



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  | <a href="#">6ES7138-6BA01-0BA0</a>                         |
| 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  |
| <b>Digital inputs</b>   |   |
| Number of digital inputs  | 2   |
| Digital inputs, parameterizable                                 | Yes   |
| Input characteristic curve in accordance with IEC 61131, type 3 | Yes   |
| <b>Digital input functions, parameterizable</b>                 |   |
| • 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   |
| <b>Input voltage</b>  |   |
| • 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  |
| <b>Input current</b>  |   |
| • for signal "1", typ.  | 2.5 mA  |
| <b>Input delay (for rated value of input voltage)</b>           |   |
| 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   |
| <b>Cable length</b>   |   |
| • shielded, max.  | 1 000 m   |
| • unshielded, max.  | 600 m   |
| <b>Digital outputs</b>  |   |
| 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   |
| <b>Digital output functions, parameterizable</b>                |   |
| • Switching tripped by comparison values                        | Yes   |
| • Freely usable digital output                                  | Yes   |
| <b>Switching capacity of the outputs</b>                        |   |
| • with resistive load, max.                                     | 0.5 A; Per digital output                                       |
| • on lamp load, max.  | 5 W   |
| <b>Load resistance range</b>                                    |   |
| • lower limit   | 48 Ω  |
| • upper limit   | 12 kΩ   |
| <b>Output voltage</b>   |   |
| • for signal "1", min.  | 23.2 V; L+ (-0.8 V)   |
| <b>Output current</b>   |   |
| • 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  |
| <b>Output delay with resistive load</b>                         |   |
| • "0" to "1", max.  | 50 μs   |
| • "1" to "0", max.  | 50 μs   |
| <b>Switching frequency</b>                                      |   |
| • 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   |

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| <b>Total current of the outputs</b>                                    |  |
| • Current per module, max.   | 1 A  |
| <b>Cable length</b>  |  |
| • shielded, max.   | 1 000 m  |
| • unshielded, max.   | 600 m  |
| <b>Encoder</b>   |  |
| <b>Encoder signals, incremental encoder (symmetrical)</b>              |  |
| • 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  |
| <b>Encoder signals, incremental encoder (asymmetrical)</b>             |  |
| • 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  |
| <b>Encoder signals, absolute encoder (SSI)</b>                         |  |
| • 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  |
| <b>Interface types</b>   |  |
| • TTL 5 V  | Yes; push-pull encoders only   |
| • RS 422   | Yes  |
| <b>Interfaces</b>  |  |
| Number of RS 485 interfaces  | 0  |
| <b>Interrupts/diagnostics/status information</b>                       |  |
| Substitute values connectable  | Yes; Parameterizable   |
| <b>Alarms</b>  |  |
| • Diagnostic alarm   | Yes  |
| • Hardware interrupt   | Yes  |
| <b>Diagnoses</b>   |  |
| • 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  |

