SattCon 05 Slimline

From Program Version 4.0

SattCon 05 Slimline is a family of compact programmable controllers for small to medium-size applications. A modular configuration, offering four different processor boards with four I/O units, means that each system can be tailored to meet your exact requirements.

In addition to the systems described in this data sheet, there are versions of SattCon 05 Slimline with built-in operator interface (SattCon OP45/ SattCon OP45SB), and units which can execute a BASIC program as well as carrying out control (SattCon 05-65/ SattCon OP65). Details of these products are presented in separate data sheets.

Systems in the SattCon 05 Slimline family are self-contained and handle both analogue and digital control, making them suitable for process and machine control applications. In addition to their use as stand-alone controllers, SattCon 05 Slimline systems have built-in facilities for network communication. The compact design allows the most cost effective use of panel space.

The SattCon 05 Slimline family includes I/O units for system expansion (SD32D, SDA, SD24D, SD24RS and SACV) and other accessories: a backup unit (SBUP05), a battery-backed real-time clock (BRT15), digital and analogue input simulators (PTC05 and ATC05), pulse encoder interface (IP05), as well as the DOX 10 and DOX5 software packages. In addition, all original SattCon 05 expansion units may be used with SattCon 05 Slimline.
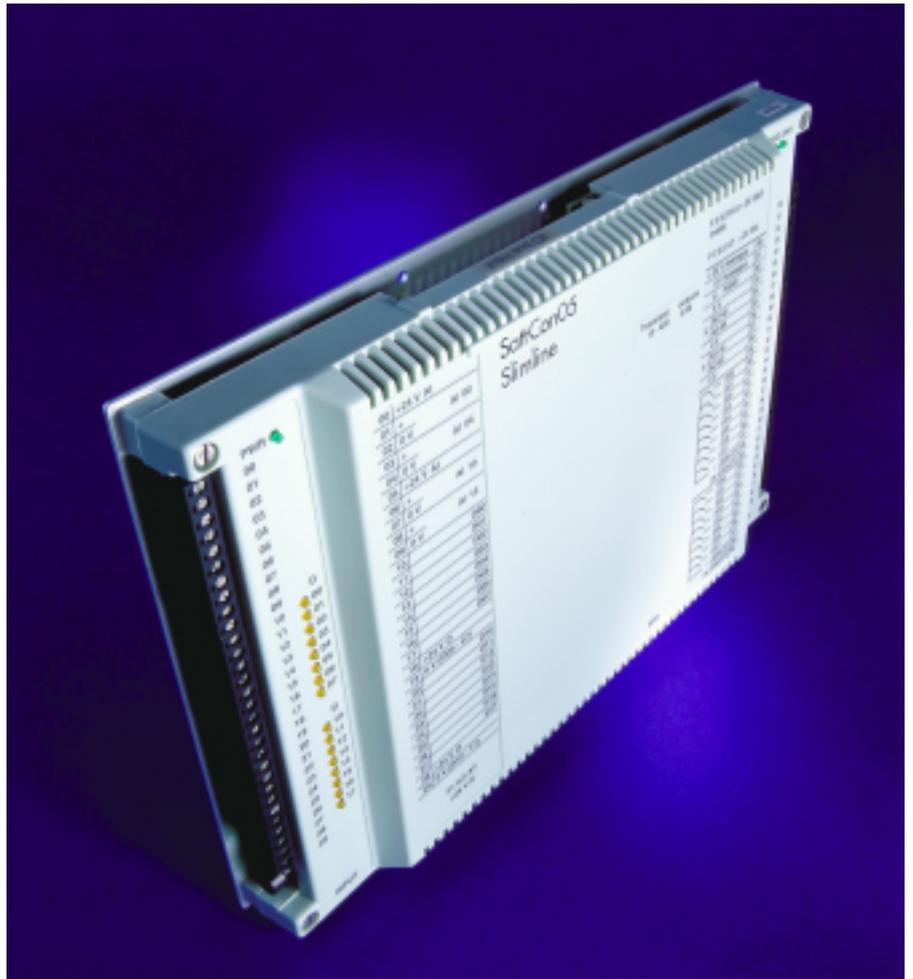
SattCon 05 Slimline has the following features:

- Combines a compact format with the flexibility of a modular system.
- PID loops and arithmetic functions for process control.
- Programming using a standard VDU or a personal computer with DOX 10 or DOX5 software installed.
- Serial ports for VDU, printer and COMLI or SattBus communication.
- Text handling includes facilities for operator inputs from VDU.
- Powerful instruction set permits complex applications.

