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Data sheet 6ES7147-6AB00-0BB0



ET 200eco PN TM PosInput 2, M12-L counting and position detection module for SSI absolute encoder, RS-422 incremental encoder, 24 V incremental encoder, 2 channels; 2 DI, 2 DQ per channel

General information	
Product type designation	TM PosInput 2
Firmware version	V5.1.x
● FW update possible	Yes
Vendor identification (VendorID)	002AH
Device identifier (DeviceID)	0306H
Manufacturer ID according to ODVA (VendorID)	04E3H
Device ID according to ODVA (Product code)	0FAFH
Number of channels	2
Product function	
● I&M data	Yes; I&M0 to I&M3
● Isochronous mode	Yes
● IRT	Yes
● Fast startup	Yes
● Prioritized startup	Yes
Engineering with	
● STEP 7 TIA Portal configurable/integrated from version	STEP 7 V18 or higher with HSP
● PROFINET from GSD version/GSD revision	GSDML V2.42
● Multi Fieldbus Configuration Tool (MFCT)	V1.5 or higher
Supply voltage	
Rated value (DC)	24 V
power supply according to NEC Class 2 required	No
Load voltage 1L+	
● Rated value (DC)	24 V
● permissible range, lower limit (DC)	20.4 V
● permissible range, upper limit (DC)	28.8 V
● Reverse polarity protection	Yes; against destruction; encoder power supply outputs applied with reversed polarity, loads conduct
Load voltage 2L+	
● Rated value (DC)	24 V
● permissible range, lower limit (DC)	20.4 V
● permissible range, upper limit (DC)	28.8 V
● Reverse polarity protection	Yes; against destruction
Input current	
Current consumption (rated value)	100 mA; without load
from load voltage 1L+ (unswitched voltage)	12 A; Maximum value
from load voltage 2L+, max.	12 A; Maximum value
Encoder supply	
Number of outputs	4; 1 per encoder connection

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24 V encoder supply	
● 24 V	Yes; 1L+ (-0.8V)
● Short-circuit protection	Yes
● Output current, max.	300 mA; Per channel
Power loss	
Power loss, typ.	7.1 W
Address area	
Address space per module	
● Inputs	32 byte
● Outputs	24 byte; 8 bytes for Motion Control
Hardware configuration	
Submodules	
● Number of configurable submodules, max.	2
Digital inputs	
Number of digital inputs	4; 2 per channel
Digital inputs, parameterizable	Yes
Source/sink input	P-reading
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	
● Type of input voltage	DC
● 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.	30 m
● unshielded, max.	30 m
Digital outputs	
Type of digital output	Transistor
Number of digital outputs	4; 2 per channel
Current-sourcing	Yes
Digital outputs, parameterizable	Yes
Short-circuit protection	Yes; electronic/thermal
● Response threshold, typ.	1 A
Limitation of inductive shutdown voltage to	2L+ (-39 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
● with inductive load, max.	0.5 A
Load resistance range	
● lower limit	48 Ω

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● upper limit	12 kΩ
Output voltage	
● Type of output voltage	DC
● for signal "1", min.	23.2 V; 2L+ (-0,8 V)
Output current	
● for signal "1" rated value	0.5 A
● for signal "1" permissible range, max.	0.6 A
● 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
Parallel switching of two outputs	
● for uprating	No
Switching frequency	
● with resistive load, max.	10 kHz
● with inductive load, max.	0.5 Hz; According to IEC 60947-5-1, DC-13
Total current of the outputs	
● Current per module, max.	2 A; Supply from 2L+
Cable length	
● shielded, max.	30 m
● unshielded, max.	30 m
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.	30 m
● 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	24 V
● Input frequency, max.	200 kHz
● Counting frequency, max.	800 kHz; with quadruple evaluation
● Cable length, shielded, max.	30 m
● 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.	30 m; Up to 500 kHz
● Parity bit, parameterizable	Yes
● Monoflop time	16, 32, 48, 64 µs & automatic
● Multiturn	Yes
● Singleturn	Yes
Interfaces	

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Number of PROFINET interfaces	1
1. Interface	
Interface type	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
Interface types	
● M12 port	Yes; 2x M12, 4-pin, D-coded
● Number of ports	2
● integrated switch	Yes
Protocols	
● PROFINET IO Device	Yes
● Open IE communication	Yes
PROFINET IO Device	
Services	
— IRT	Yes; 500 µs to 4 ms at an interval of 125 µs
— Prioritized startup	Yes
— Shared device	Yes
— Number of IO Controllers with shared device, max.	2
Interface types	
M12 port	
● Autonegotiation	Yes
● Autocrossing	Yes
● Transmission rate, max.	100 Mbit/s
Protocols	
Supports protocol for PROFINET IO	Yes
PROFIsafe	No
EtherNet/IP	Yes
Modbus TCP	Yes
Redundancy mode	
● PROFINET system redundancy (S2)	Yes
— on S7-1500R/H	Yes
— on S7-400H	Yes
● PROFINET system redundancy (R1)	No
● H-Sync forwarding	Yes
Media redundancy	
— MRP	Yes
EtherNet/IP	
Services	
— CIP Implicit Messaging	Yes
— CIP Explicit Messaging	Yes
— CIP Safety	No
— Shared device	Yes; 2x EtherNet/IP Scanner
— Number of scanners with shared device, max.	2
Updating times	
— Requested Packet Interval (RPI)	2 ms
Address area	
— Address space per module, max.	32 byte
— LargeForwardOpen (Class3)	No
Modbus TCP	
Services	
— read coils (code=1)	Yes
— read discrete inputs (code=2)	Yes
— Read Holding Registers (Code=3)	Yes
— write single coil (code=5)	Yes
— write multiple coils (code=15)	Yes
— Write Multiple Registers (Code=16)	Yes
— Parameter change by master	No
— Modbus TCP Security Protocol	No
Address space per station	
— Address space per station, max.	32 byte
— Access-consistent address space	2 byte

