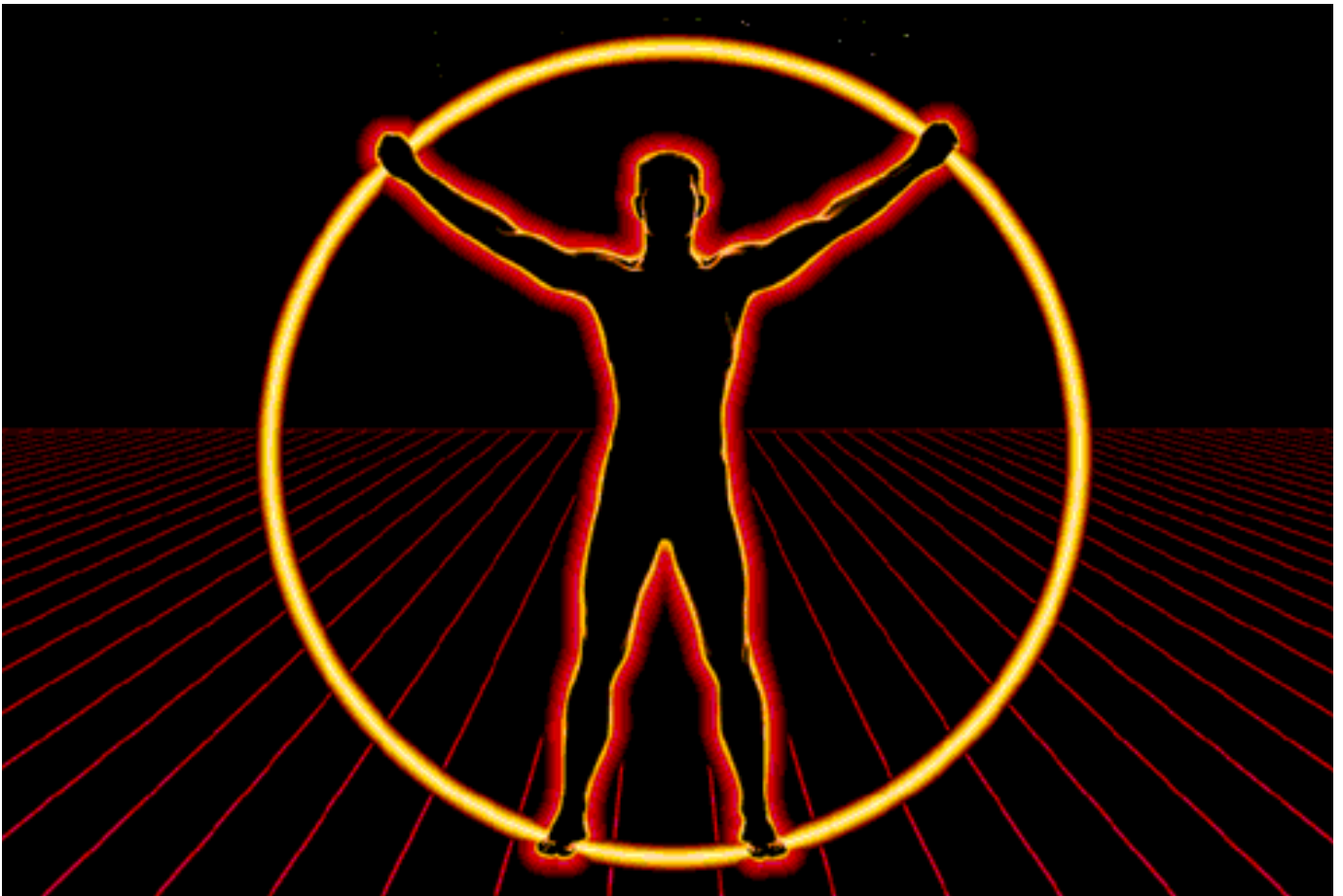


SattGraph 5000

Supervisory Control System



SattGraph 5000 is a modular PC-based SCADA* system with unique qualities. The open, object orientated system architecture is founded on true client/server principles.

The SattGraph HMI (Human Machine Interface) concept used for operator interactions, employs modern graphical interaction techniques, supports object orientation and features information zooming and pop-up windowing.

SattGraph 5000 is a scalable system concept. The architecture for a small single node combi system is exactly the same as for an enterprise size installation.

SattGraph 5000 is developed for the 32 bit Windows NT platform providing connectivity to a world of Windows applications.

SattGraph 5000 utilises a completely open system architecture which is based

on established standards like ODBC (Open Data Base Connectivity), OLE (Object Linking and Embedding), DDE (Dynamic Data Exchange), MMS (Manufacturing Message Specification), MAPI (Messaging API) and TAPI (Telephony API).

Configuration of process signals, detected events and alarms, and long-term process history are stored in true ODBC databases. This enables any type of user specific report to be generated by the use of standard Windows components, such as Microsoft Excel, Access, SQL Server, Visual Basic and Visual C++.

