SICAM PAS – 6MD90

Energy Automation

Catalog SICAM 4.1.2 · 2010

Answers for energy.

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Contents

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Fig. 1
Typical SICAM PAS configuration: IEDs are connected to the station unit with IEC 61850 and various other protocols
(see pages 4 and 5)

For some years now, power generation and distribution have been undergoing major changes. The innovation cycles (where operating equipment and communication media are concerned) are getting ever shorter, and the market is becoming increasingly deregulated.

The systems used to monitor power supply equipment and processes must take account of these changes.

When new products are used, user-friendliness, easy engineering, manifold interfacing to various communication media and extensibility are important features.

SICAM PAS (**P**ower **A**utomation **S**ystem) meets all the demands placed on a distributed substation control system – both now and in the future. Amongst many other standardized communication protocols, SICAM PAS particularly supports the IEC 61850 standard for communication between substations and IEDs.

SICAM PAS is an open system and – in addition to standardized data transfer processes – it features user interfaces for the integration of system-specific tasks and offers multiple automation options.

SICAM PAS can thus be easily included in existing systems and used for system integration, too. With modern diagnostics, it optimally supports commissioning and maintenance.

SICAM PAS is clearly structured and reliable, thanks to its open, fully documented and tested system.

System overview, application and functionality of SICAM PAS

- SICAM PAS is an energy automation solution; its system architecture makes it scalable.
- SICAM PAS is suitable for operating a substation not only from one single station level computer, but also in combination with further SICAM PAS or other station control units. Communication in this network is based on a powerful Ethernet LAN.
- With its features and its modular expandability, SICAM PAS covers a broad range of applications and supports distributed system configurations.
  A distributed SICAM PAS system operates simultaneously on several computers.
- SICAM PAS can use existing hardware components and communication standards as well as their connections.

- SICAM PAS controls and registers the process data for all devices of a substation, within the scope of the data transfer protocols supported.
- SICAM PAS is a communication gateway. This is why only one single data connection to a higher-level system control center is required.
- SICAM PAS enables integration of a fully graphical process visualization system directly in the substation.
- SICAM PAS simplifies installation and parameterization of new devices, thanks to its intuitive user interface.
- SICAM PAS is notable for its online parameter setting features, particularly when the system has to be expanded. There are no generation times; loading into a target system is not required at all or only required if configuration is performed on a separate engineering PC.
- SICAM PAS features integrated testing and diagnostic functions.
- Its user-friendliness, its operator control logic, its orientation to the Windows world and its open structure ideally suit users' requirements.
- SICAM PAS is developed in accordance with selected security standards and meets modern demands placed on safe communication.

Essential features
- Modular and scalable hardware and software
- User-friendly
- Flexible, graphical configuration of automation
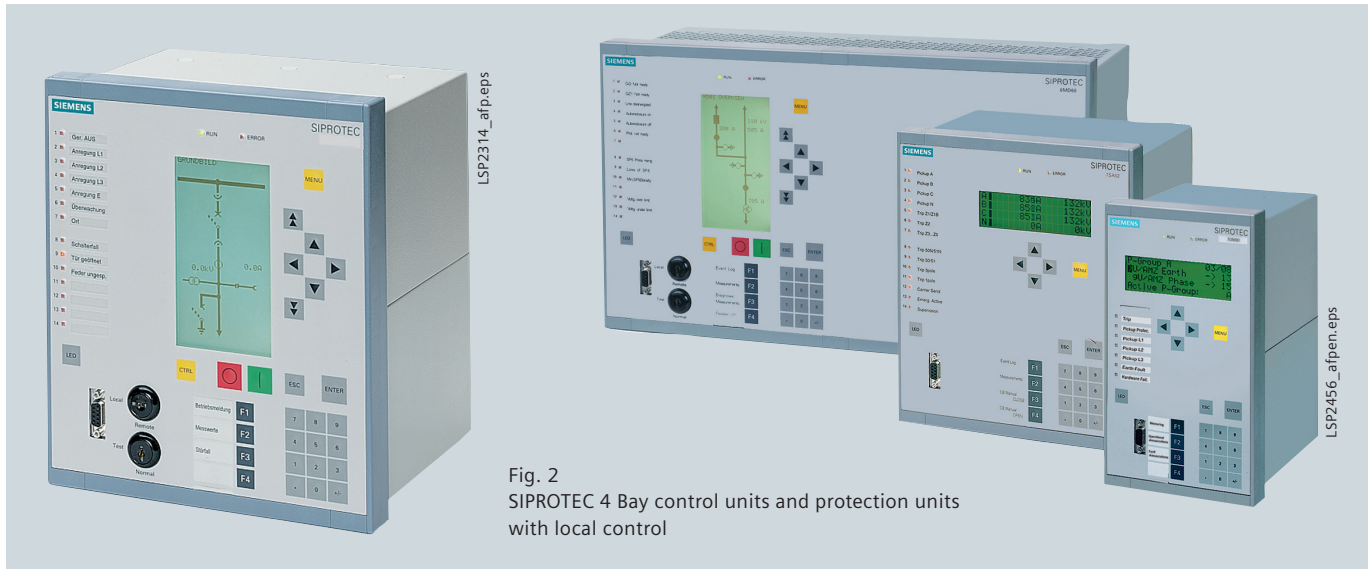- Open system thanks to standards

Communication

Fig. 2
SIPROTEC 4 Bay control units and protection units
with local control

System architecture

SICAM PAS works on industrial-standard hardware with the Microsoft Windows operating systems. The advantages of this platform are low hardware and software costs, ease of operation, scalability, flexibility and constantly available support. With the powerful real-time data distribution system, applications can be allocated among several computers, thus boosting performance, connectivity and availability.

A database system stores and organizes the data basis (e.g. configuration data, administrative status data, etc.). The device master function for communication with **I**ntelligent **E**lectronic **D**evices (IEDs) supports a large number of well-established protocols.

The SICAM PAS data normalization function allows conversions such as measured-value filtering, threshold value calculation and linear characteristics.

