

OFFICIAL DOCUMENT PACKAGE

Manufacturer's Manual

Amikon cover with selected official Siemens technical pages

SIEMENS S7-200 SMART

6ES7288-1ST40-0AA0

CPU ST40 DC/DC/DC

Selected official pages retain the original technical tables, ratings, notes and pagination.

OFFICIAL SOURCE

Siemens S7-200 SMART V2.5, A5E03822230-AI, 01/2020

Original pages 22, 48-49, 57-58, 673, 778-786

This technical extract does not replace the complete equipment and system manuals. Check the installed hardware and project before use.

1.2 New features

Only the following CPU models with firmware V2.5 or later versions support the new features described in this chapter:

Table 1- 4 CPU models affected by firmware V2.5

CPU model	Article number
CPU SR20, AC/DC/Relay	6ES7288-1SR20-0AA0
CPU ST20, DC/DC/DC	6ES7288-1ST20-0AA0
CPU SR30, AC/DC/Relay	6ES7288-1SR30-0AA0
CPU ST30, DC/DC/DC	6ES7288-1ST30-0AA0
CPU SR40, AC/DC/Relay	6ES7288-1SR40-0AA0
CPU ST40, DC/DC/DC	6ES7288-1ST40-0AA0
CPU SR60, AC/DC/Relay	6ES7288-1SR60-0AA0
CPU ST60, DC/DC/DC	6ES7288-1ST60-0AA0

STEP 7-Micro/WIN SMART V2.5 release provides the following new features:

I-Device

STEP 7-Micro/WIN SMART V2.5 and the S7-200 SMART V2.5 CPU firmware adds I-Device (Page 405) functions for PROFINET communication.

I-Device configuration

PROFINET wizard provides the function to select CPU role as I-Device (Page 421).

GSDML file export

PROFINET wizard provides the function to export GSDML file. (Page 421)

LED status for PROFINET I-Device

The LED status indicators (Page 413) display information for PROFINET I-Device.

I-Device Diagnostic

Diagnostic functions (Page 119) are available for PROFINET I-Device.

Status Chart

The Status Chart (Page 652) function is available on PROFINET I-Device.

Catalog configuration

Catalog configuration (Page 435) is a new method to configure CPU as a controller for PROFINET communication.

Before you install or remove any electrical device, ensure that the power to that equipment has been turned off. Also, ensure that the power to any related equipment has been turned off.



WARNING

Remove power to PLC before installing or removing equipment

Attempts to install or remove the PLC or related equipment with the power applied could cause electric shock or faulty operation of equipment.

Failure to disable all power to the PLC and related equipment during installation or removal procedures could result in death or serious injury to personnel, and/or damage to equipment.

Always follow appropriate safety precautions and ensure that power to the PLC is disabled before attempting to install or remove the CPU or related equipment.

Always ensure that whenever you replace or install a device, you use the correct module or equivalent device.



WARNING

Module replacement

If you install an incorrect module, the program in the CPU could function unpredictably.

Failure to replace a device with the same model, orientation, or order could result in death or serious injury to personnel, and/or damage to equipment.

Replace the device with the same model, and be sure to orient and position it correctly.

Note

Install expansion modules separately after the CPU has been installed. The CPU models CPU CR20s, CPU CR30s, CPU CR40s, and CPU CR60s do not support the use of expansion modules or signal boards.

Consider the following when installing the units on the DIN rail or on a panel:

- For DIN rail mounting, make sure the upper DIN rail clip is in the latched (inner) position and that the lower DIN rail clip is in the extended position for the CPU.
- After installing the devices on the DIN rail, move the lower DIN rail clips to the latched position to lock the devices on the DIN rail.
- For panel mounting, make sure the DIN rail clips are pushed to the extended position.

To install the CPU on a panel, follow these steps:

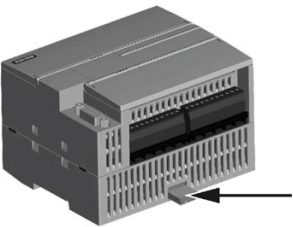
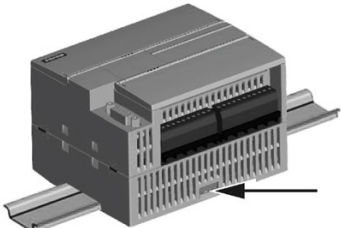
1. Locate, drill, and tap the mounting holes (M4 or American Standard number 8), using the dimensions in the table, Mounting dimensions (mm) (Page 46).
2. Ensure that the CPU and S7-200 SMART equipment are disconnected from electrical power.

