

SIMATIC C7



SIMATIC C7 family

SIMATIC C7 compact control system – PLC and Operator Panel in a single unit

Want to implement a complete machine control with operator panel in a single device?

The SIMATIC C7 compact control systems have been optimized precisely for such applications and combine a controller from the S7-300 family with integral inputs/outputs and a SIMATIC Panel in a single device. This makes it possible to implement complete, yet still expandable, machine controls in the smallest possible space and at low cost (hardware and engineering outlay).

The controller section comprises a CPU, I/O and interface for expanding the I/O; a line-oriented or pixel-graphics OP is used as the operator panel, depending on the type.

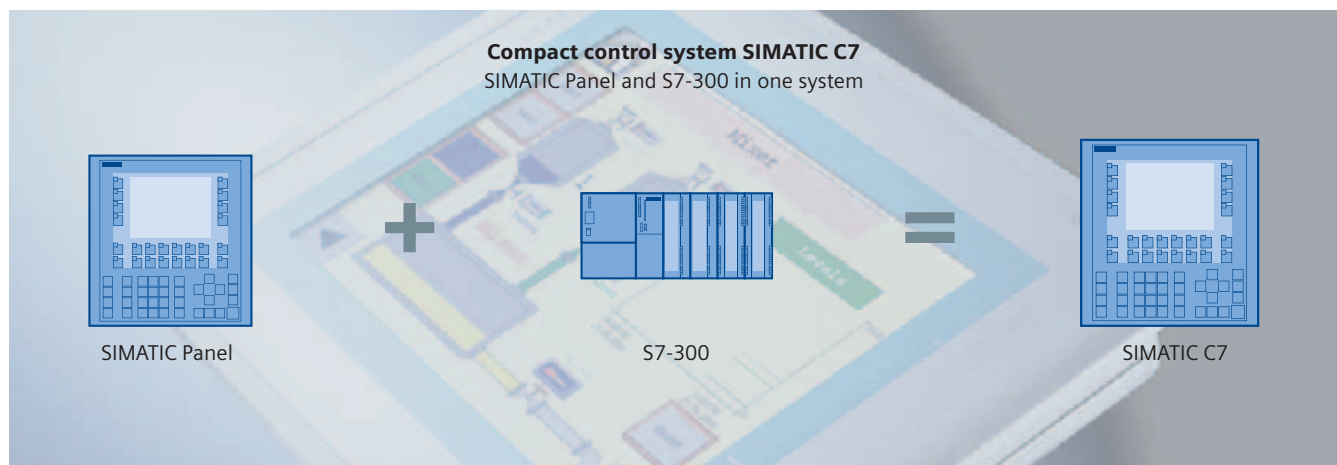
Highlights

As a compact control system – PLC and OP (operator panel) in a single unit – SIMATIC C7 offers the following decisive benefits:

- **Space savings:** the compact design reduces the installation space required direct at the machine.
- **Time savings:** the turnkey complete solution reduces the engineering overhead for design, installation and wiring, for example.
- **Cost savings:** purchase costs are up to 20% lower than those for a comparable modular solution – the control cabinet can frequently be smaller or can be dispensed with entirely, or the C7 unit is integrated direct into the operator panel.
- **Flexibility:** thanks to easy expandability with all S7-300 modules, the C7 devices are open to extensive and demanding automation solutions.
- **System integration:** as a component part of Totally Integrated Automation, SIMATIC C7 is optimally integrated into the Siemens automation environment.

Application areas for C7 compact control systems include:

- General mechanical engineering (especially serial machines)
- Special-purpose machine manufacturing
- Plastics and textile machines
- Woodworking machinery and many other applications



SIMATIC Panel and S7-300 in one system

Industrial compatibility

The SIMATIC C7 are universal thanks to their high level of industrial suitability and they are characterized by:

- High EMC
- High resistance to shock and vibration
- Ambient temperature up to 50°C with fan-free operation
- Compliance with national and international standards to DIN, UL, CSA, FM, ISO 9001 and ship building certifications.



