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Using S7-300 PROFIBUS CP as DP master or DP slave

CP 342-5, STEP 7 (TIA Portal)

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Contents

1 Introduction

If you are operating an S7-300 PROFIBUS CP as DP master or DP slave, then you have to call the DP_SEND and DP_RECV instructions in the user program of the CPU.

STEP 7 (TIA Portal) includes the DP_SEND and DP_RECV instructions in the "Instructions" task card under "Communication > Communications Processor > SIMATIC NET CP > PROFIBUS CP".

2 CP 342-5 as DP Master

This chapter describes how to configure and program an S7-300 PROFIBUS CP as DP master in STEP 7 (TIA Portal). In the example, a CP 342-5 is used as DP master.

The DP_SEND instruction transfers the data of a specified DP output area to the PROFIBUS CP for output to the distributed IO.

The DP_RECV instruction reads the process data of the distributed IO and status information into the specified DP input area.

Figure 2-1
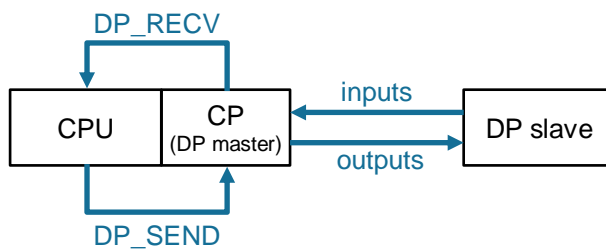
2.1 Setup

In section 2.4 we describe the parameterization of the DP_SEND and DP_RECV instructions taking the example below (see Figure 2-2).

Figure 2-2
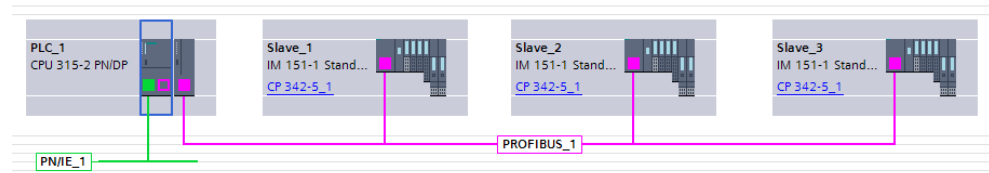
2.2 Address Area of the Inputs and Outputs

3 DP slaves with the following input and output modules are configured on the CP 342-5 (DP master):

1. Slave_1

    -   1 byte DI with the address area 0-1
    -   1 byte DO with the address area 0-1

...	Module	Rack	Slot	I address	Q address	Type	Article no.
	Slave_1	0	0			IM 151-1 Standard	6ES7 151-1AA05-0AB0
	PM-E DC24V_1	0	1			PM-E 24VDC	6ES7 138-4CA01-0AA0
	8DI x DC24V_1	0	2	0		8DI x 24VDC	6ES7 131-4BF00-0AA0
	8DO x DC24V / 0,5A_1	0	3		0	8DO x 24VDC / 0.5A	6ES7 132-4BF00-0AA0

2. Slave_2

- 1 byte DI with the address area 380-381

- 1 byte DO with the address area 470-471

...	Module	Rack	Slot	I address	Q address	Type	Article no.
	Slave_2	0	0			IM 151-1 Standard	6ES7 151-1AA05-0AB0
	PM-E DC24V_1	0	1			PM-E 24VDC	6ES7 138-4CA01-0AA0
	8DI x DC24V_1	0	2	380		8DI x 24VDC	6ES7 131-4BF00-0AA0
	8DO x DC24V / 0,5A_1	0	3		470	8DO x 24VDC / 0.5A	6ES7 132-4BF00-0AA0

3. Slave_3

- 1 byte DI with the address area 2000-2001

- 1 byte DO with the address area 2140-2141

...	Module	Rack	Slot	I address	Q address	Type	Article no.
	Slave_3	0	0			IM 151-1 Standard	6ES7 151-1AA05-0AB0
	PM-E DC24V_1	0	1			PM-E 24VDC	6ES7 138-4CA01-0AA0
	8DI x DC24V_1	0	2	2000		8DI x 24VDC	6ES7 131-4BF00-0AA0
	8DO x DC24V / 0,5A_1	0	3		2140	8DO x 24VDC / 0.5A	6ES7 132-4BF00-0AA0

The address area of the inputs is 2001 bytes (0-2000).

The address area of the outputs is 2141 bytes (0-2140).

