FM 352-5 High-Speed Boolean Processor

Overview



- The high-speed Boolean processor FM352-5 offers an extremely fast binary control and some of the quickest switching procedures ever possible (cycle duration: 1 µs)
- Programming with LAD or FBD is possible
- The accompanying instruction set includes: bit instructions (parts instructions set for STEP 7), time generator, counter, frequency divider, frequency generator, shift register
- 12 integrated DI/8 integrated DO
- 1 channel for connecting a 24-V incremental encoder, a 5-V increment encoder (RS422) or a serial interface absolute value encoder

Micro Memory Card is required for operation of the FM 352-5

Note:
We offer position sensing systems and preassembled connecting cables for counting and positioning functions under SIMODRIVE Sensors or Motion Connect 500 (see also www.siemens.de/simatic-technologie).

Technical specifications

General specifications	
Supply voltage	24 V DC
Power consumption	
1L+ module supply	150 mA (max) 60 mA (type)
2L+ DI / DO supply	200 mA (max) 60 mA (type)
3L+ with encoders	600 mA (max) 80 mA plus encoder power supplt (type)
L3+ without encoder	200 mA (max) 60 mA (typical)
From backplane bus	100 mA (type)
Power pack for position encoder	
5 V output	250 mA max.
24 V output	400 mA max.
Output voltage protection	
5 V output	Electronic overload protection. No protection when applying normal or counter voltage.
24 V output	Overload and overheating protection during overload. Diagnostics when output reaches the temperature limit. No protection when applying normal or counter voltage
Rated load voltage L+	24 V DC
Range	20.4 to 28.8 V
Polarity reversal protection	Yes
Supply voltage for position encoder	5 V or 24 V
Protection according to DIN 40050	IP 20
Permissible ambient temperature	
Storage and transport	-40 to +70 °C
Operation	0 to +60 °C
Required front connector	1 x 40-pin
Dimensions (W x H x D)	80 x 125 x 120 mm
Shipping weight, approx.	500 g (with bus and 1L connection & without I/O connection or MMC)
Module weight, approx.	434 g (with 1L connection & without I/O connection or MMC)

Separation	
Between backplane bus and digital & sensor I/O & 1L & 2L & 3L	Yes (75 V DC, 60 V AC)
Between digital I/O & 2L and sensor I/O & 3L	Yes (75 V DC, 60 V AC)
Between 1L and 2L and 3L	Yes (75 V DC, 60 V AC)
Heat dissipation of electronics module, typ.	6.5 W
Digital inputs	
Number of inputs	8 standard and up to 12 for 24 V DC sensor inputs as digital inputs
Separation	Yes CPU, I/O and sensor units are separated
Digital input	
Rated value	24 V DC
• 0 signal	-30 to 5 V
• 1 signal	11 to 30 V
Input current	
• 0 signal	≤ 1.5 mA (current at 0 signal)
• 1 signal, typ.	3.8 mA
Input frequency	200 kHz max.
Hardware input delay	3 µs max. 1.5 µs typ.
Programmable digital filter delay	None, 5 µs, 10 µs, 15 µs, 20 µs, 50 µs, 1.5 ms
Minimum pulse width for program response	1 µs, 5 µs, 10 µs, 15 µs, 20 µs, 50 µs, 1.6 ms
Cable length, sensor	100 meters unshielded, 600 m shielded, shielded cable recommended when filtering is set in the 1.6 ms grid.
Cable length, HTL incremental encoder, Siemens, type 6FX2001-4	50 kHz, 25 m shielded, max. 25 kHz, 50 m shielded, max.
Minimum pulse width (max. SW counter frequency)	1 µs (200 kHz)
Connection of two-wire BEROs	Possible
Input characteristics	Type 1A for PLC BEROs with less than 1.5 mA cutoff current

Technicals specifications (continued)

