

3.1 CPU module PM5

Order No.	6DD1600-0AJ0
Description	The CPU module processes general open- and closed-loop tasks. In addition to • max. 8 binary inputs, it also has the possibility to connect up to • 2 absolute value encoders • 2 incremental encoders.
Performance data	Computational performance: 32 MHz, 32 bit RISC processor DRAM 4 Mbytes (EDO) SRAM 64 Kbytes This CPU module permits fast cycle times of 0.1 ms. A typical application (e. g. control loop) can be configured in approx. 0.6 ms.
DRAM	The DRAM contains: • program code (is loaded and expanded when the memory module is initialized) • data memory for the operating system, communications, message buffer, trace function If the DRAM is not large enough for complex applications, a PM6 (with 8Mbyte DRAM) must be used.
SRAM, buffered	The buffered SRAM (using either a battery in the subrack or an external battery) contains the following data, which are to be saved during and after a power failure: • operating system error diagnostics („exception buffer“) • max. 1000 process quantities configured with function block SAV • data recorded/traced using the message system or trace function (can be optionally configured on the SRAM)
Programming	The program, running on the CPU module, is configured on a PC using STEP7/HWConfig and CFC. This is then loaded into an MS5 program memory module (or MS51). The program memory module is inserted in the module receptacle provided on the CPU module. The user program can be loaded in 2 ways: • via an PCMCIA card installed in the PC-programming adapter (offline loading) • directly from the PC via a serial communications connection in the memory module inserted in the CPU module (online loading)

Program size The size of the software to be loaded in the memory module (compressed to approx. 50%) and the size of the available program memory is displayed in CFC under the following menu item:

Target system \ Load \ Info

MS5, MS51 The program is loaded in a program memory module

MS5, 2 Mbyte Flash-EPROM, 8 Kbyte EEPROM

MS51, 4 Mbyte Flash-EPROM, 8 Kbyte EEPROM

A **MS51** memory module which could be used with the PM5 may only be used up to approx. 50 % so that the expanded code can be accepted on the PM5.

Serial service interface An RS 232 interface (V.24) with service protocol DUST1 with **19.2 kbd** is permanently installed in **connector X01** (9-pin sub-D socket). It is used to:

- test and commission the user program (using CFC or "IBS")
- loading the user program from the PC (only in this module)

Inputs The connections available at the 10-pin **connector X5** (8 signals and ground) are functionally sub-divided into 2 groups, each with 4 inputs:

Pins	Function		
1...4	Bin. input 1...4	Absolute value encoder 1	Incremental encoder 1
5...8	Bin. input 5...8	Absolute value encoder 2	Incremental encoder 2

A plug-in socket is provided on the PM5 for each of the 6 functions. A function is not selected by configuring, but by inserting a coded connector into the associated socket.

Selection The available connections can therefore be used for one of the following combinations of functions:

- 8 binary inputs or
- 4 binary inputs and 1 absolute value encoder or
- 4 binary inputs and 1 incremental encoder or
- 1 absolute value encoder and 1 incremental encoder or
- 2 absolute value encoders or
- 2 incremental encoders

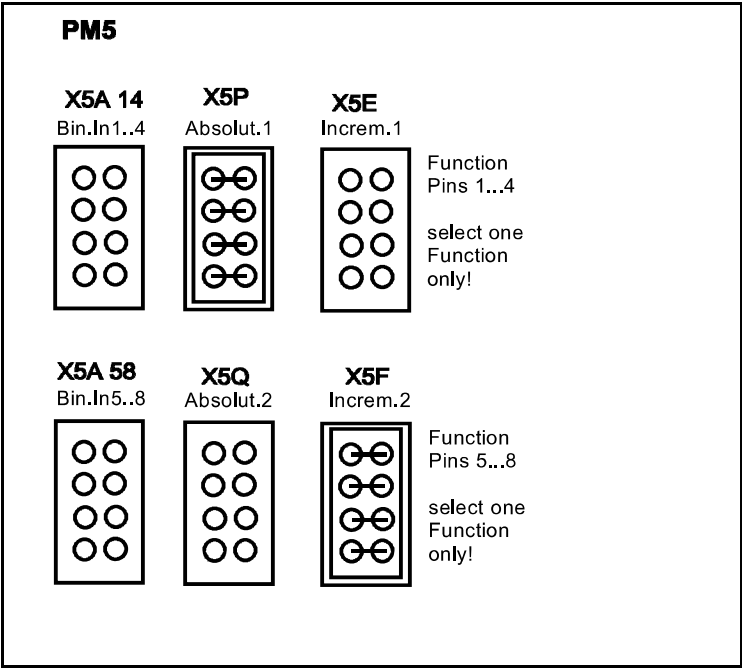


Fig. 3-1 Slots for coding connectors to select the functions for connector X5
(in this case, an absolute value encoder 1 and incremental encoder 2 have been selected)

NOTE	Only one coding connector may be inserted in each socket row (pins 1..4 or pins 5..8). A connection can only be assigned one function.
Incremental encoders	Uni-polar 15V encoders (HTL) with 2 tracks, displaced through 90°, A, B and if required zero pulse, can be connected for closed-loop speed- or position controls.
Absolute value encoder SSI, EnDat	Encoders with SSI- or EnDat protocol can be connected for positioning tasks.
Interface modules	The screw terminals for the connections are provided via interface modules (can be connected using cable SC7):

Interface module	Function
SB10 SU10	If at least 1 encoder connection is used (electrical 1:1 connection)
SB60 SB61	Optionally to SB10/SU10, if only binary inputs are used (with electrical isolation and signal conversion)

Table 3-1 Possible interface modules for PM5

7-segment display

In normal operation, the configured number of the CPU module (1...8) is displayed. When an error occurs, a letter is displayed, which refers to the error type.

