

# Diagnostics of Communication Connections of Industrial Ethernet CPx43-1 via STEP 7 and WinCC flexible User Interface

**CP343-1 and CP443-1**

**Application Description • June 2010**

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# SIMATIC

## Connection Diagnostics CPx43-1

FB170 "SR\_DIAG" and FB171 "S7\_DIAG"

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# 1 Automation Task

## 1.1 Overview

### Introduction

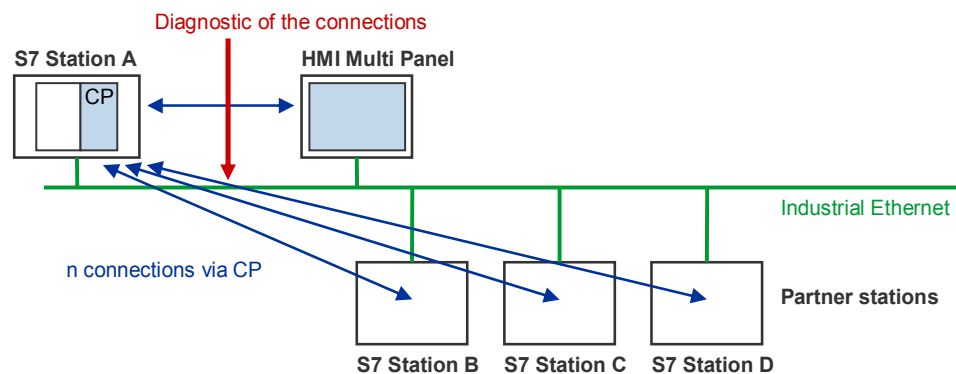
In order to diagnose communication connections which are configured for data exchange via an Industrial Ethernet communication module (CP) of S7-300, the NCM S7 diagnostic is normally used. The NCM S7 diagnostic tool is integrated in STEP 7 and provides a clear overview of the status of the configured communication connections. The disadvantage here is that the status information of the NCM S7 diagnostic cannot be visualized on an operator panel or a control system.

In this application example we show you how the status of the communication connections in the user program of the CPU can be determined and visualized on an operator panel with little configuration and programming workload.

### Overview of the automation task

The figure below provides an overview of the automation task.

Figure 1-1



### Description of the automation task

Visualizing the status of the configured communication connection of the Industrial Ethernet CP on an HMI Multi Panel using WinCC flexible requires:

- analyzing all communication connections of the Industrial Ethernet CP and
- storing them for the HMI Multi Panel in the user program of the CPU.

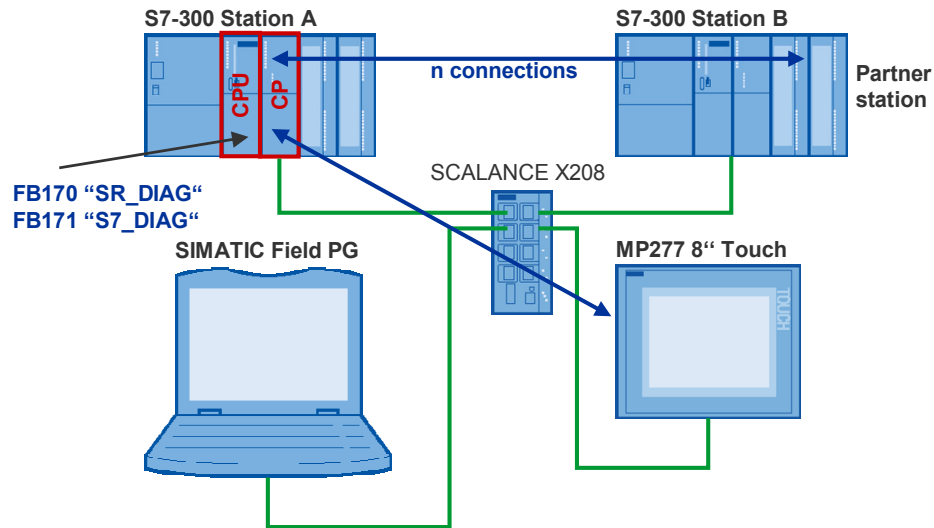
## 2 Automation Solution

### 2.1 Overview of the overall solution

#### Schematic layout

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

Figure 2-1



#### Setup

The S7-300 stations A and B are connected at the Industrial Ethernet network via communication processors (CP343-1). The data exchange between the S7-300 stations A and B occurs via several, different communication connections with standard functions.

The function blocks FB170 "SR\_DIAG" and FB171 "S7\_DIAG" supplied with this application are implemented in the user program of S7-300 station A. These compact function blocks determine the status information of the communication connections, which have been configured on S7-300 station A for the Industrial Ethernet CP343-1.

Table 2-1 gives an overview of the communication connections and standard functions configured and programmed on S7-300 station A for the data exchange via CP343-1.



Table 2-1

Connection start	ID	Connection type	Service	Standard functions
active	1	S7 connection	PUT / GET	FB14 "GET" and FB15 "PUT"
active	2	S7 connection	PUT / GET	FB14 "GET" and FB15 "PUT"
active	3	S7 connection	PUT / GET	FB14 "GET" and FB15 "PUT"
passive	4	S7 connection	BSEND / BRECV	FB12 "BSEND" and FB15 "BRECV"
passive	1	ISO-on-TCP connection	SEND / RECEIVE	FC5 "AG_SEND" and FC6 "AG_RECV"
passive	2	ISO-on-TCP connection	SEND / RECEIVE	FC5 "AG_SEND" und FC6 "AG_RECV"
passive	3	TCP connection	SEND / RECEIVE	FC5 "AG_SEND" and FC6 "AG_RECV"
passive	4	TCP connection	SEND / RECEIVE	FC5 "AG_SEND" und FC6 "AG_RECV"
passive	5	ISO-on-TCP connection	FETCH	-
passive	6	ISO-on-TCP connection	WRITE	-
-	7	TCP connection	FTP	FB40 "FTP_CMD"
-	8	UDP connection (multicast)	SEND / RECEIVE	FC5 "AG_SEND" and FC6 "AG_RECV"

Table 2-2 shows an overview of the communication connections which can be diagnosed with the supplied function blocks FB170 "SR\_DIAG" and FB171 "S7\_DIAG".

The determined status information is structured stored in the instance data block of FB170 and FB171 and displayed on the HMI Multi Panel in WinCC flexible.

For diagnosing the communication connections configured on an S7-400 station for the Industrial Ethernet CP443-1, the FB270 "SR\_DIAG\_400" is available to you.

Table 2-2

Function block	Connection type	Service	Interface		
			CP343-1	CP443-1	Integrated PN interface
FB171 "S7_DIAG"	S7 connection	PUT / GET	X	-	-
FB171 "S7_DIAG"	S7 connection	BSEND / BRCV	X	-	-
FB171 "S7_DIAG"	S7 connection	USEND / URCV	X	-	-
FB170 "SR_DIAG"	TCP connection	AG_SEND / AG_RECV	X	-	-
FB170 "SR_DIAG"	TCP connection	FETCH / WRITE	X	-	-
FB170 "SR_DIAG"	ISO transport connection	AG_SEND / AG_RECV	X	-	-
FB170 "SR_DIAG"	ISO transport connection	FETCH / WRITE	X	-	-
FB170 "SR_DIAG"	ISO-on-TCP connection	AG_SEND / AG_RECV	X	-	-
FB170 "SR_DIAG"	ISO-on-TCP connection	FETCH / WRITE	X	-	-
FB170 "SR_DIAG"	UDP connection (including multicast and broadcast)	AG_SEND / AG_RECV	X	-	-
FB170 "SR_DIAG"	TCP connection	FTP	X	-	-
FB270 "SR_DIAG_400"	TCP connection	AG_SEND / AG_RECV	-	X	-
FB270 "SR_DIAG_400"	TCP connection	FETCH / WRITE	-	X	-
FB270 "SR_DIAG_400"	ISO transport connection	AG_SEND / AG_RECV	-	X	-
FB270 "SR_DIAG_400"	ISO transport connection	FETCH / WRITE	-	X	-
FB270 "SR_DIAG_400"	ISO-on-TCP connection	AG_SEND / AG_RECV	-	X	-
FB270 "SR_DIAG_400"	ISO-on-TCP connection	FETCH / WRITE	-	X	-
FB270 "SR_DIAG_400"	UDP connection (including multicast and broadcast)	AG_SEND / AG_RECV	-	X	-
FB270 "SR_DIAG_400"	TCP connection	FTP	-	X	-

**Note**

In chapter "Performance Data" of the manual of the respective Industrial Ethernet CP (CP343-1 or CP443-1) you find information on the max. number of possible connections.

The HMI Multi Panel is connected to the same Industrial Ethernet network as the S7-300 stations. Via S7 connection it accesses the CPU of S7-300 station A, to read the structured status information of the communication connection from the instance data block of FB170 "SR\_DIAG" and FB171 "S7\_DIAG". The read status information is displayed on the HMI Multi Panel in WinCC flexible Runtime.

**Topics not covered by this application**

This application does not contain a description

- of the standard functions for the Industrial Ethernet CP343-1 or CP443-1 to exchange data via communication connections.
- for configuring WinCC flexible
- for operating the HMI Multi Panel

Basic knowledge of these topics is required.

Manuals are available to you on the internet as downloads providing you with detailed information on the standard functions for the data exchange via Industrial Ethernet CP (see \3\ and \16\).

The manuals of WinCC flexible 2008 are available to you as downloads on the internet (see \10\, \11\, \12\ and \17\).

The manual on HMI MP277 8" Touch is available to you as download on the internet (see \1\).

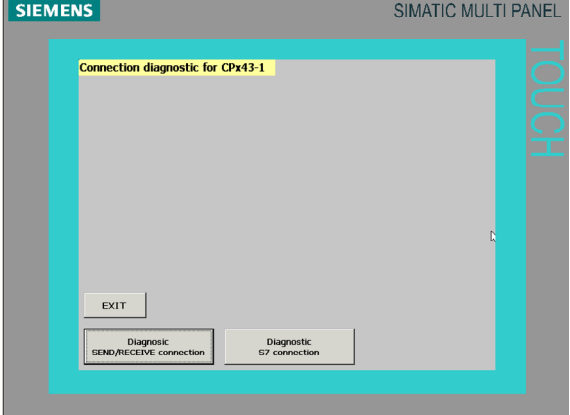
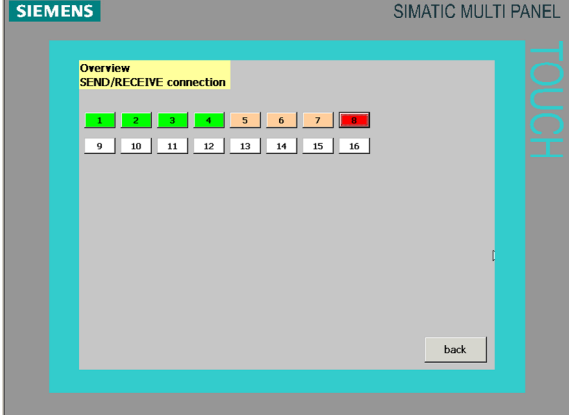
**Required knowledge**

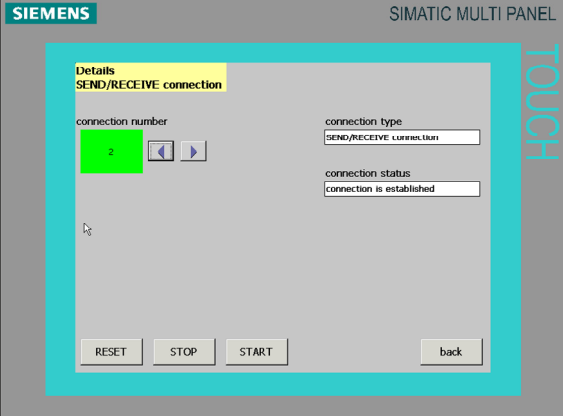
Basic knowledge on using WinCC flexible, HMI Multi Panels and communication mechanisms of the Industrial Ethernet CPs is assumed.

## 2.2 Description of the core functionality

### Process sequence of main functionality

Table 2-3

No.	Action	Note
1.	In the CPU the status information of all S7 and SEND/RECEIVE connections of the Industrial Ethernet CPs are read cyclically by FB170 "SR_DIAG" and FB171 "S7_DIAG".	CPU of S7-300 station A
2.	The status information is structured stored in the instance data blocks of FB170 and FB171.	CPU of S7-300 station A
3.	Structured status information is read from the instance data blocks of FB170 and FB171 and displayed in several pictures in WinCC flexible Runtime.	HMI Multi Panel
4.	<ul style="list-style-type: none"> <li>Start screen</li> </ul>	
5.	<ul style="list-style-type: none"> <li>Overview of connections</li> </ul>	

No.	Action	Note
6.	<p>Details view of a connection</p> <p>The details view contains the user information on connection status, connection type and connection number of a particular, selected connection.</p> <p><b>Note:</b> Information on data transmission, e.g. number of sent and received data, are not displayed in the details view.</p>	

#### Advantages of this solution

- The user has a reduced configuration and programming workload due to compact function blocks.
- The user can quickly implement the prepared pictures of the visualization in his own HMI user interface.
- No additional tool / SIMATIC field PG is required for the connection diagnostic.

## 2.3 Used hardware and software components

The application has been set up with the following components:

### Hardware components

Table 2-4

Component	Qty.	MLFB / order number	Note
CPU 315-2DP	1	6ES7315-2AG10-0AB0	V2.6
CP343-1 Advanced	1	6GK7343-1GX30-0XE0	V1.0
CPU 319-3PN/DP	1	6ES7 318-3EL00-0AB0	V2.8
CP343-1 Lean	1	6GK7 343-1CX10-0XE0	V2.1
MP277 8" Touch	1	6AV6643-0CB01-1AX1	

### Standard software components

Table 2-5

Component	Qty.	MLFB / order number	Note
STEP 7 V5.4 SP5	1	6ES7810-4CC08-0YA5	or higher
WinCC flexible 2008 SP1	1	6AV6612-0AA51-3CA5	or higher

### Example files and projects

The following list contains all files and projects used in this example.

Table 2-6

Component	Note
42453077_diagnostic_v10.zip	This zip file contains the STEP 7 project
42453077_ConnectionDiagnostic_v10_e.pdf	This document

## 2.4 Performance data

### Supported S7-300 Industrial Ethernet CPs

Table 2-7 contains an overview of the S7-300 Industrial Ethernet CPs which support FC10 "AG\_CNTRL" and hence also FB170 "SR\_DIAG".

Table 2-7

Component	MLFB	Firmware
CP343-1 Lean	6ES7343-1CX10-0XE0	as of V2.1
CP343-1	6ES7343-1EX20-0XE0	as of 1.3.9
CP343-1	6ES7343-1EX21-0XE0	as of 1.0.17
CP343-1	6ES7343-1EX30-0XE0	as of 2.0.16
CP343-1 IT	6ES7343-1GX20-0XE0	as of 1.1.4
CP343-1 Advanced	6ES7343-1GX21-0XE0	as of 1.0.24
CP343-1 Advanced	6ES7343-1GX30-0XE0	as of 1.0.23

### Supported S7-400 Industrial Ethernet CPs

Table 2-8 contains an overview of the S7-400 Industrial Ethernet CPs which support FC10 "AG\_CNTRL" and hence also FB270 "SR\_DIAG\_400".

Table 2-8

Component	MLFB	Firmware
CP443-1	6ES7443-1EX20-0XE0	as of 1.0.26
CP443-1 Advanced	6ES7443-1EX41-0XE0	as of 1.0.24
CP443-1 Advanced	6ES7443-1GX20-0XE0	as of 2.0

### Function blocks FB170, FB270 and FB171

All communication connections listed in Table 2-2 can be diagnosed with function blocks FB170 "SR\_DIAG", FB171 "S7\_DIAG" and FB270 "SR\_DIAG\_400".

The call of FC10 "AG\_CNTRL" from the `SIMATIC_NET_CP → CP 300 → Blocks` library has been implemented in FB170 "SR\_DIAG", i.e. the communication connections of the S7-300 Industrial Ethernet CPs listed in Table 2-7 can be diagnosed with FB170.

The call of FC10 "AG\_CNTRL" from the `SIMATIC_NET_CP → CP 400 → Blocks` library has been implemented in FB270 "SR\_DIAG\_400", i.e. the communication connections of the S7-400 Industrial Ethernet CPs listed in Table 2-8 can be diagnosed with FB270.

Using FB171 "S7\_DIAG" only the S7 connections of CP343-1 can be diagnosed. The S7 connections of CP443-1 or the integrated PN interface of a CPU are not diagnosed (see Table 2-2).

The status information of max 64 connections is stored in the instance data blocks of FB170, FB270 and FB171.

## Functions STOP and START

Table 2-9 contains an overview of the Industrial Ethernet CPs, on which the commands CMD 6 "CN\_DISCON" and CMD 7 "CN\_STARTCON" of FC10 "AG\_CNTRL" are supported and on which therefore the functions STOP and START are available.

