

Data sheet

6ES7138-6BA01-0BA0



Figure similar

SIMATIC ET 200SP, TM Posinput 1 counter and position decoder module for RS-422 incremental encoder or SSI absolute encoder, 2 DI, 2 DQ suitable for BU type A0, pack quantity: 1 unit

General information	
Product type designation	TM PosInput 1
Firmware version	V2.0
<ul style="list-style-type: none"> FW update possible 	Yes
usable BaseUnits	BU type A0
Color code for module-specific color identification plate	CC00
Product function	
<ul style="list-style-type: none"> I&M data 	Yes; I&M0 to I&M3
<ul style="list-style-type: none"> Isochronous mode 	Yes
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated from version 	STEP 7 V16 or higher
<ul style="list-style-type: none"> STEP 7 configurable/integrated from version 	V5.6 (use previous version *6BA00*)
<ul style="list-style-type: none"> PROFIBUS from GSD version/GSD revision 	GSD Revision 5
<ul style="list-style-type: none"> PROFINET from GSD version/GSD revision 	GSDML V2.34
Supply voltage	
Rated value (DC)	24 V
Load voltage L+	
<ul style="list-style-type: none"> Rated value (DC) 	24 V
<ul style="list-style-type: none"> permissible range, lower limit (DC) 	19.2 V
<ul style="list-style-type: none"> permissible range, upper limit (DC) 	28.8 V
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
Input current	
Current consumption, max.	75 mA; without load
Encoder supply	
Number of outputs	2
5 V encoder supply	
<ul style="list-style-type: none"> 5 V 	Yes
<ul style="list-style-type: none"> Short-circuit protection 	Yes; electronic/thermal
<ul style="list-style-type: none"> Output current, max. 	300 mA; Total current of all encoders
24 V encoder supply	
<ul style="list-style-type: none"> 24 V 	Yes; L+ (-0.8 V)
<ul style="list-style-type: none"> Short-circuit protection 	Yes; electronic/thermal
<ul style="list-style-type: none"> Output current, max. 	300 mA; Total current of all encoders
Power loss	
Power loss, typ.	1.5 W
Address area	
Address space per module	
<ul style="list-style-type: none"> Inputs 	16 byte; 4 bytes in Fast mode

• Outputs	12 byte; 4 bytes for Motion Control, 0 bytes for Fast mode
Hardware configuration	
Automatic encoding	Yes
• Mechanical coding element	Yes
• Type of mechanical coding element	type B
Digital inputs	
Number of digital inputs	2
Digital inputs, parameterizable	Yes
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Digital input functions, parameterizable	
• Gate start/stop	Yes; only for pulse and incremental encoders
• Capture	Yes
• Synchronization	Yes; only for pulse and incremental encoders
• Freely usable digital input	Yes
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-5 ... +5 V
• for signal "1"	+11 to +30V
• permissible voltage at input, min.	-30 V; -5 V continuous, -30 V brief reverse polarity protection
• permissible voltage at input, max.	30 V
Input current	
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
for standard inputs	
— parameterizable	Yes; none / 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms
for technological functions	
— parameterizable	Yes
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	600 m
Digital outputs	
Type of digital output	Transistor
Number of digital outputs	2
Digital outputs, parameterizable	Yes
Short-circuit protection	Yes; electronic/thermal
• Response threshold, typ.	1 A
Limitation of inductive shutdown voltage to	L+ (-53 V)
Controlling a digital input	Yes
Digital output functions, parameterizable	
• Switching tripped by comparison values	Yes
• Freely usable digital output	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A; Per digital output
• on lamp load, max.	5 W
Load resistance range	
• lower limit	48 Ω
• upper limit	12 kΩ
Output voltage	
• for signal "1", min.	23.2 V; L+ (-0.8 V)
Output current	
• for signal "1" rated value	0.5 A; Per digital output
• for signal "1" permissible range, max.	0.6 A; Per digital output
• for signal "1" minimum load current	2 mA
• for signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
• "0" to "1", max.	50 μs
• "1" to "0", max.	50 μs
Switching frequency	
• with resistive load, max.	10 kHz

