

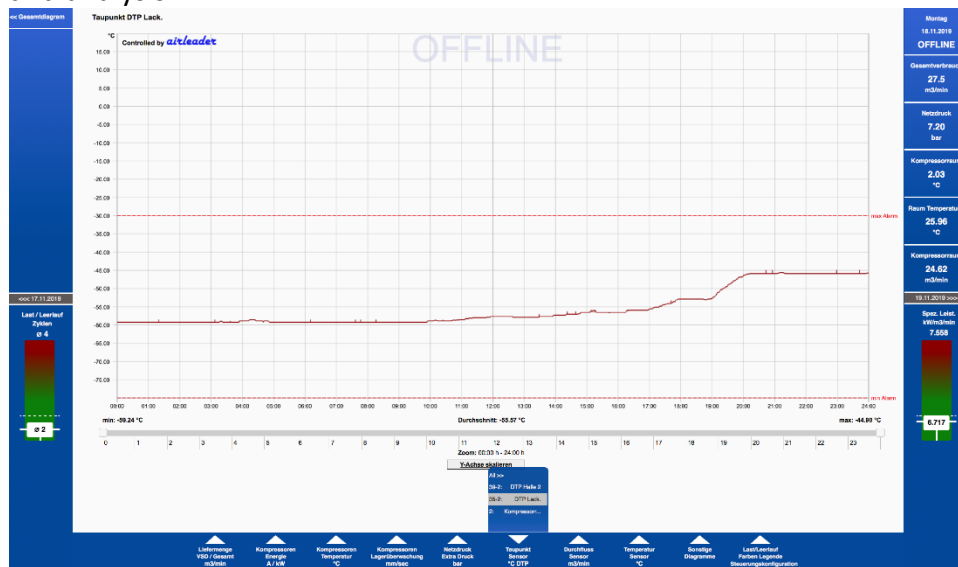
Historical Offline Overview Diagram

The overall system diagram can be retrieved for any day in the past — from the date the control system was first commissioned.

This feature allows for in-depth analysis of irregularities or specific events, such as leak detection, abnormal consumption patterns, or maintenance issues.

All Sensors at a Glance

Drop-down menus at the bottom of the screen provide quick access to all connected sensors. For example, the pressure dew point sensor can be selected directly for immediate monitoring and analysis.



Alarm Limits and Sensor Diagrams

The configured alarm limits are clearly displayed within the sensor diagrams, allowing for immediate recognition of critical values. As with other data, you can zoom in to view readings at an hourly level for precise monitoring and analysis.

Real Customer Examples

Two demo stations with real customer data are available for navigation. These allow you to explore the full range of the visualization features and gain a practical understanding of how the system operates in real-world conditions.

PROCESS VISUALIZATION

Automatic Energy and Compressed Air Reporting

The system automatically generates energy and compressed air reports at regular intervals, providing a clear overview of system performance across different timeframes:

- **Daily balance**
- **Weekly balance**
- **Monthly balance**

Each report includes all energy-relevant compressed air parameters — broken down by individual compressor and summarized for the entire station.

Custom Time Periods

In addition to predefined intervals, users can generate centralized reports for any custom-defined time period. All balances are accessible at any time via the archive.

Detailed Energy & Runtime Data

The reports include more than just energy and runtime figures. They also record:

- Number of motor starts
- Number of load-idling cycles

Thanks to the AIRLEADER MASTER module, these values are typically much lower than in traditional systems — reducing wear, service, and spare parts costs over time.

Accurate Compressor & Energy Reporting

(Example: Monthly Balance)

COMPRESSOR DATA AND ENERGY CALCULATION														Wednesday 01.06.2022 - Tuesday 28.06.2022							
efficiency:		7,49188 kW/(m3/min)					€/kWh: 0,15 €/kWh					load costs:		99,88 %							
efficiency:		0,12486 kWh/m3					P-min: 7,2 bar					unload cost:		0,12 %							
costs:		0,01873 €/m3					P-max: 7,8 bar					total costs:		12.939,26 €							
channel	compressor	m3/min		load kW		kW	load		unload	average %		cycles		compressed air	total kWh			efficiency kWh/m3	total costs €		
		min	max	min	max	unload	h	min	h	min	load	motor	load	m3	load	unload	total		load	unload	total
01	CompAir L55-10		8,6		100,00	30,00	36	11	0	23	99,0	15	15	18.671	2.476,0	10,3	2.486,3	0,13317	371,39	1,55	372,94
02	Alup SCK 75		10,0		0,00	0,00	446	28	0	17	99,9	31	31	267.880	32.233,4	10,6	32.244,0	0,12037	4.835,00	1,59	4.836,59
03	Rallye 101		8,6		0,00	0,00	111	38	2	45	97,6	110	110	57.603	6.749,0	56,9	6.806,0	0,11815	1.012,36	8,54	1.020,89
04	Rallye 101		8,6		0,00	0,00	49	7	1	6	97,8	44	44	25.344	2.995,1	22,7	3.017,8	0,11907	449,27	3,41	452,67
05	AC GA 90 VSD	2,2	17,5	0,00	0,00	0,00	647	55	0	0	100,0	1	1	321.344	41.707,7	0,0	41.707,7	0,12979	6.256,15	0,00	6.256,15
sum total												201	201	690.842	86.161,2	100,6	86.261,7	0,12486	12.924,17	15,09	12.939,26

AIRLEADER records real, measured energy values — either directly from the factory using optional accessories (kW/A measurement), or via MODBUS when measurement devices are already installed. This ensures compliance with **ISO 50001** standards.