Table 2-9

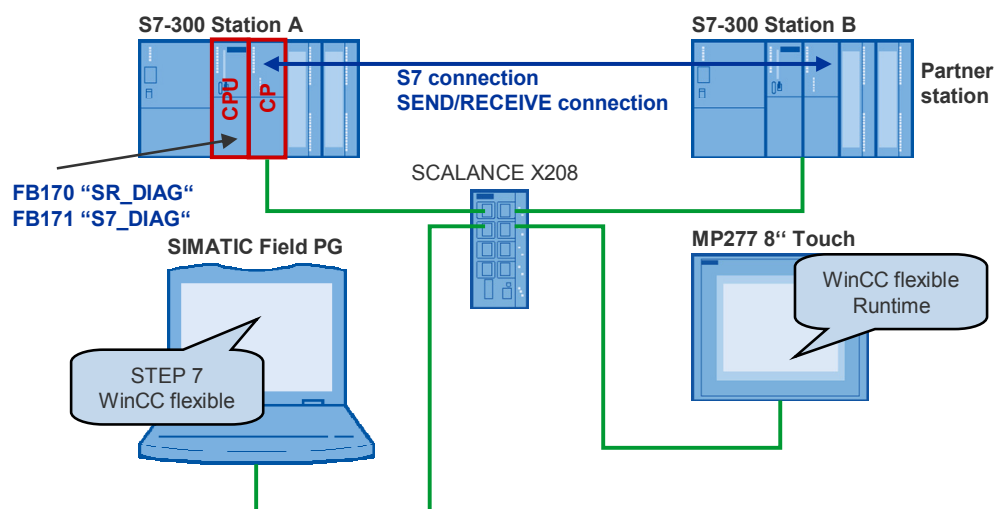
Component	MLFB	Firmware
CP343-1 Advanced	6ES7343-1GX30-0XE0	as of V1.0.23
CP443-1 Advanced	6ES7443-1GX20-0XE0	as of V2.0
CP443-1	6ES7443-1EX20-0XE0	as of V1.0.26



### 3 Function Mechanisms of this Application

#### General overview

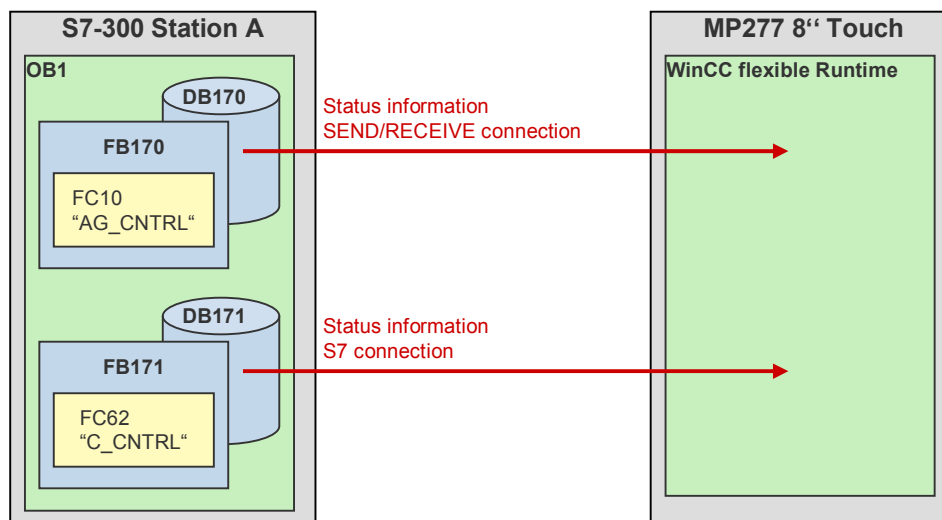
Figure 3-1



Between the CP343-1 in S7-300 stations A and B there are several S7 connections and SEND/RECEIVE connections via which data exchange is handled. Function blocks FB170 "SR\_DIAG" and FB171 "S7\_DIAG" are used to determine the status information of the configured connections and save it in the instance data block.

#### Program overview

Figure 3-2



Function blocks FB170 "SR\_DIAG" and FB171 "S7\_DIAG" are cyclically called in the user program of S7-300 station A. They internally call the functions FC10 "AG\_CNTRL" or FC62 "C\_CNTRL". This way status information, e.g. connection type and connection status, is determined, and structured stored in the instance data blocks for visualization. The saved status information is transferred to multi panel MP277 8" Touch and displayed in WinCC flexible Runtime.

**User program of S7-300 station A**

The user program of S7-300 station A consists of the following blocks:

Table 3-1

Block	Symbolic name	Description
OB1	CYCL_EXC	In OB1 the function blocks FB170 and FB171 including the appropriate instance data blocks DB170 and DB171 are called cyclically.
FB170	SR_DIAG	Internally FB170 calls the function block FC10 "AG_CNTRL" with various commands (CMD). Amongst other things, the status information of the SEND/RECEIVE connections is determined this way and can be prepared for visualization.
FB171	S7_DIAG	Internally FB171 calls the function block FC62 "C_CNTRL". Status information of the S7 connections is determined this way and can be prepared for visualization.
DB170	iDB_SR_DIAG	In instance data block DB170 the status information of the SEND/RECEIVE connections is saved.
DB171	iDB_S7_DIAG	In instance data block DB171 the status information of the S7 connections is saved.
UDT170	UDT_170	The user-defined data type UDT170 has been implemented in instance data block DB170. Here the status information of all SEND/RECEIVE connections is saved (connection numbers 1 to 64).
FB100	SR_COMM	Internally FB100 calls up the communication function for the data exchange via the configured SEND/RECEIVE connections.
FB200	S7_COMM	Internally FB200 calls up the communication function for the data exchange via the configured S7 connections.
DB100	iDB_SR_COMM	Instance data block of FB100
DB200	iDB_S7_COMM	Instance data block of FB200
DB101	SR_SendData	In DB101 the send data for the data exchange via the configured SEND/RECEIVE connections are saved..
DB102	SR_ReceiveData	DB102 contains the data, which are received via the configured SEND/RECEIVE connections.
DB201	S7_SendData	In DB201 the send data for the data exchange via the configured S7 connections are saved.
DB202	SR_ReceiveData	DB202 contains the data, which are received via the configured S7 connections.

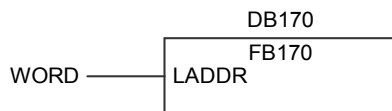
## 3.1 Diagnosing the SEND/RECEIVE connections with FB170 “SR\_DIAG”

Function block FB170 “SR\_DIAG” is used for diagnosing the SEND/RECEIVE connections of the CP343-1. Figure 3-3 illustrates the call of FB170 in the user program of the CPU. FB170 is called cyclically in OB1.

### 3.1.1 Input and output parameters of FB170 “SR\_DIAG”

FB170 “SR\_DIAG” has an input parameter “LADDR”. At the input parameter “LADDR” you enter the module start address of the Industrial Ethernet CP343-1. The module start address is available in STEP 7 in the hardware configuration (see chapter 6.4.2 “Loading the communication connections”).

Figure 3-3

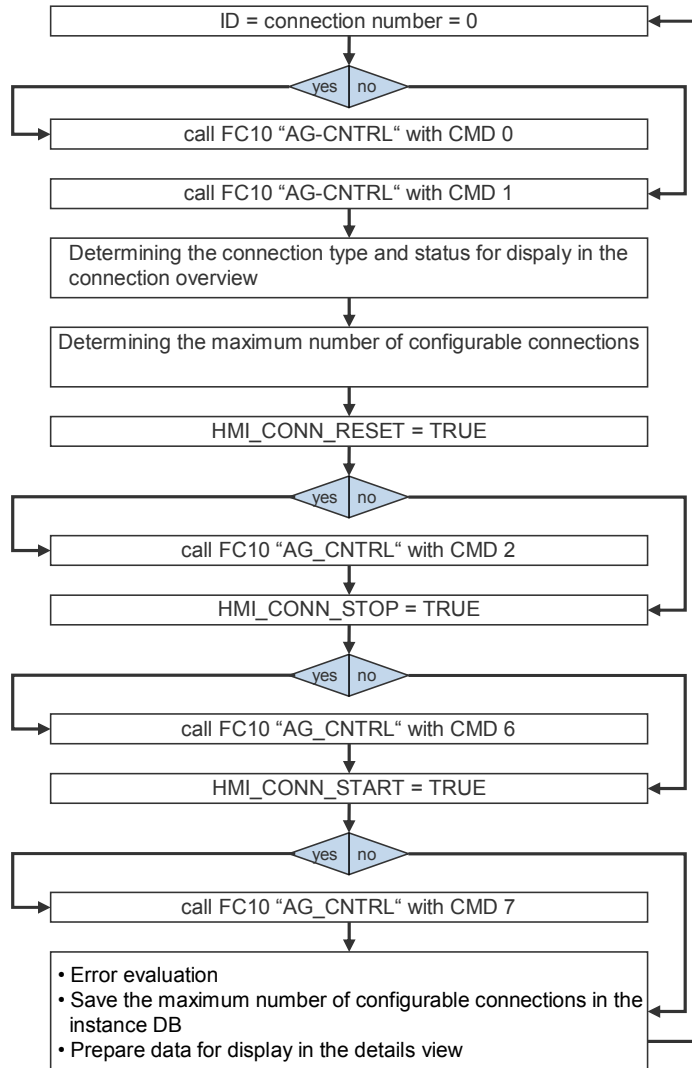


### 3.1.2 Sequence of FB170 "SR\_DIAG"

#### Overview

Figure 3-4 illustrates the sequence of FB170 "SR\_DIAG".

Figure 3-4



FB170 "SR\_DIAG" encapsulates the call of FC10 "AG\_CNTRL" from the "SIMATIC\_NET\_CP → CP 300 → Blocks" library with various commands (CMD) for determining:

- the connection status and connection type of SEND/RECEIVE connections
- the number of maximum configurable SEND/RECEIVE connections, as well as for realizing various functions e.g.:
- Resetting the connection (RESET)
- Disconnecting (START)
- Establishing the connection (STOP)

**Input and output parameters of FB10 “AG\_CNTRL”**

FC10 “AG\_CNTRL” has the following input and output parameters.

Figure 3-5

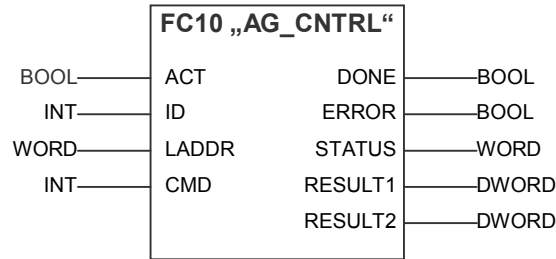


Table 3-2

Input parameters	Data type	Description
ACT	BOOL	1: function call 0: no function call and the block is quit immediately
ID	INT	Connection number The connection number is contained in the configuration.
LADDR	WORD	Module start address The module start address of the CP is contained in the hardware configuration.
CMD	INT	Command at FC10 “AG_CNTRL” Table 3-4 gives an overview of all possible commands.

Table 3-3

Output parameters	Data type	Description
DONE	BOOL	1: job executed 0: job still processed or not triggered yet At DONE=1 the output parameters RESULT1 and RESULT2 can be evaluated.
ERROR	BOOL	Error code 1: error 0: no error
STATUS	WORD	Status code
RESULT1	DWORD	Information returned according to command sent to FC10 “AG_CNTRL”
RESULT2	DWORD	Can only be evaluated for S7-400. Part 2 of information according to the command sent to FC10 “AG_CNTRL”

### Commands of the FC10 “AG\_CNTRL”

The following commands can be configured at FC10 “AG\_CNTRL” and be evaluated by the Industrial Ethernet CP:

Table 3-4

CMD	Description
0	NOP → no operation The block is processed without job for the CP.
1	CN_STATUS → connection status This command provides the status of the connection selected with ID.
2	CN_RESET → connection reset This command resets the connection selected with ID
3	CN_STATUS_ALL → all connections status This command provides the connection status of all connections.
4	CN_RESET_ALL → all connections reset This command resets all connections.
5	CN_CLEAR_RESET → Resetting the reset identifier This command resets the reset identifier of the connection selected with ID. This command is only required in special cases.
6	CN_DISCON → connection disconnect This command disconnects the connection selected with ID and LADDR (stop connection).
7	CN_STARTCON → start connection This command establishes a connection selected with ID and LADDR and previously disconnected with CMD 6 (CN_DISCON).

### Determining the connection type and status for the display in WinCC flexible

For connection number = 0 the FC10 “AG\_CNTRL” is called with the input parameter CMD=0.

For each further connection number > 0 the FC10 “AG\_CNTRL” is called with the input parameter CMD=1 and the job result of the output parameter RESULT1 and RESULT2 is evaluated.

The job result of the output parameter RESULT1 and RESULT2, which contains information on connection type and status, is evaluated and filed in the instance data block DB170 in a structure (see Table 3-7).

For the command CMD=1 the job result of the output parameters RESULT1 and RESULT2 is structured as follows:

Table 3-5

Parameters	Hex value/ area	Bit	Description
RESULT1	0000 000*(hex)	Bit 0-3: Display for the send direction	
		Bit 0	Connection type 0: no send or receive connection 1: connection reserved for send and receive jobs
		Bit 1	Status of current job 0: no send job currently processed 1: send job currently processed → not relevant

Parameters	Hex value/ area	Bit	Description
		Bit 2+3	previous job → not relevant
RESULT1	0000 00*0(hex)	Bit 4-7: display for the receive direction	
		Bit 4	Connection type 0: no send or receive connection 1: connection reserved for send and receive jobs
		Bit 5	Status of current job 0: no receive job currently processed 1: receive job currently processed → not relevant
		Bit 6+7	Previous job → not relevant
RESULT1	0000 0*00(hex)	Bit 8-11: display for FETCH / WRITE	
		Bit 8	Connection type 0: no FETCH connection 1: connection reserved for FETCH jobs
		Bit 9	Connection type 0: no WRITE connection 1: connection reserved for WRITE jobs
		Bit 10	Job status (FETCH / WRITE) 0: job status OK 1: job status NOT OK → not relevant
		Bit 11	Status FETCH / WRITE job 0: there is no job 1: a job from the LAN is currently processed → not relevant
RESULT1	0000 *000(hex)	Bit 12-15: general CP information	
		Bit 12+13	Information on the connection status 00: connection cancelled 01: connecting process running 10: disconnecting process running 11: connection established
		Bit 14	CP information (STOP/RUN) → not relevant
		Bit 15	Reset identification → nicht relevant
RESULT1	**** 0000(hex)	Bit 16-31	reserved for later expansion
RESULT2	0000 0000(hex)		reserved for later expansion

### Determining the maximum number of configurable SEND/RECEIVE connections

The maximum number of configurable SEND/RECEIVE connections is determined automatically. When calling the FC10 "AG\_CNTRL" with the input parameter CMD=1 the value of the output parameter STATUS is evaluated.

If the value of the output parameter STATUS provides the value 8186H, then the maximum number of configurable SEND/RECEIVE connections is determined via the connection number specified at the input parameter ID and stored in the instance data block DB170 (see Table 3-6).

### 3.1.3 HMI interface

The data required for the visualization is stored in the instance data block DB170 in the following tags (see Table 3-6). These tags are integrated into WinCC flexible and form the HMI interface. This enables displaying the data stored in the tags at the HMI Multi Panel or the tags can be set by the HMI Panel.

Table 3-6

Address DB170	Tag	Data type	Description
32.0	CONN	Array [0..65] of UDT 170	Status information of all configurable SEND/RECEIVE connections
296.0	MAX_CONNECTION	Int	Maximum number of configurable SEND/RECEIVE connections
298.0	HMI_CONN	Int	Connection number
300.0	HMI_Detail	Bool	Details view activated/deactivated
300.1	HMI_CONN_STOP	Bool	Stop SEND/RECEIVE connection
300.2	HMI_CONN_START	Bool	Start SEND/RECEIVE connection
300.3	HMI_CONN_RESET	Bool	Reset SEND/RECEIVE connection
301.0	HMI_CONN_TYPE	Byte	Connection type
302.0	HMI_CONN_STATUS	Byte	Connection status
303.0	HMI_CONN_RESERVE1	Byte	Reserve
304.0	HMI_CONN_RESERVE2	Byte	Reserve
306.0	HMI_CMD_STATUS	Int	Job status



## Setup of UDT 170

The relevant status information of all configured SEND/RECEIVE connections, e.g. connection type and connection status, are stored in the instance data block DB170 in CONN array of data type UDT 170.

The user-defined data type UDT170 is structured as follows:

Table 3-7

Tag	Data type	Value (bin)	Value (dec)	Description
CONN_TYPE	Byte	0000 0000	0	connection type is unknown
		0000 0001	1	SEND/RECEIVE connection
		0000 0010	2	FETCH connection
		0000 0100	4	WRITE connection
		0000 1000	8	undefined connection type
CONN_STATUS	Byte	0000 0000	0	connection is disconnected
		0000 0001	1	establishment is in process
		0000 0010	2	disconnection is in process
		0000 0011	3	Connection is established
RESERVE_1	Byte	0000 0000	0	Reserve
RESERVE_2	Byte	0000 0000	0	Reserve

The status information stored in the CONN array is implemented in WinCC flexible in the connection overview.

## Details view

The HMI\_Detail tag of data type Bool is controlled by the HMI Multi Panel. If the HMI\_Detail tag has the value "true", then the following status information of a selected SEND/RECEIVE connection is updated for the display in the details view and stored in the instance data block DB170.

Table 3-8

Tag	Data type	Status information
HMI_CONN	Int	connection number
HMI_CONN_STATUS	Byte	connection status
HMI_CONN_TYPE	Byte	connection type
HMI_CMD_STATUS	Int	error code

## Connection status

In HMI\_CONN\_STATUS tag of data type Byte the connection status of the selected SEND/RECEIVE connection is stored for the display in the details view.

Table 3-9 shows the value range of the HMI\_CONN\_STATUS tag.

Table 3-9

Value (bin)	Value (dec)	Connection status
0000 0000	0	connection is disconnected
0000 0001	1	establishment is in process
0000 0010	2	disconnection is in process
0000 0011	3	connection is established

### Connection type

In HMI\_CONN\_TYPE tag of data type Byte the connection type of the selected SEND/RECEIVE connection is stored for the display in the details view.

Table 3-10 shows the value range of the HMI\_CONN\_STATUS tag.

