# ENHANCING THE RELIABILITY OF EN 17255 DATA ACQUISITION AND HANDLING SYSTEMS

**The management and reduction of industrial emissions plays a crucial role in improving the global environment and public health. Environmental regulations are growing more stringent every year, and to manage emissions, industries must first accurately measure and report them.**

The quality of Continuous Emissions Monitoring Systems (CEMS) is intrinsically linked to the quality of the data they capture. With increasing investments into CEMS, ensuring the reliability, availability, and quality assurance of the data generated is critical. Standards such as EN 15267, EN 14181 (including Quality Assurance Level (QAL) 1, QAL 2, QAL 3), the Industrial Emission Directive (IED) 2010, and MCERTS have addressed these needs. However, EN 17255 emerged as a comprehensive standard focused on enhancing the reliability and accuracy of Data Acquisition and Handling Systems (DAHS), essential for ensuring compliance and uniformity in emissions reporting across various industries.

Incorporating EN 17255 into DAHS offers multiple advantages. It provides clear guidelines for data handling and processing, and aids industries in effectively complying with environmental regulations. The standard ensures uniformity in emissions reporting and enhances the reliability of CEMS data through its strict guidelines.

EN 17255 specifies a detailed data processing procedure, encompassing stages from raw data to QAL 3 corrections, First Level Data (FLD), Short Term Averages (STA), Long Term Averages (LTA), and tracking emission limits and availability. These steps are critical for ensuring accurate and reliable emissions reporting.

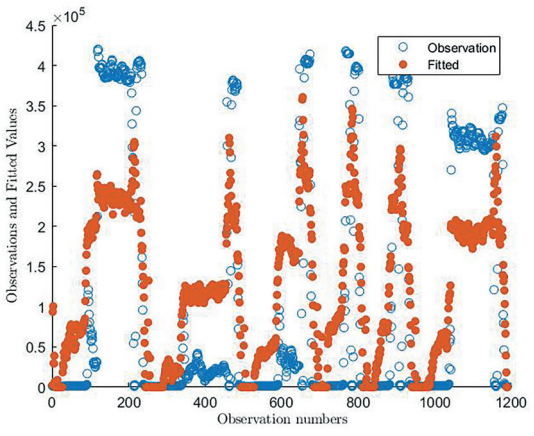
EN 17255 specifies data processing using the following: raw data → QAL 3 corrections → First Level Data (FLD) (1min) → STA (30m, 1hr, exclude offline data ⅔ rule) → substitution for invalid data → QAL 2 gradient and offset → correction to standard reference conditions (O2%, 273.15K and 101.3kPa) → Long Term Averages (LTA) (block, rolling, 6hr, 12hr, 24hr, 72hr) → energy rates and mass emissions → deduct confidence interval → track emission limits and availability.

Some facilities have their own requirements, for example applying an O2% correction at FLD versus STA, as well as when to subtract uncertainty.

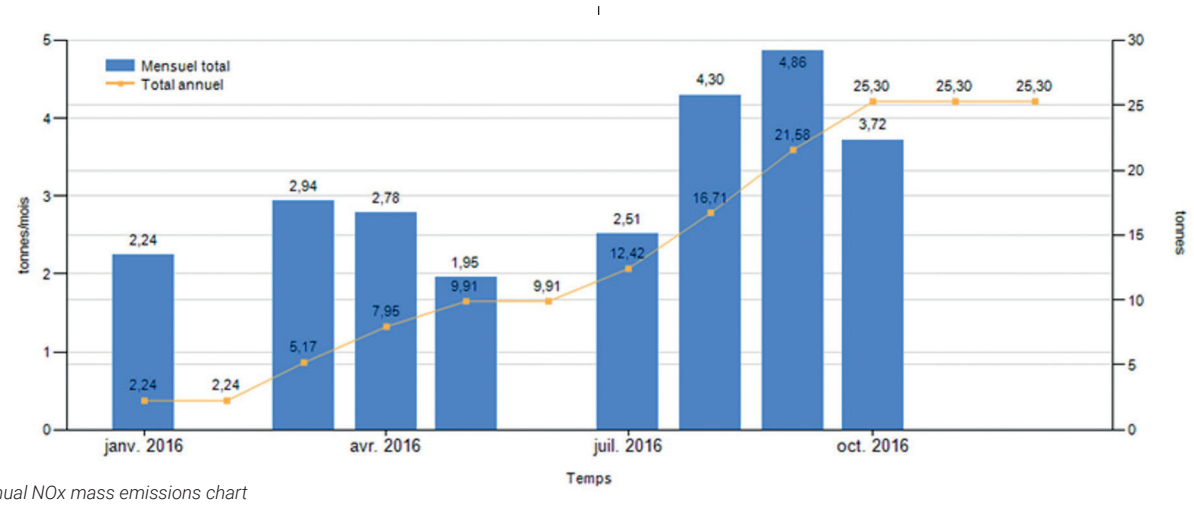
This is why we implemented a fully configurable engine supporting custom averaging (STA, FLD, LTA), data normalisation, energy rates, mass emissions, emission limit tracking, availability, and uncertainty.

