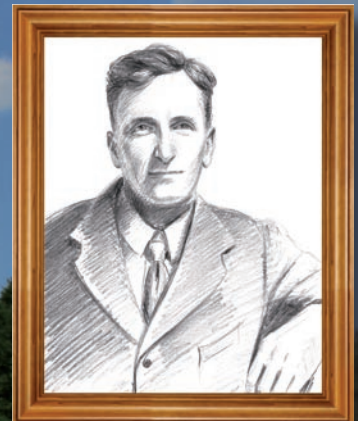


AquisNet

AIR QUALITY MONITORING

Air Quality Monitoring Software

IMMISSION - AMBIENT AIR QUALITY MONITORING |
EMISSION - CONTINUOUS EMISSION MONITORING



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As man is now changing the composition of the atmosphere at a rate which must be very exceptional on the geological time scale, it is natural to seek for the probable effects of such a change. (The composition of the atmosphere through the ages, Meteorological Magazine, 1939)

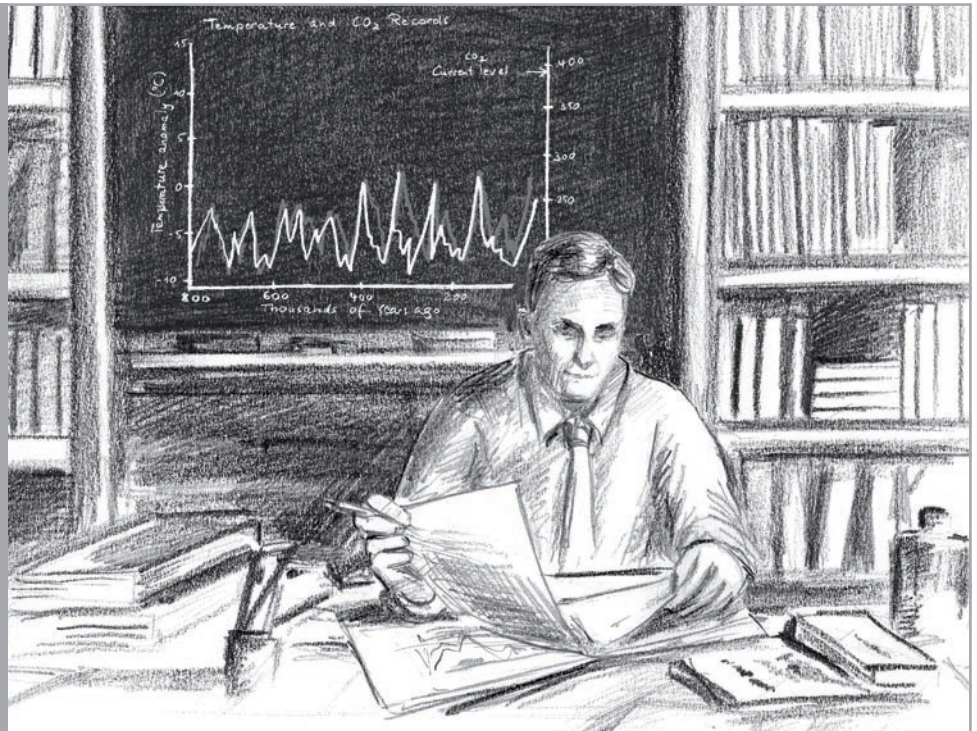
Guy Stewart Callendar | British steam engineer and meteorologist



 **KISTERS**
Pioneering Technologies.

Scrutinizing time series data

Guy Stewart Callendar, a renowned British steam engineer and meteorologist, studied the relationship between tropospheric CO₂ concentration and temperature. Disciplined and perseverant, Callendar scanned through CO₂ records reaching back to the late 19th century, rejected foul data using his quality assurance method, produced comparable aggregated CO₂ data, and correlated them with temperature time series and statistical information on fossil fuel consumption. In 1938, after thoughtful study and calculation, he published his thesis of a significant temperature increase linked to fossil fuel consumption at industrial scales. Today, this effect is known as the Callendar or Greenhouse Effect.



