

## **Innovative Software for Environmental Monitoring Systems**

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**The new generation environmental monitoring software package Prosum, developed by Siemens, is optimally tuned for usage within a network, as demanded by many users today. The new implementation of the user interface in Java has, above all, contributed its share.**

Main Objectives of this new development, whose initial module was presented at the Envitec in Düsseldorf, were among other things, extensive independence from the operating system and the database management system, the minimization of administration costs and fulfillment of the new ergonomics requirements for office work with visual display terminals stipulated in the ISO 9241. The sections 10 to 17 are defining the software requirements. Here great value is attached to the usability and efficiency of the software, which will not be accepted without an appropriate design.

For more than 20 years Siemens has been developing software in the field of environmental monitoring. Today, Prosum is monitoring the air quality in Niedersachsen (Germany) just as reliable as the nuclear power plants in Switzerland. The software Package Prosum can be used for Ambient Air Quality Monitoring, Radiation Monitoring, Water Quality Monitoring, Meteorological Monitoring and Toxic Gas Monitoring thanks to its very modular design.

Siemens offers software packages for monitoring stations (Prosum-SR), head quarters (Prosum-ZR), work places (Prosum-APR) and the presentation of the readings in the Internet for public consumption (Prosum-Web). On request, the software can be tailored to meet special client requirements.

### **Prosum-APR**

A new software system today must fit into the existing IT infrastructure, which is characterized by heterogeneous hardware and operating systems. The operational sites are scattered over a whole region and linked by telecommunication Services to a wide area network. The internet technology is well suited to solve the occurring problems.

With the new conception of Prosum-APR, Siemens is breaking the territory to meet the increased demands on a workplace in environmental monitoring systems: JAVA was used to implement a browser based software solution, which goes towards an improvement facilitating the functionality. Great store was set especially on high performance of the software operating in a wide area network (WAN).

The graphic representation in particular benefits from this new design. For example, within a report on the screen the sequence of the columns may be altered by drag and drop. One of the first implemented modules is a clear overview of the current situation presented in a map. For each point of measuring the actual reading together with the meteorological data are shown. The presentation of the value can be shown as a figure or a graph, as is desired.

### **Prosum-ZR**

Prosum-ZR is designed to meet all requirements for a central system in an environmental monitoring network, It interrogates, processes and stores all readings taken from the linked

measuring stations as well as their messages. The complete network can be supervised. With a dual host configuration high availability, as demanded for remote radioactivity monitoring networks is available: in case of an error all tasks are automatically carried out by the standby server.

All retrieved values are checked against their measuring range as well as a maximum of four limit values before they are stored in the database. Extensive mathematical, logic and technology related functions are provided to define new calculated values, which are also checkable for limit violations.

In case of an emergency the responsible persons are informed automatically by a Pager or SMS. A laptop with a modem can be used at home to connect to the headquarter and check the situation immediately.

All readings and the messages are stored in the central database. Here Prosum-ZR offers all the requisite operators for the calculation of meaningful average values. The readings archive is flexible and enough to be configured online to meet customer requirements, even for a huge measuring network storing more than 1000 readings for each period, Prosum-ZR is used without complication.

The total time period available online for evaluation is only limited by the hard disc capacity. Typically 20 years (of 30-minute averages) are available. Prosum-ZR also offers historical administration of available readings.

Beside the standard representation of graphs and reports some application specific evaluations are implemented. For air quality monitoring you are fulfilling the EC directives. For radioactivity monitoring Prosum-ZR includes a dispersion model to predict the dose rate in the vicinity of an NPP. Furthermore, the IDF-Format for an international data exchange is built in.

## **Prosum-SR**

Designed for a standard PC and the operating system Microsoft Windows, Prosum-SR carries out all tasks necessary in a monitoring station for the complete autonomous operation of the station and its analyzers: acquisition of the readings, determination of average and calculated values, data storage and transfer of the values, automatic calibration of all connected analyzers and immediate transmission of alarm messages.

Prosum-SR supports most of the analyzers normally used for environmental monitoring. Analyzers equipped with a serial port can be connected directly to a multi-port I/O serial card in the PC. Per card, a maximum of 16 serial ports is possible. Analyzers or Sensors supplying analog signals have to be connected to an external analog/digital converter, e.g. a Siemens SIMATIC PLC which itself is connected to the PC by a serial port. This concept of an external A/D Converter is the long run more economical than internal cards for the PC because they are often no longer supported when the PC is modernized.

The readings from all connected devices are retrieved cyclically. The cycle time is configurable. As a minimum, a one second interval is possible.

For each retrieved value, a value adaptation may be specified to calculate the final value. Prosum-SR offers linear or logarithmic adaptation as well as the possibility of defining sensor specific curves based on up to 21 points. Furthermore Prosum-SR comes with special methods for common meteorological parameters like wind speed or wind direction.

Quality assurance starts with the data interrogation. All measured values are tested for plausibility. For this the value is checked against the defined measuring range. Furthermore, the value is checked for limit violations: four limits can be activated (two upper and two lower limits) The results of the quality check are stored in the quality marking for each value.

As well as the readings the status signals are retrieved from the connected measuring devices (e.g. maintenance, warning) and other units (e.g. door contact, alarm signals from UPS). These status signals can be stored in the quality marking. Furthermore, a configurable message can be triggered if a status signal is changing its state.

All retrieved readings are compressed to average values. Two different averaging cycles are configurable: e. g. 10 minutes and hourly averages. In addition to the configured averaging cycles the extreme values of each day are determined.

Prosum-SR is able to calibrate most of the connected analyzers automatically at user defined regular intervals. The following sequence is used for each calibration:

- Zeropoint Calibration
- Span calibration
- Clearing of the analyzer

The time for each step can be customized. If required, the calibration can also be started immediately per user interface. The achieved results are stored in the archive and so available for long term analysis.

The archives for messages and average values are created on the PC hard disk during the installation of the system. The required space depends on the time range to be stored on the disk. As a maximum 65535 values can be stored for each measuring point. This results in it storage capacity of 455 days for 10 minute averages.

Prosum-SR is capable of exporting all archived average values as well its all messages in ASCII format for further evaluation in other software systems (e.g. Microsoft Excel). This export can be triggered automatically at regular intervals.

Exported Data can be transferred to other computers using standard transfer programs and protocols, such as FTP. Furthermore, an interface is available for a program - program communication. The average values as well as the messages are transferred to a second computer upon request.

## **Ready to use**

Upon request, your complete measurement system can be delivered and installed ready to use - including multiple stationary and mobile measurement stations, a measurement data processing centre and the communication system.

## **Project Management**

Siemens has diverse experience and extensive involvement in the areas of industry and traffic - good qualifications for the successful management of highly complex environmental monitoring

projects. More than that, Siemens possesses the ability to turn vision into reality, and has an enormous pool of resources upon which to draw.

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**Fig. 1: Overview of current situation**

**Fig. 2: Graphic presentation in the internet**

**Fig. 3: Prosum software in an environmental monitoring network**

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