

Siemens compressor automation

Boosting performance

You need optimal solutions to automate your machines and plants economically and flexibly. To optimize a compressor train's performance and lifetime, a system for controlling the rotating equipment automatically is essential. In combination with new compression solutions or in addition to existing ones, Siemens offers a complete automation system from a single source.



Benefits:

- Optimum performance and reliability due to powerful algorithms and proven program modules
- Fast and effective commissioning for the entire compressor train including unit control panel ensured by standard tools
- Reduced maintenance costs due to standard SIMATIC components



- Siemens experience: more than 1,300 systems implemented over 60 years
- Complete compressor train automation
- Modular control and monitoring concept based on standard components
- Customized design according to specific application and process data
- Integrated train control and safety systems
- Remote diagnostic capabilities enhance lifetime of rotating equipment
- Operator-friendly, ergonomic design of visual display system
- Complete data consistency due to one system engineering

Siemens Compressor Automation Solution (SCAUT) is based on the world's leading automation system family, Siemens SIMATIC S7. SCAUT is a standardized system designed to meet your needs regarding operation, monitoring, control and protection of complete compressor trains. This means that your compressors, drives and all auxiliaries run at the highest efficiency adjusted to your process requirements. SCAUT is designed in accordance with the international standards of IEC (International Electrotechnical Commission).

A large variety of configurations allows for the implementation of flexible machine concepts.

Modules



SIMATIC automation system S7-400

Compressor Control

SCAUT comprises complete compressor control functions, based on Siemens-approved algorithms, which are integrated into the SIMATIC S7 PLC for all types of compressor trains.

Benefits:

- Reduce the number of subsystems by integrating our field-proven control algorithms into the PLC.
- The optimum configuration parameters are directly derived from thermodynamic compressor design, reducing time for commissioning.
- All kinds of controllers, such as anti-surge controllers, performance controllers, limiting controllers, etc. are integrated without need for extra hardware.
- SCAUT concept saves significant installation space and investment cost for spare parts.

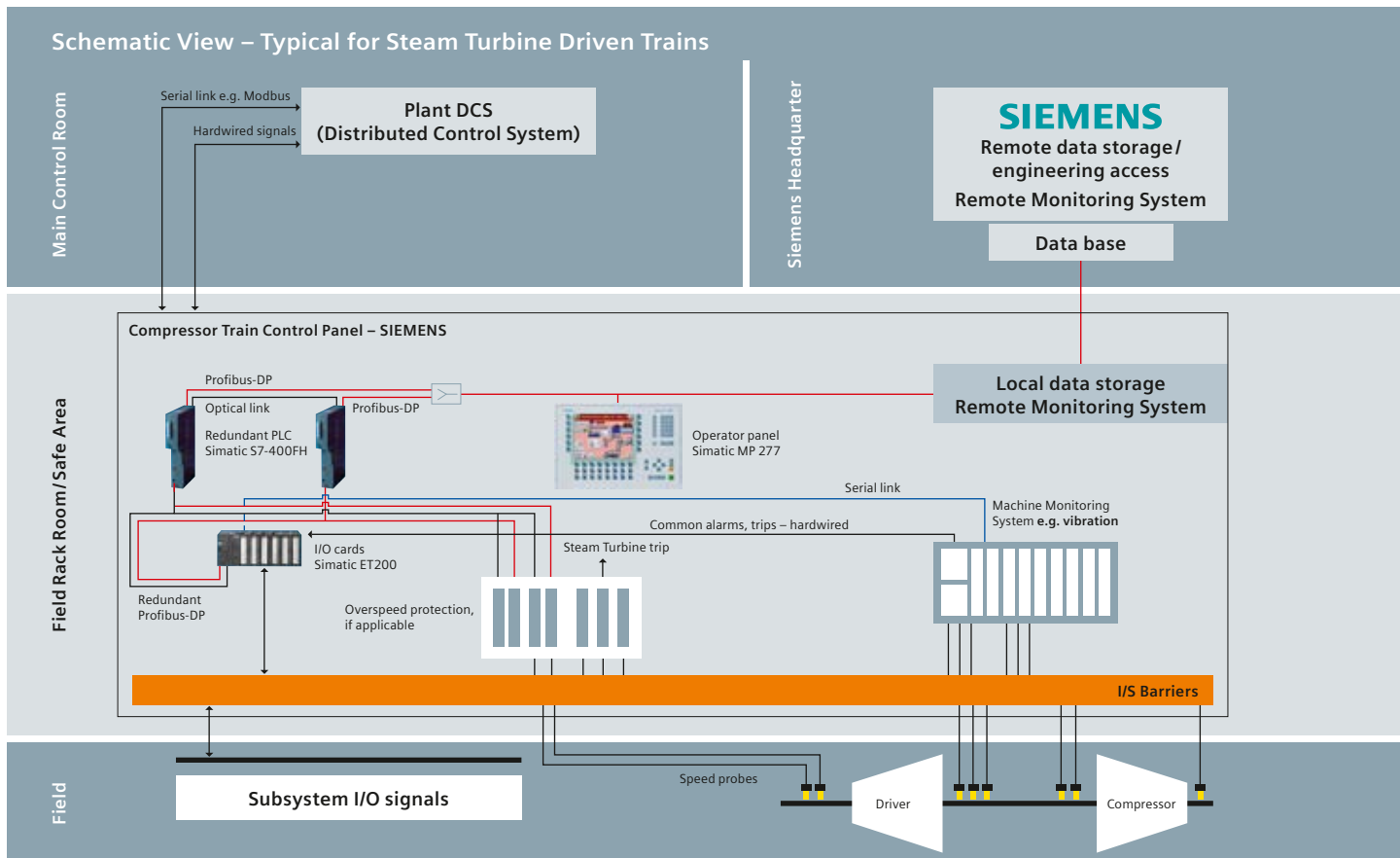
- Anti-surge control designed to cover even the most complex tasks such as variable molecular weight, fast-closing discharge valves or increasing suction temperature during recycling.
- Performance control acting on mass flow, suction- or discharge pressure including limiting functions such as discharge pressure or motor current.
- Simultaneous control of sets of variable inlet guide vanes.
- Load-sharing controller for parallel trains.
- Fully or semi-automatic start-up and shutdown sequences exactly matched to your process demands.