Intelligent - flexible - future-proof. Air Quality Monitoring needs AquisNet.

Considering the harmful effect of air pollution on human health and wellbeing and the threats of climate change due to emissions of greenhouse gases (GHG), both air quality monitoring and continuous emission control remain top priority topics on the political agenda. In the industrial field, as the regulations are extended, continuous emission control is increasingly used for process control and optimisation. A large variation of analyzers are used in ambient air monitoring stations depending on the specific role of the station for background, roadside or industrial monitoring.

Air pollution is a transboundary problem due to the long persistence of certain pollutants in the air and the (large-scale) transport by wind. The importance of the

topic is underpinned by the existence of national/supra-national legislation. Ambient air quality monitoring, monitoring of hazardous emissions and stack emission monitoring are dealt with by often complex and wide-reaching regulations. Furthermore, many countries adhere to international treaties setting clear targets such as the Kyoto Protocol and the United Nations Framework Convention on Climate Change.

Air monitoring software is designed to unburden you from the aforementioned intricacies. It provides a safe and powerful framework to collect, centralize, manage, analyse and report data.

Wondering how to successfully run your air quality monitoring network?

KISTERS' **AquisNet** (Air Quality Information System and Network) software covers all tasks of the process chain from data acquisition to validation, mass storage, graphical and numerical analysis and reporting. AquisNet is used by both public authorities and private industrial companies.

KISTERS' AquisNet is available for both: the data centre and the monitoring station. The data centre software excels where air quality networks grow big in terms of both stations and needs in archiving of legacy data. As a true air quality monitoring software, AquisNet' data-acquisition software performs all functional tests, controls the calibration cycles of intelligent analyzers and provides full logs and data flagging. AquisNet is an innovative multi-tier client server component software whose modules can be combined with ease to suit any deployment scenario and individually configured into a tailored customer solution.

AquisNet properties

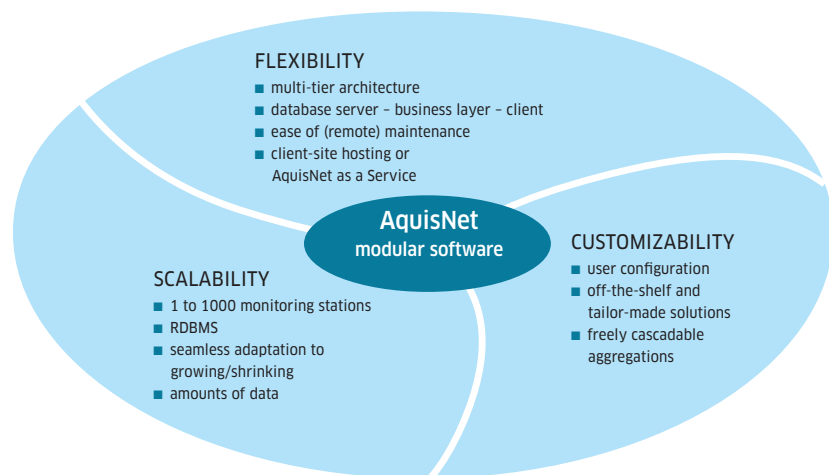
The core of AquisNet is time series management in scalable relational database management systems. KISTERS technology is field-proven with a total of around 500 customers worldwide. Despite the large measurement datasets and complex evaluations and calculations, AquisNet remains easy to use and can present data in a clear and readable fashion.

AquisNet is a modular software system. Subsequent advantages for the end-user are flexibility, scalability and customizability. AquisNet can be

- flexibly adapted to your particular needs,
- scaled to accommodate any amount of data from networks of varying extent and for more or less long archiving periods,
- customized to your national legislation and internal rules.

AquisNet is available as a comprehensive software package for both the data centre (data centralization, management, aggregation, analysis, validation and reporting) and the individual monitoring stations (data acquisition, plausibility checks, calibration runs and functional tests, local storage). Alternatively, individual modules can be combined to produce adjusted solutions meeting specific needs such as evaluation, station control or control centre management.

