

SIEMENS

SIJECT 16i
Start-Up

Technical Manual

08.2004 Edition

Manufacturer Documentation



SIJECT 16i
Start-Up

Technical Manual

Valid for

<i>Control System</i>	<i>Firmware Version</i>
SIJECT 16i	1.12

08.2004 Edition

SIJECT16i Control System	1
Installation of Control System	2
Start-up	3
Programming Tool	4
Technical Appendix	5

SIJECT® Documentation

Key to editions

The editions listed below have been published prior to the current edition.

The column headed "Note" lists the amended sections, with reference to the previous edition.

Marking of edition in the "Note" column:

A New documentation.

B Unchanged reprint with new order number

C Revised edition of new issue.

Edition	Order No.	Note
12.2000	6AT1931-5AB61-0BA0	A
01.2004	6AT1931-5AB61-0BA1	A
08.2004	6AT1931-5AB61-0BA1	C

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Exclusion of liability

We have checked that the contents of this document correspond to the hardware and software described. Nonetheless, differences might exist and we cannot therefore guarantee that they are completely identical. The information contained in this document is reviewed regularly and any necessary changes will be included in the next edition. We welcome suggestions for improvement.

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Subject to technical changes without notice.

1 SIJECT 16i Control System

1.1 Components of SIJECT 16i

What is SIJECT 16i?

The SIJECT 16i is a controller for injection molding machine. It offers solutions for injection molding machines from low-end applications to high-end applications.

Hardware components

It consists of the following hardware components, in which the parts marked with a star symbol (*) can be ordered separately:

- CI: Compact interface, main controller, i.e., CPU and I/O board.
- OP: Operator panel, with LCD display and membrane keyboard, i.e. CPU, LCD, and membrane Keyboard
- Cable: Communication cable between CI and OP.
- Multimedia card (MMC card*):

The memory space of MMC card is 32 Mbytes. It can install PLC application programs, maximum 50 sets recipe data, OP-menus and a customer specific picture (max.16KB).

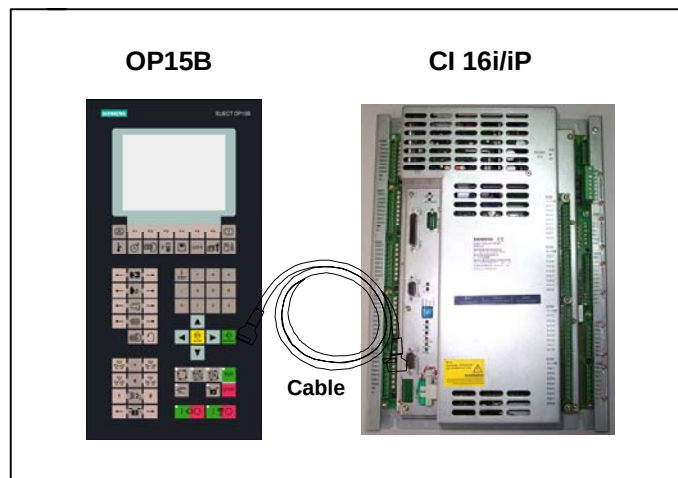


Fig 1-1 Hardware components of SIJECT 16i

Software components

- System software on the permanent Flash-EPROM of the CI:
 - Loading kernel (SIJECT Sijload): loads all the remaining part of the software of micro-controller. It is available in PRODIS system that can be free downloaded from Internet (Please refer to Notice on next page for details).
 - PLC application program: executes the Integrated PLC User Program cyclically. Before machine set-up, customers should firstly install PLC application program by themselves.

- Programming tool:
 - SIMATIC STEP7 V5.x*;
 - OP15B menu editor tool (MECO program): for OP15B, there is a HMI engineering tool for menu editor. MECO program is also in PRODIS system together with Sijload program (Refer to Notice below).

User data

User data are:

- Customer specific picture
- Recipe data
- PLC program

PLC program

The STEP7 PLC program for CI 16i/16iP is backed up by battery. The delivered CI 16i/16iP does not include any STEP7 PLC program, and the battery is not plugged in. The customer should prepare PLC program, first plug in battery then download STEP7 PLC program to CI16i/16iP unit.

Please see section **3.5.2 Automatic uploading of PLC application to PLC module** for detailed function descriptions.

Notice

Actual information, documentation (only English) and application examples in STEP 7 are on Internet available.