SICAM PAS CC is used for process visualization. Specifically designed for energy applications, it assists the operating personnel in optimizing the operations management.

It provides a quick introduction to the subject matter and a clearly arranged display of the system's operating states. SICAM PAS CC is based on SIMATIC WinCC, one of the leading process visualization processes that is used in industrial automation worldwide.

To facilitate incident analysis, the fault recordings from protection units are retrieved and archived automatically during operation. This is particularly supported for the standard protocols IEC 61850 and IEC 60870-5-103, but also for PROFIBUS FMS (SIPROTEC 4) and SINAUT LSAS ILSA. Furthermore, SIMEAS R fault recorders can also be connected to the system, and their detailed fault recordings can be retrieved and archived as well.

To manage the fault recording archive, the program SICAM PQ Analyzer with its program part Incident Explorer is used. Fault recordings are visualized and evaluated with the program Comtrade View as standard. Alternatively, SIGRA 4 with its additional functions can also be used.

Communication

Device interfaces and communication protocols

In a substation that you configure and operate with SICAM PAS, you can use various types of protection units, IEDs, bay control units, measured-value recorders and telecontrol units from a wide range of manufacturers.

SICAM PAS offers a large number of commercially available communication protocols for recording data from various devices and through differing communication channels. Subsequent expansion is easy.

• Available protocols

These communication protocols and device drivers can be obtained as optional additions to the standard scope of SICAM PAS.

– IEC 61850 (Client)

  IEC 61850 is the communication standard for interconnecting the devices at the bay and station control levels on the basis of Ethernet. IEC 61850 supports the direct exchange of data between IEDs, thus enabling switching interlocks across bays independently of the station control unit, for example.

– IEC 60870-5-103 (Master)

  Protection units, IEDs, bay control units, measured-value recorders and transformer controllers from many manufacturers support the IEC 60870-5-103 protocol and can therefore be connected directly to SICAM PAS.

– IEC 60870-5-101 (Master)

  The IEC 60870-5-101 protocol is generally used to connect telecontrol units. The 'balanced' and 'unbalanced' traffic modes are supported. Automatic dialing is also supported for the connection of substations with this protocol. SICAM PAS can establish the dial-up connection to the substation either cyclically or as required (e.g. for command output). By contrast, the substation can also establish a connection cyclically or in event-triggered mode.

– IEC 60870-5-104 (Master)

  Furthermore, connection of substations is also supported by the TCP/IP-based IEC 60870-5-104 protocol.

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– **DNP V3.0 (Master) – Level 3**
Apart from the IEC protocols -101 and -104, DNP 3.0 is another standardized telecontrol protocol used by many IEDs and RTUs and applied worldwide. The units can be connected both serially and with TCP/IP (DNPi). TCP/IP-based communication can operate with an asymmetrical encryption procedure, thus meeting security requirements.

– **PROFIBUS DP (Master)**
PROFIBUS DP is a highly powerful field bus protocol.
For example, it is used for industrial automation and for automating the supply of electricity and gas.
PROFIBUS DP serves to interface multifunctional measuring instruments such as SIMEAS P (I, V, P, Q, p.f. (cos φ)) or, for example, to connect ET200 components for gathering messages and for simple commands. Messages, for example, can be derived from the signaling contacts of fuse switch-disconnectors.

– **MODBUS (Master)**
Besides PROFIBUS DP, the MODBUS protocol is also well-known in industrial applications. SICAM PAS allows to connect IEDs und RTUs with this protocol, both via serial and TCP/IP-based connections.

– **PROFIBUS FMS (SIPROTEC 4)**
Most SIPROTEC 4 bay controllers and protection units can be connected to the SICAM PAS station unit via PROFIBUS FMS.

– **SINAUT LSA ILSA (Master)**
Communication via the SINAUT LSA ILSA protocol is a special advantage of SICAM PAS. Existing LSA central units can be replaced without changing the configuration on bay level.

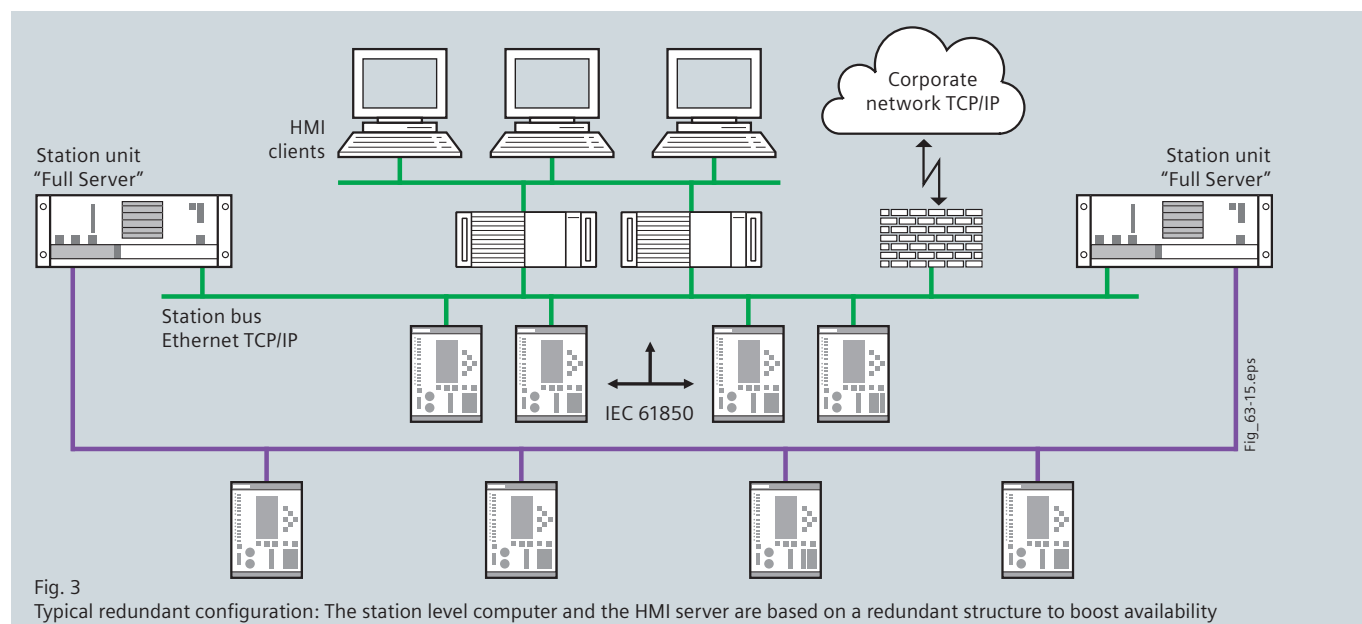System control center connections, distributed process connection and process visualization