3. Secure the module(s) to the panel, using a Pan Head M4 screw with spring and flat washer. Do not use a flat head screw.
4. If you are using an expansion module, put it next to the CPU and slide together until the connectors join securely.

Note

The type of screw will be determined by the material upon which it is mounted. You should apply appropriate torque until the spring washer becomes flat. Avoid applying excessive torque to the mounting screws. Do not use a flat head screw.

Table 3- 1 Installing a CPU on a DIN rail

Task	Procedure
	Follow the steps below to install a CPU on a DIN rail. 1. Secure the rail to the mounting panel every 75 mm. 2. Snap open the DIN clip (located on the bottom of the module) and hook the back of the module onto the DIN rail. 3. Rotate the module down to the DIN rail and snap the clip closed. Carefully check that the clip has fastened the module securely onto the rail. To avoid damage to the module, press on the tab of the mounting hole instead of pressing directly on the front of the module.
	

Note

Using DIN rail stops could be helpful if your CPU is in an environment with high vibration potential or if the CPU has been installed vertically. Use an end bracket (8WA1 808 or 8WA1 805) on the DIN rail to ensure that the modules remain connected.

If your system is in a high-vibration environment, then panel-mounting the CPU will provide a greater level of vibration protection.

Prerequisites

Before you ground or install wiring to any electrical device, ensure that the power to that equipment has been turned off. Also, ensure that the power to any related equipment has been turned off.

Ensure that you follow all applicable electrical codes when wiring the PLC and related equipment. Install and operate all equipment according to all applicable national and local standards. Contact your local authorities to determine which codes and standards apply to your specific case.

WARNING

Attempts to install or wire the PLC or related equipment with power applied could cause electric shock or faulty operation of equipment. Failure to disable all power to the PLC and related equipment during installation or removal procedures could result in death or serious injury to personnel, and/or damage to equipment.

Always follow appropriate safety precautions and ensure that power to the PLC is disabled before attempting to install or remove the PLC or related equipment.

Always take safety into consideration as you design the grounding and wiring of your PLC system. Electronic control devices, such as the PLC, can fail and can cause unexpected operation of the equipment that is being controlled or monitored. For this reason, you should implement safeguards that are independent of the PLC to protect against possible personal injury or equipment damage.

WARNING

Control devices can fail in an unsafe condition, resulting in unexpected operation of controlled equipment. Such unexpected operations could result in death or serious injury to personnel, and/or damage to equipment.

Use an emergency stop function, electromechanical overrides, or other redundant safeguards that are independent of the PLC.

Isolation guidelines

The AC power supply boundaries and I/O boundaries to AC circuits have been designed and approved to provide safe separation between AC line voltages and low voltage circuits. These boundaries include double or reinforced insulation, or basic plus supplementary insulation, according to various standards. Components which cross these boundaries such as optical couplers, capacitors, transformers, and relays have been approved as providing safe separation. Only circuits rated for AC line voltage include safety isolation to other circuits. Isolation boundaries between 24 V DC circuits are functional only, and you should not depend on these boundaries for safety.

The sensor supply output, communications circuits, and internal logic circuits of an S7-200 SMART with included AC power supply are sourced as SELV (safety extra-low voltage) according to EN 61131-2.

To maintain the safe character of the S7-200 SMART low voltage circuits, external connections to communications ports, analog circuits, and all 24 V DC nominal power supply and I/O circuits must be powered from approved sources that meet the requirements of SELV, PELV, Class 2, Limited Voltage, or Limited Power according to various standards.



WARNING

Safe use of power converters

Use of non-isolated or single insulation supplies to supply low voltage circuits from an AC line can result in hazardous voltages appearing on circuits that are expected to be touch safe, such as communications circuits and low voltage sensor wiring.

Such unexpected high voltages could result in death or serious injury to personnel, and/or damage to equipment.

Use only high-voltage-to-low-voltage power converters that are approved as sources of touch-safe, limited-voltage circuits.