System Functions

Processor boards	CU05-25	CU05-25SB	CU05-45	CU05-45SB
VDU programming	X	X[1]	X	X[1]
Programming and documentation with PC	X	X[1]	X	X[1]
Program listing on printer	X	X[1]	X	X[1]
Max. number of expansion I/O units (in addition to base unit I/O)	3	3	3	3
Interrupt-controlled fast loop	X[2]		X[2]	
Internal memory cells (reduced by no. of I/O)	3072	3072	3072	3072
Timers	64	64	64	64
Counters	64	64	64	64
Registers	28000	28000	28000	28000
Sequencers	256	256	256	256
Fast count input (2 kHz)	X[3]		X[3]	
Time channels			16	16
PID loops			8	8
Subroutines	X	X	X	X
Shift instructions	X	X	X	X
Text messages	512	512	512	512
Operator dialogue	X	X	X	X
COMLI slave	X		X	
COMLI master			X	
VDU port	X	X[1]	X	X[1]
Printer port	X	X[1]	X	X[1]
SattBus port		X		X

[1] DX232 or DX485 required.
[2] Not valid when SD24RS is used as a base unit.
[3] Only when SD32D or SDA are the base unit. DX232/DX485G cannot be used.

I/O units	SD32D	SD24D	SD24RS	SDA	SACV
Can be used as a base unit	X	X	X	X	
DX232 or DX485G can be fitted in base unit	X			X	
Fast counter input (2 kHz)	X[4]			X[4]	
Internal power supply via the processor board	X	X	X	X	X
External power supply				X	X
Digital inputs/outputs	32/28	24/24	24/16	16/16	
Opto-isolated digital inputs		X	X	X	
Opto-isolated digital outputs		X		X	
Transistor outputs	X	X		X	
Relay outputs			X		
Analogue inputs/outputs				4/2	12/4

[4] Only available when DX232 or DX485G is not installed.

System Configuration
A SattCon 05 Slimline system comprises a base unit and up to three expansion I/O units, together with any accessories required. The base unit consists of an I/O unit where a processor board is built in.
A communications board (DX232 or DX485G) can also be built in.

There are five I/O units (SD32D, SDA, SACV, SD24D, SD24RS), providing different combinations of digital and analogue I/O, and four processor boards (CU05-25, CU05-25SB, CU05-45, CU05-45SB).

CU05-45 and CU05-45SB provide a full range of facilities for process control including PID loops and time channels, while CU05-25 and CU05-25SB are intended more for machine control and do not support these functions. CU05-25 and CU05-45 support COMLI communication;

CU05-25SB and CU05-45SB have an integral SattBus port.

The facilities provided by the various processor boards and I/O units are summarised in the tables above. A table at the end of this data sheet shows all permissible combinations of processor board, I/O unit and communications board.

Memory
The program memory is battery backed CMOS RAM; the area used for the control program is 25 kbytes. An external Flash EPROM memory unit (SBUP05) is also available.

Program Functions
The main part of the control software in SattCon 05 Slimline is the PLC program. As well as providing functions for logic and interlocking, there are arithmetic and data handling

instructions, three levels of subroutines, shift registers and 256 sequencers with 100 steps each.

I/O signals can be used to start a fast loop capable of executing a section of the PLC program with a cycle time as short as 1ms (not provided by CU0525SB or CU05-45SB).

The system can handle analogue inputs and outputs. In addition to the PID loops provided in certain versions, the PLC program can be used to implement alarms, ramp functions etc. There are 28000 16-bit registers available for common use.

Timers and Counters
Every version of SattCon 05 Slimline has 64 timers and 64 counters. The PLC program has access to timer and counter presets to allow re-use with different values of operator adjustment.

Time channels

16 programmable time channels in CU05-45 and CU05-45SB can be used to start and stop activities at predetermined times and days.

PID controllers

CU05-45 and CU05-45SB have eight programmable loop controllers with P, PI, PD or PID functions which can also be cascaded. Functions such as setpoint ramping and gain scheduling may be implemented using the PLC program.

Text handling and dialogue

512 lines of text, each 32 characters long, can be used for events, alarms and dialogue messages. The messages can also include the date, time and process values.

Large numerical values, and values with up to five decimal places can be handled if several consecutive registers are used.

Numerical information may be scaled automatically and displayed in physical units with up to five decimal places. Limit checking of minimum and maximum values is performed at input.

Text can be displayed at a VDU and/or printer. Control codes can be easily inserted into messages to provide cursor positioning, flashing, high intensity text etc. on a VT100-compatible VDU.

Any ASCII character can be printed out from a register or from the text line.

A DX232 or DX485G communication board is required to use VDU and/or printer with a SattBus system.

Diagnostics

SattCon 05 Slimline has a number of built-in functions for error detection and fault-finding. These include automatic detection of analogue input/output faults, and dynamic display of program, I/O status and sequence steps.

Communication

As standard, CU05-25 and CU05-45 have an opto-isolated serial port for programming or COMLI communication, and a second port for a printer. Communication is via an RS232 interface or electrically isolated RS485 (two-wire), but the printer interface is RS232 only. Adding a DX232 or DX485G communication board provides programming, printer and two separate COMLI channels. DX232 has two RS232 interfaces and DX485G two electrically isolated RS485 channels (four-wire).

