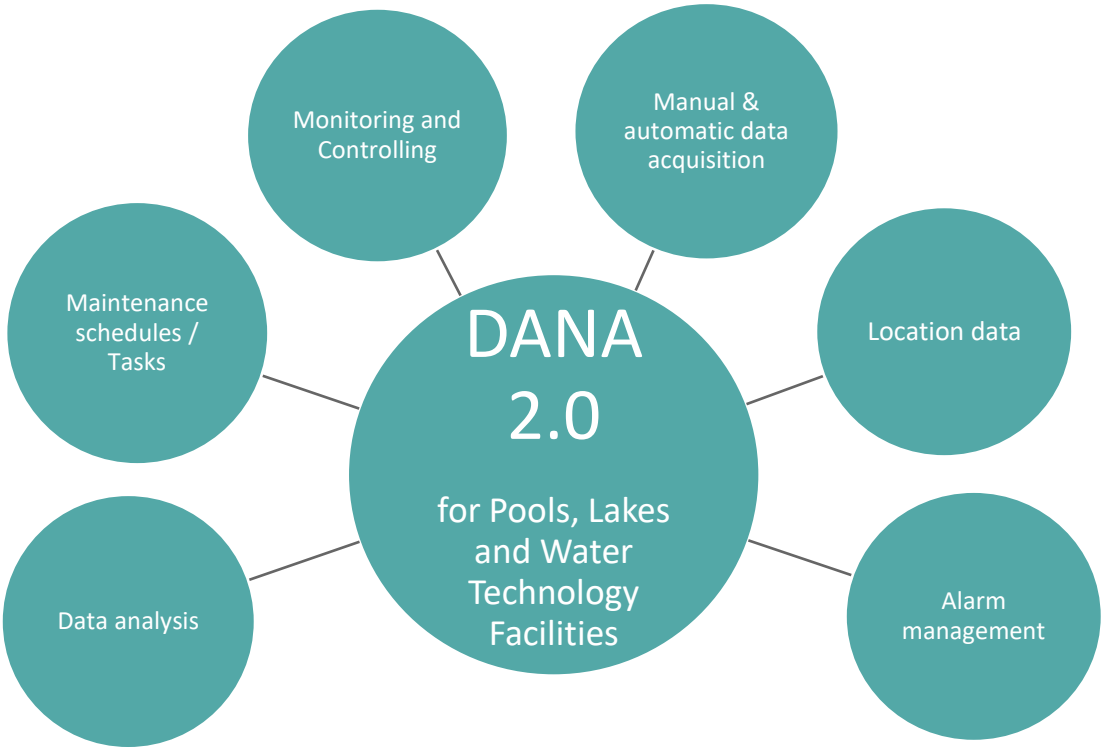
Content

DANA 2.0

Our customers have a much-diversified requirement based on their measured values, data volume as well as the plant technology. With DANA 2.0, we can now offer intuitive software for holistic operational management. Not only the operational and weather data, but also the laboratory values, live data and highly reliable alarm management systems are now available on a single platform. The web-based interface also features integrated control. Everything from a single source, secure, fast and flexible.



