

IDS HIGH-LEIT

An open and scalable SCADA system
for all infrastructure applications

The IDS HIGH-LEIT SCADA system

The HIGH-LEIT SCADA system is designed for applications of energy and water supply, for sewerage and environmental areas as well as for industrial requirements. The system offers – independently from hardware platform and operating system used – user friendly solutions for all tasks of process visualization, monitoring, control and automation.



Areas of Application

The use of modern control systems promotes economical management of operations, achieves high reliability and flexibility, and reduces capital outlay and operational costs. HIGH-LEIT was designed with modular, expandable hardware and software components for small, medium sized and large scale applications. HIGH-LEIT is already equipped for integration into future innovative applications.

HIGH-LEIT application areas are:

- Electricity, gas, water and heating.
- Waste-water plants and sewage networks.
- Communication networks and pipelines for liquids and gases.

- Industrial applications, such as energy management and accounting.
- Infrastructural applications in transportation technology (tunnel automation, rail electricity installations).

Process Interface

HIGH-LEIT is designed so that any telecontrol, automation and digital communication systems can be interfaced together.

For interfacing telecontrol systems, protection devices and remote metering devices, protocols of the IEC 60870-5-101/-103 and 104 standard series are supported. Proprietary protocols are not used at all. The quality information as defined in the standard remains available for visualisation.



Transmission protocols according to the IEC standards also facilitate system setup.

Telecontrol applications can utilize all currently available methods of communication (e.g. dedicated lines, public telephone networks or package-oriented radio services (GPRS)); local communication networks are integrated with Profibus DP or FMS, Ethernet, OPC or manufacturer-specific protocols. Protocol converters are on hand for all third party systems, and allow an easy combination of telecontrol and automation systems from different vendors.

Redundant communication paths along with ring structures or WANs guarantee communication reliability. Configuration of the entire communications network can easily be performed at the operator stations control room and downloaded to the RTUs concerned for storage in non-volatile memory.

Server Level

The available hardware platforms for the server level include high end PC-based systems. Microsoft Windows and Linux operating systems are supported. Dedicated function servers e.g. for database applications, simulation and training tasks and high-level optimizations, can be integrated into the control system. Where desired other LANs are hooked up to the SCADA system network via routing devices.

It is thus possible to make the SCADA system's data available to external database software, as well as to retrieve data from external databases (e.g. SQL interfaces). Remote access and maintenance tools are provided as standard.

Usually the SCADA systems use dedicated computers for the server functionalities. For small systems server and operator workstation functionalities are merged on a single computer.

User Level

For the HIGH-LEIT operator level PC-based hardware is used. The HMI (Human-Machine Interface) software uses the Microsoft Windows operating system.

The HMI software supports multiscreening with up to 8 monitors for each workstation and the control of large-screen displays even across workstations. The number of workstations possible is practically unlimited. In addition to workstations directly connected via LAN to the SCADA system, office workstations can be also connected via various networks using routers. Connection to remote workstations is accomplished via ISDN, HSCSD or similar communication services.

HIGH-LEIT also offers the possibility to work with "Thin Clients". Classic web technologies (http) for pure information functions are used via the HIGH-LEIT web interface. Workstations with the complete SCADA-functionality are connected via the HIGH-LEIT terminal server. Access can be realised via both Intranet and Internet.

User-friendly Interface

User Interface

The HIGH-LEIT user interface is integrated into the standardized graphical interface of the operating system. In addition to windowing, the software supports a system interface with overlapping screens (multiscreening). All presentations and dialogs are selected and manipulated via icons and pull-down menus. The system allows the user to call up context sensitive help at any time, which provides all information necessary for system operation.

Visualization of all process information is accomplished by system diagrams which can be freely configured by the user. The diagrams can be zoomed and remotely zoomed. Both manual as well as zoom-dependent decluttering is possible. Vector graphics can be taken over from GIS or CAD systems via dxf-import. Via this, world map displays can be created with compression techniques for many thousands of graphical objects.

For the control of large scale displays and projection systems special functions are integrated which provide a presentation independently of equipment limits. The overall available display area can be divided into several logical screens.