- SICAM PAS operates on the basis of Microsoft Windows operating systems. This means that the extensive support which Windows offers for modern communication protocols is also available with SICAM PAS.
- SICAM PAS was conceived for easy and fast integration of conventional protocols. Contact Siemens if you have any questions about integration of user-specific protocols.
- For the purpose of linking up to higher-level system control centers, the standardized **telecontrol protocols**
  IEC 60870-5-101,
  IEC 60870-5-104 and
  DNP V3.00 (Level 3) serially and over IP (DNPi) as well as MODBUS (serially and over IP), TG 8979 (serially) and CDT (serially) are supported.
  Security or "safe communication" are gaining more and more importance.
  Asymmetric encryption enables tap-proof communication connection to higher-level control centers with IEC 60870-5-104 and DNP V3.00 via TCP/IP. For DNP V3.00, authentication can be used as an additional security mechanism.
- Distributed process connection in the substation is possible thanks to the SICAM PAS **D**evice **I**nterface **P**rocessor (DIP).

- SICAM PAS can also be set up on computers networked with TCP/IP. Here, one computer performs the task of the so-called Full Server. Up to six other computers can be used as DIPs. With this architecture, the system can be adapted to the topological situation and its performance also boosted.
- SICAM PAS allows use of the SICAM PAS CC process visualization system for central process control and monitoring. For industrial applications, it is easy to configure an interface to process visualization systems via OPC (**o**bject linking and embedding for **p**rocess **c**ontrol).
- SICAM PAS can be configured as an **OPC server** or as an **OPC client**.
  The SICAM PAS process variables – available with the **OPC server** – can be read and written with OPC clients working either on the same device or on one networked by TCP/IP. This mechanism enables, for example, communication with another process visualization system. The OPC server is included in the basic system.
  Optionally, this server functionality is also available as OPC XML DA for communication with clients based on other operating systems as well as beyond firewall limits.
  The **OPC client** can read and write data from other OPC servers. A typical application could be the connection of SIMATIC programmable controllers.
  The OPC client is available as an optional package.
- **SICAM Diamond**
  SICAM Diamond can be used to monitor the system interfaces, to indicate switching device states and up-to-date measured values, and also for further diagnostic purposes. Apart from these configuration-free diagnostic views, SICAM Diamond also supports message logging in event and alarm lists as well as process visualization in single-line diagrams, and can thus be used as a simple human-machine interface. Messages and measured values can be archived in files (monthly).
  On the one hand, SICAM Diamond consists of the Diamond Server, which is directly connected with SICAM PAS and prepares the data for access with a **Web browser**, and on the other hand, the SICAM Diamond Client as operator interface in the context of the **Microsoft Internet Explorer**. Except for the Microsoft Internet Explorer, no additional software has to be installed on the Web clients.
  SICAM Diamond allows access to archive files and fault recordings through the World Wide Web. The archive files can be saved on the Web client for evaluation, e.g. with Microsoft Excel. Fault recordings can be visualized directly in the Internet Explorer.

Protocols
SICAM PAS supports the following communication protocols as standard (optionally available):
- Control center connection IEC 60870-5-101, IEC 60870-5-104, DNP V3.00, MODBUS, TG 8979, CDT
- Open data exchange OPC server, OPC XML DA server, OPC client
- IED and substation connection IEC 61850, IEC 60870-5-101, IEC 60870-5-103, IEC 60870-5-104, DNP V3.00, PROFIBUS FMS (SIPROTEC 4), PROFIBUS DP, MODBUS, SINAUT LSA-ILSA

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Automation

Fig. 3
Typical redundant configuration: The station level computer and the HMI server are based on a redundant structure to boost availability

Further station control aspects

During e.g. maintenance work or for other operational reasons, information exchange with the control centers or the substation itself can be blocked with the **telecontrol blocking** and **bay blocking** functions.

The telecontrol blocking function can also be configured for specific channels so as to prevent the transfer of information to one particular control center during operation, while transfer continues with other control centers. The bay blocking and telecontrol blocking functions act in both the signaling and the command directions.

Channel-specific **switching authority** also makes it possible to distinguish between local control (SICAM PAS CC) and remote control for the switching direction, but also between control center connections.

For these three functions, information-specific exceptions can be declared additionally, so that e.g. certain messages are transmitted despite an activated block, or special commands are processed and issued despite of a defined switching authority. While a 1-out-of-n check is normally effective in IEDs, i.e. only one command is accepted and issued at the same time, an **m-out-of-n check** is supported on the side of the substation control system with SICAM PAS. This helps to define how many commands can be processed at the same time for all IEDs. Circuit-breakers can be controlled in **synchronized/ unsynchronized** mode.

Automation tasks

can be configured in SICAM PAS with the CFC (**C**ontinuous **F**unction **C**hart), which conforms to IEC 61131. In this editor, tasks are configured graphically by wiring function blocks. SICAM PAS comes with an extensive library of CFC function blocks, developed and system-tested specially for energy automation.

Applications range from generation of simple group indications through switching interlocks to complex operating sequences. Creation of operating sequences is supported by the SFC Editor (Sequential Function Chart).

In this context, additionally pre-configured and system-tested applications such as frequency-based load shedding, transformer monitoring and SF_6 gas monitoring can be optionally licensed. Besides special functional components and CFCs, the scope of supply also covers operating images for SICAM PAS CC.

