

*safety in test > safety in flight*

**TESTFUCHS**

Data Solutions

THE TEST-FUCHS WAY OF IOT



# ENTER THE NEW WORLD OF DIGITALIZED TESTING

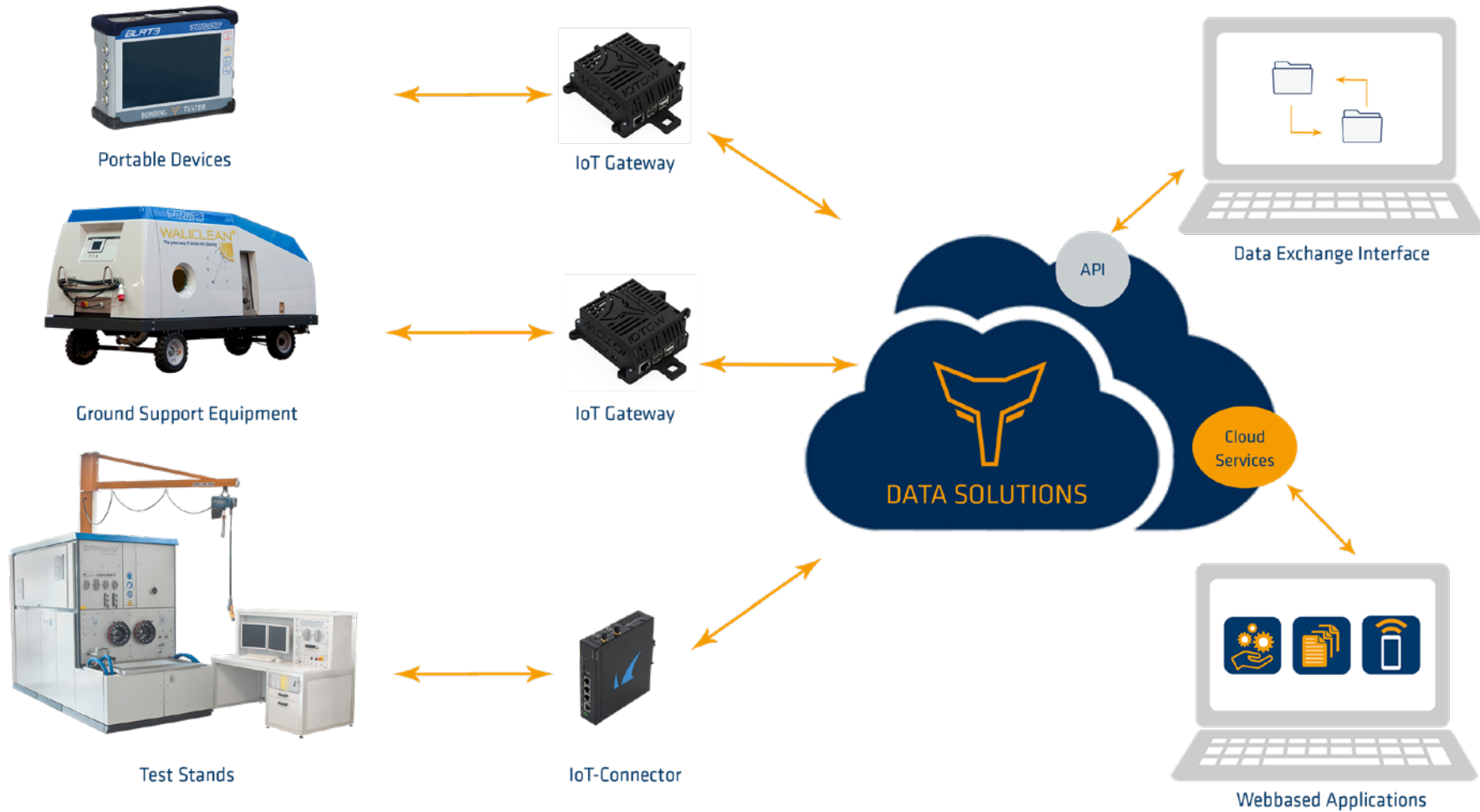
## > What is TEST-FUCHS Data Solutions?

- ▶ DATA SOLUTIONS is an all-in one solution to connect physical machines to the digital world in order to create value from digitalization advantages.
- ▶ For our customers DATA SOLUTIONS is designed as an easy to use cloud-based web-application, which doesn't require any extra software or installation.
- ▶ DATA SOLUTIONS provides easy access to cross-company data and information for all authorized participants and represents a global interface for data exchange.

