# SIEMENS

SIMATIC


Communications processor
CP 340 PtP Printer Driver


Getting Started

## Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only have no safety alert symbol. These notices shown below are graded according to the degree of danger.

### Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.

### Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.

### Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

### Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

### Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

## Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

## Prescribed Usage

Note the following:

### Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

## Trademarks

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# First Steps in Commissioning

## Preface

These instructions show you how to output messages from a CP 340 to a printer step-by-step on the basis of a concrete example. In the process you also get to know the basic functions of the CP 340 printer driver.

The time required amounts to one to two hours, depending on your experience, plus the time required for procurement, wiring and supply with auxiliary power.

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### ⚠ Warning

As a component of plants or systems your PLC requires special rules and regulations to be observed, depending on the field of use.

The non-compliance with these regulations could result in severe injury as well as damage to machines and equipment.

Observe the applicable regulations on safety and the prevention of accidents, for example IEC 204 (EMERGENCY-OFF equipment).

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### ⚠ Warning

You may come into contact with live cables and wires if the power supply module of your PLC is activated or if the supply cable is connected to the power system.

Only wire your PLC when it is de-energized.

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## Requirements

- You have an S7-300 station consisting of

  – Rack

  – Power supply unit

  – CPU

  – CP 340 with RS 232C port and printer option

- You have an IBM-compatible printer with RS 232 interface. The printer is prepared for serial data transfer and is connected by means of an RS 232 connecting cable to the CP 340.
  An appropriate configuration of the printer should only be carried out by specialist personnel.

- STEP 7 V5.1+ Service pack 2 are installed correctly on the programming device. Ensure that all the components are compatible, starting from the operating system + service pack up to the STEP7 package + service pack + hotfix and the version of the configuration software with its updates.

- You have set up a printer output sample project for the S7–300 station.

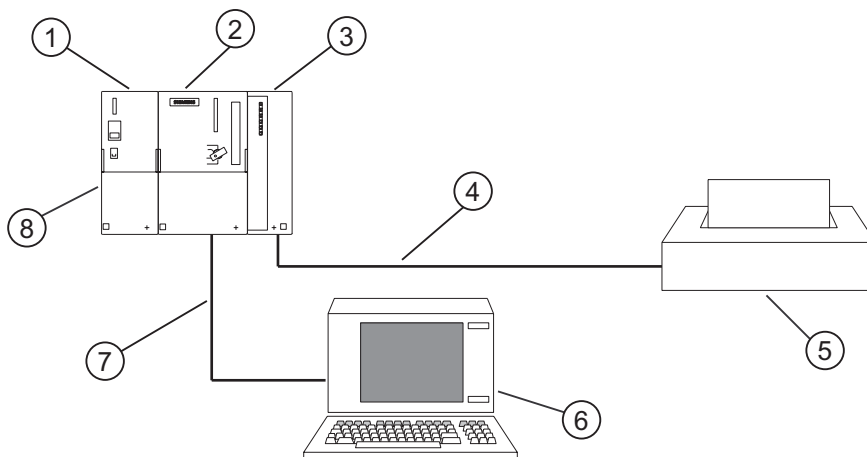- The programming device is connected to the CPU of the PLC.



Figure 1-1     Example setup

①     Power supply unit
②     CPU 3xx
③     CP 340
④     RS 232 connecting cable / CP 340 - printer
⑤     IBM-compatible printer
⑥     Programming device
⑦     MPI connecting cable / CPU - programming device
⑧     S7-300 station

## Purpose of the Getting Started Document

The purpose of the Getting Started document is to output the following messages at the following printer:

- At xx:xx:xx.xxx the value reached the limit of 1500 liters
- At xx:xx:xx.xxx the value exceeded the limit of 1500 liters
- At xx:xx:xx.xxx the value dropped below the limit of 1500 liters

Whereby xx:xx:xx.xxx is the current time of day.

The messages are created in this Getting Started by using a format string with 3 variables:

Format string:                    At    %Z      the value    %Z    the limit of   %i   liters

Message:                          At xx:xx:xx.xxx the value reached the limit of 1500 liters

Variable 1: Time of day —————————————
Variable 2: Configured message No. 0—————————————
Variable 3: Integer value 1500 —————————————

### Whereby:

- %Z: Is the conversion instruction for the data type TIME_OF_DAY
- %i: Is the conversion instruction for the data type INT, WORD, DINT, DWORD
- %N: Is the conversion instruction for outputting a message configured in HW Config

### In this Getting Started

- The format string is defined by the DB 10,
- The variables 1, 2 and 3 are defined by the DBs 6, 7 and 8,
- The DB 5 contains the pointer DB, the pointers to the DBs 6 to 10.