2.3 Module Start Address

1. Mark the CP 342-5 in the Network view or Device view. The properties of the CP 342-5 are displayed in the inspector window.

2. Go to the "General" tab and navigate to "I/O addresses" to determine the module start address. In this example the CP 342-5 has the following module start address: 256 (dec) = 16#100 (hex).

2.4 Parameterization of the DP_SEND and DP_RECV Instructions

Call the DP_SEND and DP_RECV instructions in the user program of the CPU. In this example the call is made cyclically in OB1.

DP_SEND

The following figure shows the call of the DP_SEND instruction.

Figure 2-3

```
        CALL  DP_SEND
            CPLADDR :=W#16#100                         W#16#100
            SEND    :=P#DB1.DBX0.0 BYTE 2141    P#DB1.DBX0.0 BYTE 2141
            DONE    :="BlockData".SendDone            %DB3.DBX0.0
            ERROR   :="BlockData".SendError           %DB3.DBX0.1
            STATUS  :="BlockData".SendStatus          %DB3.DBW2
```

The table below shows the inputs of the DP_SEND instruction.

Table 2-1

Input	Data type	Description
CPLADDR	WORD	Module start address (See section 2.3)
SEND	ANY	Specify the address area of the outputs (see section 2.2).

The table below shows the outputs of the DP_SEND instruction.

Table 2-2

Output	Data type	Description
DONE	BOOLEAN	The Status parameter indicates whether the order has been executed error-free.
ERROR	BOOLEAN	Error display
STATUS	WORD	Status display

Data transfer with DP_SEND has been successfully completed when all the following conditions are fulfilled:

- Value of the output ERROR = false
- Value of the output DONE = true
- Value of the output STATUS = 16#0000

When the data has been transferred successfully, the value of the output STATUS changes between 16#0000 und 16#8180 and the value of the output DONE changes between true and false, because the DP_SEND instruction is called cyclically.

DP_RECV

The following figure shows the call of the DP_RECV instruction.

Figure 2-4

```
CALL  DP_RECV
    CPLADDR  :=W#16#100                              W#16#100
    RECV     :=P#DB2.DBX0.0 BYTE 2001       P#DB2.DBX0.0 BYTE 2001
    NDR      :="BlockData".RecvNdr                  %DB3.DBX4.0
    ERROR    :="BlockData".RecvError                %DB3.DBX4.1
    STATUS   :="BlockData".ErrorStatus              %DB3.DBW6
    DPSTATUS :="BlockData".DpStatus                 %DB3.DBB8
```

The table below shows the inputs of the DP_RECV instruction.

Table 2-3

Input	Data type	Description
CPLADDR	WORD	Module start address (See section 2.3)
RECV	ANY	Specify the address area of the outputs (see section 2.2).

The table below shows the outputs of the DP_RECV instruction.

Table 2-4

	Data type	Description
NDR	BOOLEAN	The Status parameter indicates whether new data has been received.
ERROR		Error display
STATUS		Status display
DPSTATUS		DP status display

Data transfer with DP_RECV has been successfully completed when all the following conditions are fulfilled:

- Value of the output ERROR = false

- Value of the output NDR = true

- Value of the output STATUS = 16#0000

When the data has been transferred successfully, the value of the output STATUS changes between 16#0000 und 16#8180 and the value of the output NDR changes between true and false, because the DP_RECV instruction is called cyclically.

Note	If you use the start address 0 for address area of the inputs, p#DB*.DBX0.0 Byte *, for example, then in program processing you can access the areas of the data blocks using the download and transfer commands as if the address of the data block corresponds to the addresses of the process IO. • You use the command "L DB2.DBB380" to read the input EB 380. • You use the command "T DB1.DBB470" to write to the output AB 470. The outputs are transferred and the inputs are loaded.

3 CP 342-5 a DP Slave

This chapter describes how to configure and program an S7-300 PROFIBUS CP as DP slave in STEP 7 (TIA Portal). In the example, a CP 342-5 is used as DP slave.

If you use the CP 342-5 as DP slave, you call the DP_SEND and DP_RECV instructions in the user program of the S7-300 CPU. In this way the data is transferred from the S7-300 CPU to the CP 342-5 and read.

The DP_SEND instruction transfers the input data of the DP slave to the PROFIBUS CP for transfer to the DP master.

The DP_RECV instruction reads the output data transferred from the DP master into the DP data area specified in the instruction.

