MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

6ES7138-6BA00-0BA0

COUNTER AND POSITION DECODER MODULE

Used with the applicable SIMATIC ET 200SP TM PosInput 1 configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens 6ES7138-6BA00-0BA0 official technical data; applicable specification pages.

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Data sheet 6ES7138-6BA00-0BA0



*** spare part *** SIMATIC ET 200SP, TM Posinput 1 counter and position decoder module for RS-422 incremental encoder or SSI absolute encoder, 2 DI, 2 DQ

General information	
Product type designation	TM PosInput 1
Firmware version	V1.3
● FW update possible	Yes
usable BaseUnits	BU type A0
Product function	
● I&M data	Yes; I&M0 to I&M3
● Isochronous mode	Yes
Engineering with	
● STEP 7 TIA Portal configurable/integrated from version	V13 (FW V1.0), V14 (V1.2), V15 (FW V1.3) / V13 (FW V1.0), V14 SP1 (V1.2)
● STEP 7 configurable/integrated from version	As of V5.5 SP3, only up to FW V1.2
● PROFIBUS from GSD version/GSD revision	GSD Revision 5
● PROFINET from GSD version/GSD revision	GSDML V2.3
Supply voltage	
Load voltage L+	
● Rated value (DC)	24 V
● permissible range, lower limit (DC)	19.2 V
● permissible range, upper limit (DC)	28.8 V
● Reverse polarity protection	Yes
Input current	
Current consumption, max.	75 mA; without load
Encoder supply	
Number of outputs	1
24 V encoder supply	
● 24 V	Yes; L+ (-0.8 V)
● Short-circuit protection	Yes; electronic/thermal
● Output current, max.	300 mA
Power loss	
Power loss, typ.	1.9 W
Address area	
Address space per module	
● 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

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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
— at "0" to "1", min.	6 µs; for parameterization "none"
— at "1" to "0", min.	6 µs; for parameterization "none"
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+ (-33 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
● with inductive load, max.	0.5 Hz; Acc. to IEC 60947-5-1, DC-13; observe derating curve
● on lamp load, max.	10 Hz
Total current of the outputs	
● Current per module, max.	1 A
Cable length	
● shielded, max.	1 000 m
● unshielded, max.	600 m

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Encoder	
Encoder signals, incremental encoder (symmetrical)	
● Input voltage	RS 422
● Input frequency, max.	1 MHz
● Counting frequency, max.	4 MHz; with quadruple evaluation
● Cable length, shielded, max.	32 m; at 1 MHz
● Signal filter, parameterizable	Yes
● Incremental encoder with A/B tracks, 90° phase offset	Yes
● Incremental encoder with A/B tracks, 90° phase offset and zero track	Yes
● pulse encoder	Yes
● Pulse encoder with direction	Yes
● pulse encoder with one impulse signal per count direction	Yes
Encoder signals, incremental encoder (asymmetrical)	
● Input voltage	5 V TTL (push-pull encoders only)
● Input frequency, max.	1 MHz
● Counting frequency, max.	4 MHz; with quadruple evaluation
● Signal filter, parameterizable	Yes
● Incremental encoder with A/B tracks, 90° phase offset	Yes
● Incremental encoder with A/B tracks, 90° phase offset and zero track	Yes
● pulse encoder	Yes
● pulse encoder with direction	Yes
● pulse encoder with one impulse signal per count direction	Yes
Encoder signals, absolute encoder (SSI)	
● Input signal	to RS-422
● Telegram length, parameterizable	10 ... 40 bit
● Clock frequency, max.	2 MHz; 125 kHz, 250 kHz, 500 kHz, 1 MHz, 1.5 MHz or 2 MHz
● Binary code	Yes
● Gray code	Yes
● Cable length, shielded, max.	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.
● Parity bit, parameterizable	Yes
● Monoflop time	16, 32, 48, 64 µs & automatic
● Multiturn	Yes
● Singleturn	Yes
Interface types	
● TTL 5 V	Yes; push-pull encoders only
● RS 422	Yes
Interrupts/diagnostics/status information	
Substitute values connectable	Yes; Parameterizable
Alarms	
● Diagnostic alarm	Yes
● Hardware interrupt	Yes
Diagnoses	
● Monitoring the supply voltage	Yes
● Wire-break	Yes
● Short-circuit	Yes
● A/B transition error at incremental encoder	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

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● 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 µs
— 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
Altitude during operation relating to sea level	
● Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
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

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