The data processing and reporting is handled by Limedas, which is independent from the data collection software DCU. Changes such as new formulas and reports can be made to the system without affecting the data collection process. All calculations are performed on the fly, as needed, which greatly simplifies redundant synchronisation and data substitution.

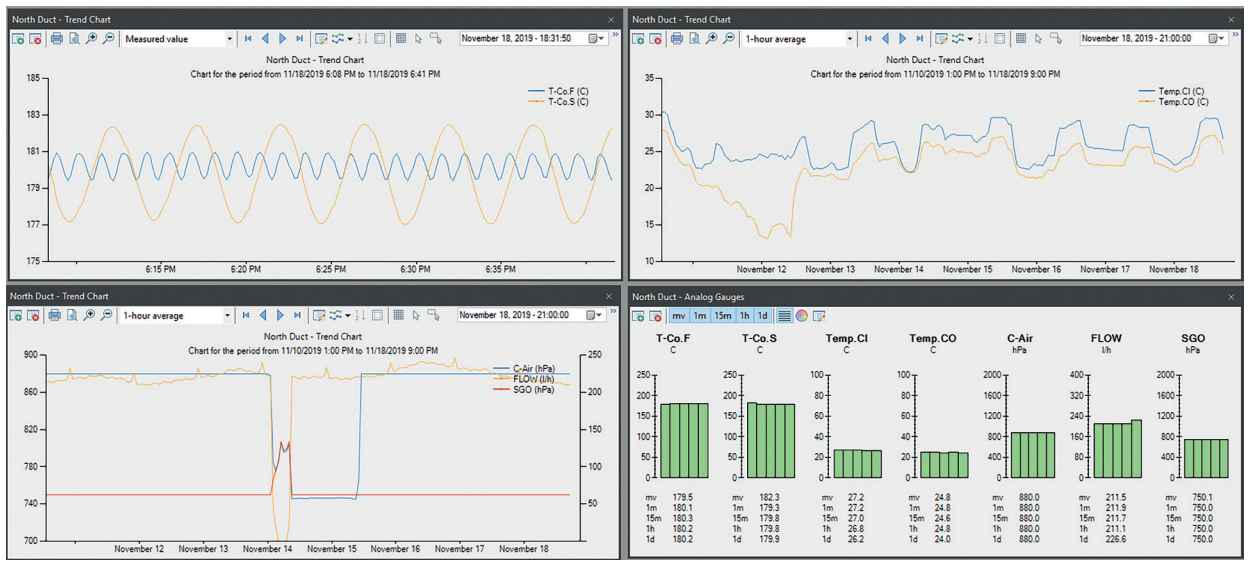
The system is a dedicated, fully configurable, open platform that facilitates troubleshooting and updates by end users, incorporating the latest cybersecurity measures. Features like an electronic operator logbook ensure easy tracking and retrieval of system changes, alarms, and actions during audits.