**Access to DATA SOLUTIONS enables your company to make use of:**

- > The Internet of things (IoT)
- > Real time tracking
- > Remote controlling
- > Predictive maintenance
- > On demand access from everywhere
- > And many more advantages

# THE TEST-FUCHS DATA SOLUTIONS INFRASTRUCTURE





# APPLICATIONS OVERVIEW



## CONDITION MONITORING

Monitoring a system's behavior by constantly sending selected sensor and process data to the Data Solutions cloud to create a digital twin and visualize its condition.



## ACTIVE SUPPORT

Helps maintenance personnel to fix a possible failure. They will be supported by the application itself and by the TEST-FUCHS support team if requested.



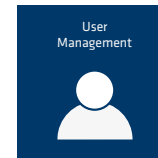
## DATA EXCHANGE

The Data Solutions Platform offers standardized APIs to exchange data. Customers are able to use these interfaces to integrate data into their own systems.



## TEST RESULT MANAGEMENT

Collecting global test data and reports from test stands and GSE. Easy access for statistical tools and data analytics is provided.



## USER MANAGEMENT

User Management allows to create, edit, and remove platform users. It is also possible to set user permissions according to the user's role.



## TEST PROGRAM MANAGEMENT

Managing the worldwide distribution of test programs to the applicable test stands. New test programs are available immediately. Permission to run a certain test program can be granted or withdrawn with a single click.

## APPLICATIONS OVERVIEW



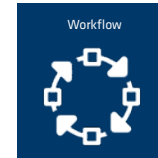
### FLEET MANAGEMENT

Keep track of your devices by visualizing the GPS location on a map, set maintenance dates and intervals. Lock/unlock devices remotely in case of misuse.



### THIRD PARTY MANAGEMENT

Manage your test equipment that is used by a 3rd party in a remote way. Set limits and a maximum time the device is allowed to operate offline.



### WORKFLOW

This application for straightforward workflows allows collaboration between companies. Uploaded files are securely administrated and only accessible by the participants of the corresponding workflow.

These Data Solutions applications are standardized and can be adapted to each product. This results in a competitive price model even for a low number of connected devices.

TEST-FUCHS also offers highly customized web solutions, specifically designed for use cases needed by the customer.



## HOW TO USE DATA SOLUTIONS

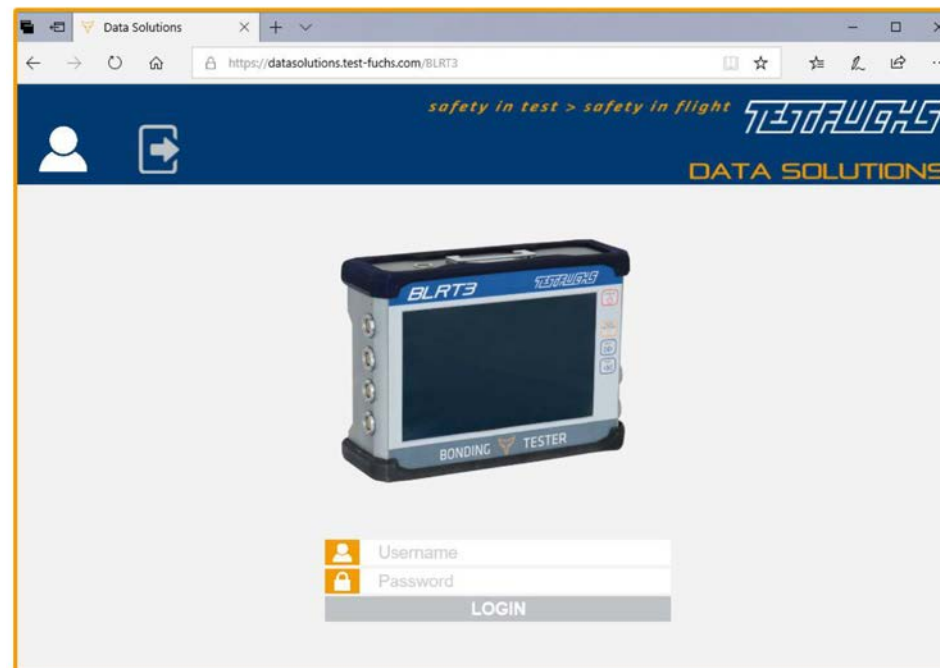
Simply use the browser on your computer, tablet or cellphone to connect with Data Solutions via the internet. Authorized users can access their product's Data Solutions user interface by using the product's corresponding link:  
<https://datasolutions.test-fuchs.com/ProductName>.

