MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected official pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7450-1AP01-0AE0

FM 450-1 Two-Channel Counter Module. Relevant section pages: 2, 9, 10, 11. Adjacent model text on shared pages is outside this product reference.

OFFICIAL SOURCE

Counter module FM 450-1; 03/2022

Siemens original documentation and product reference

Selected FM 450-1 functional overview and manufacturer safety notices. This is not a wiring or installation guide; counter-input isolation and terminal instructions are not established by this excerpt.

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Amikon Limited prepared this independent reference package. Selected manufacturer pages follow with their original content and pagination visible.

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

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indicates that minor personal injury can result if proper precautions are not taken.

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indicates that property damage can result if proper precautions are not taken.

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Product Overview

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1.1 Chapter overview

Section overview

This section provides you with an overview of the FM 450-1 function module.

- It informs you of what the FM 450-1 can do.
- Examples demonstrate some of the possible applications of the FM 450-1.
- You will learn how the FM 450-1 is integrated into the S7-400 automation system, and familiarize yourself with the vital components of FM 450-1.

1.2 Properties

Properties

The FM 450-1 is a fast counter module to be used in the S7-400 automation system. There are two counters on the module which can work in the following counting ranges as required:

- 0 to 4 294 967 295 (0 to 2^{32} - 1)
- - 2 147 483 648 to + 2 147 483 647 (-2^{31} to 2^{31} - 1).

The maximum input frequency of the counter signals is up to 500 kHz depending on the encoder signal.

The FM 450-1 can be used for the following counting tasks:

- Continuous counting
- Single counting
- Periodic counting

You can start and stop the count either via the user program (software gate) or via external signals (hardware gate).

Comparison values

You can store two comparison values per counter on the module; they are assigned to the two corresponding outputs on the module. If the counter status reaches one of the comparison values, then the output assigned to it can be set so that it triggers control operations directly in the process.

Load value

You can determine an initial value (load value) for each counter on the FM 450-1 The counter is set at the initial value if a software or hardware-related signal to the module comes up.

Hardware interrupts

When comparison values are reached, for overflow, underflow and/or for zero crossing of a counter, the FM 450-1 can trigger a Hardware interrupt.

Diagnostic interrupt

When the following events occur, the FM 450-1 can trigger a diagnostic interrupt:

- External auxiliary voltage faulty
- Encoder 5.2 VDC supply faulty
- Module not assigned parameters or errors in parameter assignment
- Watchdog timeout
- RAM defective
- Hardware interrupt lost
- Fault in signal A, B, or N of the 5 V encoder

Pulse duration

You can determine a pulse duration for the digital outputs of the FM 450-1. The pulse duration is used to specify how long the corresponding digital output is to be set. You can specify a value between 0 and 500 ms for the pulse duration. This value applies to both outputs. By prescribing a pulse duration you can adapt the FM 450-1 to existing actors.

Which signals can the FM 450-1 count?

The FM 450-1 can count signals that are generated by the following encoders:

- Incremental 5-V encoders
- Incremental 24-V encoders
- 24-V pulse encoders with direction level
- 24-V initiators without direction level
  e.g., light barrier or BERO

Input filter

For the purpose of suppressing interference, you can assign input filters (RC elements) with a uniform filter time for the 24 V inputs A*, B*, and N* and for the digital inputs. The following two input filters are available:

Table 1-1 Input filter

Characteristics	Input filter 1 (default)	Input filter 2
Typical input delay	1 µs	15 µs
Maximum count frequency	200 kHz	20 kHz
Minimum pulse width of the count signals	2.5 µs	25 µs

1.3 Fields of applications of the FM 450-1

You can use the FM 450-1 as follows:

The main field of application of the FM 450-1 is where it is necessary to count signals with high frequencies and fast reactions must be triggered when a prescribed counter reading is reached.

Examples are:

- Packaging plants,
- sorting plants,
- dosing plants

Example application for an FM450-1

Here a specific number of parts is to be filled into a box. An FM 450-1 counter assumes the job of counting the parts and controlling the two motors for transporting the parts and the box.

If the box is in the right position, belt A is stopped via the light barrier, the counting process is started and the motor for belt B switched on. If the programmed number of parts are in the box, the FM 450-1 stops the motor for belt B and switches on the motor for belt A so that the box can be transported away. The counting process can start again when the next box reaches the light barrier