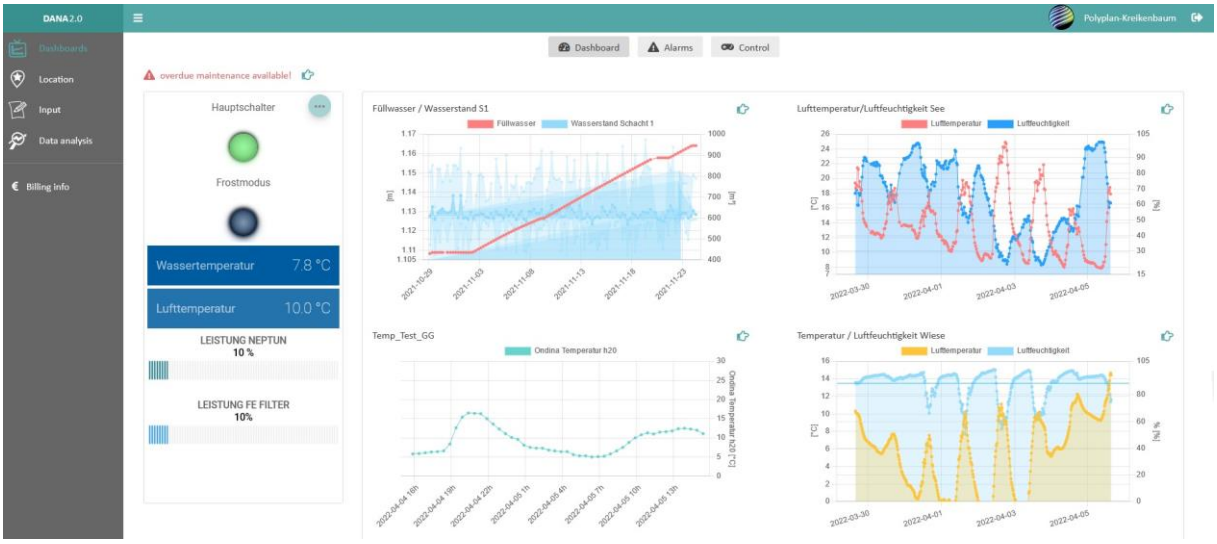
1 Functional overview

DANA 2.0 is an intuitive monitoring and controlling tool for lakes, public as well as private pools, and other water technology facilities. DANA 2.0 has a wide range of functions that support operational management at all levels. Decades of experience have shown that the successful operation of a wide range of water treatment plants, especially those with biological water treatment, is practically impossible without monitoring. DANA 2.0 enables easy data entry, monitoring and evaluation of individually configurable measurements of any kind: from manual measured values to live data from connected sensors or plant control systems to laboratory measurements and highly reliable alarm messages. The operators can create individual maintenance plans and measurement protocols, which can then be filled out by authorized users. The result is a holistic overview of the current as well as historical operating status of a plant in the simplest way possible. The integrated control interface allows convenient remote control of various operating parameters via PC or laptop. Manual data acquisition is also possible via a tablet or a smartphone. DANA 2.0 combines all these functions in a web-based software solution with an intuitive user interface.

1.1 Dashboard

The dashboard is the start page of each plant. Live data from the plant (operating status, temperature measurements and plant loads) are displayed here. In addition, dynamic or static graphics from the data analysis can be displayed to provide an immediate and individual overview of the plant operation. Links to important menu items such as alarm management or the control interface are directly accessible at the top.

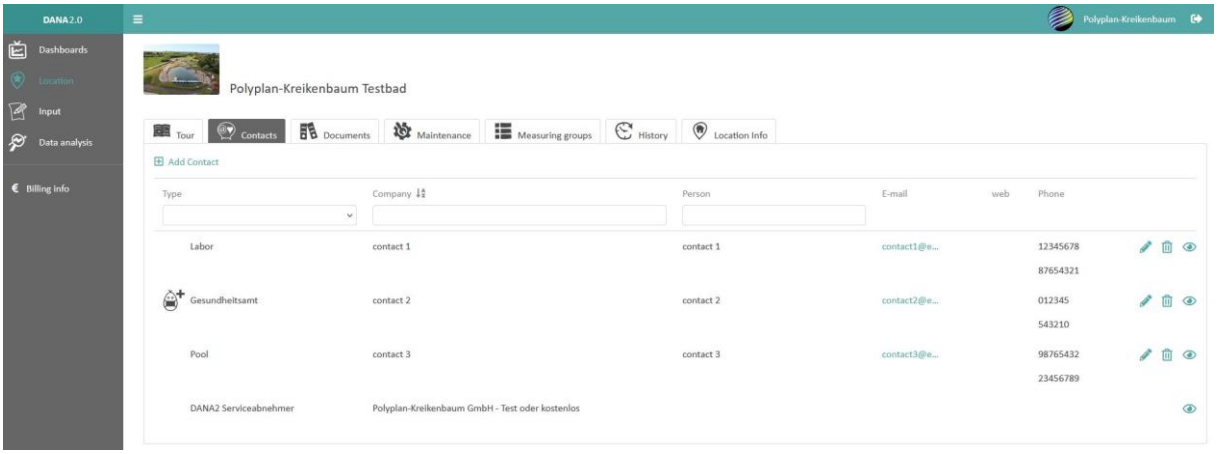
Example: Dashboard



1.2 Location

The menu item "Location" contains various tabs under which the most important location information can be stored and edited. This includes contact data of the most important persons responsible for the operation, documents such as the operating instructions or hydraulic diagrams, maintenance plans (see chapter 2.7) and also the measuring groups created for data acquisition. As a user interface, special emphasis was also placed here on direct and uncomplicated access to information. For example, stored documents can be searched directly in the web interface to quickly access the desired information.