## 1. Step: Installing the configuration software on the programming device

The configuration software contains the function blocks required to connect to your user program as well as programming examples.

The configuration software can be found alternatively

- On the supplied CD
- In the Internet at: http://www.ad.siemens.de/simatic-cs Contribution ID: 12310504

| Step | Action | Result |
|------|--------|--------|
| 1 | Start the installation program by double-clicking the file called SETUP.EXE in the SETUP folder. | The installation program is started. |
| 2 | Follow the instructions issued by the installation program. | |

## 2. Step: configure the CP 340

| Step | Action | Result |
|---|---|---|
| 1 | Open your project in the SIMATIC Manager. | |
| 2 | In your project, call the HWCONFIG configuration table. | |
| 3 | Double-click on the CP340 RS232C. | The dialog box"CP 340-RS232C properties" opens. |
| 4 | Note the module address in the "Addresses" tab. This value is required as a parameter when calling the FB P_PRINT in your user program. | |
| 5 | Click on the **Parameters** command button. | The dialog box "Configure point-to-point coupling CP 340-RS232C" opens. |
| 6 | Select the protocol **PRINTER** and confirm with **Yes**. | The printer protocol is loaded with the following default settings: 9600 bits/s, 8 data bits, 1 stop bit, parity even, no data flow control, activate BREAK monitoring . |
| 7 | Double-click on the Protocol envelope. | The "Protocol" dialog box opens. |
| 8 | If necessary, adapt the default protocol settings to your printer protocol and confirm with **OK**. | |
| 9 | Double click the **page layout**. | The "Page layout" dialog box opens. |
| 10 | Specify the page layout and confirm with **OK**. | |
| 11 | Double click on **Messages** and then **SDB.** | The "Messages" dialog box opens. |
| 12 | Assign a name consisting of a maximum of 8 ASCII characters for the text SDB. | |
| 13 | Enter the following message numbers and message texts consecutively at "Edit message:" and click the **Enter** command button after each entry.<br><br>| Number | Text |<br>\|---\|---\|<br>| 0 | reached |<br>| 1 | exceeded |<br>| 2 | dropped below | | The message texts entered at "Edit message:" are imported into the "Message texts" overview. |
| 14 | Click the command buttons **OK** and **SDB**. | The "Messages" dialog box closes. |
| 15 | Save the configuration with **File > Save** and exit the configuration dialog box with **File > Exit**. | |
| 16 | In the "Properties CP 340-RS232C" dialog box click on the **OK** command button. | |
| 17 | Save the configuration you have created with **Station > Save** and compile in your project. | |
| 18 | Transfer the configuration with the CPU in STOP mode by choosing **PLC > Download to Module**. | The data are transferred directly to the CPU and the CP 340. The "SF" LED goes out to indicate the successful completion of downloading. |
| 19 | Use **Station > Exit** to close the HW Config. | |

### 3. Step: creating blocks in the block folder

| Step | Action | Result |
|---|---|---|
| 1 | In SIMATIC Manager use **File > Open** ... **> Libraries** in the catalog Siemens\STEP7\S7libs\CP PtP to open the blocks folder CP 340 and its blocks container. | A two-section window is opened with the title of the library and the FBs and FCs belonging to the CP 340. |
| 2 | Copy the FB 4 into the block folder of your project. | |
| 3 | In SIMATIC Manager use **File > Open** ... > Libraries in the catalog Siemens\STEP7\S7libs\StdLib30 to open the blocks folder IEC Function Blocks and its blocks container. | A two-section window is opened with the title of the library and the IEC functions. |
| 4 | Copy the FC 8 into the block folder of your project. | |
| 5 | In SIMATIC Manager use **File > Open** ... > Libraries in the catalog Siemens\STEP7\S7libs\StdLib30 to open the blocks folder IEC Function Blocks and its blocks container. | A two-section window is opened with the title of the library and the SFBs and SFCs. |
| 6 | Copy the SFC 1 into the block folder of your project. | |
| 7 | In the blocks container of your project, use **Insert > S7 block > Data blocks** the following data blocks:<br><br>{{DBTABLE}} | |
| 8 | In the blocks container of your project, use **Insert > S7 block > Variable table** to create the variable table VAT_1. | |