Table 3-10

Value (bin)	Value (dec)	Connection type
0000 0000	0	connection type is unknown
0000 0001	1	SEND/RECEIVE connection
0000 0010	2	FETCH connection
0000 0100	4	WRITE connection
0000 1000	8	undefined connection type

### Connection number

In HMI\_CONN tag of data type Integer the connection number is stored. The tag is set via the HMI Multi Panel in connection overview of the SEND/RECEIVE connection.

If the value of the HMI\_CONN tag is larger than the determined maximum number of configurable SEND/RECEIVE connections, the HMI\_CONN tag is set to value 1(dec).

If the value of the HMI\_CONN tag is smaller than 1 (dec), the HMI\_CONN tag is set to the determined maximum number of configurable SEND/RECEIVE connections.

### Job status

The HMI\_CMD\_STATUS tag data type integer is implemented in the details view of SEND/RECEIVE connection. It displays the job status of the functions STOP, START und RESET.

Table 3-11 shows an overview of the job status of functions STOP, START and RESET and the value of the HMI\_CMD\_STATUS tag.

Table 3-11

Value of the HMI_CMD_STATUS (dec) tag	Job status
0	request is completed successfully
1	function not available
2	command isn't allowed
9	general failure

### 3.1.4 Functions

The tags of the instance data block DB170 listed in Table 3-12 are implemented in the details view of the SEND/RECEIVE connection diagnostic and can therefore be controlled via the HMI Multi Panel to realize different functions.

If the tags are controlled to value "true" a job for resetting, stopping or starting a certain, selected SEND/RECEIVE connection is initiated.

Table 3-12

Tag	Data type	Function
HMI_CONN_STOP	Bool	0: no function 1: STOP (stop the connection)
HMI_CONN_START	Bool	0 = no function 1 = START (start the connection)
HMI_CONN_RESET	Bool	0 = no function 1 = RESET (reset the connection)

#### Reset the connection (RESET)

If the HMI\_CONN\_RESET tag of the type BOOL has the value "true", then the FC10 "AG\_CNTRL" is called with input parameter CMD=2. This resets the connection specified at the input parameter ID via the connection number.

If the job was completed successfully or with error, then the HMI\_CONN\_RESET tag is reset to value "false".

If the job was completed with error, then there is an additional error evaluation (see chapter 3.1.5 "Error evaluation").

#### Stop the connection (STOP)

If the HMI\_CONN\_STOP tag of the type BOOL has the value "true", then the FC10 "AG\_CNTRL" is called with input parameter CMD=6. This stops the connection specified at the input parameter ID via the connection number.

If the job was completed successfully or with error, then the HMI\_CONN\_STOP tag is reset to value "false".

If the job was completed with error, then there is an additional error evaluation (see chapter 3.1.5 "Error evaluation").

#### Start the connection (START)

If the HMI\_CONN\_START tag of the type BOOL has the value "true", then the FC10 "AG\_CNTRL" is called with input parameter CMD=7. This starts the connection specified at the input parameter ID via the connection number and which was previously stopped with CMD=6.

If the job was completed successfully or with error, then the HMI\_CONN\_START tag is reset to value "false".

If the job was completed with error, then there is an additional error evaluation (see chapter 3.1.5 "Error evaluation").

### 3.1.5 Error evaluation

If the start, stop or reset job of the FC10 "AG\_CNTRL" is transferred successfully to the Industrial Ethernet CP then the HMI\_CMD\_STATUS tag is set to value 0 (dec).

If one of the jobs of FC10 "AG\_CNTRL" was not successfully transferred to the Industrial Ethernet CP and completed with error, then the value of the output parameter STATUS is evaluated.

For the display in the details view a value is assigned to the HMI\_CMD\_STATUS tag according to the value at the output parameter STATUS.

Table 3-13

Value at output parameter STATUS (hex)	Value of the HMI_CMD_STATUS (dec) tag	Job status
0000	0	request is completed successfully
80B0	1	function not available
8189		
8187	2	command isn't allowed
8xxx	9	general failure

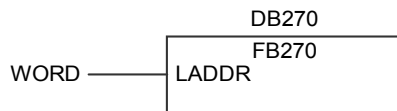
## 3.2 Diagnosing SEND/RECEIVE connections with the FB270 “SR\_DIAG\_400”

Function block FB270 “SR\_DIAG” is used for diagnosing the SEND/RECEIVE connections of the CP443-1. Figure 3-6 illustrates the call of FB270 in the user program of the CPU. FB270 is called cyclically in OB1.

### 3.2.1 Input and output parameters of FB270 “SR\_DIAG\_400”

Analog to FB170 “SR\_DIAG”, the FB270 “SR\_DIAG\_400” has the input parameter “LADDR”. At the input parameter “LADDR” you enter the module start address of the Industrial Ethernet CP443-1. The module start address is available in STEP 7 in the hardware configuration.

Figure 3-6

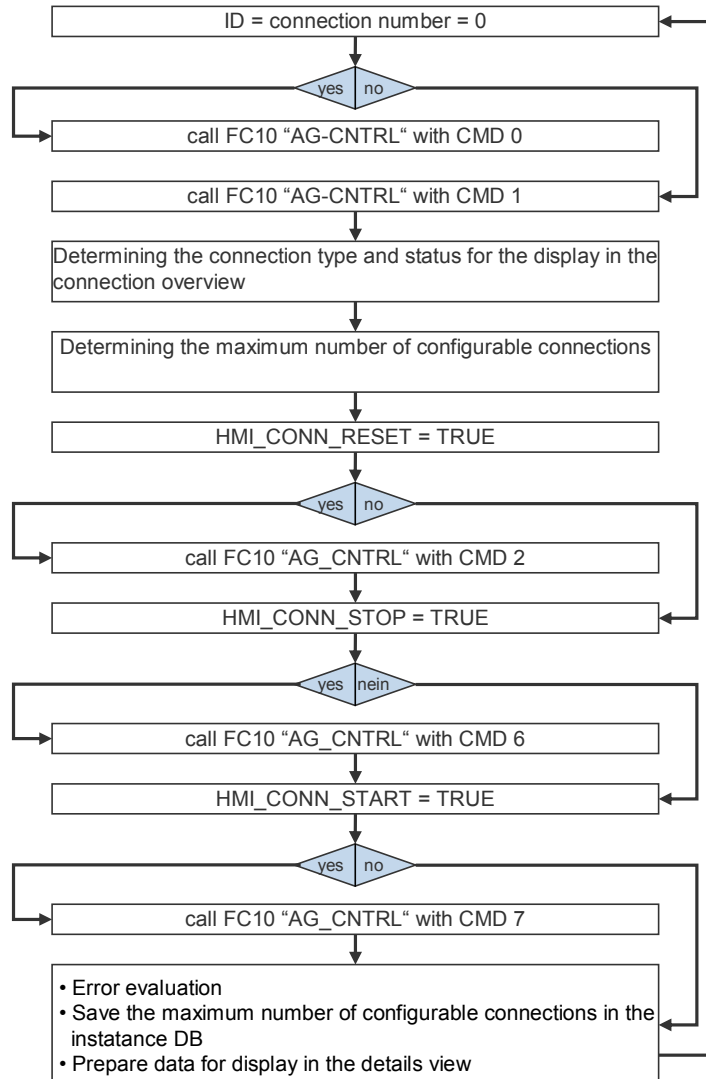


### 3.2.2 Sequence of FB270 "SR\_DIAG\_400"

#### Overview

Figure 3-7 illustrates the sequence of FB270 "SR\_DIAG\_400".

Figure 3-7



FB270 "SR\_DIAG\_400" encapsulates the call of FC10 "AG\_CNTRL" from the library "SIMATIC\_NET\_CP → CP 400 → Blocks" with various commands (CMD) for determining:

- the connection status and connection type of SEND/RECEIVE connections
- the number of maximum configurable SEND/RECEIVE connections, as well as for realizing various functions e.g.:
- Reset the connection (RESET)
- Start the connection (START)
- Stop the connection (STOP)

### 3.2.3 HMI interface

The data required for the visualization is stored in the instance data block DB270 in the following tags (see Table 3-14). These tags are integrated into WinCC flexible and form the HMI interface. This enables displaying the data stored in the tags at the HMI Multi Panel or the tags can be set by the HMI Panel.

Table 3-14

Address DB270	Tag	Data type	Description
32.0	CONN	Array [0..65] of UDT 170	Status information of all configurable SEND/RECEIVE connections
296.0	MAX_CONNECTION	Integer	Maximum number of configurable SEND/RECEIVE connections
298.0	HMI_CONN	Integer	Connection number
300.0	HMI_Detail	Bool	Details view activated/deactivated
300.1	HMI_CONN_STOP	Bool	Stop SEND/RECEIVE connection
300.2	HMI_CONN_START	Bool	Start SEND/RECEIVE connection
300.3	HMI_CONN_RESET	Bool	Reset SEND/RECEIVE connection
301.0	HMI_CONN_TYPE	Byte	Connection type
302.0	HMI_CONN_STATUS	Byte	Connection status
303.0	HMI_CONN_RESERVE1	Byte	Reserve
304.0	HMI_CONN_RESERVE2	Byte	Reserve
306.0	HMI_CMD_STATUS	Integer	Job status

#### Setup of UDT 170

The relevant status information of all configured SEND/RECEIVE connections, e.g. connection type and connection status, are stored in the instance data block DB270 in CONN array of data type UDT 170.

Table 3-7 shows the setup of the user-defined data type UDT170.

#### Details view

The HMI\_Detail tag of data type Bool is controlled by the HMI Multi Panel. If the HMI\_Detail tag has the value "true", then the following status information listed in Table 3-8 of a selected SEND/RECEIVE connection is updated for the display in the details view and stored in the instance data block DB270.

#### Connection status

In HMI\_CONN\_STATUS tag of data type Byte the connection status of a selected SEND/RECEIVE connection is stored for the display in the details view.

Table 3-9 shows the value range of the HMI\_CONN\_STATUS tag.

**Connection type**

In HMI\_CONN\_TYPE tag of data type Byte the connection type of a selected SEND/RECEIVE connection is stored for the display in the details view.

Table 3-10 shows the value range of the HMI\_CONN\_STATUS tag.

**Connection number**

In HMI\_CONN tag of data type Integer the connection number is stored. The tag is set via the HMI Multi Panel in connection overview of the SEND/RECEIVE connection.

If the value of the HMI\_CONN tag is larger than the determined maximum number of configurable SEND/RECEIVE connections, the HMI\_CONN tag is set to value 1(dec).

If the value of the HMI\_CONN tag is smaller than 1 (dec), the HMI\_CONN tag is set to the determined maximum number of configurable SEND/RECEIVE connections.

**Job status**

The HMI\_CMD\_STATUS tag data type integer is implemented in the details view of SEND/RECEIVE connection. It displays the job status of the functions STOP, START und RESET.

Table 3-11 shows an overview of the job status of functions STOP, START and RESET and the value of the HMI\_CMD\_STATUS tag.

**3.2.4 Functions**

The tags of the instance data block DB270 listed in Table 3-12 are implemented in the details view of the SEND/RECEIVE connection diagnostic and can therefore be controlled via the HMI Multi Panel to realize different functions.

If the tags are controlled to value "true" a job for resetting, stopping or starting a certain, selected SEND/RECEIVE connection is initiated.

**Reset the connection (RESET)**

If the HMI\_CONN\_RESET tag of the type BOOL has the value "true", then the FC10 "AG\_CNTRL" is called with input parameter CMD=2. This resets the connection specified at the input parameter ID via the connection number.

If the job was completed successfully or with error, then the HMI\_CONN\_RESET tag is reset to value "false".

If the job was completed with error, then there is an additional error evaluation (see 3.2.5 "Error evaluation").

**Stop the connection (STOP)**

If the HMI\_CONN\_STOP tag of the type BOOL has the value "true", then the FC10 "AG\_CNTRL" is called with input parameter CMD=6. This stops the connection specified at the input parameter ID via the connection number.

If the job was completed successfully or with error, then the HMI\_CONN\_STOP tag is reset to value "false".

If the job was completed with error, then there is an additional error evaluation (see 3.2.5 "Error evaluation").



### **Start the connection (START)**

If the HMI\_CONN\_START tag of the type BOOL has the value "true", then the FC10 "AG\_CNTRL" is called with input parameter CMD=7. This starts the connection specified at the input parameter ID via which the connection number has been specified and which was previously stopped with CMD=6.

If the job was completed successfully or with error, then the HMI\_CONN\_START tag is reset to value "false".

If the job was completed with error, then there is an additional error evaluation (see 3.2.5 "Error evaluation").

### **3.2.5 Error evaluation**

If the start, stop or reset job of the FC10 "AG\_CNTRL" is transferred successfully to the Industrial Ethernet CP then the HMI\_CMD\_STATUS tag is set to value 0 (dec).

If one of the jobs of FC10 "AG\_CNTRL" was not successfully transferred to the Industrial Ethernet CP and completed with error, then the value of the output parameter STATUS is evaluated.

For the display in the details view a value is assigned to the HMI\_CMD\_STATUS tag according to the value at the output parameter STATUS (see Table 3-13).

### 3.3 Diagnosing S7 connections with FB171 “S7\_DIAG”

Function block FB171 “S7\_DIAG” is used for diagnosing the S7 connections of the CP343-1.

FB171 is called cyclically in OB1.

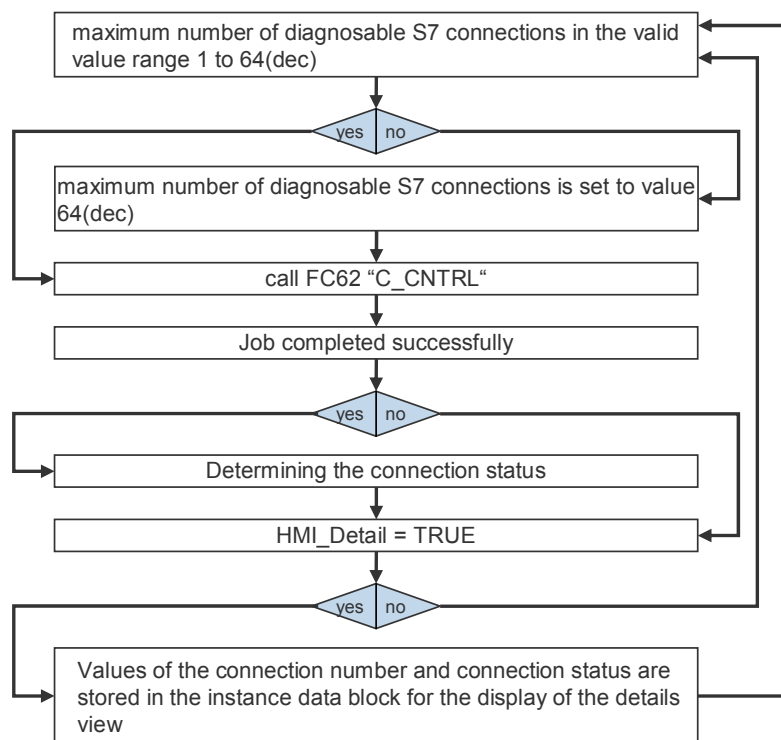
When calling FB171 “S7\_DIAG” a configuration of input and output parameters is not necessary.

#### 3.3.1 Sequence of FB171 “S7\_DIAG”

##### Overview

Figure 3-8 illustrates the sequence of FB171 “S7\_DIAG”.

Figure 3-8



FB171 “S7\_DIAG” encapsulates the call of function FC62 “C\_CNTRL”, in order to determine the status of S7 connections of the CP343-1 for the S7-300. If function FC62 “C\_CNTRL” is called at the control input EN\_R with the value 1, the current status of the connection addressed via the input parameter ID is determined.

**Input and output parameters of function FB62 “C\_CNTRL”**

Function FC62 “C\_CNTRL” has the following input and output parameters.

Figure 3-9

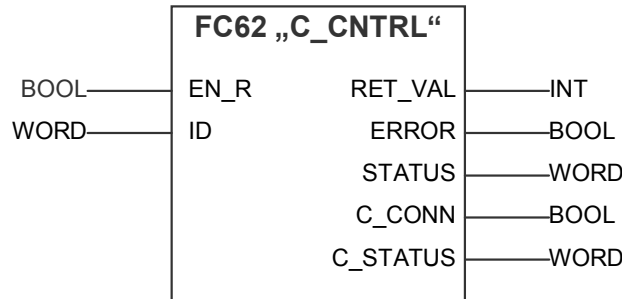


Table 3-15

Input parameters	Data type	Description
EN_R	BOOL	Control parameter (enable to receive) The control parameter signals read to receive if the input is set.
ID	WORD	Connection number The connection number is contained in the configuration.

Table 3-16

Output parameters	Data type	Description
RET_VAL	INT	Error information
ERROR	BOOL	Status parameters ERROR and STATUS: <ul style="list-style-type: none"> <li>ERROR=0 and STATUS has the values: 0000H: neither warning nor error &lt;&gt;0000H: warning</li> <li>ERROR=1: error</li> </ul>
STATUS	WORD	
C_CONN	BOOL	Status of the corresponding connection: 0: connection stopped or not started 1: connection exists
C_STATUS	WORD	Connection status: W#16#0000: connection is disconnected W#16#0001: establishment is in process W#16#0002: connection is established W#16#000F: connection status is not available W#16#00FF: connection is not configured

### Value range of the maximum number of S7 connections

In FB171 "S7\_DIAG" it is checked whether the maximum number of diagnosable S7 connections is in the valid value range 1 to 64 (dec). The maximum number of S7 connections is stored in the instance data block of FB171 in the Max\_connection tag of data type integer.

If the maximum number of S7 connections lies outside the valid value range, then the MAX\_connection tag is set to value 64(dec). The maximum number of diagnosable S7 connections is therefore limited to 64(dec).

