

## SIPLUS SM 1221 digital input modules

### Overview

- Digital inputs as supplement to the integral I/O of the CPUs
- For flexible adaptation of the controller to the corresponding task
- For subsequent expansion of the system with additional inputs
- From +60 °C to +70 °C, max. 50% of the inputs can be controlled simultaneously

### Note:

SIPLUS extreme products are based on SIMATIC standard products. The contents listed here were taken from the respective standard products. SIPLUS extreme-specific information was added.

### Application

Digital input modules allow the connection of the controller to digital signals of 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 1221 digital input signal modules convert the level of the external digital signals from the process into the internal signal level of the S7-1200 controller.

### Technical specifications

Article number	6AG1221-1BF32-2XB0 SIPLUS S7-1200 SM 1221 8DI	6AG1221-1BF32-4XB0 SIPLUS S7-1200 SM 1221 8DI	6AG1221-1BH32-2XB0 SIPLUS S7-1200 SM 1221 16DI	6AG1221-1BH32-4XB0 SIPLUS S7-1200 SM 1221 16DI
<b>General information</b>				
Product type designation	SM 1221, DI 8x24 V DC	SM 1221, DI 8x24 V DC	SM 1221, DI 16x24 V DC	SM 1221, DI 16x24 V DC
<b>Supply voltage</b>				
Rated value (DC)	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
permissible range, upper limit (DC)	28.8 V	28.8 V	28.8 V	28.8 V
<b>Input current</b>				
from backplane bus 5 V DC, max.	105 mA	105 mA	130 mA	130 mA
<b>Digital inputs</b>				
• from load voltage L+ (without load), max.	4 mA; per channel	4 mA; per channel	4 mA; per channel	4 mA; per channel
<b>output voltage / header supply voltage of the transmitters / header</b>				
• product function / supply voltage for transmitters	Yes	Yes	Yes	Yes
<b>Power loss</b>				
Power loss, typ.	1.5 W	1.5 W	2.5 W	2.5 W
<b>Digital inputs</b>				
Number of digital inputs	8	8	16	16
• in groups of	2	2	4	4
Input characteristic curve in accordance with IEC 61131, type 1	Yes	Yes	Yes	Yes
<b>Number of simultaneously controllable inputs</b>				
<b>all mounting positions</b>				
— up to 40 °C, max.	8	8	16	16
<b>horizontal installation</b>				
— up to 40 °C, max.	8	8	16	16
— up to 50 °C, max.	8	8	16	16
<b>vertical installation</b>				
— up to 40 °C, max.	8	8	16	16
<b>Input voltage</b>				
• Rated value (DC)	24 V	24 V	24 V	24 V
• 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
• 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
<b>Input current</b>				
• for signal "0", max. (permissible quiescent current)	1 mA	1 mA	1 mA	1 mA
• for signal "1", min.	2.5 mA	2.5 mA	2.5 mA	2.5 mA
• for signal "1", typ.	4 mA	4 mA	4 mA	4 mA