Grounding guidelines

The best way to ground your application is to ensure that all the common and ground connections of your PLC and related equipment are grounded to a single point. This single point should be connected directly to the earth ground for your system.

All ground wires should be as short as possible and should use a large wire size, such as 2 mm² (14 AWG).

When locating grounds, remember to consider safety grounding requirements and the proper operation of protective interrupting devices.

Wiring guidelines

When designing the wiring for your S7-200 SMART CPU, provide a single disconnect switch that simultaneously removes power from the CPU power supply, from all input circuits, and from all output circuits. Provide over-current protection, such as a fuse or circuit breaker, to limit fault currents on supply wiring. Consider providing additional protection by placing a fuse or other current limit in each output circuit.

Install appropriate surge suppression devices for any wiring that could be subject to lightning surges.

Avoid placing low-voltage signal wires and communications cables in the same wire tray with AC wires and high-energy, rapidly switched DC wires. Always route wires in pairs, with the neutral or common wire paired with the hot or signal-carrying wire.

Use the shortest wire possible and ensure that the wire is sized properly to carry the required current.

Use wire and cable with a temperature rating 30 °C higher than the ambient temperature around the S7-200 SMART CPU (for example, a minimum of 85 °C-rated conductors for 55 °C ambient temperature). You should determine other wiring type and material requirements from the specific electrical circuit ratings and your installation environment.

Open loop motion control

The S7-200 SMART CPU provides three methods of open loop motion control:

- Pulse Train Output (PTO): Built into the CPU for speed and position control. See Pulse Output instruction. (Note: There is no PTO wizard available. Use the Motion wizard instead.)
- Pulse Width Modulation (PWM): Built into the CPU for speed, position, or duty cycle control. See Pulse Output instruction.
- Axis of Motion: Built into the CPU for speed and position control

The CPU provides three digital outputs (Q0.0, Q0.1, and Q0.3) that you can configure as PTO or PWM outputs by the PLS Instruction, PWM outputs by the PWM wizard, or as motion control outputs by the Motion wizard.

Note

The CPU models CPU CR20s, CPU CR30s, CPU CR40s, and CPU CR60s do not support motion control.

When you configure an output for PTO operation, the CPU generates a 50% duty cycle pulse train for open loop control of the speed and position for either stepper motors or servo motors. The built-in PTO function only provides the pulse train output. Your application program must supply direction and limit controls using I/O built into the PLC or provided by expansion modules.

When you configure an output for PWM operation, the CPU fixes the cycle time of the output, and your program controls the pulse width or duty cycle of the pulse. You can use the variations in pulse width to control the speed or position in your application.

The Axis of Motion provides a single pulse train output with integrated direction control and disable outputs. It also includes programmable inputs which allow the CPU to be configured for several modes of operation, including automatic reference point seek. The Axis of Motion provides a unified solution for open loop control of the speed and position for either stepper motors or servo motors.

To simplify the use of motion control in your application, STEP 7-Micro/WIN SMART provides a Motion wizard to configure Axis of Motion and a PWM wizard to configure PWM. The wizards generate motion instructions that you can use to provide dynamic control of speed and motion in your application. For the Axis of Motion, STEP 7-Micro/WIN SMART also provides a control panel that allows you to control, monitor, and test your motion operations.

A.2.3 CPU ST40, CPU SR40, CPU CR40s, and CPU CR40

A.2.3.1 General specifications and features

General specifications and features of the CPU ST40, CPU SR40, and CPU CR40s

Table A- 40 General specifications

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Article number	6ES7288-1ST40-0AA0	6ES7288-1SR40-0AA0	6ES7288-1CR40-0AA1	6ES7288-1CR40-0AA0
Dimensions W x H x D (mm)	125 x 100 x 81	125 x 100 x 81	125 x 100 x 81	125 x 100 x 81
Weight	410.3 grams	441.3 grams	475 grams	486.2 grams
Power dissipation	18 W	23 W	8 W	8 W
Current available (EM bus)	1400 mA max. (5 V DC)	1400 mA max. (5 V DC)	Not available	Not available
Current available (24 V DC)	300 mA max. (sensor power)	300 mA max. (sensor power)	300 mA max. (sensor power)	300 mA max. (sensor power)
Digital input current consumption (24 V DC)	4 mA/input used	4 mA/input used	4 mA/input used	4 mA/input used