Ready made event reports and history reports are supplied as Access runtime modules. These report handlers also serve as templates providing a basis for user adaptation.

The Workstation Graphical User Interface (GUI) is developed according

to the Windows Interface Guidelines giving a Windows 95 "look and feel". On-line help is provided via the Windows Help 4.0 Engine. SattGraph 5000 has the following key features:

- True client/server system
- Object oriented graphical HMI
- Runs under Windows NT
- 32-bit implementation
- Connectivity to Windows applications
- Object oriented database
- Databases accessible through ODBC
- Software bus for openness
- Standard Microsoft Windows tools provide additional functionality
- Wizards and function libraries to speed up application work
- On-line context sensitive Help.

* Supervision, Control and Data Acquisition

System Architecture

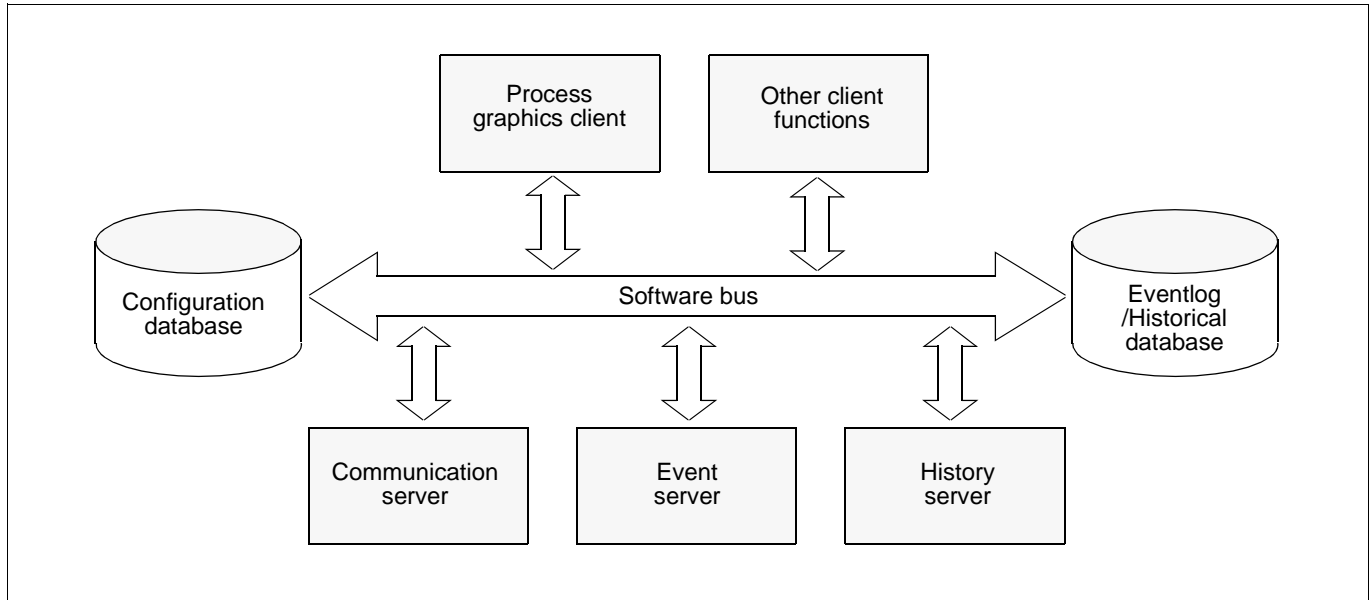
SattGraph 5000 has a completely open software architecture. This is a result of applying established software standards to all interfaces between the different components of the system.

The Configuration database contains all application data for process objects and signals, including alarm and history definitions. The Eventlog database contains all logged events and alarms

and the Historical database contains all long-term historical readings. All databases are accessible from any Windows application through ODBC.

The system has a true client/server architecture. Multiple operator stations are allowed simultaneous access to the server. Automatic reservation mechanisms prevent control hazards, i.e. if two operators try to give orders to the same object at the same time.

Operator access to a process window is obtained through the SattGraph 5000 client. Other client functions available include Event Reporting, History Reporting, History-Trend Diagram Presentation and System Diagnostics. More client functions are easily added using standard Windows applications like Excel, Access, Word etc.



