

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

6ES7451-3AL00-0AE0

FM451 POSITIONING MODULE

Used with the applicable PLC System configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens official manufacturer documentation

SIMATIC S7-400 advanced controller

Function modules

FM 450-1 counter module

1

Technical specifications (continued)

Article number	6ES7450-1AP01-0AE0 FM 450-1, COUNTER MODULE, 2 CHANNELS
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes; With 2 pulse trains offset by 90°
• Incremental encoder (asymmetrical)	Yes
• 24 V initiator	Yes
• 24 V directional element	Yes; 1 pulse train, 1 direction level
Counter	
Number of counter inputs	2; 32 bit or +/-31 bit
Counter input 5 V	
• Type	RS 422
• Terminating resistor	220 Ω
• Differential input voltage	min. 0.5 V
• Counting frequency, max.	500 kHz
Counter input 24 V	
• Input voltage, for signal "0"	-30 to +5V
• Input voltage, for signal "1"	+11 to +30V
• Input current, for signal "1", typ.	9 mA
• Counting frequency, max.	200 kHz
• Minimum pulse width	>= 2.5 μs (200 kHz); >= 25 μs (20 kHz) (parameterizable)
Parameter	
Remark	Assigned binary addresses: 64 bytes / 64 bytes
Galvanic isolation	
Galvanic isolation digital inputs	
• between the channels and the backplane bus	Yes; Optocoupler
Galvanic isolation digital outputs	
• between the channels and the backplane bus	Yes; Optocoupler
Galvanic isolation counter	
• between the channels and the backplane bus	Yes; Optocoupler
Permissible potential difference	
between different circuits	75V DC/60V AC
Isolation	
Isolation checked with	500 V
Connection method	
required front connector	1x 48-pin
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm
Weights	
Weight, approx.	650 g

Ordering data

Article No.

FM 450-1 counter module

with 2 channels, max. 500 kHz;
for incremental encoder

6ES7450-1AP01-0AE0

Front connectors

48-pin

- with screw contacts, 1 item
- with screw contacts, 84 items
- with spring-loaded terminals, 1 item
- with crimp contacts, 1 item
- with crimp contacts, 84 items

6ES7492-1AL00-0AA0

6ES7492-1AL00-1AB0

6ES7492-1BL00-0AA0

6ES7492-1CL00-0AA0

6ES7492-1CL00-1AB0

Front covers for CPU and function modules

Spare part

6ES7492-1XL00-0AA0

SIMATIC S7-400 advanced controller

Function modules

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FM 451 positioning module

Overview



- Three-channel positioning module for rapid/slow-action drives
- 4 digital outputs per channel for motor control
- Displacement measurement incremental or synchronous-serial

Note

Displacement measuring systems and precut/preassembled cables for counting and positioning functions are available under SIMODRIVE Sensor or Motion Connect 500.

www.siemens.com/simatic-technology

Technical specifications

Article number	6ES7451-3AL00-0AE0 FM 451 positioning module
Product type designation	
Supply voltage	
Rated value (DC)	
• 24 V DC	Yes
Input current	
Current consumption, max.	550 mA
Encoder supply	
5 V encoder supply	
• 5 V	Yes
• Output current, max.	210 mA
• Cable length, max.	35 m; at max. 210 mA
24 V encoder supply	
• 24 V	Yes
• Output current, max.	300 mA
• Cable length, max.	100 m; at max. 300 mA
Absolute encoder (SSI) encoder supply	
• Absolute encoder (SSI)	Yes
• Type of output voltage	24 V DC
• Output current, max.	300 mA
• Cable length, max.	300 m; At max. 156 kbit/s
Digital inputs	
Number of digital inputs	12; 4 per axis
Functions	Reference cams, reversing cams, flying actual value setting, start/stop positioning
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-3 to +5V
• for signal "1"	+11 to +30V
Input current	
• for signal "1", typ.	6 mA
for 2-wire sensor	
- for signal "1", typ.	30 mA

Article number	6ES7451-3AL00-0AE0 FM 451 positioning module
Digital outputs	
Number of digital outputs	12; 4 per axis
Functions	Rapid traverse, creep, run right, run left
short-circuit protection	Yes
Output voltage	
• for signal "1", min.	UP - 3 V
Output current	
• for signal "1" permissible range for 0 to 55 °C, max.	600 mA; with UPmax
• for signal "0" residual current, max.	0.5 mA
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes
• Incremental encoder (asymmetrical)	Yes
• Absolute encoder (SSI)	Yes
Encoder signals, incremental encoder (symmetrical)	
• Trace mark signals	A, notA, B, notB
• Zero mark signal	N, notN
• Input signal	5 V difference signal (phys. RS 422)
• Input frequency, max.	1 MHz
Encoder signals, incremental encoder (asymmetrical)	
• Trace mark signals	A, B
• Zero mark signal	N
• Input voltage	24 V
• Input frequency, max.	50 kHz; for 25 m cable length, 25 kHz for 100 m cable length
• Cable length, shielded, max.	100 m
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V difference signal (phys. RS 422)
• Data signal	DATA, notDATA
• Clock signal	CL, notCL
• Message frame length, parameterizable	13 or 25 bit serial
• Clock frequency, max.	1.25 MHz
• Gray code	1
• Cable length, shielded, max.	300 m; At max. 156 kbit/s

SIMATIC S7-400 advanced controller

Function modules

FM 451 positioning module

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Technical specifications (continued)

Article number	6ES7451-3AL00-0AE0 FM 451 positioning module
Galvanic isolation	
Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	Yes
Galvanic isolation digital outputs	
• Galvanic isolation digital outputs	Yes
Degree and class of protection	
Degree of protection to EN 60529	
• IP20	Yes
Ambient conditions	
Ambient temperature in operation	
• Min.	0 °C
• max.	55 °C
Storage/transport temperature	
• Min.	-40 °C
• max.	70 °C
Relative humidity	
• Humidity class F	Yes
Connection method	
required front connector	1x 48-pin
Dimensions	
Width	50 mm
Height	290 mm
Depth	210 mm
Weights	
Weight, approx.	1 300 g

Ordering data

Article No.

