SIEMENS

SIMATIC

C7-621 / C7-621 AS-i Control Systems

Volume 1 Hardware and Installation

Manual

C79000-G7076-C621-01

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Product Overview

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In This Chapter

This chapter introduces you to the C7-621 and C7-621 AS-i. A brief overview of the range of performance will give you a first impression of the two devices.

This chapter also explains the additional components that you can connect to a C7.

Accessories for Installing and Starting Up a C7

To install and start up the C7, you require the following accessories:

- Programming device or PC with an MPI interface and PG cable
- The following software must be loaded on the programming device or PC
  - STEP 7 Tools
  - ProTool or ProTool/Lite

Overview

There are two versions of the C7:

C7-621

With a two-line display and 20 characters per line with 5 mm high characters (see Figure 1-1).

The C7-621 has the following components:

- MPI interface
- Digital inputs and outputs
- Analog inputs and outputs
- P bus connection (for the IM 621 module)

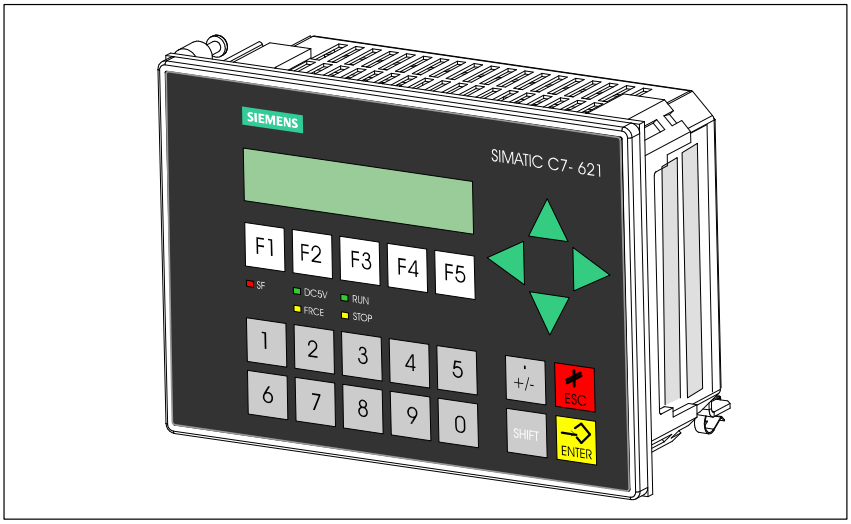


Figure 1-1 C7-621

Range of Functions

You can do the following with the C7-621:

- Run user programs that were written in STL, LAD or FBD and downloaded to the C7 CPU.
- Process digital and analog signals using the I/Os integrated on the C7.
- Download and use operator interface applications that you created with the “ProTool” or “ProTool/Lite” configuration tool.
- Using these configurations, you can monitor and intervene in the process you are controlling with the user program.
- Connect further S7-300 modules.

C7-621 Units

The C7 has two independent units that communicate with each other via an internal MPI interface:

- C7 CPU with digital and analog inputs and outputs
- C7 OP

Where necessary, these units are dealt with separately in the manuals.

C7-621 AS-i

With a two-line display and 20 characters per line with characters 5 mm high (see Figure 1-2).

The C7-621 AS-i has the following components:

- MPI interface
- AS-interface
- P bus connection (for the IM 621 module)

This model does not have digital inputs/outputs and analog inputs/outputs.