Table A- 41 CPU features

Technical data		CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
User memory	Program	24 Kbytes	24 Kbytes	12 Kbytes	
	User data (V)	16 Kbytes	16 Kbytes	8 Kbytes	
	Retentive	10 Kbytes max. ¹	10 Kbytes max. ¹	2 Kbytes max. ¹	
On-board digital I/O		24 inputs/16 outputs	24 inputs/16 outputs	24 inputs/16 outputs	
Process image		256 bits of inputs (I) / 256 bits of outputs (Q)	256 bits of inputs (I) / 256 bits of outputs (Q)	256 bits of inputs (I) / 256 bits of outputs (Q)	
Analog image		56 words of inputs (AI) / 56 words of outputs (AQ)	56 words of inputs (AI) / 56 words of outputs (AQ)	Not available	
Bit memory (M)		256 bits	256 bits	256 bits	
Temporary (local) memory (L)		64 bytes in the main program and 64 bytes in each sub-routine and interrupt routine 60 bytes when programming in LAD or FBD (STEP 7-Micro/WIN reserves 4 bytes)	64 bytes in the main program and 64 bytes in each sub-routine and interrupt routine 60 bytes when programming in LAD or FBD (STEP 7-Micro/WIN reserves 4 bytes)	64 bytes in the main program and 64 bytes in each sub-routine and interrupt routine 60 bytes when programming in LAD or FBD (STEP 7-Micro/WIN reserves 4 bytes)	

Technical data		CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Sequential control relays (S)		256 bits	256 bits	256 bits	
Expansion modules expansion		6 max.	6 max.	Not available	
Signal board expansion		1 max.	1 max.	Not available	
High-speed counters	Total	6	6	4	
	Single phase	4 at 200 kHz 2 at 30 kHz	4 at 200 kHz 2 at 30 kHz	4 at 100 kHz	
	A/B phase	2 at 100 kHz 2 at 20 kHz	2 at 100 kHz 2 at 20 kHz	2 at 50 kHz	
Pulse outputs ²		3 at 100 kHz	3 at 100 kHz	Not available	
Pulse catch inputs		14	14	Not available	
Cyclic interrupts		2 at 1 ms resolution	2 at 1 ms resolution	2 at 1 ms resolution	
Edge interrupts		4 rising and 4 falling (6 and 6 with optional signal board)	4 rising and 4 falling (6 and 6 with optional signal board)	4 rising and 4 falling	
Memory card		microSDHC Card (optional)	microSDHC Card (optional)	Not available	
Real time clock accuracy		120 seconds/month	120 seconds/month	Not available	
Real time clock retention time		7 days typ./6 days min. at 25 °C	7 days typ./6 days min. at 25 °C	Not available	

¹ You can configure areas of V memory, M memory, C memory (current values), and portions of T memory (current values) on retentive, up to the specified maximum amount.

² The specified maximum pulse frequency is possible only for CPU models with transistor outputs. Pulse output operation is not recommended for CPU models with relay outputs.

Table A- 42 PROFINET features

Description	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay
Support Controller function for PROFINET communication	Yes	
Support I-Device function for PROFINET communication	Yes	
Maximum number of PROFINET device	8	
Device number of PROFINET device	1 to 8	
Maximum input size of each PROFINET device	128 Bytes	
Maximum output size of each PROFINET device	128 Bytes	
Maximum input size of PROFINET I-Device	128 Bytes	
Maximum output size of PROFINET I-Device	128 Bytes	
Maximum number of modules	64	
Minimum cyclic update time of PROFINET device	The minimum value of the update time also depends on the communication component set for PROFINET, on the number of PROFINET devices, and the quantity of configured user data.	

