SIEMENS

SIMATIC

Function modules
FM 452 First Steps in Commissioning

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 only to property damage 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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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Purpose of the Getting Started

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Task

This Getting Started is intended to lead you through the five steps in commissioning a fully functional application. Based on a practical example, it shows you how to create several position-based cams on a rotary axis, introduces the basic functions of FM 452 hardware and software, and corresponding test features.

It will take you between 1 and 2 hours to work your way through the example, depending on your prior experience.

Preconditions

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Overview

The following preconditions must be met:

- You have an S7-400 station, consisting of a power supply module and a CPU.
- STEP 7 (≥V5.3 SP2) is correctly installed on your programming device.
- You have configured a project for the S7-400 station.
- The programming device is connected to the CPU.
- You must have an FM 452 module, the configuration package for the FM 452, an external 24 V DC power supply and the necessary accessories such as a front connector and wiring material.

Installing the Configuration Package on your Programming Device

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Procedure

The FM 452 configuration package contains a parameter assignment tool, the necessary functions (FCs), the data structures (UDTs), and a sample program.

1. Place the CD into the CD drive.

2. In Windows, run the software setup dialog by double-clicking "Add/Remove Programs" in the "Control Panel".

3. Click "Install", select the Setup.exe file from the Setup folder on the CD, and follow the setup instructions.

FM 452, installing and wiring

<div style="text-align: right">**4**</div>

Procedure

1. Switch off the power supply, then set the mode selector switch of the CPU to STOP.

2. Hook the FM 452 onto the designated slot of the rack, tilt it downwards, and screw it into place. You can find a detailed explanation in the *manual*.

3. Wire the front connector as in the following image.
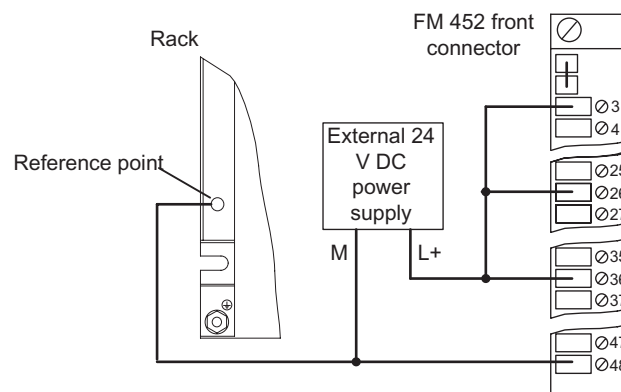
4. Insert the front connector onto the FM 452 and screw it into place.

Test

Switch on the power supply module and the external 24 V DC power supply.

The red LED EXTF of the FM 452 lights up briefly and goes out. The LED INTF remains on because the FM 452 has not yet been entered in the hardware configuration.

Programming the FM 452

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Procedure

1. Open your project in SIMATIC Manager.

2. Open the object hardware. The HW Config window with the configuration table is displayed.

3. In the hardware catalog, select the FM 452 with the correct order number and drag it to the appropriate slot.

4. Double-clicking on the FM 452 leads you to the "Cam Controller - [FM 452 CAM (*Slot*) (Setting parameters) - *Projectname*|*Stationname*]" window of the parameter assignment interface.

5. Select the following settings in the parameter assignment dialog box (leave all other settings unchanged):

System units:	Degree (4 decimal places)
Axis:	⊙ Rotary axis
	End of the rotary axis 360.0000 degrees
	Simulated speed 360.0000 degrees/min
Encoders:	Monitoring Switch off wire break and error pulse
Cams:	

No.	Valid	Track	Type	Start [degree]	End [degree]	Time [ms]	Lead time [ms]	Activation direction	Hardware interrupt
0	✓	0	Distance	0.0000	90.0000		0.0	Both	None
1	✓	0	Distance	180.0000	270.0000		0.0	Both	None
2	✓	1	Distance	0.0000	90.0000		2000.0	Both	None
3	✓	1	Distance	180.0000	270.0000		2000.0	Both	None
4	✓	2	Distance	130.0000	330.0000		0.0	Both	None
5	✓	3	Distance	130.0000	330.0000		2000.0	Both	None

6. Apply the settings in the parameter assignment interface with "File > Save", and close the interface with "File > Exit".

7. Save your configuration to your project with "Station > Save and compile".

8. When the CPU is in STOP mode, choose "PLC > Download to module" to download the configuration.

The data are transferred directly to the CPU and the FM 452. The LED INTF on the FM 452 goes off. Provided you backup configuration data on the CPU, the CPU always transfers these data to FM 452 at each STOP to RUN transition.

