

# SCAUT Compact

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SCAUT (Siemens Energy Compressor AUTomation) is a standardized automation solution that, thanks to its modular design, fulfills every requirement for operation, monitoring, closed-loop and open-loop control as well as for protecting compressors, drives and ancillary systems. The system is based on the worldwide leading SIMATIC S7 automation product family from Siemens Energy, which is built on a unique symbiosis with our decades of experience in instrumentation and control for compressor installations.

After the implementation of the second generation of the SCAUT Compact in 2010, the technology has established and will be always developed in the future.

## SCAUT compact surge limit controller

The system is based on the world-wide leading SIMATIC S7 automation product family, which is built on a unique symbiosis with our decades of experience in instrumentation and control for compressor installations.

### Application

SCAUT Compact is the smallest and most cost-effective variant in the SCAUT family and performs important protection functions and tasks in the automated process control of compressor installations. Optimum safety of the overall plant, energy costs, lifetime of the compressor and quality of the overall process depend on closed-loop control.

The system is a freely-configurable control based on SIMATIC S7, specially designed for compressor applications that can react extremely quickly to changes in volume flow and pressure measurement at the compressor and can protect the compressor from "surging." The integrated Touch Panel makes operation easier thanks to a clear over-view and an extremely user-friendly, intuitive user interface that has been adapted to the customer process.

## Surge limit controller

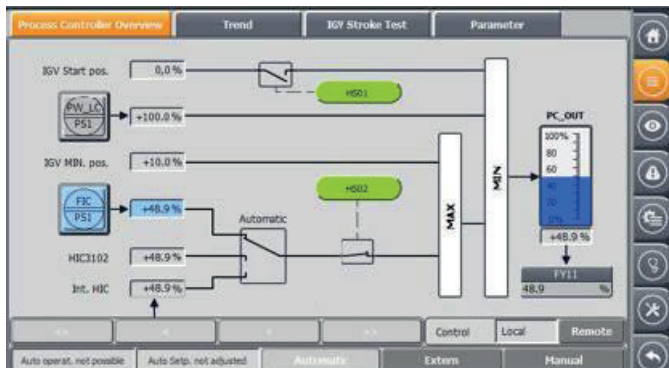
The surge limit controller prevents the compressor from operating in surge which is an undesirable unstable condition. Surging is an uncontrolled flow event in the compressor that invokes large variations in pressure and cyclic reversal of the direction of flow. If these occur, high levels of vibration and excessive thermal loading will result. Damage to various components of the compressor, such as bearings, seals, impellers and rotors can occur which can cause significant repair costs and production outages. Even in the absence of any obvious damage, the service life and efficiency of the compressor will be adversely affected.

The closed-loop control defines a limit curve in the compressor map and prevents it from being overshoot by means of continuously controlled opening of the surge control valve which helps the compressor to operate within its range of stability at all times. Supplementary functions of temperature and power frequency compensation provide additional support here.



## Process controller

Many chemical and biological processes demand a high degree of accuracy with regard to the supplied volume of a compressed gas. Varying volumetric flow at constant discharge pressure or suction pressure may also be required. These tasks are performed by the integrated process controller.



## Limit controller

An additional controller ensures that no undesirable process states occur and limits the motor current, discharge pressure or suction pressure for this purpose. If a choke limit control system is also required, this can be implemented in SCAUT.

## Guide vane coupling

Another integrated controller synchronizes the separately controlled inlet guide vanes of the various stages. Impermissible deviations are detected and an alarm signal is generated. Ultimately, the complete concept comprising hardware, control system structure, incorporated experience of the compressor characteristic and process response of the load, are decisive factors in the quality of closed-loop control and is therefore individually adapted to the specific application.

## Special features

### DCS connection / Remote access

The SCAUT Compact offers several possibilities of data connection and remote access

1

**Modbus over TCP/IP optional serial link RS485 or RS232. The Modbus connection offers two options:**  
Modbus Data (transmission of all I/O signals, process alarms, channel errors and status signals)

Modbus Control (Operation of the SCAUT Compact controller via Modbus connection)

2

**OPC UA**

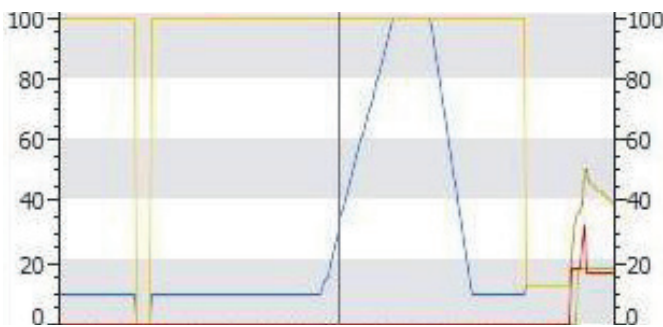
3

**Sm@rt Server (remote access to the HMI panel)**

## Long-term archive

The SCAUT Compact contains two long-term archives per process stage for diagnostic and maintenance purposes. One long-term archive contains all anti-surge controller relevant data (ASC Archive) and the other contains all process controller relevant data (PC Archive).

The current data of each long-term archive is stored into a circular log file with a capacity of at least one hour. To ensure long-term historical data this circular log files are copied every hour into the corresponding long-term archive paths, so that every hour the long-term archives will be increased by one historical data file. The historical data files are stored in "csv" files.