Actual Link: <http://www4.ad.siemens.de/>
(Please input "SIJECT" in Search box.)

For more information or proposals, you can link:

<http://www.siemens.com/motioncontrol>

<http://www.ad.siemens.de/csinfo>

Or contact (Europe):

Email: wolfgang.radermacher@siemens.com

Email: wolfgang.zapf@siemens.com

Technical support

Email: dietmar.antwerpen@siemens.com

1.2 Technical Data

Connected load

Table 1-1 Connected load

Parameter	Min	Type	Max	Unit	Remarks
Supply voltage	20.4	24	28.8	V	
Power of CI and OP		20	35	W	
Current consumption of each output		2		A	
Digital input/output		24		V	
Proportional valve		24/38		V	*

* It depends on the resistance of proportional valve.

Weight

Table 1-2 Weight

Component	Weight (Kg)
CI component	4.1
OP component	1.8

Dimensions

Table 1-3 Component Dimensions

Component	Dimensions: H×W×D (mm)
CI component	390×288×84.5
OP component	392×202×36

Environmental operating conditions

Table 1-4 Environmental operating conditions

Parameter	Description
Temperature range	0 ~ +50°C
Permissible relative humidity	5...95% without condensation
Air pressure	700...1,060hPa

Transport and storage conditions

Table 1-5 Transport and storage conditions

Parameter	Description
Temperature	Transport: -40~+70°C Storage: -20~+55°C
Permissible relative air humidity	5...95% without condensation
Air pressure	700...1,060hPa
Transport height	-1,000...3,000 m

Free fall in transport package	500mm
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Protective quality and degree of protection

Class of protection level to IEC 536, CI: IP20, OP: IP54
PE terminal required.
Foreign matter and water protection to IEC 529.

System characteristics

Table1-6 System characteristics

System		SIJECT CI 16i	SIJECT CI 16iP
PLC module		314	314-2DP
Programming		SIMATIC STEP 7	SIMATIC STEP 7
Guaranteed memory	Load memory	256 Kbytes	524 Kbytes
	Work memory	163 Kbytes	460 Kbytes
Prog. memory (after loaded technology)	Load memory	_*	498 Kbytes
	Work memory	_*	437 Kbytes
Timer		128	256
Counter		64	256
Digital input (DC24V)		31	31
High speed counter		1	1
Digital output (2A)		40	40
Short-circuit protection		Yes	Yes
Thermocouple input (16 Bit)		8	8
Inputs for linear scales (1k Ω ~10k Ω , 12 Bit)		4	4
Inputs for fast analog signals (0~10V, 14-Bit resolution)		-	2 (X207)
Analog output (+/-10V, 12 Bit)		4	4
Proportional valve current output (+24~38V / 0.75~1.4A, 12Bit)		2 (X306) **	-
OP interface (serial)		1	1
MPI interface		1	1
P_Bus interface		1	1
Profibus-DP interface		-	1
Memory card slot		1	1
System power supply		DC 24V	DC 24V

* No correspondent technology blocks for CI 16i.

** For CI16i, two outputs can only be used alternatively as voltage output (+/- 10V) or as current outputs (0.75-1.4A).

1.3 Order Number

General

The SIJECT series product can be ordered in the form of package. But you also can receive the components separately if you only order the option. It depends on the configuration and can meet your requirements. Please see the order number of all components in the following table.

Table 1-7 Order Number

No.	Component	MLFB (Order No.) / SNC No.
1	SIJECT15+ (OP15B)	185010901900 China only
2	SIJECT 16i (CI16i+OP15B)	6AT1131-6CD21-0XB0
3	SIJECT OP15B FV1 (English, Chinese, Turkish, Russian) SIJECT OP15B FV2 (English, Chinese, Spanish, Reserve)	6AT1131-5BB20-0XB0 6AT1131-5BC20-0XB0
4	SIJECT CI16i	6AT1131-6DD21-0AB0
5	SIJECT CI16iP	6AT1131-6DE21-0AB0
6	Communication cable	185010900200 China only
7	SIJECT adapter	6AT1131-0FA00-0AA0
8	Multimedia Card (MMC card)	6AT1131-0GA00-0AA0
9	SIJECT PTPS (SIJECT Project Tool), English Version (SW)	185010901800 China only
10	SIJECT Sijload (SIJECT Loader), English Version (SW)	185010755002 China only
11	SIMATIC Manager V5.2	6ES7810-4CC06-0YX0
12	Short Guide for Start-up	184000000060 China only
13	Operation Manual (OP15B) SIJECT 16i, English	184000000059 China only
14	Operation Manual (OP15B) SIJECT 16i, Chinese	184000000062 China only
15	Start Up Manual (OP15B) SIJECT 16i, English	184000000058 China only
16	Start Up Manual (OP15B) SIJECT 16i, Chinese	184000000061 China only
17	P_BUS cable (2.5m)	6ES7368-3BC51-0AA0
18	P_BUS cable (5.0m)	6ES7368-3BF01-0AA0
19	Profi_bus cable	6XV1830-0EH10-1AB0
20	Profi_bus Connector 1	6ES7972-0BA40-0XA0
21	Profi_bus Connector 2	6ES7972-0BB40-0XA0
22	Lithium battery for SIJECT CI boards	6FC5247-0AA18-0AA0