The DP master reads the data out of the CP 342-5 and writes the data to the CP 342-5. In this way the CP 342-5 functions as a data buffer between the controllers of the DP slave and the DP master. You have to configure a communication for the DP slave and the DP master.
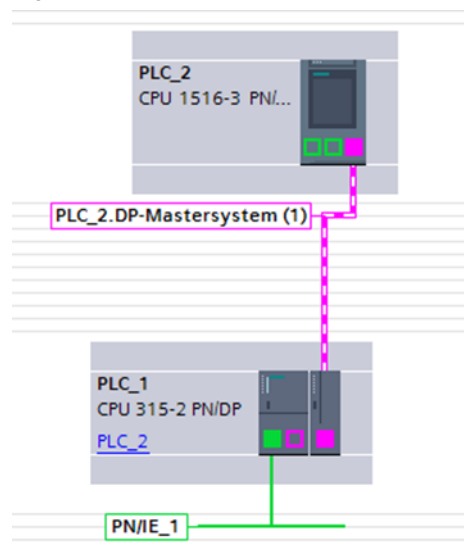
Figure 3-1
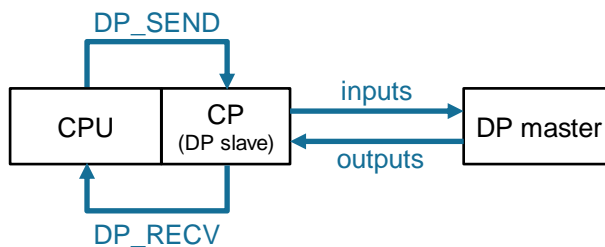
3.1 Setup

In section 3.5 we describe the parameterization of the DP_SEND and DP_RECV instructions taking the example below (see Figure 3-2).

Figure 3-2

3.2 Set DP Slave Mode

1. Mark the CP 342-5 in the Network view or Device view. The properties of the CP 342-5 are displayed in the inspector window.

2. Go to the "General" tab and under "Operating mode" you select the operating mode "DP slave".
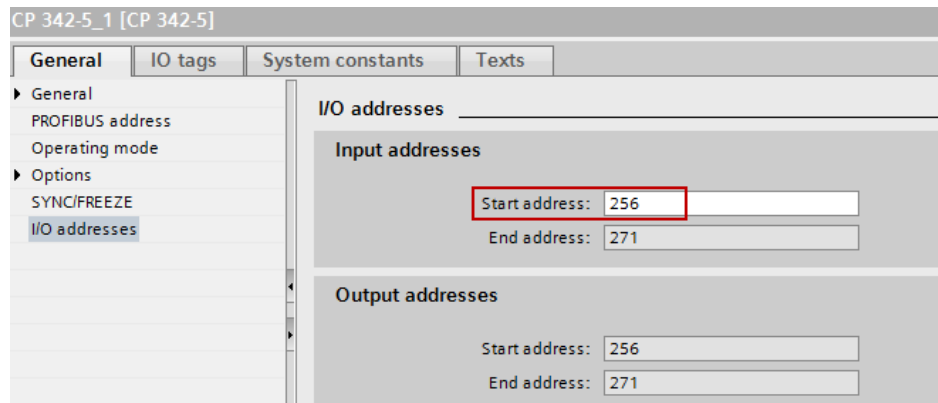
3. Assign the relevant DP master to the CP 342-5.

3.3 Create Transfer Areas

You have to create the transfer areas for the data exchange with the DP master.

1. Mark the CP 342-5 in the Network view or Device view. The properties of the CP 342-5 are displayed in the inspector window.

