

NEX[DAQ]

AS A TOOL FOR CLOUD BASED DATA ACQUISITION



DEWETRON

In this application note you will learn how DEWETRON's NEX[DAQ] data acquisition device can be used as a cloud based data acquisition tool in an automotive, aerospace and defense and industrial environment.

FURTHER INFORMATION

Visit www.DEWETRON.com



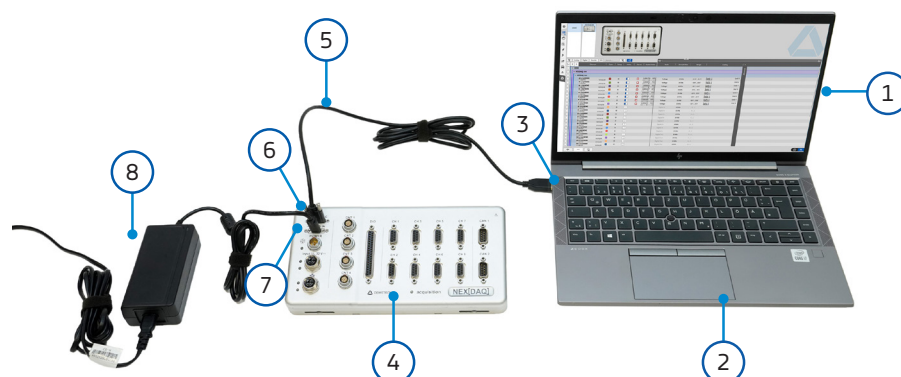
In the rapidly evolving landscape of technology-driven sectors such as automotive, industrial, and defense, the ability to gather, analyze, and interpret data has become instrumental in achieving enhanced performance, safety, and efficiency. This has led to the widespread adoption of data acquisition devices, which serve as indispensable tools for capturing and converting real-world physical parameters into usable digital information. Whether in the context of automotive innovation, industrial process optimization, or defense system advancement, data acquisition devices play a pivotal role in enabling informed decision-making and driving progress across these domains.

NEX[DAQ] AT A GLANCE

In automotive, industrial and military or defense sectors, the accuracy, reliability, and speed of data acquisition devices are paramount. The devices must be designed to withstand harsh conditions, maintain data integrity, and provide seamless integration with existing systems.

The NEX[DAQ] is an IP67 rated data acquisition device designed to be used in harsh environments. A front end itself does not store data and has no hard drive. A data acquisition front-end does not carry the overhead of running an entire operating system and software suite, unlike a full all-in-one system and is also not as prone to power surges, vibrations, or temperature fluctuations that could affect a full PC measurement system.

The following picture shows the connection schematic for the NEX[DAQ].



1. OXYGEN software
5. USB-C cable

2. Laptop/PC
6. USB-C SS port

3. USB port on laptop/PC
4. NEX[DAQ]
7. PD IN port

8. Power supply unit

▼ CLOUD-BASED DATA ACQUISITION

The integration of cloud-based data acquisition systems has emerged as a transformative approach with widespread benefits across various industries. This innovative methodology involves capturing, transmitting, and storing data from remote sources directly onto cloud servers, providing a dynamic and accessible platform for information processing and utilization. From streamlining operations to enhancing decision-making, the advantages of cloud-based data acquisition are profound and have the potential to reshape the way industries function.