The text handling includes facilities for interface to Hayes modem.

CU05-25SB and CU05-45SB communicate via SattBus instead of COMLI. SattBus is a two-wire asynchronous token-passing bus. A maximum of 120 nodes may be connected over a maximum length of 2000 m. In a SattBus network at least one of the nodes must include the supervisor function, e.g. SattBus Connector (SBC), since the function is not provided in SattCon 05 Slimline.

Using either SattBus or COMLI, signal status, register values and other data can be transferred to and from other systems. A personal computer can be used to upload/download data and programs. On-line programming and program changes can be performed via the network (not valid for DOX 10).

Programming and Documentation

The minimum requirement for programming SattCon 05 Slimline is a VDU terminal. All programmed functions can be listed on a printer. CU05-25SB and CU05-45SB require a DX232 or DX485G to provide the VDU and printer ports.

An IBM compatible personal computer with the DOX 10 or DOX5 software package serves as an enhanced programming and documentation tool.

Programs can be developed off-line using identifiers (signal names rather than numeric addresses) and comments. Function block library handling speeds up program development. When the program has been transferred to the SattCon 05 Slimline, it can be supervised on-line via DOX 10/DOX5, which still shows identifiers etc.

For programming via the SattBus network, a personal computer running DOX5 is connected via an SBC connector (see separate data sheet).

SattCon OP45SB must be equipped with a DX232 or DX485 communication board, if it is to be programmed via a VDU or DOX 10.

Allowed Combinations of Boards

Any CPU board can be mounted in any of the I/O units SD32D, SDA, SD24D or SD24RS to make a base unit. SACV must constitute an expansion unit of its own and cannot be combined with a CPU board.

The communication boards DX232 and DX485G can only be mounted in the I/O units SD32D and SDA.

I/O Units
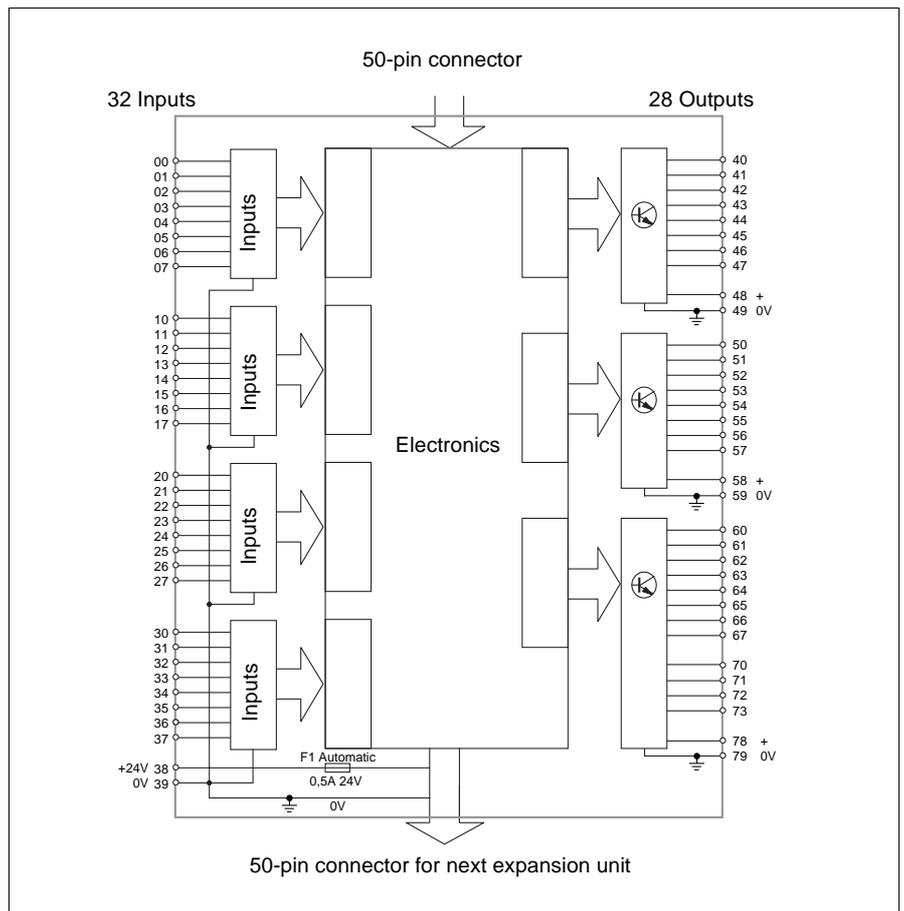
SD32D

SD32D is a digital I/O unit with 32 inputs (16–32 V DC) and 28 transistor outputs (12–50 V DC). When used in a SattCon 05 Slimline base unit, DX232/DX485G can also be fitted.