Example: Location



1.3 Data analysis

The graphical interface of the data analysis is designed intuitively and user-oriented to make the evaluation of the operational data as simple and effective as possible. Available data from sensors, operating parameters or laboratory measurements can be sorted and displayed according to different filter types (basin types, measurement types, etc.) or time intervals. A tabular summary of the most important calculations such as mean values, limit value violations, minimum and maximum values are automatically generated and dynamically adapted to the set time intervals. If the user wishes to process the available data using spreadsheet applications such as Microsoft Excel, the data can be easily exported as a CSV file.

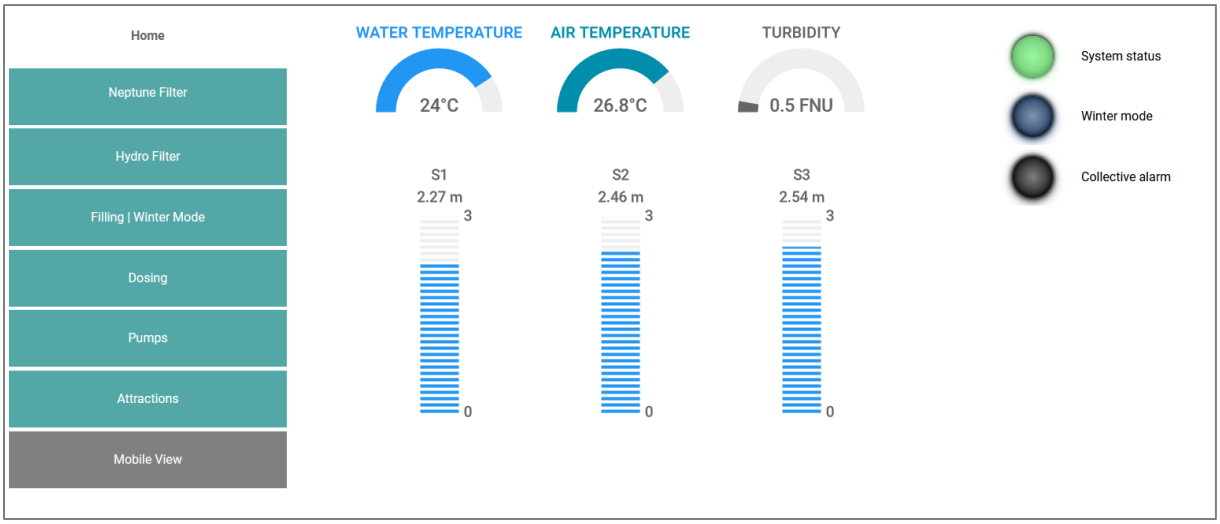
Example: Data analysis

1.4 Control

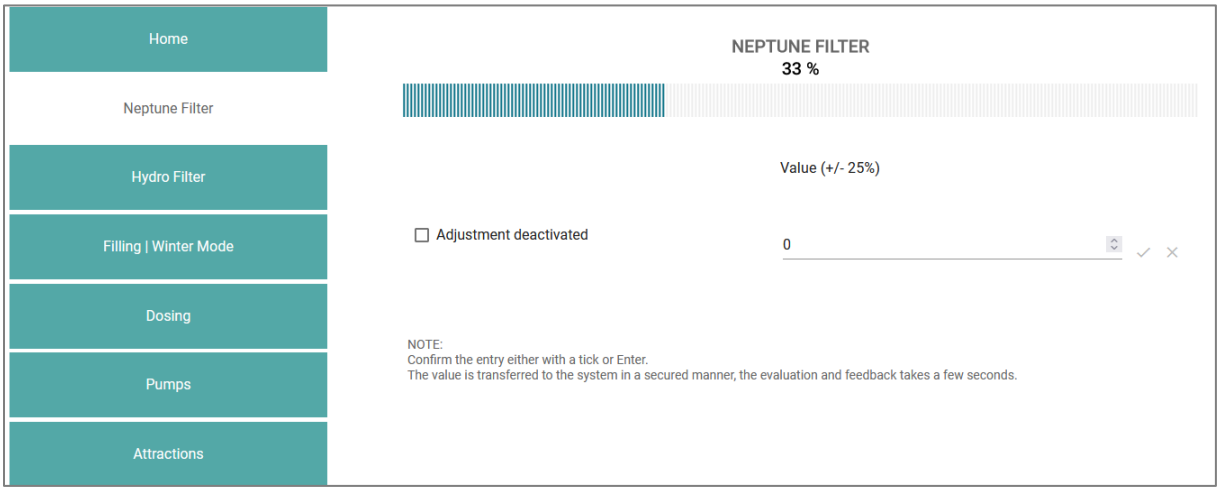
A highly secure (see chapter 3.2) control interface individually adapted to the plant is integrated in DANA 2.0. Here, in addition to the display of live data of the most important operating parameters and modes, the possibility is offered to change plant parameters remotely. For example, the plant load correction of various filters or the entire plant can be set on or off. The control interface thus enables convenient setting of the operating parameters for which on-site intervention would have been necessary in the past. The control interface can be accessed from either a PC, tablet, or a smartphone.