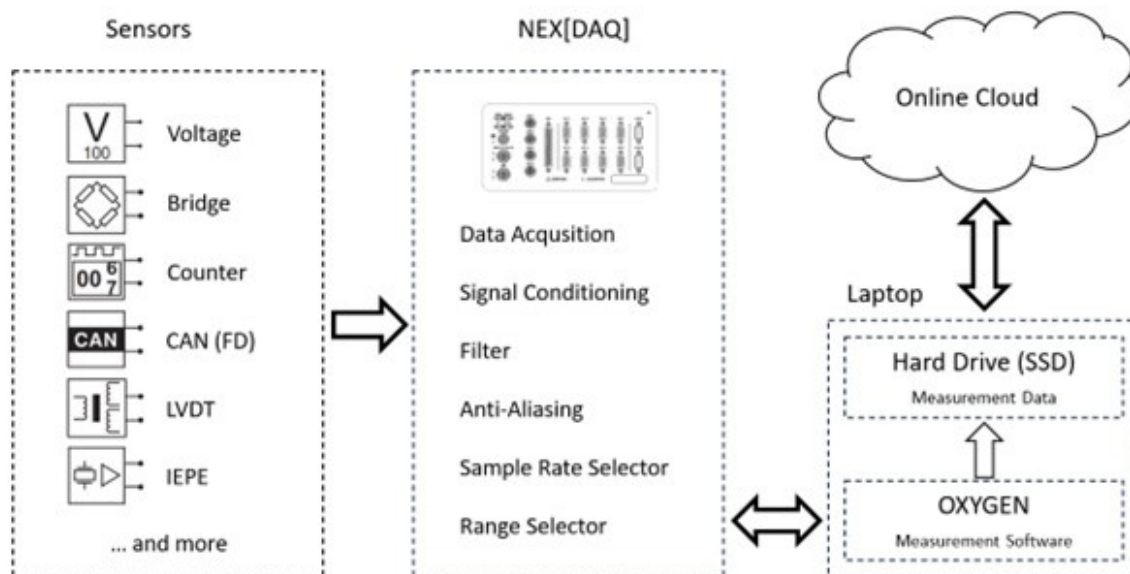


One of the primary benefits of cloud-based data acquisition is the scalability it offers. Traditional data acquisition systems often required substantial upfront investments in hardware and infrastructure, limiting the flexibility to adapt to changing needs. In contrast, cloud-based systems can easily scale up or down based on demand, allowing industries to efficiently manage resources while accommodating fluctuations in data volume.

Another significant advantage is the accessibility of data. Cloud-based solutions enable real-time access to collected information from anywhere with an internet connection. This accessibility fosters seamless collaboration among geographically dispersed teams, allowing stakeholders to make informed decisions without delays. Furthermore, remote accessibility encourages agile responses to critical situations, whether it's fine-tuning industrial processes, diagnosing automotive performance, or assessing defense systems. Data security is a paramount concern, especially in sensitive sectors like defense and finance. Cloud-based data acquisition systems often employ robust encryption protocols, authentication mechanisms, and continuous monitoring to ensure the confidentiality and integrity of the collected data. Cloud providers invest heavily in cybersecurity measures, alleviating concerns about data breaches and unauthorized access that may otherwise plague on-premises solutions.

The utilization of cloud resources also enhances data analytics capabilities. By harnessing the processing power and scalability of cloud platforms, industries can employ advanced analytics tools, including machine learning and artificial intelligence, to extract actionable insights from complex datasets. This is particularly valuable in industries where predictive maintenance, anomaly detection, and pattern recognition drive operational efficiency and cost savings.

The following picture shows the whole signal chain from sensor input to measurement data upload.



The NEX[DAQ] itself handles the signal conditioning, amplification, filtering, and the data transfer to the connected Laptop. The connected computer can be a Laptop, PC or Tablet. Only requirement is a Windows or Linux operating system and somewhat modern specs (Intel i3 3rd gen. processor or better with at least 8 GB RAM).

USE CASES

The NEX[DAQ] is flexible and has a wide range of applications, due to the extensive amount of sensors compatible with the NEX[DAQ] and the vast analysis capabilities of OXYGEN.

Applications include:

- > Predictive maintenance
- > Power analysis
- > Power quality
- > Temperature and pressure monitoring
- > Battery test
- > Vibration analysis
- > General test and measurement
- > Acoustics
- > Video
- > Order analysis

With the MSI (Modular Smart Interface) Adapters on top of the NEX[DAQ] it is possible to extent the measurement range to up to 600 V_{RMS}. This enables 3 Phase AC measurements and DC measurements simultaneously. With the 1 MS/s per channel synchronous data acquisition and the counter channels it is possible to perform high speed and highly accurate power analysis with mechanical power and efficiency for inverter and traction motor testing and performance optimization.



