| 1. | Open the project of the AS 417-4. In the "AS11" object, navigate to the "Block" entry and select it.<br>Add a new data block (DB) in the user program of AS 417-4 via the `Insert` menu → `S7 Block` → `Data Block`. |  |
| 2. | Enter a free number and a sensible symbolic name in the properties dialog of the DB.<br>e.g.: DB1 "FROM_ABB" |  |
| 3. | Emulate the frame header in bytes 0-19 of the DB. From byte 20 the user data received by PCS 7 will be saved. |  |

| No. | Instruction | Comment |
|---|---|---|
| 4. | The volume of user data that is received by PCS 7 is determined by the number of variables in the structured data of the Freelance 800F process control system. |  |
| 5. | Add another DB in the AS 417-4 user program.<br>Enter a free number and a sensible symbolic name in the properties dialog of the DB.<br>e.g.: DB2 "TO_ABB" |  |
| 6. | Emulate the frame header in bytes 0-19 of the DB. From byte 20 the user data that is to be sent from PCS 7 to Freelance 800F will be saved. |  |

| No. | Instruction | Comment |
|---|---|---|
| 7. | The volume of user data that is sent from PCS 7 to Freelance 800F is determined by the number of variables in PCS 7. The structured data type of the Freelance 800F process control system has to be adjusted accordingly. |  |



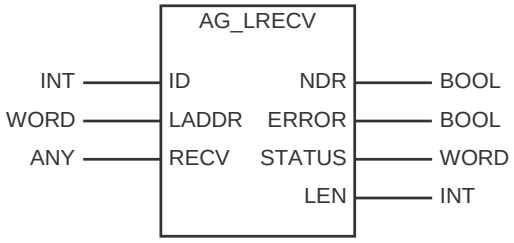
**Note** Copy the frame header of the receive data block in Online mode into the frame header of the send block. Doing this updates the send and receive interface of ABB and it does not have to be updated manually.



## 5.2.3 Calling and configuring the communication function blocks FC50 "AG_LSEND" and FC60 "AG_LRECV"

### Overview FC60 "AG_LRECV"

Figure 5-1




### Input parameters FC60 "AG_LRECV"

Table 5-7

| Input parameters | Data type | Description |
|---|---|---|
| ID | INT | The parameter ID specifies the connection number of the configured communication connection. |
| LADDR | WORD | Module start address |
| RECV | ANY | Specifying address and length of receive data area<br>The address of the data area alternatively refers to:<br>• data area<br>• memory area |

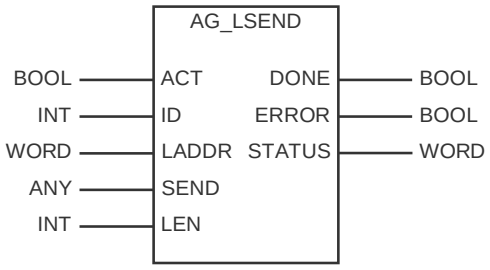
### Output parameters FC60 "AG_LRECV"

Table 5-8

| Output parameters | Data type | Description |
|---|---|---|
| NDR | BOOL | The parameter indicates whether new data has been accepted<br>0: -<br>1: New data |
| ERROR | BOOL | Error display<br>0: -<br>1: Error when receiving the data |
| STATUS | WORD | Status display |
| LEN | INT | Indicates the number of bytes which were adopted in the receive data area. |

### Overview FC50 "AG_SEND"

Figure 5-2




### Input parameters FC50 "AG_LSEND"

Table 5-9

| Input parameters | Data type | Description |
|---|---|---|
| ACT | BOOL | Job trigger<br>1: Data is sent from the send buffer indicated<br>0: Status displays DONE, ERROR and STATUS are updated |
| ID | INT | The parameter ID specifies the connection number of the configured communication connection. |
| LADDR | WORD | Module start address |
| SEND | ANY | Specifying address and length of send data area<br>The address of the data area alternatively refers to:<br>• data area<br>• memory area |
| LEN | INT | Number of bytes which are to be transmitted by the job from the indicated send data area. |

**Output parameters FC50 "AG_LSEND"**

Table 5-10

| Output parameters | Data type | Description |
|---|---|---|
| DONE | BOOL | The parameter indicates whether the job has been processed without errors.<br>No other job can be triggered as long as DONE=0<br>0: Job running<br>1: Job completed |
| ERROR | BOOL | Error display<br>0: -<br>1: Error when sending the data |
| STATUS | WORD | Status display |

### Calling and configuring the communication function blocks

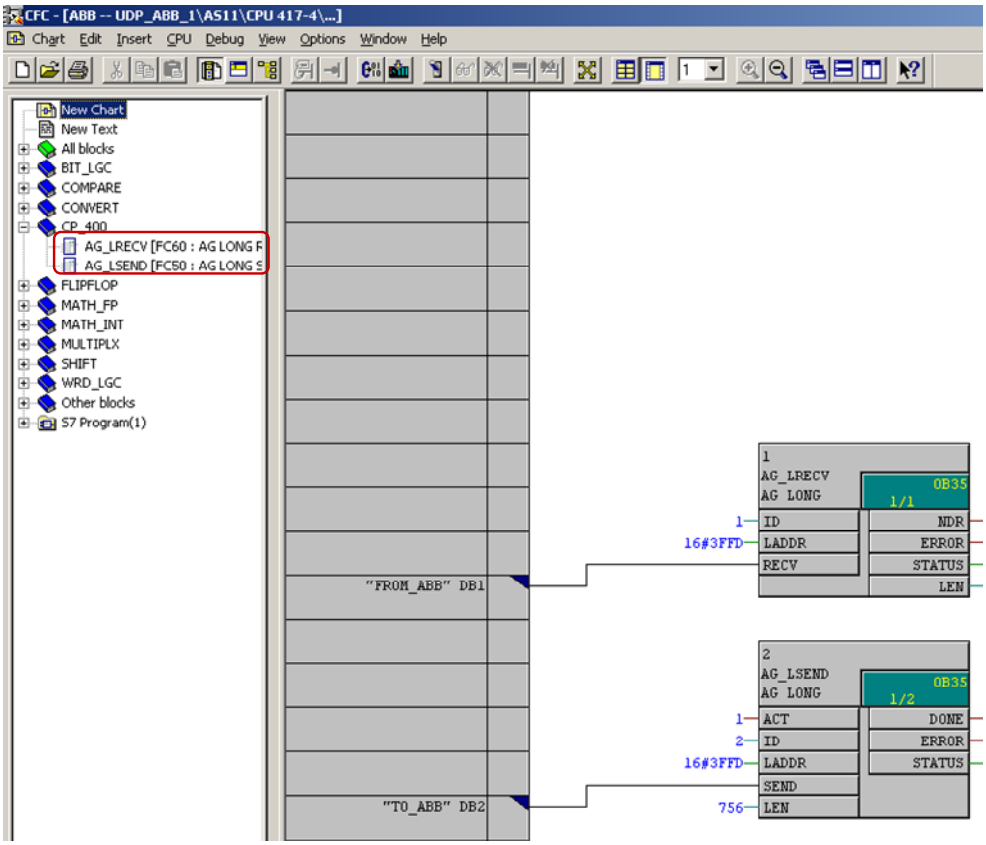
Open the project in the SIMATIC PCS7 ES/OS 547B IE workstation in the SIMATIC Manager which contains the configuration of AS 417-4.