### Determining the connection status for the display in WinCC flexible

For each connection number in the value range from 1 to 64 the function FC62 "C\_CNTRL" is called and the job result of the output parameters C\_STATUS and C\_CONN is evaluated.

The job result of the output parameter C\_STATUS and C\_CON, which contains information on the connection status, is evaluated and structured filed in the instance data block DB170 (see 3.2.3 "HMI interface").

### 3.3.2 HMI interface

The data required for the visualization is stored in the instance data block DB171 in the following tags (see Table 3-17). These tags are integrated into WinCC flexible and form the HMI interface. This enables displaying the data stored in the tags at the HMI Multi Panel or the tags can be set by the HMI Panel.

Table 3-17

Address DB171	Tag	Data type	Description
16.0	CON_ACTIVE_1	DWord	Status of the S7 connections (connection number 1-32)
20.0	CON_ACTIVE_2	DWord	Status of the S7 connections (connection number 33-64)
24.0	CONN_STATUS	Array [0..65] of Byte	Status information of all configurable S7 connections
90.0	HMI_Detail	Bool	Details view activated/deactivated
91.0	HMI_CONN_STATUS	Byte	Connection status
92.0	HMI_CONN	Int	Connection number

### Structure of the CONN\_STATUS tag

The value at output parameter C\_STATUS of the FC62 "C\_CNTRL" function is stored for each S7 connection in the instance data block DB171. The CONN\_STATUS tag of data type Array is available for this.

The CONN\_STATUS tag has the following structure:

Table 3-18

Tag	Data type	Value (hex)	Value (dec)	Description
CONN_STATUS[0]	BYTE	B#16#00	0	connection is disconnected
		B#16#01	1	establishment is in process
		B#16#02	2	connection is established
		B#16#0F	15	connection status is not available
		B#16#FF	255	connection is not configured
CONN_STATUS[1]	BYTE	B#16#00	0	connection is disconnected
		B#16#01	1	establishment is in process
		B#16#02	2	connection is established
		B#16#0F	15	connection status is not available
		B#16#FF	255	connection is not configured
...				
CONN_STATUS[65]	BYTE	B#16#00	0	connection is disconnected
		B#16#01	1	establishment is in process
		B#16#02	2	connection is established
		B#16#0F	15	connection status is not available
		B#16#FF	255	connection is not configured

The status information stored in the CONN\_STATUS array is implemented in WinCC flexible in the connection overview.

### Structure of the CONN\_ACTIVE\_1 und CONN\_ACTIVE\_1 tag

The value at output parameter C\_CONN of the FC62 "C\_CNTRL" is stored for each S7 connection in the instance data block DB171. The tags CONN\_ACTIVE\_1 and CONN\_ACTIVE\_2 of data type DWord are available for this.

Table 3-19 shows the structure of DWord CONN\_ACTIVE\_1. The individual bits of the DWord show the status of the configured S7 connections with the connection numbers 1 to 32.

Table 3-19

CONN_ACTIVE_1	Value range	Description
Bit 0	0	Connection with connection number 1 stopped or not started
	1	Connection with connection number 1 started
Bit 1	0	Connection with connection number 2 stopped or not started
	1	Connection with connection number 2 started
...		
Bit 31	0	Connection with connection number 32 stopped or not started
	1	Connection with connection number 32 started

Table 3-20 shows the structure of DWord CONN\_ACTIVE\_2. The individual bits of the DWord show the status of the configured S7 connections with the connection numbers 33 to 64.

Table 3-20

CONN_ACTIVE_2	Value range	Description
Bit 0	0	Connection with connection number 33 stopped or not started
	1	Connection with connection number 33 started
Bit 1	0	Connection with connection number 34 stopped or not started
	1	Connection with connection number 34 started
...		
Bit 31	0	Connection with connection number 64 stopped or not started
	1	Connection with connection number 64 started

### Details view

The HMI\_Detail tag of data type Bool is controlled by the HMI Multi Panel. If the HMI\_Detail tag has the value "true", then the following status information of the selected S7 connection is prepared for the display in the details view and stored in the instance data block DB171.

Table 3-21

Tag	Data type	Status information
HMI_CONN	Int	Connection number
HMI_CONN_STATUS	Byte	Connection status

### Connection status

In HMI\_CONN\_STATUS tag of data type Byte the connection status of the selected S7 connection is stored for the display in the details view.

Table 3-22 shows the value range of the HMI\_CONN\_STATUS tag.

Table 3-22

Value (hex)	Value (dec)	Connection status
B#16#00	0	connection is disconnected
B#16#01	1	establishment is in process
B#16#02	2	connection is established
B#16#0F	15	connection status is not available
B#16#FF	255	connection is not configured

### Connection number

In HMI\_CONN tag of data type Integer the connection number is stored. The tag is set via the HMI Multi Panel in connection overview of the S7 connection.

If the value of the HMI\_CONN tag is not within the valid value range 1 to 64 (dec), then the HMI\_CONN tag is set to value 64(dec). This corresponds to the maximum number of diagnosable S7 connections.

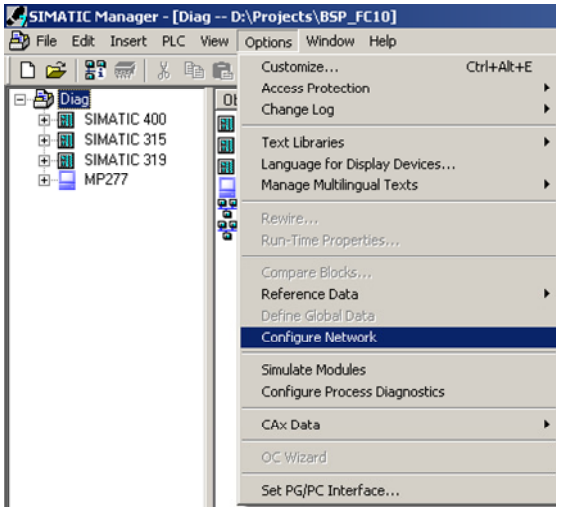
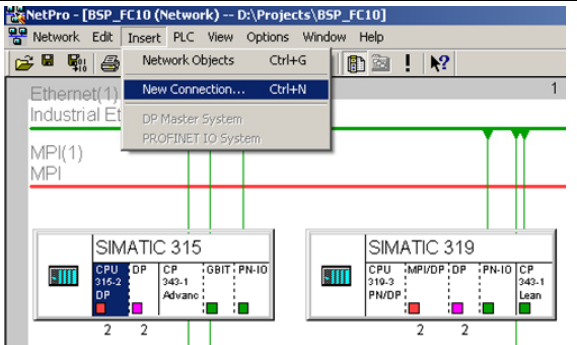
# 4 Configuration and Settings

## 4.1 Configuring the communication connections

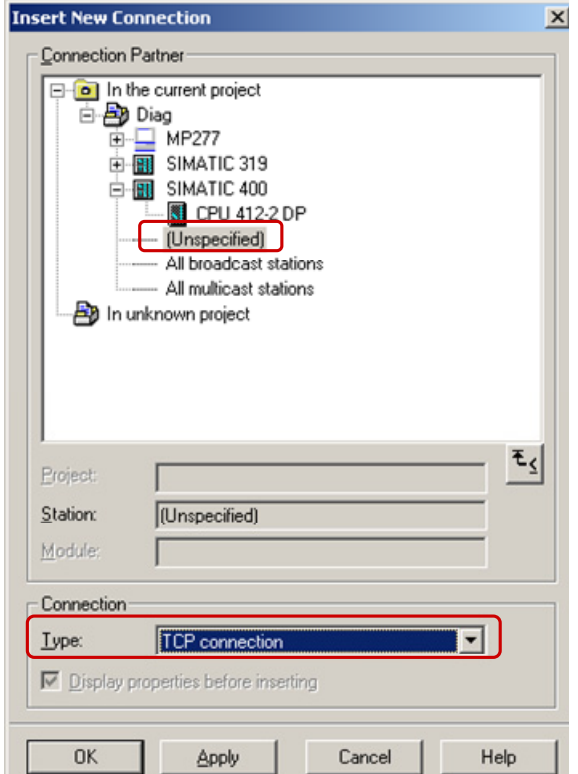
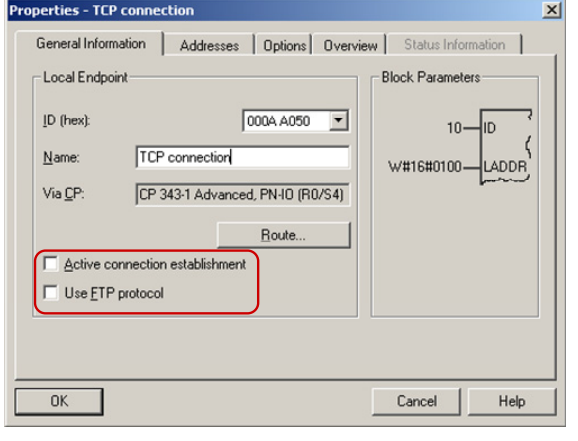
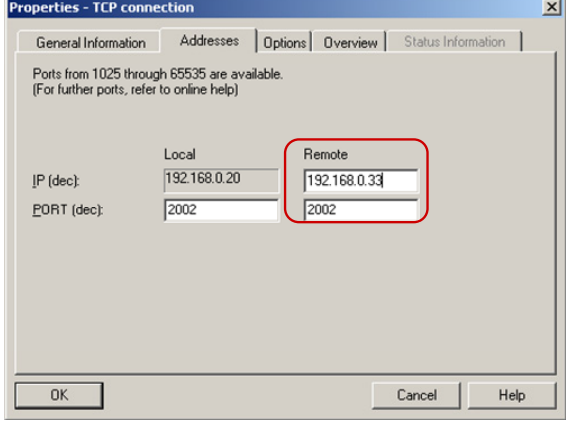
### 4.1.1 Configuring the SEND/RECEIVE connection

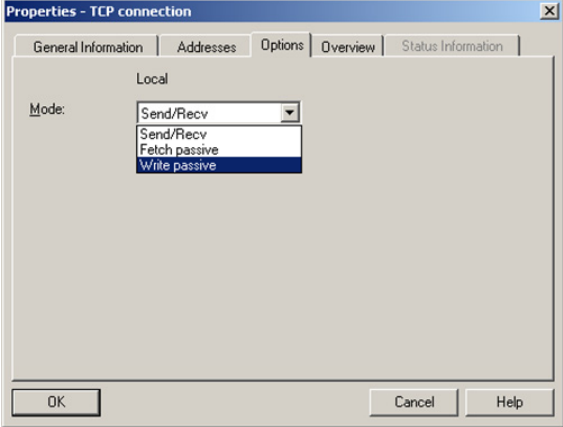
The following instruction shows the configuration of a SEND/RECEIVE connection exemplary for a TCP connection:

Table 4-1

No.	Action	Note
1.	Open NetPro in the SIMATIC Manager via menu Options → Configure Network or via the “Configure Network” button.	 <p>The screenshot shows the SIMATIC Manager interface with the 'Options' menu open. The 'Configure Network' option is highlighted in blue. The background shows a project tree with SIMATIC 400, SIMATIC 315, SIMATIC 319, and MP277.</p>
2.	Select the CPU of the SIMATIC Station and select the menu Insert → New Connection.... The dialog box “New Connection” appears.	 <p>The screenshot shows the NetPro interface with a 'New Connection' dialog box open. The dialog box has 'New Connection...' selected. The background shows a network diagram with SIMATIC 315 and SIMATIC 319 stations connected to an Ethernet network.</p>



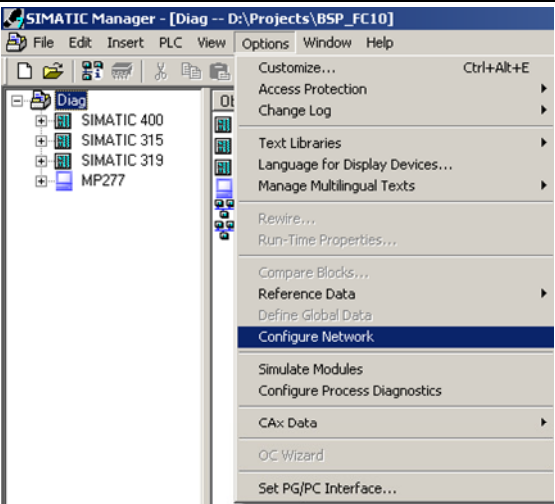
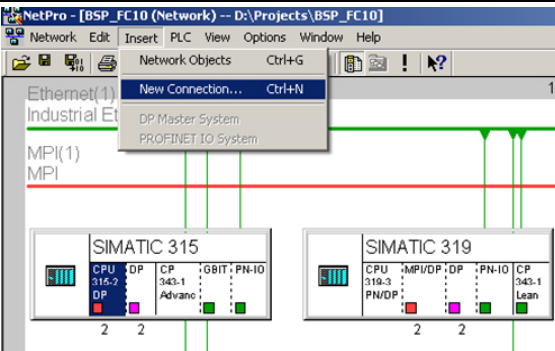
No.	Action	Note
3.	<p>Select "Unspecified" as the connection partner.</p> <p>If the communication partner has been configured in the same STEP 7 project, you can select the CPU of the communication partner directly.</p> <p>Select the connection type "TCP connection".</p> <p>Apply the settings with "OK".</p> <p>The properties dialog of the TCP connection opens.</p>	 <p>The screenshot shows the 'Insert New Connection' dialog box. In the 'Connection Partner' tree, 'CPU 412-2 DP' is selected. The 'Type' dropdown menu is set to 'TCP connection'. The 'Station' field is '(Unspecified)'. The 'Display properties before inserting' checkbox is checked.</p>
4.	<p>Switch to the "General Information" tab.</p> <p>Specify whether the SIMATIC station is involved active or passive in establishing the connection, i.e. activate or deactivate the function "Active connection establishment".</p> <p>When using the FTP service via the TCP connection, then activate the function "Use FTP protocol".</p>	 <p>The screenshot shows the 'Properties - TCP connection' dialog box, General Information tab. The 'Active connection establishment' checkbox is checked. The 'Use FTP protocol' checkbox is unchecked. The 'Local Endpoint' section shows 'ID (hex): 000A A050', 'Name: TCP connection', and 'Via CP: CP 343-1 Advanced, PN-IO (R0/S4)'. The 'Block Parameters' section shows '10-ID' and 'W#16#0100-LADDR'.</p>
5.	<p>Switch to the "Addresses" tab.</p> <p>Enter the IP address of the communication partner.</p> <p>Enter the local port of the SIMATIC station and the port of the communication partner.</p>	 <p>The screenshot shows the 'Properties - TCP connection' dialog box, Addresses tab. The 'Local' IP address is 192.168.0.20 and the 'Local' port is 2002. The 'Remote' IP address is 192.168.0.33 and the 'Remote' port is 2002. A note at the top states: 'Ports from 1025 through 65535 are available. (For further ports, refer to online help)'.</p>

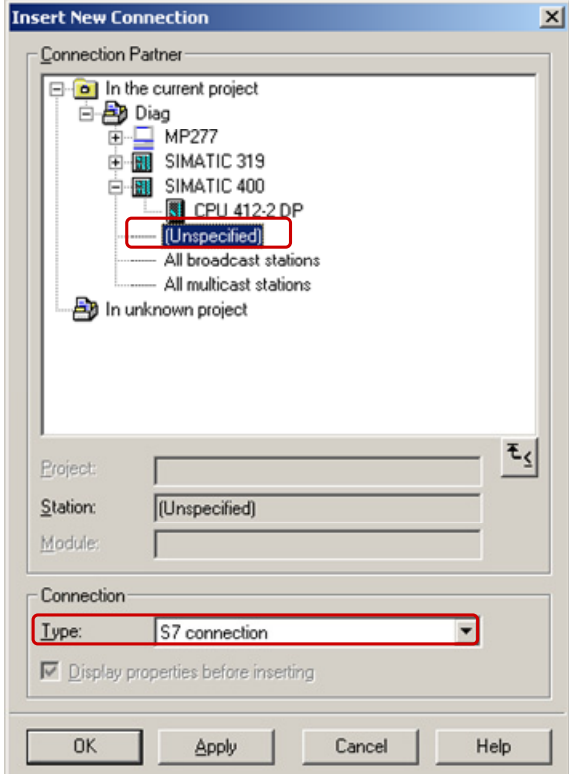
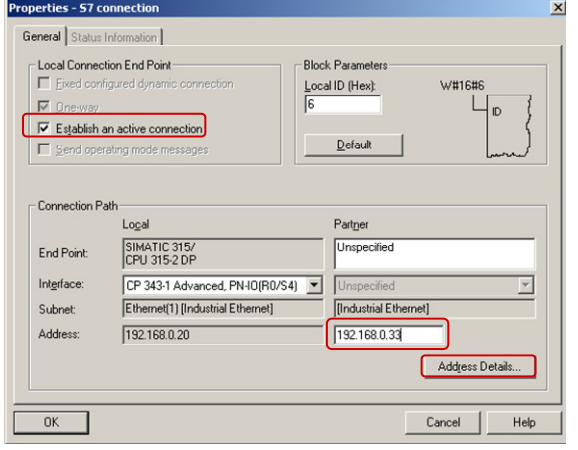
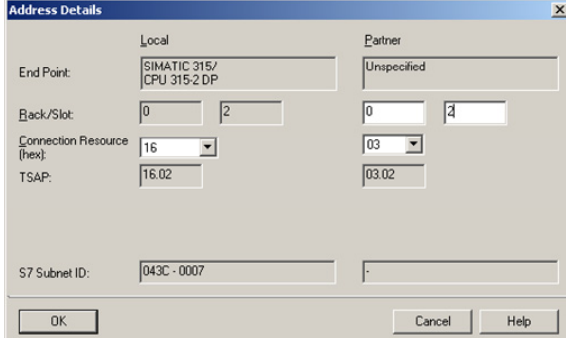
No.	Action	Note
6.	<p>Go to the "Options" tab.</p> <p>Select one of the following modes.</p> <ul style="list-style-type: none"> <li>• Send/Recv</li> <li>• Fetch passive or</li> <li>• Write passive</li> </ul> <p>The operating modes Fetch or Write are only possible if the SIMATIC station is involved passive in establishing the connection.</p> <p>If you have already activated the function "Use FTP protocol" in the "General Information" tab, then the FTP mode is set.</p> <p>Apply the settings with "OK".</p>	

### 4.1.2 Configuring the S7 connection

The following instruction shows the configuration of a S7 connection exemplary for an unspecified, unilaterally configured S7 connection:

Table 4-2

No.	Action	Note
1.	<p>Open NetPro in the SIMATIC Manager via menu <b>Options</b> → <b>Configure Network</b> or via the "Configure Network" button.</p>	
2.	<p>Select the CPU of the SIMATIC Station and select the menu <b>Insert</b> → <b>New Connection...</b></p> <p>The dialog box "New Connection" appears.</p>	

No.	Action	Note
3.	<p>Select "Unspecified" as the connection partner.</p> <p>If the communication partner has been configured in the same STEP 7 project, you can select the CPU of the communication partner directly.</p> <p>Select the connection type S7 connection.</p> <p>Apply the settings with "OK".</p> <p>The properties dialog of the S7 connection opens.</p>	
4.	<p>Specify whether the SIMATIC station is involved active or passive in establishing the connection, i.e. activate or deactivate the function "Active connection establishment".</p> <p>Enter the IP address of the communication partner.</p> <p>Click the "Address Details" button.</p>	
5.	<p>Enter the local TSAP of the SIMATIC station and the TSAP of the communication partner.</p> <p>Apply the settings with "OK".</p>	

## 4.2 Programming the communication blocks for the data exchange

### 4.2.1 Programming the communication function blocks for the data exchange via SEND/RECEIVE connections

For data exchange via the following communication connections of a S7-300 Industrial Ethernet CP you call the communication function blocks FC5 "AG\_SEND" and FC6 "AG\_RECV" in the S7 program.