SDA

A combination of digital and analogue I/Os can be connected to SDA: 16 opto-isolated digital inputs (16–32 V DC), 16 opto-isolated digital outputs (12–50 V DC), 4 analogue inputs with common signal ground (0–5 V/1–5 V/0–10 V/ 0–20 mA/4–20 mA) and 2 analogue outputs (0–10 V/0–20 mA/4–20 mA). When used in a SattCon 05 Slimline base unit, DX232/DX485G can also be fitted.
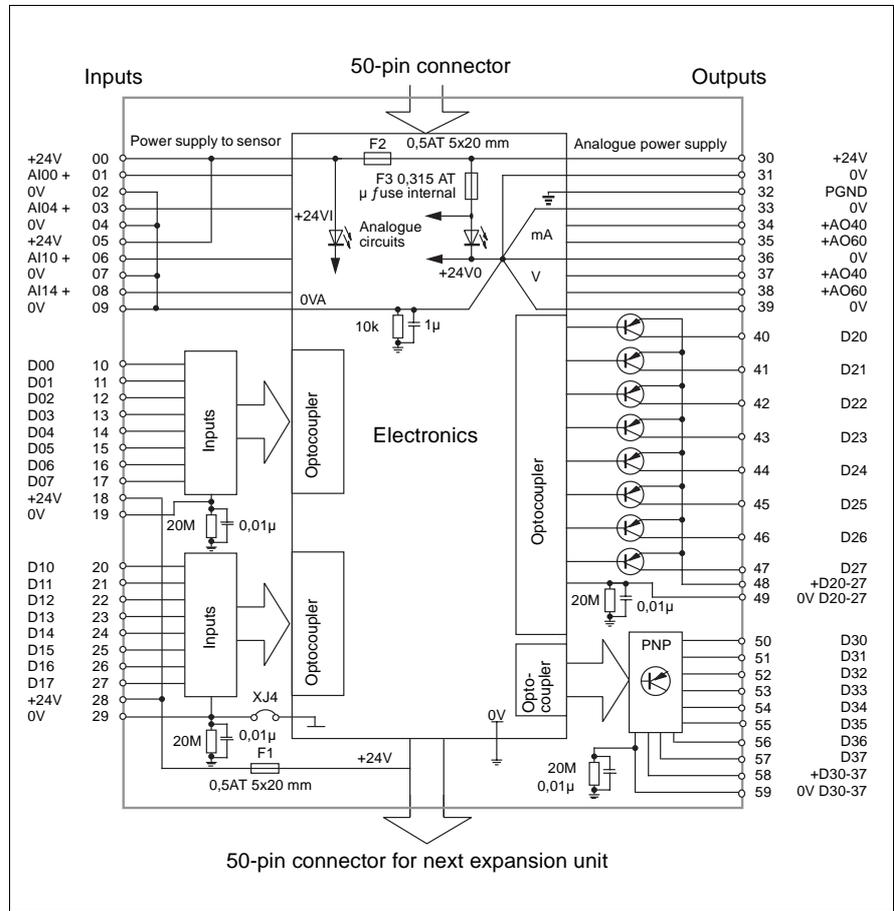
SD24D

SD24D is a digital I/O unit with 24 opto-isolated inputs (16–32 V DC) and 24 opto-isolated transistor outputs (12–50 V DC).
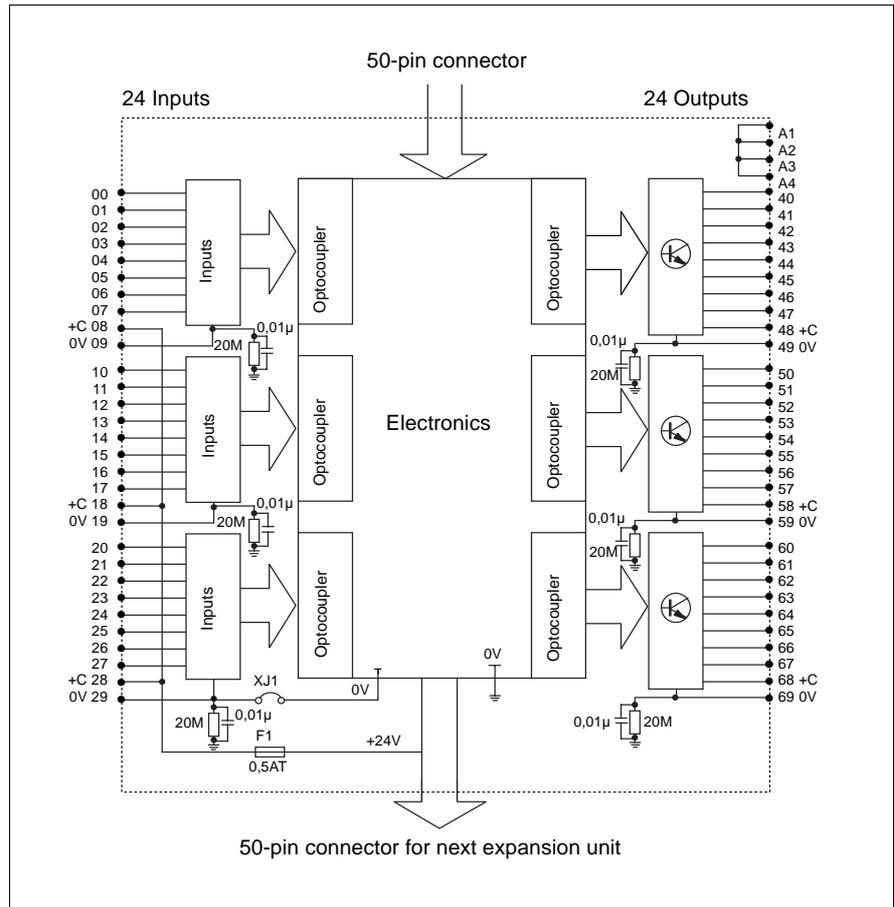
SD24RS