Create a plan folder and a CFC plan in program S7.

Open the CFC plan with the CFC editor.

On the first sheet of the CFC plan add the communication function blocks FC50 "AG_LSEND" and FC60 "AG_LRECV" with drag & drop.

Figure 5-3




Enter the following values for the input parameters of FC60 "AG_LRECV".

Table 5-11

| Input parameters | Value | Note |
|---|---|---|
| ID | 1 (dez) | Take the value for the input parameter "ID" in NetPro from the properties dialog of the UDP connection → tab "General information". |
| LADDR | 3FFD (hex) | Take the value for the "LADDR" input parameter in NetPro from the properties dialog of the UDP connection → "General information" tab. |
| RECV | - | Interconnect the RECV input parameter of FC60 "AG_LRECV" with the already created DB1 "FROM_ABB . In this block the received data is saved. |

Enter the following values for the input parameters of FC50 "AG_LSEND".

Table 5-12

| Input parameters | Value | Note |
|---|---|---|
| ACT | true | true = Trigger of send job |
| ID | 2 (dez) | Take the value for the input parameter "ID" in NetPro from the properties dialog of the UDP connection → "General information" tab. |
| LADDR | 3FFD (hex) | Take the value for the "LADDR" input parameter in NetPro from the properties dialog of the UDP connection → "General information" tab. |
| LEN | 756 (dez) | The value of the LEN input parameter is determined as follows:<br>LEN = n * 4 + 20<br>n = number of data (DWORDs) to be sent<br>20 = frame header |
| SEND | - | Interconnect the SEND input parameter of FC50 "AG_LSEND" with the already created DB2 "TO_ABB". The data is read and sent from this block. |

**Example for calculating the LEN input parameter**

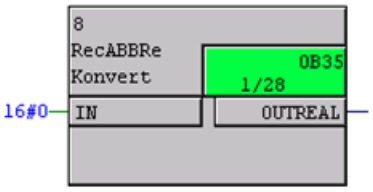
184 DWORDs are sent to Freelance 800F by PCS 7.

LEN = 184 * 4 + 20 = 756

### 5.2.4 Calling the function blocks for converting the data

Call the "RecABBRe" function block for converting the received variables of the REAL data type in a CFC plan.
Interconnect the IN input parameter with the data source in DB1, where the received data is stored.

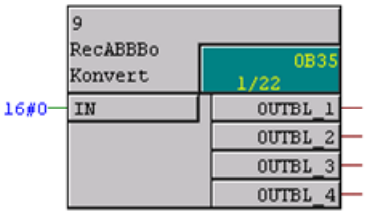
Figure 5-4



Call the "RecABBRo" function block for converting the received variables from the BOOL data type in a CFC plan.
Interconnect the following input parameters with the data source in DB1, where the received data is stored.

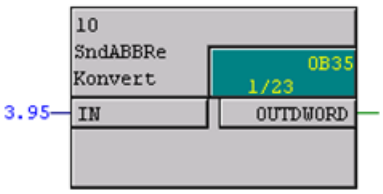
- INBL_1
- INBL_2
- INBL_3
- INBL_4

Figure 5-5



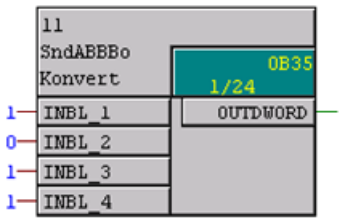

Call the "SndABBRe" function block for converting the received variables from the REAL data type in a CFC plan.
Interconnect the IN input parameter with the data source in DB2 where the data to be sent to Freelance 800F, is stored.

Figure 5-6




Call the "SndABBRo" function block for converting the received variables from the REAL data type in a CFC plan.
Interconnect the IN input parameter with the data source in DB2 where the data to be sent to Freelance 800F, is stored.

Figure 5-7

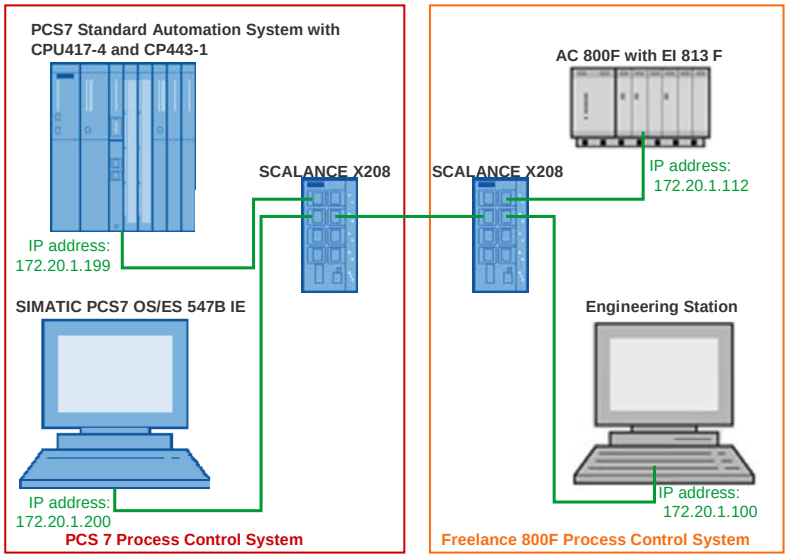


# 6 Installation

## 6.1 Installation of the hardware

The figure below shows the hardware configuration of the application:

Figure 6-1




For details on the hardware components, please refer to chapter 2.3 Hardware and software components used.