Signal cable

Pre-assembled for SSI absolute encoder, UL/DESINA

6FX50 2-2CC11-

Pre-assembled for TTL encoder 6FX2001-1, UL/DESINA

6FX50 2-2CD01-

Pre-assembled for TTL encoder 24 V, UL/DESINA

6FX50 2-2CD24-

Not crimped

0

Module end crimped, connector case supplied

1

Motor end crimped, connector case supplied

4

0 m

1

100 m

2

200 m

3

0 m

A

10 m

B

20 m

C

30 m

D

40 m

E

50 m

F

60 m

G

70 m

H

80 m

J

90 m

K

0 m

A

1 m

B

2 m

C

3 m

D

4 m

E

5 m

F

6 m

G

7 m

H

8 m

J

0 m

K

0.0 m

0

0.1 m

1

0.2 m

2

0.3 m

3

0.4 m

4

0.5 m

5

0.6 m

6

0.7 m

7

0.8 m

8

Ordering data

Article No.

FM 451 positioning module	6ES7451-3AL00-0AE0
for rapid traverse and creep speed drives	
Front connector	
48-pin	
• with screw contacts, 1 item	6ES7492-1AL00-0AA0
• with screw contacts, 84 items	6ES7492-1AL00-1AB0
• with spring-loaded terminals, 1 item	6ES7492-1BL00-0AA0
• with crimp contacts, 1 item	6ES7492-1CL00-0AA0
• with crimp contacts, 84 items	6ES7492-1CL00-1AB0
Front covers for CPU and function modules	6ES7492-1XL00-0AA0
Spare part	

SIMATIC S7-400 advanced controller

Function modules

FM 452 cam controller

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Overview



- Very high speed electronic cam controller
- Low-cost alternative to mechanical cam controllers
- 32 cam tracks, 16 onboard digital outputs for direct output of actions
- Incremental or synchronous-serial position feedback

Note:

We offer position measuring systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensor or Motion Connect 500.

www.siemens.com/simatic-technology

Technical specifications

Article number	6ES7452-1AH00-0AE0
	FM 452 electronic cam controller
Product type designation	
Supply voltage	
Rated value (DC)	
• 24 V DC	Yes
Input current	
Current consumption, max.	500 mA
Encoder supply	
5 V encoder supply	
• 5 V	Yes
• Output current, max.	300 mA
• Cable length, max.	32 m
24 V encoder supply	
• 24 V	Yes
• Output current, max.	300 mA
• Cable length, max.	100 m
Digital inputs	
Number of digital inputs	11
Functions	Reference point switch, flying actual value setting/length measurement, brake release, enable track output nos. 3 to 10

Article number	6ES7452-1AH00-0AE0
	FM 452 electronic cam controller
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-28.8 ... +5V
• for signal "1"	+11 to +28.8V
Input current	
• for signal "0", max. (permissible quiescent current)	2 mA
for 2-wire sensor	
- for signal "1", typ.	9 mA
Digital outputs	
Number of digital outputs	16
Functions	Cam track
short-circuit protection	Yes
Output voltage	
• Rated value (DC)	24 V
• for signal "1", min.	UP - 0.8 V
Output current	
• for signal "1" permissible range for 0 to 55 °C, max.	600 mA; with UPmax
• for signal "0" residual current, max.	0.5 mA
Encoder	
Connectable encoders	
• Incremental encoder (symmetrical)	Yes
• Incremental encoder (asymmetrical)	Yes
• Absolute encoder (SSI)	Yes
• 2-wire sensor	Yes
Encoder signals, incremental encoder (symmetrical)	
• Trace mark signals	A, notA, B, notB
• Zero mark signal	N, notN
• Input signal	5 V difference signal (phys. RS 422)
• Input frequency, max.	1 MHz
Encoder signals, incremental encoder (asymmetrical)	
• Trace mark signals	A, B
• Zero mark signal	N
• Input voltage	24 V
• Input frequency, max.	50 kHz; 50 kHz for 25 m cable length; 25 kHz for 100 m cable length
Encoder signals, absolute encoder (SSI)	
• Input signal	5 V difference signal (phys. RS 422)
• Data signal	DATA, notDATA
• Clock signal	CL, notCL
• Message frame length, parameterizable	13 or 25 bit serial
• Clock frequency, max.	1 MHz
• Gray code	1
• Cable length, shielded, max.	300 m; at max. 125 kHz
Galvanic isolation	
Galvanic isolation digital inputs	
• Galvanic isolation digital inputs	No
Galvanic isolation digital outputs	
• Galvanic isolation digital outputs	No
Degree and class of protection	
Degree of protection to EN 60529	
• IP20	Yes