2. Go to the "General" tab and under "Operating mode > I-slave communication" you create the transfer areas for data exchange with the DP master. The transfer area for the inputs has a length of 15 bytes. The transfer area for the outputs has a length of 35 bytes.
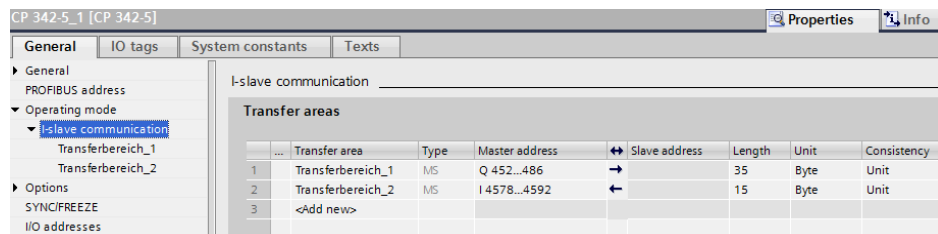
3. Only specify the master address. The slave address is configured with the DP_SEND and DP_RECV instructions.
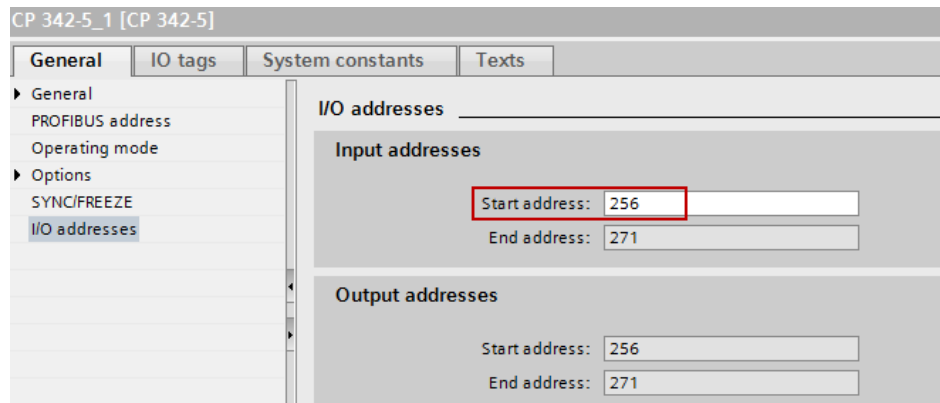
3.4   Module Start Address

1. Mark the CP 342-5 in the Network view or Device view. The properties of the CP 342-5 are displayed in the inspector window.

2. Go to the "General" tab and navigate to "I/O addresses" to determine the module start address. In this example the CP 342-5 has the following module start address: 256 (dec) = 16#100 (hex).

3.5   Parameterization of the DP_SEND and DP_RECV Instructions

Call the DP_SEND and DP_RECV instructions in the user program of the CPU. In this example the call is made cyclically in OB1.

DP_SEND

With the DP_SEND instruction the input addresses are sent to the DP master.

The following figure shows the call of the DP_SEND instruction.

Figure 3-3

The table below shows the inputs of the DP_SEND instruction.

Table 3-1

Input	Data type	Description
CPLADDR	WORD	Module start address (See section 3.4)
SEND	ANY	Specify the length of the transfer area of the inputs (see section 3.3).

The table below shows the outputs of the DP_SEND instruction.

Table 3-2

Output	Data type	Description
DONE	BOOLEAN	The Status parameter indicates whether the order has been executed error-free.
ERROR	BOOLEAN	Error display
STATUS	WORD	Status display

Data transfer with DP_SEND has been successfully completed when all the following conditions are fulfilled:

- Value of the output ERROR = false

- Value of the output DONE = true

- Value of the output STATUS = 16#0000

When the data has been transferred successfully, the value of the output STATUS changes between 16#0000 und 16#8180 and the value of the output DONE changes between true and false, because the DP_SEND instruction is called cyclically.

DP_RECV

With the DP_RECV instruction the output addresses of the DP master are received.

The following figure shows the call of the DP_RECV instruction.

Figure 3-4

```
 9          CALL  DP_RECV
10              CPLADDR  :=W#16#100                         W#16#100
11              RECV     :=P#DB2.DBX0.0 BYTE 35      P#DB2.DBX0.0 BYTE 35
12              NDR      :="GeneralData".RecvNdr             %DB3.DBX4.0
13              ERROR    :="GeneralData".RecvError           %DB3.DBX4.1
14              STATUS   :="GeneralData".RecvStatus          %DB3.DBW6
15              DPSTATUS :="GeneralData".DPStatus            %DB3.DBB8
```

The table below shows the inputs of the DP_RECV instruction.

Table 3-3

Input	Data type	Description
CPLADDR	WORD	Module start address (See section 3.4)
RECV	ANY	Specify the length of the transfer area of the outputs (see section 3.3).

The table below shows the outputs of the DP_RECV instruction.

Table 3-4

	Data type	Description
NDR	BOOLEAN	The Status parameter indicates whether new data has been received.
ERROR		Error display
STATUS		Status display
DPSTATUS		DP status display

Data transfer with DP_RECV has been successfully completed when all the following conditions are fulfilled:

- Value of the output ERROR = false
- Value of the output NDR = true
- Value of the output STATUS = 16#0000

When the data has been transferred successfully, the value of the output STATUS changes between 16#0000 und 16#8180 and the value of the output NDR changes between true and false, because the DP_RECV instruction is called cyclically.