Redundancy

SICAM PAS features comprehensive redundancy functions to boost the availability of the station automation system:
– The substation control unit can be used in a duplicate configuration ("system redundancy")
– The communication to IEDs and RTUs can be redundant ("interface redundancy")
– Subordinate units can be duplicated (redundancy at the bay control level)
– Subunits that are only designed for communication with one master (e.g. with only one serial interface) can be supported

The individual applications (communications protocols) operate independently of each other in a hot/standby connection, i.e. a changeover e.g. of the IEC 61850 client from one station control unit to the other due to a disturbance has no effects on the communication connection to the control center, which remains on the first station control unit without interruption. Apart from a higher stability in unaffected communication connections, the redundancy changeover of affected components takes place within a very short time (depending on application and configuration, between 250 ms and max. 3 sec).

Adjustments during operation such as bay/telecontrol blocking, switching authority, but also marking commands to the SoftPLC for operational control of the automation functions, are kept synchronous in both station control units during redundancy operation. The current adjustments are also valid after a redundancy changeover.

SICAM PAS CC communicates simultaneously with both redundant station control units.

A redundant structure is also possible for process visualization with SICAM PAS CC and fault-record archiving with SICAM PQ Analyzer as shown in Fig. 3 (see page 6).

Post Disturbance Review (PDR)

When an event occurs, the SICAM PAS Option SICAM PDR Recorder records state changes of messages and measured values for a period of up to 6 min. The triggering event, the length of the time window (including 1 min lead time) as well as the tags to be recorded can be parameterized. The resulting fault data file is archived and can be evaluated graphically and in tabular form in the Incident Explorer of the SICAM PQ Analyzer program.

Scope of information

The amount of information to be processed by SICAM PAS is essentially determined by the following factors:
• Computer network concept (multiple-computer network or single-station system)
• Performance data of the hardware used
• Performance data of the network
• Size of the database (RDBMS)
• Rate of change of values

With a distributed PAS system using a Full Server and up to 6 DIPs, a maximum of 350 IEDs and 20,000 data points can be supported.

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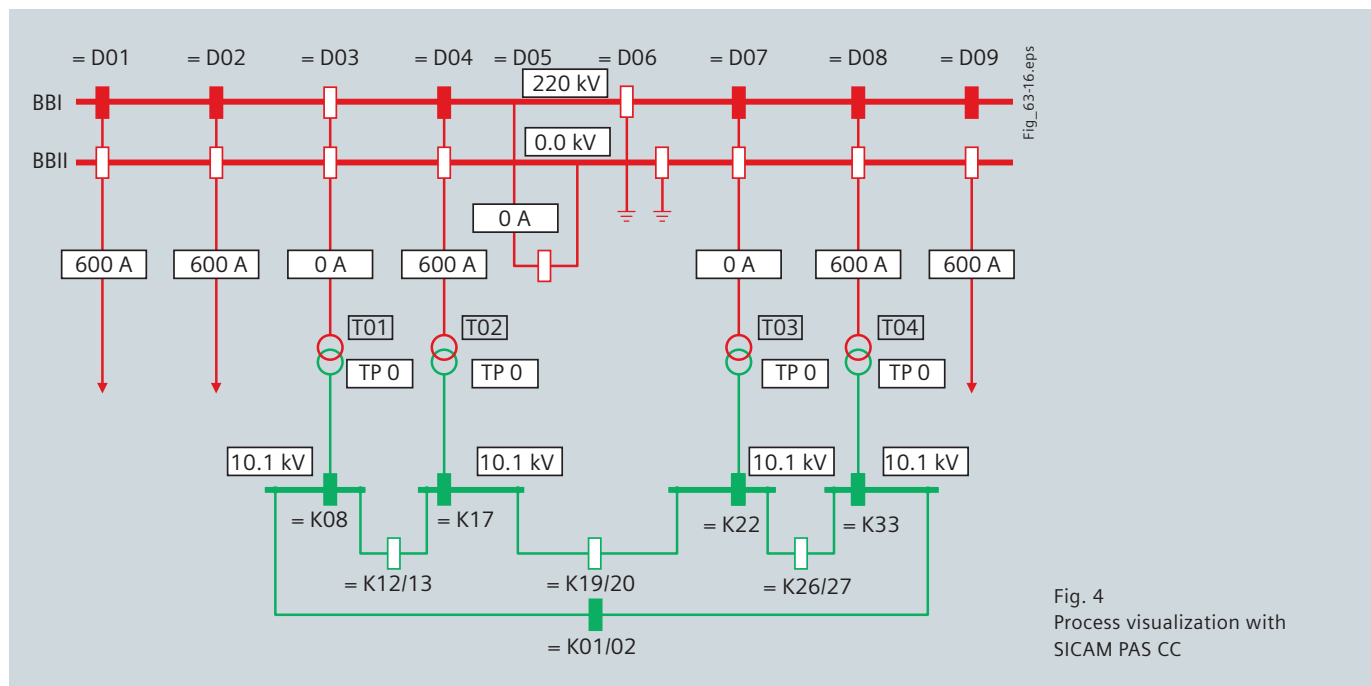
Process Visualization

Fig. 4
Process visualization with
SICAM PAS CC

Process visualization with SICAM PAS CC

In the operation of a substation, SICAM PAS is used for configuration purposes and as a powerful data concentrator. SICAM PAS CC serves as the process visualization system. Several independent SICAM PAS CC servers can be connected to one SICAM PAS. Connection of redundant servers is also supported. SICAM PAS CC supports the connection of several SICAM PAS systems.

In the signal lists, the original time stamps are logged in ms resolution as they occur in the devices. With every signal, a series of additional data is also presented to provide information about causes (spontaneous, command), event sources (close range, local, remote), etc. Besides process signals, command signals are also logged.