- TCP connection with the services SEND/RECEIVE or FETCH/WRITE
- ISO-on-TCP connection with the services SEND/RECEIVE or FETCH/WRITE
- ISO transport connection with the services SEND/RECEIVE or FETCH/WRITE
- USP connection with the SEND/RECEIVE services

The communication function blocks FC5 "AG\_SEND" and FC6 "AG\_RECV" are available in the "SIMATIC\_NET\_CP → CP300 → Blocks" library.

For data exchange via SEND/RECEIVE connections of a S7-400 Industrial Ethernet CP you use the communication function blocks FC50 "AG\_LSEND" and FC60 "AG\_LRECV" from the "SIMATIC\_NET\_CP → CP 400 → Blocks" library.

On the internet the following program examples are available to you as downloads (see \4\ and \5).

### 4.2.2 Programming the communication function blocks for data exchange via S7 connections

For data exchange via the S7 connections of a S7-300 Industrial Ethernet CP the following communication function blocks are available to you:

- FB14 "GET" and FB15 "PUT" for unilaterally and bilaterally configured S7 connections
- FB12 "BSEND" and FB13 "BRECV" for bilaterally configured S7 connections
- FB8 "USEND" and FB9 "URECV" for bilaterally configured S7 connections

These communication function blocks are available in the "SIMATIC\_NET\_CP → CP300 → Blocks" library. Call the respective communication function blocks in the S7 program.

For data exchange via the S7 connections of a S7-400 Industrial Ethernet CP the following system function blocks are available to you:

- SFB14 "GET" and SFB15 "PUT" for unilaterally and bilaterally configured S7 connections
- SFB12 "BSEND" and SFB13 "BRECV" for bilaterally configured S7 connections
- SFB8 "USEND" and SFB9 "URECV" for bilaterally configured S7 connections

These system function blocks are available in the standard library at "System Function Blocks → Blocks".

On the internet the following program examples are available to you as downloads (see \6\, \7\ and \8).

### 4.2.3 Programming the communication function blocks for data transfer with FTP

The following functions are available to you for data transfer with FTP:

Table 4-3

Function	Symbolic name	Description
FC40	FTP_CONNECT	Establishment of an FTP connection from client to server
FC41	FTP_STORE	Transfer of a DB from client to server
FC42	FTP_RETRIEVE	Transfer of a file from server to client
FC43	FTP_DELETE	Deleting a file on the server
FC44	FTP_QUIT	Stopping a connection which has been started via ID

For the following module types the function block FB40 "FTP\_CMD" is additionally available to you for data transfer with FTP:

- CP343-1 Advanced as of 6ES7343-1GX30-0XE0
- CP443-1 Advanced as of 6ES7443-1GX20-0XE0

With FB40 "FTP\_CMD" you can establish FTP connections and transfer files from and to an FTP server.

Detailed information on the function blocks and on the functions for data transfer with FTP is available in the manual "Functions (FC) and Function Blocks (FB) for SIMATIC NET S7-CP Programming Manual" (see \16).

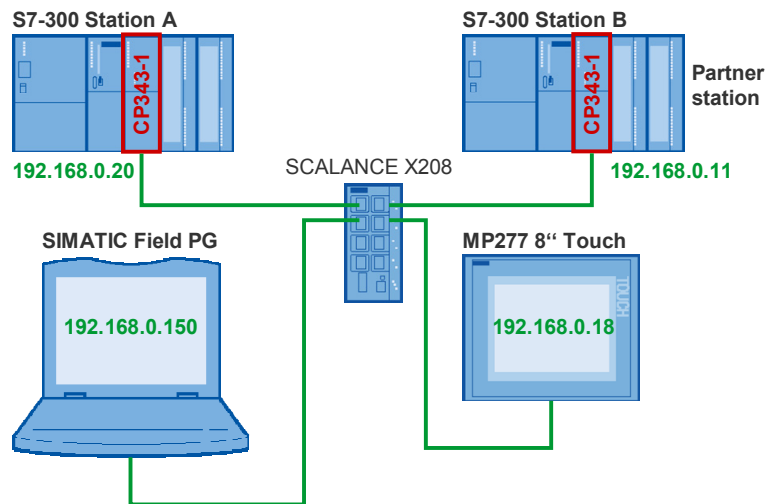
## 5 Installation

### 5.1 Installation of the hardware

#### Overview

The figure below shows the hardware setup of the application.

Figure 5-1



The following table gives you an overview of the IP addresses used.

Table 5-1

Device	IP address	Subnet mask
SIMATIC Field PG	192.168.0.150	255.255.255.0
MP277 8" Touch	192.168.0.18	255.255.255.0
CP343-1 (S7-Station A)	192.168.0.20	255.255.255.0
CP343-1 (S7-Station B)	192.168.0.11	255.255.255.0
SCALANCE X208	192.168.0.100	255.255.255.0

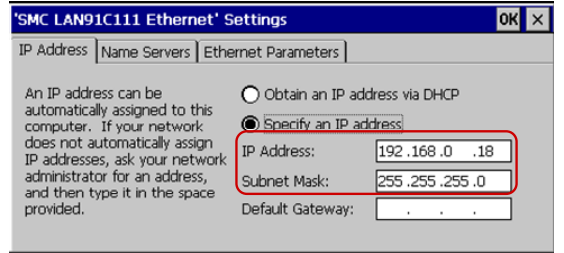
#### Note

It is also important to read the descriptions, manuals and any delivery information supplied with the products.

### Installation of the multi panel MP277 8" Touch

Assign the IP address to the multi panel MP277 8" Touch according to the configuration (see Figure 5-1).

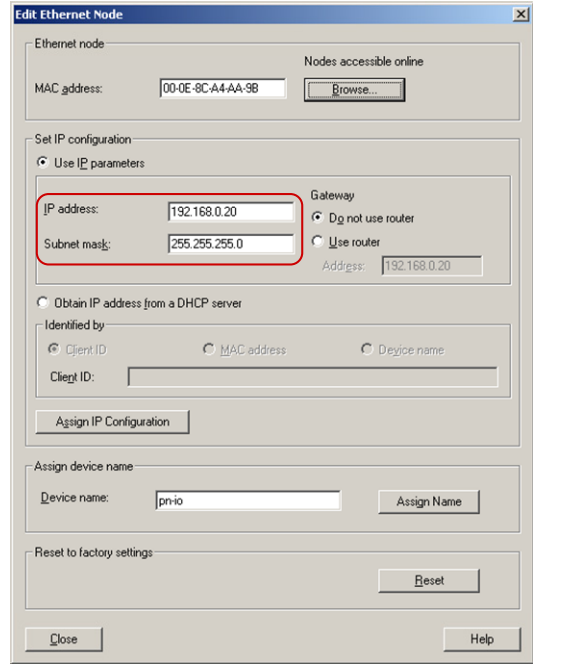
Table 5-2

Action	Screenshot
On the operator panel MP277 8" Touch at Control Panel → Network and Dial-up Connections → LAN90001 you set the IP address 192.168.0.18 and the subnet mask 255.255.255.0.	

### Installation of the S7 station A

Assign the IP address to the CP343-1 according to the configuration (see Figure 5-1).

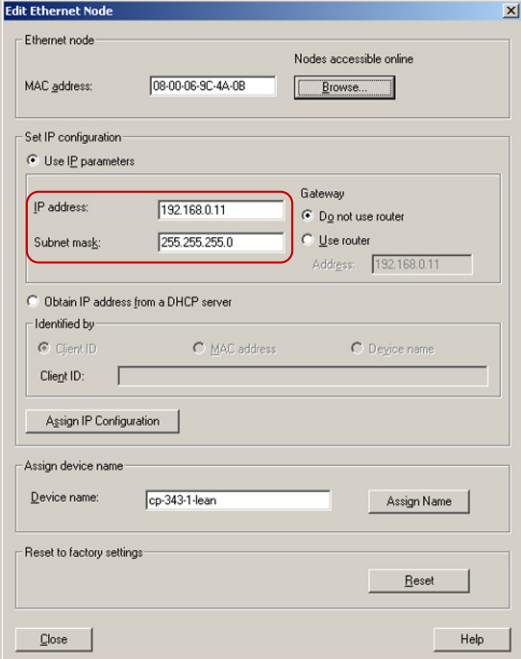
Table 5-3

Action	Screenshot
Open the SIMATIC Manager via the Windows Start menu → SIMATIC → SIMATIC Manager.	
In the SIMATIC Manger via the menu PLC → Edit Ethernet Node... you assign the IP address 192.168.0.20 and the subnet mask 255.255.255.0.	

**Installation of S7 station B**

Assign the IP address to the CP343-1 according to the configuration (see Figure 5-1).

Table 5-4

Action	Screenshot
<p>Open the SIMATIC Manager via the Windows Start menu → SIMATIC → SIMATIC Manager.</p>	
<p>In the SIMATIC Manger via the menu PLC → Edit Ethernet Node... you assign the IP address 192.168.0.11 and the subnet mask 255.255.255.0.</p>	 <p>The screenshot shows the 'Edit Ethernet Node' dialog box. The 'Set IP configuration' section is expanded, and the 'Use IP parameters' radio button is selected. The IP address field contains '192.168.0.11' and the subnet mask field contains '255.255.255.0'. The gateway section has 'Do not use router' selected. The 'Identified by' section has 'Client ID' selected. The device name field contains 'cp-343-1-lean'. The 'Assign IP Configuration' button is visible.</p>



## 5.2 Installing the software

Keep the following order when installing the configuration software on the SIMATIC Field PG:

- Install STEP 7 V5.4 SP5 or higher
- Install WinCC flexible 2008 SP1.

**Note**

In the manual of STEP 7 and WinCC flexible you find further information on installing the configuration software (see \10\ and \13\).

## 5.3 Application software installation

The application software is a STEP 7 project which contains the complete hardware configuration of multi panel MP277 8" Touch and S7-300 station.

In addition to the hardware configuration of MP277 8" Touch and the S7-300 station, the WinCC flexible project for the multi panel MP277 8" Touch as well as the S7 program for the S7-300 station are integrated in the STEP 7 project.

The STEP 7 project can be downloaded from the internet as a ZIP file.

Unzip the file "42453077\_diagnostic\_v10.zip" into a separate directory. The STEP 7 project is then automatically unzipped with all respective subdirectories.

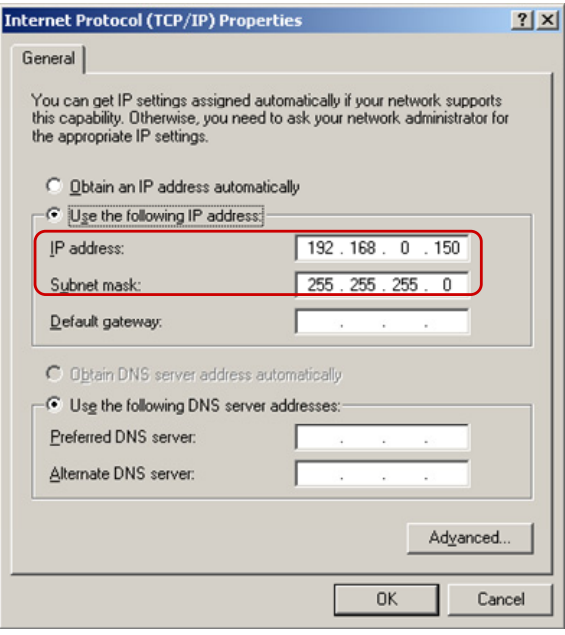
Subsequently, you can open and edit the extracted STEP 7 project with the SIMATIC Manager.

# 6 Starting up the Application

## 6.1 Preparation

Assign the IP address to the network card of the SIMATIC Field PG according to the configuration (see Figure 5-1).

Table 6-1

Action	Screenshot
<p>Open the Properties dialog of the Local Area Network (LAN) in the Network Connections of Windows.</p> <p>Enter the IP address 192.168.0.150 and the subnet mask 255.255.255.0.</p>	

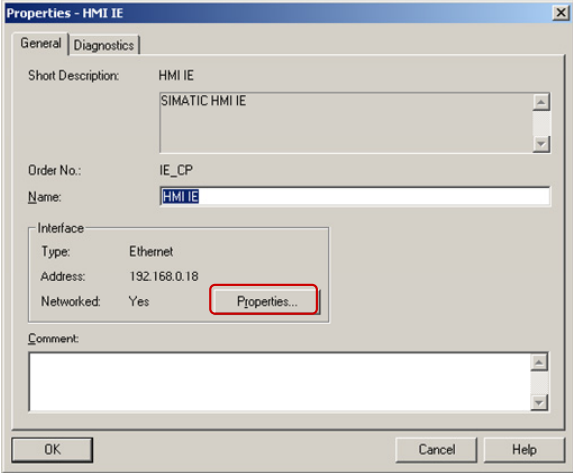
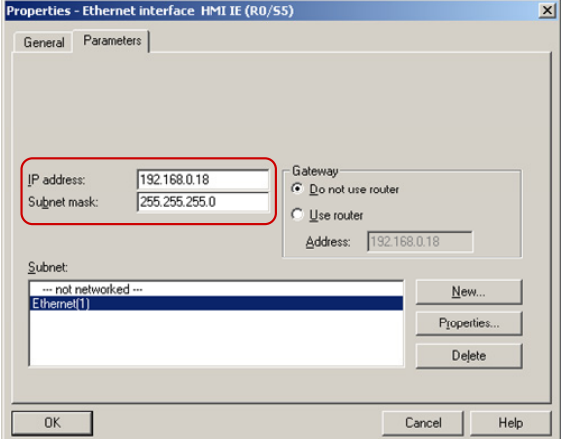
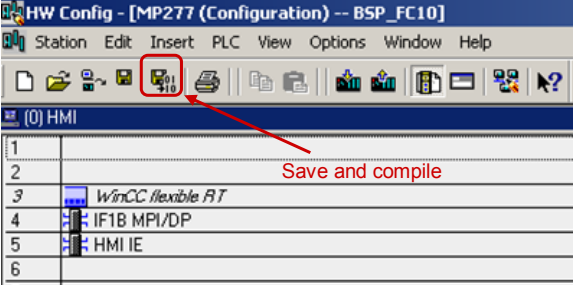
## 6.2 Commissioning the multi panel MP277 8” Touch

### 6.2.1 Hardware configuration

In the hardware configuration of the multi panel MP277 8” Touch you enter the IP address, already set on the multi panel, for the Industrial Ethernet interface (see chapter 5.1 “Installation of the hardware”).