In addition to information presentation, it is possible to integrate selector buttons in the system diagrams for supplementary diagrams or functionalities. This permits for example the user to directly select preconfigured charts and reports and to customize his own user interface as desired. All displayed information can be commented. Moreover, it is possible to attach memos or object-related marks anywhere on the screen, which can be made available to all other workstations.

Alarm Line and Alerting

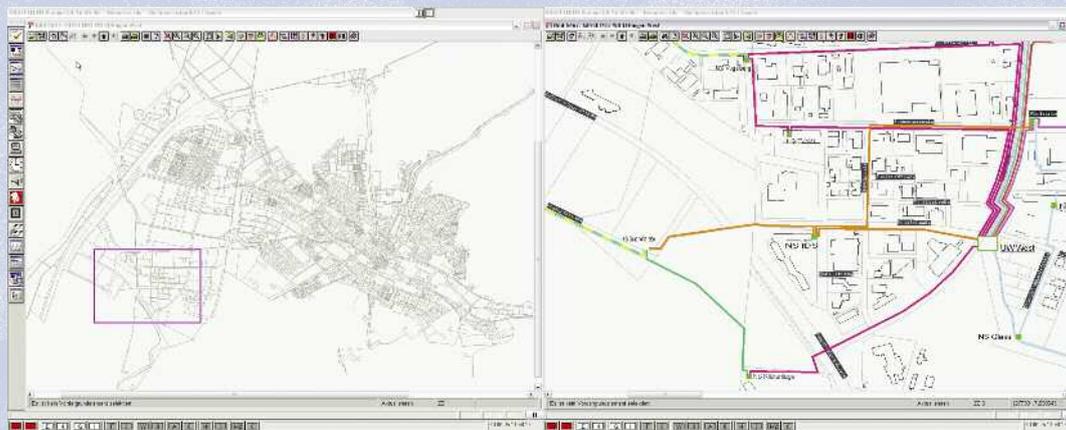
The HIGH-LEIT SCADA system provides an efficient alarm scheme for prompt detection and remedying of disturbances. An alarm line and alarm lists give an immediate overview of all pending alarms differentiated according to object hierarchy and alarm grade.



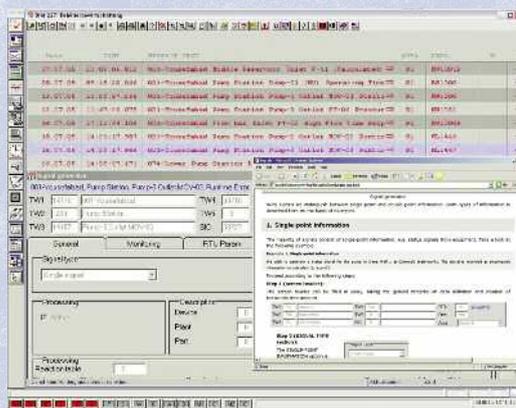
There are multiple ways of notifying the user of an alarm, one of them being to activate a digital output for optical or acoustic signaling. In order to notify responsible personnel of alarms even when the control room is unmanned, HIGH-LEIT supports alarm notification per phone voice output, via voice modem, email, fax, pagers or SMS. The notification of the maintenance personnel can be automated via corresponding calendar functions and thus be scheduled on a long-term basis.

Multi-client Capability

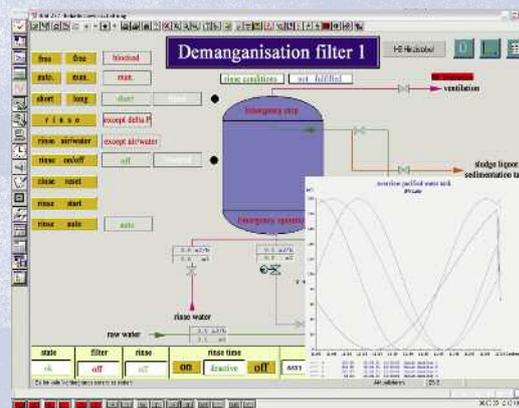
HIGH-LEIT, as a multiclient-oriented system, can process data from different plants separately. The user can configure access permissions structured at workstation, function, operator, sector and client.



Remote zooming with navigation window in a geo-referenced world map



User interface with context-sensitive help instructions



Display with archive graphics

Object-oriented Parameterization

HIGH-LEIT supports object-oriented configuration. Systems, subsystems and resources can be created, copied and deleted in accordance with logical level. The entire system hierarchy is clearly presented in the HIGH-LEIT navigator and can be processed in connection with the display editor.

