

SIEMENS



SIMATIC

S7-1500

CPU 1512C-1 PN (6ES7512-1CK00-0AB0)

Manual

Edition

09/2016

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System diagnostics and messages

Integrated system diagnostics is enabled by default for the CPUs. The different types of diagnostics are configured instead of programmed. System diagnostics information is shown uniformly and in plain text on the display of the CPU, in STEP 7 (TIA Portal), on the HMI and on the Web server, even for alarms related to drives. This information is available in RUN mode, but also in STOP mode of the CPU. The diagnostics information is updated automatically when you configure new hardware components.

The CPU is available as a central interrupt server for 3 languages. The CPU, STEP 7 (TIA Portal) and your HMI guarantee data consistency. You can skip the various engineering steps, just load it into the CPU. The maintenance work is easier.

2.3 Properties

The hardware of the CPU 1512C-1 PN consists of a CPU part, an analog on-board I/O (X10) and a digital on-board I/O (X11 and X12). When configured in the TIA Portal, the compact CPU therefore occupies a single shared slot (slot 1).

The properties of the CPU part, the analog on-board I/O and the digital on-board I/O can be found in the subsections below.

Article number of the compact CPU

6ES7512-1CK00-0AB0

Accessories

The following accessories are included in the scope of delivery and can also be ordered separately as spare parts:

- 3 x front connector (push-in terminals) including cable ties
- 3 x shield clamp
- 3 x shield terminal
- 3 x infeed element (push-in terminals)
- 3 x labeling strip
- 3 x universal front cover

For more information on accessories, refer to the S7-1500, ET 200MP system manual (<http://support.automation.siemens.com/WW/view/en/59191792>).

Properties

The digital on-board I/O has the following technical properties:

- Digital inputs
 - 32 high-speed digital inputs for signals up to max. 100 kHz
The inputs can be used as standard inputs and as inputs for technology functions.
 - Rated input voltage 24 V DC
 - Suitable for switches and 2-/3-/4-wire proximity switches
 - Configurable diagnostics
 - Hardware interrupt can be set (for each channel)
 - Support of the value status (Quality Information, QI)
- Digital outputs
 - 32 digital outputs, 8 of which can be used as high-speed outputs for technology functions
The outputs can be used as standard outputs and as outputs for technology functions.
 - Rated output voltage 24 V DC
 - Rated output current
 - as output for standard mode 0.5 A per channel
 - as output for technology functions, you can select between an output current of up to 0.5 A for an output frequency up to 10 kHz (load dependent) and a reduced output current of max. 0.1 A at an increased output frequency of up to 100 kHz
 - Suitable for, e.g., solenoid valves, DC contactors and indicator lights or also for signal transmission or for proportional valves
 - Configurable diagnostics
 - Support of the value status (Quality Information, QI)

You can find a table showing the output frequencies and output currents through which outputs is available in the section Interconnection overview of outputs (Page 100).

The digital outputs feature driver blocks with push-pull outputs. Due to their basic functional design, such driver blocks always contain parasitic diodes, that act as freewheeling diodes when shutting off inductive loads (see figure "Current flow with correct wiring using the digital on-board I/O X11 as an example" in the section Terminal and block diagram of the digital on-board I/O (Page 81)). The shutdown voltage is limited to -0.8 V. Therefore, the demagnetization of inductive loads takes longer and can be approximately calculated using the following formula.

$\tau = L / R$ (τ = time constant, L = inductance value, R = ohmic resistance value)

After the expiration of a period of $5 * \tau$, the current has decreased in effect to 0 A due to the inductive load.

The maximum value is derived from: $\tau = 1.15\text{H} / 48\text{ Ohm} = 24\text{ms}$. After $5 * 24\text{ ms} = 120\text{ ms}$, the current has decreased in effect to 0 A.

For comparison: With standard modules, inductive shutdown voltage, for example, is limited to $V_{cc} - 53\text{ V}$ (supply voltage – 53 V), so that the current has decreased to about to 0 A after 15 ms.

The digital on-board I/O supports the following functions:

- Reconfiguration in RUN
You can reconfigure some of the technological functions in the RUN mode of the CPU (for more information, refer to the section Parameter assignment and structure of the parameter data records of the digital on-board I/O (Page 158)).

Supply voltage using the digital on-board I/O X11 as an example

The inputs and outputs of the digital on-board I/O are divided into two load groups, which are supplied with 24 V DC.

The digital inputs DI0 to DI15 form a load group and are supplied via the connections 1L+ (terminal 19) and 1M (terminal 20).

The digital outputs DQ0 to DQ7 are supplied via the connection 2L+ (terminal 29). The digital outputs DQ8 to DQ15 are supplied via the connection 3L+ (terminal 39). Please note that the digital outputs DQ0 to DQ15 only have a common ground. In each case, they are led through to the two terminals 30 and 40 (2M/3M) and bridged in the module. The digital outputs form a common load group.

NOTICE

Polarity reversal of the supply voltage

An internal protective circuit protects the digital on-board I/O against destruction if the polarity of the supply voltage is reversed. In the case of polarity reversal of the supply voltage, however, unexpected states can occur at the digital outputs.

Response of the digital outputs to a wire break at ground connection of the outputs

Due to the characteristics of the output driver used in the module, approx. 25 mA supply current flows out through the outputs via a parasitic diode in the event of a ground wire break. This behavior can lead to non-set outputs also carrying high levels and emitting up to 25 mA output current. Depending on the type of load, 25 mA can be sufficient to control the load with high level. To prevent unintended switching of the digital outputs in the event of a ground wire break, follow these steps:

Wire to ground twice

Connect ground to terminal 30 and to terminal 40.

1. Route the first ground connection from terminal 30 to the central ground connection of the plant.
2. Route the second ground connection from terminal 40 to the central ground connection of the plant.

If terminal 30 or 40 are interrupted by a ground wire break, the outputs will continue to be supplied via the second, intact ground connection.



WARNING

Wire break at ground connection

Never bridge from terminal 30 to terminal 40 in the front connector and **never** lead only one wire to the central ground connection.

Connect terminal 30 and terminal 40 to a common ground point.

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Configuring	
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• GRAPH	Yes
Know-how protection	
User program protection	Yes
Copy protection	Yes
Block protection	Yes
Access protection	
Password for display	Yes
Protection level: Write protection	Yes
Protection level: Write/read protection	Yes
Protection level: Complete protection	Yes
Cycle time monitoring	
Low limit	Configurable minimum cycle time
High limit	Configurable maximum cycle time
Dimensions	
Width	110 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	1360 g