Digital output	
Number of inputs	8
Output type	Current sinking
Output voltage	28.8 V max.
• Rated value	24 V DC
• 0 signal	28.8 V DC max.
• 1 signal	≤ 0.5 V DC max.
Output current	
• 0 signal (current at 0 signal)	≤ 1.0 mA
• 1 signal	
• Permissible range	5 mA to 0.6 A
• Rated value	0.5 A at 60°C
Leak current in switched off state	< 1 mA
Parallel outputs	Yes, 2
Loss of voltage/pt @ 500 mA	125 mW
Number of switching actuations	
• For resistive load	20 kHz at 0.5 A 100 kHz at 0.25 A
• For inductive load	2 Hz at 0.5 A with external commutator diodes 0.5 Hz at 0.5 A without external commutator diodes
• For a lamp load	≤ 10 Hz 5 Watt maximum
Output delay (resistive load)	
• ON to OFF	1.7 µs 50 mA / 1.5 µs 0.5 A
• OFF to ON	0.6 µs 50 mA / 1.0 µs 0.5 A
Output protection	
Short circuit	Yes
Threshold value for response	1.7 A to 3.5 A
Overvoltage	Yes
Thermal	Yes
Inductive limitation at kickback from inductive loads	Yes; 2M +45 V type, (40 to 55 V) Note: no protection against inductive kickback > 55 mJ
Digital input control	No
Cable length	
• Unshielded	100 m
• Shielded	600 m
Status, diagnostics	
Module malfunction	SF, red LED
MMC error	MCF, red LED
Module supply	5V DC, green LED
I/O status	IOF, red LED
Run mode	RUN, green LED
Stop mode	STOP, yellow LED
Overload on sensor power supply	5VF, red LED, 24VF, red LED
Status display, digital input module DI	I0 to I11, 12 green LEDs
Status display, digital output module DO	O0 to O7 8 green LEDs

Sensor support	
5 V differential	16-bit or 32-bit counter
24 V single-wire	16-bit or 32-bit counter
Serial interface	13-bit or 25-bit message length
Support for additional 24 V inputs	Yes, at 5 V differential or serial interface sensor inputs or if no sensor is available
Maximum counter input frequency for sensor	
• 5 V DC input	1 MHz
• 24 V DC input	200 kHz
Control at 5 V and 24 V signal	
Sensor gating	Pulse & direction, 1X, 2X, 4X
Reset source	No, HW, SW, HW and SW, HW or SW
Reset value source	Constant 0, min/max value, load value
Reset signal type	Edge, layer
Load value, source	Constant, module application
Hold source	No, HW, SW, HW and SW, HW or SW
Load value	User entry or module application
Counter range, minimum	User entry
Counter range, maximum	User entry
Main counting direction	Count forward/backward
Hardware hold source	Can be set to any input between 0 and 14
Hardware reset source	Can be set to any input between 0 and 14
Count modes	
Continuous	Yes, 16-bit or 32-bit counter
Counter range (16-bit counter):	-32768 to 32767 (user-specific within this range)
Counter range (32-bit counter):	-2,147,483,648 to 2,147,483,647 (user-specific within this range)
Periodic	Yes, 16-bit or 32-bit counter
Counter range (16-bit counter):	-32768 to 32767 (user-specific within this range)
Counter range (32-bit counter):	-2,147,483,648 to 2,147,483,647 (user-specific within this range)
Individual	Yes, 16-bit or 32-bit counter
Counter range (16-bit counter):	-32768 to 32767 (user-specific within this range)
Counter range (32-bit counter):	-2,147,483,648 to 2,147,483,647 (user-specific within this range)
Encoder signals	
Incremental 5 V encoder (RS422)	A, /A, B, /B, and N, /N
Incremental 24 V encoder	A, B and N

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Technical specifications (continued)