In HIGH-LEIT templates for data and graphical objects are managed separately from the data model. By this it is possible to centrally modify bequeathed characteristics such as colouring, symbolism etc. Also electricity topological functions can be parameterized object-oriented. Here the pattern technology can be used to automatically create multiple diagrams of substations, feeders or power lines, based on the topological representation of the

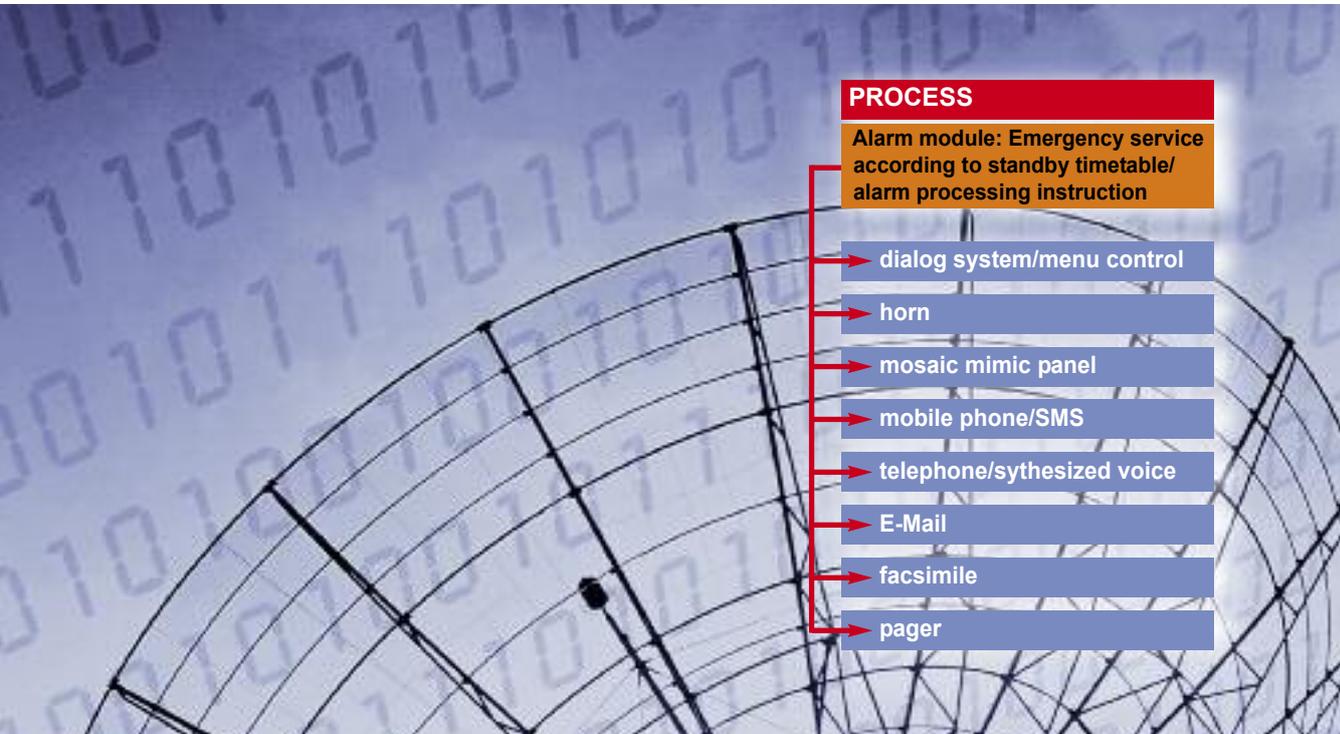
electrical network. Alternatively, easy-to-use input dialogs are also available for conventionally configuring the system.

For the parameterization of the system with large data amount (e.g. from existing systems), MS-Excel is integral part of the parameterization interface.

Connectivity

The "connectivity" function provides interactive generation of graphics and reports, the start of various queries, e.g. log or data model, or the request for additional information on objects. The function is easily called via the popup menu and is available throughout the system.