The table below gives an overview of the IP addresses as well as the devices which are used in the hardware setup of the application.

Table 6-1

| Device | IP Address |
|---|---|
| CP443-1 in AS 417-4 | 172.20.1.199 |
| EI 813F in AC 800F controller | 172.20.1.112 |
| SIMATIC PCS 7 OS/ES 547B IE | 172.20.1.200 |
| Engineering Station Freelance 800F | 172.20.1.100 |

**Note**

The setup guidelines for PCS 7 must always be followed. Further information on installation guidelines for PCS 7 can be found in the "SIMATIC Process Control System PCS 7 Compendium Part A - Configuration Guidelines" manual. This is available as a download via the following link:

http://support.automation.siemens.com/WW/view/en/35016996

## 6.2 Installation of the software

In the manual "SIMATIC Process Control System PCS 7 V7.0 SP1 PC Configuration and Authorization" you will find information on installing PCS 7. This is available as a download via the following link:

http://support.automation.siemens.com/WW/view/en/27002558

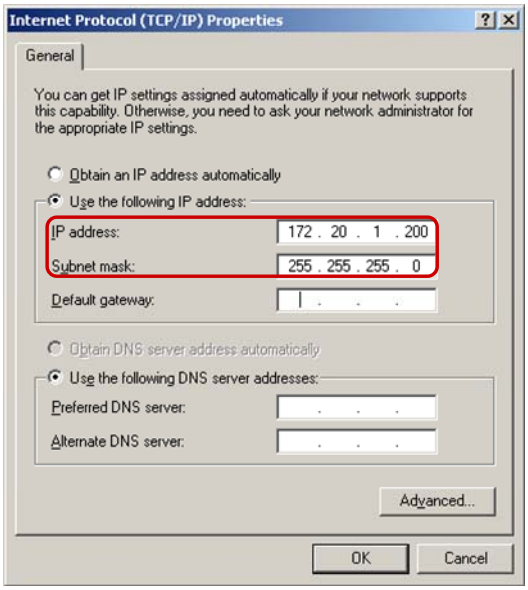
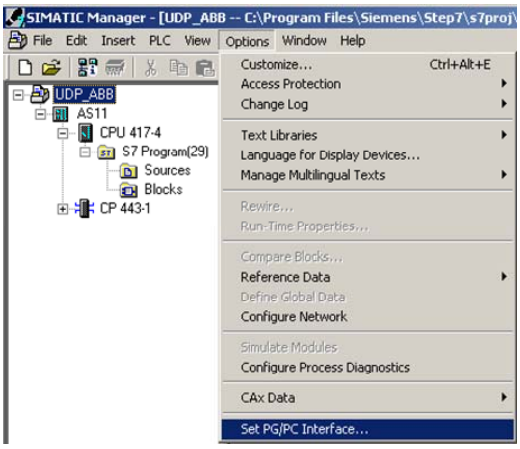
# 7 Startup of the Application

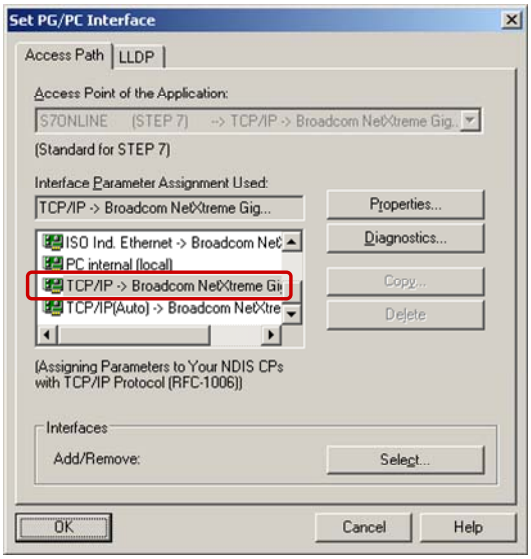
## 7.1 Commissioning the application in PCS 7

When commissioning the application in PCS 7 proceed as follows.

**Set IP address and PG/PC interface of the SIMATIC PCS7 OS/ES 547B IE workstation**

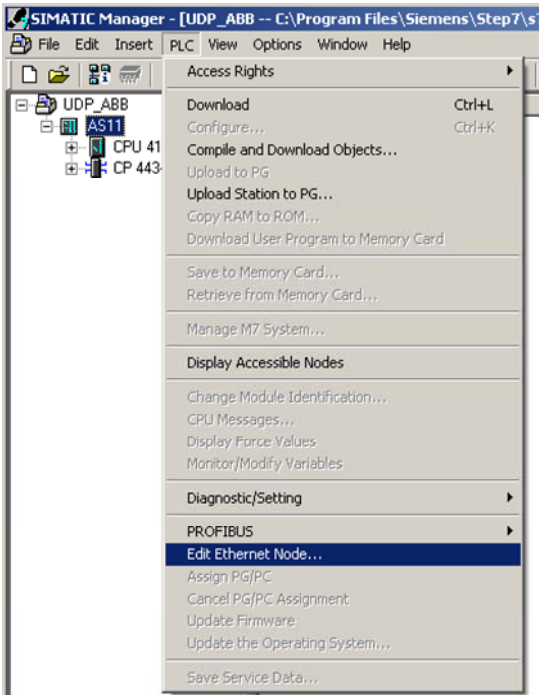
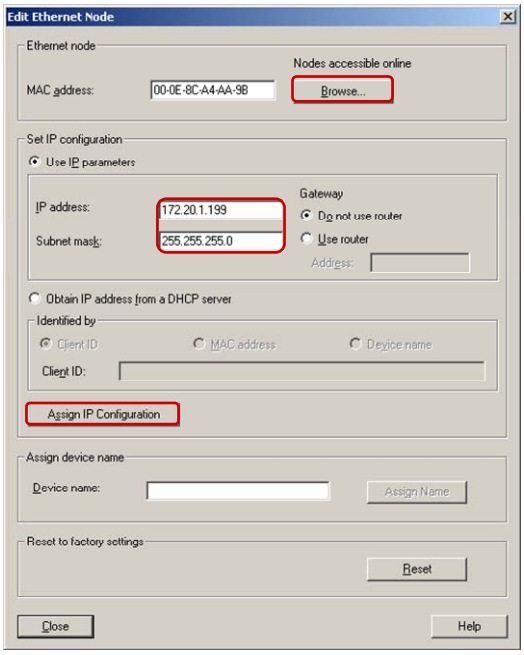
Table 7-1