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Table 6-2

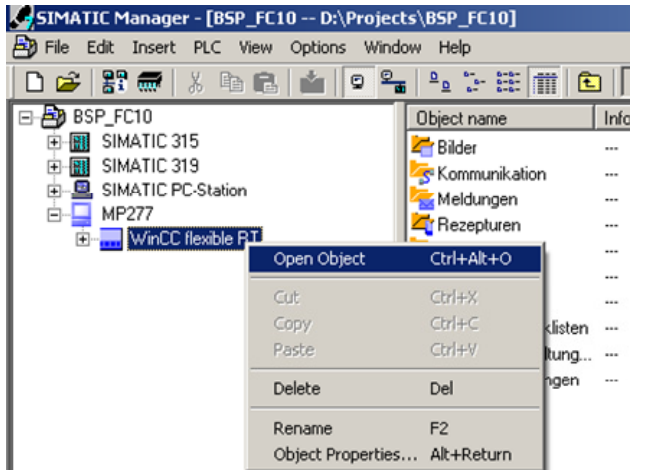
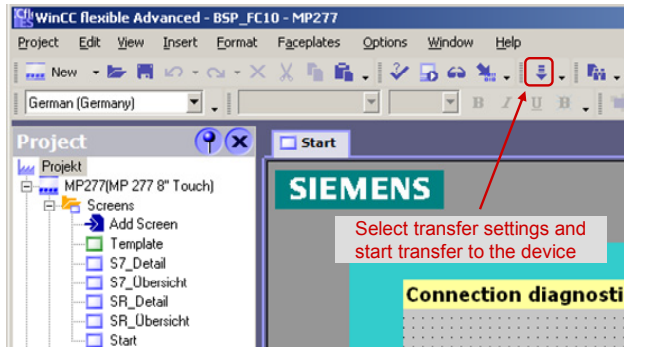
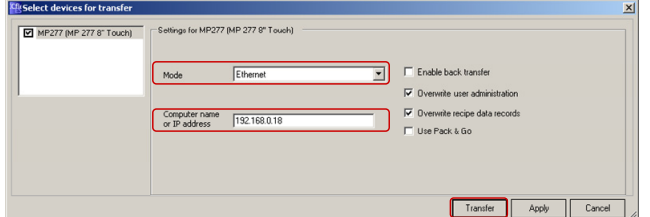
Action	Screenshot
<p>Open the Properties dialog of the Industrial Ethernet interface and click the “Properties...” button.</p>	
<p>In the dialog “Properties – Ethernet interface HMI IE” → “Parameters” tab you enter the IP address and Subnet mask which you have already set on the multi panel.</p> <p>In Subnet you select the Ethernet subnet to which you wish to assign the HMI IE interface.</p> <p>If an Ethernet subnet does not yet exist, you click the “New...” button to create a new Ethernet subnet.</p>	
<p>Save and compile the hardware configuration of the multi panel MP277 8” Touch.</p>	

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### 6.2.2 Loading WinCC flexible Runtime

When loading the WinCC flexible Runtime onto the multi panel MP277 8” Touch, please proceed according to the following instruction:

Table 6-3

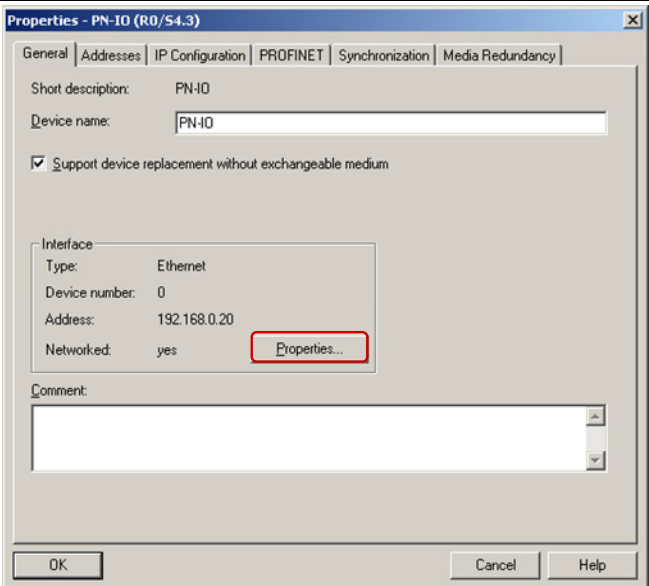
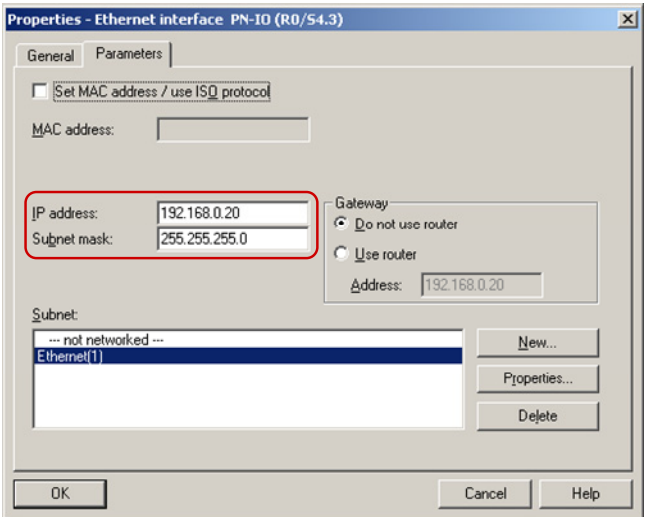
No.	Action	Screenshot
1	<p>In the SIMATIC Manager under the object HMI Station “MP277” you right-click the entry “WinCC flexible RT” and select the “Open Object” item.</p> <p>The WinCC flexible project of the MP277 8” Touch opens.</p>	
2	<p>In WinCC flexible you click the “Select transfer settings and start transfer to the device” button.</p> <p>The dialog “Select devices for transfer” appears.</p>	
3	<p>Select the “Ethernet” mode and enter the IP address 192.168.0.18 of the MP277 8” Touch.</p> <p>Click the “Transfer” button to transfer the WinCC flexible Runtime to the MP277 8” Touch.</p>	

### 6.3 Commissioning the S7 station A

#### 6.3.1 Loading the hardware configuration

In the hardware configuration of S7 station A you enter the already assigned IP address for the CP343-1 (see chapter “5.1” “Installation of the hardware”).

Table 6-4

No.	Action	Screenshot
1.	Open the Properties dialog of the PN-IO interface of the CP343-1 and click the “Properties...” button.	
2.	In the “Properties - Ethernet interface PN-IO” dialog select the “Parameters” tab and enter IP address and subnet mask which you have already assigned to the CP343-1. Acknowledge the entry with “OK”.	

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No.	Action	Screenshot
3.	Save and compile the hardware configuration of the S7-300 station and load it onto your CPU.	

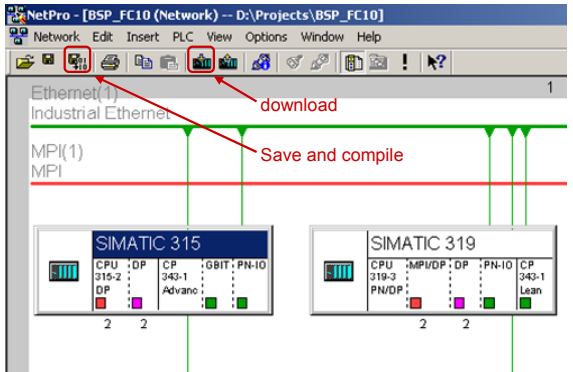
6.3.2 Loading the communication connections

When loading the communication connections proceed as follows:

Table 6-5

No.	Action	Screenshot																																																																														
1.	Open NetPro in the SIMATIC Manager via menu Options → Configure Network or via the “Configure Network” button.																																																																															
2.	Select the CPU of the SIMATIC Station “SIMATIC 315”. The connection table shows you the configured S7 and SEND/RECEIVE connections.	<table border="1"> <thead> <tr> <th>Local ID</th> <th>Partner ID</th> <th>Partner</th> <th>Type</th> <th>Active connection partner</th> <th>Subnet</th> </tr> </thead> <tbody> <tr> <td>2</td> <td></td> <td>Unknown</td> <td>S7 connection</td> <td>Yes</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>3</td> <td></td> <td>Unknown</td> <td>S7 connection</td> <td>Yes</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>4</td> <td>1</td> <td>SIMATIC 319 / CPU 319-3 PN/CP</td> <td>S7 connection</td> <td>No</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0001 A050</td> <td>0001 A050</td> <td>SIMATIC 319 / CPU 319-3 PN/CP</td> <td>ISO-on-TCP connection</td> <td>No</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0002 A050</td> <td>0002 A050</td> <td>SIMATIC 319 / CPU 319-3 PN/CP</td> <td>ISO-on-TCP connection</td> <td>No</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0003 A050</td> <td>0003 A050</td> <td>SIMATIC 319 / CPU 319-3 PN/CP</td> <td>TCP connection</td> <td>No</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0004 A050</td> <td>0004 A050</td> <td>SIMATIC 319 / CPU 319-3 PN/CP</td> <td>TCP connection</td> <td>No</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0005 A050</td> <td></td> <td>ISO_FETCH</td> <td>ISO-on-TCP connection</td> <td>No</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0006 A050</td> <td></td> <td>ISO_WRITE</td> <td>ISO-on-TCP connection</td> <td>No</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0007 A050</td> <td></td> <td>TCP/IP</td> <td>TCP connection</td> <td>-</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0008 A050</td> <td></td> <td>(All multicast nodes)</td> <td>UDP connection</td> <td>-</td> <td>Ethernet(1) [E]</td> </tr> <tr> <td>0009 A050</td> <td></td> <td>(All broadcast nodes)</td> <td>UDP connection</td> <td>-</td> <td>Ethernet(1) [E]</td> </tr> </tbody> </table>	Local ID	Partner ID	Partner	Type	Active connection partner	Subnet	2		Unknown	S7 connection	Yes	Ethernet(1) [E]	3		Unknown	S7 connection	Yes	Ethernet(1) [E]	4	1	SIMATIC 319 / CPU 319-3 PN/CP	S7 connection	No	Ethernet(1) [E]	0001 A050	0001 A050	SIMATIC 319 / CPU 319-3 PN/CP	ISO-on-TCP connection	No	Ethernet(1) [E]	0002 A050	0002 A050	SIMATIC 319 / CPU 319-3 PN/CP	ISO-on-TCP connection	No	Ethernet(1) [E]	0003 A050	0003 A050	SIMATIC 319 / CPU 319-3 PN/CP	TCP connection	No	Ethernet(1) [E]	0004 A050	0004 A050	SIMATIC 319 / CPU 319-3 PN/CP	TCP connection	No	Ethernet(1) [E]	0005 A050		ISO_FETCH	ISO-on-TCP connection	No	Ethernet(1) [E]	0006 A050		ISO_WRITE	ISO-on-TCP connection	No	Ethernet(1) [E]	0007 A050		TCP/IP	TCP connection	-	Ethernet(1) [E]	0008 A050		(All multicast nodes)	UDP connection	-	Ethernet(1) [E]	0009 A050		(All broadcast nodes)	UDP connection	-	Ethernet(1) [E]
Local ID	Partner ID	Partner	Type	Active connection partner	Subnet																																																																											
2		Unknown	S7 connection	Yes	Ethernet(1) [E]																																																																											
3		Unknown	S7 connection	Yes	Ethernet(1) [E]																																																																											
4	1	SIMATIC 319 / CPU 319-3 PN/CP	S7 connection	No	Ethernet(1) [E]																																																																											
0001 A050	0001 A050	SIMATIC 319 / CPU 319-3 PN/CP	ISO-on-TCP connection	No	Ethernet(1) [E]																																																																											
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0006 A050		ISO_WRITE	ISO-on-TCP connection	No	Ethernet(1) [E]																																																																											
0007 A050		TCP/IP	TCP connection	-	Ethernet(1) [E]																																																																											
0008 A050		(All multicast nodes)	UDP connection	-	Ethernet(1) [E]																																																																											
0009 A050		(All broadcast nodes)	UDP connection	-	Ethernet(1) [E]																																																																											

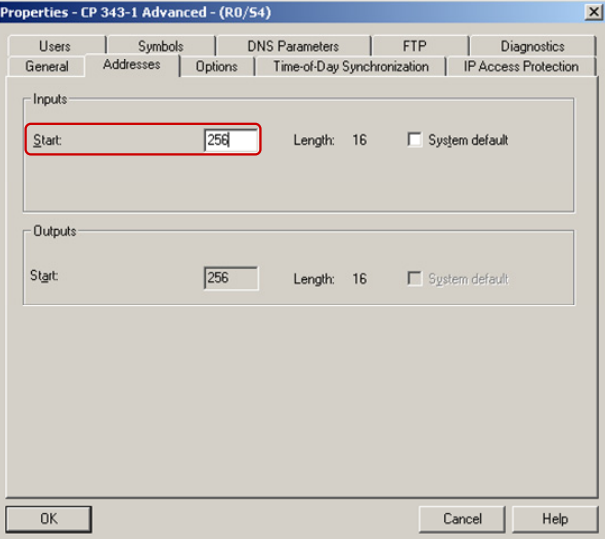
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No.	Action	Screenshot
3.	Select the SIMATIC 300 station "SIMATIC 315". Then save and compile the configuration and load it to the CPU.	

**6.3.3 Calling and configuring the function blocks FB170 "SR\_DIAG" and FB171 "S7\_DIAG", and loading the user program**

In the user program of the CPU315-2DP you call the function blocks FB170 "SR\_DIAG" and FB171 "S7\_DIAG".

Table 6-6

	Action	Screenshot
1.	Call the function blocks FB170 "SR_DIAG" and FB171 "S7_DIAG" in OB1. At the input parameter LADDR of the FB170 "SR_DIAG" you enter the module start address of the Industrial Ethernet CP.	<pre>CALL "SR_DIAG" , "iDB_SR" LADDR:=W#16#100  CALL "S7_DIAG" , "iDB_S7"</pre>
2.	The module start address is available in the hardware configuration. In the Properties dialog of the Industrial Ethernet CP select the "Addresses" tab. Here you find the module start address 256 <sub>DEC</sub> = 100 <sub>HEX</sub> .	
3.	After you have called and configured the function blocks in OB1 you load the user program to the CPU315-2DP.	

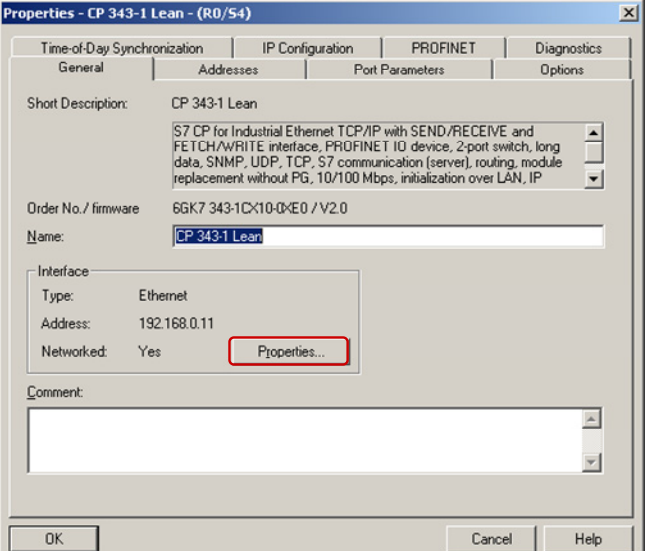
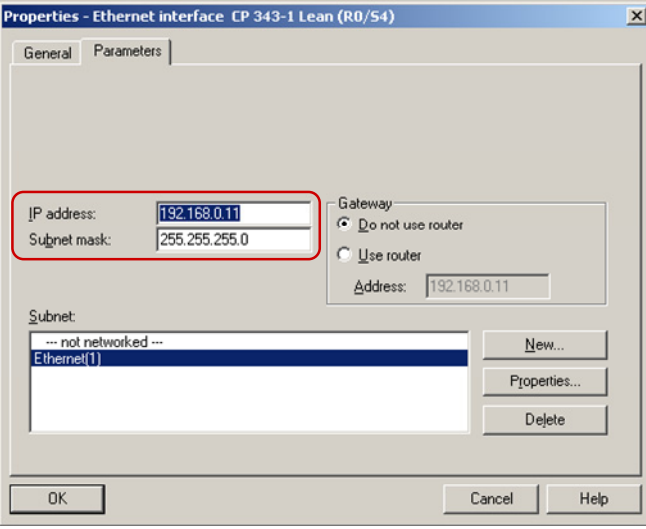
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## 6.4 Commissioning the S7 station B

### 6.4.1 Loading the hardware configuration

In the hardware configuration of S7 station B you enter the already assigned IP address for the CP343-1 (see chapter “5.1” “Installation of the hardware”).

Table 6-7

	Action	Screenshot
1.	Open the Properties dialog of the CP343-1 and click the “Properties...” button.	
2.	In the “Properties - Ethernet interface CP343-1 Lean” dialog select the “Parameters” tab and enter IP address and subnet mask which you have already assigned to the CP343-1. Acknowledge the entry with “OK”.	

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	Action	Screenshot
3.	Save and compile the hardware configuration of the S7-300 station and load it onto your CPU.	