Possible operating- and error statuses:

Display	Operating- and error statuses	Display can be deleted with key
1...8	Configured number of the CPU module in normal operation	-
A	User error: with function block USF from the diagnostics event defined by the user. This has no influence on the program run.	yes
-	Initialization phase individual initialization steps are displayed with increasing numbers during the run-up phase	-
.	5V available; no program is being executed	-
0	Error during initialization: the user program does not start if errors occur when the system is being initialized. Initialization error due to erroneous or incorrectly inserted modules for the actual software which has been configured: - flashing „0“: Error on this module - steady „0“: Error on other modules - continuous: Error when loading the system software Start diagnostics at the CPU module, which first displayed the "0" error message. If you cannot identify which CPU module was the first to have displayed the error message, then you should start with that CPU module which displays a "0" and is inserted farthest to the left.	no
b	Monitoring error - e.g. missing, discharged buffer battery - background processing error - when initializing non-critical error which permits standard operation to start	yes
C	Communications error erroneous configured communications or connection	no
d	- steady "d": Module is in the STOP mode; selection in the „Target system/operating mode“ menu; software is still not being downloaded - flashing "d": Data is being downloaded in the STOP mode is faster than download in the RUN mode (runs in the background)	no

Display	Operating- and error statuses	Display can be deleted with key
E	Task administrator error: • cycle error a task was not able to be processed within the sampling time • task backup if the task is not designated as a high-priority task, and has to be re-started. • no free local buffer the data buffer is no longer enabled. Task start is skipped. • software watchdog if the base sampling time is not processed for four consecutive times. The basic clock timer is re-initialized with the configured base sampling time and processing is continued.	yes
H	Fatal system error: hardware or software problem which cause a program crash: Display: • flashing „H“: Fault/error on this module • steady „H“: Fault/error on another module	no

Additional information

on diagnostics refer to the Manual "SIMADYN D Basis Software for D7-SYS".

Button S1

The button has 2 functions:

- Deleting the error display:
By depressing button S1, sporadic errors („E“) or non-critical errors („b“) appearing in the display can be deleted.
If another error is present, this is displayed after the first has been acknowledged.
- Binary signal input with function block ASI

Real-time clock

Resolution, 0.1 ms;
e. g. to time stamp messages

Software protection

A plug-in socket for a 28-pin EPLD device is provided on the module (ALTERA company) so that the user program can be copy-protected („Hardlock PAL“).
Using a special function block, this EPLD device can be checked and program stopped if the code is missing or is incorrect.
Additional information on request.

3.1.1 Supplementary components

- MS5 and MS51 program memory modules
- cable SC57 for PC connection, 9-core, 5 m
- cable SC7 to connect an interface module, 10-core, 2 m

If additional input/output signals and other functions are required, then these can be implemented by inserting a maximum of 2 **expansion modules**; the types are subsequently listed:

- IT41
- IT42
- ITDC
- ITSL

3.1.2 Application information and noise immunity

- operation **without fan** is possible
- noise-immune operation is only possible if the module is tightly screwed into the subrack
- do not insert or withdraw the module when the subrack is powered-up

Other information

For more information regarding EMC and ambient conditions, refer to the Section „General technical data“

3.1.3 Connector assignments

Serial interface X01 RS 232

Pin	Designation	Comment
2	RxD	Receive data
3	TxD	Transmit data
5	M	Ground
7	RTS	Request to send („1“)

Table 3-2 Connector assignment X01

Binary- and encoder inputs X5

Pin	As binary input	As absolute value encoder (SSI or EnDat)	As incremental encoder (15V)
1	Binary input 1	SSI1: Data +	Encoder 1: Track A
2	Binary input 2	SSI1: Data -	Encoder 1: Track B

Pin	As binary input	As absolute value encoder (SSI or EnDat)	As incremental encoder (15V)
3	Binary input 3	SSI1: Clock +	Encoder 1: Zero pulse
4	Binary input 4	SSI1: Clock -	-
5	Binary input 5	SSI2: Data +	Encoder 2: Track A
6	Binary input 6	SSI2: Data -	Encoder 2: Track B
7	Binary input 7	SSI2: Clock +	Encoder 2: Zero pulse
8	Binary input 8	SSI2: Clock -	-
9	+ 15 V Encoder power supply		
10	Ground		