SCADA Functions



SCADA Functions

HIGH-LEIT SCADA functions go far beyond basic processing of monitored binary information, measured values, counter values, switching commands and setpoints. Extensive consistency and plausibility checks and complex logical or arithmetical computations make process control easier. The process variables can be archived over a long period of time, limited only by disk capacity. Sampling rates range from instantaneous values taken with milliseconds resolution, as well as the archiving in minutes, 1/4 hourly, hourly, daily, monthly or annually intervals. Peak and average values can also be computed.

In addition to the usual ways of representing archived information such as line charts, bar charts, x-y-plots, statistical displays, dot charts and alphanumeric reports in freely definable layouts, a wide range of filter functions for event reporting enable the user to quickly and precisely obtain the desired readings.

The fully integrated Excel-reports offer further evaluation and presentation possibilities. All presentation and processing functions can be grouped according to sector and are thus available or inhibited for user groups.

Archived data can be automatically stored on external mass media and later processed using standard HIGH-LEIT functions (reports, charts etc.). This allows different archive periods to be compared.

Sophisticated Applications

Electricity

HIGH-LEIT in the electricity sector offers for topological presentation, in addition to the basic functions, various ground fault and short-circuit search strategies for meshed or branched networks as well as schematic representation of lines for overview diagrams – a unique feature. It is possible to snapshot a process image copy at any one time for later recall.

A further topology function provides for network provisional arrangements. These involve time restricted network changes which are input directly and without generating action into the network diagram. In this way, replacement lines, separations, replacement transformer stations and emergency feeders can be included.

As a standard functionality, basic interlocking rules are implemented in the HIGH-LEIT topology software package. Formulation of additional and explicit interlocking conditions is needed only under exceptional conditions. Within online network calculation, in addition to the present load flow, currents from single or multipolar short circuits may be computed.

During short-circuit disconnections, the system automatically determines command times and run times and detects switching failures.

HIGH-LEIT also makes extensive process simulations possible. Review and snapshot function as well as switching sequence recorder and load flow computations, can be incorporated into a training program for operating personnel.

Graphical presentation and logging of power network events (with millisecond resolution), a network protection data log, as well as process recording also are all part of the extensive HIGH-LEIT functionality.

Data and fault logs can be acquired, evaluated and archived from digital protection relays in accordance with IEC 60870-5-103.

HIGH-LEIT functions include load control and optimization taking into account sheddable load (including front-end and back-end night storage

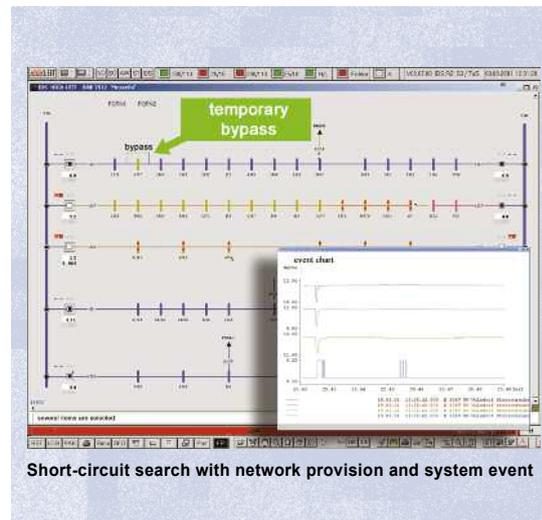
heating), district heating power stations and emergency power supplies.

Electric load control is possible on a spontaneous or a scheduled basis. Scheduled load control utilizes adaptive mechanisms for output forecasts.

In-house generation of electricity using gas (heating power stations, gas and steam power stations etc.) allows cross system optimization, which can minimize total energy costs.

Flexibility of the tools used ensures that tasks to be modified in the future due to deregulation can be solved.

Functions for the control of ripple control equipment can be directly integrated into HIGH-LEIT.



Short-circuit search with network provision and system event

Advanced Management Functions



Gas

For gas supply applications, HIGH-LEIT provides extensive functionality for forecasting gas output. In addition to two adaptive mathematical forecast algorithms and the prognosis with neuronal networks, the system can incorporate a climate database for long-term archiving of reference days.

Easy to use software modules control output optimization for hourly and daily based contracts involving storage reserves, peak supply units and disconnectable consumers.