Description	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay
CPU address range of PROFINET process image input register	I128.0 to I1279.7	
CPU address range of PROFINET process image output register	Q128.0 to Q1279.7	
CPU address of PROFINET process image input and output register for device #1	I128.0 to I255.7 Q128.0 to Q255.7	
CPU address of PROFINET process image input and output register for device #2	I256.0 to I383.7 Q256.0 to Q383.7	
CPU address of PROFINET process image input and output register for device #3	I384.0 to I511.7 Q384.0 to Q511.7	
CPU address of PROFINET process image input and output register for device #4	I512.0 to I639.7 Q512.0 to Q639.7	
CPU address of PROFINET process image input and output register for device #5	I640.0 to I767.7 Q640.0 to Q767.7	
CPU address of PROFINET process image input and output register for device #6	I768.0 to I895.7 Q768.0 to Q895.7	
CPU address of PROFINET process image input and output register for device #7	I896.0 to I1023.7 Q896.0 to Q1023.7	
CPU address of PROFINET process image input and output register for device #8	I1024.0 to I1151.7 Q1024.0 to Q1151.7	
CPU address of PROFINET process image input and output register for I-Device	I1152.0 to I1279.7 Q1152.0 to Q1279.7	

Table A- 43 Performance

Type of instruction	Execution speed
Boolean	150 ns instruction
Move Word	1.2 µs/instruction
Real math	3.6 µs/instruction

Table A- 44 User program elements supported

Element		Description
POUs	Type/quantity	Main program: 1 Subroutines: 128 (0 to 127) Interrupt routines: 128 (0 to 127)
	Nesting depth	From main program: 8 subroutine levels From interrupt routine: 4 subroutine levels
Accumulators	Quantity	4
Timers	Type/quantity	Non-retentive (TON, TOF): 192 Retentive (TONR): 64
Counters	Quantity	256

Table A- 45 Communication

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Number of ports	PROFINET (LAN): 1 Serial ports: 1 (RS485) Add-on serial ports: 1 (with optional RS232/485 signal board)	PROFINET (LAN): 1 Serial ports: 1 (RS485) Add-on serial ports: 1 (with optional RS232/485 signal board)	PROFINET (LAN): 0 Serial ports: 1 (RS485) Add-on serial ports: 0	PROFINET (LAN): 1 Serial ports: 1 (RS485) Add-on serial ports: 0
HMI device	PROFINET (LAN): 8 connections Serial ports: 4 connections per port	PROFINET (LAN): 8 connections Serial ports: 4 connections per port	PROFINET (LAN): Not available Serial ports: 4 connections per port	PROFINET (LAN): 8 connections Serial ports: 4 connections per port
Programming device (PG)	PROFINET (LAN): 1 connection Serial ports: 1 connection	PROFINET (LAN): 1 connection Serial ports: 1 connection	PROFINET (LAN): Not available Serial ports: 1 connection	PROFINET (LAN): 1 connection Serial ports: 1 connection
CPUs (PUT/GET)	PROFINET (LAN): 8 client and 8 server connections	PROFINET (LAN): 8 client and 8 server connections	PROFINET (LAN): Not available	PROFINET (LAN): 8 client and 8 server connections
Open user communication	PROFINET (LAN): 8 active and 8 passive connections	PROFINET (LAN): 8 active and 8 passive connections	PROFINET (LAN): Not available	PROFINET (LAN): 8 active and 8 passive connections
Data rates	PROFINET (LAN): 10/100 Mb/s RS485 system protocols: 9600, 19200, and 187500 b/s RS485 freeport: 1200 to 115200 b/s	PROFINET (LAN): 10/100 Mb/s RS485 system protocols: 9600, 19200, and 187500 b/s RS485 freeport: 1200 to 115200 b/s	PROFINET (LAN): Not available RS485 system protocols: 9600, 19200, and 187500 b/s RS485 freeport: 1200 to 115200 b/s	PROFINET (LAN): 10/100 Mb/s RS485 system protocols: 9600, 19200, and 187500 b/s RS485 freeport: 1200 to 115200 b/s
Isolation (external signal to PLC logic)	PROFINET (LAN): Transformer isolated, 1500 V AC RS485: RS485 signal to chassis ground, 500 V AC/ 707 V DC; RS485 signal to CPU logic common, 500 V AC/ 707V DC;	PROFINET (LAN): Transformer isolated, 1500 V AC RS485: RS485 signal to chassis ground, 500 V AC/ 707 V DC; RS485 signal to CPU logic common, 500 V AC/ 707V DC;	PROFINET (LAN): Not available RS485: RS485 signal to chassis ground, 500 V AC/ 707 V DC; RS485 signal to CPU logic common, 500 V AC/ 707V DC;	PROFINET (LAN): Transformer isolated, 1500 V AC RS485: RS485 signal to chassis ground, 500 V AC/ 707 V DC; RS485 signal to CPU logic common, 500 V AC/ 707V DC;
Cable type	PROFINET (LAN): CAT5e shielded RS485: PROFIBUS network cable	PROFINET (LAN): CAT5e shielded RS485: PROFIBUS network cable	PROFINET (LAN): Not available RS485: PROFIBUS network cable	PROFINET (LAN): CAT5e shielded RS485: PROFIBUS network cable
PROFINET Communication				
PROFINET controller	Yes	Yes	No	No
PROFINET device	Yes	Yes	No	No