Not only that, due to the compact and rugged design the NEX[DAQ] can be used for mobile applications. The NEX[DAQ] supports CAN and CAN FD with voltage, vibration, pressure, temperature, force measurements and many more simultaneously. All captured in OXYGEN with many more analysis tools like Filtering, Statistics, Spectrum Analysis, Math functions and more. The measurement data is stored in a compressed format by default and can be synchronized with the cloud, if an internet connection is established.

Automatic data exports in different formats are also possible (.mat, .dat, .csv, .hdf5, .mdf4, and more). OXYGEN can also be used as a post processing tool to analyze and review the measured data.

In industrial environments, data acquisition devices like the NEX[DAQ] play a pivotal role in facilitating proactive maintenance strategies that optimize operational efficiency and minimize downtime. These downtimes in automated industrial environments can be very costly and disrupt process flow.

These devices serve as essential tools for capturing real-time data from various machinery, processes, and systems, providing insights that enable timely maintenance interventions and enhance overall productivity.

By monitoring critical parameters such as temperature, pressure, vibration, and fluid flow, data acquisition devices continuously gather information on the health and performance of industrial equipment.

This data is then analyzed to identify patterns, anomalies, or deviations from expected norms. Through the implementation of predictive analytics and condition monitoring, maintenance teams can anticipate potential issues before they escalate into costly breakdowns.



For instance, in a manufacturing facility, data acquisition devices might be strategically placed on conveyor belts, motors, and pumps. These devices monitor the equipment's operational parameters. When deviations from optimal conditions are detected, the data acquisition system triggers alerts or notifications to maintenance personnel. This timely information allows technicians to address emerging problems promptly, preventing unplanned outages and production disruptions.

Overall, data acquisition devices empower industrial maintenance teams to shift from reactive to proactive maintenance practices. This transition reduces operational risks, enhances equipment reliability, and extends the lifespan of machinery. By leveraging real-

time data insights, industries can streamline their maintenance processes, minimize downtime, and maximize the utilization of resources for sustained growth and competitiveness.

In the defense and aerospace sectors, data acquisition devices serve as indispensable tools for ensuring the performance, safety, and reliability of complex systems and equipment. These industries demand the



highest levels of precision and accuracy, making data acquisition devices critical components in various applications, from aircraft and missile systems to satellite technology and ground-based defense equipment.

Defense systems, whether deployed on land, sea, or air, rely on data acquisition devices to ensure their readiness and effectiveness. These devices monitor the functioning of weaponry, radar systems, communication equipment, and more. By continuously collecting and analyzing data, defense personnel can verify that critical systems are operating within specified parameters, enhancing operational capabilities and enabling quick adjustments when necessary.



In aerospace research and development, data acquisition devices play a crucial role in testing new technologies and prototypes. Engineers use these devices to gather data during test flights, wind tunnel experiments, and structural assessments. The collected data aids in the refinement of designs, assessment of performance, and validation of engineering models, ensuring that aerospace systems meet stringent safety and performance standards.

SUMMARY

In summary, data acquisition devices are integral components in defense and aerospace environments, enabling precise monitoring, testing, and optimization of critical systems. By providing real-time data insights and ensuring the reliability of complex equipment, these devices contribute to the safety, efficiency, and technological advancement of both industries.

In conclusion, data acquisition devices like the NEX[DAQ] have emerged as indispensable tools in the automotive, industrial, and defense domains, revolutionizing the way data is collected, interpreted, and utilized. By enabling precise measurements and offering valuable insights, these devices contribute significantly to innovation, optimization, and safety across sectors that rely on cutting-edge technology to thrive in today's dynamic world. Cloud-based data acquisition offers a paradigm shift in how industries manage and leverage data. Its scalability, accessibility, security measures, analytical potential, and maintenance ease collectively make it a game-changer across sectors. Whether optimizing manufacturing processes, enhancing automotive technologies, or bolstering defense systems, the benefits of cloud-based data acquisition are clear, promising a more agile, efficient, and informed approach to decision-making and progress.