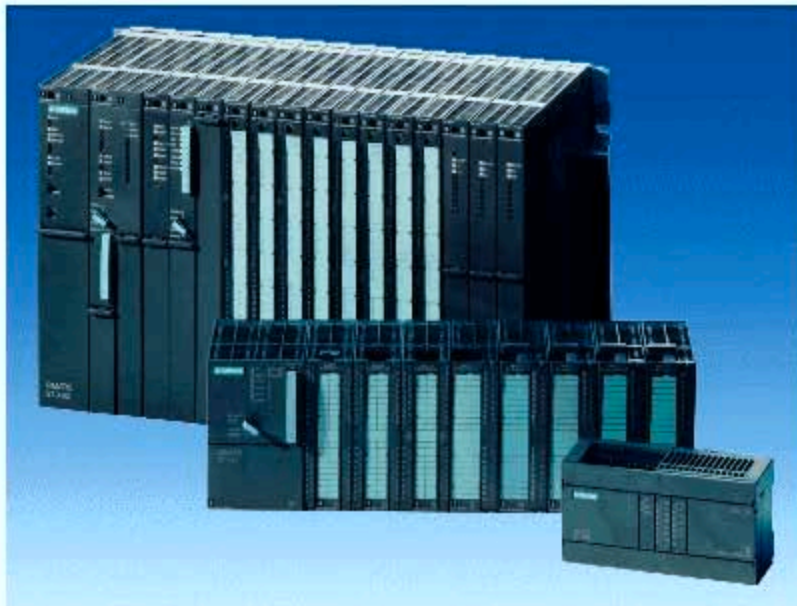## 4.5 The SIMATIC S7 system family

The S7-300/400 automation system has a modular structure. The modules can be arranged centrally (close to the CPU) or decentrally on site, without the need for special settings or parameterisation. The decentralised peripherals are an integral part of the system in the SIMATIC S7. The main module with its different memory areas represents the hardware basis for executing user programs. A load memory contains the entire user program; the process-related program parts are in a RAM, and fast access times are a prerequisite for fast program execution.

The SIMATIC S7-300/400 automation system is a programmable logical controller with a modular design that consists of the following components:
Racks: contain the modules and connect them to each other
Power supply (PS); supplies the supply voltages
Central processing unit (CPU); stores and executes the user program
Interface modules; provide the rack interconnections
Signal modules (SM); adapt the system signals to the internal signal level or control actuators via digital and analogue signals.
Function modules (FM); process complex or time-critical processes independently of the main module
Communication modules (CP); interconnect the automation systems or connect them to other devices via serial connections.

An automation system (station) can consist of several racks that are interconnected by a bus cable. The main rack contains the power supply, the CPU and peripheral modules (SMs, FMs and CPs). If there is not enough space in the main rack for the peripheral modules or you would like to have your peripheral modules in a separate location from the main rack, extension racks are available that create the link to the main rack via interface modules. It is also possible to connect decentralised peripherals to a station.