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
PROFINET controller				
Services				
PG/OP communication	Yes	Yes	No	No
S7 routing	Yes	Yes	No	No
Isochronous mode	No	No	No	No
Open IE communication	Yes	Yes	No	No
IRT	No	No	No	No
MRP	No	No	No	No
PROFenergy	No	No	No	No
Max. number of PROFINET devices that you can connect for RT	8	8	--	--
Max. number of module	64	64	--	--
Update times	The minimum value of the update time also depends on the communication component set for PROFINET, on the number of PROFINET devices, and the quantity of configured user data.	The minimum value of the update time also depends on the communication component set for PROFINET, on the number of PROFINET devices, and the quantity of configured user data.	No	No
With RT				
Send clock of 1 ms	1 ms to 512 ms	1 ms to 512 ms	--	--

Table A- 46 Power supply

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Voltage range	20.4 to 28.8 V DC	85 to 264 V AC	85 to 264 V AC	
Line frequency	--	47 to 63 Hz	47 to 63 Hz	

Technical data		CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Input current (max. load)	CPU only	190 mA at 24 V DC (without driving 300 mA sensor power) 470 mA at 24 V DC (with driving 300 mA sensor power)	130 mA at 120 V AC (without driving 300 mA sensor power) 250 mA at 120 V (with driving 300 mA sensor power) 80 mA at 240 V AC (without driving 300 mA sensor power) 150 mA at 240 V AC (with driving 300 mA sensor power)	150 mA at 120 V AC 80 mA at 240 V AC	
	CPU with all expansion accessories	680 mA at 24 V DC	300 mA at 120 V AC 190 mA at 240 V AC	--	
Hold up time (loss of power)		20 ms at 24 V DC	30 ms at 120 V AC 200 ms at 240 V AC	30 ms at 120 V AC 200 ms at 240 V AC	
Inrush current (max.)		11.7 A at 28.8 V DC	16.3 A at 264 V AC	16.3 A at 264 V AC	
Isolation (input power to logic)		--	1500 V AC	1500 V AC	
Ground leakage, AC line to functional earth		--	0.5 mA	0.5 mA	
Internal fuse, not user replaceable		3 A, 250 V, slow blow	3 A, 250 V, slow blow	3 A, 250 V, slow blow	

Table A- 47 Sensor power

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Voltage range	20.4 to 28.8 V DC	20.4 to 28.8 V DC	20.4 to 28.8 V DC	
Output current rating (max.)	300 mA	300 mA	300 mA (short circuit protected)	
Maximum ripple noise (<10 MHz)	< 1 V peak to peak	< 1 V peak to peak	< 1 V peak to peak	
Isolation (CPU logic to sensor power)	Not isolated	Not isolated	Not isolated	

A.2.3.2 Digital inputs and outputs

Table A- 48 Digital inputs

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Number of inputs	24	24	24	
Type	Sink/Source (IEC Type 1 sink, except I0.0 to I0.3)	Sink/Source (IEC Type 1 sink)	Sink/Source (IEC Type 1 sink)	