Transparent distillation process thanks to clear display on SIMATIC C7

Selection tool C7 compact control system

C7 compact control system	C7-613 ²⁾	C7-635 Touch	C7-635 Key ²⁾	C7-636 Touch	C7-636 Key
CPU	CPU 313C	CPU 314C-2 DP		CPU 315-2 DP	
CPU user memory	64 KB	96 KB		128 KB	
PLC programming	STEP 7	STEP 7		STEP 7	
I/O	24 DI / 16 DO 4 AI + 1 PT100 2 AO	24 DI / 16 DO 4 AI + 1 PT100 2 AO		24 DI / 16 DO 4 AI + 1 PT100 2 AO	
Functions	Counter, frequency measurement, impulse outputs, controlling	Counter, frequency measurement, pulse outputs, positioning, closed-loop control		Counter, frequency measurement, pulse outputs, positioning, closed-loop control	
Interfaces	MPI	MPI DP (master or slave)		MPI DP (master or slave)	
Panel		TP 170B (6")	OP 170B (6")	TP 270B (10")	OP 270B (6")
Display Resolution	4 x 20 characters	Vector graphics (monochrome) 320 x 480 pixels		Vektor graphics (color) 640 x 480 pixels	Vector graphics (color) 320 x 480 pixels
HMI configuration	STEP 7 and parameterization support ¹⁾	WinCC flexible Compact or higher		WinCC flexible Standard or higher	

¹⁾ On the low-cost C7-613 compact control system, the HMI is also configured with STEP 7 – WinCC flexible is not required for this. Editing of display texts is made as simple as possible with a new parameterization support (can be installed from STEP 7 V5.2). The data blocks with the parameters and variables for the STEP 7 project of the C7-613 are created direct from these parameterization dialogs. The parameterization support is a component part of Configuration Tools SIMATIC C7-613 from V 2.0.

²⁾ as SIPLUS component also for corrosive atmosphere/condensation (www.siemens.com/siplus)

Design

All SIMATIC C7 devices have a range of important features.

Housing/installation

- Rugged, compact plastic or aluminum housing¹⁾ with IP65 degree of protection (front)
- Can be installed in operator panels, control cabinets or gantries.
- Fixed wiring with terminal blocks, that is, problem-free module replacement for service purposes

Front panel

- Rugged membrane keyboard
- Easy-to-read, backlit LC display, graphics, blue mode or color¹⁾
- LEDs to indicate PLC status and operating mode

Interfaces

- Powerful communication by means of the MPI multi-point interface
- Printer interface ¹⁾, e.g. for documentation of production data and quality assurance
- PROFIBUS DP ¹⁾ can be parameterized per software as master or slave, 12 Mbit/s
- Interface for user-friendly expansion with modules from the S7-300 range (external or direct on the backplane bus of the C7)

Integrated I/O devices

- Digital inputs
- Digital outputs
- Analog inputs
- Analog outputs

Integral technological functions

- Counters
- Pulse outputs
- Frequency counting
- Open-loop positioning ¹⁾
- Closed-loop control

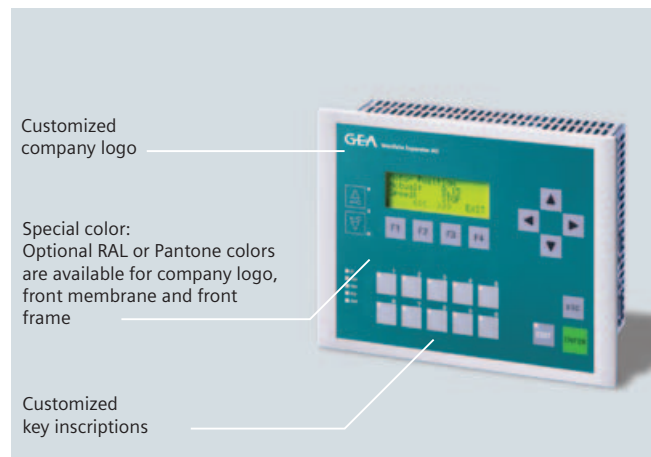
¹⁾ depends on the C7 version

Customized design

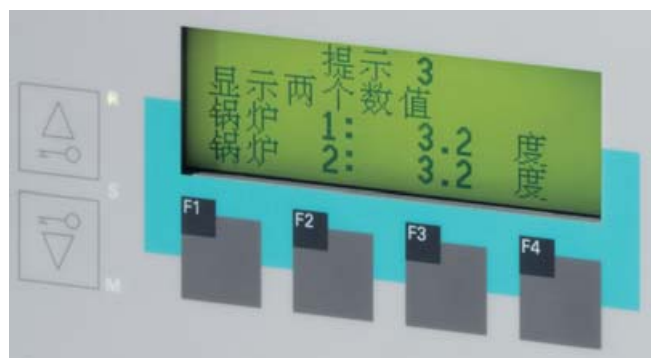
The SIMATIC C7 compact control systems are also available in customized design. This is of benefit if the appearance of the compact control systems has to be adapted to suit the machine or plant.