2 Installing the Control System

2.1 Installing and Dismantling



Warning

Do not install when the equipment is live! Do not dismantle when the equipment is live!

The modules contain electrostatically sensitive devices. It must be ensured that persons without ESD protection never touch printed circuit boards or components when handling operator panel (OP) and CI unit.

Procedure

Prior to installation, you should prepare 4 nuts (M3) for OP installation and 4 cross-head screws (M4) for CI installation. The sheet metal can not have any paint. The thickness of a sheet metal for mounting shall not be less than 2 mm.

1. Install the CI within the electrical cabinet;
2. Install the Operator Panel on the control rack of injection molding machine;
3. Connect CI and OP with communication cable;
4. Connect the wiring of periphery circuit (I/Os, thermocouple, linear scale, proportional valve, etc.);
5. Connect entry wire of power supply.

Dismantling the control system

The control components are dismantled as described above in the reverse order.



Danger

Install grounding connection before plug-in of screw-terminal block to DC24V mains.

Make sure that all delivered interface connectors (female) are plugged in before operation.

Battery set-up

The back-up battery is not connected to the CI board in original package. It is necessary to connect the back-up battery to CI board and reset the memory prior to the system start-up. Please refer to operation sequences of battery set-up as follows.

Operating sequence:

1. When the system is firstly power on, observe the status of LEDs: BATF (red), DC5V (green) and SF (red) are lighting on, and STOP (yellow) is flashing. PLC should be reset;
2. Switch the mode selector S1 to position **MRES** by screwdriver and observe the status of LEDs: BATF (red) and DC5V (green) are still on; SF (red) is off; STOP (yellow) will flash rapidly at first, then stay on;
3. Switch the mode selector S1 to **RUN_P**, and you will find that STOP (yellow) is off and RUN_P (green) is on;