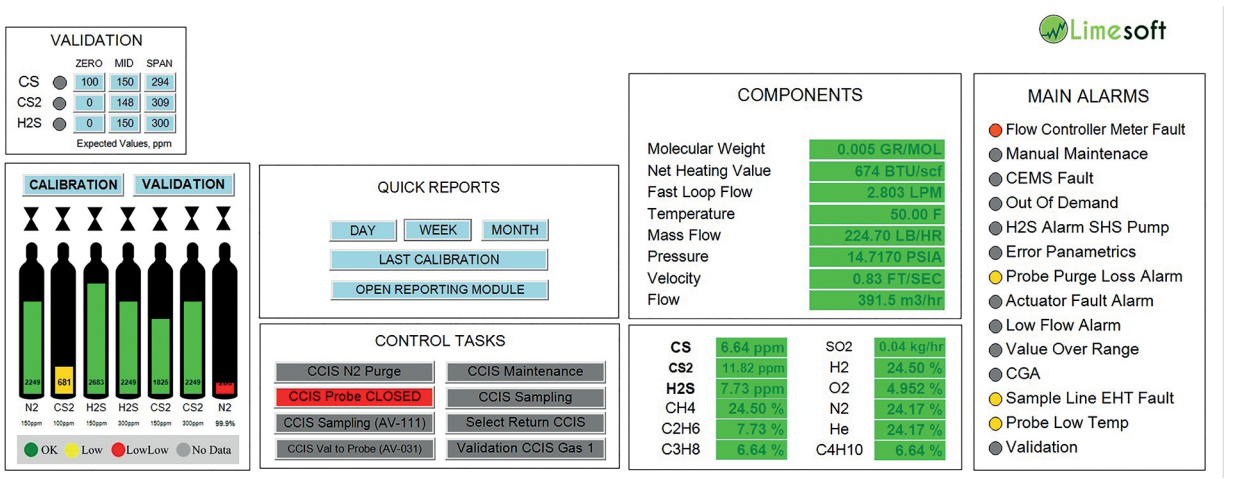



*PEMS model*




*Annual NOx mass emissions chart*




*Diagnostic information*

Given the linguistic diversity in regions like the EU, multilingual support in DAHS is vital. The ability to switch between various languages enhances the system's usability across different countries. Tracking Key Performance Indicators (KPIs) such as availability, operating time, analyser drift, relative accuracy, bias, uncertainty, linearity, device failures, maintenance, over range events, emission exceedances, energy, and emission rates is fundamental in assessing the system's performance and reliability.

The system also allows unlimited tags and buffer storage, ensuring the security of all data for the project's lifetime. Enhanced CEMS maintenance involves tracking diagnostics from instruments, generating alarms, sending emails, and performing corrective actions. The system can also function as a backup for the process control system. The capability to generate reports in multiple formats and upload them to FTP enhances the versatility of the system.

Expandability and flexible hardware options mean that the system can combine emission sources cost-effectively, which centralises emissions data for easier reporting. The absence of a PLC requirement reduces associated costs and complexity.

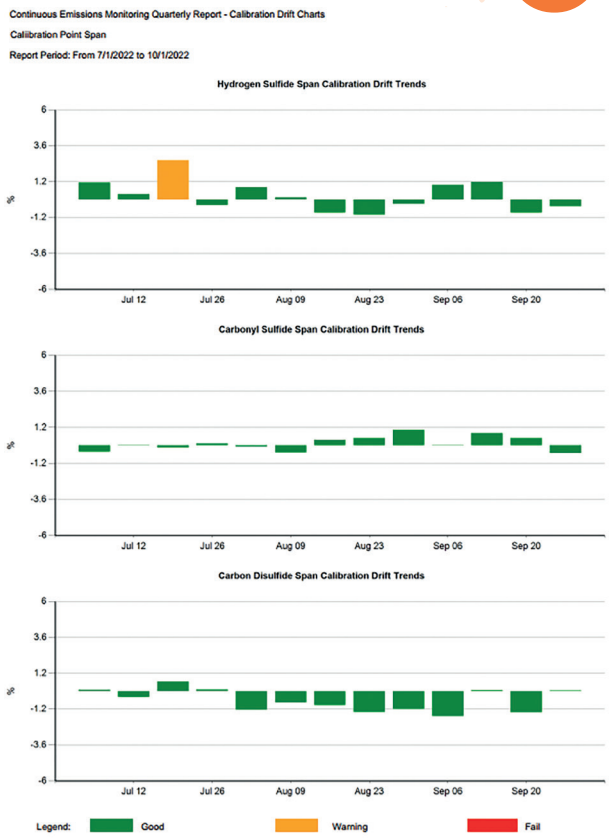
Integrating automatic QAL 3 into CEMS DAHS significantly improves reliability and efficiency. This ongoing quality assurance process maintains the operational integrity of CEMS by ensuring compliance with required zero and span drift values. The process streamlines QAL 3 procedures, eliminating the need for manual intervention, thus offering cost-effective solutions.

Control charts like CUSUM, Shewhart, and EWMA are integral to QAL 3. They play a vital role in monitoring the performance of remote analysers, analysing instrument zero and span calibration checks, and detecting measurement drift within permissible limits. This continuous analysis is essential for swiftly identifying and correcting calibration errors or biases.

Automatic QAL 3 in CEMS DAHS not only improves the system's reliability, but also ensures sustained compliance with evolving environmental standards and regulations. This technological progress signifies a commitment to cleaner emissions and better air quality, reflecting the ongoing evolution in environmental monitoring systems.

Predictive Emissions Monitoring (PEMS) plays a crucial role in enhancing the reliability of CEMS. PEMS can be used to backfill missing or invalid data and aid in forecasting future emissions, thus facilitating process optimisation and compliance. This predictive capability is integral in maintaining the high standards of emissions monitoring required by current regulations.

The enhancement of DAHS reliability as per EN 17255 is not just a regulatory requirement. It is a strategic investment in environmental stewardship. By implementing advanced data processing techniques, ensuring data immutability and redundancy, and integrating systems like PEMS, industries can achieve a high degree of accuracy and reliability in emissions monitoring. As environmental regulations become increasingly stringent, the role of robust and reliable DAHS will become ever more critical in ensuring compliance and protecting our environment.




*Quarterly calibration report*

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