| No. | Instruction | Comment |
|---|---|---|
| 1. | Open the properties dialog of the Local Area Networks (LAN) in the Windows network setting of the SIMATIC PCS7 OS/ES 547B IE workstation to assign the IP address.<br>Enter the IP address 172.20.1.200 and the subnet mask und confirm the entry with "OK". |  |
| 2. | Open the SIMATIC Manager via `Start` → `SIMATIC` → `SIMATIC Manager`.<br>Open the "Set PG/PC Interface…" dialog in the SIMATIC Manager via the `Options` menu → `Set PG/PC Interface`…. |  |

| No. | Instruction | Comment |
|---|---|---|
| 3. | Under "Interface Parameter Assignment Used" select the following entry:<br>TCP/IP → <Network card><br>Confirm your selection by clicking OK. |  |

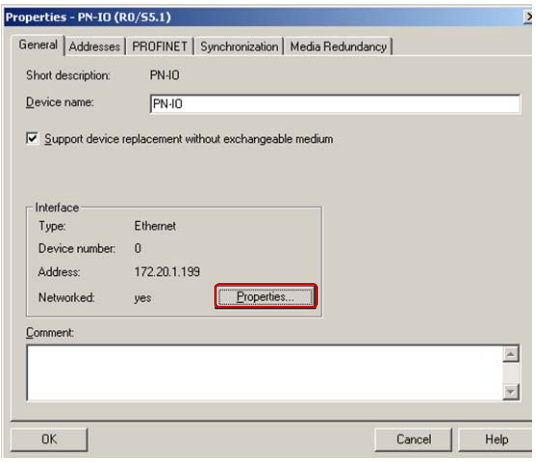
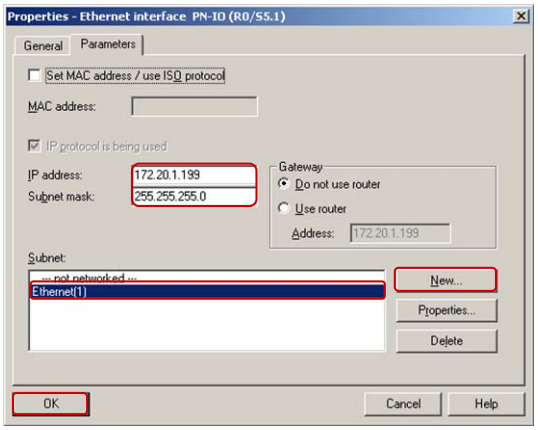
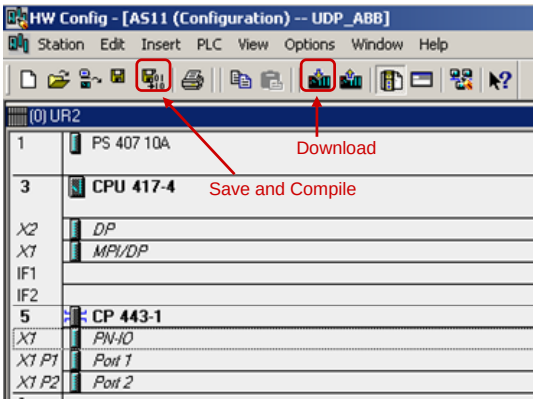
### Setting IP address of CP443-1 in AS 417-4

Table 7-2

| No. | Instruction | Comment |
|---|---|---|
| 1. | Open the "Set PG/PC interface…" dialog in the SIMATIC Manager via the PLC menu → `Edit Ethenet Node`…. |  |
| 2. | Click the "Browse..." button to search your network for accessible nodes.<br>Select the MAC address of the CP443-1 and enter the IP address 172.20.1.199 and subnet mask 255.255.255.0 for the CP443-1 in the "Edit Ethernet Node" dialog.<br>Click the "Assign IP Configuration" button to assign the IP address and the subnet mask just entered to the CP443-1.<br>Click the "Close" button to exit the "Edit Ethernet Node" dialog. |  |

### Load hardware configuration and user program of AS 417-4

Table 7-3

| No. | Instruction | Comment |
|---|---|---|
| 1. | Open the properties dialog of the Industrial Ethernet Interface of the CP443-1 in the hardware configuration of the AS 417-4.<br>In the "General" tab, click the "Properties..." button. The "Properties – Ethernet interface PN-IO" dialog is opened. |  |
| 2. | In the "Properties – Ethernet interface PN-IO" dialog → "General" tab enter the IP address 172.20.1.199 and the subnet mask 255.255.255.0 which you have already assigned to CP443-1.<br>Assign a subnet to CP443-1. If there is no subnet yet, click the "New…" button and create a new subnet.<br>Apply the settings with OK. |  |
| 3. | Save and compile the configuration of AS 417-4.<br>Subsequently load the configuration in the CPU of the AS 417-4. |  |