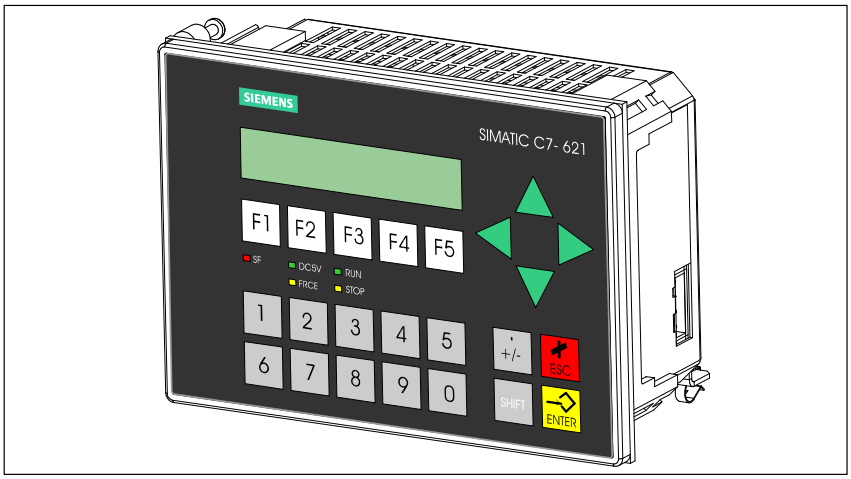


Figure 1-2 C7-621 AS-i

Range of Functions

You can do the following with the C7-621 AS-i control system:

- Run user programs that were written in STL, LAD or FBD and downloaded to the C7 CPU.
- Connect actuators and sensors via the AS-interface to the C7-621 AS-i.
- Download and use operator interface applications that you created with the “ProTool” or “ProTool/Lite” configuration tool.
- Using these configurations, you can monitor and intervene in the process you are controlling with the user program.
- Connect further S7-300 modules.

C7-621 AS-i Units

The C7 has two independent units that communicate with each other via an internal MPI interface.

- C7 CPU with C7 AS-i CP
- C7 OP

When necessary, these units are dealt with separately in the manuals.

Components that Can Be Connected to a C7

Apart from the connections to the process you can also connect various components to the C7. The most important components and their functions are listed in Table 1-1:

Table 1-1 Components that Can Be Connected to a C7

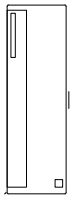
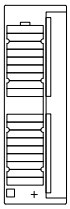
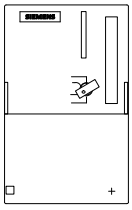
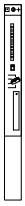
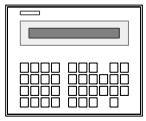
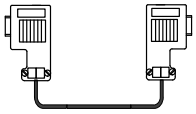
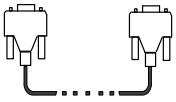
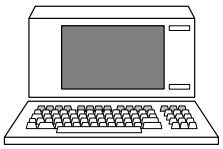
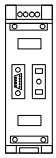
Component	Function	Schematic
IM 621 interface module with cable	...connects a C7 with an expansion rack for S7-300 modules	
Signal module (SM) (Digital input modules, digital output modules, analog input modules, analog output modules, analog input/output modules)	...adapt various process signal levels to the C7 CPU. Can be connected to the C7 via an IM 621.	
S7-300 (CPU)	...communicates via the MPI interface with C7 and with other nodes on an MPI network.	
S7-400 (CPU)	...communicates via the MPI interface with C7 and other nodes on an MPI network.	
OP (Operator Panel)	...allows operator interface functions.	
PROFIBUS LAN cable with bus connector	...interconnects nodes on an MPI network.	
PG cable	...connects a programming device/PC with a C7.	

Table 1-1 Components that Can Be Connected to a C7, continued

Component	Function	Schematic
Programming device (PG) or PC with the STEP 7 software package and ProTool or Pro Tool/Lite	...configures, assigns parameters, programs, and tests the C7.	
RS 485 repeater	...amplifies the signals in an MPI or PROFIBUS DP network and connects segments of an MPI or PROFIBUS DP network.	
Sensors and actuators		
AS-i slaves	Refer to the various catalogs (applies only to the C7-621 AS-i).	

Overview of the C7

The SIMATIC C7-621/C7-621 AS-i devices consist of several components that interact with each other:

- A programmable controller CPU of the SIMATIC S7-300 class (C7 CPU),
- A line-oriented SIMATIC OP (C7 OP),
- Integrated digital and analog I/Os (C7-621 I/Os),
- A P bus connection for expanding the C7-621 with an IM 621 using S7-300 modules,
- An MPI interface for communication with the programming device/PC and other S7 CPUs, C7 control systems and OPs,
- An AS-interface (AS-i) for connecting sensors and actuators (version C7-621 AS-i, see Figure 1-4)