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Rated voltage	24 V DC at 4 mA, nominal	24 V DC at 4 mA, nominal	24 V DC at 4 mA, nominal	24 V DC at 4 mA, nominal
Continuous permissible voltage	30 V DC, max.	30 V DC, max.	30 V DC, max.	30 V DC, max.
Surge voltage	35 V DC for 0.5 sec.	35 V DC for 0.5 sec.	35 V DC for 0.5 sec.	35 V DC for 0.5 sec.
Logic 1 signal (min.)	I0.0 to I0.3: 4 V DC at 8 mA Other inputs: 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
Logic 0 signal (max.)	I0.0 to I0.3: 1 V DC at 1 mA Other inputs: 5 V DC at 1 mA	5 V DC at 1 mA	5 V DC at 1 mA	5 V DC at 1 mA
Isolation (field side to logic)	500 V AC for 1 minute	500 V AC for 1 minute	500 V AC for 1 minute	500 V AC for 1 minute
Isolation group	1	1	1	1
Filter times	Individually selectable on each channel (points I0.0 to I1.5): µs: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8 ms: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8	Individually selectable on each channel (points I0.0 to I1.5): µs: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8 ms: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8	Individually selectable on each channel (points I0.0 to I1.5): µs: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8 ms: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8	Individually selectable on each channel (points I0.0 to I1.5): µs: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8 ms: 0.2, 0.4, 0.8, 1.6, 3.2, 6.4, 12.8
	Individually selectable on each channel (points I1.6 and greater): ms: 0, 6.4, 12.8	Individually selectable on each channel (points I1.6 and greater): ms: 0, 6.4, 12.8	Individually selectable on each channel (points I1.6 and greater): ms: 0, 6.4, 12.8	Individually selectable on each channel (points I1.6 and greater): ms: 0, 6.4, 12.8
HSC clock input rates (max.) (Logic 1 Level = 15 to 26 V DC)	Single phase: 4 HSCs at 200 kHz; 2 HSCs at 30 kHz A/B phase: 2 HSCs at 100 kHz; 2 HSCs at 20 kHz	Single phase: 4 HSCs at 200 kHz; 2 HSCs at 30 kHz A/B phase: 2 HSCs at 100 kHz; 2 HSCs at 20 kHz	Single phase: 4 HSCs at 100 kHz A/B phase: 2 HSCs at 50 kHz	Single phase: 4 HSCs at 100 kHz A/B phase: 2 HSCs at 50 kHz
Number of inputs on simultaneously	24	24	24	24
Cable length (max.), in meters	I0.0 to I0.3: Shielded (only): 500 m normal (low-speed) inputs, 50 m HSC (high-speed) inputs	All inputs: Shielded: 500 m normal inputs 50 m HSC inputs Unshielded: 300 m normal inputs	All inputs: Shielded: 500 m normal inputs 50 m HSC inputs Unshielded: 300 m normal inputs	
	All other inputs: Shielded: 500 m normal inputs Unshielded: 300 m normal inputs			

Table A- 49 Digital outputs

Technical data	CPU ST40 DC/DC/DC	CPU SR40 AC/DC/Relay	CPU CR40s AC/DC/Relay	CPU CR40 AC/DC/Relay
Number of outputs	16	16	16	
Type	Solid state - MOSFET (sourcing)	Relay, dry contact	Relay, dry contact	
Voltage range	20.4 to 28.8 V DC	5 to 30 V DC or 5 to 250 V AC	5 to 30 V DC or 5 to 250 V AC	
Logic 1 signal at max. current	20 V DC min.	--	--	
Logic 0 signal with 10 K Ω load	0.1 V DC max.	--	--	
Rated current per point (max.)	0.5 A	2 A	2 A	
Rated current per common (max.)	6 A	10 A	10 A	
Lamp load	5 W	30 W DC / 200 W AC	30 W DC / 200 W AC	
ON state resistance	0.6 Ω max.	0.2 Ω max. when new	0.2 Ω max. when new	
Leakage current per point	10 μ A max.	--	--	
Surge current	8 A for 100 ms max.	7 A with contacts closed	7 A with contacts closed	
Overload protection	No	No	No	
Isolation (field side to logic)	500 V AC for 1 minute	1500 V AC for 1 minute (coil to contact) None (coil to logic)	1500 V AC for 1 minute (coil to contact) None (coil to logic)	
Isolation resistance	--	100 M Ω min. when new	100 M Ω min. when new	
Isolation between open contact	--	750 V AC for 1 minute	750 V AC for 1 minute	
Isolation groups	2	4	4	
Inductive clamp voltage	L+ minus 48 V DC, 1 W dissipation	--	--	
Switching delay (Qa.0 to Qa.3)	1.0 μ s max., off to on 3.0 μ s max., on to off	10 ms max.	10 ms max.	
Switching delay (Qa.4 to Qb.7)	50 μ s max., off to on 200 μ s max., on to off	10 ms max.	10 ms max.	
Lifetime mechanical (no load)	--	10,000,000 open/close cycles	10,000,000 open/close cycles	
Lifetime contacts at rated load	--	100,000 open/close cycles	100,000 open/close cycles	
Output state in STOP mode	Last value or substitute value (default value 0)	Last value or substitute value (default value 0)	Last value or substitute value (default value 0)	
Number of outputs on simultaneously	16	16	16	
Cable length (max.), in meters	Shielded: 500 m Unshielded: 150 m	Shielded: 500 m Unshielded: 150 m	Shielded: 500 m Unshielded: 150 m	