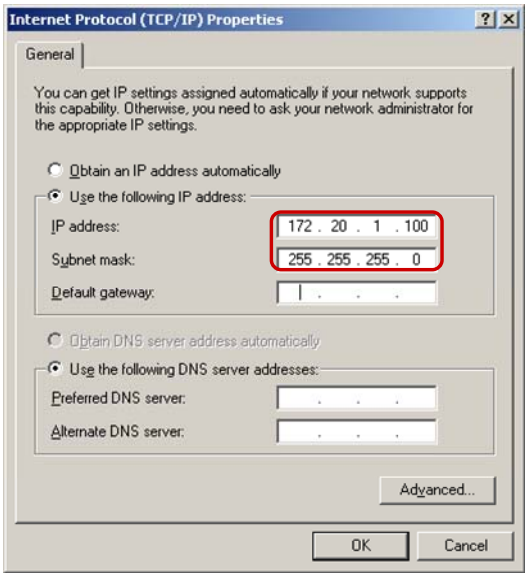
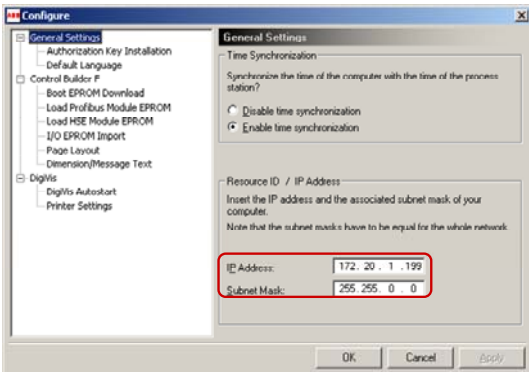
Once the configuration of the AS 417-4 is completed, load the user program into the CPU of the AS 417-4.

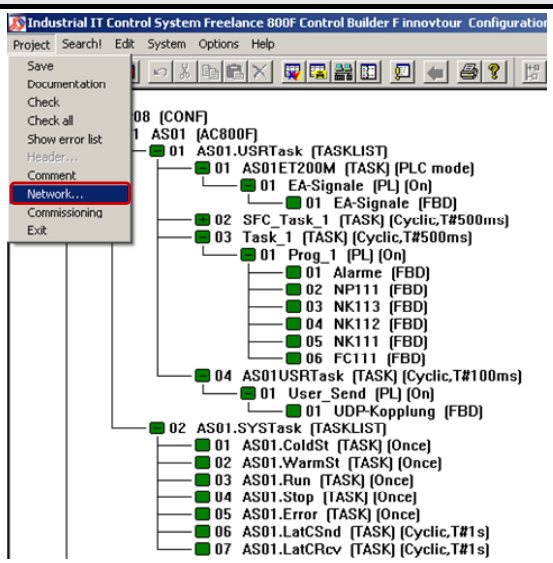
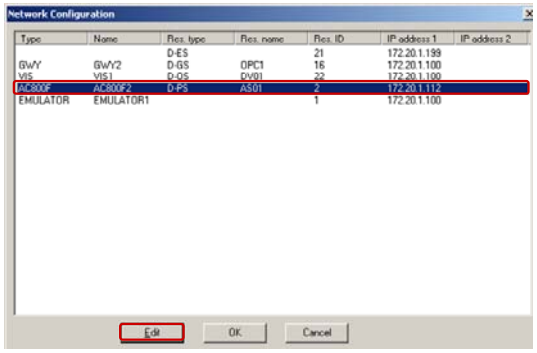
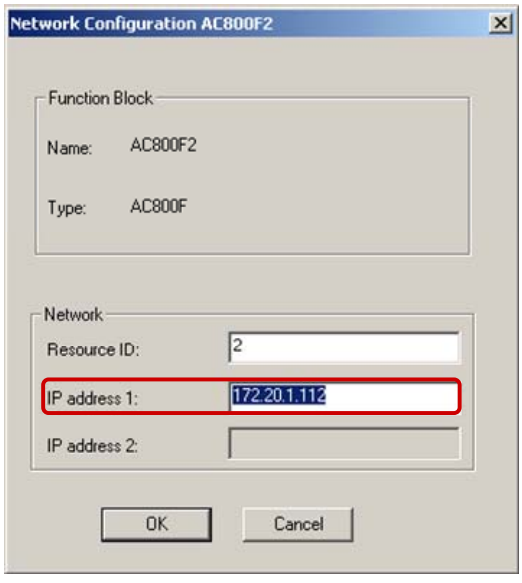
## 7.2 Commissioning the application in the Freelance 800F process control system

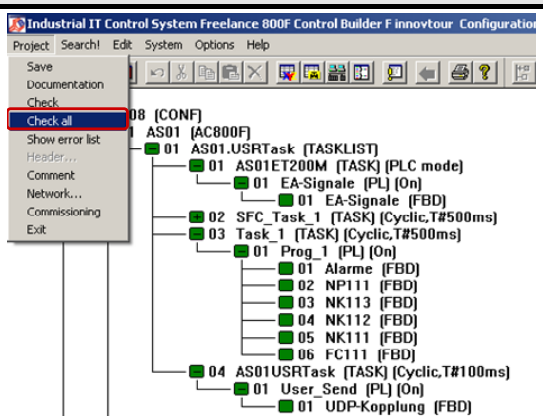
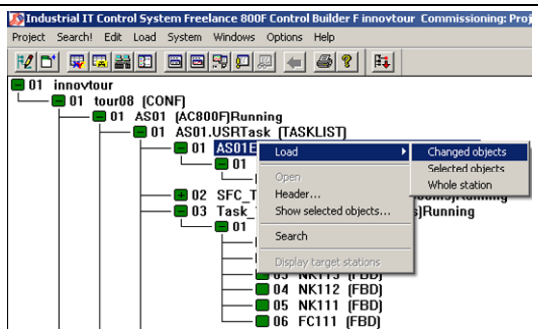
When commissioning the application in the Freelance 800F process control system proceed as follows.

**Setting IP address and PG/PC interface of the engineering station**

Table 7-4

| No. | Instruction | Comment |
|---|---|---|
| 1. | Open the properties dialog of the Local Area Networks (LAN), to set the IP address of the engineering station in the Windows network settings of the engineering station in the Freelance 800F process control system.<br>Enter the IP address 172.20.1.100 and the subnet mask. |  |
| 2. | Select the `Start menu → Programs → ABB Industrial IT → Freelance 800F Vx.x → Configure`.<br>In the `General Settings` menu enter the IP address 172.20.1.100 and the subnet mask 255.255.255.0 of the engineering station in the Freelance 800F process control system. |  |

| No. | Instruction | Comment |
|---|---|---|
| 3. | Open the engineering tool "Control Builder F" via `Start` → `Programs` → ABB `Industrial IT` → `Freelance 800F` `Vx.x`.<br>Select the `Project` menu → `Network`… to open the `Network Configuration` dialog. |  |
| 4. | Selet type AC800F. Click the `Edit` button to open the `Network Configuration` `AC800F2` dialog. |  |
| 5. | Enter the IP address 172.20.1.112 of the AC 800F controller. |  |