For each plant connected to DANA 2.0, a control interface with the most important functions is released. However, highly customized controls can be designed and implemented for your facility in cooperation with the measurement and control team. Following are some examples of a typical control interface of a natural outdoor pool.

Example: Control (Overview)



Example: Control (Neptune Filter)

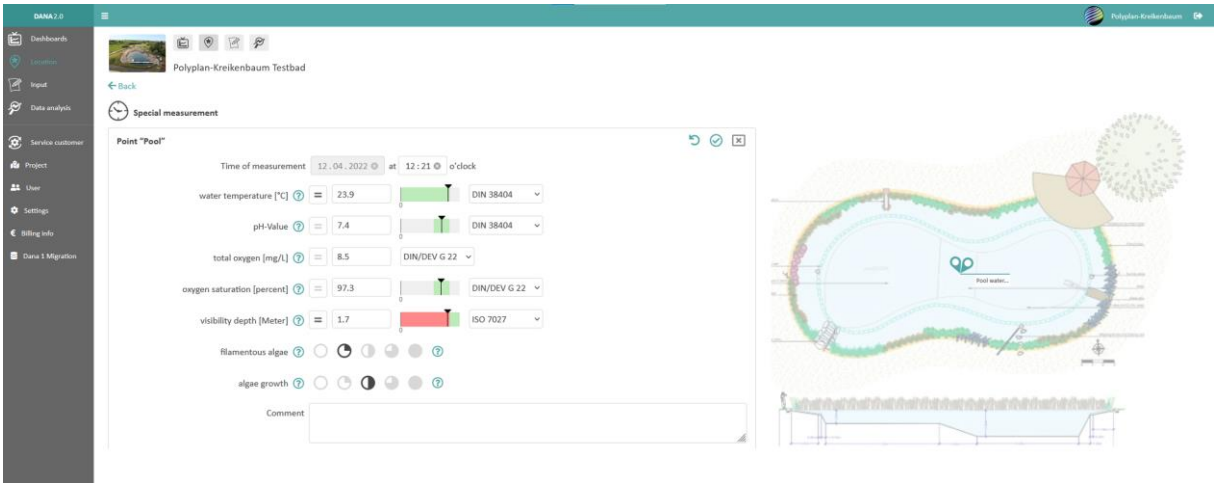


1.5 Data acquisition

Laboratory data or manual measurements can be entered for the configured measuring points of a plant and are then available for data analysis. Limit values are displayed in color by the stored standards and guidelines and dynamically adapted to the input. Thus, on one hand, measurement or calibration errors can be noticed directly, and on the other hand, immediate measures can be taken in case of limit value violations. In the case of these violations, information, specific to the measured value can be displayed for problem detection and troubleshooting.

For large amounts of data (e.g. laboratory data) or historically created data, the CSV import is enabled. There, existing tables in CSV format can be read directly from DANA 2.0 without having to enter each value manually. This type of imported data can be directly integrated to the existing measurement data and offer the full range of functions of manual measurements.