Authentication with e-mail or username and password, plus a comprehensive permission system enables a personalized view and assures access according to the users authorization. After logging in, you are redirected to your personalized Data Solutions workspace with access to your Data Solutions applications.

TEST-FUCHS devices that feature connection to Data Solutions are already configured and installed before delivery.

The Condition Monitoring application is featured by default for every TEST-FUCHS device with Data Solutions. Best results are achieved as knowledge on engineering and data transfer is accessed from a single source.

TEST-FUCHS also enables the possibility to connect external devices to Data Solutions by installing IoT-Gateways. The applications to external devices can be designed according to the available data.



Access from anywhere



# THE DATA SOLUTIONS USER INTERFACE

The screenshot displays the TEST-FUCHS Data Solutions user interface. The top header includes the user profile of Gabriel Meier, the company logo, and the slogan "safety in test > safety in flight". The main navigation bar features "WORKFLOW" and "DATA SOLUTIONS" tabs, with sub-tabs for "Overview" and "Editor".

The interface is divided into several sections:

- Left Sidebar:** Contains icons for "WORKFLOW", "UUT", "TEST PROGRAMS", "WORKFLOW", "USER MANAGEMENT", and "DEVICE MANAGEMENT".
- Workflows Section:** Displays a list of workflows with columns for Progress, Name, Version, and Started. A "Max Maintainer" tile is also visible.
- Workflow Progress Section:** Shows a table of workflow progress with columns for #, User, Task, and Days. It includes a "Comment" field and a "Mail" field.
- Workflow Data Section:** Displays a table of workflow data with columns for #, Uploader, Task, Filename, and Uploaded. It includes a "Comment" field and a "Mail" field.

The interface is designed to be intuitive and self-explanatory, with info boxes for each tile providing additional context.

The tile-based user interface features a clearly arranged workspace with a personalized view, providing an intuitive user experience.

Each TEST-FUCHS product has its specifically designed Data Solutions user interface. Therefore all relevant information is displayed with a minimum of complexity. Optionally the design can also be adapted to customer needs.

Interactive charts, gauges, matrices, maps and other visualizations make it easy to capture key parameters at first glance. Most applications manage to feature full functionality within a single page. Easy and structured access to up and download documents and other files, or to trigger actions (like installing a test program) on devices is provided. Tiles that contain tables or charts can be expanded for a better overview.

Info boxes for each tile make the intuitive workspace self-explanatory. By clicking the info icon at the top of a tile, information on functionality is provided right where it is needed.

## HOW WE TRANSFER DATA

### TEST-FUCHS IoT-Gateway

- > Secure communication (private APN) – no Internet connection
- > 3G/4G connection (global)
- > GPS
- > Various sensors (e.g. pressure, temperature, humidity, shock, light, ...)
- > Power management (wake-up scheduling)

The TEST-FUCHS IoT-Gateway is specifically designed for integration in mobile and portable devices (e.g. GSE). It enables location tracking and provides various interfaces and modularly extendable sensors to ensure high flexibility.

Environmental sensors for temperature, pressure and humidity are already integrated. Additional sensors can be attached on demand. Depending on the interface and protocol used, writing from gateway to device is possible too.



TEST-FUCHS IoT-Gateway

### Barracuda IoT-Connector

- > Integrated firewall to protect the software integrity of the test stand and to allow secure interconnects to customer networks
- > Secure, military grade encrypted remote support connection
- > Different interfaces available (wired, wireless, WWAN, 3G,...)
- > Provides connectivity to Data Solutions Platform if requested

It deals with high amounts of real-time data, as well as strict data security issues. Next to establishing the remote support connection for TEST-FUCHS customer services, it enables a connection to the Data Solutions platform if requested. If needed, it can also activate a connection from the test bench to the customer network to enable data exchange with customer systems. This is achieved, while completely separating the test stands telemetry data traffic from customer or any UUT-related network.