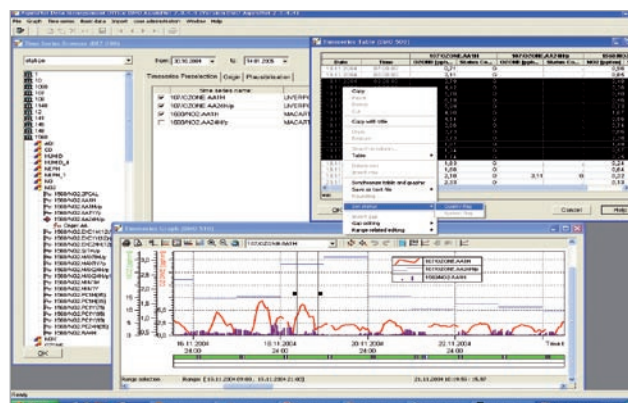
AquisNet is both platform-independent and web-enabled thanks to a clever choice of programming languages and development environments (C, Java, PHP). AquisNet will run on both Windows and Linux environments and can be set up to communicate with different commercial and open source relational database management systems.



Web applications are available to supervise and configure measurement stations and to manage data stored on the database server. Discontinuous manually entered or imported (from external sources) data such as laboratory analysis results can be stored alongside continuous measurement data. Metadata on measurement stations can be managed and mobile equipment can be tracked. For all communications with remote DAS, AquisNet has a preference for the highly reliable, standard TCP/IP protocol on a wide selection of communication links such as ISDN, GSM/GPRS, 3G, DSL, ...

AquisNet is a data management centre software for air quality monitoring networks consisting of homogenous or heterogeneous stations for applications such as:

- ambient air quality monitoring
- fence line monitoring (industrial air pollution concentration monitoring)
- meteorological monitoring
- roadside monitoring
- background monitoring
- tunnel monitoring
- monitoring of background concentrations
- continuous emission monitoring (CEM)



Right from the outset, AquisNet has been designed with demanding applications in mind. The continued development in close cooperation with major customers has resulted in versatile generic software that is easily augmented, localized and configured to meet specific user needs.

AquisNet functions

General functions

Station management & data management

- flexible metadata: user-defined combination of attributes
- station data and station groups
- original time series and production time series
- measurement and calibration data
- aggregation templates

Automation

- time-table controlled polling of measurement stations
- automatic execution of aggregations
- automatic execution of user defined reports

Calculation

- arbitrarily cascadable aggregations (min/max, sum, percentile, mean value, exceedance frequencies, ...)
- plausibility checks (relative/absolute standard deviation, 2-way plausibility check, ...)
- correction (interpolation)
- free and predefined evaluations

Time series management

- graph and table time series editor
- interactive processing of one or several time series
- time series browser and history

Reports

- predefined and user-defined reports
- basic data reports
- measuring data reports
- report storage
- report scheduler
- report formats: HTML, PDF, CSV, XLS

Display

- configurable numeric tables and line graphs, polar graphs, bar graphs
- time series, aggregations, etc.
- wind and pollutant concentration roses
- advanced 'openair project' graphics types

Data import, export and forwarding

- import from a range of sources (stations, laboratories, other measuring networks, interval measurements)
- export of time series and basic data

- report forwarding by ftp, email, fax, sms or printer
- web publishing

Special functions for the data acquisition system AquisNet DAS

Data acquisition

- highly configurable individual input channel drivers
- support for intelligent serial analyzers and scanning of analogue inputs
- individualized scan rates
- individualized integration cycles

