MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected official pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7221-1BF30-0XB0

Eight-Channel Digital Input Module. Source PDF pages: OLD pp. 2,64,745-747; UP pp. 1-2. Adjacent model text on shared pages is outside this product reference.

OFFICIAL SOURCE

S7-1200 Programmable Controller System Manual; 04/2012

Siemens original documentation and product reference

Siemens 01/2013; UP source pp. 1-2

Manufacturer technical reference excerpt; edition and complete order number apply. This is not a complete installation manual.

AMIKON PRODUCT SUPPORT

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Amikon Limited prepared this independent reference package. Selected manufacturer pages follow with their original content and pagination visible.

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE

indicates that an unintended result or situation can occur if the relevant information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Order number: 6ES7298-8FA30-8BH0
℗ 05/2012 Technical data subject to change

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All S7-1200 modules have removable connectors for user wiring. To prevent loose connections, ensure that the connector is seated securely and that the wire is installed securely into the connector. To avoid damaging the connector, be careful that you do not over-tighten the screws. The maximum torque for the CPU and SM connector screw is 0.56 N-m (5 inch-pounds). The maximum torque for the SB connector screw is 0.33 N-m (3 inch-pounds).

To help prevent unwanted current flows in your installation, the S7-1200 provides isolation boundaries at certain points. When you plan the wiring for your system, you should consider these isolation boundaries. Refer to the technical specifications for the amount of isolation provided and the location of the isolation boundaries. Do not depend on isolation boundaries rated less than 1500 VAC as safety boundaries.

Guidelines for lamp loads

Lamp loads are damaging to relay contacts because of the high turn-on surge current. This surge current will nominally be 10 to 15 times the steady state current for a Tungsten lamp. A replaceable interposing relay or surge limiter is recommended for lamp loads that will be switched a large number of times during the lifetime of the application.

Guidelines for inductive loads

You should equip inductive loads with suppression circuits to limit voltage rise when the control output turns off. Suppression circuits protect your outputs from premature failure due to the high voltages associated with turning off inductive loads. In addition, suppression circuits limit the electrical noise generated when switching inductive loads. Placing an external suppression circuit so that it is electrically across the load, and physically located near the load is most effective in reducing electrical noise.

S7-1200 DC outputs include internal suppression circuits that are adequate for the inductive loads in most applications. Since S7-1200 relay output contacts can be used to switch either a DC or an AC load, internal protection is not provided.

Note

The effectiveness of a given suppression circuit depends on the application, and you must verify it for your particular use. Always ensure that all components used in your suppression circuit are rated for use in the application.

Pin	X10	X11 (gold)	X12
5	M / 24VDC Sensor Out	AI 0	DQ a.2
6	1M	AI 1	DQ a.3
7	DI a.0	--	DQ a.4
8	DI a.1	--	DQ a.5
9	DI a.2	--	DQ a.6
10	DI a.3	--	DQ a.7
11	DI a.4	--	DQ b.0
12	DI a.5	--	DQ b.1
13	DI a.6	--	--
14	DI a.7	--	--
15	DI b.0	--	--
16	DI b.1	--	--
17	DI b.2	--	--
18	DI b.3	--	--
19	DI b.4	--	--
20	DI b.5	--	--

Note

Unused analog inputs should be shorted.

A.6 Digital signal modules (SMs)

A.6.1 SM 1221 digital input specifications

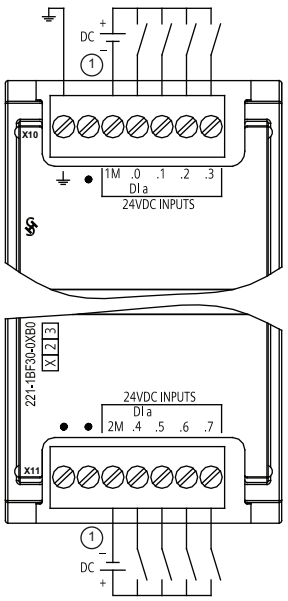
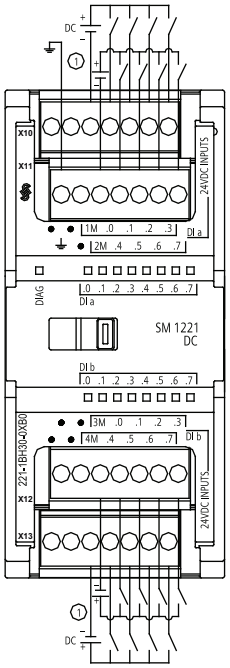
Table A- 81 General specifications

Model	SM 1221 DI 8 x 24 VDC	SM 1221 DI 16 x 24 VDC
Order number	6ES7 221-1BF30-0XB0	6ES7 221-1BH30-0XB0
Dimensions W x H x D (mm)	45 x 100 x 75	45 x 100 x 75
Weight	170 grams	210 grams
Power dissipation	1.5 W	2.5 W
Current consumption (SM Bus)	105 mA	130 mA
Current consumption (24 VDC)	4 mA / input used	4 mA / input used