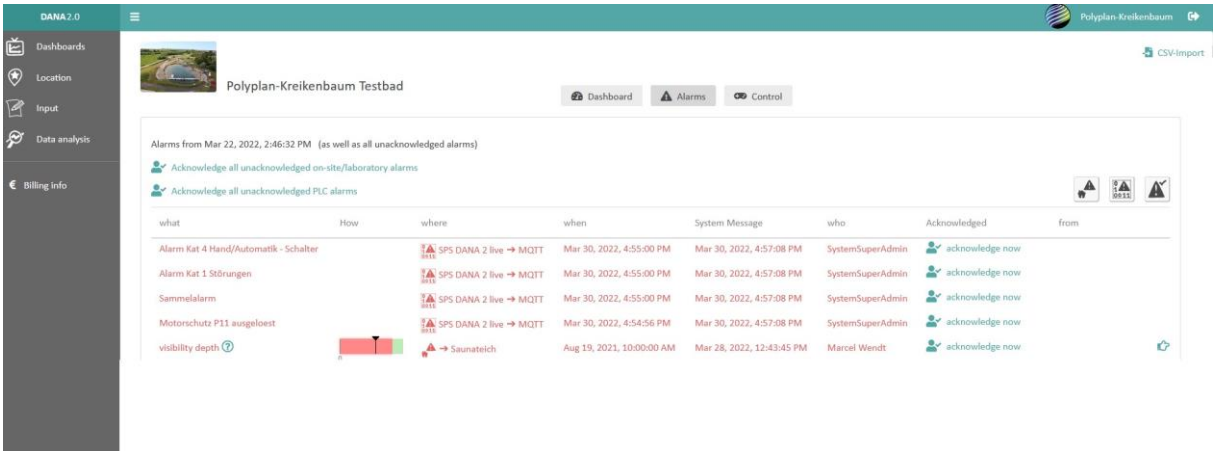
Example: Manual data entry



1.6 Alarm management

In DANA 2.0, measured variables can be individually declared as alarms. Thus, alarms can be switched for a multitude of essential operating parameters, which are directly visible and historically stored in DANA 2.0. In addition, alarm e-mails can be defined for each location, to which an automatic message is sent when an alarm is triggered. It should be noted that the e-mail dispatch depends on the service availability and may have a corresponding time delay. Typical alarm messages are operating parameters such as manhole limits or pump failures, but also water-chemical or -biological limit value violations by manual or laboratory measurements.

Example: Alarm display - Outdoor Natural Pool

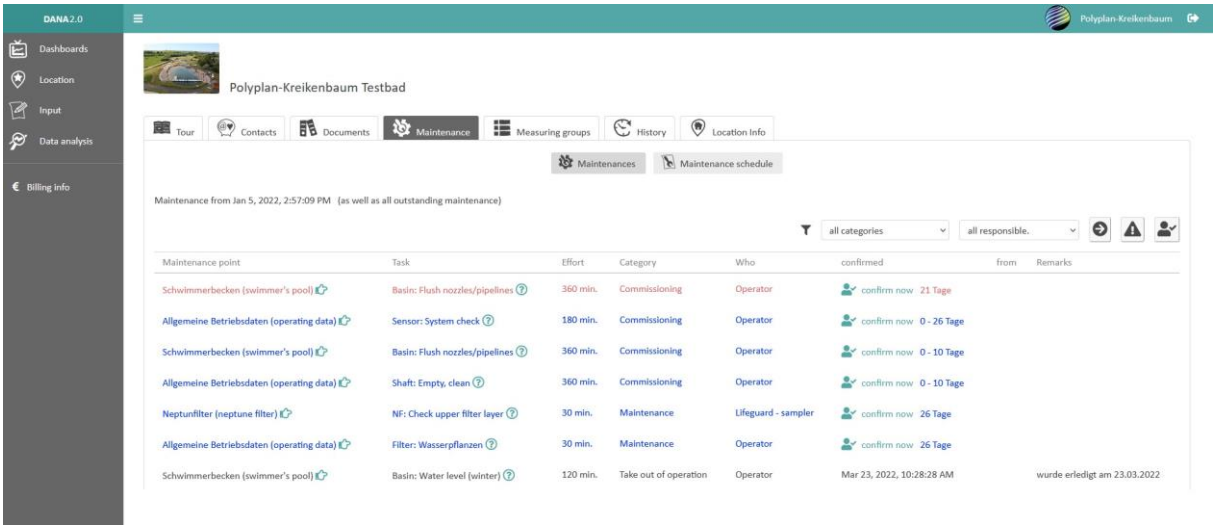


1.7 Maintenance scheduling

In addition to the daily data entry, it is possible to create an individual maintenance plan for certain maintenance tasks that are scheduled at repeated intervals or even once at certain points in the season (e.g. commissioning and decommissioning, on-site appointments or maintenance appointments with external companies). This shows upcoming and overdue maintenance tasks, so that operators and responsible persons are constantly informed. They can be found under the location data of the plant as well as in the data acquisition under the corresponding measuring points. In this way, they are always present and visible during the daily operation.