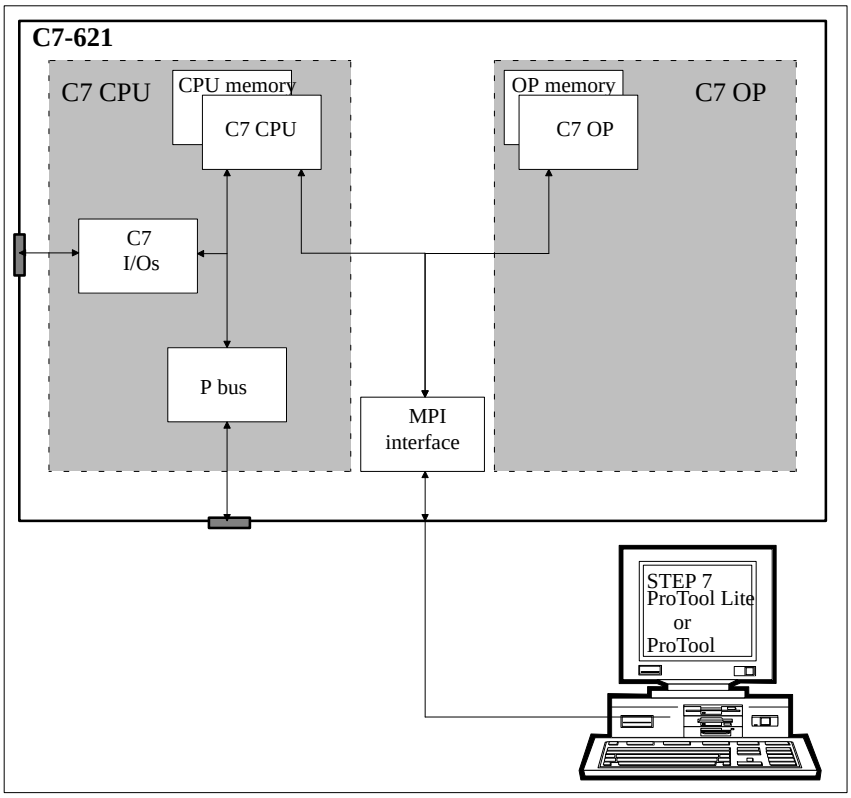


Figure 1-3 Components of the C7-621

The individual components integrated in the SIMATIC C7 correspond to the components that can also be used in the modular configuration consisting of an S7-300 CPU, OP etc. The I/O expansion via the P bus interface (IM 621) allows the connection of a maximum of four SIMATIC S7-300 modules. The AS-interface allows the connection of sensors and actuators to the C7-621 AS-i (Figure 1-4).

The basic functions also correspond to those of a modular configuration with standard modules from the programmable controller and OP families, the individual components operate independently of each other and each of the processors has its own memory.

C7 CPU is programmed with STEP 7 and the C7 OP is configured with ProTool/Lite.