IndustrialX-Controls are used to control and monitor the switching devices. These **switching device objects** support four different forms of presentation (IEC, DIN, SINAUT LSA, SICAM) for circuit-breakers and disconnectors. It is also possible to create bitmaps (defined for a specific project) to represent the switching devices, and to link them to the objects. For informative visualization, not only nominal and spontaneous flashing are supported, but also the display of various device and communication states (e.g. up-to-date/not up-to-date, bay and telecontrol blocking, etc.).

Measured values and switching device states that are not continuously updated due to, e.g., device or communication failure or bay blocking, may be updated directly via the operation panel with SICAM PAS CC.

In conjunction with the SICAM PAS station unit, the switching devices can be controlled either directly or with "select before operate".

When visualizing the process by single-line images, topological coloring can be used.

The WinCC Add-on SIMATIC Web navigator can be used for control and monitoring via the Internet.

SICAM Valpro can be used to evaluate measured and metered values. It not only allows a graphical and a tabular display of archived values, but also enables subsequent evaluation functions such as minima, maxima and averages (on an hourly or daily basis).

For protection devices connected with the protocols IEC 61850, IEC 60870-5-103 as well as PROFIBUS FMS (SIPROTEC 4) or SINAUT LSA ILSA, fault recordings can be retrieved and archived automatically. SICAM PQ Analyzer with its component **Incident Explorer** is used for management and evaluation of the fault recordings.

SICAM PAS CC is based on **SIMATIC WinCC**, which has advanced to become both the industrial standard and the market leader in Europe. It has the following impressive features:

• Multilingual capability

• All operation and monitoring functions on-board.
  These include not only the graphics system for plant displays and the signaling and archiving system for alarms and measured values, but also a reporting and logging system. Further advantages are integrated user administration, along with the granting and checking of access rights for configuration and runtime operations.

• Easy and efficient configuration
  Configuration is assisted by dialogs, wizards and extensive libraries.

• Consistently scalable, even via the Web
  In conformity with requirements, the bandwidth ranges from small single-user stations up to client/server solutions with user stations on the Web as well as support of the server redundancy.

• WinCC/Redundancy – increases system availability by redundant WinCC stations or servers monitoring each other mutually, ensuring the operability of the system and enabling complete data acquisition.

• Open standards for easy integration

– Using any external tools, archived data can be accessed through a series of open interfaces (such as SQL and ODBC) for further editing.

– Manufacturer-independent communication with lower-level controllers (or with applications such as MS Excel) is supported with OPC (OLE for Process Control).

• Visual Basic for Applications (VBA), VBScript or ANSI-C create an ideal scope for project-specific solutions.
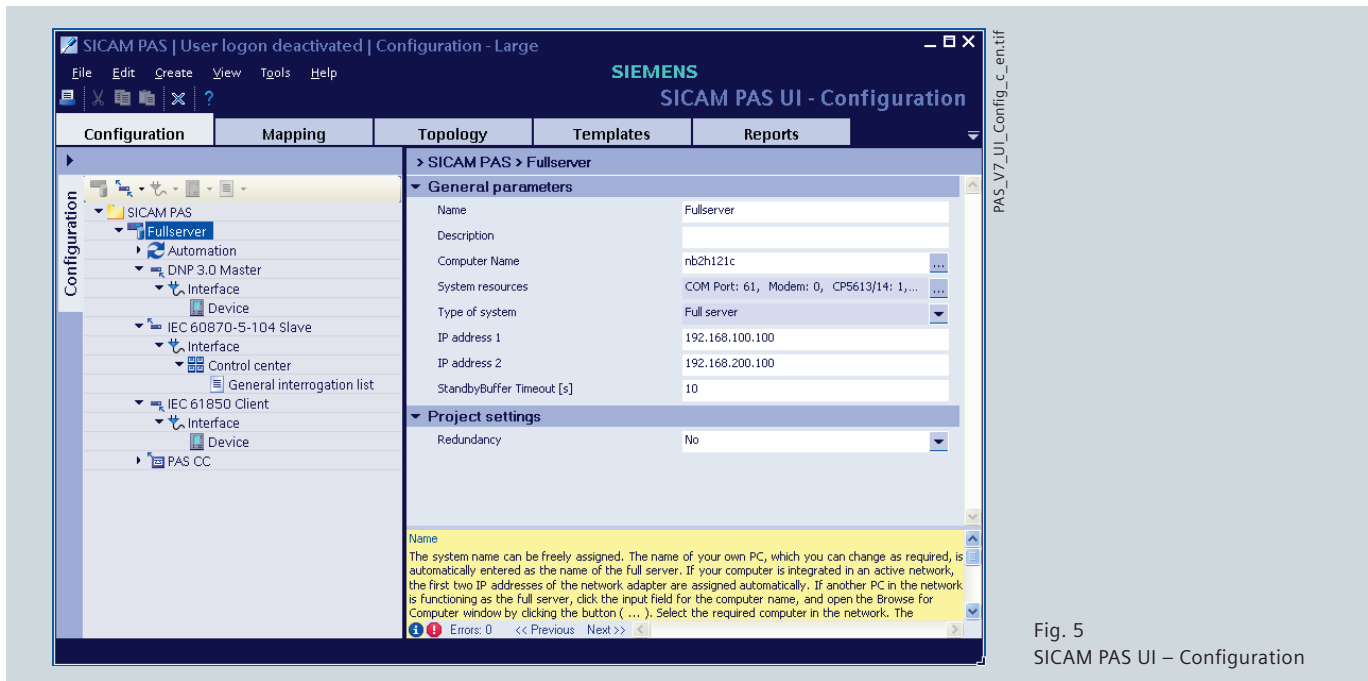
Fig. 5
SICAM PAS UI – Configuration

• Expandable with options and add-ons such as
– WinCC/Dat@Monitor
   serves to display and evaluate current process states and
   historical data on office PCs, using standard tools such as
   the Microsoft Internet Explorer or Microsoft Excel
– WinCC/Web Navigator
   is an option with SIMATIC WinCC for controlling and
   monitoring systems over the Internet, a company Intranet
   or a LAN
– WinCC/Connectivity Pack
   The functions of the two OPC servers HDA and A&E,
   and of the WinCC OLE-DB provider are ensured by the
   WinCC/Connectivity Pack.
– Alarm Management System ACC
   With the aid of the Alarm Management System ACC,
   messages from the WinCC signaling system can be forwarded
   automatically to radio call receivers.