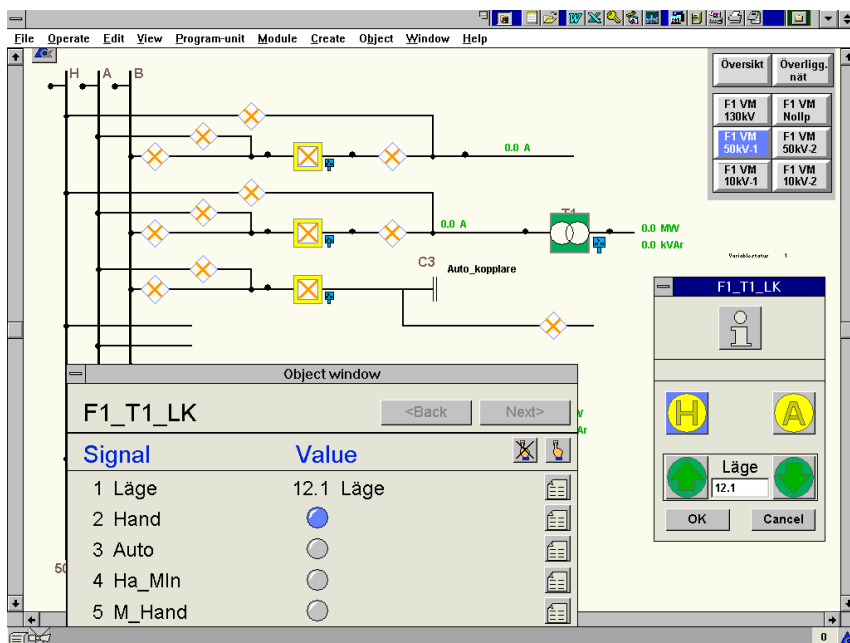
The open architecture enables SattGraph 5000 to be configured to an optimum for process supervision

Operator Interface

The SattGraph 5000 operator interface supports object orientation and information zooming. Any part of the application picture can be zoomed up to display a more detailed view of process objects.

The complete application picture represents the process in a

comprehensive and intuitive way. The operator can create extra windows at any moment to view any combination of process overview and process detail. Process objects are controlled using customized object pop-up windows.



The operator interface

Communication

Communication with PLC's is handled by the Communication server. This server supports protocols for COMLI, SattBus, SattBus over TCP/IP and also an open DDE interface.

The COMLI and SattBus protocols include support for the following message types:

- Request of I/O or Registers
- Transfer of I/O, Registers or Analog Outputs
- Transfer of one I/O bit
- Request of Analog Inputs
- Request of time marked events

Process Objects

A process object is configured into the database as an object type. All event and logging actions for each signal associated with the object type are defined as a part of this configuration.

The object oriented approach lets the user define object types with properties that are shared among a group of similar objects. It is possible to specify deviations from the default for each object.

Events and Alarms

An event or alarm may be triggered on a binary signal or on an internal limiter in the server.

Printouts and Event logs can be generated for all state changes with a configurable status description. Printouts can be sent to any configuration of printers.

The latest events can be inspected in an event list.

Alarms are displayed in the alarm list and on the alarm line in the SattGraph operator station. Alarms may be delayed a certain amount of time to avoid false detection.

An alarm can notify bits in a PLC when detected and when acknowledged. Priorities 1–127 and alarm classes 1–9999 can be used.

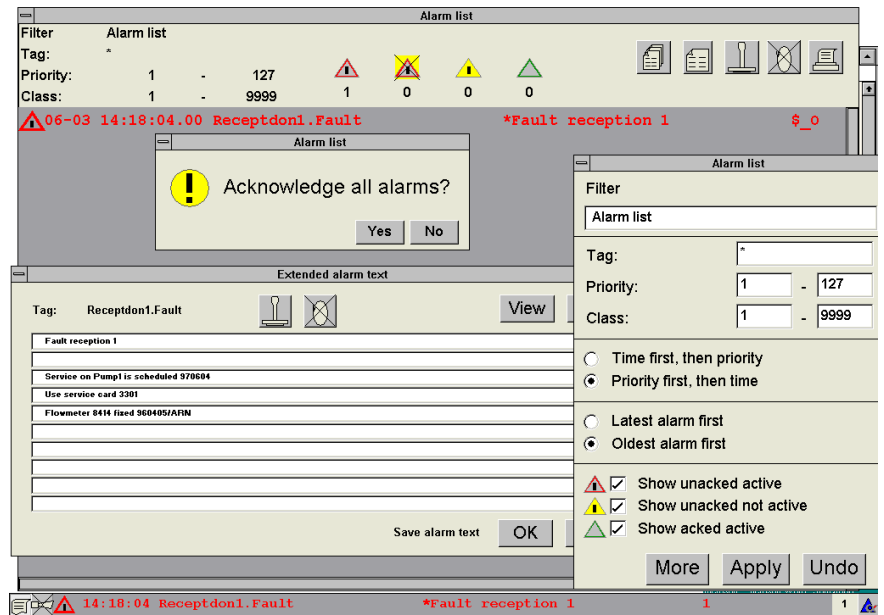
Three modes for acknowledgement are available: Normal, No Acknowledgement, and Reset Of Alarm When Acknowledged.

Alarms can be blocked. Blocked alarms are handled in a blocking list. Blocking of an alarm is also recorded and displayed as an event.

