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SM 1223 digital input/output modules

Overview

- Digital inputs and outputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the relevant task
- For subsequent expansion of the system with additional inputs and outputs

Application

Digital input/output modules permit:

- Connection of the controller to digital signals of the process
- Output of digital signals from the controller to the process

This provides users with the following advantages:

- Optimum adaptation:
 - With signal modules which can be mixed as desired, users can adapt their controllers exactly to the relevant task. This avoids superfluous investments. Modules with 8, 16, and 32 input/output channels are available.
- Flexibility:
 - If the task is expanded subsequently, the controller can be upgraded. Updating of the user program is extremely simple

Function

The SM 1223 digital input/output signal modules convert:

- the level of the external digital signals from the process into the internal signal level of the S7-1200 controller and
- the internal signal level of the SIMATIC S7-1200 Controller into the external signal level required for the process.

Technical specifications

| Article number | 6ES7223-1BH32-0XB0 | 6ES7223-1BL32-0XB0 | 6ES7223-1BL32-1XB0 | 6ES7223-1PH32-0XB0 | 6ES7223-1PL32-0XB0 | 6ES7223-1QH32-0XB0 |
|-------------------------------------|-------------------------------------|---------------------------------------|---|------------------------------------|--------------------------------------|---|
| | Digital I/O SM 1223, 8 DI / 8 DO | Digital I/O SM 1223, 16DI/16DO | Digital I/O SM 1223, 16DI/16DO sink | Digital I/O SM 1223, 8DI/8DO | Digital I/O SM 1223, 16DI/16DO | Digital I/O SM 1223, 8DI AC/ 8DO Rly |
| General information | | | | | | |
| Product type designation | SM 1223, DI 8x24 V DC, DQ 8x24 V DC | SM 1223, DI 16x24 V DC, DQ 16x24 V DC | SM 1223, DI 16x24 V DC, DO 16x 24 V DC Sink | SM 1223, DI 8x24 V DC, DQ 8x relay | SM 1223, DI 16x24 V DC, DQ 16x relay | SM 1223, DI 8x120/230 V AC, DQ 8x relay |
| Supply voltage | | | | | | |
| Rated value (DC) | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V |
| permissible range, lower limit (DC) | 20.4 V | 20.4 V | 20.4 V | 20.4 V | 20.4 V | 20.4 V |

| permissible range, upper limit (DC) | 28.8 V | 28.8 V | 28.8 V | 28.8 V | 28.8 V | 28.8 V |
|--|---|---|---|--|--|--|
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| Input current | | | | | | |
| from backplane bus 5 V DC, max. | 145 mA | 185 mA | 185 mA | 145 mA | 180 mA | 120 mA |
| Digital inputs | | | | | | |
| • from load voltage L+ (without load), max. | 4 mA; per channel | 4 mA; per channel | 4 mA; per channel | 4 mA/input 11 mA/relay | 4 mA/input 11 mA/relay | |
| output voltage / header supply voltage of the transmitters / header | | | | | | |
| • product function / supply voltage for transmitters | Yes | Yes | Yes | Yes | Yes | Yes |
| Power loss | | | | | | |
| Power loss, typ. | 2.5 W | 4.5 W | 4.5 W | 5.5 W | 10 W | 7.5 W |
| Digital inputs | | | | | | |
| Number of digital inputs | 8 | 16 | 16 | 8 | 16 | 8 |
| • in groups of | 2 | 2 | 2 | 2 | 2 | 4 |
| Input characteristic curve in accordance with IEC 61131, type 1 | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of simultaneously controllable inputs | | | | | | |
| all mounting positions | | | | | | |
| — up to 40 °C, max. | 8 | 16 | 16 | 8 | 16 | 8 |
| horizontal installation | | | | | | |
| — up to 40 °C, max. | 8 | 16 | 16 | 8 | 16 | 8 |
| — up to 50 °C, max. | 8 | 16 | 16 | 8 | 16 | 8 |
| vertical installation | | | | | | |
| — up to 40 °C, max. | 8 | 16 | 16 | 8 | 16 | 8 |
| Input voltage | | | | | | |
| • Type of input voltage | DC | DC | DC | DC | DC | AC |
| • Rated value (DC) | 24 V | 24 V | 24 V | 24 V | 24 V | |
| • Rated value (AC) | | | | | | 120/230 V AC |
| • for signal "0" | 5 V DC at 1 mA | 5 V DC at 1 mA | 5 V DC at 1 mA | 5 V DC at 1 mA | 5 V DC at 1 mA | 20 V AC at 1 mA |
| • for signal "1" | 15 V DC at 2.5 mA | 15 V DC at 2.5 mA | 15 V DC at 2.5 mA | 15 V DC at 2.5 mA | 15 V DC at 2.5 mA | 79 V AC at 2.5 mA |
| Input current | | | | | | |
| • for signal "0", max. (permissible quiescent current) | 1 mA | 1 mA | 1 mA | 1 mA | 1 mA | 1 mA |
| • for signal "1", min. | 2.5 mA | 2.5 mA | 2.5 mA | 2.5 mA | 2.5 mA | 2.5 mA |
| • for signal "1", typ. | 4 mA | 4 mA | 4 mA | 4 mA | 4 mA | 9 mA |
| Input delay (for rated value of input voltage) for standard inputs | | | | | | |
| — parameterizable | Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms | Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms | Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms | Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, | Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, | Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, |