The design can be modified in different ways:

- Customized company logo
- Special color scheme:
Any RAL or Pantone colors are available for the company logo, front membrane and front frame
- Customized key labeling



C7 compact control systems with customized design for adapting to the machine or plant



International character sets improve the export chances of machines equipped with SIMATIC C7

PLC/HMI functions

Open-loop control with integral controller

An S7-300 CPU is used as the integrated controller, offering the following functions:

- **High-speed instruction execution:**
execution times from 0.1 μ s enable extremely short machine cycle times.
- **Maintenance-free:**
Retentive data management on the micro memory card (MMC) enables freedom from maintenance because there is no backup battery.
- **Diagnostics functions:**
The intelligent diagnostics system facilitates troubleshooting and reduces plant downtimes. C7-635 and C7-636 support the PROFIBUS DPV1 standard; parameterization and optimization of field devices during operation allow short retooling times.
- **Password protection:**
Password protection enables effective protection of the PLC know-how against unauthorized copying and modification.
- **Technological tasks:**
High-speed actual value acquisition, with direct access to hardware counters and inputs for the functions counting and frequency measurement, enables high dynamic response for, say, positioning tasks. The positioning functions allow direct control of the MICROMASTER frequency inverters in conjunction with the integral analog output.

Human-machine interfacing with integral Panel

The Panel of the C7 units enables diverse HMI functions:

- **Status and fault messages:**
Provide the operator with important information about the current process sequence, e.g. for remedying faults or for maintenance purposes.
- **Display of pictures:**
Pixel-graphics displays enable realistic visualization of the machine to be monitored. The process data can be presented in the form of bar charts, trend curves or transition diagrams for a quick overview.
- **User menu:**
User-specific menus can be defined for adapting the operator input sequence to the application.
- **Limit monitoring and password protection:**
Configurable limit values and passwords improve the security of operator inputs for safe process control.
- **Configurable printer protocol:**
Printers connected directly log data quickly and simply, for quality verification, for example (not C7-613).
- **Online language change:**
All texts can be stored in several languages. This facilitates startup and service in international use (also Cyrillic and Asian characters).
- **Display of statuses of the integral inputs/outputs.**
- **Recipe management:**
Many different recipes can be managed simultaneously (not C7-613).
- **Key or Touch:**
The Touch devices enable intuitive operator control and monitoring thanks to their touch screens, and they significantly reduce the costs of familiarizing operating personnel. Simple, self-explanatory graphic buttons make operation easier and prevent operator errors. Key devices with membrane keyboard have been developed for applications in strongly contaminated environments.
- **Data backup:**
Slot for memory module in order to backup the configuration and recipe records (micro memory card).

Expansion

Flexible expansion facilities

Different variants with graded performance and the comprehensive module spectrum of SIMATIC S7-300 support accurate adaptation of SIMATIC C7 to the respective task.

The compact control systems can be upgraded as the scope of tasks increases and at any time by using additional modules (Function Module FM, Communications Processor CP, I/O). This means AS-Interface and PROFINET (Industrial Ethernet) can be connected as well as PROFIBUS DP.

Without interface module

The C7-613, C7-635 and C7-636 compact control systems can be expanded with up to four S7-300 modules (FM, CP, I/O) direct on the backplane of the C7 device. There is a choice of two I/O expansion sets for this purpose so that expansion is possible with up to four modules in deep design and up to two modules in flat design. An interface module (IM) is not required. This retains the compact design.

Alternatively, it is possible to expand it externally with up to four S7-300 modules using a 1.5 m I/O cable. This also does not require an interface module (IM). In addition, the 1.5 m I/O cable provides greater mechanical leeway at installation.