Manual control of process signals may be blocked. Control blocked signals are displayed in a list in the SattGraph operator station.

Control signals may be manually forced. Forced control signals are displayed in a separate list.

The event report may be used to generate a total report or a selected



Alarm list

report for any time period. A selected report may include certain types of events, most frequent events or latest events. The report handler is an Access application, provided both as a runtime report and as source code.

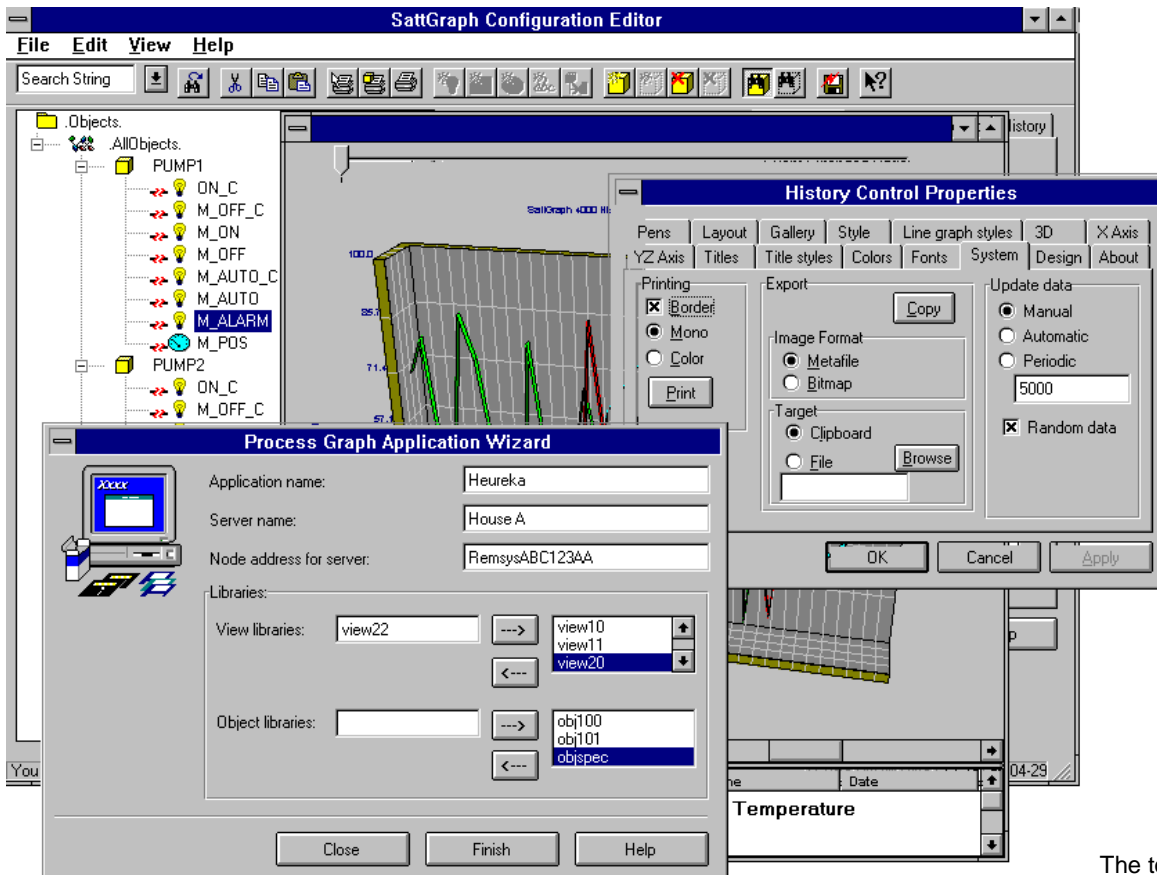
Any signal can be configured to initiate a user written OLE handler, i.e to send an alarm via GSM or mail to a remote location.

Tools

Configuration is edited with a visual configuration tool. The latest, highly ergonomic, Windows techniques are used, such as tabbed entry forms and object tree controls.

Windows style Wizards are used to guide the user through the process of defining all basic properties of the application.

The editor for process graphics has direct access to objects defined in the configuration database.



The tools

Recording

Short Term Historic Recording

A process signal can be recorded with any of 10 configurable sample frequencies. Logging is performed in the file system to achieve optimum performance and maximum capacity.

Recorded values can be based on values from other samples. They can be calculated as minimum-, maximum-, mean- or momentary values.

Limits for the number of recorded tags and the length of recorded time interval is set depending on the application and the chosen hardware.