| | ms, selectable in groups of four | ms, selectable in groups of four | ms, selectable in groups of four | selectable in groups of four | selectable in groups of four | selectable in groups of four |
|---|----------------------------------|----------------------------------|-------------------------------------|--|--|--|
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| for interrupt inputs | | | | | | |
| — parameterizable | Yes | Yes | Yes | Yes | Yes | Yes |
| Cable length | | | | | | |
| ● shielded, max. | 500 m | 500 m | 500 m | 500 m | 500 m | 500 m |
| ● unshielded, max. | 300 m | 300 m | 300 m | 300 m | 300 m | 300 m |
| Digital outputs | | | | | | |
| Number of digital outputs | 8 | 16 | 16; Transistor current sinking | 8 | 16 | 8 |
| ● in groups of | 1 | 1 | 1 | 2 | 4 | 4 |
| Short-circuit protection | No; to be provided externally | No; to be provided externally | Yes; 1 to 3.5 A | No; to be provided externally | No; to be provided externally | No; to be provided externally |
| Limitation of inductive shutdown voltage to | L+ (-48 V) | L+ (-48 V) | Typ 45 V | | | |
| Switching capacity of the outputs | | | | | | |
| ● with resistive load, max. | 0.5 A | 0.5 A | 0.5 A | 2 A | 2 A | 2 A |
| ● on lamp load, max. | 5 W | 5 W | 5 W | 30 W with DC, 200 W with AC | 30 W with DC, 200 W with AC | 30 W with DC, 200 W with AC |
| Output voltage | | | | | | |
| ● Rated value (DC) | 24 V | 24 V | 24 V | 5 V DC to 30 V DC | 5 V DC to 30 V DC | 5 V DC to 30 V DC |
| ● Rated value (AC) | | | | 5 V AC to 250 V AC | 5 V AC to 250 V AC | 5 V AC to 250 V AC |
| ● for signal "0", max. | 0.1 V; with 10 kOhm load | 0.1 V; with 10 kOhm load | L+ minus 0.75 V DC with 10k Load | | | |
| ● for signal "1", min. | 20 V DC | 20 V DC | 0.5 V | | | |
| Output current | | | | | | |
| ● for signal "1" rated value | 0.5 A | 0.5 A | 0.5 A | 2 A | 2 A | 2 A |
| ● for signal "1" permissible range, max. | 0.5 A | 0.5 A | 0.5 A | 2 A | 2 A | 2 A |
| ● for signal "0" residual current, max. | 10 µA | 10 µA | 75 µA | | | |
| Output delay with resistive load | | | | | | |
| ● "0" to "1", max. | 50 µs | 50 µs | 20 µs | 10 ms | 10 ms | 10 ms |
| ● "1" to "0", max. | 200 µs | 200 µs | 350 µs | 10 ms | 10 ms | 10 ms |
| Total current of the outputs (per group) | | | | | | |
| horizontal installation | | | | | | |
| — up to 50 °C, max. | 4 A; Current per mass | 8 A; Current per mass | 8 A; Current per mass | 10 A; Current per mass | 8 A; Current per mass | 8 A; Current per mass |
| Relay outputs | | | | | | |
| ● Number of relay outputs | | | | 8 | 16 | 8 |
| ● Rated supply voltage of relay coil L+ (DC) | | | | 24 V | 24 V | 24 V |
| ● Number of operating cycles, max. | | | | mechanically 10 million, at rated load | mechanically 10 million, at rated load | mechanically 10 million, at rated load |