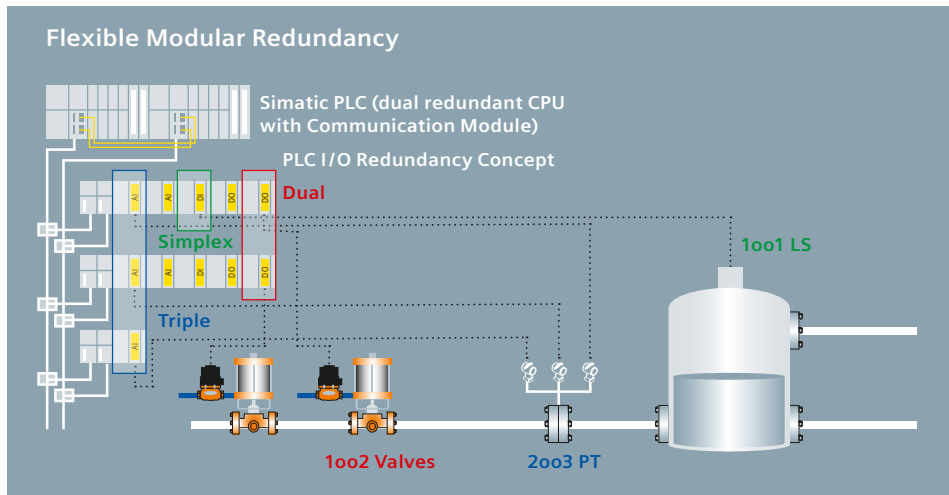
Integrated Steam Turbine Control

Steam turbine speed-control algorithms established through the proven operation of many generator sets and compressor trains over the years have been integrated into the SIMATIC S7 PLC in the SCAUT system.

Once again, the redundancy concept for the PLC is adapted to the control system, thus reducing the number of required subsystems.

Schematic View – Typical for Steam Turbine Driven Trains





Speed governors are available for:

- Back-pressure turbines
- Condensing turbines
- Extraction /induction condensing turbines

SCAUT system turbine control includes

- Safeguarding functions, such as over-temperature or minimum flow protection
- Additional control of extraction pressure, inlet pressure or induction pressure covering all interactions with the speed governor
- Automatic ramp-up to minimum governor speed according to predefined start-up curves, including the avoidance of max. two critical speed bands

Safety-Integrated System

If a plant risk analysis identifies functions indicating the need for a safety-integrated system (SIS) there is also a solution within the SCAUT product range based on the Simatic S7-400FH failsafe automation system. This solution incorporates your safety requirements (up to SIL 3 in accordance with IEC 61508) as well as your needs for the highest availability in your plant.

The safety-related functions of the S7-400FH automation system are incorporated into the F-program of the CPU and the fail-safe I/O modules. Both standard modules and fail-safe modules can be used. This means that it is possible to set up a fully integrated control system for your compressor train with both safety-related and standard areas.

