SIEMENS

Data sheet 6AG2138-6BA01-2BA0

Figure similar

SIPLUS ET 200SP TM Posinput 1 RAIL based on 6ES7138-6BA01-0BA0 with conformal coating -40...+70 °C, OT4 with ST1/2 (+70 °C for 10 minutes) . 1 counter and position detection module for RS-422 incremental encoder or SSI absolute encoder, 2 DI, 2DQ suitable for BU type A0, pack quantity: 1 unit pack quantity: 1 unit

General information	
Product type designation	TM PosInput 1
Firmware version	
● FW update possible	Yes
based on	6ES7138-6BA01-0BA0
usable BaseUnits	BU type A0
Color code for module-specific color identification plate	CC00
Product function	
● I&M data	Yes; I&M0 to I&M3
● Isochronous mode	Yes
Engineering with	
● STEP 7 TIA Portal configurable/integrated from version	see entry ID: 109746275
Supply voltage	
Rated value (DC)	24 V
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	2
5 V encoder supply	
● 5 V	Yes
● Short-circuit protection	Yes; electronic/thermal
● Output current, max.	300 mA; Total current of all encoders
24 V encoder supply	
● 24 V	Yes; L+ (-0.8 V)
● Short-circuit protection	Yes; electronic/thermal
● Output current, max.	300 mA; Total current of all encoders
Power loss	
Power loss, typ.	1.5 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
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
● 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
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
Interfaces	
Number of RS 485 interfaces	0
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
● 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	750 V DC (type test) and according to EN 50155 (routine test)
Standards, approvals, certificates	
Suitable for safety functions	No
Railway application	
● EN 50121-3-2	Yes; EMC for rail vehicles
● EN 50121-4	Yes; EMC for signal and telecommunications systems
● EN 50121-5	Yes; EMC for fixed installations and railway power supply equipment (shielded cables required)
● EN 50124-1	Yes; Railway applications - overvoltage category OV2; pollution degree PD2; rated surge voltage UNi = 0.5 kV; UNm = 24 V DC
● EN 50125-1	Yes; Rail vehicles - see ambient conditions
● EN 50125-2	Yes; Stationary electrical equipment - see ambient conditions
● EN 50125-3	Yes; Signal and telecommunications systems - see ambient conditions; vibrations and shocks: Application point outside of tracks (1 m to 3 m away from track)

● EN 50155	Yes; Rail vehicles - temperature class OT2, ST1/ST2, horizontal mounting position
● EN 61373	Yes; Rail vehicles - vibrations and shocks: Category 1 Class A/B
● Fire protection acc. to EN 45545-2	Yes; For proof of conformity, see Service & Support
Ambient conditions	
Ambient temperature during operation	
● horizontal installation, min.	-40 °C; = Tmin (incl. condensation/frost)
● horizontal installation, max.	60 °C; = Tmax; +70 °C for 10 min (OT2, ST1/ST2 acc. to EN 50155); +70 °C continuously with configured slots to the left and right of the module (OT4, ST1/ST2 acc. to EN 50155)
● vertical installation, min.	-40 °C; = Tmin
● vertical installation, max.	50 °C; = Tmax; see Derating BasedOn (e.g. manual)
● ceiling installation, min.	-40 °C; = Tmin
● ceiling installation, max.	50 °C; = Tmax
● floor installation, min.	-40 °C; = Tmin
● floor installation, max.	50 °C; = Tmax
Altitude during operation relating to sea level	
● Installation altitude above sea level, max.	2 000 m
● Ambient air temperature-barometric pressure-altitude	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m)
Relative humidity	
● With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation
Resistance	
Coolants and lubricants	
— Resistant to commercially available coolants and lubricants	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
— to biologically active substances according to EN 60721-3-3	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
— to chemically active substances according to EN 60721-3-3	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
— to mechanically active substances according to EN 60721-3-3	Yes; Class 3S4 incl. sand, dust, *
— Against mechanical environmental conditions acc. to EN 60721-3-3	Yes; Class 3M8 using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0//6AG1193-6AB00-0AA0)
Use on land craft, rail vehicles and special-purpose vehicles	
— to biologically active substances according to EN 60721-3-5	Yes; Class 5B2 mold, fungus and dry rot spores (with the exception of fauna); Class 5B3 on request
— to chemically active substances according to EN 60721-3-5	Yes; Class 5C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
— to mechanically active substances according to EN 60721-3-5	Yes; Class 5S3 incl. sand, dust; *
— Against mechanical environmental conditions acc. to EN 60721-3-5	Yes; Class 5M2 using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0/6AG1193-6AB00-0AA0)
— against mechanical environmental conditions in agriculture acc. to ISO 15003	Yes; Level 1 (Location LE) using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0/6AG1193-6AB00-0AA0)
Usage in industrial process technology	
— Against chemically active substances acc. to EN 60654-4	Yes; Class 3 (excluding trichlorethylene)
— Environmental conditions for process, measuring and control systems acc. to ANSI/ISA-71.04	Yes; Level GX group A/B (excluding trichlorethylene; harmful gas concentrations up to the limits of EN 60721-3-3 class 3C4 permissible); level LC3 (salt spray) and level LB3 (oil)
Remark	
— Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04	* The supplied plug covers must remain in place over the unused interfaces during operation!
Conformal coating	
● Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high reliability
● Protection against fouling acc. to EN 60664-3	Yes; Type 1 protection
● Electronic equipment on rolling stock acc. to EN 50155	Yes; class PC2 protective coating acc. to EN 50155
● Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life
● Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A	Yes; Conformal coating, Class A

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
Other	
Note:	for use in railway applications, also observe the product information "SIPLUS extreme RAIL" A5E37661960A, Online Support article 109736776

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			Railway
Manufacturer Declaration	UKCA	China RoHS	Confirmation

last modified: 10/23/2025