Table in Step 7:

| DB | Meaning in the Printer output project |
|---|---|
| DB 5 | Pointer DB |
| DB 6 | DB for the Variable 1 |
| DB 7 | DB for the Variable 2 |
| DB 8 | DB for the Variable 3 |
| DB 9 | DB for the Variable 4 |
| DB 10 | DB for the format string |

## 4. Step: calling blocks in the OB 1

| Step | Action | | | |
|------|--------|--|--|--|
| 1 | In your project open the OB 1. | | | |
| 2 | In the declaration table create the variable of the data type DATE_AND_TIME called "Time". | | | |
| 3 | In the OB 1 call the SFC 1, the FC 8 and the FB 4 and assign parameters to the blocks as follows: | | | |
| | CALL | "READ_CLK" | SFC1 | //Read date and time |
| | RET_VAL | :=MW3 | | |
| | CDT | := #Time | | Enter //date and time in the "Time" variable |
| | CALL | "DT_TOD" | FC8 | //Convert the date and time into the time of day |
| | IN | := #Time | | |
| | RET_VAL | := DB6.DBD0 | | //Placeholder for the time of day (Variable 1 in the DB 6) |
| | CALL | "P_PRINT", DB4 | FB4 | //FB for the printer output of message texts |
| | REQ | :=M1.0 | | Trigger bit, positive edge required |
| | R | := | | //Reset bit |
| | LADDR | := 256 | | //Module address of the CP 340 (from HW Config) |
| | DB_N0 | := 5 | | //Number of the Pointer DB |
| | DBB_N0 | := 0 | | //Offset in the Pointer DB |
| | DONE | := M1.1 | | //Job finished without errors |
| | ERROR | := M1.2 | | //Job finished with errors |
| | STATUS | := MW2 | | //Specification of the error |
| 4 | Save the OB 1 with **File > Save**. | | | |

## 5. Step: specifying the data structure of the blocks (also refer to the manual, section "Outputting Message Texts to a Printer")

Now specify the data structure of the blocks DB 5 to 10 and enter the initial values.

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**Note**

Please observe the following points when entering and changing initial values in data blocks:

1. Enter the initial values in the Declaration view of the data blocks.

2. Use **Data > View** to change over to the Data view.

3. Initialize the data blocks with **Edit > Initialize Data Block**.

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Table 1-1    Data structure of the DB 5 (pointer DB):

| Address | Name | Type | Initial value | Remark |
|---------|------|------|---------------|--------|
| | | STRUCT | | |
| +0.0 | DB_VAR1 | ARRAY[0..2] | 6, 0, 4 | Pointer to the DB 6 with offset 0 and length 4(DB 6 = DB for the Variable 1: "Time of day") |
| *2.0 | | INT | | |
| +6.0 | DB_VAR2 | ARRAY[0..2] | 7, 0, 2 | Pointer to the DB 7 with offset 0 and length 2(DB 7 = DB for the Variable 2: "1500") |
| *2.0 | | INT | | |
| +12.0 | DB_VAR3 | ARRAY[0..2] | 8, 0, 1 | Pointer to the DB 8 with offset 0 and length 1(DB 8 = DB for the Variable 3: "Number of the configured message") |
| *2.0 | | INT | | |
| +18.0 | DB_VAR4 | ARRAY[0..2] | 0, 0, 0 | DB No. 0: The pointer is interpreted as non-existing and is skipped. Variable 4 is not used. |
| *2.0 | | INT | | |
| +24.0 | DB_String | ARRAY[0..2] | 10, 2, 41 | Pointer to the DB 10 with offset 2 and length 41(DB 10 = DB for the format string); The specification offset 2 is necessary, since the length information of the string is container in the Byte 0 and 1. The length (in this case 41) must correspond to the number of characters which are entered at "Initial value" in the format string (in this case DB 10). |
| *2.0 | | INT | | |
| =30.0 | | END_STRUCT | | |

Save the DB 5 with **File > Save**.

Table 1-2    Data structure of the DB 6 for the Variable 1:

| Address | Name | Type | Initial value | Remark |
|---------|------|------|---------------|--------|
| 0.0 | | STRUCT | | |
| +0.0 | DB_VAR | TIME_OF_DAY | TOD#0:0:0.0 | Time of day |
| =4.0 | | END_STRUCT | | |

Save the DB 6 with **File > Save**.