<ul style="list-style-type: none"> with inductive load, max. on lamp load, max. 	0.5 Hz; Acc. to IEC 60947-5-1, DC-13; observe derating curve 10 Hz
Total current of the outputs	
<ul style="list-style-type: none"> Current per module, max. 	1 A
Cable length	
<ul style="list-style-type: none"> shielded, max. unshielded, max. 	1 000 m 600 m
Encoder	
Encoder signals, incremental encoder (symmetrical)	
<ul style="list-style-type: none"> Input voltage Input frequency, max. Counting frequency, max. Cable length, shielded, max. Signal filter, parameterizable Incremental encoder with A/B tracks, 90° phase offset Incremental encoder with A/B tracks, 90° phase offset and zero track pulse encoder Pulse encoder with direction pulse encoder with one impulse signal per count direction 	RS 422 1 MHz 4 MHz; with quadruple evaluation 32 m; at 1 MHz Yes Yes Yes Yes Yes Yes Yes
Encoder signals, incremental encoder (asymmetrical)	
<ul style="list-style-type: none"> Input voltage Input frequency, max. Counting frequency, max. Signal filter, parameterizable Incremental encoder with A/B tracks, 90° phase offset Incremental encoder with A/B tracks, 90° phase offset and zero track pulse encoder pulse encoder with direction pulse encoder with one impulse signal per count direction 	5 V TTL (push-pull encoders only) 1 MHz 4 MHz; with quadruple evaluation Yes Yes Yes Yes Yes Yes Yes
Encoder signals, absolute encoder (SSI)	
<ul style="list-style-type: none"> Input signal Telegram length, parameterizable Clock frequency, max. Binary code Gray code Cable length, shielded, max. Parity bit, parameterizable Monoflop time Multiturn Singleturn 	to RS-422 10 ... 40 bit 2 MHz; 125 kHz, 250 kHz, 500 kHz, 1 MHz, 1.5 MHz or 2 MHz Yes Yes 320 m; Cable length, RS-422 SSI absolute encoders, Siemens type 6FX2001-5, 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. 1.5 MHz, 10 meters shielded, max.; 2 MHz, 8 meters shielded, max. Yes 16, 32, 48, 64 µs & automatic Yes Yes
Interface types	
<ul style="list-style-type: none"> TTL 5 V RS 422 	Yes; push-pull encoders only Yes
Interfaces	
Number of RS 485 interfaces	0
Interrupts/diagnostics/status information	
Substitute values connectable	Yes; Parameterizable
Alarms	
<ul style="list-style-type: none"> Diagnostic alarm Hardware interrupt 	Yes Yes
Diagnoses	
<ul style="list-style-type: none"> Monitoring the supply voltage Wire-break Short-circuit A/B transition error at incremental encoder 	Yes Yes Yes Yes

• Telegram error at SSI encoder	Yes
• Group error	Yes
Diagnostics indication LED	
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED
• Channel status display	Yes; green LED
• for module diagnostics	Yes; green/red DIAG LED
• Status indicator forward counting (green)	Yes
• Status indicator backward counting (green)	Yes
Integrated Functions	
Counter	Yes
• Number of counters	1
• Counting frequency, max.	4 MHz; with quadruple evaluation
Fast mode	Yes
Counting functions	
• Can be used with TO High_Speed_Counter	Yes; only for pulse and incremental encoders
• Continuous counting	Yes
• Counter response parameterizable	Yes
• Hardware gate via digital input	Yes
• Software gate	Yes
• Event-controlled stop	Yes
• Synchronization via digital input	Yes
• Counting range, parameterizable	Yes
Comparator	
— Number of comparators	2
— Direction dependency	Yes
— Can be changed from user program	Yes
Position detection	
• Incremental acquisition	Yes
• Absolute acquisition	Yes
• Suitable for S7-1500 Motion Control	Yes
Measuring functions	
• Measuring time, parameterizable	Yes
• Dynamic measurement period adjustment	Yes
• Number of thresholds, parameterizable	2
Measuring range	
— Frequency measurement, min.	0.04 Hz
— Frequency measurement, max.	4 MHz
— Cycle duration measurement, min.	0.25 μ s
— Cycle duration measurement, max.	25 s
Accuracy	
— Frequency measurement	100 ppm; depending on measuring interval and signal evaluation
— Cycle duration measurement	100 ppm; depending on measuring interval and signal evaluation
— Velocity measurement	100 ppm; depending on measuring interval and signal evaluation
Potential separation	
Potential separation channels	
• between the channels and backplane bus	Yes
Isolation	
Isolation tested with	707 V DC (type test)
Standards, approvals, certificates	
Suitable for safety functions	No
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C; Observe derating
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C; Observe derating
• ceiling installation, min.	-30 °C
• ceiling installation, max.	50 °C; Observe derating
• floor installation, min.	-30 °C

• floor installation, max.	50 °C; Observe derating
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Absolute humidity	
• dew point, min.	-60 °C
Decentralized operation	
to SIMATIC S7-300	Yes
to SIMATIC S7-400	Yes
to SIMATIC S7-1200	Yes
to SIMATIC S7-1500	Yes
to standard PROFIBUS master	Yes
to standard PROFINET controller	Yes
Dimensions	
Width	15 mm
Height	73 mm
Depth	58 mm
Weights	
Weight, approx.	45 g
Classifications	

	Version	Classification
eClass	14	27-24-26-05
eClass	12	27-24-26-05
eClass	9.1	27-24-26-05
eClass	9	27-24-26-05
eClass	8	27-24-26-05
eClass	7.1	27-24-26-05
eClass	6	27-24-26-05
ETIM	10	EC001601
ETIM	9	EC001601
ETIM	8	EC001601
ETIM	7	EC001601
IDEA	4	3567
UNSPSC	15	32-15-17-05

Approvals / Certificates

General Product Approval

[Manufacturer Declaration](#)



[Miscellaneous](#)

[China RoHS](#)



General Product Approval For use in hazardous locations



[FM](#)



[Miscellaneous](#)

For use in hazardous locations Maritime application

[Type Examination Certificate](#)



[NK / Nippon Kaiji Kyokai](#)

Maritime application



[CCS \(China Classification Society\)](#)



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