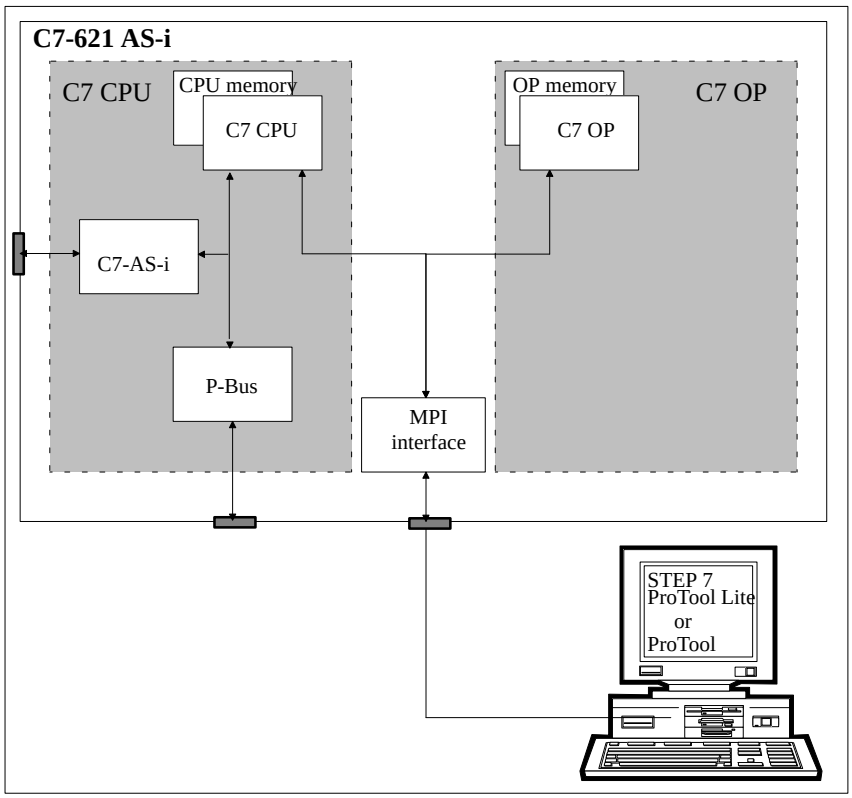


Figure 1-4 Components of the C7-621 AS-i

2.2 Installing a C7

The Installation

The C7 is designed for fixed installation in a switching panel or wiring closet door. To install the C7, follow the steps outlined below:

Step	Action
1.	Cut out a section of the switching panel as shown in Figure 2-2.
2.	Insert the sealing ring behind the front panel (see Figure 2-1).
3.	Insert the C7 into the cutout in the switching panel.
4.	Insert the 4 securing posts (see Figure 2-3) into the guides, pushing them until the spring engages.
5.	Screw the 4 securing screws supplied with the C7 into the 4 securing posts (see Figure 2-4 ①).
6.	Tighten the 4 screws with a screwdriver (tightening torque 0.6 Nm).

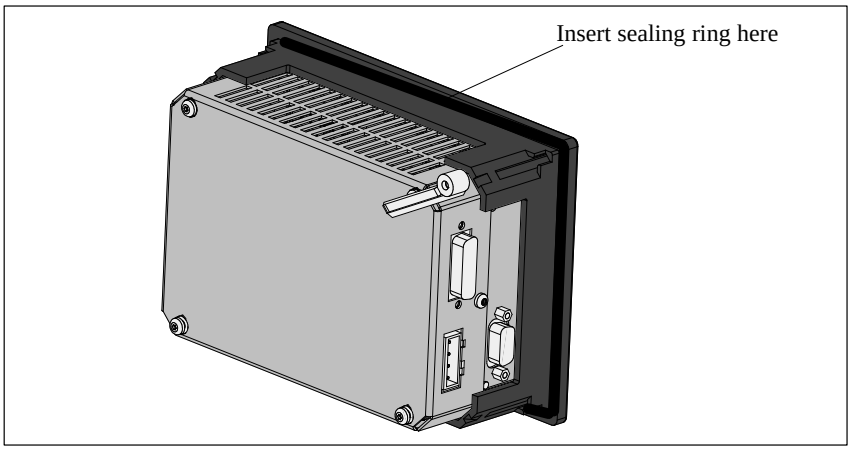


Figure 2-1 Inserting the Sealing Ring

2.3 Location of the C7

Points to Note When Installing the C7

When installing the C7, please remember the following points:

- The thickness of the switching panel can be between 1 and 4 mm. Make sure that the sealing ring makes a tight seal all round.
- There must be a clearance of at least 50 mm above and below and 70 mm at the sides of the C7 as shown in Figure 2-6.
- Make sure that the sealing ring on the front panel sits correctly.
- Choose a location for the C7 away from direct sunlight.

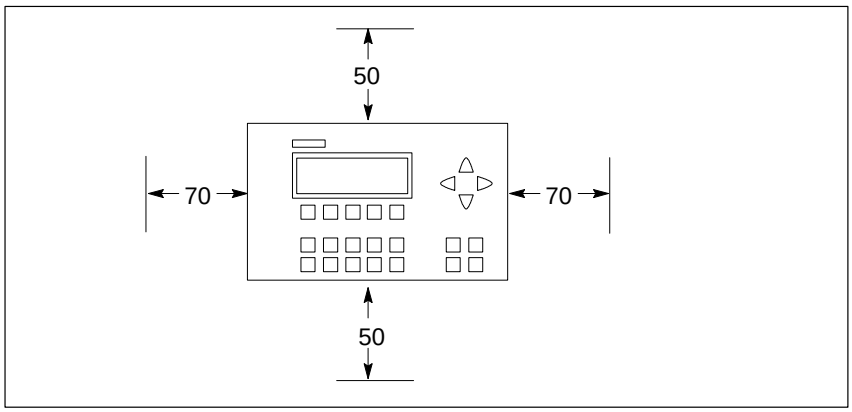


Figure 2-6 Minimum Clearances when Installing the C7

C7-621 AS-i

The figure illustrates the AS-i connector of the C7-621 AS-i. This connector only exists on the C7-621 AS-i.