## Hardware-diagnostic

The hardware diagnosis is used for monitoring and detecting of hardware errors of the control system. The hardware diagnostic application offers the user the possibility to perform diagnostics on the user interface without additional tools. This can significantly reduce downtime.

## Surge protection

The surge protection application is used to protect the machinery from damage as a result of repeated surge events. The SCAUT Compact offers two modes of surge protection.

**Control Deviation:** The "Control Deviation" mode of surge protection is coming out of the anti-surge controller function. This mode of surge protection is monitoring the compressor operation point in relation to the control line.

A surge is detected, if the control deviation is negative. This means, that the compressor operating point is on the left side of the control line. The activation of the "Control Deviation" mode can be done by anti-surge controller parameter.

**Gradient:** The "Gradient" mode of surge protection is coming out of an additional surge protection function. This mode of surge protection is monitoring the gradient of up to four process signals. A surge is detected, if one of the gradients is passing over the gradient limit. The gradient limits are configured during commissioning. The activation of the "Gradient" mode can be done by anti-surge controller parameter.

## Alarm management with archive

The alarm management of SCAUT Compact offers all alarm messages with additional alarm related information. The SCAUT alarm management features an alarm message chart, an alarm message archive, a system message archive and a first trip indication.

The alarm message chart contains all active or unacknowledged alarm messages. The alarm message archive stores every message and its status up to an amount of 10.000 items. The system message archive contains all HMI system related messages and the first trip indication offers the information of which trip signal caused the shutdown of the compressor.

## Main components

### Automation

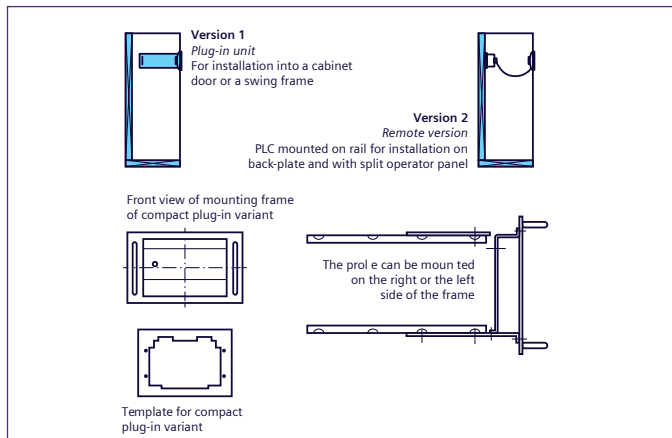
SIMATIC S7-1500 has been designed for innovative system solutions in the mid-performance range. As a universal automation system, it represents an optimum solution for applications in centralized and distributed installations. The preferred SIMATIC S7-1513 or S7-1517 is implemented according to the particular application and requirements. The controllers are of a modular design and are equipped with a large program memory and quantitative framework for mastering demanding, high speed applications.

## Operation and monitoring

A SIMATIC Touch Panel TP700 comfort (Standard version with mounting frame) with 16 mil-color display is implemented as an HMI device. It offers the user extensive functions for operating and monitoring machines and plants thanks to the balance it achieves between cost-effectiveness and ease of use. Due to the standardized HMI and the pretested interface to SIMATIC S7, the benefits become apparent as early as the commissioning phase. Later, the control and compressor will operate regardless of the availability of the higher-level process control system. Independently of this, the signals available in the SIMATIC S7 (measured variables, status and alarm signals) can be supplied to the process control system via an interface as required.

## Mounting

The SCAUT Compact version is available in two mounting types. The conventional solution ensures the physically separated installation of control unit and controller, whereby the individual modules, such as SIMATIC S7, power supply unit, additional I/O modules, or communication modules, are mounted on an integrated rail.



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The compact withdrawable unit with its mounting rack combines the HMI display TP700 comfort and the SIMATIC S7 components together into a mechanically stable unit which is ideally suited for installation in the front panel or door of a control cabinet.

SCAUT Compact is therefore of interest as a cost-effective, high-performance alternative replacement for existing compact controllers.

With small alterations to the cut-out of the legacy control cabinet or panel, the existing controller can be replaced and available space can be increased.

## Potential scope of supply for standard SCAUT Compact

- SIMATIC PLC: S7-1513, S7-1517 separate cards as binary and analog input and output channels
- SIMATIC TP700 comfort Touch Panel, 7" with 16 mil colors Configured, preinstalled on rails, tested and ready for commissioning

## Product description

- SCAUT surge limit control function description
- Overview diagram for SCAUT surge limit control with the inputs and outputs to be connected

## Expandable with

- Power pack
- Communication processor (CP) for communication with the customer I&C system
- Further binary and analog input and output cards
- Cabinet or mounting rack including templates for the cutout in the cabinet door
- Mounting dimensions for conventional solution
- HMI screen TP700 comfort housing front (height x width): 158 mm x 214 mm
- HMI screen TP700 comfort mounting cutout (height x width / device depth): 141 mm x 197 mm / 63 mm
- SIMATIC on shaped rail (height x width x depth): 147 mm x 483 mm x 130 mm
- Mounting dimensions for compact with drawable unit
- Mounting rack (height x width / handle): 170 mm x 272 mm / 42 mm
- Mounting depth above mounting rack: Varies from 220 mm to 560 mm according to application