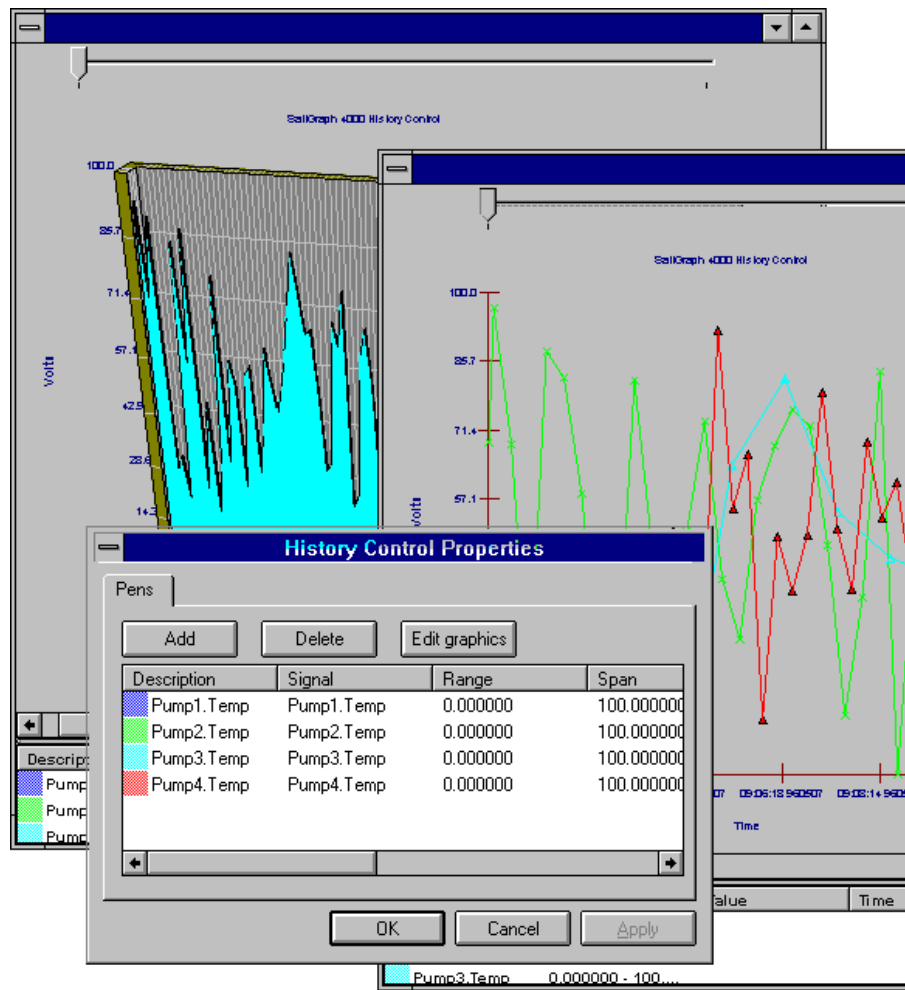
Long Term Historic Recording

Recording is performed in the ODBC Log database. A process signal can be recorded with the sample interval of 1 hour and/or 24 hours. Error status is also recorded.

Calculated values can be based on values from short time recordings.

There is no fixed limits for the number of recorded tags or for the length of recorded time interval.

The history report can be used to generate reports for day, month and year. The report is a table of signal values for different times. Error status is also indicated. Summary-, minimum-, maximum- and mean-values are presented per signal and per logging time.



History diagram

History diagram

Recorded values can be presented in the SattGraph 5000 History diagram. Groups of values can also be presented.

The History diagram supports a multitude of functions, including flexible layout and coloring, direct connection of signals to pens, zoom function, 2D and 3D graphs, bargraph, tapegraph, copy to clipboard, copy to Excel etc.

Reports

Event and history reports are implemented as Access reports. User specific reports can easily be added using Microsoft Excel or Access.

Options

OLE MMS Gateway is an option used for access of real time process values handled by the Communication server. An application in Visual Basic or Visual C++ can thus access process values through use of OLE.

Journal to Database Utility is an option used to transfer short term historic data to an ODBC database permitting access from other software products – such as Microsoft Excel or Access.

Plant:	Production Plant A	Date: 1996-05-30 09.21.26	Page: 1
Report:	Total Report		
Comment:	For Production Archive		
Max Number of Records:	10		
Total Number of Records:	5		
Time Interval:	1995-01-01 00.00.00 to 1995-01-01 15.00.00		

Date				Time	ms	Tag							
Alarm Text													
Comment													
1995-01-01 12.00.00 10 Valve							Valve is open.						
1995-01-01 13.00.00 10 Pump							Waterpump is on.						
1995-01-01 14.00.00 10 Engir													
1995-01-01 14.00.00 10 Switc													
1995-01-01 15.00.00 10 Statc													