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|--|--|
| <b>Diagnostics indication LED</b>  |  |
| <ul style="list-style-type: none"> <li>• Monitoring of the supply voltage (PWR-LED)</li> </ul> | Yes; green PWR LED   |
| <ul style="list-style-type: none"> <li>• Channel status display</li> </ul>                     | Yes; green LED   |
| <ul style="list-style-type: none"> <li>• for module diagnostics</li> </ul>                     | Yes; green/red DIAG LED  |
| <ul style="list-style-type: none"> <li>• Status indicator forward counting (green)</li> </ul>  | Yes  |
| <ul style="list-style-type: none"> <li>• Status indicator backward counting (green)</li> </ul> | Yes  |
| <b>Integrated Functions</b>  |  |
| Counter  | Yes  |
| <ul style="list-style-type: none"> <li>• Number of counters</li> </ul>                         | 1  |
| <ul style="list-style-type: none"> <li>• Counting frequency, max.</li> </ul>                   | 4 MHz; with quadruple evaluation   |
| Fast mode  | Yes  |
| <b>Counting functions</b>  |  |
| <ul style="list-style-type: none"> <li>• Can be used with TO High_Speed_Counter</li> </ul>     | Yes; only for pulse and incremental encoders   |
| <ul style="list-style-type: none"> <li>• Continuous counting</li> </ul>                        | Yes  |
| <ul style="list-style-type: none"> <li>• Counter response parameterizable</li> </ul>           | Yes  |
| <ul style="list-style-type: none"> <li>• Hardware gate via digital input</li> </ul>            | Yes  |
| <ul style="list-style-type: none"> <li>• Software gate</li> </ul>                              | Yes  |
| <ul style="list-style-type: none"> <li>• Event-controlled stop</li> </ul>                      | Yes  |
| <ul style="list-style-type: none"> <li>• Synchronization via digital input</li> </ul>          | Yes  |
| <ul style="list-style-type: none"> <li>• Counting range, parameterizable</li> </ul>            | Yes  |
| <b>Comparator</b>  |  |
| — Number of comparators  | 2  |
| — Direction dependency   | Yes  |
| — Can be changed from user program   | Yes  |
| <b>Position detection</b>  |  |
| <ul style="list-style-type: none"> <li>• Incremental acquisition</li> </ul>                    | Yes  |
| <ul style="list-style-type: none"> <li>• Absolute acquisition</li> </ul>                       | Yes  |
| <ul style="list-style-type: none"> <li>• Suitable for S7-1500 Motion Control</li> </ul>        | Yes  |
| <b>Measuring functions</b>   |  |
| <ul style="list-style-type: none"> <li>• Measuring time, parameterizable</li> </ul>            | Yes  |
| <ul style="list-style-type: none"> <li>• Dynamic measurement period adjustment</li> </ul>      | Yes  |
| <ul style="list-style-type: none"> <li>• Number of thresholds, parameterizable</li> </ul>      | 2  |
| <b>Measuring range</b>   |  |
| — Frequency measurement, min.  | 0.04 Hz  |
| — Frequency measurement, max.  | 4 MHz  |
| — Cycle duration measurement, min.   | 0.25 $\mu$ s   |
| — Cycle duration measurement, max.   | 25 s   |
| <b>Accuracy</b>  |  |
| — 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   |
| <b>Potential separation</b>  |  |
| <b>Potential separation channels</b>   |  |
| <ul style="list-style-type: none"> <li>• between the channels and backplane bus</li> </ul>     | Yes  |
| <b>Isolation</b>   |  |
| Isolation tested with  | 750 V DC (type test) and according to EN 50155 (routine test)  |
| <b>Standards, approvals, certificates</b>  |  |
| Suitable for safety functions  | No   |
| <b>Railway application</b>   |  |
| <ul style="list-style-type: none"> <li>• EN 50121-3-2</li> </ul>                               | Yes; EMC for rail vehicles   |
| <ul style="list-style-type: none"> <li>• EN 50121-4</li> </ul>                                 | Yes; EMC for signal and telecommunications systems   |
| <ul style="list-style-type: none"> <li>• EN 50121-5</li> </ul>                                 | Yes; EMC for fixed installations and railway power supply equipment (shielded cables required)   |
| <ul style="list-style-type: none"> <li>• EN 50124-1</li> </ul>                                 | Yes; Railway applications - overvoltage category OV2; pollution degree PD2; rated surge voltage UNi = 0.5 kV; UNm = 24 V DC                                  |
| <ul style="list-style-type: none"> <li>• EN 50125-1</li> </ul>                                 | Yes; Rail vehicles - see ambient conditions  |
| <ul style="list-style-type: none"> <li>• EN 50125-2</li> </ul>                                 | Yes; Stationary electrical equipment - see ambient conditions  |
| <ul style="list-style-type: none"> <li>• EN 50125-3</li> </ul>                                 | Yes; Signal and telecommunications systems - see ambient conditions; vibrations and shocks: Application point outside of tracks (1 m to 3 m away from track) |