Local data handling

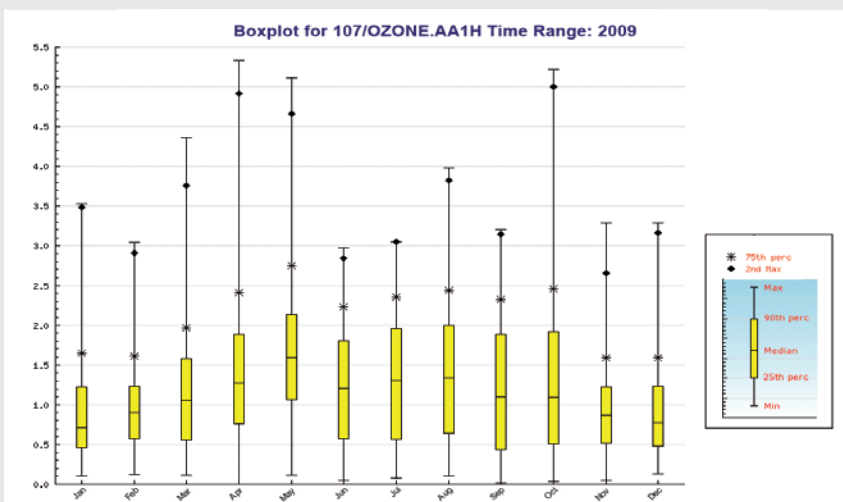
- data validation and plausibility tests
- functional tests of intelligent sensors
- control of calibration cycles (including appropriate data flagging)
- configurable ring buffer for continuous loss-free storage of input signals
- data storage autonomy depends on available disk memory only
- versatile and comprehensive data flagging

Interactive station software

- set up and configuration
- several tabular and graphical views of locally stored data
- web application

Alarm function

- analyzer/sensor malfunction
- intrusion into shelter
- peripheral malfunction (air conditioning, suction, etc.)
- calibration or function check failure
- alarm messages forwarded by ftp, email, Fax, sms



AquisNet Software

AquisNet consists of five fundamental software modules:

- AquisNet SYS (system core)
- AquisNet DMO (data management office)
- AquisNet REP (reporting)
- AquisNet DV (data forwarding)
- AquisNet DAS (data acquisition system)

A functional data centralization system can be built by combining just two of the modules, namely the AquisNet SYS with either AquisNet DMO or AquisNet REP. AquisNet DV adds the periodic communication and alarming functions required in networks. AquisNet DAS is a data acquisition Windows application for non proprietary PC computer systems. Finally, it would be possible to run a complete system consisting of all modules in a measurement site or on a central data management server.

Load balancing and multi-user access are main advantages of distributed client-server architectures. AquisNet SYS manages user rights for both users located inside or outside the data center. All external data sources (DAS polled by SODA) and sinks (users using either a Web browser or any AquisNet client)

