

Exact positioning with stepper motors (with S7-200, EM 253 POSITION and FM STEPDRIVE)

Micro Automation Set 10

V1.3 (Edition 05/2002)

Preliminary Remarks

As a start-up aid, this document provides test code as well as test parameter sets to assist you in your first steps and tests with the Micro Automation Sets. These sets enable quick testing of hardware and software interfaces between the products described in the Micro Automation Sets.

The test code is always assigned to the **components used** in the set, and shows their principal interaction, however, it is not a real application in the sense of technological problem solving with definable properties.

1 **Warranty/Disclaimer of Liability**

These software samples do not purport to cover all details or variations in equipment, nor do they provide for every possible contingency. The software samples are no customer specific solution. Every user is responsible for proper operation of the described products. These software samples do not relieve you of the responsibility to use sound practices in application, installation, operation and maintenance. By using these software samples, you acknowledge that Siemens shall not be liable under any theory for damages or personal injury resulting from such use.

Siemens reserves the right to make changes in these software samples at any time without notice or obligation. Should a conflict arise between the suggestions in these software samples and other Siemens publications such as the S7-200 Programmable Controller System Manual or the SIMATIC S7 / M7 / C7 Programmable Controllers Catalog ST 70, the other publication shall take precedence.

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2 Used Components

Products

| Component | Type | MLFB/Ordering informaton | No. | Manufacturer |
|--|-----------------|--------------------------|-----|--------------|
| S7-200 CPU | CPU 224 | 6ES7 214-1BD22-0XB0 | 1 | SIEMENS A&D |
| Expansion module | EM 253 POSITION | 6ES7 253-1AA22-0XA0 | 1 | |
| Power section for controlling stepper motors | FM STEPDRIVE | 6SN1227-2ED10-0HA0 | 1 | |
| Stepper motor | SIMOSTEP 2Nm | 1FL3041-0AC31-0BK0 | 1 | |

Accessories

| Component | Type | MLFB/Ordering informaton | No. | Manufacturer |
|---|--|--------------------------|-----|--------------|
| Connection cable between motor and Stepdrive FM | Double-shielded power cable 3x1.5mm ² | 6FX5008-5AA00-1BA0 | 1 | SIEMENS A&D |
| Connector for pulse interface Stepdrive FM | 15 pole Sub-D, female | 6FC9348-7HX | 1 | |

Configuration software/tools

| Component | Type | MLFB/Ordering informaton | No. | Manufacturer |
|-------------------|--------------|--------------------------|-----|--------------|
| STEP7 MicroWin 32 | from V3.2 | 6ES7810 2BC02 0YX0 | 1 | SIEMENS A&D |
| Connection cable | PC/PPI cable | 6ES7901-3BF21-0XA0 | 1 | |

Note

A PG (e.g., PG 740 III; 6ES7 742-0AC00-0BA2) or PC with a free serial interface is required for running configuration software and tools!

When you use PGs, the faster MPI interface can be used to transmit the configuration.