**6.4.2 Loading the communication connections**

When loading the communication connections proceed as follows:

Table 6-8

No.	Action	Screenshot																																										
1.	Open NetPro in the SIMATIC Manager via menu Options → Configure Network or via the “Configure Network” button.																																											
2.	Select the CPU of the SIMATIC Station “SIMATIC 319”. The connection table shows you the configured S7 and SEND/RECEIVE connections.	<table border="1" data-bbox="790 1657 1364 1747"> <thead> <tr> <th>Local ID</th> <th>Partner ID</th> <th>Partner</th> <th>Type</th> <th>Active connection partner</th> <th>Subnet</th> </tr> </thead> <tbody> <tr> <td>0001 A050</td> <td>0001 A050</td> <td>SIMATIC 319 / CPU 319-3 DP</td> <td>S7 connection</td> <td>Yes</td> <td>control(1)</td> </tr> <tr> <td>0002 A050</td> <td>0002 A050</td> <td>SIMATIC 315 / CPU 315-2 DP</td> <td>ISO-on-TCP connection</td> <td>Yes</td> <td>Ethernet(1)</td> </tr> <tr> <td>0003 A050</td> <td>0003 A050</td> <td>SIMATIC 315 / CPU 315-2 DP</td> <td>TCP connection</td> <td>Yes</td> <td>Ethernet(1)</td> </tr> <tr> <td>0004 A050</td> <td>0004 A050</td> <td>SIMATIC 315 / CPU 315-2 DP</td> <td>TCP connection</td> <td>Yes</td> <td>Ethernet(1)</td> </tr> <tr> <td>0005 A050</td> <td>0001 A050</td> <td>SIMATIC 400 / CPU 415-2 DP</td> <td>ISO-on-TCP connection</td> <td>No</td> <td>Ethernet(1)</td> </tr> <tr> <td>0006 A050</td> <td></td> <td>(All multicast nodes)</td> <td>UDP connection</td> <td>-</td> <td>Ethernet(1)</td> </tr> </tbody> </table>	Local ID	Partner ID	Partner	Type	Active connection partner	Subnet	0001 A050	0001 A050	SIMATIC 319 / CPU 319-3 DP	S7 connection	Yes	control(1)	0002 A050	0002 A050	SIMATIC 315 / CPU 315-2 DP	ISO-on-TCP connection	Yes	Ethernet(1)	0003 A050	0003 A050	SIMATIC 315 / CPU 315-2 DP	TCP connection	Yes	Ethernet(1)	0004 A050	0004 A050	SIMATIC 315 / CPU 315-2 DP	TCP connection	Yes	Ethernet(1)	0005 A050	0001 A050	SIMATIC 400 / CPU 415-2 DP	ISO-on-TCP connection	No	Ethernet(1)	0006 A050		(All multicast nodes)	UDP connection	-	Ethernet(1)
Local ID	Partner ID	Partner	Type	Active connection partner	Subnet																																							
0001 A050	0001 A050	SIMATIC 319 / CPU 319-3 DP	S7 connection	Yes	control(1)																																							
0002 A050	0002 A050	SIMATIC 315 / CPU 315-2 DP	ISO-on-TCP connection	Yes	Ethernet(1)																																							
0003 A050	0003 A050	SIMATIC 315 / CPU 315-2 DP	TCP connection	Yes	Ethernet(1)																																							
0004 A050	0004 A050	SIMATIC 315 / CPU 315-2 DP	TCP connection	Yes	Ethernet(1)																																							
0005 A050	0001 A050	SIMATIC 400 / CPU 415-2 DP	ISO-on-TCP connection	No	Ethernet(1)																																							
0006 A050		(All multicast nodes)	UDP connection	-	Ethernet(1)																																							

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No.	Action	Screenshot
3.	Select the SIMATIC 300 station "SIMATIC 319". Then save and compile the configuration and load it to the CPU.	<p>The screenshot shows the NetPro interface with a network diagram. Two SIMATIC 300 stations are visible: SIMATIC 315 and SIMATIC 319. The SIMATIC 319 station is highlighted in blue. In the toolbar, the 'download' icon (a computer with a downward arrow) and the 'Save and compile' icon (a document with a checkmark) are circled in red. Red arrows point from these icons to the labels 'download' and 'Save and compile' respectively. The network diagram shows connections for Ethernet, Industrial Ethernet, MPI(1), and MPI between the two stations.</p>

**6.4.3 Loading the user program**

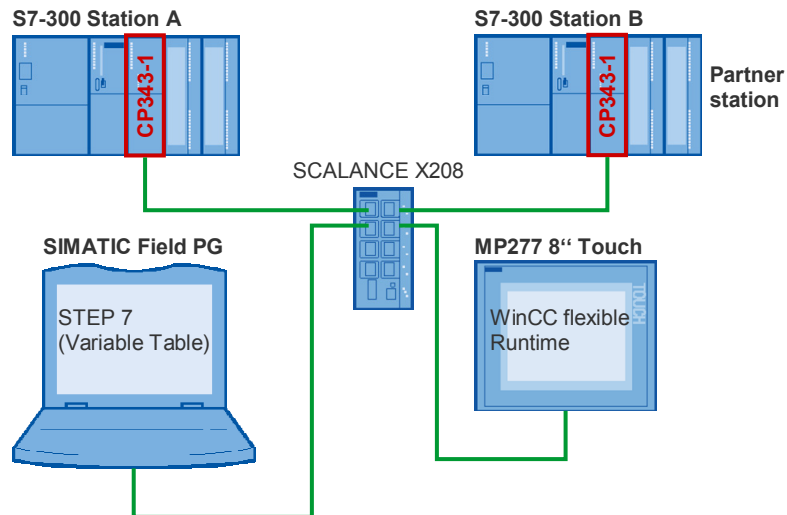
Load the user program to the CPU 319-3PN/DP.

# 7 Operating the Application

## 7.1 Overview

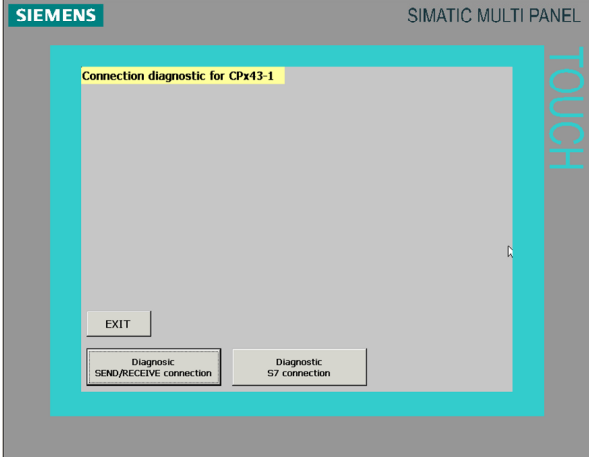
The status information of the S7 connections and SEND/RECEIVE connections, which are configured for the CP343-1 in S7-300 station A, are displayed in WinCC flexible Runtime on the multi panel MP277 8" Touch.

Figure 7-1



If you start WinCC flexible Runtime on the HMI Multi Panel, the start screen will be display.

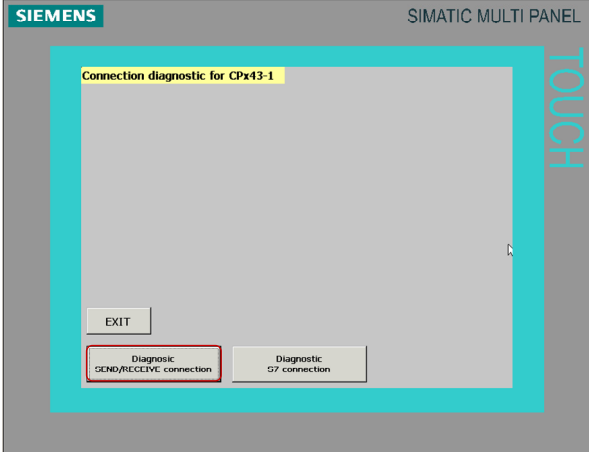
Table 7-1

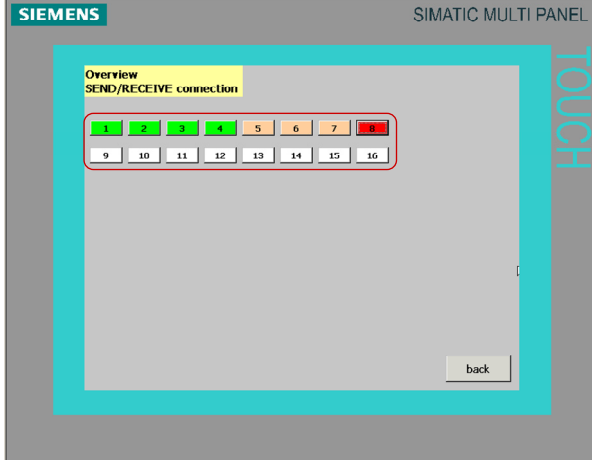
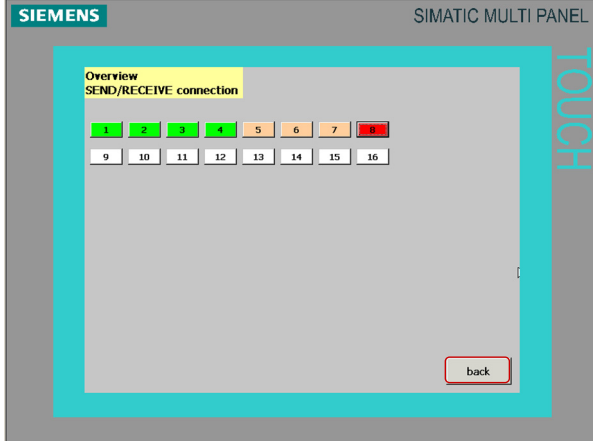
No.	Action	Screenshot
1.	<p>The start screen of WinCC flexible Runtime, which runs on the multi panel MP277 8" Touch, has three buttons:</p> <ol style="list-style-type: none"> <li>1. EXIT, to exit WinCC flexible Runtime</li> <li>2. Diagnostic SEND/RECEIVE connection, to open the connection view of the SEND/RECEIVE connection</li> <li>3. Diagnostic SEND/RECEIVE connection, to open the connection overview of the S7 connection</li> </ol>	

## 7.2 Connection overview of the SEND/RECEIVE connections

The connection overview displays the status of all possible SEND/RECEIVE connections of the Industrial Ethernet CP. This enables a fast diagnostic of the configured SEND/RECEIVE connection.

Table 7-2

No.	Action	Screenshot
1.	<p>In the start screen you click on the "Diagnostic SEND/RECEIVE connection" button to open the connection overview of the SEND/RECEIVE connections.</p>	

No.	Action	Screenshot
2.	<p>In the connection overview of the SEND/RECEIVE connections the connection number and the connection status determined in the S7 program for all possible SEND/RECEIVE connections are visualized via buttons.</p> <p>The number of displayed buttons is determined dynamically. It depends on the maximum number of configurable SEND/RECEIVE connections. The maximum number of configurable SEND/RECEIVE connections is determined in the S7 program.</p>	
3.	<p>Click on the “back” button to quit the connection overview of the SEND/RECEIVE connections and return to the start screen.</p>	

### Connection status

The connection status of the SEND/RECEIVE connections determined in the S7 program is stored in the instance data block DB170 in the CONN array and represented via the color of the button.

The following tags of the CONN array are assigned to the buttons with connection numbers. The buttons are displayed in colors which depend on the value of these tags.

Table 7-3

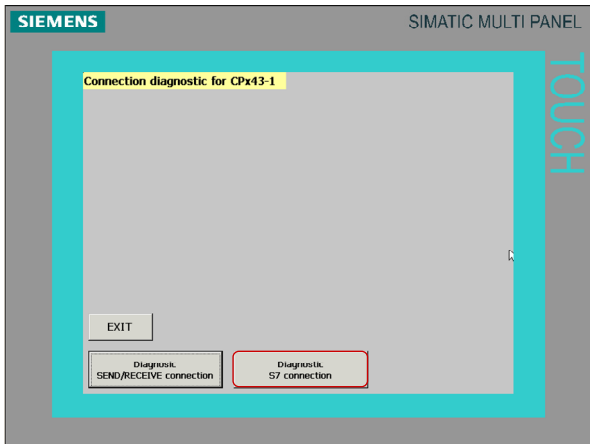
Button	Tag of the CONN array	Value (dec)	Color	Connection status
1	CONN[1].CONN_STATUS	0		connection is disconnected
		1		establishment is in process
		2		disconnection is in process
		3		connection is established
		4		unknown
		5		unknown
		6		unknown
7		unknown		

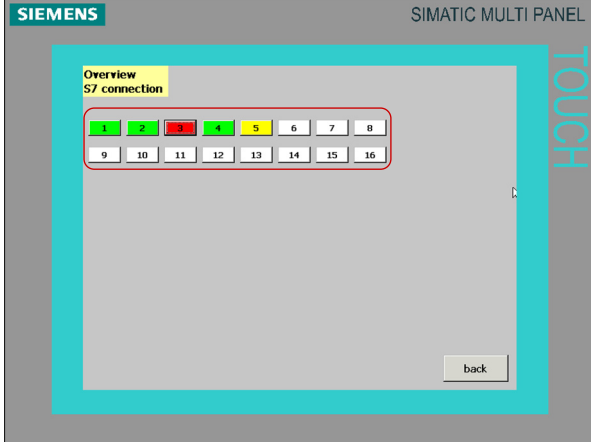
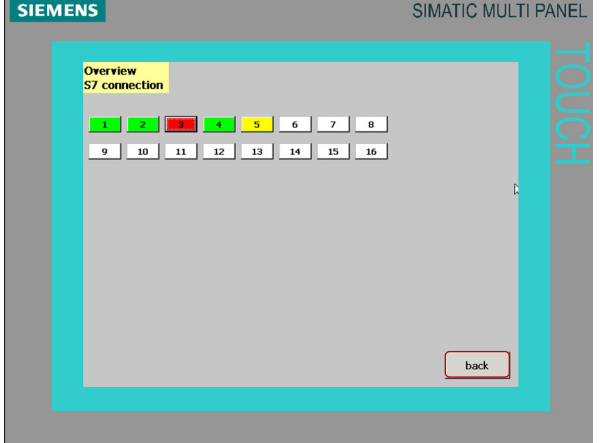
Button	Tag of the CONN array	Value (dec)	Color	Connection status
2	CONN[2].CONN_STATUS	0	Red	connection is disconnected
		1	Orange	establishment is in process
		2	Yellow	disconnection is in process
		3	Green	connection is established
		4		unknown
		5		unknown
		6		unknown
		7		unknown
...				
64	CONN[64].CONN_STATUS	0	Red	connection is disconnected
		1	Orange	establishment is in process
		2	Yellow	disconnection is in process
		3	Green	connection is established
		4		unknown
		5		unknown
		6		unknown
		7		unknown

### 7.3 Connection overview of the S7 connections

The connection overview displays the status of all possible S7 connections of the Industrial Ethernet CP. This enables a fast diagnostic of the configured S7 connection.

Table 7-4

No.	Action	Screenshot
1.	In the start screen you click on the "Diagnostic S7 connection" button to open the connection overview of the S7 connections.	

No.	Action	Screenshot
2.	<p>In the connection overview of the S7 connections the connection number and the connection status determined in the S7 program for all possible S7 connections are visualized via buttons.</p> <p>The number of displayed buttons is determined dynamically. It depends on the maximum number of configurable S7 connections. The maximum number of configurable S7 connections is determined in the S7 program.</p>	
3.	<p>Click on the “back” button to quit the connection overview of the S7 connections and return to the start screen.</p>	

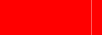



### Connection status

The connection status of the S7 connections determined in the S7 program is stored in the instance data block DB171 in the CONN\_STATUS array and represented via the color of the button.

The following tags are assigned to the buttons with connection numbers. The buttons are displayed in colors which depend on the value of these tags.

Table 7-5

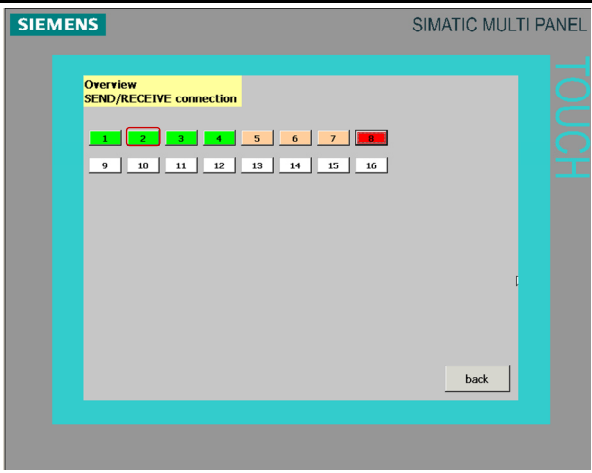
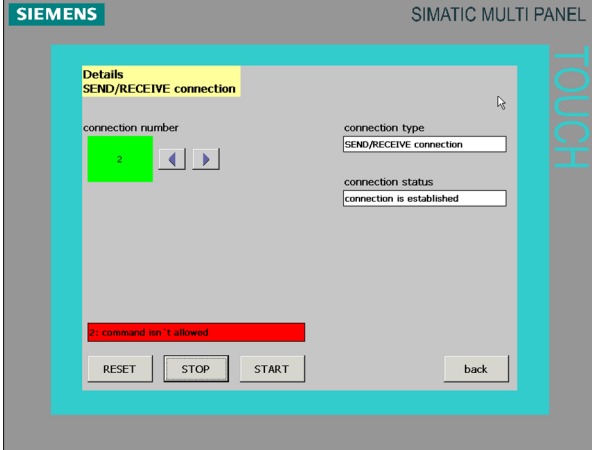
Button	Tag	Value (dec)	Color	Connection status
1	CONN_STATUS[1]	0	Red	connection is disconnected
		1	Orange	establishment is in process
		2	Green	connection is established
		15	Yellow	connection status is not available
		255	White	connection is not configured
2	CONN_STATUS[2]	0	Red	connection is disconnected
		1	Orange	establishment is in process
		2	Green	connection is established
		15	Yellow	connection status is not available

Button	Tag	Value (dec)	Color	Connection status
		255		connection is not configured
...				
64	CONN_STATUS[64]	0		connection is disconnected
		1		establishment is in process
		2		connection is established
		15		connection status is not available
		255		connection is not configured

## 7.4 Details view of the SEND / RECEIVE connection diagnostic

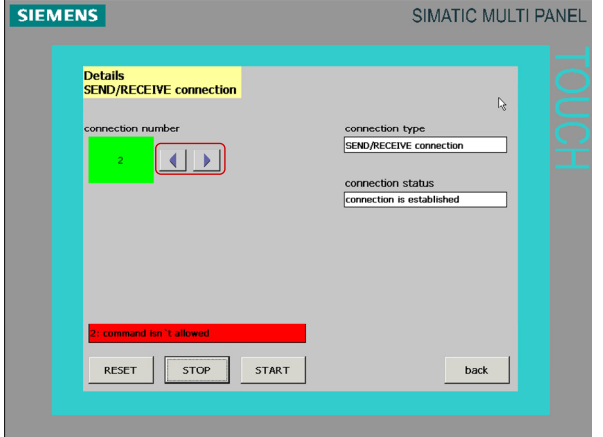
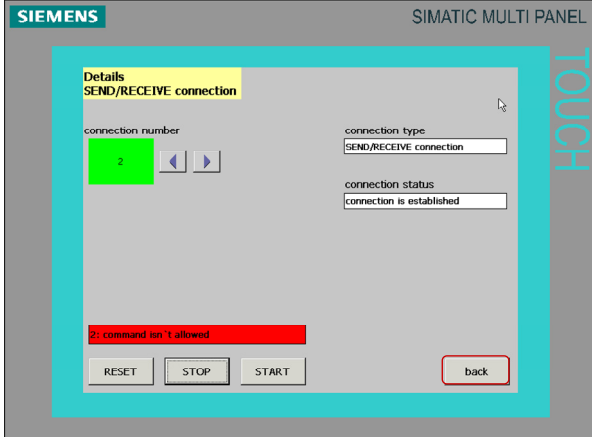
The details view shows the status information of the certain selected SEND/RECEIVE connection.