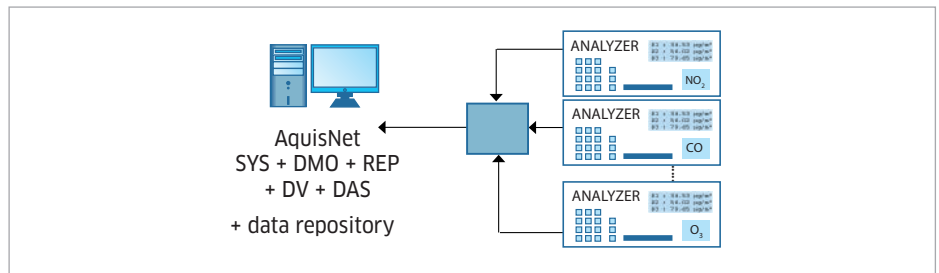


Figure 1: Typical single station architecture

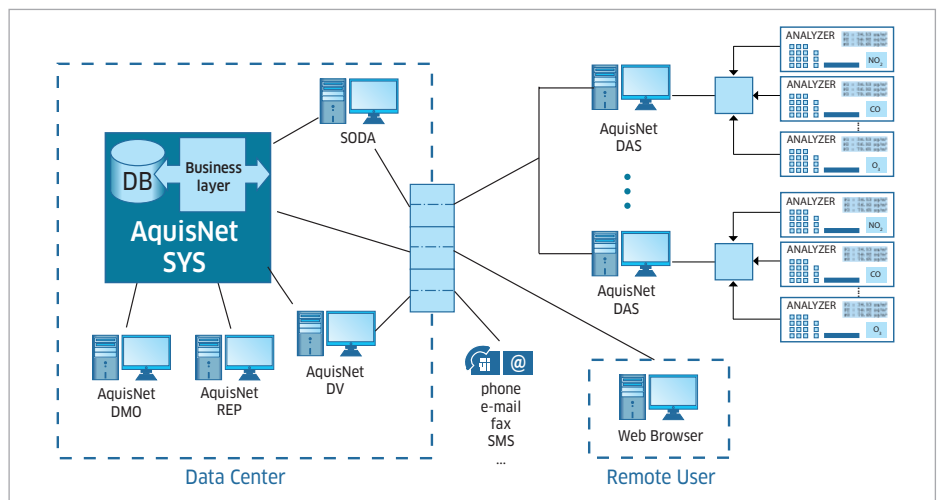


Figure 2: Typical multi-user monitoring network architecture

are connected using TCP/IP protocol on either WAN or LAN links. AquisNet DV opens the door towards commodity communication

links/protocols such as voice messaging, email, fax, sms, etc.

KiTSM - KISTERS Time Series Management as a shared base technology

In many technical and commercial software systems, it is necessary to acquire, process and archive mass data in the form of time series. In addition to many specialist technical aspects, rapid processing and quick data access are of utmost importance. These demands call for specific software solutions,

which up until now were typically developed independently for each application. The KiTSM (KISTERS Time Series Management) System is the shared system core of all KISTERS products where time series are involved. It represents the application layer of a 3-tiers architecture, and provides all services

necessary for time series management and calculation to applications built upon it.

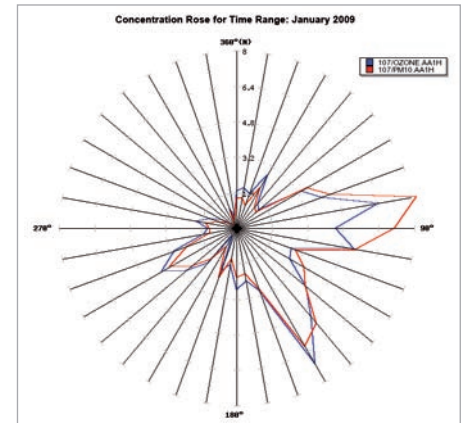
A time series is a time referenced sequence of data points. Individual or multiple numerical values are called, transferred, verified and held for further processing not continuously,

but in regular or irregular time intervals. In addition to its numerical value, every data point has at least a timestamp, and often also further qualifying information. Time series reflect states, development and trends, and form the foundation for technical and business processes, forecasts and decisions.

In the KISTERS products for the management of air quality data (AquisNet), hydrological data (WISKI, Hydstra), and energy data

(BelVis), time series management is the core function of the products, paired with the specialist knowledge cast in the software framework for the respective fields of application.

With the development of the TSM System, KISTERS has succeeded in bundling over 25 years of competency in time series management in various fields of application into a central software component.