SD24RS is a digital I/O unit with 24 opto-isolated inputs (16–32 V DC) and 16 relay outputs.
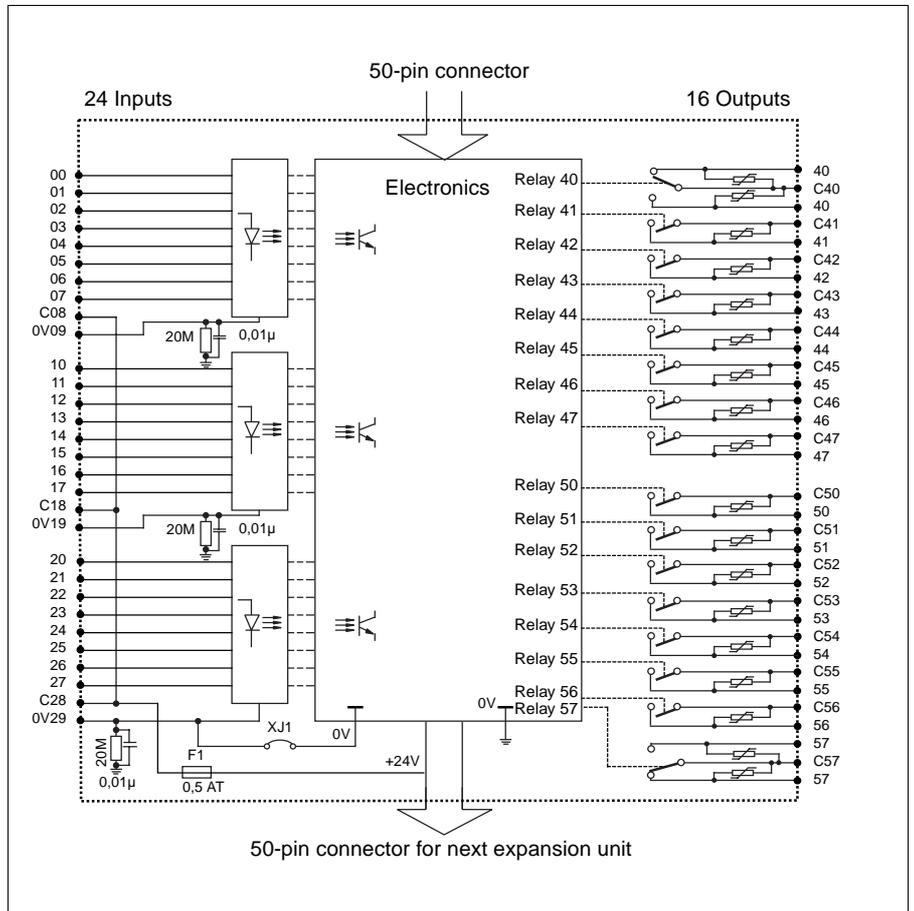
SACV