The racks connect the modules via two bus systems: the peripheral bus (P-bus) and the communication bus (K-bus). The P-bus connects the CPU and the programming interface (MPI) to function modules and communication modules.
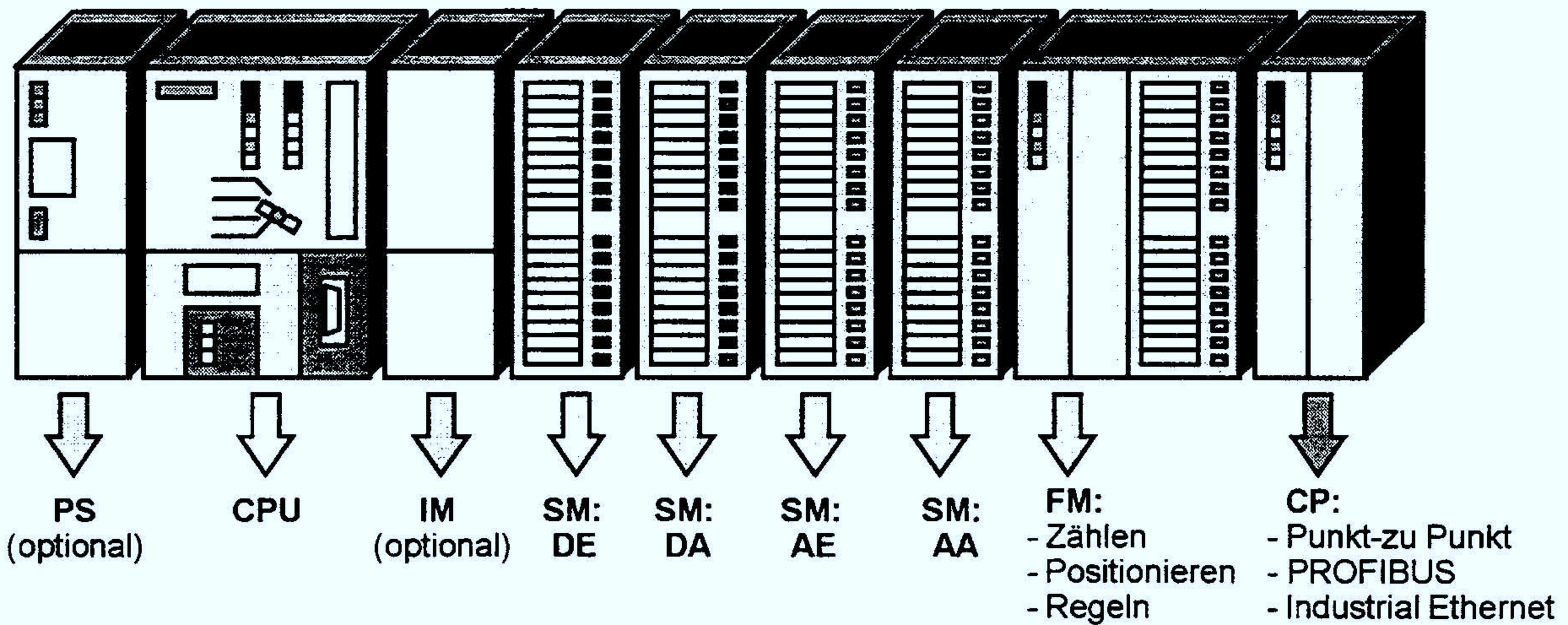
4.6 S7-300
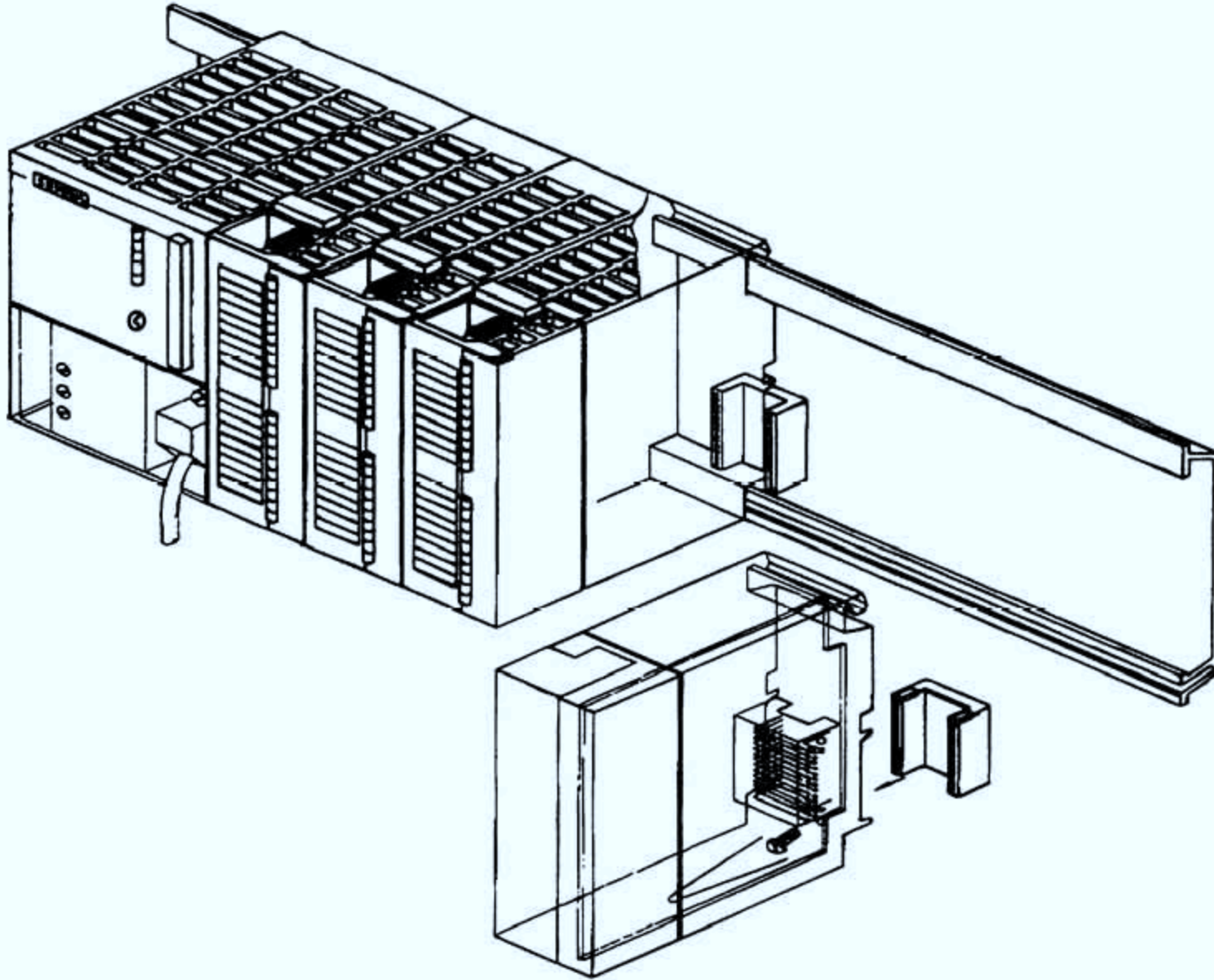
Features:	•	Modular small control system for the low-end performance range
	•	Graduated CPU range
	•	Comprehensive module range
	•	Expandable up to 32 modules
	•	Backplane bus integrated in modules
	•	Can be networked with - the multi-point interface (MPI),
		- PROFIBUS or
		- Industrial Ethernet
	•	Central programming device connection with access to all modules
	•	No plug-in location rules
	•	Parameters are configured and set using the "HW/Config." tool.