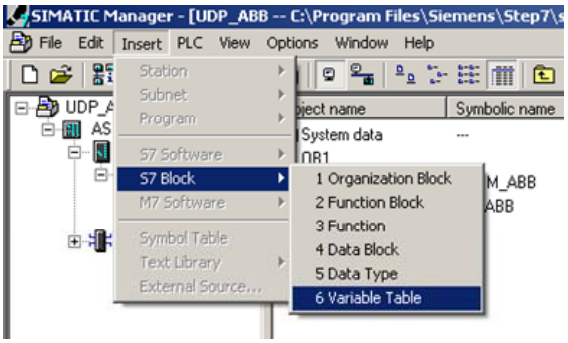
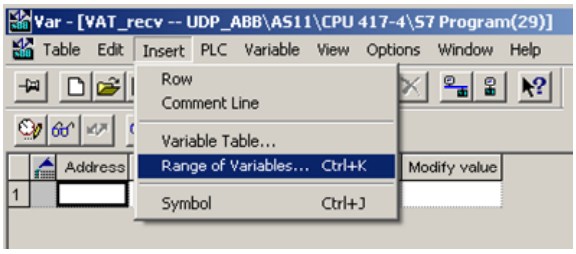
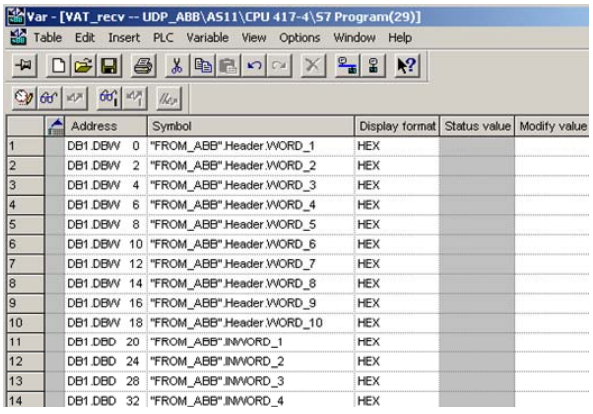
| No. | Instruction | Comment |
|---|---|---|
| 6. | Verify all settings made in `Project` menu → `Check all`. |  |
| 7. | Right click the AC800F controller in the engineering tool "Control Builder F" and select the `Load` menu → `Changed objects`, to load the settings. |  |

# 8 Operation of the Application

## 8.1 Operation of the application in PCS 7

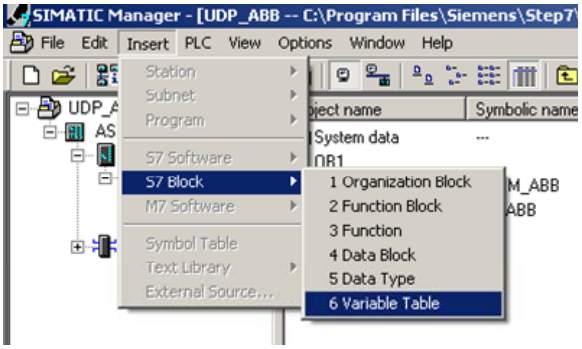
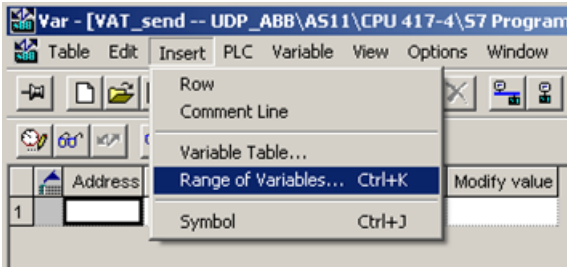
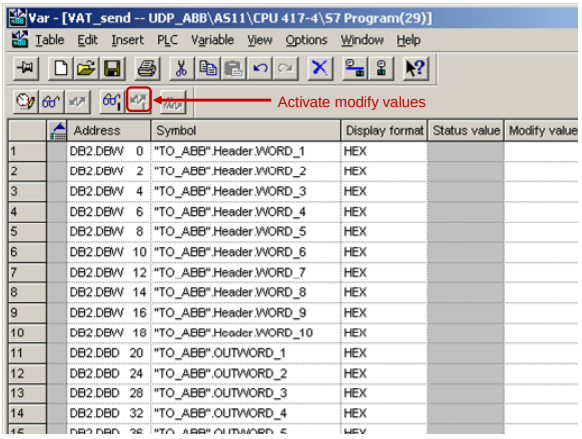
**Monitoring receive data in the variable table**

Table 8-1

| No. | Instruction | Comment |
|---|---|---|
| 1. | Add another variable table in the AS 417-4 user program. |  |
| 2. | Add the receive data area for monitoring via the `Insert` menu → `Range of Variables….` |  |
| 3. | 756 bytes are defined as receive data area in DB1 from address 0 onward. Via the variable table you can monitor the receive data area and therefore the data received by ABB (header frame and user data).<br>The user data received is saved in DB1 from address 20 onwards. |  |

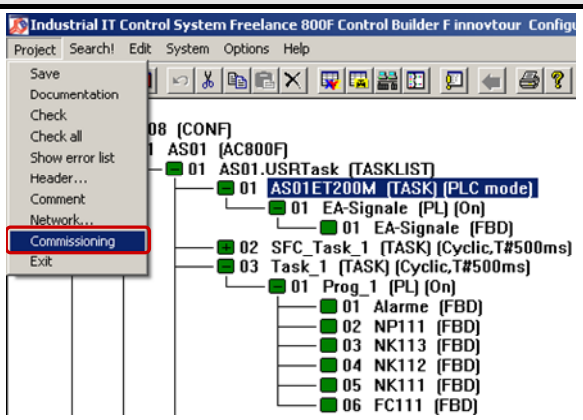
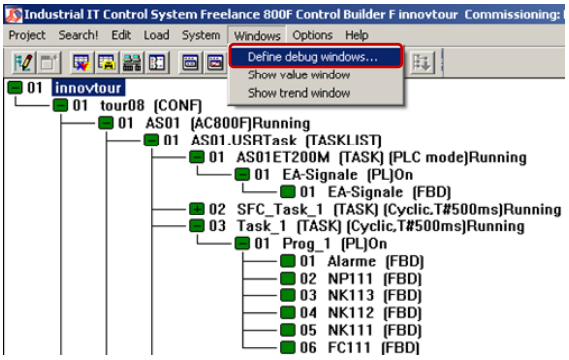
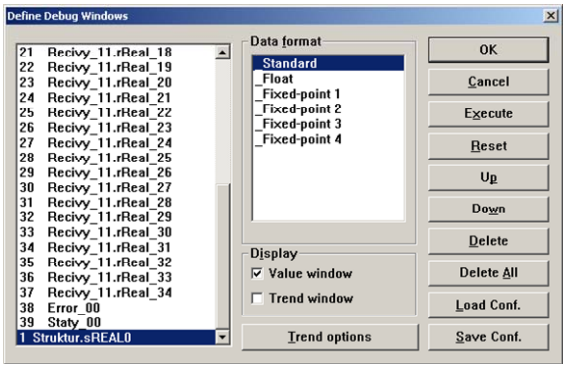
### Controlling send data via the variable table