SACV is an analogue I/O unit having 12 analogue inputs with common signal ground (0–20 mA/4–20 mA/0–10 V) and 4 analogue outputs (0–20 mA/4–20 mA/0–10 V). SACV must constitute an expansion unit of its own and cannot be combined with a CPU board in a base unit.
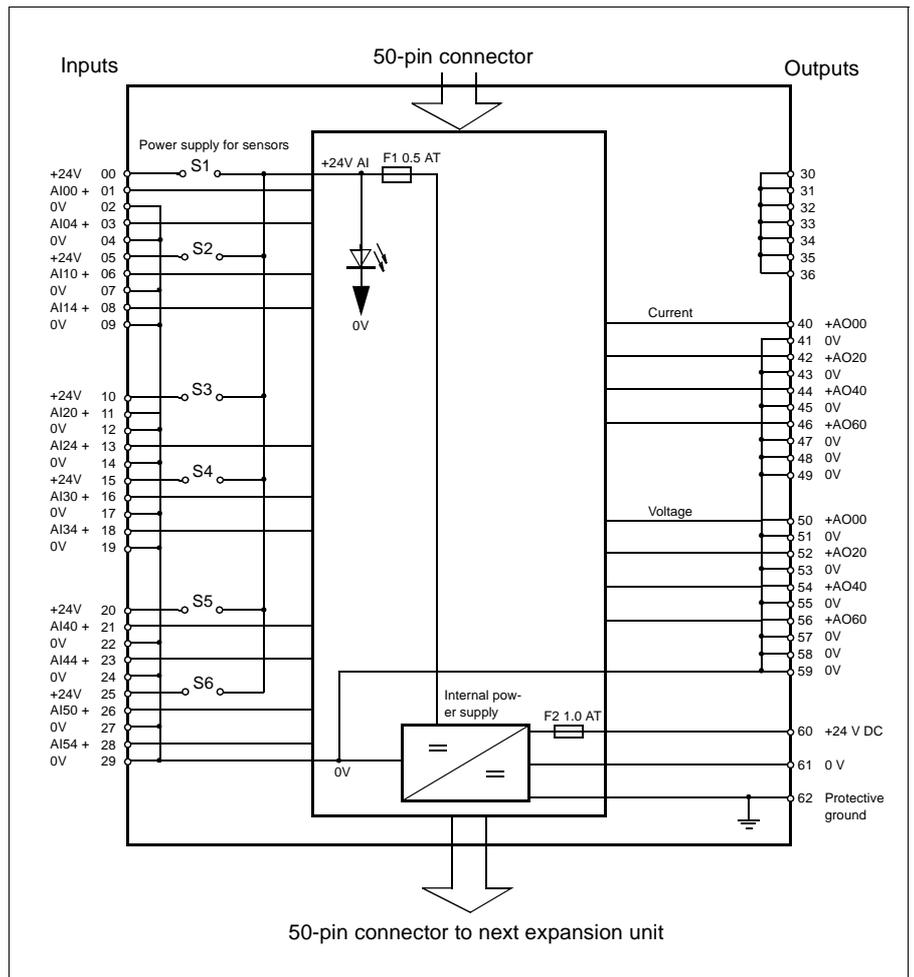
Accessories
Communication boards
DX232 and DX485G provide two additional serial ports each, RS232 and RS485 respectively. When connected to CU05-25 or CU05-45 these ports are used for COMLI communication. When connected to CU05-25SB or CU05-45SB they provide ports for a VDU and a printer.
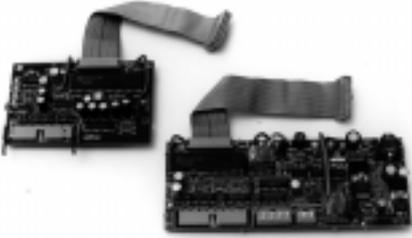
DXDSUB-SL connector
A box with two D-sub connectors, DXDSUB-SL, is available for external connection of the communication ports. This unit is connected via a ribbon cable to DX232 or DX485G.

BRT15, battery-backed real time clock
BRT15 maintains the correct date and time even when the power is disconnected.
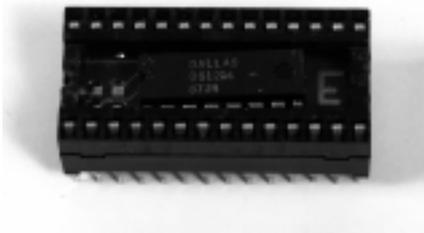
IOCOP cable
Each expansion unit is supplied with a short ribbon cable (0.1 m) for connection between I/O units. Cables with 0.3, 1.0 respective 2.0 m length can be ordered as accessory items. The total cable length between base unit and the I/O units must not exceed 2.7 m.
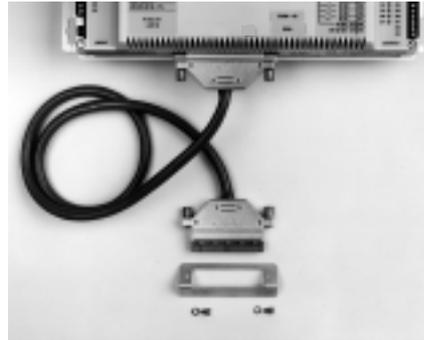
SBUP05 backup unit
The contents of the program memory can be stored in the SBUP05 backup unit, which uses a Flash PROM memory. This is a type of non-volatile, electrically erasable EPROM. If SBUP05 is permanently connected, and the switch is in the position "1", the SattCon 05 Slimline's RAM memory is automatically loaded from the SBUP05 on power-up and program execution starts. An adapter cable is required for use with a SattCon OP45 base unit.
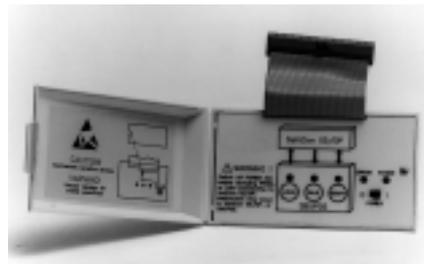
DOX 10/DOX5 software packages
DOX10/DOX5 software packages can be installed in IBM compatible personal computers. Programming and documentation of SattCon 05 Slimline functions without a control system connected are then possible (DOX5 with some limitations). The software packages can also be used for commissioning and fault-finding in existing programs. CU05-25SB and CU05-45SB require a DX232/DX485G if the personal computer is to be connected directly to the control system. Communication can take place via DOX 10/DOX5 alternatively via the SattBus network using an SBC connector.