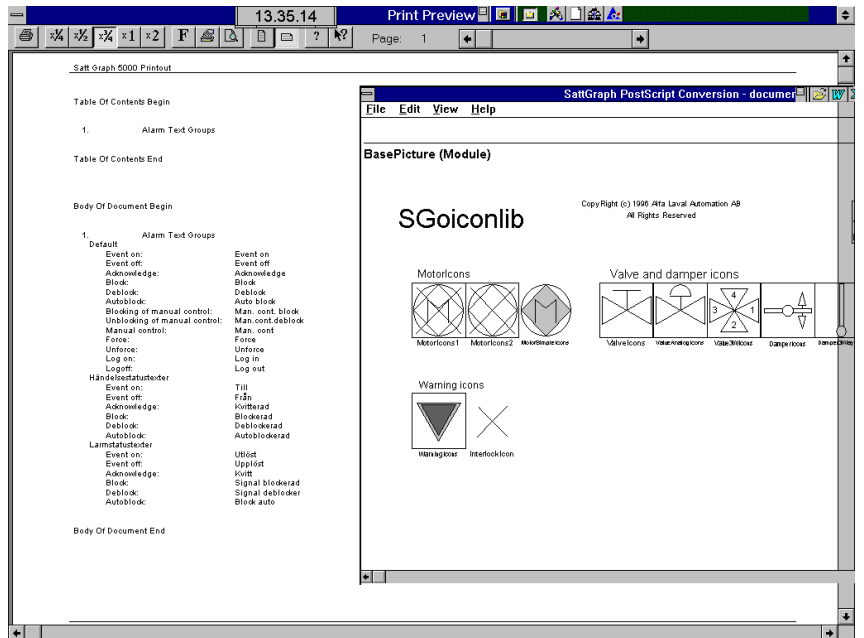
Headline: Production Unit 20										
Plant: Production Plant A										
Report: Day Report										
1996-04-04										
Time										
Tag	Testing1	Testing2	Testing3	Sum	Avg	Min	Max			
Unit										
00.00.00	E 1.777	O 67	E 0.876543	67	67	67	6.70E			
01.00.00	O 1.999	E 102	E 202	1.999	1.999	1.999	1.999			
02.00.00	Y 79.89	O 103	O 203	385.89	128.6	79.89	203			
03.00.00	Y 79.89	E 104	E 204	79.89	79.89	79.89	79.89			
04.00.00	E 79.89	O 105	O 205	310	155	105	205			
05.00.00	Y 79.89	E 106	E 206	79.89	79.89	79.89	79.89			
06.00.00	K 55.55	O 107	O 207	369.55	123.1	55.55	207			
07.00.00	K 55.55	O 108	O 208	371.55	123.8	55.55	208			
08.00.00	E 55.55	O 109	O 209	318	159	109	209			
09.00.00	K 55.55	O 110	O 210	375.55	125.1	55.55	210			
10.00.00	K 55.55	O 111	O 211	377.55	125.8	55.55	211			
11.00.00	K 55.55	O 112	O 212	379.55	126.5	55.55	212			
12.00.00	K 55.55	O 113	O 213	381.55	127.1	55.55	213			
13.00.00	K 55.55	O 114	O 214	383.55	127.8	55.55	214			
14.00.00	K 55.55	O 115	O 215	385.55	128.5	55.55	215			
15.00.00	K 55.55	O 116	O 216	387.55	129.1	55.55	216			
16.00.00	O 77	O 117	O 217	411	137	77	217			
17.00.00	O 30	O 118	O 218	366	122	30	218			
18.00.00	O 30	O 119	O 219	368	122.6	30	219			
19.00.00	O 30	O 120	O 220	370	123.3	30	220			
20.00.00	O 21	O 121	O 221	363	121	21	221			
21.00.00	O 22	O 122	O 222	366	122	22	222			
22.00.00	O 23	O 123	O 223	369	123	23	223			

Event report

History report

Plant Documentation

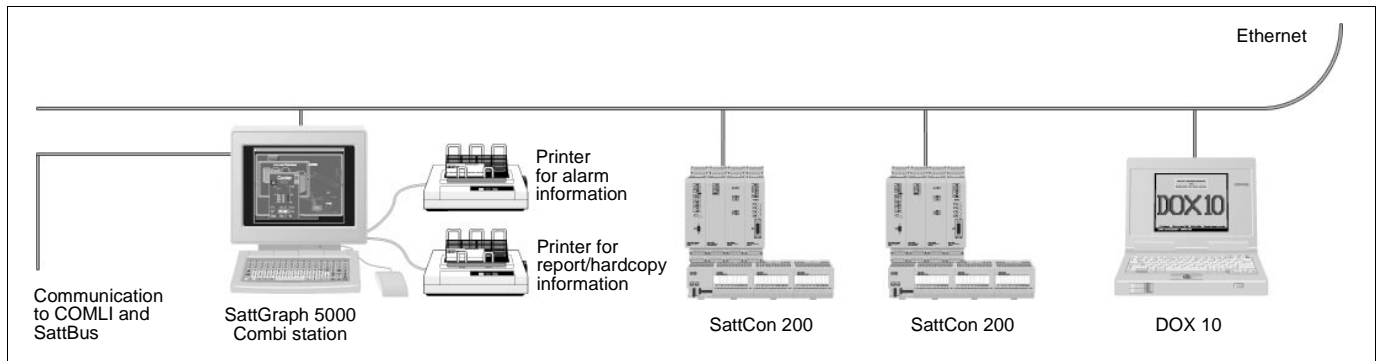
Documentation of application software is done automatically with built-in tools.