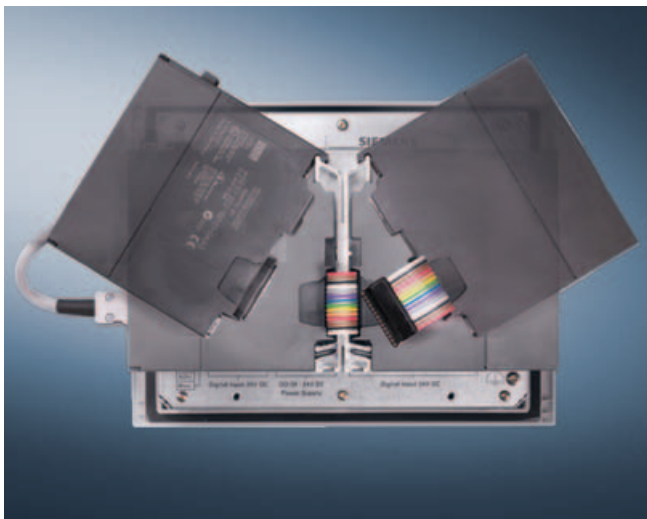
Expansion of C7-613, C7-635, C7-636 with I/O cable (1.5m)



I/O in flat design



I/O in deep design



Hooking in the I/O

With interface module

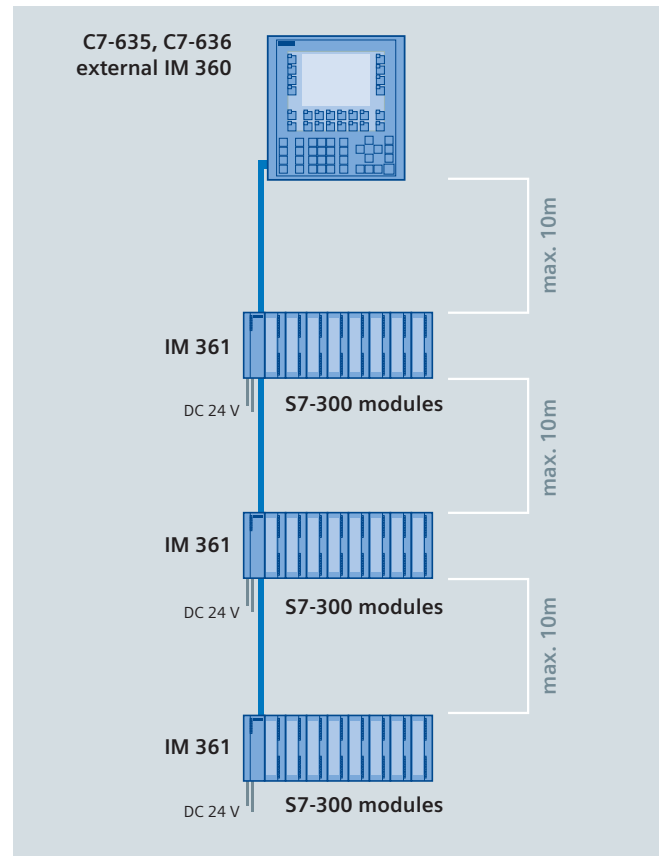
Special interface modules enable additional expansions with I/O.

IM 360/361 interface module

To enable individual solutions, the C7-635 and C7-636 compact control systems can also be expanded externally with up to 24 modules from the SIMATIC S7-300 range. Up to 8 modules can be plugged into each rack¹⁾.

With its extensive range of I/O, PROFIBUS can, of course, also be used for distributed expansion – in the case of the ET 200M also in S7-300 design.

¹⁾ The C7-635 and C7-636 must be expanded externally at the C7 using the IM 360. The expansion racks are connected via the IM 361 interface module.