Test the FM 452

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Procedure

1. In HW Config, open the parameter assignment interface by double-clicking the FM 452.

2. Open the "Cam Controller - [FM 452 CAM (*Slot*) (Commissioning) --
   Projectname|Stationname]" commissioning screen with "Test > Commissioning".

3. Select track signals 0 to 3 for "Enable track signals", and enable them by clicking "Apply".

4. Select the "Set reference point" setting in "Other test functions", enter 0.000 degrees as
   the reference point, and click "Apply". This synchronizes the axis, the display is green at
   "Synchronized" in the commissioning interface.

5. In "Other test functions", activate the simulation with the "Function switch" and click
   "Apply".

6. Click "On" for "Enable test".

7. Click "On" for "Cam controller". The cam start has been configured to 0 for tracks 0 and 1
   in the example, and as a reaction, the "Cam processing active" display and the track
   signals 0 and 1 are displayed in green.

8. Click "Dir_P" for "Simulation direction".

The encoder signals are now being simulated. You can monitor the actual value and the
track signals (green = at least one active cam; gray = no active cams). You can also monitor
the track signals on the LEDs of the outputs Q0 to Q3 of the FM 452.

Integration in the user program 7

Procedure

1. In SIMATIC Manager, choose "File > Open... > Libraries" to open the FMx52LIB library.

2. Copy FC 0, FC 1, and UDT 1 from the FM 352,452 CAM / Blocks folder of the FMx52LIB library to the "Blocks" folder of your project.

3. Choose "Insert > S7 Block > Data Block" to insert DB 1 and choose "Insert > S7 Block > Organization Block" to insert OB 100 into the "Blocks" folder of your project.

4. Open DB 1 and create it with the assigned user-defined data type UDT 1. You thus create the channel DB.

5. Save DB 1 with "File > Save", and exit the DB editor with "File > Exit".

6. Now enter the module address in DB 1: To do this, choose "File > Properties..." in the FM 452 parameter assignment interface. Click "Mod Addr...", select DB 1, and confirm with "OK".

7. Now open OB 1 and OB 100 in your project. Call FC 1 in OB 1, call FC 0 in OB 100, and assign parameters to the FCs (see manual):

```
OB 1:
CALL FC 1
      DB_NO := 1
      RET_VAL := FW0
```

```
OB 100:
CALL FC 0
      DB_NO := 1
```

8. Choose "File > Save" to save OB 1 and OB 100.

9. Select blocks FC 0, FC 1, DB 1, OB 1 and OB 100 in your project.

10. Choose "PLC > Download" to download your program to the CPU.

Test

Use the "Monitor and modify variables" functions to monitor the cam data, cam tracks and the actual value, for example:

1. Create a symbol with the name "CAM" for DB 1.

2. Select the "Blocks" folder in your project. Choose "Insert > S7 Block > Variable Table" to insert the VAT 1 variable table, and then confirm with "OK".

3. Open the variable table VAT 1 and enter the following in the "Symbol", "Display Format" and "Modify Value" columns:

Address	Symbol	Display format	Status value	Modify value	Meaning
DB1.DBW 16	CAM.TRACK_EN	HEX		FFFF	Enable track signals
DB1.DBD 98	CAM.REFPT	DEZ		0	Reference point coordinate
DB1.DBX 36.3	CAM.REFPT_EN	BIN		1	Set reference point
DB1.DBX 15.4	CAM.CAM_EN	BIN		1	Cam controller ON
DB1.DBX 34.1	CAM.SIM_ON	BIN		1	Simulation ON
DB1.DBX 15.3	CAM.DIR_P	BIN		1	Simulation direction positive
DB1.DBD 26	CAM.ACT_POS	DEZ			Current actual value
DB1.DBD 30	CAM.TRACK_OUT	BIN			Track signals

4. Choose "Table > Save" to save the variable table VAT 1.

5. Choose "PLC > Connect To > Configured CPU" to switch to online.

6. Choose "Variable > Monitor" to switch to monitoring.

7. Switch the CPU to RUN-P.

8. Choose "Variable > Activate Modify Values" to make the control values valid.

9. You can now monitor the current actual value (ACT_POS) and the track signals (TRACK_OUT) in the "Status Value" column.

Diagnostics

Problems can occur due to bad operator input, incorrect wiring or inconsistent parameter assignment. The manual describes how to diagnose such errors and messages.

Example

In the zEn19_01_FMx52_Prog project you will find additional examples. You can use these examples as a guide and adapt them to your application.