Table 1-3    Data structure of the DB 7 for the Variable 2:

| Address | Name | Type | Initial value | Remark |
|---------|------|------|---------------|--------|
| 0.0 | | STRUCT | | |
| +0.0 | DB_VAR | INT | 1500 | Limit 1500 liters |
| =2.0 | | END_STRUCT | | |

Save the DB 7 with **File > Save**.

Table 1-4    Data structure of the DB 8 for the Variable 3:

| Address | Name | Type | Initial value | Remark |
|---------|------|------|---------------|--------|
| 0.0 | | STRUCT | | |
| +0.0 | DB_VAR | Byte | B#16#0 | 0 = Number of the configured message(Text of Message No. 0 = "reached") |
| =2.0 | | END_STRUCT | | |

Save the DB 8 with **File > Save**.

Table 1-5    Data structure of the DB 9 for the Variable 4:

| Address | Name | Type | Initial value | Remark |
|---------|------|------|---------------|--------|
| 0.0 | | STRUCT | | |
| +0.0 | DB_VAR | Byte | 0 | DB 9 for the Variable 4 is not used. |
| =2.0 | | END_STRUCT | | |

Save the DB 9 with **File > Save**.

Table 1-6    Data structure of the DB 10 for the format string:(also refer to the manual, section "Conversion and Control Statements for Printer Output")

| Address | Name | Type | Initial value | Remark |
|---------|------|------|---------------|--------|
| 0.0 | | STRUCT | | |
| +0.0 | DB_VAR | STRING[41] | 'At %Z the value %N the limit of %i liters' | %Z: variable 1 in the format string (time of day)<br>%i: variable 2 in the format string (1500)<br>%N: variable 3 in the format string (number of configured message)<br>The format string entered at Initial value comprises 41 characters (including the blanks).<br>The following applies for the string length to be specified at the type:<br>Number of characters at the initial value $\leq$ string length at type $\leq$ 254 |
| =2.0 | | END_STRUCT | | |

Save the DB 10 with **File > Save**.

## 6. Step: creating the variable table

Open the variable table VAT_1 and carry out the following entries:

| | Address | Symbol | Display format | Status value | Modify value | Remarks |
|---|---------|--------|----------------|--------------|--------------|---------|
| 1 | M 1.0 | | BIN | | 2#0 | Trigger bit (0-1 edge required) |
| 2 | M 1.1 | | BIN | | | |
| 3 | M 1.2 | | BIN | | | |
| 4 | DB6.DBD0 | | TIME | | | Current time of day |
| 5 | MW 2 | | HEX | | | |
| 6 | DB8.DBB0 | | HEX | | B#16#00 | Number of the configured message |

Save the variable table VAT_1 with **Table > Save**.

## 7. Step: downloading the program

| Step | Action |
|------|--------|
| 1 | In SIMATIC Manager in your project select the blocks container. |
| 2 | In the STOP state of the CPU, download these blocks to your CPU by using **PLC > Load**. |
| 3 | Switch the CPU to the RUN state. |

## 8. Step: testing the program

| Step | Action | Result |
|---|---|---|
| 1 | In the variable table switch to online by using **PLC > Create connection to > Configured CPU.>** | |
| 2 | Switch to monitor mode with **Variable > Observe**. | You can observe the current time of day at the status value of the address DB6.DBD0. |
| 3 | Create 0–1 edges at the address M 1.0, the trigger bit for the FB 4, by alternatively entering 0 and 1 as the modify value and making hte respective modify value valid by using **Variable > Modify value activate**. | At every 0–1 edge on the trigger bit, the following message is output at the printer: **At xx:xx:xx.xxx the value reached the limit of 1500 liters**. |
| 4 | At the address DB8.DBB0, change the modify value to 1 and make it valid by using **Variable > Modify valueactivate**. | |
| 5 | Create 0-1 edges at the address M 1.0 | At every 0–1 edge on the trigger bit, the following message is output at the printer: **At xx:xx:xx.xxx the value reached the limit of 1500 liters**. |
| 6 | At the address DB8.DBB0, change the modify value to 2 and make it valid by using **Variable > Modify valueactivate**. | |
| 7 | Create 0-1 edges at the address M 1.0 | At every 0–1 edge on the trigger bit, the following message is output at the printer: **At xx:xx:xx.xxx the value reached the limit of 1500 liters**. |