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Updating time	
— I/O request interval	2 ms
Connections	
— number of connections per device	12
Open IE communication	
● TCP/IP	Yes; (only EtherNet/IP or Modbus TCP)
● SNMP	Yes
● LLDP	Yes
● ARP	Yes
Isochronous mode	
Equidistance	Yes
shortest clock pulse	500 µs
max. cycle	4 ms
Interrupts/diagnostics/status information	
Substitute values connectable	Yes
Alarms	
● Diagnostic alarm	Yes; Parameterizable
● Maintenance interrupt	Yes; Parameterizable
● Hardware interrupt	No
Diagnoses	
● Diagnostic information readable	Yes
● Monitoring the supply voltage	Yes
— parameterizable	Yes
● Wire-break	Yes
● Short-circuit	Yes
● Short-circuit encoder supply	Yes
● A/B transition error at incremental encoder	Yes
● Telegram error at SSI encoder	Yes
Diagnostics indication LED	
● RUN LED	Yes; green LED
● ERROR LED	Yes; red LED
● MAINT LED	Yes; Yellow LED
● NS LED	Yes; green/red LED
● MS LED	Yes; green/red LED
● IO LED	Yes; red/green/yellow LEDs
● Channel status display	Yes; green LED
● for channel diagnostics	Yes; red LED
● For load voltage monitoring	Yes; green LED
● Connection display LINK TX/RX	Yes; green LED, only link
Integrated Functions	
Counter	Yes
● Number of counters	2
● Counting frequency, max.	4 MHz; with quadruple evaluation
Fast mode	No
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; Per channel
— Direction dependency	Yes
— Can be changed from user program	Yes
Position detection	
● Incremental acquisition	Yes

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● 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	
between the load voltages	Yes
between Ethernet and electronics	Yes
Potential separation channels	
● between the channels	Yes; DI channels are isolated from the DQ channels
Isolation	
tested with	
● 24 V DC circuits	707 V DC (type test)
● Test voltage for interface, rms value [Vrms]	1 500 V; According to IEEE 802.3
Degree and class of protection	
IP degree of protection	IP65/67/69K
Standards, approvals, certificates	
Suitable for safety-related tripping of standard modules	Yes
Ecological footprint	
Global warming potential	
— global warming potential, (total) [CO2 eq]	75 kg
— global warming potential, (during production) [CO2 eq]	21.1 kg
— global warming potential, (during operation) [CO2 eq]	57.2 kg
— global warming potential, (after end of life cycle) [CO2 eq]	-3.5 kg
Highest safety class achievable for safety-related tripping of standard modules	
● Performance level according to ISO 13849-1	PL d
● Category according to ISO 13849-1	Cat. 3
● SIL acc. to IEC 62061	SIL 2
● remark on safety-oriented shutdown	https://support.industry.siemens.com/cs/document/39198632
Security	
signed firmware update	Yes; V5.1.2 or higher
safely removing data	Yes; V5.1.2 or higher
Ambient conditions	
Ambient temperature during operation	
● min.	-40 °C
● max.	60 °C
Altitude during operation relating to sea level	
● Ambient air temperature-barometric pressure-altitude	Up to max. 5 000 m, at installation height > 2 000 m additional restrictions
Connection method	
Design of electrical connection	4/5/8-pin M12 circular connectors
Design of electrical connection for the inputs and outputs	M12, 5-pin, A-coded
Design of electrical connection for supply voltage	M12, 4-pin, L-coded
Decentralized operation	
to SIMATIC S7-300	Yes
to SIMATIC S7-400	Yes
to SIMATIC S7-1200	Yes

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to SIMATIC S7-1500	Yes
to standard PROFIBUS master	No
to standard PROFINET controller	Yes
Dimensions	
Width	45 mm
Height	200 mm
Depth	48 mm
Weights	
Weight, approx.	820 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

Approvals / Certificates

General Product Approval

Manufacturer Declaration | Miscellaneous | KC

General Product Approval | **EMV** | **For use in hazardous locations**

CCC-Ex | Miscellaneous

Maritime application

NK / Nippon Kaiji Kyokai

Maritime application | **Food, Pharmaceutical, Medical** | **Environment** | **Industrial Communication**

CCS (China Classification Society) | Confirmation | PROFINET

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