The AquisNet Team - dedicated to the customer and to continuity

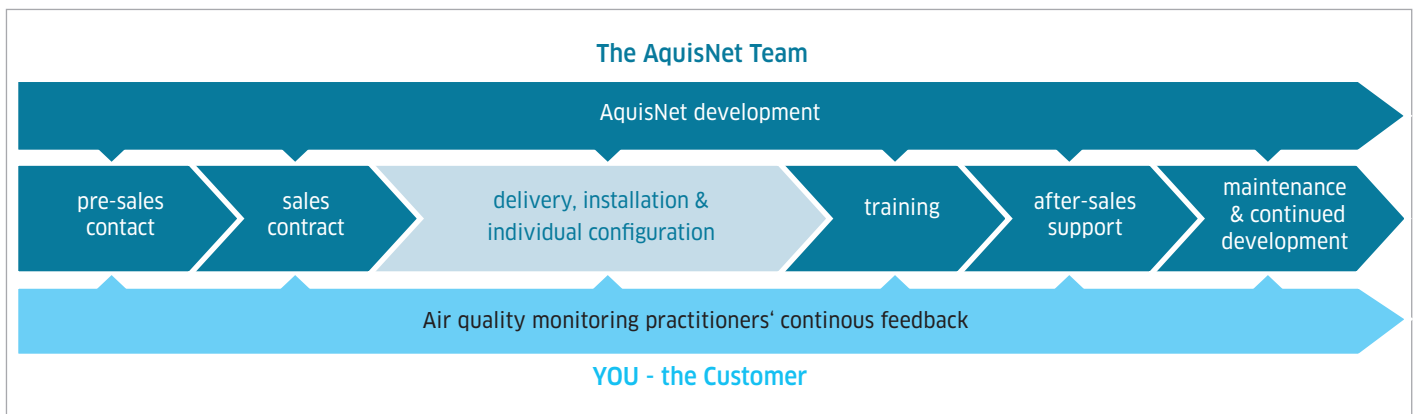
AquisNet is more than just a mature and capable software solution; it is contemporary, state-of-the-art software constantly evolving by means of a continuous development effort. Actually, the broad range of functions is frequently adapted to keep suit with both changing regulatory requirements and practically-orientated demands from the customer base.

Your advantages are manifold as the larger customer base bears part of the continuous improvements of the portfolio as a whole, thereby increasing market relevance, future performance and quality.

KISTERS' in-house developers and experts from the AquisNet Team carry out the continuous development of AquisNet. The team features members with academic training and practical experience in IT, software development (database, application and web) and environmental sciences. Continued care is brought to you by the AquisNet Team from pre-sales contacts to ongoing after-sales maintenance and development. For more than 15 years, customers from both public institutions and private companies actively using AquisNet cherish this unique consistency in dealing with KISTERS AG.

The long-standing and continued existence and development of AquisNet has helped to build solid software that has proven its worth many times over.

The AquisNet team would be pleased to help you choose the optimal software solution for your requirements. The KISTERS portfolio ranges from consultation and planning, to full operation and maintenance of a measuring network for air quality monitoring, right through to user orientation and training.



KISTERS - a sure bet in environmental informatics

KISTERS AG is a worldwide leader in the environmental informatics market.

The story of KISTERS AG is the story of environmental informatics. Starting off more than 40 years ago as a consulting engineering company, the need for powerful software to assess and manage complex environmental problems was perceived and the cornerstones of the current portfolio of products and services were laid.

From here on, KISTERS AG evolved fast into a multinational player with fully-owned subsidiaries in the USA, Australia, China, New Zealand, Spain, France and Germany.

Time series management is a core competency at KISTERS, with some 25 years of development and deployment experience. In this time, the base technology has successfully been transferred and applied in the design of air quality measurement networks, in the water management field, in the data management field in networks, sales, retail and procurement in the liberalised energy market and with transportation telematics. The breadth and intensity of the fields where the technology has been deployed have resulted in constant optimization and performance improvements. The concepts and technologies developed in-house by horizontal expert teams provide a technological basis shared between KISTERS' monitoring applications, the most prominent of which are

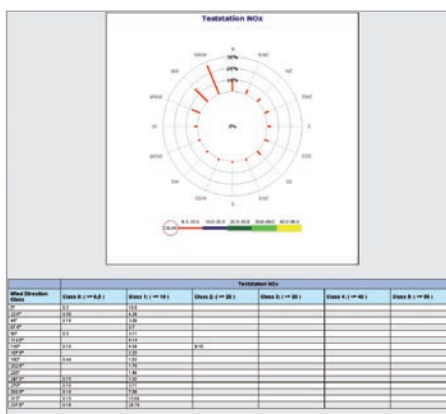
- AquisNet, KISTERS ambient air quality monitoring software,
- WISKI, KISTERS water monitoring and management application,
- BelVis, KISTERS monitoring and manage-

ment solution for the deregulated (EU) energy sector.

