Plant automation and telecontrol in one system

SIMATIC PCS 7 TeleControl

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Answers for industry.
The requirements for automation in process industries are enormous. Adding to the challenge, many installations are spread out over a very large geographical area - particularly in the oil and gas and water industries. In these cases, telecontrol protocols are very useful for integrating the widely distributed remote stations into the control system.

Conventional solutions employ heterogeneous system levels: process control systems for more complex plant sections, more simple remote terminal units for remote stations with a lower degree of automation – as well as a higher level network control system for monitoring the widely distributed plant.

This requires merging of the separately configured subsystem in a second configuration step in the higher level network control system. Siemens supplies the intelligent (i.e. integrated) solution – with SIMATIC PCS 7 TeleControl.
One system, numerous advantages

SIMATIC PCS 7 TeleControl unifies the automation of central installations and monitoring of distributed process areas into one control console. The advantages are clear:
- Shared operator control
- Convenient and easy data management
- Integrated engineering.
Our innovative solution supports both traditional communication modes, such as radio and telephone, and new Internet-based communication techniques.

Typical applications

Oil and gas industry
- Compressor, pressure reduction, transfer and metering stations in gas networks
- Pumps and valve stations in oil pipelines
- Automation for gas and oil wells
- Stations for the injection of water or CO₂ into the oil fields.

Water industry
- Well, pump and valve stations in water supply networks
- Rainwater overflow basins and pumping station in wastewater networks.

Other applications (power management, environment, traffic control)
- Monitoring and control of small, distributed stations
- Data collection and transmission.
Our answer to requirements for highly integrated solutions

SIMATIC PCS 7 TeleControl dramatically increases the degree of integration of your plant:

The uniform user interface for local and remote processes minimizes the risk of errors –
the uniform software platform reduces configuration and maintenance work.

**Powerful components**

SIMATIC PCS 7 TeleControl is based on powerful components which are opti-
mally tuned to one another, forming a user-friendly, flexible telecontrol system integrated into the entire engineering concept.

Distributed automation stations (remote terminal units – RTUs):

- Based on SIPLUS RIC (remote interface control) with Modbus/IEC interface, extended temperature range, lower power consumption, up to approx. 30 I/O signals
- Based on SIMATIC S7-300/S7-300F with SINAUT TIM (TeleControl interface mo-
dule), Modbus/IEC interface, also available with failsafe functionality, up to approx. 100 I/O

- Based on SIMATIC S7-400 / S7-400F, with SINAUT TIM, Modbus/IEC inter-
face, also available with failsafe functionality for a higher number of I/O signals

Operator station:

- As a standalone system or in a client/ server configuration
- As a "dedicated" TeleControl operator station or "dual leg" with connection to both SIMATIC PCS 7 and PCS 7 TeleControl

Engineering station (integrated into SIMATIC PCS 7):

- With a basic library of TeleControl blocks, expandable using new block types with corresponding script processing
Customized communications

SIMATIC PCS 7 TeleControl supports the following communication modes:
- SINAUT ST7 protocol, as well as Modbus connections (serial, TCP/IP supported)
- Dynamic response for slow transmission paths
- Time stamp for data (messages, measurements) in the remote stations
- Time synchronization of remote stations through TeleControl server
- Prevention of data loss through data buffering in the remote stations (e.g. to bridge connection interferences)
- Event-driven processing of alarms and analog values to reduce data volume
- Correct archiving and processing of buffered data in the TeleControl server
- Several public and private communication networks – e.g. dedicated lines, dial-up connections (analog, ISDN, GSM) and TCP-based technologies (DSL, GPRS).

For greater availability: redundancy

SIMATIC PCS 7 TeleControl can also be configured redundantly for higher availability.
- Redundant operator station with automatic data synchronization after server restart.
- Redundant communications to the RTUs
  - Based on SINAUT (redundancy path selected in the central module)
  - Based on Modbus (redundancy path selected in the TeleControl server).