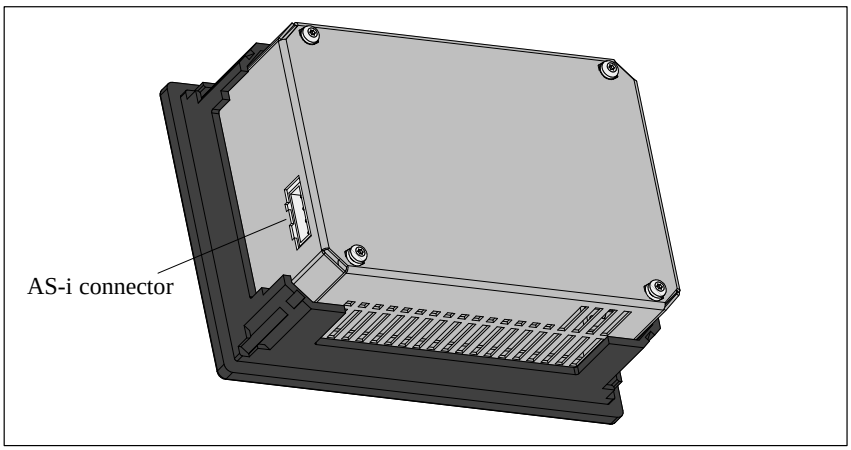


Figure 2-10 C7-621 AS-i with AS-i Connector

AS-i Connector

To connect actuators, sensors and the AS-i power supply unit

Table 2-5 Pinout of the AS-Interface

Pin	Function
AS-i -	Connected internally with AS-i -
AS-i +	Connected internally with AS-i +
AS-i -	Connected internally with AS-i -
AS-i +	Connected internally with AS-i +

2.5 Guidelines for Trouble-Free Installation

Overview

To prevent disturbances, the wiring and cabling in an automation system must be installed according to certain rules.

If a system is poorly grounded or not shielded, low frequency and high frequency interference signals can be coupled into the internal bus of the controller and cause malfunctions.

Interference signals or noise can be caused for example by switching relays or contactors (rapid changes in current or voltage levels, high frequency interference signals) or by different ground potentials between two sections of the system (low frequency interference signals).

Cabling Rules

Only shielded cables are permitted for data lines and analog signal lines.

- Cable shields must be grounded at both ends.

  The standard cables in the catalogs *ST80.1* and *ST70* meet these requirements.

- All plug-in connectors must be secured by screws or locked in position.
- Data lines and signal lines must not be laid parallel to power lines. Use a separate cable duct for signal lines with a minimum clearance of 50 cm to power lines.

Wiring Closet Layout

Install devices that could introduce interference signals from the outside at the bottom of the wiring closet The grounding rail should be located directly at the point of entry to the closet so that cables that could be carrying interference signals can be connected directly to ground. The shields of all shielded cables must make contact here. If the signal lines have a double shield, only the outer shield makes contact here.

Install long signal lines along the walls of the wiring closet. To reduce interference, it is important to plan the layout of the wiring closet in keeping with the EMC guidelines. All the chassis connections in the wiring closet must be established with large conductor cross-sections and contact should be over a large an area as possible.

Analog devices installed in the wiring closet should be insulated and grounded at one point in the closet (use copper band!).

Always use metal parts with the same electrical characteristics in the cabinet (do not use aluminum due to the danger of oxidization).

2.11 Status and Error LEDs on the C7

Status and Error LEDs

The C7-621 or C7-621 AS-i has the following status and error LEDs:

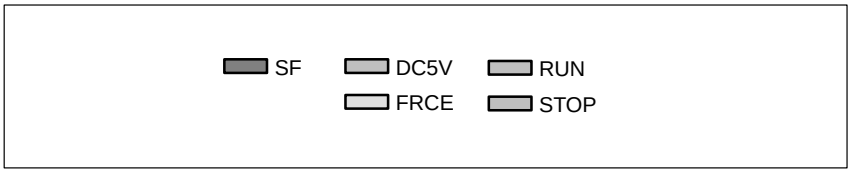


Figure 2-19 Status and Error LEDs of the C7-621 or C7-621 AS-i

Meaning of the Status and Error LEDs

The status and error LEDs are explained in the order in which they appear on the C7.