|   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• EN 50155</li> <li>• EN 61373</li> <li>• Fire protection acc. to EN 45545-2</li> </ul>  | <p>Yes; Rail vehicles - temperature class OT2, ST1/ST2, horizontal mounting position</p> <p>Yes; Rail vehicles - vibrations and shocks: Category 1 Class A/B</p> <p>Yes; For proof of conformity, see Service &amp; Support</p>  |
| <b>Ambient conditions</b>   |  |
| <b>Ambient temperature during operation</b>   |  |
| <ul style="list-style-type: none"> <li>• horizontal installation, min.</li> <li>• horizontal installation, max.</li> <li>• vertical installation, min.</li> <li>• vertical installation, max.</li> <li>• ceiling installation, min.</li> <li>• ceiling installation, max.</li> <li>• floor installation, min.</li> <li>• floor installation, max.</li> </ul>  | <p>-40 °C; = Tmin (incl. condensation/frost)</p> <p>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)</p> <p>-40 °C; = Tmin</p> <p>50 °C; = Tmax; see Derating BasedOn (e.g. manual)</p> <p>-40 °C; = Tmin</p> <p>50 °C; = Tmax</p> <p>-40 °C; = Tmin</p> <p>50 °C; = Tmax</p>   |
| <b>Altitude during operation relating to sea level</b>  |  |
| <ul style="list-style-type: none"> <li>• Installation altitude above sea level, max.</li> <li>• Ambient air temperature-barometric pressure-altitude</li> </ul>   | <p>2 000 m</p> <p>Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m)</p>   |
| <b>Relative humidity</b>  |  |
| <ul style="list-style-type: none"> <li>• With condensation, tested in accordance with IEC 60068-2-38, max.</li> </ul>   | <p>100 %; RH incl. condensation / frost (no commissioning in bedewed state), horizontal installation</p>   |
| <b>Resistance</b>   |  |
| <b>Coolants and lubricants</b>  |  |
| <ul style="list-style-type: none"> <li>— Resistant to commercially available coolants and lubricants</li> </ul>   | <p>Yes; Incl. diesel and oil droplets in the air</p>   |
| <b>Use in stationary industrial systems</b>   |  |
| <ul style="list-style-type: none"> <li>— to biologically active substances according to EN 60721-3-3</li> <li>— to chemically active substances according to EN 60721-3-3</li> <li>— to mechanically active substances according to EN 60721-3-3</li> <li>— Against mechanical environmental conditions acc. to EN 60721-3-3</li> </ul>   | <p>Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request</p> <p>Yes; Class 3C4 (RH &lt; 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *</p> <p>Yes; Class 3S4 incl. sand, dust, *</p> <p>Yes; Class 3M8 using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0/6AG1193-6AB00-0AA0)</p>  |
| <b>Use on land craft, rail vehicles and special-purpose vehicles</b>  |  |
| <ul style="list-style-type: none"> <li>— to biologically active substances according to EN 60721-3-5</li> <li>— to chemically active substances according to EN 60721-3-5</li> <li>— to mechanically active substances according to EN 60721-3-5</li> <li>— Against mechanical environmental conditions acc. to EN 60721-3-5</li> <li>— against mechanical environmental conditions in agriculture acc. to ISO 15003</li> </ul>                   | <p>Yes; Class 5B2 mold, fungus and dry rot spores (with the exception of fauna); Class 5B3 on request</p> <p>Yes; Class 5C3 (RH &lt; 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *</p> <p>Yes; Class 5S3 incl. sand, dust; *</p> <p>Yes; Class 5M2 using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0/6AG1193-6AB00-0AA0)</p> <p>Yes; Level 1 (Location LE) using the SIPLUS Mounting Kit ET 200SP (6AG1193-6AA00-0AA0/6AG1193-6AB00-0AA0)</p> |
| <b>Usage in industrial process technology</b>   |  |
| <ul style="list-style-type: none"> <li>— Against chemically active substances acc. to EN 60654-4</li> <li>— Environmental conditions for process, measuring and control systems acc. to ANSI/ISA-71.04</li> </ul>   | <p>Yes; Class 3 (excluding trichlorethylene)</p> <p>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)</p>  |
| <b>Remark</b>   |  |
| <ul style="list-style-type: none"> <li>— Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04</li> </ul>   | <p>* The supplied plug covers must remain in place over the unused interfaces during operation!</p>  |
| <b>Conformal coating</b>  |  |
| <ul style="list-style-type: none"> <li>• Coatings for printed circuit board assemblies acc. to EN 61086</li> <li>• Protection against fouling acc. to EN 60664-3</li> <li>• Electronic equipment on rolling stock acc. to EN 50155</li> <li>• Military testing according to MIL-I-46058C, Amendment 7</li> <li>• Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A</li> </ul> | <p>Yes; Class 2 for high reliability</p> <p>Yes; Type 1 protection</p> <p>Yes; class PC2 protective coating acc. to EN 50155</p> <p>Yes; Discoloration of coating possible during service life</p> <p>Yes; Conformal coating, Class A</p>  |

| 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 |

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10/23/2025