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<b>Input delay (for rated value of input voltage)</b>				
<b>for standard inputs</b>				
— parameterizable	Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four	Yes; 0.2 ms, 0.4 ms, 0.8 ms, 1.6 ms, 3.2 ms, 6.4 ms and 12.8 ms, selectable in groups of four
<b>for interrupt inputs</b>				
— parameterizable	Yes	Yes	Yes	Yes
<b>Cable length</b>				
• shielded, max.	500 m	500 m	500 m	500 m
• unshielded, max.	300 m	300 m	300 m	300 m
<b>Interrupts/diagnostics/status information</b>				
Diagnostics function	Yes	Yes	Yes	Yes
<b>Alarms</b>				
• Diagnostic alarm	Yes	Yes	Yes	Yes
<b>Diagnoses</b>				
• Monitoring the supply voltage	Yes	Yes	Yes	Yes
<b>Diagnostics indication LED</b>				
• for status of the inputs	Yes	Yes	Yes	Yes
• for maintenance	Yes	Yes	Yes	Yes
<b>Potential separation</b>				
<b>Potential separation digital inputs</b>				
• between the channels, in groups of	2	2	4	4
<b>Degree and class of protection</b>				
IP degree of protection	IP20	IP20	IP20	IP20
<b>Ambient conditions</b>				
<b>Free fall</b>				
• Fall height, max.	0.3 m; five times, in product package	0.3 m; five times, in product package	0.3 m; five times, in product package	0.3 m; five times, in product package
<b>Ambient temperature during operation</b>				
• min.	-40 °C; = Tmin (incl. condensation/frost); start-up @ -25 °C	-20 °C; = Tmin (incl. condensation/frost); start-up @ 0 °C	-40 °C; = Tmin (incl. condensation/frost); start-up @ -25 °C	-20 °C; = Tmin (incl. condensation/frost); start-up @ 0 °C
• max.	70 °C; = Tmax; Tmax > +60 °C number of simultaneously activated inputs 4 (no adjacent points) for horizontal mounting position	60 °C; = Tmax	70 °C; = Tmax; Tmax > +60 °C number of simultaneously activated inputs 8 (no adjacent points) for horizontal mounting position	60 °C; = Tmax
• At cold restart, min.	-25 °C	0 °C	-25 °C	0 °C
<b>Ambient temperature during storage/transportation</b>				
• min.	-40 °C	-40 °C	-40 °C	-40 °C
• max.	70 °C	70 °C	70 °C	70 °C
<b>Altitude during operation relating to sea level</b>				
• Installation altitude above sea level, max.	5 000 m	5 000 m	5 000 m	5 000 m
• Ambient air temperature-barometric pressure-altitude	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)
<b>Relative humidity</b>				
• With condensation, tested in accordance with IEC 60068-2-38, max.	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
<b>Resistance</b>				
<b>Coolants and lubricants</b>				
— Resistant to commercially available coolants and lubricants	Yes	Yes	Yes	Yes
<b>Use in stationary industrial systems</b>				
— 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	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request	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); *	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 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	Yes; Class 3S4 incl. sand, dust, *	Yes; Class 3S4 incl. sand, dust, *	Yes; Class 3S4 incl. sand, dust, *	Yes; Class 3S4 incl. sand, dust, *

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60721-3-3				
<b>Use on ships/at sea</b>				
— to biologically active substances according to EN 60721-3-6	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
— to chemically active substances according to EN 60721-3-6	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
— to mechanically active substances according to EN 60721-3-6	Yes; Class 6S3 incl. sand, dust; *	Yes; Class 6S3 incl. sand, dust; *	Yes; Class 6S3 incl. sand, dust; *	Yes; Class 6S3 incl. sand, dust; *
<b>Usage in industrial process technology</b>				
— Against chemically active substances acc. to EN 60654-4	Yes; Class 3 (excluding trichlorethylene)	Yes; Class 3 (excluding trichlorethylene)	Yes; Class 3 (excluding trichlorethylene)	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)	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)	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)	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)
<b>Remark</b>				
— 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!	* The supplied plug covers must remain in place over the unused interfaces during operation!	* The supplied plug covers must remain in place over the unused interfaces during operation!	* The supplied plug covers must remain in place over the unused interfaces during operation!
<b>Conformal coating</b>				
• Coatings for printed circuit board assemblies acc. to EN 61086	Yes; Class 2 for high reliability	Yes; Class 2 for high reliability	Yes; Class 2 for high reliability	Yes; Class 2 for high reliability
• Protection against fouling acc. to EN 60664-3	Yes; Type 1 protection	Yes; Type 1 protection	Yes; Type 1 protection	Yes; Type 1 protection
• Military testing according to MIL-I-46058C, Amendment 7	Yes; Discoloration of coating possible during service life	Yes; Discoloration of coating possible during service life	Yes; Discoloration of coating possible during service life	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	Yes; Conformal coating, Class A	Yes; Conformal coating, Class A	Yes; Conformal coating, Class A
<b>connection method / header</b>				
required front connector	Yes	Yes	Yes	Yes
<b>Mechanics/material</b>				
Enclosure material (front)				
• Plastic	Yes	Yes	Yes	Yes
<b>Dimensions</b>				
Width	45 mm	45 mm	45 mm	45 mm
Height	100 mm	100 mm	100 mm	100 mm
Depth	75 mm	75 mm	75 mm	75 mm
<b>Weights</b>				
Weight, approx.	170 g	170 g	210 g	210 g