Table A- 82 Digital inputs

Model	SM 1221 DI 8 x 24 VDC	SM 1221 DI 16 x 24 VDC
Number of inputs	8	16
Type	Sink/Source (IEC Type 1 sink)	Sink/Source (IEC Type 1 sink)
Rated voltage	24 VDC at 4 mA, nominal	24 VDC at 4 mA, nominal
Continuous permissible voltage	30 VDC, max.	30 VDC, max.
Surge voltage	35 VDC for 0.5 sec.	35 VDC for 0.5 sec.
Logic 1 signal (min.)	15 VDC at 2.5 mA	15 VDC at 2.5 mA
Logic 0 signal (max.)	5 VDC at 1 mA	5 VDC at 1 mA
Isolation (field side to logic)	500 VAC for 1 minute	500 VAC for 1 minute
Isolation groups	2	4
Filter times	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms (selectable in groups of 4)	0.2, 0.4, 0.8, 1.6, 3.2, 6.4, and 12.8 ms (selectable in groups of 4)
Number of inputs on simultaneously	8	16
Cable length (meters)	500 m shielded, 300 unshielded	500 m shielded, 300 unshielded

Table A- 83 Wiring diagrams for the digital input SMs

SM 1221 DI 8 x 24 VDC (6ES7 221-1BF30-0XB0)	SM 1221 DI 16 x 24 VDC (6ES7 221-1BH30-0XB0)
	

① For sinking inputs, connect "-" to "M" (shown). For sourcing inputs, connect "+" to "M".

Table A- 84 Connector pin locations for SM 1221 DI 8 x 24 VDC (6ES7 221-1BF30-0XB0)

Pin	X10	X11
1	GND	No connection
2	No connection	No connection
3	1M	2M
4	DI a.0	DI a.4
5	DI a.1	DI a.5
6	DI a.2	DI a.6
7	DI a.3	DI a.7

Table A- 85 Connector pin locations for SM 1221 DI 16 x 24 VDC (6ES7 221-1BH30-0XB0)

Pin	X10	X11	X12	X13
1	GND	No connection	No connection	No connection
2	No connection	No connection	No connection	No connection
3	1M	2M	3 M	4 M
4	DI a.0	DI a.4	DI b.0	DI b.4
5	DI a.1	DI a.5	DI b.1	DI b.5
6	DI a.2	DI a.6	DI b.2	DI b.6
7	DI a.3	DI a.7	DI b.3	DI b.7

A.6.2 SM 1222 8-Point Digital Output Specifications

Table A- 86 General specifications

Model	SM 1222 DQ 8 x Relay	SM 1222 DQ8 RLY Changeover	SM 1222 DQ 8 x 24 VDC
Order number	6ES7 222-1HF30-0XB0	6ES7 222-1XF30-0XB0	6ES7 222-1BF30-0XB0
Dimensions W x H x D (mm)	45 x 100 x 75	70 x 100 x 75	45 x 100 x 75
Weight	190 grams	310 grams	180 grams
Power dissipation	4.5 W	5 W	1.5 W
Current consumption (SM Bus)	120 mA	140 mA	120 mA
Current consumption (24 VDC)	11 mA / Relay coil used	16.7 mA/Relay coil used	11 mA / Relay coil used

Table A- 87 Digital outputs

Model	SM 1222 DQ 8 x Relay	SM 1222 DQ8 RLY Changeover	SM 1222 DQ 8 x 24 VDC
Number of outputs	8	8	8
Type	Relay, dry contact	Relay change over contact	Solid state - MOSFET (sourcing)

SIEMENS

SIMATIC
S7-1200
S7-1200 Signal modules and spare parts
Product Information

S7-1200 Signal modules (SM)

Siemens is pleased to announce the following new and improved S7-1200 signal modules for use with STEP 7 V11 w/HSP Basic and Professional software (HSP_V11SP2_0033_001_S71200_SM_2.0).

The order numbers of the signal modules are shown below. The old order numbers are also shown for reference.