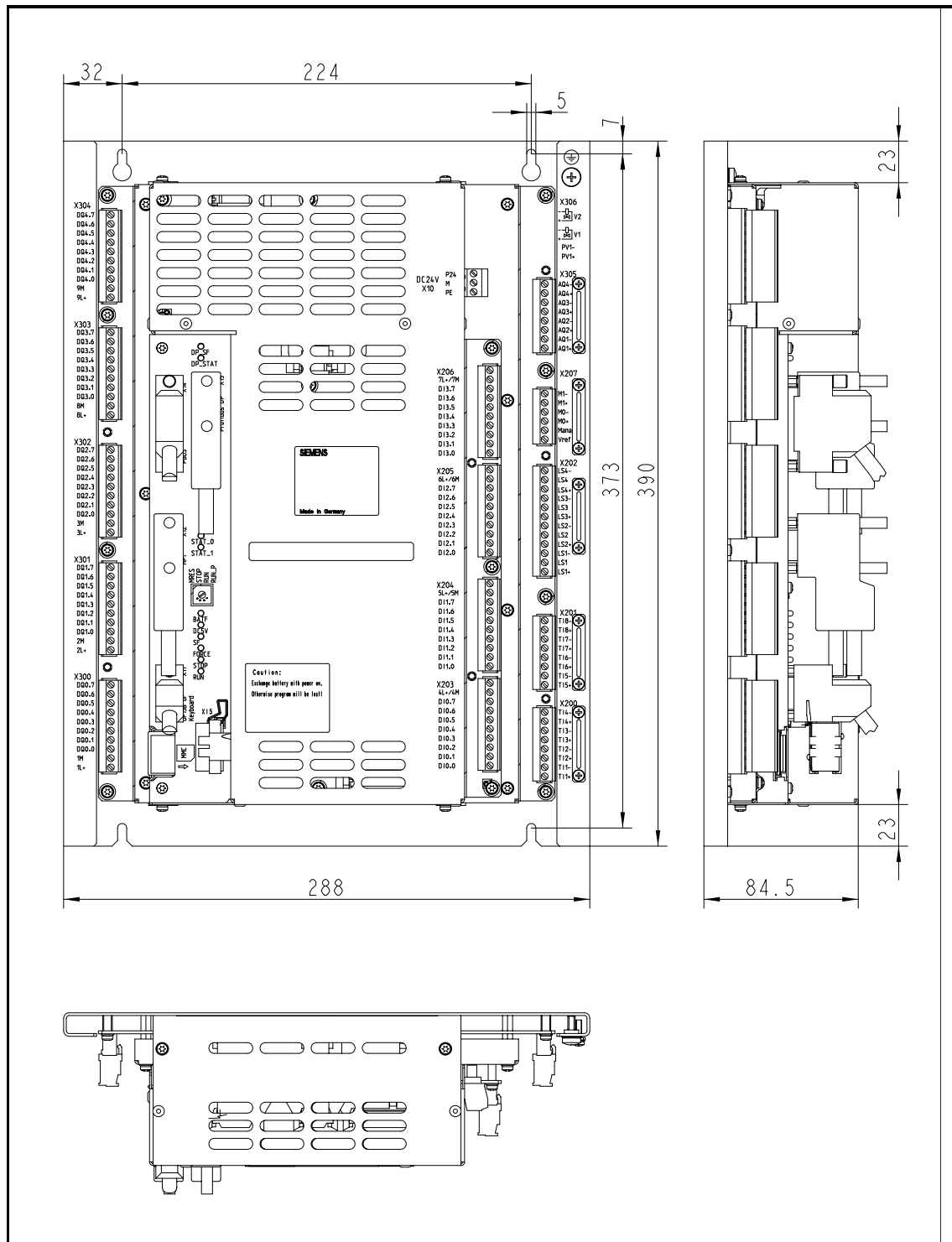


Fig. 2-2 Mounting dimensions of CI

2.2 Interfaces and Cabling

Position of interfaces and front panel elements

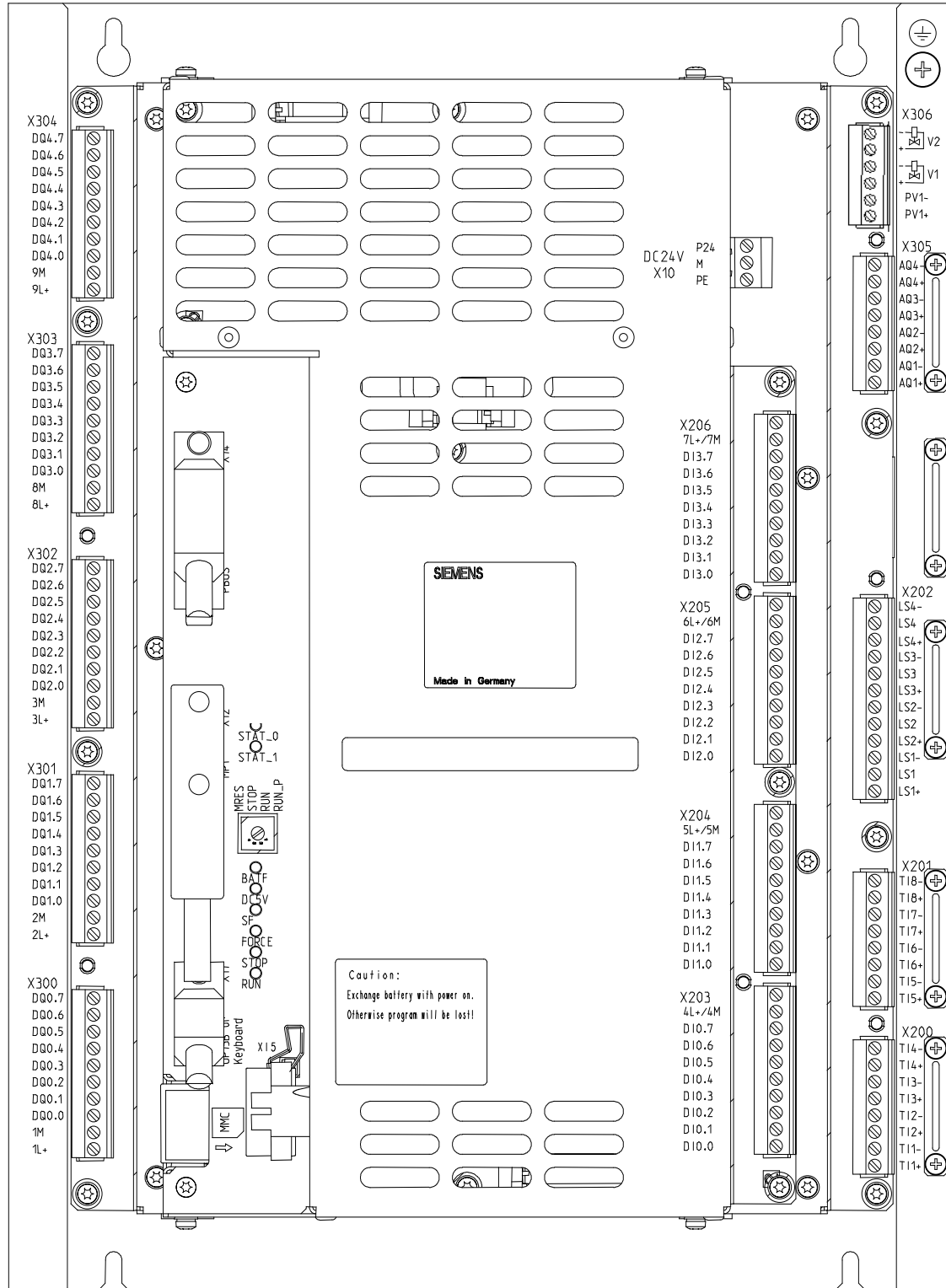


Fig.2-4 User interfaces for SIJECT C116i (for reference)

Interfaces

CI

- **Power supply connector (DC24V) ***
3 – pin screw-terminal block for connecting the power supply.
- **X11 — OP interface**
9 – pin sub-D male connector for connecting OP and providing power supply for OP.
- **X12 — MPI / RS232 interface**
9 – pin sub-D female connector for communicating with PC/PG and other standard OP.
- **X14 — P_BUS**
25 – pin sub-D female connector for periphery extension.
- **X15¹ — Profibus**
9 – pin sub-D female connector for connecting controller (Profibus protocol).
- **X200, X201 — Temperature input ***
8 – pin male connector (2 sets) for connecting thermocouple inputs.
- **X202 — Analog input ***
12 – pin male connector (1 set) for connecting linear scale inputs.
- **X203, X204, X205, X206 — Digital input ***
10 – pin male connector (4 sets) for connecting digital inputs, 1 pin of them (DI3.7/X206) is adapted for connecting high-speed input including proximity switch.
- **X207² — Fast Analog Inputs ***
6 – pin male connector (1 set) for two fast analog inputs (10V) and for the reference power output supplied by the system (DC 10V).
- **X300, X301, X302, X303, X304 — Digital output ***
10 – pin male connector (5 sets) for connecting digital outputs.