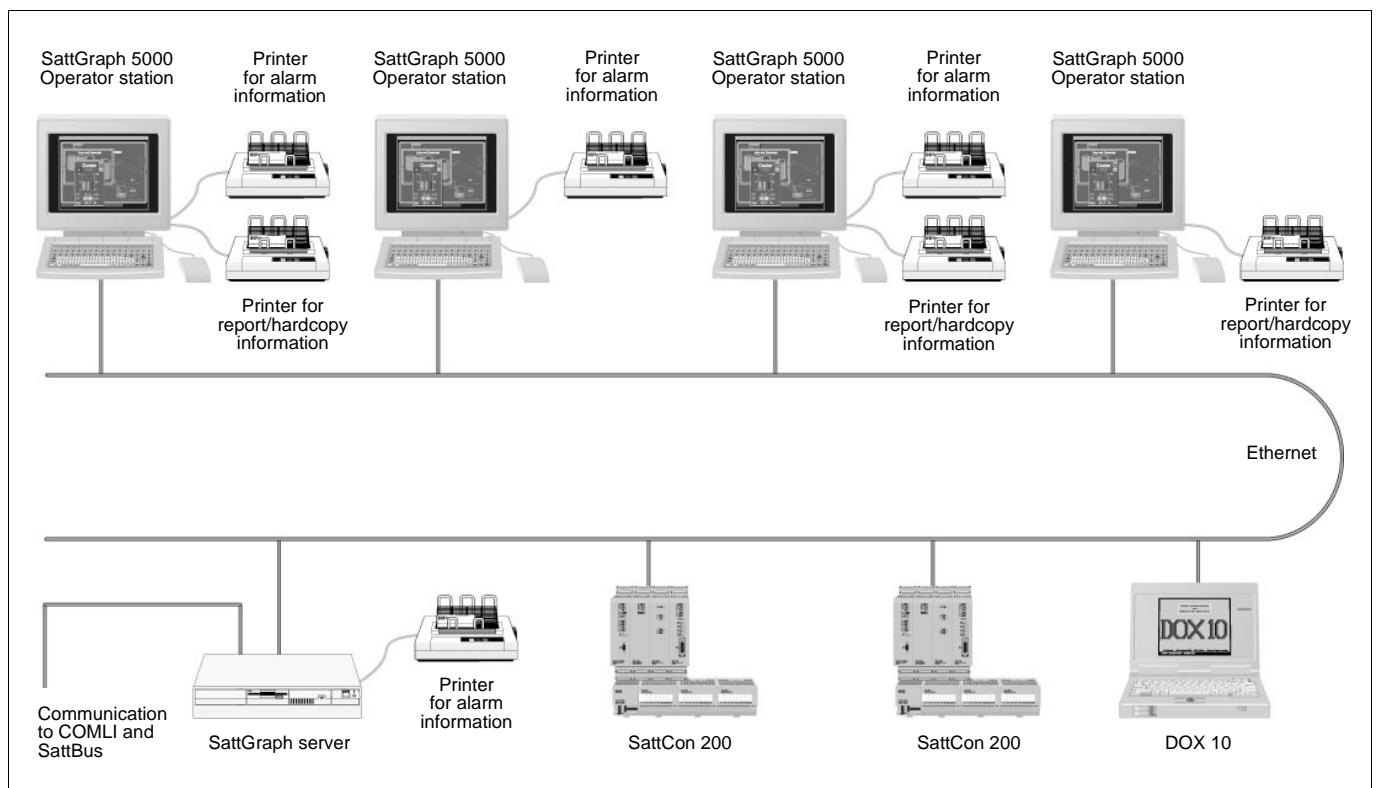
Plant documentation

System configuration

SattGraph 5000 can be configured as a single node or as client/server configuration.