Barracuda IoT-Connector



## DATA SECURITY

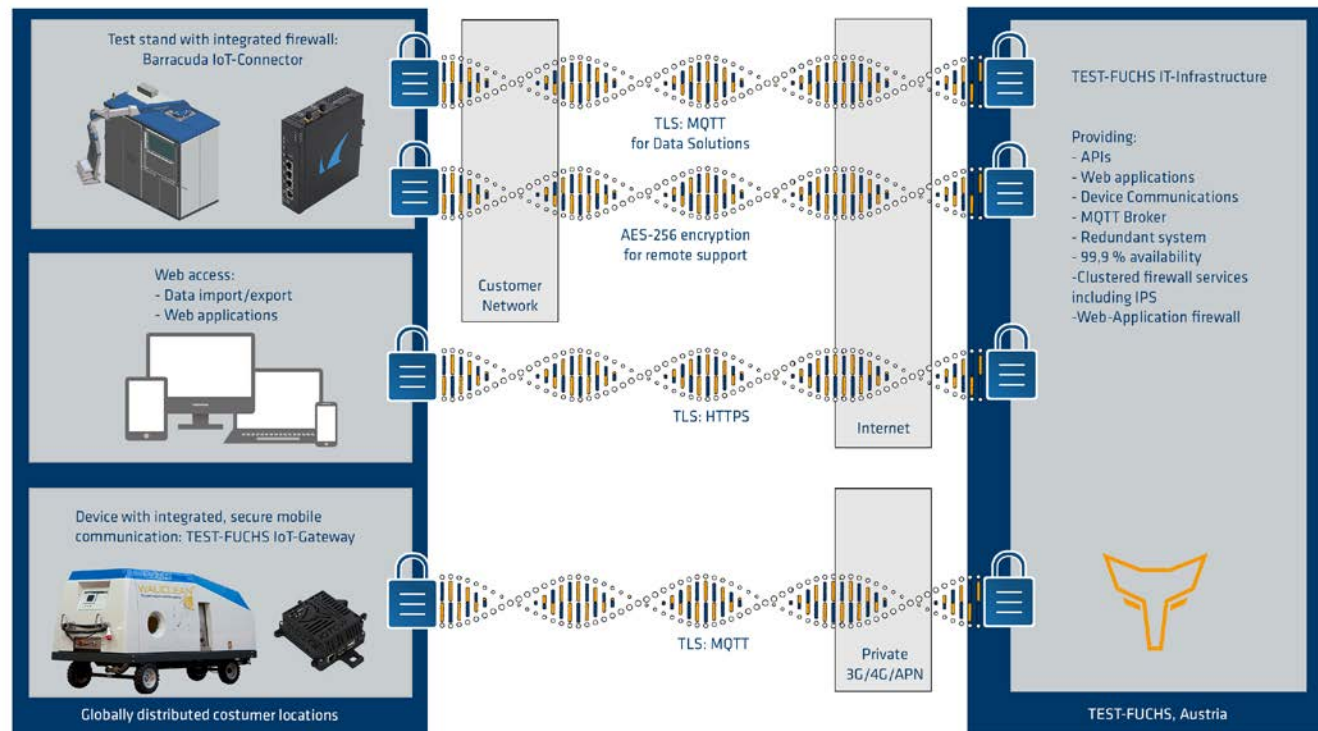
TEST-FUCHS products are operating worldwide. The industry's safety and regulatory compliance for data security is an essential requirement.

In order to protect TEST-FUCHS products from any threats arising from the surrounding networks (and the internet), state-of-the-art

encryption and firewall technologies with world class security standards are integrated in every TEST-FUCHS product.

Each user, as well as each device, have their own unique login credentials to be identified. The Barracuda IoT-Connector has a full digital identity backed with electronic certificates.

Test stands can only connect either to the Data Solutions platform, or to the customer support system. The TEST-FUCHS IoT-Gateway communicates via private APN and doesn't get in touch with any surrounding networks (or the internet). Devices can only connect to the Data Solutions Platform.





## THE PATH TO PREDICTIVE MAINTENANCE

### > Condition Monitoring - In Detail

Monitor your system's condition and perform maintenance activities only when they are necessary or to avoid machine failures.

With Condition Monitoring the reliability of test stands and ground support equipment (and other devices) can be managed and increased. Various parameters such as sensor values, log data or failures are monitored and stored. Troubleshooting becomes easier and maintenance costs can be minimized.

Test stands and GSE have multiple sensors that monitor all important parameters of the machine. These parameters are collected and securely transmitted to the Data Solutions platform via an integrated IoT-Hardware.

There is a digital twin of the machine with current data.