Efficient engineering:
Data Base Automation

With Data Base Automation (DBA), we offer a tool for highly efficient engineering – in conformance with SIMATIC PCS 7.
- DBA enables plant expansions while the plant is still running, facilitates project-specific adaptation of the system and enables the import of existing configurations within the scope of migration.

Easy going: integration and migration

Serial substations can be connected using SINAUT ST7 central modules directly connected to the server. Plants with a Modbus infrastructure can also be easily migrated to SIMATIC PCS 7 TeleControl.
- Substations based on TCP/IP can be linked to the plant bus either directly or with a router – without an additional front end processor.
- Data on the SIMATIC PCS 7 TeleControl servers is processed and displayed using corresponding blocks stored in a library. These blocks support user guidance as well as the alarm hierarchy of SIMATIC PCS 7 – providing a uniform look & feel for both plant automation and telecontrol.
Applications in the oil and gas industry

Gas pipeline from the compressor station to the pressure reducing station

A gas pipeline covers a distance of roughly 400 km, comprising a compressor station at the start, 20 block valve stations and three metering stations in-between along with a pressure reducing station at the end of the line. The compressor station with approx. 800 I/O signals as well as the pressure reducing station with approx. 300 I/O signals are automated with the SIMATIC PCS 7 process control system. Based on high availability requirements, a redundant controller has been used which also supports homogeneous integration of the emergency shutdown (ESD) functionality. The compressor station houses the central console for operation of all stations in the pipeline. Both the PCS 7 server and the TeleControl servers are redundantly configured for added availability. Via the PCS 7 clients, operators can access the same range of functions and controls on the PCS 7 and TeleControl servers and, in turn, on all stations.

The units and measurements from the different stations are displayed with the same look & feel using uniform faceplates. That makes process guidance easier, gives the operator a better overview of the complete pipeline and helps prevent operating errors. The communication connection to all stations along the pipeline meets greater availability requirements, with a media-redundant ring topology. The block valve stations (RTUs) with approx. 30 I/O signals are automated with SIMATIC S7-300 controllers. The metering stations with approx. 100 I/O signals feature an S7-400 controller, and are also connected to the TeleControl bus via SINAUT TIM modules. In the relief station at the end of the pipeline, there is a further operator console with its own redundant PCS 7 server. This decouples the individual stations for a further increase in availability across the entire operating level.

Main features

- Uniform monitoring and control of different stations along the entire gas route
- Economical integration of all stations in the gas pipeline
- High availability based on redundant design in just the places required
- Integrated safety technology (for ESD).
The wastewater network consists of various metering stations within the sewer network, several rainwater overflow basins as well as the central sewage treatment plant. Furthermore, a pumping station is installed to pump sewage from low-lying districts into the central sewage treatment plant. The pump stations are automated locally using SIMATIC S7-300 controllers, which also contain a TIM module for the telecontrol connection to the control station. A SIPLUS RIC is used as a local station in the rainwater overflow basins based on the low number of process signals, the difficult environmental conditions and the low power consumption. The stations are connected via private dedicated lines (telecommunication cable), but it is also possible to dial-up via the telephone network and/or ISDN. More remote rainwater overflow basins are linked via GPRS.

The process control system SIMATIC PCS 7 is used in the central sewage treatment plant, handling both Human Machine Interface (HMI) and process control tasks there. This system is designed redundantly and operated via several operator stations. The sewage treatment plant is controlled via PCS 7 controllers in the areas:
- Inflow / pre-treatment
- Aeration / blowing station
- Sludge treatment.

The PCS 7 servers in combination with the central telecontrol modem manage the data traffic with the stations. The data collected in the stations is integrated into the process displays and message lists. Important process information is archived based on the supplied time stamps. Operating personnel can directly intervene in the processes using control commands or setpoint entries, e.g. turn pump on/off or activate valve.

Main features
- Efficient and safe control of the entire sewage network via one central control room
- Economical use of rainwater overflow basins and protection for sewage treatment plants during precipitation events
- High degree of safety and availability of the communications network based on the use of private dedicated lines and GPRS technology.
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