**Overview of the operator control philosophy and user
interface**
The SICAM PAS user interface is based on customary Windows
technology, which enables you to navigate in the familiar
Windows environment both when configuring the system and
during ongoing operation.
The system distinguishes between configuration and operation
of a substation. In SICAM PAS, these two tasks are firmly sepa-
rated by two independent programs.
The **SICAM PAS UI – Configuration** program is used to create
and edit a project-specific configuration. To enhance clarity,
several views are distinguished:
– Configuration
– Mapping
– System topology
– Device templates.

A common feature of all views is that they have an Explorer
window that shows the system configuration in a clearly
arranged tree structure. As in the Windows Explorer, you can
open individual levels of this tree structure to work in them.
Meanwhile, you can close other levels to improve clarity.
Depending on the level you are currently navigating in and the
component you have chosen, in the context menu (right mouse
button) SICAM PAS offers you precisely those program func-
tions that are currently appropriate.
You work through the necessary steps in the data window on
the right. Here, you set parameters, select information and
define assignments to a user-specific, process-oriented system
topology.
The user interface is uncomplicated and structured according
to the task definition, so as to enable intuitive working and to
simplify changes. The user interface assists the editing process
by displaying parameter descriptions and messages when incor-
rect parameters are entered.
In the tabular views for information assignment and allocation
to the system topology, configuration is made easy by extensive
sorting and filtering mechanisms, multiple choices and Drag &
Drop.
To ensure data consistency and to avoid redundant data input,
SICAM PAS UI provides extensive import and export functions
for the exchange of configuration data, e.g. with the bay
control level and with process visualization.
To create new PAS projects and change the structure of exist-
ing PAS projects, a configuration license is required for using
"SICAM PAS UI – Configuration". For reading access to the
parameterizing data as well as parameter changes, the program
can also be used on a runtime license basis.
In SICAM PAS, everything is on board. Apart from the actual
runtime environment, the **"SICAM PAS UI – Configuration"**
program is always installed on the station computer. Thus, the
project database and the configuration program always match,
and adjustments and expansions are also possible after many
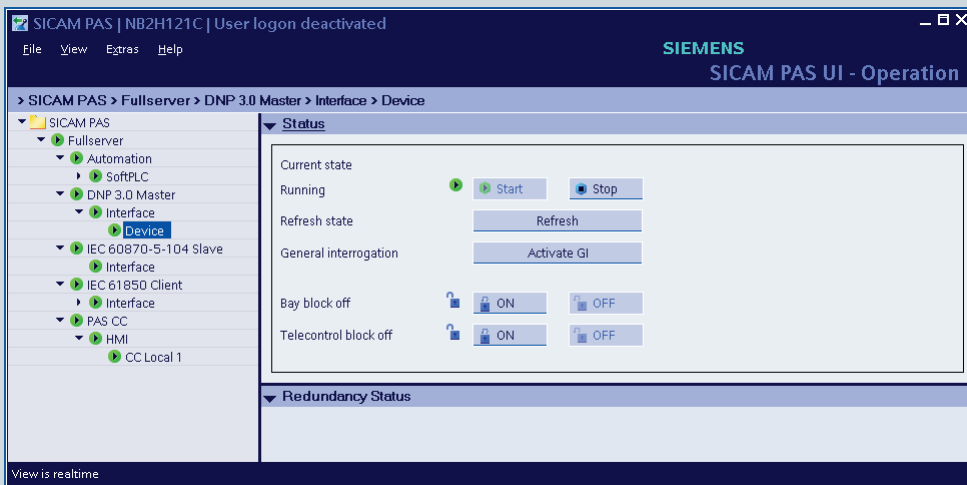years – regardless of separate engineering computers.

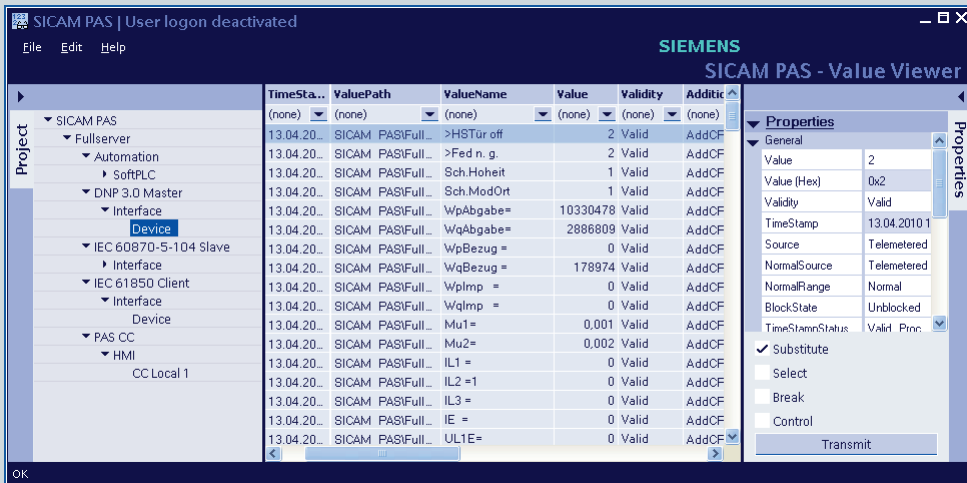# Test and Diagnosis

Fig. 6
SICAM PAS UI – Operation

Fig. 7
SICAM PAS Value Viewer

The **SICAM PAS UI – Operation** program features a series of editing and diagnostics views for monitoring and controlling a substation.

In the **Operation Manager**, you check and control the states of individual data connections.

In the **SCADA Value Viewer** you can see incoming values in a clearly arranged form and perform operator control actions for test purposes.