And there is more to KISTERS than just a handful of star products: weather radar software Calamar and data-acquisition systems SODA and HydroTel are perfect complements to the aforementioned environmental software solutions.

In its team of 400+ employees worldwide, KISTERS unites expert knowledge from fields as diverse as engineering, mathematics, geography, database/application/GIS programming, environmental sciences, IT, ... Employee qualifications in the business division of environmental information technologies are distributed as follows on a percentage basis (excluding administrative personnel):

- Engineering degree 32 %
- Doctorate in engineering 6 %
- Humanities degree 11 %
- Doctorate in humanities 7 %
- Degree in mathematics / computer science 28 %
- Other college degree 3 %
- Data processing or other education 13 %



More important than individual qualification is people constructively working together in expert teams, devoted to their task and at the service of the customer. These melting pots of informed thoughts and ideas ignited by customer feedback are the source of the sustainable advantage built into KISTERS products. Leading customers expect leading products.

We constantly push on the technological advantage of our products with an international team of natural scientist and engineers. Whether it's for resource management, the energy industry or environmental protection and safety: we develop software for mature markets and highly organized customers. We meet the high, standardized demands concerning mass data and processing velocity, data quality and long-term archiving, failure and information safety. For this reason our software establishes a sound basis for efficient, effective and legal handling.

Why AquisNet?

Monitoring air quality either in ambient air or right at the emitting source is a challenging task that produces huge amounts of data to be delivered in time and in compliance with severe quality standards. Developing reliable, powerful yet convenient software for this task requires in-depth practical experience in time series data management.

KISTERS has cast this experience into AquisNet. Just like its peer products for water and energy monitoring, AquisNet relies on KISTERS advanced time series management technology.

Effectively, AquisNet makes air quality monitoring more convenient and unburdens the user from all the routine tasks linked to the management of long time series.

This leaves more room for your scientific analysis, which results in a better understanding of effects and causes and therefore leads to better action plans. Furthermore, your investments are protected due to the continuity of KISTERS' development efforts, the scalability of the offered time series management solution, the highly flexible client-server architecture, and – last but

not least! – the significantly lower system administration costs thanks to the upcoming sharing of a core time series engine between all KISTERS applications. Considering KISTERS long-term presence in the air quality monitoring market, AquisNet is a field-proven software product. Nevertheless, AquisNet does not suffer from the superficiality of off-the-shelf software. At KISTERS we care for our customers and are happy to individually configure AquisNet into a tailored customer solution.

AquisNet Advantages in a Nutshell

- field-proven time series management technology ensures data integrity and fast processing/calculation
- data acquisition and validation in real-time
- fully automated processes to acquire, validate, collect, centralize, store, manage, evaluate and aggregate data
- numerical statistical analysis and powerful graphics
- advanced reporting and dissemination schemes including web publishing
- flexibility due to modular concept to suit your needs now and stay open for upgrades in the future
- no requirements to use proprietary technology
- reliable TCP/IP communication on many different types of communication links
- choice of operating environment and relational database management system
- scalability to meet data needs and budget constraints
- consequent use of technical standards, thus easy integration of AquisNet into existing IT platforms
- compliance with major air pollution regulations
- support for individual language versions
- continued development keeps software up-to-date and additionally constitutes a solid base for both individual adaptation and project work
- software solution + reliable services by a competent team of KISTERS experts
- the complete monitoring chain covered by a single software solution from one supplier

And don't take our word for it: Ask for AquisNet product demonstrations and reference customers. We at KISTERS are looking forward to your call!

AquisNet is a product of KISTERS AG, a multinational software and consulting company specializing in air quality, water and energy monitoring and management with subsidiaries in the USA, Australia, China, New Zealand, Spain, France and Germany.

Headquarters:
KISTERS AG
Charlottenburger Allee 5 - 7
52068 Aachen
GERMANY
Phone: +49 241 9671 0

Please do not hesitate to contact us for contact details of the AquisNet distributor closest to you. You may also want to check our website www.kisters.eu for more information on AquisNet and KISTERS worldwide subsidiaries.