For the creation of an individual maintenance plan, the maintenance tool allows the definition of plant-specific maintenance tasks as well as their assignment to the maintenance point (location of the plant) to which they refer, as well as the responsible group of persons (e.g. operator, swimming pool attendant) who carry them out. The specification of the desired period or optionally a maintenance interval within this period, as well as a short description complete the maintenance task, so that it can be found in the maintenance plan in a defined time. Once maintenance has been completed, the responsible people can confirm it. This enables a complete documentation of the operational management.

Example: Maintenance tasks



2 Technical specifications

2.1 Connections

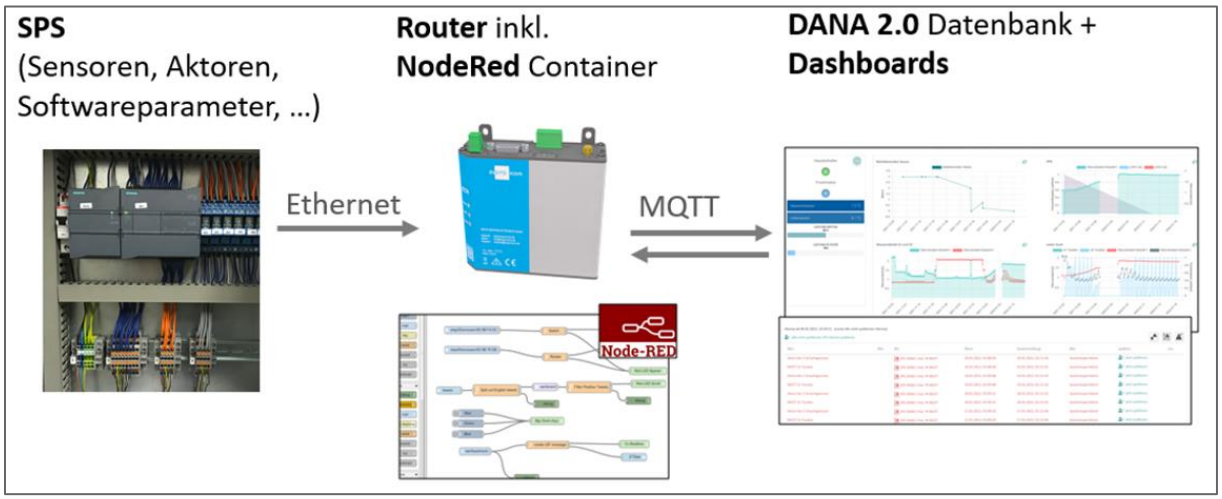
DANA 2.0 allows the integration of different types of devices. These include, above all, systems with Siemens PLC (programmable logic controller). The prerequisite here is that the PLC should be from the S7 1200 or S7 1500 series and have a stable Internet connection to ensure secure data transmission and control. The interface used here is the ECR LW 300 router from Insys Icom, which guarantees highly secure data transfer and stability as an industry standard. For upgrades of existing plans, it is possible to find individualized solutions depending on the previous connection status.

Standard interfaces for the connection to a plant

Type of device	Model
PLC	S7 1200 / 1500
Router	Insys ECR LW 300

Apart from the PLC-controlled plants with wired sensors, smaller systems can also be integrated via LoRaWAN. LoRaWAN (Long Range Wide Area Network) is a protocol for energy-efficient sending and receiving of data over long distances. Especially for IoT applications that do not have and do not need a fixed power supply and Internet connection, even battery-powered sensors can be connected.

Schematic representation of the data transmission



2.2 Data protection

The transfer of data and control commands takes place via MQTT interface to our server-based database. Besides the encryption of the MQTT data via TLS during the transmission, the read and write commands, i.e. PLC -> DANA and DANA -> PLC were created separately. In this way, it can be traced via two separate paths whether a command to the PLC was also executed. The software of our database is multi-client capable: This means that a separate database is available to each user. This provides maximum protection for historical data, user administration and, in particular, plant control.