PTC05 digital input simulator
PTC05 connects directly to the inputs of an I/O unit. It can be used to simulate the status of eight inputs while testing the operation of the control program.
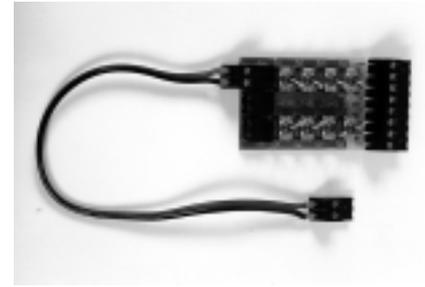
ATC05 analogue input simulator
ATC05 connects directly to the inputs on an SDA I/O unit. It provides four 0–10 V signals to simulate signals from the process.

IP05 pulse encoder interface
The IP05 pulse encoder interface can be connected to base units with CU05-25 or CU05-45 processors and SD32D or SDA I/O units. Pulse encoders with or without zero pulse and with one or two pulse trains may be used.
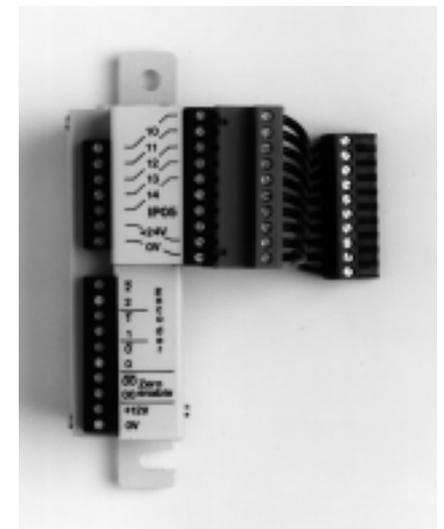
Technical Data, Processor Boards and I/O Units