Table 7-6

No.	Action	Screenshot
4.	<p>In the connection overview you click the button of a SEND/RECEIVE connection to open its details view for the connection diagnostics.</p> <p>The HMI_CONN tag is set to the value displayed on the button. This value corresponds to the connection number of the SEND/RECEIVE connection.</p> <p>The HMI_Detail tag of data type Bool is set to the value "true".</p>	
5.	<p>The details view of the SEND/RECEIVE connection diagnostic displays the following status information of the certain selected connection:</p> <ul style="list-style-type: none"> <li>• Connection number</li> <li>• Connection type</li> <li>• Connection status</li> </ul>	

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No.	Action	Screenshot
6.	Click the arrow buttons to go to the details view of the previous or subsequent SEND/RECEIVE connection.	
7.	Click on the “back” button to quit the details view of the SEND/RECEIVE connection diagnostic and return to the overview of the SEND/RECEIVE connections. The HMI_CMD_STATUS tag is set to the value 0 and the HMI_Detail tag is reset to “false”.	

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### 7.4.1 Visualizing the status information

To display the status information in WinCC flexible Runtime the following tags of the instance data block DB170 are linked with WinCC flexible basic objects in the details view.

Table 7-7

WinCC flexible basic object	Tag	Data type	Description
I/O field	HMI_CONN	INT	Connection number
Symbolic I/O field	HMI_CONN_TYPE	BYTE	Connection type
Symbolic I/O field	HMI:CONN_STATUS	BYTE	Connection status

#### Connection number

The connection number is visualized via the HMI\_CONN tag. The value of the HMI\_CONN tag is displayed in an I/O field.

The background color of the I/O field depends on the value of the HMI\_CONN\_STATUS tag, i.e. the background color of the I/O field displays the connection status of the selected SEND/RECEIVE connection.

Table 7-8

Value of the HMI_CONN_STATUS (dec) tag	Connection status	Background color I/O field
0	connection is disconnected	
1	establishment is in process	
2	disconnection is in process	
3	connection is established	
4	unknown	
5	unknown	
6	unknown	
7	unknown	

### Connection status

The connection status is visualized via the HMI\_CONN\_STATUS tag and displayed as text in a symbolic I/O field. The text to display the connection status is stored in the text list "SR\_Connection\_Status". Depending on the value of the HMI\_CONN\_STATUS tag the respective text is displayed.

Table 7-9

Value of the HMI_CONN_STATUS (dec) tag	Connection status	Text list SR_Connection_Status
0	connection is disconnected	connection is disconnected
1	establishment is in process	establishment is in process
2	disconnection is in process	disconnection is in process
3	connection is established	connection is established
4	unknown	unknown
5	unknown	unknown
6	unknown	unknown
7	unknown	unknown

### Connection type

The connection type is visualized via the HMI\_CONN\_TYPE tag and displayed as text in a symbolic I/O field. The text to display the connection type is stored in the text list "SR\_Connection\_Type". Depending on the value of the HMI\_CONN\_STATUS tag the respective text is displayed.

Table 7-10

Value of the HMI_CONN_Type (dec) tag	Connection type	Text list SR_Connection_Type
0	unknown	connection type is unknown
1	SEND/RECEIVE connection	SEND/RECEIVE connection
2	FETCH connection	FETCH connection
3	-	not possible
4	WRITE connection	WRITE connection
5	-	not possible
6	-	not possible

Value of the HMI_CONN_Type (dec) tag	Connection type	Text list SR_Connection_Type
7	-	not possible
8	undefined, e.g. FTP connection or e-mail connection	undefined connection type
9	-	not possible
10	-	not possible
11	-	not possible
12	-	not possible
13	-	not possible
14	-	not possible
15	-	not possible

### 7.4.2 Functions

In the details view of the SEND/RECEIVE connection diagnostic the following functions are available to the user:

- RESET (reset the connection)
- STOP (stop the connection)
- START (start the connection)

These functions are implemented in FB170 "SR\_DIAG". In WinCC flexible Runtime you can control these functions in the details view of the SEND/RECEIVE connection diagnostic via buttons (see Table 7-11).

Table 7-11

Button	Action	Comment
<b>Reset the connection</b>		
RESET	<p>Click on the "RESET" button to reset the SEND/RECEIVE connection selected in the details view, i.e. the connection is automatically stopped and restarted via the S7 program.</p> <p>When the job has been completed, you can reset the same connection or a different connection again by clicking the "RESET" button.</p>	<ul style="list-style-type: none"> <li>The HMI_CONN_RESET tag of data type BOOL is set to the value "true".</li> <li>The FC10 "AG_CNTRL" is called with the input parameter CMD=2 and the connection number of the selected SEND/RECEIVE connection is assigned to the input parameter ID.</li> <li>Changes of the connection status are displayed in the details view.</li> </ul>
<b>Stop the connection</b>		
STOP	<p>Click on the "STOP" button to automatically stop the SEND/RECEIVE connection selected in the details view via the S7 program.</p> <p>As soon as the connection is stopped you click the "START" button to restart it.</p>	<ul style="list-style-type: none"> <li>The HMI_CONN_STOP tag of data type BOOL is set to the value "true".</li> <li>The FC10 "AG_CNTRL" is called with the input parameter CMD=6 and the connection number of the selected connection is assigned to the input parameter ID.</li> <li>Changes of the connection status are displayed in the details view.</li> </ul>
<b>Stop the connection</b>		
START	<p>Click on the "START" button to automatically start the SEND/RECEIVE connection selected in the details view via the S7 program.</p> <p>The requirement is that the connection has previously been stopped via the "STOP" button hence with CMD=6.</p>	<ul style="list-style-type: none"> <li>The HMI_CONN_START tag of data type BOOL is set to the value "true".</li> <li>The FC10 "AG_CNTRL" is called with the input parameter CMD=7 and the connection number of the selected connection is assigned to the input parameter ID.</li> <li>Changes of the connection status are displayed in the details view.</li> </ul>

### 7.4.3 Job status

The job status of FC10 "AG\_CNTRL" for realizing the above functions is visualized via the HMI\_CMD\_STATUS tag and displayed in a symbolic I/O field as text. The symbolic I/O field is only visible if the job status has the value  $\neq 0$ . The text to display the job status is stored in the text list "CMD\_ERROR". Depending on the value of the HMI\_CMD\_STATUS tag the respective text is displayed.

Table 7-12

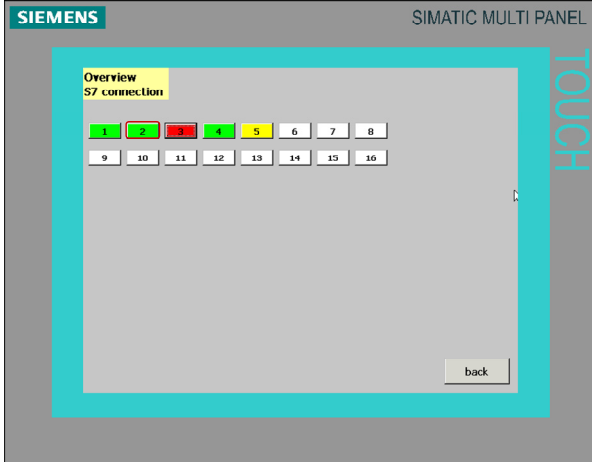
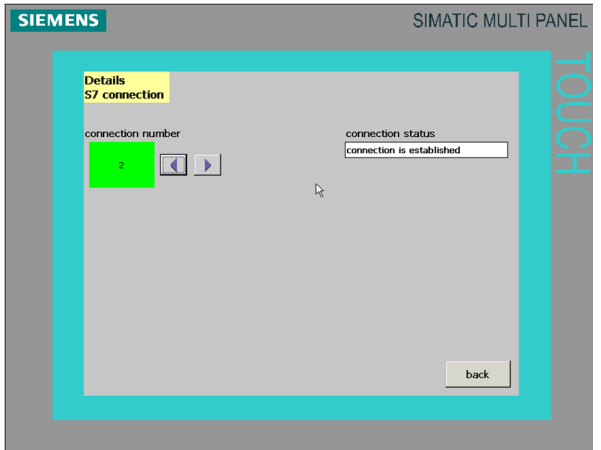
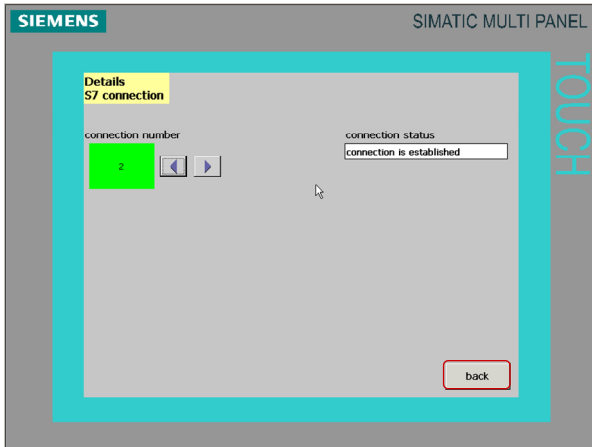
Value of the HMI_CMD_STATUS (dec) tag	Job status	Text list CMD_ERROR
0	job completed successfully	0: request is completed successfully
1	function not available	1: function not available
2	command isn't allowed	2: command isn't allowed
9	general error	9: general failure

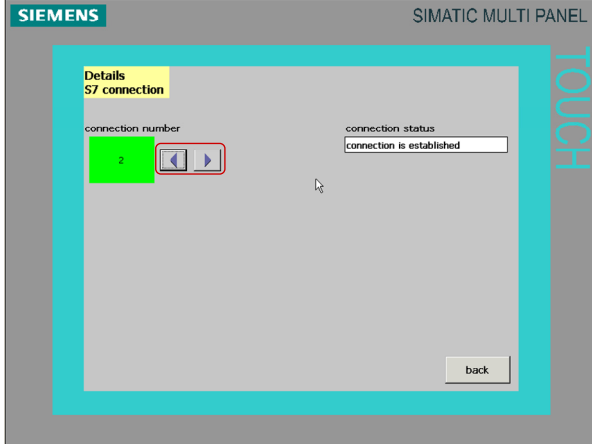
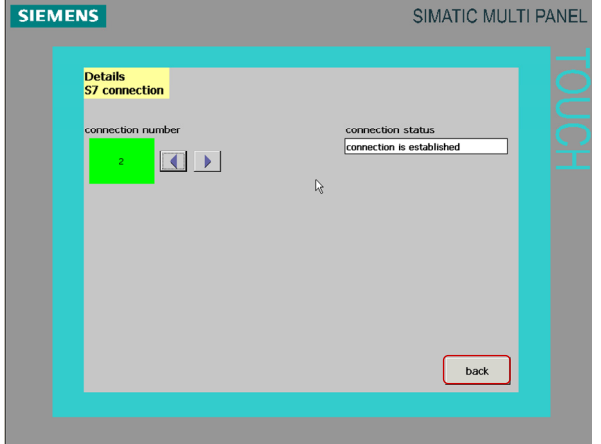
If the HMI\_CMD\_STATUS tag has the value 0, then the symbolic I/O field for display of the job status is hidden.

## 7.5 Details view of the S7 connection diagnostic

The details view shows the status information of the certain selected S7 connection.

Table 7-13

No.	Action	Screenshot
1.	<p>In the connection overview you click the button of an S7 connection to open its details view for the connection diagnostics.</p> <p>The HMI_CONN tag is set to the value displayed on the button. This value corresponds to the connection number of the S7 connection.</p> <p>The HMI_Detail tag of data type Bool is set to the value "true".</p>	
2.	<p>The details view of the S7 connection diagnostic displays the following status information of a certain selected connection:</p> <ul style="list-style-type: none"> <li>• Connection number</li> <li>• Connection status</li> </ul>	
3.	<p>Click on the "back" button to quit the details view of the S7 connection diagnostic and return to the overview of the S7 connections.</p> <p>The HMI_Detail tag is set to the value "false".</p>	

No.	Action	Screenshot
4.	Click the arrow buttons to go to the details view of the previous or subsequent S7 connection.	
5.	Click on the “back” button to quit the details view of the S7 connection diagnostic and return to the overview of the S7 connections. The HMI_Detail tag is set to the value “false”.	

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### 7.5.1 Visualizing the status information

To display the status information in WinCC flexible Runtime the following tags of the instance data block DB171 are linked with WinCC flexible basic objects in the details view.

Table 7-14

WinCC flexible basic object	Tag	Data type	Description
I/O field	HMI_CONN	INT	Connection number
Symbolic I/O field	HMI:CONN_STATUS	BYTE	Connection status

#### Connection number

The connection number is visualized via the HMI\_CONN tag. The value of the HMI\_CONN tag is displayed in an I/O field.

The background color of the I/O field depends on the value of the HMI\_CONN\_STATUS tag, i.e. the background color of the I/O field displays the connection status of the selected S7 connection.

Table 7-15

Value of the HMI_CONN_STATUS (dec) tag	Connection status	Background color I/O field
0	connection is disconnected	Red
1	establishment is in process	Orange
2	connection is established	Green
15	connection status is not available	Yellow
255	connection is not configured	

### Connection status

The connection status is visualized via the HMI\_CONN\_STATUS tag and displayed as text in a symbolic I/O field. The text to display the connection status is stored in the text list "S7\_Connection\_Status". Depending on the value of the HMI\_CONN\_STATUS tag the respective text is displayed.

Table 7-16

Value of the HMI_CONN_STATUS (dec) tag	Connection status	Text list S7_Connection_Status
0	connection is disconnected	connection is disconnected
1	establishment is in process	establishment is in process
2	connection is established	connection is established
15	connection status is not available	connection status is not available
255	connection is not configured	connection is not configured

## 8 Links & Literature

### 8.1 Internet Links

The following list is by no means complete and only provides a selection of appropriate sources.

Table 8-1

	Topic	Title
\1\	Manual MP277	<a href="http://support.automation.siemens.com/WW/view/en/23337820">http://support.automation.siemens.com/WW/view/en/23337820</a>
\2\	FC10 "AG_CNTRL"	<a href="http://support.automation.siemens.com/WW/view/en/22637440">http://support.automation.siemens.com/WW/view/en/22637440</a>
\3\	FC62 "C_CNTRL"	<a href="http://support.automation.siemens.com/WW/view/en/1214574">http://support.automation.siemens.com/WW/view/en/1214574</a>
\4\	FC5 "AG_SEND"/ FC6 "AG_RECV"	<a href="http://support.automation.siemens.com/WW/view/en/17853532">http://support.automation.siemens.com/WW/view/en/17853532</a>
\5\	FC50 "AG_LSEND"/ FC60 "AG_LRECV"	<a href="http://support.automation.siemens.com/WW/view/en/24693800">http://support.automation.siemens.com/WW/view/en/24693800</a>
\6\	FB14 "GET"/ FB15 "PUT"	<a href="http://support.automation.siemens.com/WW/view/en/22792404">http://support.automation.siemens.com/WW/view/en/22792404</a>
\7\	SFB14 "GET"/ SFB15 "PUT"	<a href="http://support.automation.siemens.com/WW/view/en/23378099">http://support.automation.siemens.com/WW/view/en/23378099</a>
\8\	FB12 "BSEND"/ FB13 "BRCV"	<a href="http://support.automation.siemens.com/WW/view/en/22789990">http://support.automation.siemens.com/WW/view/en/22789990</a>
\9\	FTP	<a href="http://support.automation.siemens.com/WW/view/en/30374198">http://support.automation.siemens.com/WW/view/en/30374198</a>
\10\	WinCC flexible 2008	<a href="http://support.automation.siemens.com/WW/view/en/18796010">http://support.automation.siemens.com/WW/view/en/18796010</a>
\11\	WinCC flexible 2008 Communication Part1	<a href="http://support.automation.siemens.com/WW/view/en/18797552">http://support.automation.siemens.com/WW/view/en/18797552</a>
\12\	WinCC flexible 2008 Communication Part2	<a href="http://support.automation.siemens.com/WW/view/en/18797249">http://support.automation.siemens.com/WW/view/en/18797249</a>
\13\	STEP 7 V5.4 First Steps	<a href="http://support.automation.siemens.com/WW/view/en/18652511">http://support.automation.siemens.com/WW/view/en/18652511</a>
\14\	STEP 7 V5.4 Programming	<a href="http://support.automation.siemens.com/WW/view/en/18652056">http://support.automation.siemens.com/WW/view/en/18652056</a>
\15\	Configuring STEP 7 V5.4 Hardware and Connections	<a href="http://support.automation.siemens.com/WW/view/en/18652631">http://support.automation.siemens.com/WW/view/en/18652631</a>
\16\	FC and FB for S7-CPs	<a href="http://support.automation.siemens.com/WW/view/en/30564821">http://support.automation.siemens.com/WW/view/en/30564821</a>
\17\	WinCC flexible Runtime	<a href="http://support.automation.siemens.com/WW/view/en/18795593">http://support.automation.siemens.com/WW/view/en/18795593</a>



## 9 History

Table 9-1

Version	Date	Changes
V1.0	29.06.2010	First issue