Table 3-3 Connector assignment X5

3.1.4 Technical data

General data

No. of slots occupied	1
Dimensions W x H x D [mm]	20.14 x 233.4 x 220
Weight	Approx. 0.7 kg

Power supply

Rated voltage	min.	max.	Typical current drain
+5 V	+4.75 V	+5.25 V	1200 mA
+15 V	+14.4 V	+15.6 V	35 mA + encoder load (max. 100 mA, electronic. limited)
-15 V	-15.6 V	-14.4 V	35 mA
24 V (external)	20 V	30 V	100 mA + binary output currents

Binary inputs

No.	Depending on the selection via coding plug: 0 no coding plug at sockets X5A... 4 coding plug at 1 socket X5A... 8 2 coding plugs at both sockets X5A... of which, max. 4 are interrupt-capable		
Input voltage	+24 V rated voltage		
	for 0 signal	-1 V to +6 V or binary inputs open-circuit	
	for 1 signal	+13 V to +33 V	
Input current			
	for 0 signal	0 mA	
	for 1 signal	3 mA typ.	
Input delay	Max. 20 µs		
Electrical isolation	No; only via SB60, SB61 interface modules		

3.1.5 Connector assignments

Serial interface X01 RS 232

Pin	Designation	Comment
2	RxD	Receive data
3	TxD	Transmit data
5	M	Ground
7	RTS	Request to Send („1“)

Table 3-4 Connector assignment X01

Binary- and encoder inputs X5

Pin	As binary input	As absolute value encoder (SSI oder EnDat)	As incremental encoder (15V)
1	binary input 1	Encoder1: Data +	Encoder1: Track A
2	binary input 2	Encoder1: Data -	Encoder1: Track B
3	binary input 3	Encoder1: Clock +	Encoder1: Zero pulse
4	binary input 4	Encoder1: Clock -	-
5	binary input 5	Encoder2: Data +	Encoder2: Track A
6	binary input 6	Encoder2: Data -	Encoder2: Track B
7	binary input 7	Encoder2: Clock +	Encoder2: Zero pulse
8	binary input 8	Encoder2: Clock -	-
9	+ 15 V Encoder power supply (100 mA current limited)		
10	Ground		

Table 3-5 Connector assignment X5

Specification absolute value encoder

	SSI-Protokoll	EnDat-Protokoll
Pegel	RS 485	RS 485
max. frequency	2 MHz	2 MHz
Data direction	unidirectional	bidirectional
Data bits	13 + Parity 25 + Parity	variabel (max. 33)
Codierung	Gray Binär	Gray Binär

Table 3-6 Specification absolute value encoder

3.1.6 Connection diagram

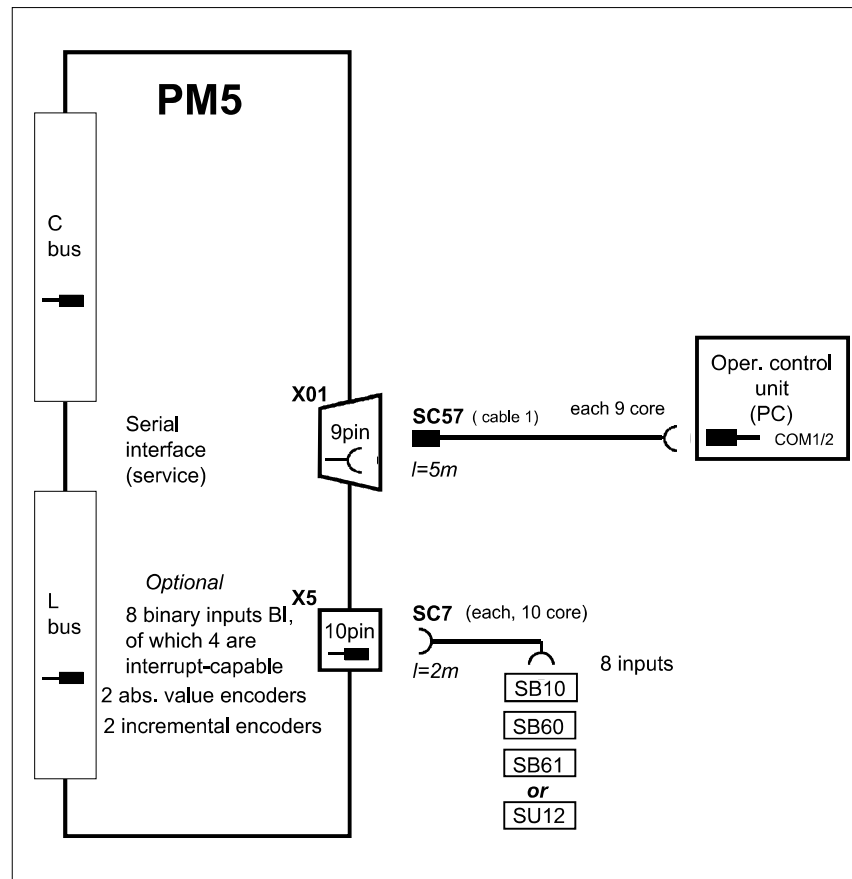


Fig. 3-2 Connecting cables and interface modules