4.6.1 Modules

								FM:	CP:
PS (optional)	CPU	IM (optional)	SM: DE	SM: DA	SM: AE	SM: AA		- Zählen - Positionieren - Regeln	- Punkt-zu Punkt - PROFIBUS - Industrial Ethernet

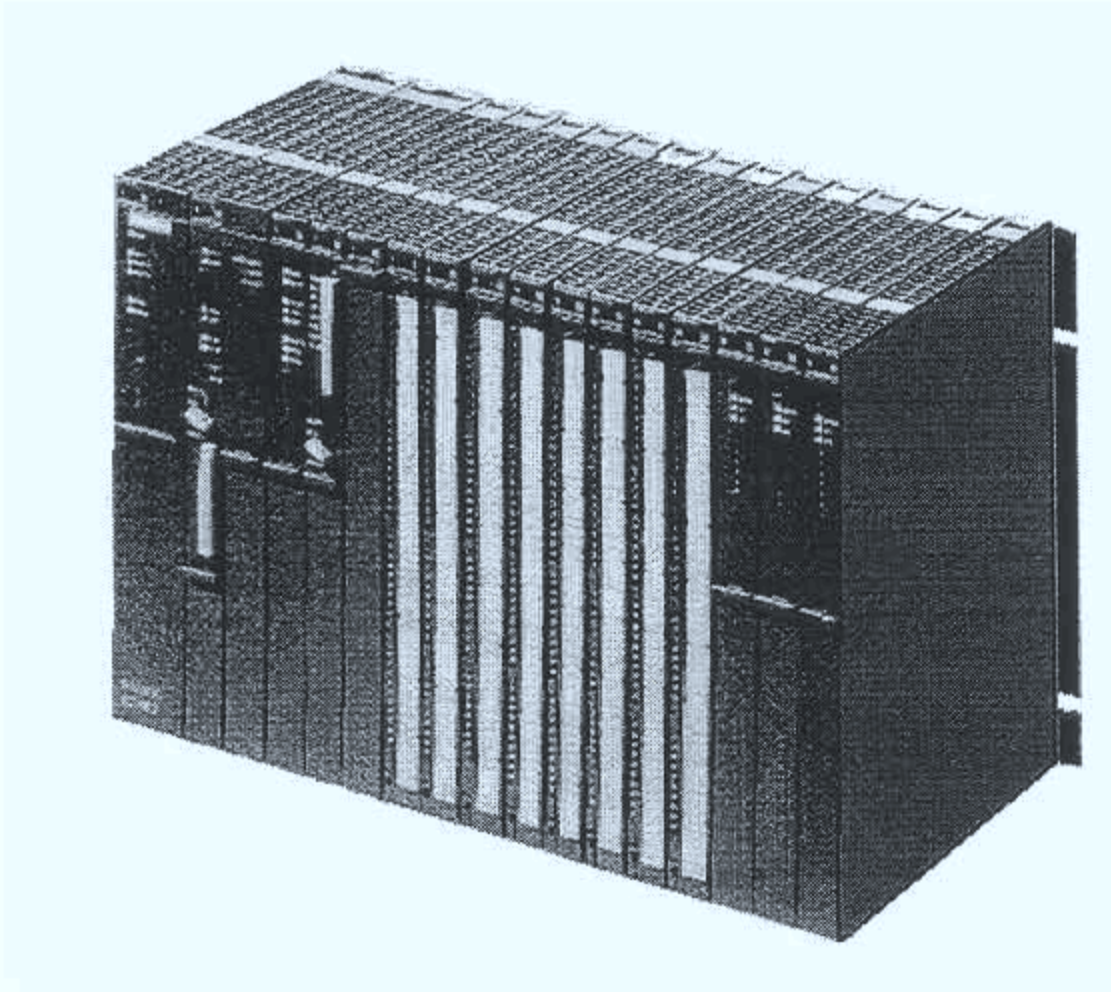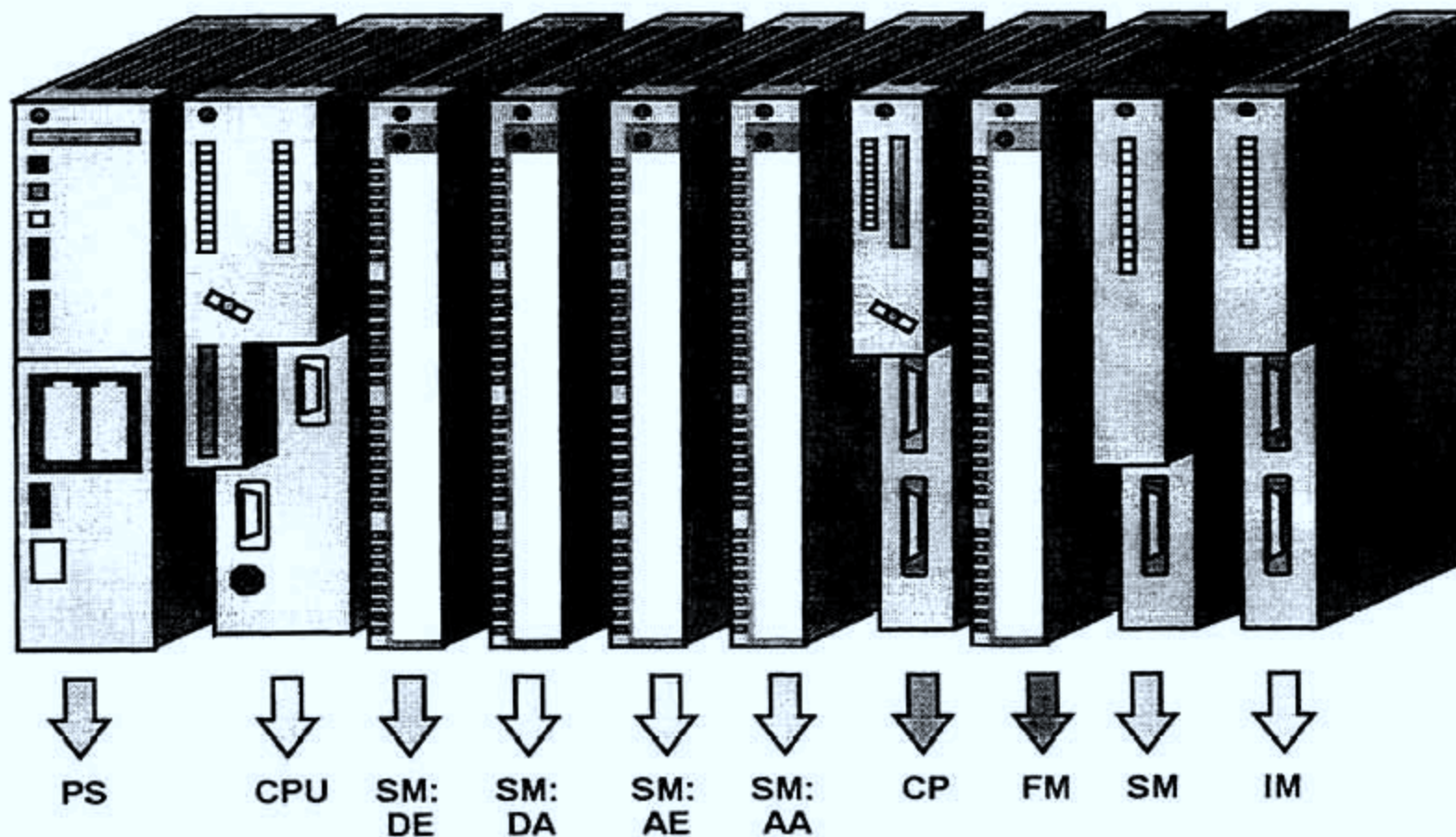|		
Signal modules (SM)	• Digital input modules	24V=, 120/230V
	• Digital output modules	24V=, Relay
	• Analogue input modules	Voltage Current Resistor, thermal element
	• Analogue output modules	Voltage, Current
Interface modules (IM)	The IM360/IM361 and IM365 interface modules make it possible to have a multi-line layout. The bus is looped forward between the lines.	
Placeholder modules (DM)	The DM 370 placeholder module occupies an installation location for a non-parameterised signal module. For this reason the location can also be reserved for subsequent installation of an interface module.	
Function modules (FM)	Provide "special functions" Counting Positioning Controlling	
Communication modules (CP)	Provide the following networking facilities: Point-to-point connection PROFIBUS Industrial Ethernet	
Accessories	Bus connectors and front connectors	