Security can be boosted by applying "user administration" to use the three programs SICAM PAS UI Configuration, UI Operation and Value Viewer. User administration supports different user roles with pre-defined rights. Working with these programs is then password-protected.

SICAM PQS (**P**ower **Q**uality **S**ystem)
In addition to the classical functions of station control systems, SICAM PAS offers the possibility to be used as a **P**ower **Q**uality **S**ystem: Both as an independent, pure PQ system and as an integrated solution, combining the aspects of station control, power quality and fault recording in one system. For this purpose, SIMEAS R fault recorders as well as SIMEAS Q80 power quality devices can be connected, and their comprehensive data can be processed and archived. With the additional functions of SICAM PQ Analyzer, the results of the comprehensive power quality analysis can be displayed and further evaluations are possible.

Besides the necessary communication protocols, further options are available, such as
– automatic fault location (one side, two sides and considering parallel wire compensation)
– automatic grid code evaluation (e.g. according to EN 50160, user-defined)
– automatic, scheduled reporting

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System requirements

- Station unit with:
  - Pentium processor III ≥ 1.8 GHz
  - Main memory ≥ 2 GBytes
  - Hard disk capacity ≥ 2 GBytes
  - Graphics card for recommended resolution of ≥ 1024 x 768
  - Color monitor matching the graphics card
  - DVD drive
  - Keyboard
  - Mouse
  - USB interface
  - Network adapter for LAN/WAN connection
  - Interface cards for connection of IEDs
  - SIMATIC CP 5613/14 for connecting units with PROFIBUS DP interfaces
  - e.g. Rocket Port COM Expander for serial connection of units with IEC 80670-5-103 interfaces, etc.

For the station level computer Siemens recommends the station unit as standardized hardware solution with Microsoft Windows XP Embedded.

Furthermore, SICAM PAS can also be used with these operating systems:
- Microsoft Windows XP Professional
- Microsoft Windows 7 Professional
- Microsoft Windows Server 2003
- Microsoft Windows Server 2008

- Operating system for visualization with SICAM PAS CC:
- Microsoft Windows XP Professional
- Microsoft Windows Vista
- Microsoft Windows Server 2003

Services

- Configuration
  Large-scale orders call for comprehensive configuration work and competent project management.

We will support you with:
- Project planning
- Project management
- Project controlling

or we will perform these tasks for you.

- Training
  SICAM PAS courses are staged at our
- Nuremberg training center
  E D SE
  Tel.: +49-911 / 433-7005
  Fax: +49-911 / 433-7929

For details of individual courses, consult our catalog on the Internet at http://www.ptd-training.de
or contact our training center.

- Certificates
  A DQS-certified quality management system conforming to DIN ISO 9001 is applied in the manufacture and sale of the products listed in this brochure.

Fig. 8
Recommended device with more functionalities: 6MD91 station unit

Selection and Ordering Data

Description	Order No.
Software [1]	
The SICAM PAS **basic system** includes:	• SICAM PAS UI – Operation	
	• SICAM PAS UI – Configuration	
	• SICAM PAS – Value Viewer	
	• OPC-Server	
	• Communication with TM 1703mic with IEC 60870-5-104	
	• SNMP Manager	
	• SNTP for time synchronization	
	• Real-time data distribution system	
	• SQL database	
The following **variants** of the basic system are available:	**"Full Server" basic component as a single-user system or as the central component in a distributed system**	
	"Full Server" runtime & configuration license for more than 15 units	6MD9000-1AA00-7AA0
	"Full Server" runtime & configuration license for up to 15 units or 2000 tags	6MD9000-1MA00-7AA0
	"Full Server" runtime & configuration license for more than 15 units	6MD9000-1AA10-7AA0
	"Full Server" runtime & configuration license for up to 15 units or 2000 tags	6MD9000-1MA10-7AA0
	"Full Server" runtime & configuration license for up to 4 units	7KE9000-1RA10-7AA0
	Configuration license for more than 15 units	6MD9000-1AA20-7AA0
	Configuration license for up to 15 units or 2000 tags	6MD9000-1MA20-7AA0
	Device Interface Processor (DIP) basic component for use as a subordinate component in a distributed PAS system	
	"DIP" runtime & configuration license	6MD9010-1AA00-7AA0
	"DIP" runtime license	6MD9010-1AA10-7AA0
Functional upgrades of the basic system	**Licenses with reduced number of units already available:**	
	"Full Server" runtime upgrade license for up to 15 units	6MD9004-0RA10-7AA0
	"Full Server" runtime upgrade license for more than 15 units	6MD9004-0MA10-7AA0
	"Full Server" runtime & configuration upgrade license for more than 15 units	6MD9004-0MA00-7AA0
	Configuration upgrade license for more than 15 units	6MD9004-0MA20-7AA0
	Full Server runtime license already available:	
	Configuration upgrade for a "Full Server" with more than 15 units	6MD9004-1AA23-7AA0
	Configuration upgrade for a "Full Server" with up to 15 units or 2000 tags	6MD9004-1AA24-7AA0
The following **option packages** are available for SICAM PAS Full Server and SICAM PAS DIP:	for connecting bay control units and protection devices **IEC 61850 (Client)**	6MD9000-0CE00-7AA0
	IEC 61850 (Client) (only monitoring direction)	6MD9000-0CE00-7MA0
	Driver for PROFIBUS FMS	6MD9000-0CB02-7AA0
	for connecting devices (e.g. SIPROTEC 4, SIMEAS P, S7-300, ET 200, etc.) **Driver for PROFIBUS DP**	6MD9000-0CB01-7AA0
	for connecting IEDs or substations	
	IEC 60870-5-103 Master	6MD9000-0CB00-7AA0
	IEC 60870-5-103 Master (only monitoring direction)	6MD9000-0CB00-7MA0
	IEC 60870-5-101 Master	6MD9000-0CD00-7AA0
	IEC 60870-5-104 Master	6MD9000-0CD04-7AA0
	DNP V3.00 Master	6MD9000-0CB07-7AA0
	MODBUS Master	6MD9000-0CB05-7AA0
	SINAUT LSA-ILSA Master	6MD9000-0CB03-7AA0
	for connection to higher-level control centers	
	IEC 60870-5-101 Slave	6MD9000-0CC00-7AA0
	IEC 60870-5-104 Slave	6MD9000-0CC04-7AA0
	DNP V3.00 Slave	6MD9000-0CC07-7AA0
	CDT Slave	6MD9000-0CC08-7AA0

[1] Positions 13 and 16 of the software Order No. indicate the version. Version 7.0 is the current version.