Upon request, a dedicated computer for dynamic gas network simulation can be integrated into the control system.

Heating

HIGH-LEIT optimally controls heat generation and heating/power stations as required. All local PLC parameters can be adapted throughout the control system. Requests from other sectors (e.g. where generating power has priority) are automatically taken into consideration. For local and district heating supply HIGH-LEIT provides functionalities for forecasting heating requirements and for optimizing heating generation and distribution. Local controllers can be incorporated into the higher level optimization.

Multi-Utility Optimization

For electricity, gas and district heating systems an overall optimization is possible. For this purpose deployment scheduling is done for combined heat



Water

In addition to the detection and monitoring of leaks and low levels, HIGH-LEIT provides algorithms for water demand forecasts. Based upon predicted demand as well as available reserve capacity in purified water tanks, the use of on-demand pumps can be optimized. Moreover, procedures for optimum control of mixing water are also provided.

Environmental Technology

HIGH-LEIT provides automatically documents for presentation to supervisory authorities in form of Excel reports. Analysis results are automatically taken from analysis equipment or can be manually entered. Completeness and plausibility of manually entered data is also verified.

HIGH-LEIT also controls and monitors large canal networks. Special optimization and prognosis modules determine the draining procedures in the canal network, and allow the individual dam reservoirs along the canal system to be optimally managed during times of rainfall.



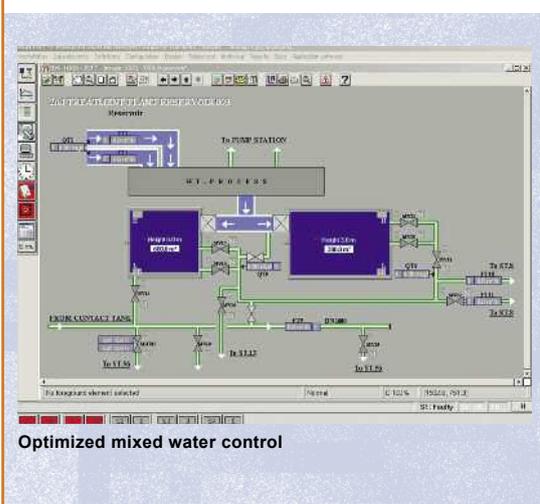
and power plants, taking into consideration power and heating requirements as well as available heating storage capacity.

Pipelines

HIGH-LEIT provides special functions for control and monitoring of pipelines for gases and liquids. Dedicated computers can be used for leak detection and localization.

Broadcast Networks

HIGH-LEIT is used for controlling and monitoring civil and military broadcast and communication networks. Special communication structures, such as broadcasting for radio and television stations can also be used. Modern transmitter equipment can be coupled using available standards directly via SNMP (centralized and de-centralized) or also via a bit bus.



Optimized mixed water control

System Architecture

HIGH-LEIT with its decentralized structure is an open system with scalable computing capacity. Control level, process connection, user level as well as additional dedicated computers for special tasks are linked together via a high speed network.

Redundant configuration in "hot-standby mode" is possible for all system components. Additional functional servers are integrated for e.g. simulation or training tasks, for database applications or any other CPU-intensive computations (load flow calculations, dynamic gas network simulation).

Control and user levels embody a classical client-server architecture.

HIGH-LEIT supports control system interfacing in accordance with IEC 60870-6 (TASE.2) as well as via IEC 60870-5-104.

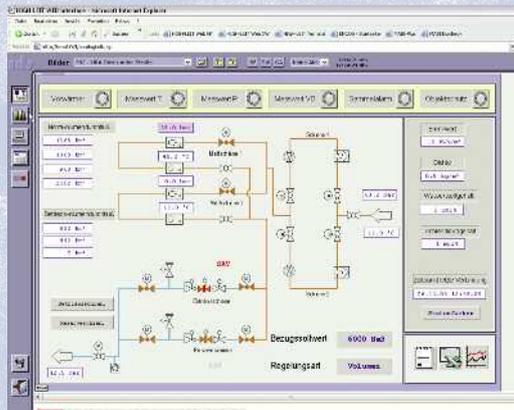
The open system architecture of HIGH-LEIT enables the integration of interfaces to other systems. Mutual data exchange with systems for energy data management, which are widely used by public suppliers, is easily possible.