- **X305 — Analog output ***
8 – pin male connector (1 set) for connecting analog output for proportional pressure and flow valve with external driver card.
- **X306³ — Current output for proportional pressure and flow valve ***
6 – pin male connector (1 set) for connecting power output for proportional pressure and flow valve with integrated driver card.

Notice

Temperature rating of field-installed conductor shall be 75°C only for the Digital Outputs (X300, X301, X302, X303 and X304), and Analog Output (X306). No marking is required when intended for connection to control circuit conductors only.

For the parts marked with a star symbol (*), please use terminal blocks made by PHOENIX CONTACT GMBH & CO (E60425), catalog number MVSTBR2.5/X-ST-5.08, where X can be 6, 8, 10 OR 12.

¹ It is only applicable for SIJECT CI 16iP.

² It is only applicable for SIJECT CI 16iP.

³ It is only applicable for SIJECT CI 16i.

OP

- **X21 — CI interface**
9 – pin sub-D female connector for connecting CI.

LEDs 10 LEDs for fault and status displays

Operating elements Mode selector S1

Connecting cables The components are wired up as shown in the following Connection Diagram. Please refer to this figure for the type of cables required.

**Warning**

In practical use, the length of those wires transmitting digital and analog input/output signals should be less than 30 meters. In case the wire length is more than 30 meters, corresponding measures should be taken against surge interference.