A.2.3.3 Wiring diagrams

Table A- 50 Wiring diagram for the CPU ST40 DC/DC/DC (6ES7288-1ST40-0AA0)

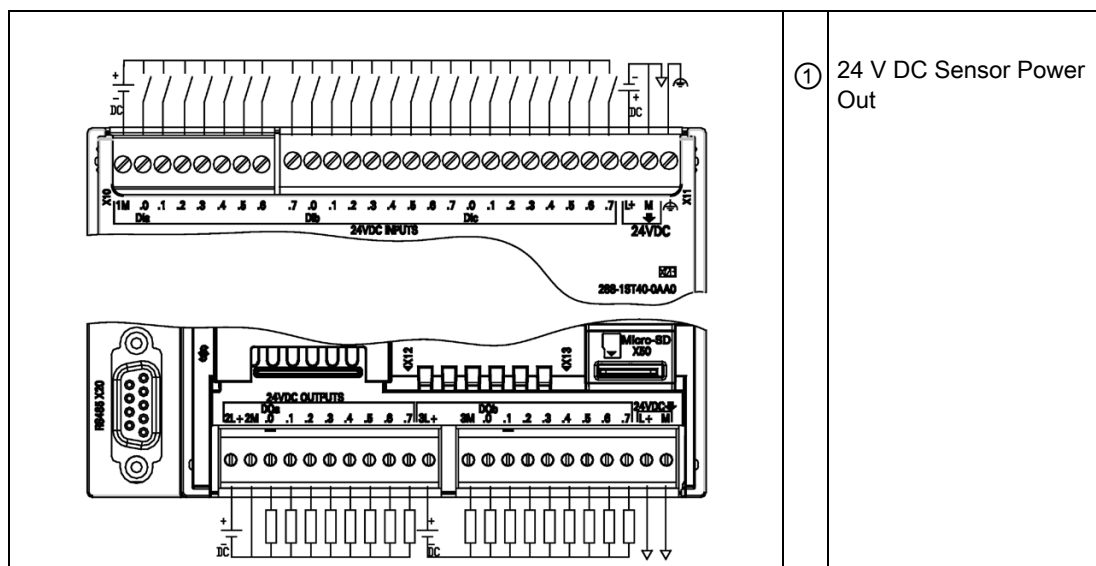


Table A- 51 Connector pin locations for CPU ST40 DC/DC/DC (6ES7288-1ST40-0AA0)

Pin	X10	X11	X12	X13
1	1M	DI a.7	2L+	3M
2	DI a.0	DI b.0	2M	DQ b.0
3	DI a.1	DI b.1	DQ a.0	DQ b.1
4	DI a.2	DI b.2	DQ a.1	DQ b.2
5	DI a.3	DI b.3	DQ a.2	DQ b.3
6	DI a.4	DI b.4	DQ a.3	DQ b.4
7	DI a.5	DI b.5	DQ a.4	DQ b.5
8	DI a.6	DI b.6	DQ a.5	DQ b.6
9	--	DI b.7	DQ a.6	DQ b.7
10	--	DI c.0	DQ a.7	L+ / 24 V DC Out
11	--	DI c.1	3L+	M / 24 V DC Out
12	--	DI c.2	--	--
13	--	DI c.3	--	--
14	--	DI c.4	--	--
15	--	DI c.5	--	--
16	--	DI c.6	--	--
17	--	DI c.7	--	--
18	--	L+ / 24 V DC	--	--
19	--	M / 24 V DC	--	--
20	--	Functional Earth	--	--