Signal module	Old order number	New order number
SM 1221 8 x 24 VDC Input (Sink/Source)	6ES7 221-1BF30-0XB0	6ES7 221-1BF32-0XB0
SM 1221 16 x 24 VDC Input (Sink/Source)	6ES7 221-1BH30-0XB0	6ES7 221-1BH32-0XB0
SM 1222 8 x 24 VDC Output (Source)	6ES7 222-1BF30-0XB0	6ES7 222-1BF32-0XB0
SM 1222 16 x 24 VDC Output (Source)	6ES7 222-1BH30-0XB0	6ES7 222-1BH32-0XB0
SM 1222 8 x Relay Output	6ES7 222-1HF30-0XB0	6ES7 222-1HF32-0XB0
SM 1222 8 x Relay Output (CO)	6ES7 222-1XF30-0XB0	6ES7 222-1XF32-0XB0
SM 1222 16 x Relay Output	6ES7 222-1HH30-0XB0	6ES7 222-1HH32-0XB0
SM 1223 8 x 24 VDC Input (Sink/Source) / 8 x 24 VDC Output (Source)	6ES7 223-1BH30-0XB0	6ES7 223-1BH32-0XB0
SM 1223 16 x 24 VDC Input (Sink/Source) / 16 x 24VDC Output (Source)	6ES7 223-1BL30-0XB0	6ES7 223-1BL32-0XB0
SM 1223 8 x 24 VDC Input (Sink/Source) / 8 x Relay Output	6ES7 223-1PH30-0XB0	6ES7 223-1PH32-0XB0
SM 1223 16 x 24 VDC Input (Sink/Source) / 16 x Relay Output	6ES7 223-1PL30-0XB0	6ES7 223-1PL32-0XB0
SM 1223 DI 8 x 120/230 VAC Input (Sink/Source) / 8 x Relay Output	6ES7 223-1QH30-0XB0	6ES7 223-1QH32-0XB0
SM 1231 4 x Analog Input	6ES7 231-4HD30-0XB0	6ES7 231-4HD32-0XB0
SM 1231 8 x Analog Input	6ES7 231-4HF30-0XB0	6ES7 231-4HF32-0XB0
SM 1232 2 x Analog Output	6ES7 232-4HB30-0XB0	6ES7 232-4HB32-0XB0
SM 1232 4 x Analog Output	6ES7 232-4HD30-0XB0	6ES7 232-4HD32-0XB0
SM 1234 4 x Analog Input / 2 x Analog Output	6ES7 234-4HE30-0XB0	6ES7 234-4HE32-0XB0

Improved feature sets

These signal modules now have the following features:

- 4-20 mA range added to the analog input and output modules listed above. Refer to the S7-1200 System Manual (04/2012), table A-135 for Analog input representation for current. The new table for Analog output representation for current is shown below.
- Wirebreak detection when using 4-20 mA added to the analog input modules listed above
- Connector keying to prevent errors when plugging in field wiring connectors added to the modules with relay outputs, listed above

Table 1 Analog output representation for current

System		Current Output Range		
Decimal	Hexadecimal	0 mA to 20 mA	4 mA to 20 mA	
32767	7FFF	See note 1	See note 1	Overflow

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System		Current Output Range		
Decimal	Hexadecimal	0 mA to 20 mA	4 mA to 20 mA	
32512	7F00	See note 1	See note 1	
32511	7EFF	23.52 mA	22.81 mA	Overshoot range
27649	6C01			
27648	6C00	20 mA	20 mA	Rated range
20736	5100	15 mA	16 mA	
1	1	723.4 nA	4 mA + 578.7 nA	
0	0	0 mA	4mA	
-1	FFFF		4 mA to 578.7 nA	Undershoot range
-6912	E500		0 mA	
-6913	E4FF			Not possible. Output value limited to 0 mA.
-32512	8100			
-32513	80FF	See note 1	See note 1	Underflow
-32768	8000	See note 1	See note 1	

[1] In an overflow or underflow condition, analog outputs will take on the substitute value of the STOP mode.

Spare parts compatibility

The new signal modules (6ES7 2xx-xxx32-0XB0) replace existing signal modules (6ES7 2xx-xxx30-0XB0) and are compatible. You can employ the revised modules in place of the existing SM modules without any changes.

Software requirements

- To use the improved analog signal modules, you must configure the module with its new order number, and if applicable, with the corresponding HSP_V11SP2_0033_001_S71200_SM_2.0.
- Because uploading a module configuration from the device configuration editor cannot recognize the new signal modules, you must manually include them in your project. Drag and drop the signal modules from the hardware catalog into the device configuration.

New spare parts

The following spare parts are now available for use with the S7-1200 CPUs.

Item	Order number
Terminal block, keyed left, 7 contact	6ES7 292-1AG40-0XA1
Terminal block, keyed right, 7 contact	6ES7 292-1AG40-0XA0
Terminal block, keyed right, 8 contact	6ES7 292-1AH40-0XA0
Terminal block, keyed right, 11 contact	6ES7 292-1AL40-0XA0
Terminal block, keyed right, 12 contact	6ES7 292-1AM40-0XA0
Terminal block, keyed right, 14 contact	6ES7 292-1AP40-0XA0
Terminal block, keyed right, 20 contact	6ES7 292-1AV40-0XA0

Refer to the SIMATIC S7-1200 Programmable Controller System Manual for technical specifications for these signal modules, and for more information about the S7-1200 product family.

Additional assistance

For assistance in answering technical questions, for training on these products, or for ordering, contact your Siemens distributor or sales office.

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S7-1200 Signal modules and spare parts
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