LED	Meaning	Explanation
SF (red)	C7 CPU group error	**Lights up** in the following situations: • Hardware faults • Firmware errors • Programming errors • Parameter assignment errors • Math errors • Time errors • Defective internal memory • I/O fault/error in the internal I/O functions To find out the exact cause of the problem read out the diagnostic buffer using a programming device..
DC5V (green)	5V DC power supply for the C7	**Lights up** when the internal 5V DC power supply is functioning correctly.
FRCE (yellow)	Reserved	-
RUN (green)	RUN or RUNP mode on the C7 CPU	**Lights up** when the C7 is executing the user program. **Flashes** (several times) during the C7 startup. After the STOP LED goes off, the outputs are enabled.
STOP (yellow)	STOP mode on the C7 CPU	**Lights up** when the C7 is not executing the user program. **Flashes** at 1 second intervals when a memory reset has been requested by the operator or by the C7 CPU. **Flashes** twice; refer to installation.

Replacing the C7

The C7 is not designed for field repair. A defective C7 must therefore be replaced.

Requirements

To replace a C7, the following requirements must be met:

Hardware

- Programming device/PC with MPI interface
- Suitable connecting cable

Development tools

- STEP 7
- ProTool or ProTool/Lite

User software (stored outside the C7)

- User configuration
- User control program (when data from the C7 CPU can no longer be read)

Removal

Follow the steps outlined below:

- The C7 is removed in the reverse order from that in which it was installed.
- Connect a programming device/PC to the MPI interface.
- Save the user program from the C7-CPU on a programming device/PC using STEP 7.
  If the C7-CPU is defective and the user program can no longer be read, remove the C7 without attempting to back up the data.
- The configuration loaded on the C7 cannot be read. This must be available on a programming device or PC.

Installation

As soon as you have a new C7 available, install it as follows:

1. Mechanical and electrical installation is as described in the manual.
2. Connect a programming device/PC to the MPI interface. Set the highest MPI address.
3. Reset the C7 memory as described.
4. Transfer the previously saved user program from the programming device/PC with the corresponding data to the C7-CPU (using STEP 7).
5. Download you configuration to the C7 using ProTool/Lite.
6. Start the user program.

A.1 Technical Specifications

The table contains the technical specifications of the entire unit. The data for the I/Os can be found in the relevant chapters.

Table A-1 Technical Specifications of the C7

Characteristic	Technical Specifications
C7-621 / C7-621 ASi	
Order number	C7-621: 6ES7621-1AD00-0AE3 C7-621 ASi: 6ES7621-6BD00-0AE3
Dimensions: C7 Installation dimensions	168 x 120 x 70 mm (H x W x D) 159 x 110 mm
Weight	C7-621: 1350g C7-621 AS-i: 1390g
Display C7-621 and C7-621 ASi	STN-LC display/ 2 lines of 20 characters each. 5 mm character height/ LED backlit
Keypad	Sealed keypad with metal domes C7-621: 23 keys
P bus (C7-621)	Interface to S7-300 modules
MPI interface	Standard MPI interface
C7 OP	
Flash memory (configuration memory)	C7-621: 128 Kbytes C7-621 AS-i: 128 Kbytes
C7-621 ASi CP	
Bus cycle time	5 ms with 31 slaves
Connection of the AS-i cable	Current load between terminals Ai+ and Ai+ maximum 4A
ASi CP current consumption	max. 100 mA
ASi CP supply voltage from the ASi cable	According to the AS-i specification
C7 Power Supply	
Supply voltage (U_N) • Protected against reverse-polarity voltage • Voltage dip (buffered)	24 V DC (20.4 to 30.2 V.DC safety extra low voltage, SELV) the C7-621 and C7-621 ASi do not have protection against high-energy surge pulses in the µs range. For details of protection, please refer to the manual **/70/** Chapter 4. yes ≤ 20 ms
Current consumption (I_N)	1000mA max.
Safety	
Standards	DIN EN 61131-2 ≙ IEC 1131-2