SSI sensor	
Signal types	D, /D, CK and /CK
Master mode	Yes
Listening mode	Yes, up to two stations
Multi-turn	25-bit message frame
Maximum number of sequence steps	16.777.216 sequence step
Delay, configurable (Monoflop timer)	16, 32, 48, or 64 µs.
Shift register, length	13 bit or 25 bit
Clock rate	125 kHz, 250 kHz, 500 kHz, or 1 MHz
Cable length, RS-422 (5 V) incremental sensor, Siemens type 6FX201-2, 5 V supply	500 kHz, 32 meters, shielded, max.
Cable length, RS-422 (5 V) incremental sensor, Siemens type 6FX201-2, 24 V supply	500 kHz, 100 meters, shielded, max.
Cable length, RS-422 serial interface absolute sensor Siemens type 6FX201-5, 24 V supply	125 kHz, 320 meters shielded, max. 250 kHz, 160 meters shielded, max. 500 kHz, 60 meters shielded, max. 1 MHz, 20 meters shielded, max.
Data shifting direction (normalizing)	Left or right
Data shifting distance (normalizing)	0 to 12 bit
5 V level for input logic	Via RS-422
5 V input voltage	330Ω DC / 116Ω AC

Interrupts	
Diagnostics	1L, 2L, 3L missing; MMC error; output overload (8); sensor supply overload; differential wire break; parameter assignment error; serial interface message frame overflow.
Process	8 available; for generation by user program
Program technical specifications	
Program cycle time (scan)	1 µs
Update rate PLC interface	5 ms (2.6 ms typ.)
Input to output response time	
5 V input to 24 V output, 0 filter	1 to 4 µs (typ.)
24 V input to 24 V output, 0 filter	2 to 6 µs (typ.)
Control signal buffer size	**Partitioned, maximum**
FLIP FLOPS, etc.	
RSFF	1
SRFF	1
NEG	2
POS	2
BISCALE	2
CP_GEN	29
MOVE	17
MOVE_U	0

COUNTERS	
CTD16	36
CTU16	31
CTUD16	47
CTUD32	99
TIMERS	
TOF16	26
TOF32	55
TON16	25
TON32	53
TP16	26
TP32	54
SHIFT REGISTERS	
SHIFT	18
SHIFT2	18
SHIFT4	18
SHIFT8	19
COMPARATORS	
CMP16_EQ	6
CMP16_GE	17
CMP16_GT	8
CMP16_LE	17
CMP16_LT	8
CMP16_NE	6
CMP32_EQ	11
CMP32_GE	33
CMP32_GT	25
CMP32_LE	33
CMP32_LT	25
CMP32_NE	11
TYPE GENERATION	
I_DI	9
I_DI_U	0
LOGICAL OPS	
AND	1
OR	1
XOR	1
SENSOR TYPES	
Serial interface Master - 13-bit	64
Serial interface Master - 25-bit	117
Serial interface Listener - 16-bit	61
Serial interface Listener - 32-bit	100
None	77
Serial interface Master - 13-bit	122
Serial interface Master - 25-bit	0
Memory card	**Required for operation**
Size	128 KB, at least
Type	MMC (Micro Memory Card)
Order No.	6ES7 953-8Lx00-0AA0

Ordering data	Order No.
FM 352-5 high-speed Boolean processor	**6ES7 352-5AH00-0AE0**
Configuring software for FM 352-5 in 5 languages Ge, En, Fr, Sp, It; executes under Windows 98/Me/ NT 4.0 from SP3 onwards/2000 Professional from SP 1 onwards	**6ES7 352-5AH00-7XG0**

	Order No.
Micro memory card	
128 KB	**6ES7 953-8LG00-0AA0**
512 KB	**6ES7 953-8LJ00-0AA0**
2 MB	**6ES7 953-8LL00-0AA0**
Front connector	
40-pin, with screw-type terminals	
• 1 unit	**6ES7 392-1AM00-0AA0**
• 100 units	**6ES7 392-1AM00-1AB0**
40-pin, with spring-loaded terminals	**6ES7 392-1BM01-0AA0**