CPU	Dallas 80C320 or equivalent		**Digital inputs**	
Program memory	25 kbytes available for the PLC pro-gram; CMOS RAM with battery back-up, battery life approx. 3 years in operation and 5 years in storage (25 °C)		SD32D	32 separate groups. 16–32 V DC, 10 mA. Switching level <6 V= logic 0, >13 V= logic 1. Filter constant 10 ms, max. 50 Hz square wave
			SD24D	24 in 3 separate groups. Opto-isolated. Other data as SD32D
Instruction time	Bit instructions: typically 1.2 μs/instruction. Word instructions: typical-ly 20 μs/instruction		SD24RS	See SD24D data
			SDA	16 in 2 separate groups. Opto-isolated. Other data as SD32D
Working memory	Total of 3072 bits, this number is reduced by the number of inputs/out-puts used by the application. 60 bits are battery backed		**Digital Outputs**	
			SD32D	28 in 3 groups. 12–50 V DC, max. 0.8 A/output, max. 3.2 A/group, max. 6 A/unit. Transient current max. 2 A for 50 ms. Peak voltage max. 75 V DC (average max. 50 V DC). Fused external
Timers	64 pcs. 0.1 s–9 h 6 m 7 s			
Counters	64 pcs 65535 steps, up/down counter			
Registers (16-bit)	28000 pcs			
Sequencers	256 pcs. with 100 steps each		SD24D	24 in 3 groups. Opto-isolated. Other data as SD32D
Time channels	16 pcs. programmable. Not valid for CU05-25/25SB		SD24RS	16 relay outputs. AC: Max. 250 V, max. 5 A resistive load. DC: Max. 120 V, max.4 A (24 V DC +20%), max. 0.6 A (48 V DC +20%), resitive load. See the Installation and Maintenance manual for more information. On/off switching delay max. 15/10 ms. type 8/4 ms
Text messages	512 x 32 characters. Time, date and process values can be included. Texts can also be sent to printer. Text handling includes dial-up function for Hayes modem			
Controllers	8 programmable P, PI, PD or PID. Not valid for CU05-25/25SB			
Pulse input			SDA	16 in 2 groups. Opto-isolated. Other data as SD32D
CU05-25 and CU05-45	Max. 2 kHz. Only if the base unit is a SD32D or a SDA. Not valid if a com-munication board (DX232 or DX485G) is fitted in the base unit		**Analogue inputs**	
			SDA	4 inputs, common signal ground. 0–5/1–5/ 0–10 V (>1 MΩ, max. 15 V continuous) or 0–20 mA/4–20 mA (max. 250 Ω, max. 30 mA continu-ous). 10 bit resolution. Filter constant 100 ms. Accuracy ±0.5% of full scale deflection (0–50 °C)
Expansion	Max. 3 I/O units in addition to the base unit			
Communication				
CU05-25	One serial port, COMLI slave. RS232 or RS485 (galv. separated). With DX232 or DX485G, a total of two COMLI ports		SACV	12 inputs 0–10 V (>1 MΩ, max. 15 V continuous) or 0–20 mA/4–20 mA (max. 50 Ω, max. 50 mA continuous). Accuracy ±0.4% of full scale deflec-tion (0–50 °C). Other data as SDA
CU05-45	One serial port, optional COMLI mas-ter/slave. RS232 or RS485 (galv. separated). With DX232 or DX485G, a total of two COMLI ports		**Analogue outputs**	
			SDA	2 outputs, 0–10 V max. 10 mA or 0–20 mA/4–20 mA (external load <750 Ω). 8 bit resolution. Accuracy ±0.5% of full scale deflection (0–50 °C)
CU05-25SB and CU05-45SB	SattBus connection. Does not have supervisor function. 120 nodes, max. 2000 m			
Programming			SACV	4 outputs 0–10 V/0–20 mA/4–20 mA. Other data as SDA
CU05-25 and CU05-45	VDU or PC with DOX10/DOX5		**Power consumption I/O units**	Refer to the Installation and Maintenance manual
CU05-25SB and CU05-45SB	DX232 or DX485G is required to allow programming via terminal. PC and DOX 10/DOX5 can be used for programming via SattBus		**Environment**	Industrial premises
			Approvals (when product or packaging is marked)	CE-marked and meets EMC directive 89/336/EEC according to the follow-ing standards: EN 50081-2 and EN 50082-2.
DOX5	Software for personal computer. Off-line programming with IDF and comments			
				Low Voltage Directive 73/23/EEC with supplement 93/68/EEC accord-ing to the following standard: EN61131-2
DOX 10	Software for off-line programming with personal computer. Graphic pro-gramming is possible			
Backup	Total with SBUP05, DOX 10 and DOX5			UL listed according to UL 508
Printer connection			**Protection class**	IP20
CU05-25/45	RS232 via 25-pole D-type connector.		**Ambient temperature**	Operating: 0 to +50 °C Non-operating: -25 to +70 °C
CU05-25SB/45SB	DX232 or DX485G is required			
Power supply	24 V DC -15% +20%. Max. ripple 5% (100–120 Hz). No additional supply for I/O units is normally required. SDA and SACV require however 24 V DC -15% +20%		**Relative humidity**	10–95%, non-condensing. For SDA and SACV 10–85%, non-condensing
			Dimensions	W342 X H200 X D47 mm
			Weight	Max. 2.2 kg
Power consumption	Ca. 3 W (processor board only). For details, refer to the Installation and Maintenance manual			

Technical Data, Accessories

DX232

Baud rate	Max. 19200 baud
Cable	Screened multicore, max. length 15 m at 19200 baud
Power consumption	1.0 W (+24 V DC)
Power supply	+5 V DC from CU05

DX485G

Baud rate	Max. 19200 baud
Cable	Screened multicore, max. length 1200 m
Power consumption	2.8 W (+24 V DC)
Power supply	+5 V DC and +24 V DC from CU05

SBUP05

Memory	128 kbytes Flash EPROM
Power consumption	0.6 W (+24 V DC)
Power supply	From base unit
Dimensions	W135 X H75 X D35 mm

BRT15

Accuracy	±1 min. per month at 25 °C

IP05

Pulse encoder inputs	3 for incremental pulse encoders (channel 1, 2 plus zero pulse). 1 input for ZER0 ENABLE. Differential or single-ended signals with active high or active low
Input voltage	12–24 V DC
Pulse rate	Selectable from pulse encoder x1, x2 or x0.5
Pulse frequency	To IP05: max. 4 kHz From IP05: max. 2 kHz

Power supply	From base unit, pulse encoder powered from terminal +12 V, max. 100 mA
Power consumption	2.5 W (+24 V DC)
Dimensions (incl. cable)	W45 X H110 X D70 mm

PTC05

Output	8
Power supply	From base unit with cable supplied
Protection class	IP10
Dimensions	W85 X H41 X D28 mm

ATC05

Outputs	4. 0–10 V
Power supply	Direct from SDA or SACV
Dimensions	W70 X H50 X D30 mm

The following applies to all units unless stated otherwise:

Ambient temperature

Operating	0 to +50 °C
Non-operating	-25 to +70 °C

Relative humidity	10–95%
Protection class	IP20
Environment	Industrial premises
Approvals (when product or packaging is marked)	CE-marked and meets EMC directive 89/336/EEC according to the following standards: EN 50081-2 and EN 50082-2. Low Voltage Directive 73/23/EEC with supplement 93/68/EEC according to the following standard: EN61131-2 UL listed according to UL 508

Dimensions

All dimensions are given in mm