Table 8-2

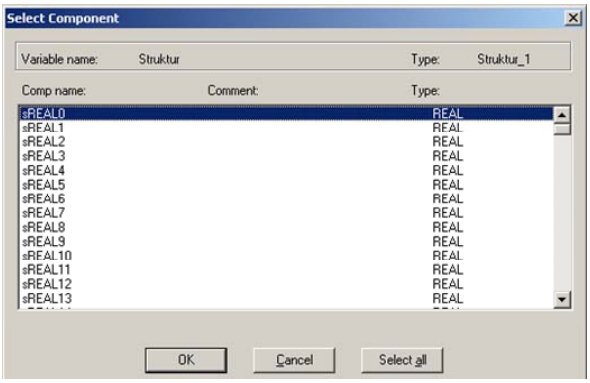
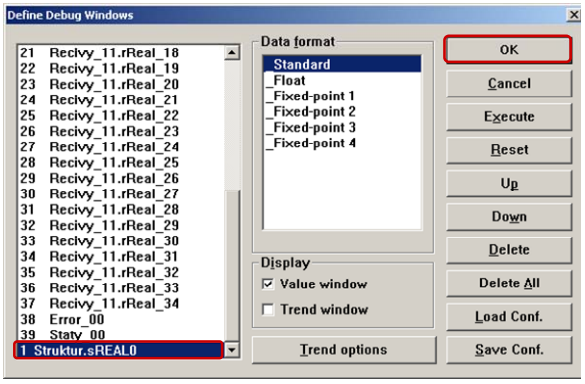
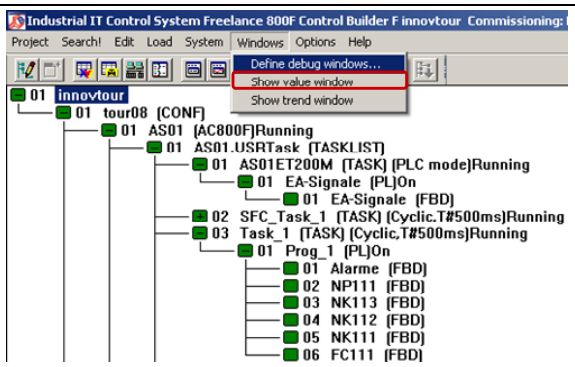
| No. | Instruction | Comment |
|---|---|---|
| 1. | Set the input parameter ACT=1 at FC50 "AG_LSEND". | The send job is triggered or excecuted. |
| 2. | Add another variable table in the AS 417-4 user program. |  |
| 3. | Add the send data area for controlling the send data via the `Insert` menu → `Range of Variables….` |  |
| 4. | 756 bytes are defined as send data area in DB2 from address 0 onward. Via the variable table you can control the data (header frame and user data) to be sent to ABB.<br>The user data to be sent is saved in DB2 from address 20. |  |

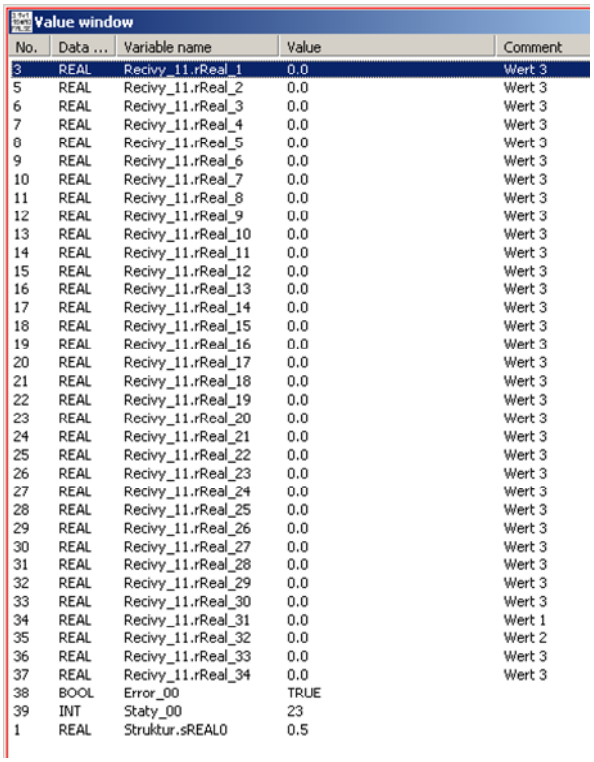
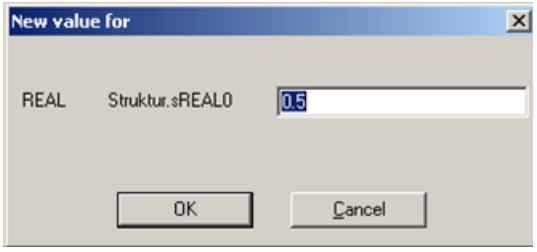
# 8.2 Operation of the application in the Freelance 800F process control system

Table 8-3

| No. | Instruction | Comment |
|---|---|---|
| 1. | In the engineering tool "Control Builder F" go to the commissioning mode via `Project` menu → `Commissioning`. |  |
| 2. | Select the FBS program with a send or receive block in project tree.<br>Subsequently open the `Define Debug Windows` dialog via the `Windows` menu → `Define debug windows….` |  |
| 3. | At first the dialog is empty. Doubleclick the respective variable in the plan which you would like to add. |  |