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Description		Order No.
Software [1] (continued) The following **option packages** are available for SICAM PAS Full Server and SICAM PAS DIP:	**MODBUS** Slave	**6MD9000-0CC05-7AA0**
	TG8979 Slave	**6MD9000-0CC10-7AA0**
	Further option packages	
	Automation SoftPLC (CFC, SFC)	**6MD9000-0BA50-7AA0**
	OPC Client	**6MD9000-0BA40-7AA0**
	OPC XML-DA Server	**6MD9000-0CA41-7AA0**
	Post Disturbance Review (PDR)	**6MD9000-0BA70-7AA0**
	SICAM PAS Applications (frequency-based load shedding, SF6 gas monitoring, transformer monitoring)	**6MD9000-0PA01-7AA0**
	Secure communication (for TCP/IP-based communication protocols T104 Slave, DNP 3 Slave, DNP 3 Master)	**6MD9000-0SC00-7AA0**
Functional upgrades of option packages	**IEC 60870-5-103 Master (supports command direction additionally)**	**6MD9004-0CB00-7AA0**
	IEC 61850 (Client) (supports command direction additionally)	**6MD9004-0CE00-7AA0**
Additional **option packages** for fault recorder and power quality functions	**SIMEAS R Master**	**7KE9000-0CB11-7AA0**
	SIMEAS Q80 Master	**7KE9000-0CB12-7AA0**
	Automatic Comtrade import	**7KE9000-0BA60-7AA0**
	Automatic PQDif import	**7KE9000-0BA62-7AA0**
	Automatic GridCode evaluation	**7KE9000-0BA67-7AA0**
	Scheduled reporting	**7KE9000-0BA68-7AA0**
	Automatic fault locator	**7KE9000-0BA69-7AA0**
SICAM PAS CC **Human Machine Interface**	**Runtime**	**6MD550_-0AP00-7AA0**
	Runtime incl. **evaluation program** SICAM Valpro	**6MD550_-0BP00-7AA0**
	Runtime & configuration	**6MD551_-0AP00-7AA0**
	Runtime & configuration incl. **evaluation program** SICAM Valpro	**6MD551_-0BP00-7AA0**
	128 tags	----------1
	512 tags	----------2
	2048 tags	----------3
	8196 tags	----------4
	65536 tags	----------5
SICAM PQ Analyzer	**Incident Explorer license** for evaluation of fault recordings and PDRs	
	Application on SICAM PAS Full Server	6MD5530-0AA10-2AA0
	up to 5 clients, archive transfer of 1 server/full server	6MD5530-0AA10-2BA0
	up to 5 clients, archive transfer of up to 5 servers/full servers	6MD5530-0AA10-2BB0
	up to 5 clients, archive transfer of more than 5 servers/full servers	6MD5530-0AA10-2BC0
	more than 5 clients, archive transfer of 1 server/full server	6MD5530-0AA10-2CA0
	more than 5 clients, archive transfer of up to 5 servers/full servers	6MD5530-0AA10-2CB0
	more than 5 clients, archive transfer of more than 5 servers/full servers	6MD5530-0AA10-2CC0
Functional upgrades ref. to number of servers/full servers	up to 5 servers/full servers	6MD5530-4AA00-2AB0
	more than 5 servers/full servers	6MD5530-4AA00-2AC0
Functional upgrades ref. to number of clients	up to 5 clients	6MD5530-4AA00-2BA0
	more than 5 clients	6MD5530-4AA00-2CA0
User documentation	SICAM PAS – Overview	E50417-X8900-C431
	SICAM PAS – Installation Manual	E50417-M8900-C432
	SICAM PAS – Configuration and Operation	E50417-P8900-C433
	SICAM PAS – Automation Blocks	E50417-H8900-C436
	SICAM PAS CC – Human Machine Interface	E50417-H8900-C434
	SICAM Valpro – Measured/Metered Value Processing Utility	E50417-H8900-C479
	SICAM PQ Analyzer Incident Explorer – Fault Record Processing Utility	E50417-X8900-C465

1) Positions 13 and 16 of the software Order No. indicate the version. Version 7.0 is the current version.
Further information on the hardware regarding the SICAM 6MD91 station unit: Refer to catalog SICAM 4.1.3 (Order No. see next page)

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Appendix

Catalog Index of the Energy Sector, Power Distribution (Energy Automation)		
Energy automation		
SICAM PAS – 6MD90	SICAM 4.1.2	E50001-K5604-A121-A1
SICAM Station Unit – 6MD91 (Hardware)	SICAM 4.1.3	E50001-K5604-A131-A1
Numerical protection systems and bay control units		
SIPROTEC Numerical Protection Relays (printed catalog)	SIP · 2008	E50001-K4400-A101-A5-7600
SIPROTEC Numerical Protection Relays (CD ROM)	SIP · 2008	E50001-D4400-A107-A5-7600

CE-conformity

This product is in conformity with the directives of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Council Directive 89/336/EEC) and concerning electrical equipment for use within specified voltage limits (low-voltage directive 73/23/EEC).

This product conforms with the international standard IEC 60255, and the national standard DIN 57435/Part 303.

The product is designed for use in an industrial environment acc. to the EMC standard specification.

Conformity is proved by tests performed by Siemens AG in line with article 10 of the Council Directives in accordance with the generic standards EN 50081 and EN 50082 for EMC directive EN 60255-6 for the "low-voltage directive".

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