HIGH-LEIT provides interfaces for horizontal integration of further applications such as geographical information systems (GIS) or plant or

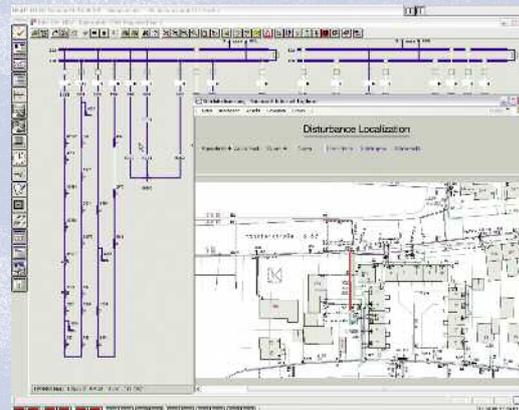
workflow management systems. As an example, the IDS ACOS NMS system shall be mentioned with its functions asset management, maintenance management, outage management and fault documentation and workforce management, which exchanges specific data with HIGH-LEIT online.

Decentral control systems can be linked via WAN, and in this way also incorporate redundant tasks within the entire system.

The HIGH-LEIT SNMP manager offers maximum convenience and safety for complex IT-networks. This intelligent utility program monitors function and workload of all active network components and detects a wide range of failures (failure of active network components, faulty cables etc.). With appropriate redundant design of the network, data flow is diverted automatically via other available network components. Status and workload parameters of the individual network components can be visualized on operator station screens so that it is at any time possible to rapidly pinpoint and where necessary replace faulty components.



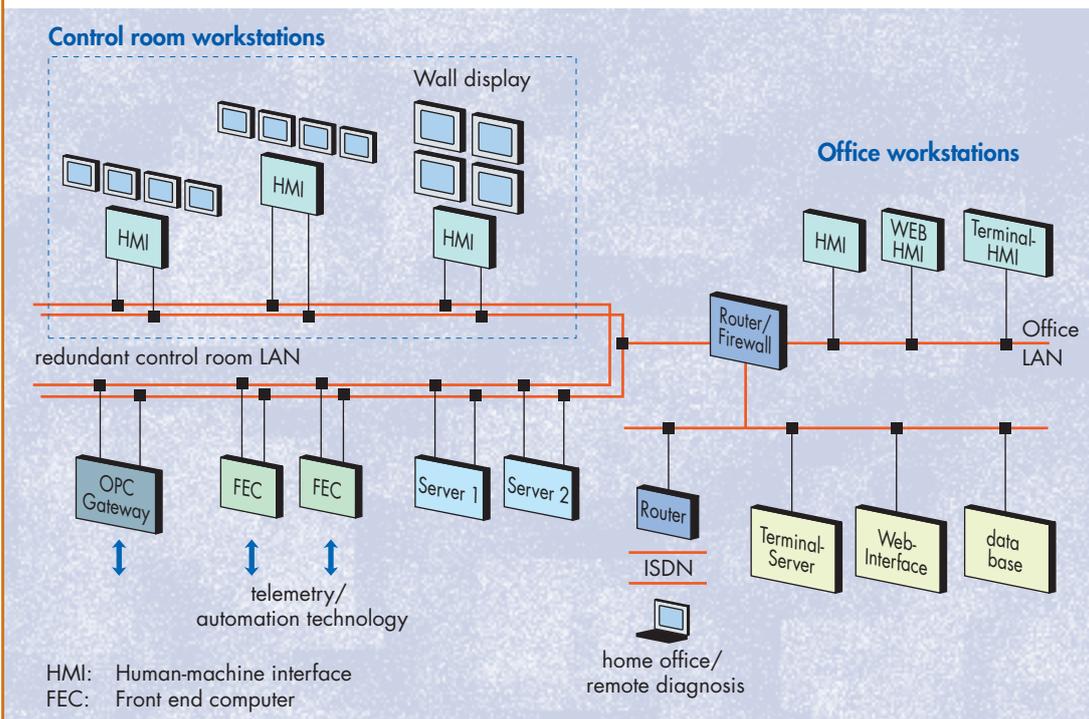
Web technology



Geographical information system (GIS)



Sample configuration IDS HIGH-LEIT



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