The graphical user interface for Condition

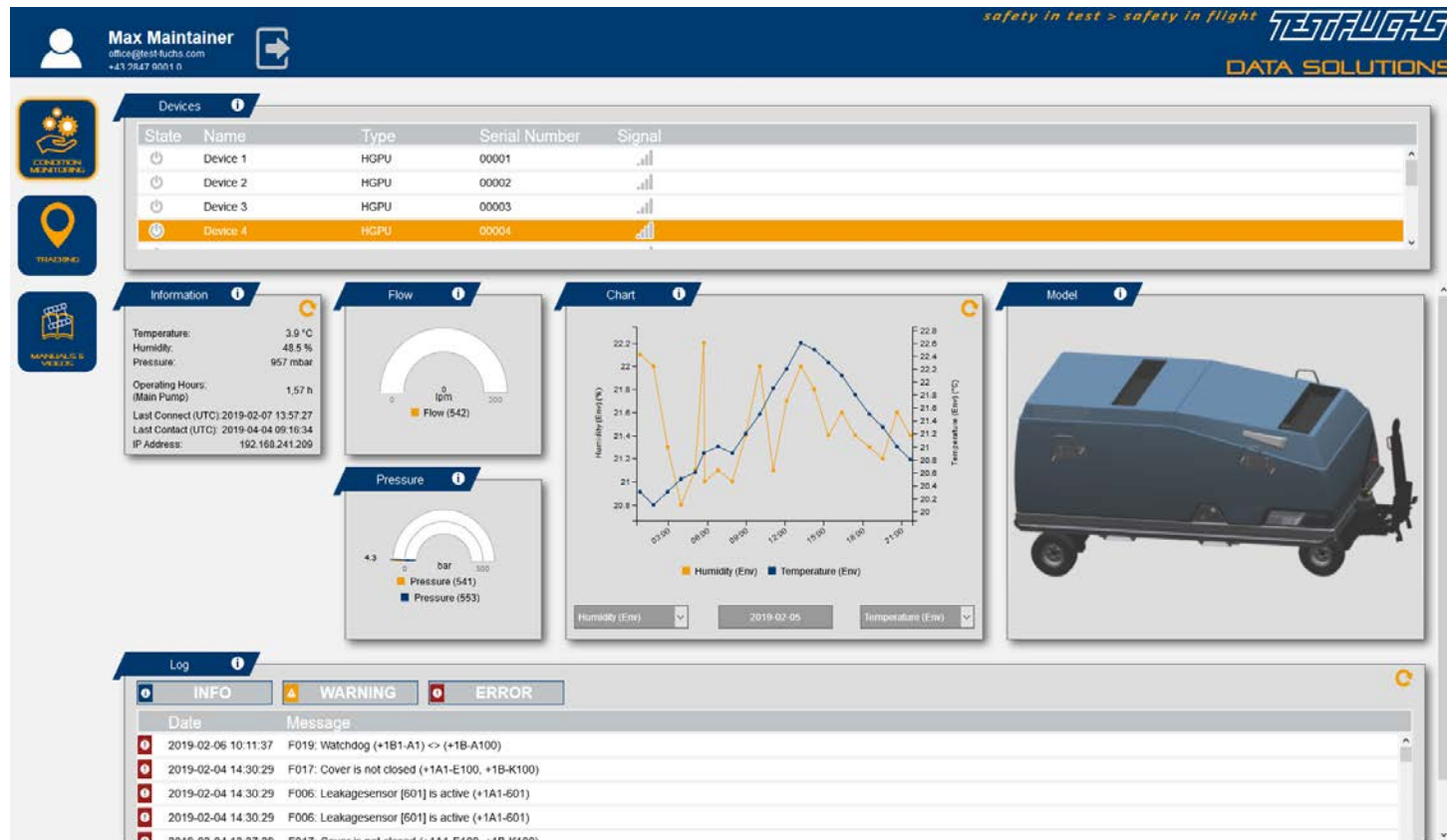
Monitoring features gauges and a chart to visualize selected parameters by default. Typical parameters are motor speed, operating time, environmental temperature, GPS location, etc. gauges display live data. The chart can be used to observe current and past data. It features a time selection and can display two parameters simultaneously. Log messages (info, warning and error messages) are displayed as well.

Condition Monitoring also features warning and alarm functions. Mail or text message notifications can be triggered when a sensor value exceeds a certain value or when a certain log message pops up.



# CONDITION MONITORING - USER INTERFACE

## YOUR ADVANTAGES



- > Forecast machine failure
- > Planned maintenance strategy
- > Minimize downtime
- > Minimize maintenance costs
- > Maximize availability



Programmed in every detail. **Safety in test > safety in flight**

**Proven technology and solutions tested  
by major OEMs and MROs**