Expansion with IM 360/361 and I/O cable (3x10m) on C7-635, C7-636

Technical specifications SIMATIC C7

C7 compact control system	C7-613	C7-635 Touch	C7-635 Key	C7-636 Touch	C7-636 Key
Order No. group: 6ES7	613-1CA.	635-2EB.	635-2EC.	636-2EB.	636-2EC.
General data					
Degree of protection to IEC 60529	Front: IP65, housing: IP20	Front: IP65, housing: IP20		Front: IP65, housing: IP20	
Degree of protection in accordance with NEMA	NEMA 4X	NEMA 4X		NEMA 4X	
Approvals, certifications	EN 61131-2 (IEC 1131-2); UL Listing UL 508; Canadian Standard Association (CSA) to Standard C22.2 Number 142; FM approval, FM standards No. 3611, 3600, 3810 Class I, Div. 2 Group A, B, C, D; DIN/ISO 9001 certification of production and development				
Device dimensions (W x H x D in mm)	215 x 165 x 79	260 x 199 x 79	260 x 274 x 79	335 x 275 x 100	260 x 274 x 80
Cutout dimensions (B x H in mm)	202 x 152	231 x 183	231 x 257	310 x 248	231 x 257
Controller-specific data					
Memory					
Work memory	64 KB	96 KB		128 KB	
Instructions	21 K	32 K		42 K	
Maximum number of blocks	512 FC, 512 FB, 511 DB	512 FC, 512 FB, 511 DB		2048 FC, 2048 FB, 1023 DB	
Bit memories	256 byte	256 byte		2048 byte	
S7 timers/counters	256/256	256/256		256/256	
Execution times					
Bit operation	0.1 µs	0.1 µs		0.1 µs	
Word operation	0.2 µs	0.2 µs		0.2 µs	
Fixed-point operation	2 µs	2 µs		2 µs	
Floating-point operation	3 µs	3 µs		3 µs	
Integrated I/O					
Digital inputs (DI)	24 x 24 V DC; all channels can be used for process interrupts	24 x 24 V DC; all channels can be used for process interrupts		24 x 24 V DC; all channels can be used for process interrupts	
Digital outputs (DA)	16 x 24 V DC, 0.5 A	16 x 24 VDC, 0.5 A		16 x 24 VDC, 0.5 A	
Analog inputs (AI)	4: ± 10 V, 0...10 V, ± 20 mA, 0/4 - 20 mA; 1: 0...600 Ω, Pt100	4: ± 10 V, 0...10 V, ± 20 mA, 0/4 to 20 mA; 1: 0...600 Ω, Pt100		4: ± 10 V, 0...10 V, ± 20 mA, 0/4 to 20 mA; 1: 0...600 Ω, Pt100	
Analog outputs (AO)	2: ± 10 V, 0...10 V, ± 20 mA, 0/4 to 20 mA	2: ± 10 V, 0...10 V, ± 20 mA, 0/4 to 20 mA		2: ± 10 V, 0...10 V, ± 20 mA, 0/4 to 20 mA	
Integrated functions					
Counters	3 incremental encoders 24 V/30 kHz	4 incremental encoders 24 V/60 kHz		4 incremental encoders 24 V/60 kHz	
Pulse outputs	3 channels PCM max. 2.5 kHz	4 channels pulse-width modulation (PCM) max. 2.5 kHz		4 channels pulse-width modulation (PCM) max. 2.5 kHz	
Frequency counting	3 channels max. 30 kHz	4 channels max. 60 kHz		4 channels max. 60 kHz	
Open-loop positioning		SFB for positioning, 1 axis via 2 DO, AO		SFB for positioning, 1 axis via 2 DO, AO	
Closed-loop control	PID controller	PID controller		PID controller	
Expansions					
S7-300 rack	max. 4	max. 24		max. 24	
Suitable FMs	4	8		8	
Suitable PtP CPs	2	8		8	
Suitable LAN CPs	1	10		10	

C7 compact control system	C7-613	C7-635 Touch	C7-635 Key	C7-636 Touch	C7-636 Key
Interfaces					
PROFIBUS DP interface	–	1		1	
DP connection (master/slave)	1 (CP 342-5)	1 (integrated, master/slave), 1 (CP 342-5)		1 (integrated, master/slave), 1 (CP 342-5)	
Programming, configuring					
Programming software	STEP 7	STEP 7		STEP 7	
HMI configuring	STEP 7 and parameterization support	WinCC flexible Compact or higher		WinCC flexible Standard or higher	
Panel-specific data					
Display					
Type	LC display	STN display, blue mode touch screen	STN display, blue mode	STN display, 256 colors touch screen	STN display, 256 colors
Lines x characters per line	4 x 20				
Character height	5 mm				
Resolution in pixels		320 x 240	320 x 240	640 x 480	320 x 240
Size		5,7"	5,7"	10,4"	5,7"
Graphics	Character graphics (within the scope of the character set)	Pixel graphics (vector graphics)		Pixel graphics (vector graphics)	
Others					
Number of softkeys/ function keys	4/10		14/10		14/10
Messages	128	2000 ¹⁾		4000 ¹⁾	
Process images	128	500 ¹⁾		500 ¹⁾	
Recipes		100 ¹⁾		300 ¹⁾	
Online languages	3 ²⁾	5 ²⁾		5 ²⁾	
Real-time clock	Hardware clock, battery-backed	Software clock, without battery backup		Hardware clock, not battery-backed	
Printer port		RS232		RS232, USB	

1) Values valid for WinCC flexible

2) Also Cyrillic, Chinese, Taiwanese and many more