Example of a SattGraph 5000 single node configuration



Example of a SattGraph 5000 client/server configuration

Technical Data

Software	Windows 4.0 required. Access 97 and/or Office 97 optional	Typical HM performance	Change of view 1.0 s Dynamic update of view, terminal to screen 2.5 s at 9600 Baud Manual control of object, screen to terminal 0.8 s at 9600 Baud Alarm detection, terminal to screen 2.5 s at 9600 Baud
Hardware	Hardware supported by the Windows NT Compatibility list. Platforms should be Pentium systems >= 300MHz. Operator Station requires graphics interface with 1024 x 768/256 colors. (If used with Office 97 at the same time as operator graphics then 65535 colors are required). DAT tape is recommended for backup of system data. Ethernet board is required for system bus communication and as hardware key. PCI type Ethernet board is recommended. 1-3 SattBus PC boards from Alfa Laval Automation can be used. Digiboard PC 2e, PC 4e, PC 8e, PC 16e are recommended for serial communication. HDD (SCSI or IDE2) must be of a type supported by Windows NT. CDROM is needed for program installation. A three button mouse is recommended for operator stations. Printers for hardcopy and text reports can be used if supported by Windows NT. Printer for alarms must be a line oriented printer (e.g. matrix printer) and support 7-bit ASCII code. Operator keyboard, IP65 or IP54 with trackball, from Alfa Laval Automation may be used	Typical configurations	Combo system (Server + Operator Station in one system). 1500 process signals, 10-30 views. Hardware: PII/300 MHz, rec. 128 Mb, HDD 4 Gb. Client/server system (1 Server + 4 Operator Stations). 5000 process signals, 30-50 views. Hardware Server: PII/400 MHz, rec. 128 Mb, HDD 4 Gb. Hardware Op. Station: PII/300 MHz, rec. 96 Mb, HDD 2 Gb
Configuration Size	1 server, 1-4 operator stations, max. 3500 process signals	Licenses	
PLC protocols		Basic licenses	SattGraph 5000 Server Base License, Operator stations: 1-4, I/O: 50, 100, 200, 500, 1500, 2000, 5000. SattGraph 5000 Operator station Base License. SattGraph 5000 Combi Base License
COMLI or Modbus RTU	1-16 channels, 300-9600 Baud, distance 15 m. maximum or via RS422/RS485 converter (4-wire) 1200 m. maximum, multidrop	Optional licenses	SattGraph 5000 COMLI driver SattGraph 5000 SattBus driver SattGraph 5000 DDE driver SattGraph 5000 Modbus RTU driver SattGraph 5000 Dial option SattGraph 5000 OLE MMS Gateway option
SattBus	1-3 networks, 62.5 Kbaud, twisted pair, 2000 m max. bus cable, token net protocol. Subsystems can be connected via SattBus or SBC.	Distribution	SattGraph 5000 Software distribution on CD
SattBus over TCP/IP	1 network, Ethernet IEEE802.3 10BASE2 (thin wire) or 10BASE5 (thick wire), 10 Mbit/s, segment length 185 m (thin wire) or 500 m (thick wire). Subsystems of type SattCon 200 can be connected		
DDE	DDE connection can be used with Excel, VB application or driver DLL		
Applicom	Protocols supported by Applicom Server		

Microsoft and Windows are registered trademarks of Microsoft Corporation.



ABB Automation center in Malmö, Sweden: +46 40 222000, Fax: +46 40 219539, Internet: www.automation.alfalaval.com. TELEPHONE: ARGENTINA Buenos Aires: +54 1 229 5500/5560, AUSTRIA Vienna: +43 1 60109/9105, BELGIUM Brussels: +32 2 7186471, BRAZIL Osasco: +55 11 7084 8220, CANADA Scarborough: +1 416 2996101, CHILE Santiago: +56 2 2335366, DENMARK Copenhagen: +45 44 848844, SILEBORG: +45 86 822811, ESTONIA Tallinn: +372 6 711800, FINLAND Helsinki: +358 10 222000, FRANCE Le Blanc-Mesnil: +33 1 55815200, GERMANY Munich: +49 89 840000, Glinde: +49 40 727409, Heert: +49 2129 94130, HUNGARY Budapest: +36 1 4635270, INDIA Pune: +91 212 797721, IRELAND Dublin: +353 1 4573399, ITALY Monza: +39 3624951, LATVIA Riga: +371 7 828508, LITHUANIA Vilnius: +370 2 233566, MEXICO Mexico City: +52 5 3986162, NETHERLANDS Eindhoven: +31 76 5086200, NORWAY Oslo: +47 64 835200, PERU Lima: +51 1 2248801, POLAND Warszawa: +48 22 6581020, ROMANIA Bucharest: +40 1 3370615, RUSSIA Moscow: +7 095 2322593, SINGAPORE: +65 776 5711, SLOVAK REPUBLIC Bratislava: +421 7 5254473, SPAIN Madrid: +34 1 3790741, SWEDEN Malmö: +46 40 222000, Gästved: +46 371 80151, Göteborg: +46 31 7276950, Jönköping: +46 36 175030, Karlskoga: +46 586 39330, Stockholm: +46 8 53066100, Sundsvall: +46 60 129380, Västerås: +46 21 810135, SWITZERLAND Kloten: +41 1 8046600, UNITED KINGDOM Northwich: +44 1606 49935, USA Kenosha: +1 414 9429310, Wernimster: +1 215 9578980, Greenwood: +1 317 8894626.

Specifications subject to change without notice. Printed in Sweden. © 1998 ABB Satt AB.