## 8.2 Operation of the application in the Freelance 800F process control system

| No. | Instruction | Comment |
|---|---|---|
| 4. | In this application example a single variable of a structure is controlled. Once you have selected the structure the `Select Component` dialog will be opened.<br>Mark the variable you need for operation and apply the settings with OK. |  |
| 5. | The `Define Debug Windows` dialog will display the desired variable.<br>Add other variables according to the same procedure, if other variables are to be operated.<br>Once you have defined all variables exit the `Define Debug Windows` dialog with OK. |  |
| 6. | Open the `Value window` dialog via the `Windows` menu → `Show value window` to display and control the values of the defined variables. |  |

| No. | Instruction | Comment |
|---|---|---|
| 7. | The defined variables are displayed with the current value. Doubleclick the variable to change the value. |  |
| 8. | Enter the new value and apply the settings with OK. |  |

Value window

| No. | Data ... | Variable name | Value | Comment |
|---|---|---|---|---|
| 3 | REAL | Recivy_11.rReal_1 | 0.0 | Wert 3 |
| 5 | REAL | Recivy_11.rReal_2 | 0.0 | Wert 3 |
| 6 | REAL | Recivy_11.rReal_3 | 0.0 | Wert 3 |
| 7 | REAL | Recivy_11.rReal_4 | 0.0 | Wert 3 |
| 8 | REAL | Recivy_11.rReal_5 | 0.0 | Wert 3 |
| 9 | REAL | Recivy_11.rReal_6 | 0.0 | Wert 3 |
| 10 | REAL | Recivy_11.rReal_7 | 0.0 | Wert 3 |
| 11 | REAL | Recivy_11.rReal_8 | 0.0 | Wert 3 |
| 12 | REAL | Recivy_11.rReal_9 | 0.0 | Wert 3 |
| 13 | REAL | Recivy_11.rReal_10 | 0.0 | Wert 3 |
| 14 | REAL | Recivy_11.rReal_11 | 0.0 | Wert 3 |
| 15 | REAL | Recivy_11.rReal_12 | 0.0 | Wert 3 |
| 16 | REAL | Recivy_11.rReal_13 | 0.0 | Wert 3 |
| 17 | REAL | Recivy_11.rReal_14 | 0.0 | Wert 3 |
| 18 | REAL | Recivy_11.rReal_15 | 0.0 | Wert 3 |
| 19 | REAL | Recivy_11.rReal_16 | 0.0 | Wert 3 |
| 20 | REAL | Recivy_11.rReal_17 | 0.0 | Wert 3 |
| 21 | REAL | Recivy_11.rReal_18 | 0.0 | Wert 3 |
| 22 | REAL | Recivy_11.rReal_19 | 0.0 | Wert 3 |
| 23 | REAL | Recivy_11.rReal_20 | 0.0 | Wert 3 |
| 24 | REAL | Recivy_11.rReal_21 | 0.0 | Wert 3 |
| 25 | REAL | Recivy_11.rReal_22 | 0.0 | Wert 3 |
| 26 | REAL | Recivy_11.rReal_23 | 0.0 | Wert 3 |
| 27 | REAL | Recivy_11.rReal_24 | 0.0 | Wert 3 |
| 28 | REAL | Recivy_11.rReal_25 | 0.0 | Wert 3 |
| 29 | REAL | Recivy_11.rReal_26 | 0.0 | Wert 3 |
| 30 | REAL | Recivy_11.rReal_27 | 0.0 | Wert 3 |
| 31 | REAL | Recivy_11.rReal_28 | 0.0 | Wert 3 |
| 32 | REAL | Recivy_11.rReal_29 | 0.0 | Wert 3 |
| 33 | REAL | Recivy_11.rReal_30 | 0.0 | Wert 3 |
| 34 | REAL | Recivy_11.rReal_31 | 0.0 | Wert 1 |
| 35 | REAL | Recivy_11.rReal_32 | 0.0 | Wert 2 |
| 36 | REAL | Recivy_11.rReal_33 | 0.0 | Wert 3 |
| 37 | REAL | Recivy_11.rReal_34 | 0.0 | Wert 3 |
| 38 | BOOL | Error_00 | TRUE | |
| 39 | INT | Staty_00 | 23 | |
| 1 | REAL | Struktur.sREAL0 | 0.5 | |

# 9 Related Literature

## 9.1 Bibliography

This list is not complete and only represents a selection of relevant literature.

Table 9-1 Bibliographic references

| | Topic | Title |
|---|---|---|
| /1/ | STEP7 | Automating with STEP7 in STL and SCL<br>Hans Berger<br>Publisher: Vch Pub<br>ISBN-10 3895783412<br>ISBN-13 9783895783418 |
| /2/ | CFC | SIMATIC Process Control System PCS 7 CFC for SIMATIC S7<br>http://support.automation.siemens.com/WW/view/en/27002752 |
| /3/ | Installation PCS7 | SIMATIC Process Control System PCS 7 V7.0 SP1 PC Configuration and Autorization<br>http://support.automation.siemens.com/WW/view/en/27002558 |
| /4/ | Configuration with PCS 7 | SIMATIC Process Control System PCS 7 Compendium Part A – Configuration Guidelines<br>http://support.automation.siemens.com/WW/view/en/35016996 |
| /5/ | Commissioning / Configuration CP443-1 | S7-CPs for Industrial Ethernet Configuring and Commissioning Part A - General Application<br>http://support.automation.siemens.com/WW/view/en/31526062 |

## 9.2 Internet Links

This list is not complete and only represents a selection of relevant information.

Table 9-2 Internet links

| | Topic | Title |
|---|---|---|
| \1\ | UDP protocol | http://support.automation.siemens.com/WW/view/en/26484229 |
| \2\ | Siemens I IA/DT Customer Support | http://support.automation.siemens.com |
| \3\ | ABB | http://www.abb.com/ |



# 10 History

Table 10-1 History

| Version | Date | Modifications |
|---|---|---|
| V1.0 | 27.11.2009 | First version |
| | | |
| | | |