voltage 100
000 voltage 100
000 voltage 100
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| Switching capacity of contacts | | | | | | |
| — with inductive load, max. | | 0.5 A | 0.5 A | 2 A | 2 A | 2 A |
| — on lamp load, max. | | 5 W | 5 W | 30 W with DC, 200 W with AC | 30 W with DC, 200 W with AC | 30 W with DC, 200 W with AC |
| — with resistive load, max. | | 0.5 A | 0.5 A | 2 A | 2 A | 2 A |
| Cable length | | | | | | |
| ● shielded, max. | 500 m | 500 m | 500 m | 500 m | 500 m | 500 m |
| ● unshielded, max. | 150 m | 150 m | 150 m | 150 m | 150 m | 150 m |
| Interrupts/diagnostics/status information | | | | | | |
| Alarms | | | | | | |
| ● Diagnostic alarm | Yes | Yes | Yes | Yes | Yes | Yes |
| Diagnostics indication LED | | | | | | |
| ● for status of the inputs | Yes | Yes | Yes | Yes | Yes | Yes |
| ● for status of the outputs | Yes | Yes | Yes | Yes | Yes | Yes |
| Potential separation | | | | | | |
| Potential separation digital inputs | | | | | | |
| ● between the channels, in groups of | 2 | 2 | 2 | 2 | 2 | 2 |
| Potential separation digital outputs | | | | | | |
| ● between the channels | | | | Relays | Relays | Relays |
| ● between the channels, in groups of | 1 | 1 | 1 | 2 | 4 | 2 |
| ● between the channels and backplane bus | 500 V AC | 500 V AC | 500 V AC | 1 500 V AC for 1 minute | 1 500 V AC for 1 minute | 1 500 V AC for 1 minute |
| Permissible potential difference | | | | | | |
| between different circuits | | | | 750 V AC for 1 minute | 750 V AC for 1 minute | 750 V AC for 1 minute |
| Degree and class of protection | | | | | | |
| IP degree of protection | IP20 | IP20 | IP20 | IP20 | IP20 | IP20 |
| Standards, approvals, certificates | | | | | | |
| CE mark | Yes | Yes | Yes | Yes | Yes | Yes |
| CSA approval | Yes | Yes | Yes | Yes | Yes | Yes |
| UL approval | Yes | Yes | Yes | Yes | Yes | Yes |
| cULus | Yes | Yes | Yes | Yes | Yes | Yes |
| FM approval | Yes | Yes | Yes | Yes | Yes | Yes |
| RCM (formerly C-TICK) | Yes | Yes | Yes | Yes | Yes | Yes |
| KC approval | Yes | Yes | Yes | Yes | Yes | Yes |
| Marine approval | Yes | Yes | Yes | Yes | Yes | Yes |
| Ambient conditions | | | | | | |
| Free fall | | | | | | |
| ● Fall height max | 0.3 m; five | 0.3 m; five | 0.3 m; five | 0.3 m; five | 0.3 m; five | 0.3 m; five |

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| Ambient temperature during operation | | | | | | |
| • min. | -20 °C | -20 °C | -20 °C | -20 °C | -20 °C | -20 °C |
| • max. | 60 °C | 60 °C | 60 °C | 60 °C | 60 °C; Number of simultaneously activated outputs: 8 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 16 at 55 °C horizontal or 45 °C vertical | 60 °C; Number of simultaneously activated outputs: 4 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 8 at 55 °C horizontal or 45 °C vertical |
| • horizontal installation, min. | -20 °C | -20 °C | -20 °C | -20 °C | -20 °C | -20 °C |
| • horizontal installation, max. | 60 °C | 60 °C | 60 °C | 60 °C | 60 °C | 60 °C |
| • vertical installation, min. | -20 °C | -20 °C | -20 °C | -20 °C | -20 °C | -20 °C |
| • vertical installation, max. | 50 °C | 50 °C | 50 °C | 50 °C | 50 °C | 50 °C |
| • permissible temperature change | 5°C to 55°C, 3°C / minute | 5°C to 55°C, 3°C / minute | 5°C to 55°C, 3°C / minute | 5°C to 55°C, 3°C / minute | 5°C to 55°C, 3°C / minute | 5°C to 55°C, 3°C / minute |
| Ambient temperature during storage/transportation | | | | | | |
| • min. | -40 °C | -40 °C | -40 °C | -40 °C | -40 °C | -40 °C |
| • max. | 70 °C | 70 °C | 70 °C | 70 °C | 70 °C | 70 °C |
| Air pressure acc. to IEC 60068-2-13 | | | | | | |
| • Storage/transport, min. | 660 hPa | 660 hPa | 660 hPa | 660 hPa | 660 hPa | 660 hPa |
| • Storage/transport, max. | 1 080 hPa | 1 080 hPa | 1 080 hPa | 1 080 hPa | 1 080 hPa | 1 080 hPa |
| Relative humidity | | | | | | |
| • Operation at 25 °C without condensation, max. | 95 % | 95 % | 95 % | 95 % | 95 % | 95 % |
| connection method | | | | | | |
| required front connector | Yes | Yes | Yes | Yes | Yes | Yes |
| Mechanics/material | | | | | | |
| Enclosure material (front) | | | | | | |
| • Plastic | Yes | Yes | Yes | Yes | Yes | Yes |
| Dimensions | | | | | | |
| Width | 45 mm | 70 mm | 70 mm | 45 mm | 70 mm | 45 mm |
| Height | 100 mm | 100 mm | 100 mm | 100 mm | 100 mm | 100 mm |
| Depth | 75 mm | 75 mm | 75 mm | 75 mm | 75 mm | 75 mm |
| Weights | | | | | | |
| Weight, approx. | 210 g | 310 g | 310 g | 230 g | 350 g | 230 g |