Our SCAUT solutions yield lower hardware and engineering costs. Your compressor

train can be configured and programmed using the same standard tools, providing an economic overall solution for your process demands.

High availability for your processes

The SCAUT standard PLC hardware platform is the Simatic S7. To match your process needs the SCAUT product range provides S7-300 systems for small and intermediate solutions or S7-400 systems for high performance needs.

If your process requires an even higher degree of availability, a SCAUT system based on a Simatic S7-400H fault-tolerant automation system with redundant design is available, including such features as:

- ➔ hot stand-by: automatic reaction-free switching to the standby unit in the event of a fault
- ➔ flexible modular redundancy: you can choose between single, dual or triple-channel I/O redundancy

Flexible Modular Redundancy

As sensors and actuators are the weakest parts of an instrument loop, any redundancy concept should start with the appropriate number of field devices. (Typical fault-rate split for a loop (according to TÜV): Sensor 35 % – PLC 15 % – Actuator 50 %)

The Siemens SCAUT system is designed to match the PLC and field-device redundancy in order to:

- maximize availability
- minimize costs

Remote Monitoring

Siemens Turbomachinery Application – Remote Monitoring System (STA-RMS) is a remote monitoring system integrated into SCAUT to support you in the use of our products and to ensure that you obtain maximum value from them.

How it works:

STA-RMS has two modes of operation:

1. Remote Support

- STA-RMS provides the possibility to allow authorized Siemens support engineers to offer real-time, direct remote support and trouble shooting – subject to approval of the end-user.

2. Data Collection & Analysis

- Data are recorded within the control system of the equipment
- STA-RMS automatically collects these data from the control system
- STA-RMS optionally analyses these raw data to extract information which helps to provide a more effective service

Benefits:

Fast commissioning support

- Additional commissioning support by our designers to any location worldwide via remote access to the automation system.
- Data to assist us to optimize control functions according to your need.

Data analysis and reports (optional)

- Improved availability
- Better information to assist in earlier detection of faults and faster diagnosis
- Faster response and/or repair
- Support for the operator as he becomes familiar with the equipment

Data Security

- The IT-infrastructure of the Remote Monitoring Network incorporates today's best practice in security standards (e.g. several password levels, data encryption).

Ease of use

Operation is simplified thanks to the ergonomic design of the visual display system. Additional diagnostic screens give guidance to the operators and speed up their response time. The Siemens SIMATIC MP 277 operation and visual display panel is included as standard. The size of this platform provides a good blend of economy and operability.

Fast commissioning

Fast and effective commissioning is ensured by the modular program structure. Further optimization functions can be provided by our site service engineer.

The engineering editor CFC (continuous function chart) is used for object-oriented graphic programming and configuration.

Flexibility

Without any compromise in terms of safety or operability we can also offer economic alternatives to our customers. One of the best and most frequent examples: the shaft monitoring system can be replaced by a vibration transmitter system.

The unit control panel can also be mounted on the skid for compressors located in non-hazardous areas as an alternative to the control room.

Easily integrated with other supervisory systems

Even if the SCAUT system is completely independent of the monitoring and safety systems of the complete compressor train, it is becoming increasingly important for all information to be made available to operators in a centralized control room. Therefore, standardized serial interfaces such as Modbus, Industrial Ethernet or Profibus are utilized to allow easy data transfer to any supervisory system.

Reliability and economy

High reliability as a result of quality hardware and software from SIMATIC S7, which has been proven reliable in more than a million installations worldwide. Prefabricated, standardized, tested and fault-free modules. Low expenses for training and spare parts due to the use of standard S7 components.

Typical SCAUT panel for a steam turbine driven recycle gas compressor during factory acceptance test.



Comprehensive one-stop solutions

We are a world leader in turbomachinery, providing overall solutions encompassing:

Design

Our highly trained turbomachinery-control engineers configure the sub-systems for optimized control and monitoring as well as for management of the complex interface between the compressor train, the unit control panel and supervisory systems such as the DCS.

System engineering

One system engineering for the complete Instrumentation and Control (I&C) scope including SCAUT panel ensures complete data consistency from the field transmitter on P&ID via the junction boxes and signal adaptations on I&C loops and circuit diagrams up to the automation system shown on the arrangement drawing of the SCAUT panel.

Manufacturing

The unit control panels are manufactured with the same high level of workmanship and quality controls as the equipment, which means that you can count on years of reliable service.

Testing

We provide full support for factory acceptance testing, including functional tests, performance tests, and interface tests. As an option, a complete unit test of the compressor and unit control panel can be conducted.

Commissioning

As an international company with the philosophy to provide support when and where you need it, we offer for the complete unit: site support during erection and commissioning, on-site acceptance testing.

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