4.7 S7-400

Features:	•	The power PLC for the medium and high-end performance range.
	•	Graduated CPU range.
	•	Expandable to more than 300 modules
	•	Backplane bus integrated in the modules.

	•	Can be networked with - the multi-point interface (MPI),
		    - PROFIBUS or
		    - Industrial Ethernet.

	•	Central programming device connection with access to all modules.
	•	No plug-in location rules.
	•	Parameters are configured and set using the "HW/Config. Tool.
	•	Multicomputing (possible to have up to 4 CPU's running simultaneously in one rack).

4.7.1 S7-400: Modules

Signal modules (SM)	• Digital input modules	24V=, 120/230V~
	• Digital output modules	24V=, relay, 120/230V~
	• Analogue input modules	Voltage, Current, Resistor, Thermal element
	• Analogue output modules	Voltage, Current

Interface modules (IM)
The IM460, IM461, IM463, IM467 interface modules provide the link between different racks:
UR1 (Universal Rack) with max. 18 modules
UR2 (Universal Rack) with max. 9 modules
ER1 (Extension Rack) with max. 18 modules
ER2 (Extension Rack) with max. 9 modules
CR1 (Central Rack) with max. 18 modules

Function modules (FM)
Provide "special functions":
Counting
Positioning
Controlling

Communication modules (CP)
Provide the following networking facilities:
Point-to-point connection
PROFIBUS
Industrial Ethernet

Detailed PLC hardware information is shown in Appendix 2.