3 Layout diagram

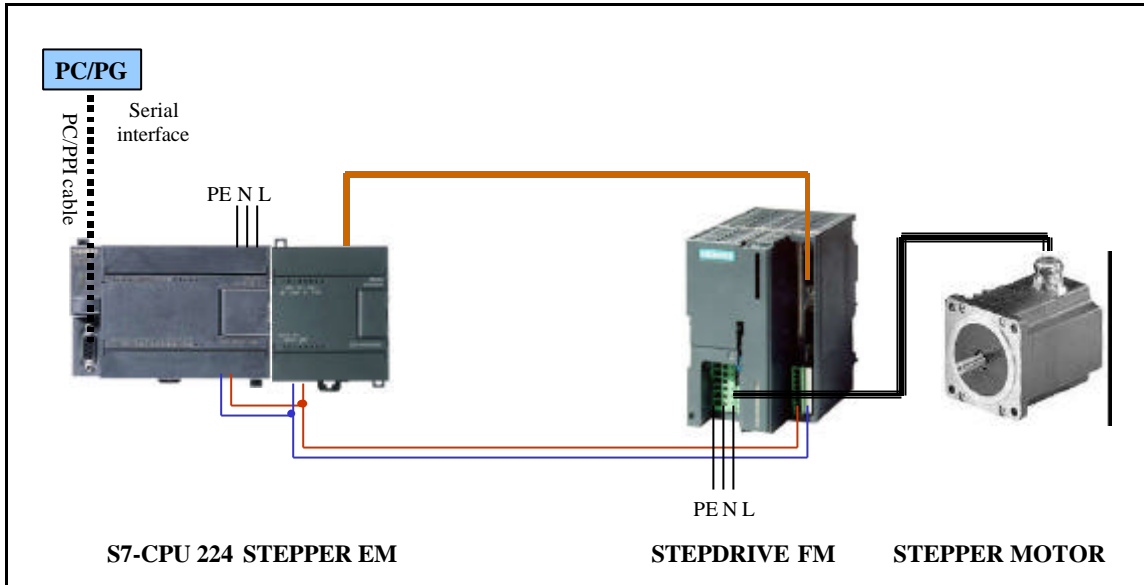


Figure 3-1 Layout diagram of the Micro Automation Set 10

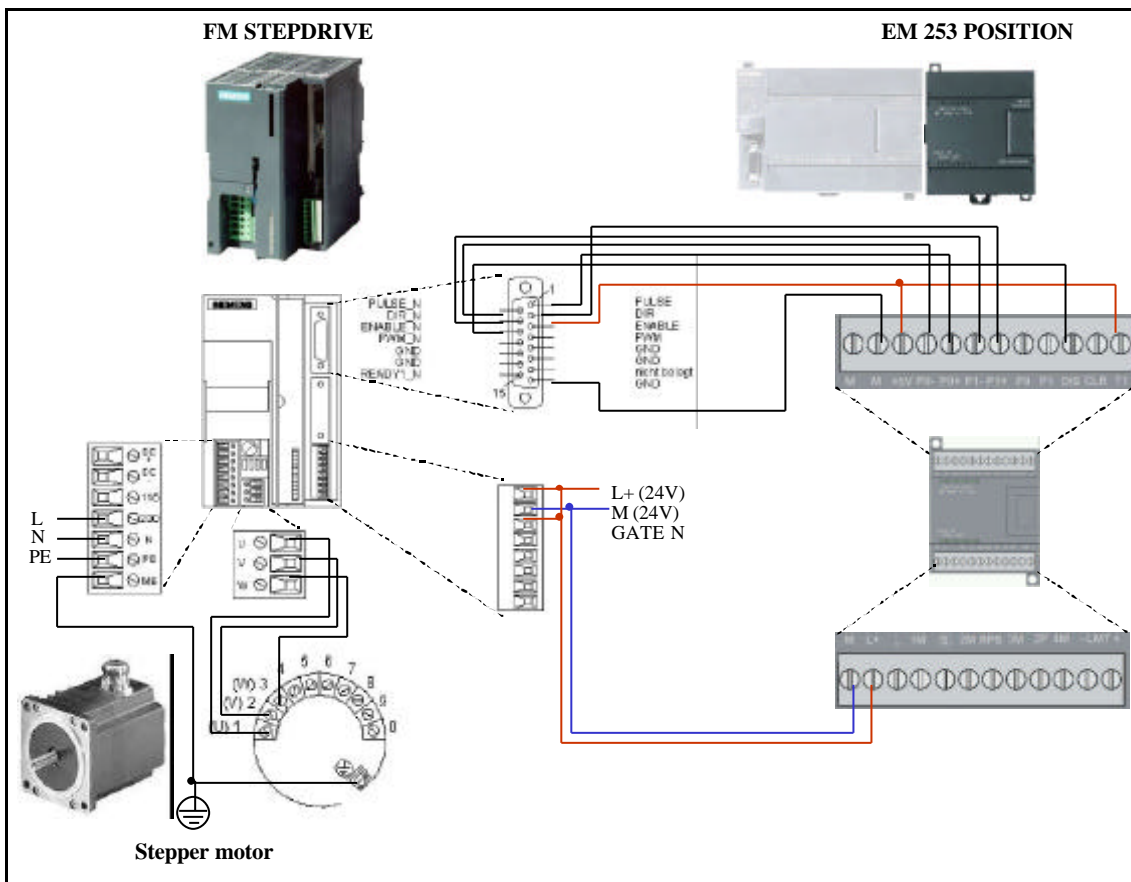


Figure 3-2 Connection diagram of the Micro Automation Set 10

Setting of current limiting for stepper motors

| | | | | | | | | |
|-------------|-----|---|-----|-----|-----|-----|-----|-----|
| Position | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Current [A] | 1.7 | 2 | 2.4 | 2.7 | 3.1 | 3.4 | 3.7 | 4.1 |



| | | | | | | | | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Position | 8 | 9 | A | B | C | D | E | F |
| Current [A] | 4.4 | 4.8 | 5.1 | 5.4 | 5.8 | 6.1 | 6.5 | 6.8 |

Recommended switch position for SIEMENS motors:

| | | | | | |
|----------|---------|---------|---------|---------|---------|
| SIMOSTEP | 1FL3041 | 1FL3042 | 1FL3043 | 1FL3061 | 1FL3062 |
| Position | 0 | 1 | 2 | 7 | 9 |

Setting number of steps and current decrement in standstill

Switch from left to right



| No. of Steps | Switch 1 | Switch 2 |
|--------------|----------|----------|
| 500 | OFF | OFF |
| 1000 | ON | OFF |
| 5000 | OFF | ON |
| 10000 | ON | ON |

Switch 3: Current decrement in standstill OFF enabled, ON disabled

Switch 4: No function



Caution

Settings must only be made at disconnected power supply



Caution

Phase current settings larger than the above ones are not permitted, as they may cause overheating of the motor. Smaller phase current settings are permitted, however, they result in a lower torque at the motor.

4 Method of function

The expansion module EM 253 and the CPU 224 are connected via the expansion bus. The configured control tasks are transmitted from the CPU to the expansion module.

The expansion module uses the information of the CPU to automatically create the necessary steps for moving the stepper motor, and transfers these steps to the FM STEPDRIVE power section as pulses (direction, travel, and speed pulses)

The FM STEPDRIVE power section controls the stepper motor using the information from these pulses.

5 Configuration/Test Code

- To call the corresponding project file, click the file below, if you are running STEP7-Micro/WIN 3.02 or later.
The appropriate project file is included, just like this document, in the ZIP-file you have downloaded.
- If you are running an earlier version of STEP7-Micro/WIN software, you must start Micro/WIN, then select Project->Open to start the project test.
- The test code as well as the specified test parameters/configurations enable the following features:
 - Manual step forward (10.3)
 - Manual step back (10.4)
 - Activate manual control (10.0)

Note:

You will find a more detailed "Micro Application Example" with detailed program code, installation guide and the performance data in the topic „Controlled Positioning of an Axis with Stepper Motor Using the Example of a "Cutting-to-Length" Process incl. HMI Configuration“ under:

http://www.ad.siemens.de/microset/html_76/support/maes/mae10.htm