Energy Manager–Compliant Reports

Everything the energy manager needs is clearly summarized for the selected period, including:

- **Compressed air index** (specific power) in kWh/m³ and kWh/(m³/min)
- **Energy cost per mcf** (\$ / mcf)
- **Total energy cost for the period** (\$)
- **Load share** in % and \$
- **Idle share** in % and \$
- **Total number of motor starts**
- **Total number of load cycles**
- **Compressed air volume generated** (cfm)
- **Total kWh consumed**
-

For **each compressor**, the report includes:

- Name
- Nominal delivery volume
- Load power (kW) & energy (kWh)
- Idle power (kW) & energy (kWh)
- Load time (hh:mm)
- Idle time (hh:mm)
- Motor starts
- Load cycles
- Generated compressed air volume (m³)
- Specific power
- Energy costs: load, idle, total

Simple Export to Excel and Word

With just one click, the data can be exported directly to your local **Excel** or **Word** application. All relevant data is automatically filled into a ready-to-use format for further in-house processing. Installed flow meters (consumption sensors) are also included in the report, and summed for the selected time period, alongside curve diagrams.

PREDICTIVE MAINTENANCE

Operating Hours Tracking

- Each compressor tracks both **total operating hours** and **load hours** separately.
- These are displayed in the **service mask** (interface).

Maintenance Countdown and Alerts

- After programming or pressing **RESET** (post-maintenance), the countdown timer for service intervals starts.
- Once the set time reaches **0**, a **maintenance message** appears.
- This message is also recorded in the **monthly ALARM and SERVICE REPORT**.
- If the "**Alarm + Service Management**" option is enabled:
 - Notifications are sent automatically via **email, SMS, or fax**.
 - The counter continues past zero into negative time, turning **red**.
 - A **service warning** also appears on-screen.
- The interval can be reset to the configured value using the **"R" (reset) button**.

Custom Service Intervals

- Up to **4 service positions** can be defined for each compressor.
- Each can have different service intervals, for example:
 - Filter mats → **500h**
 - Intake filter → **1,000h**
 - Oil & oil filter → **2,000h**
 - Oil separator → **4,000h**

Visualization

- Two stations with real customer data are available for complete navigation and visualization of the system.

COMPRESSOR SERVICE AND ALERT MANAGEMENT

1. Operating Hours Tracking

- Each compressor independently records:
 - Total operating hours**
 - Load hours**
- These values are shown in the **service mask** for easy monitoring.

2. Service Intervals & Maintenance Alerts

- After programming, or pressing **RESET** after maintenance, service times **count down to zero**.
- Once the interval expires:
 - A **maintenance message** is displayed.
 - The event is recorded in the **monthly ALARM and SERVICE REPORT**.
- With the "**Alarm + Service Management**" option:
 - Notifications are automatically sent by **e-mail, SMS, or fax**.
 - Expired counters turn **red** and continue counting into negative values.
 - A **service warning** is also shown on the display.
- The "**R**" button can reset the interval to its predefined service value at any time.

Configurable Service Positions

Each compressor can have up to **4 service positions** with different intervals, for example:

- Filter mats → 500 h
- Intake filter → 1,000 h
- Oil and oil filter → 2,000 h
- Oil separator → 4,000 h

Kanal	Bezeichnung	Gesamt [h]	Last [h]		[h]		[h]		[h]		[h]	Alarm	nächster Service
1	CompAir L55-10	52853	51748	2500	R	3000	R	8000	R	2126	R	☒	---
2	Alup SCK 75	29645	26229	4000	R	500	R	1500	R	745	R	☒	---
3	Rallye 101	72722	71526	1000	R	1447	R	1447	R	1447	R	☒	---
4	Rallye 101	72684	71487	3000	R	1801	R	1549	R	1549	R	☒	---
5	AC GA 90 VSD	2705	2704	1295	R	1295	R	3110	R	1295	R	☒	---
6	Modul 6	0	0	2000	R	500	R	2000	R	2000	R	☒	---
		0	0	2000	R	500	R	2000	R	2000	R	☒	---

3. Fault Notification & Alarm Reporting

- If a **compressor or connected accessory device** experiences a fault:
 - The message is logged in the **monthly Alarm + Service Report**.
 - An **alarm warning** is displayed on the system screen.
- All compressor faults generate a **collective fault message**, triggered via a **switching contact** directly at the MASTER II and CN control unit.
- Accessory device faults are also reported via a **separate collective fault contact**.
- This setup enables **two alarm paths of different priority**, which can be connected to existing **alarm distributors** (e.g., ZLT, telephone systems).

4. Enhanced Alarm + Service Management

- With the **optional Alarm + Service Management module**:

- Notifications (e-mail, fax, SMS) can be sent directly from the **web-based visualization**.
- Fault and service alerts can also be triggered by **connected sensors** when:
 - Maintenance messages occur
 - Limit values are exceeded
- This ensures **maximum operational reliability** of the compressed air system.

Datei wählen

2021-01
2020-12
2020-11
2020-10

Report löschen

Airleader Kompressor-Management Alarm + Service-Report							
2021-01			Alarmmeldung			Servicemeldung	
Pos	Datum	Uhrzeit	Kompressor Modul	Steuerung	Analogmodule	Kompressor Modul	Änderungsmeldung
560	18.01.2021	12:33:32	-	-	Lagerüberwachung CM02 S "Alup SCK 75"	-	-
559	18.01.2021	12:18:46	-	-	Lagerüberwachung CM02 S "Alup SCK 75"	-	-
558	18.01.2021	12:06:45	-	-	Lagerüberwachung CM02 S "Alup SCK 75"	-	-
557	18.01.2021	11:54:44	-	-	Lagerüberwachung CM02 S "Alup SCK 75"	-	-

5. Visualization

- Two **demo stations** with real customer data are available.
- Users can **navigate through the complete visualization** to experience all monitoring and reporting functions in action.

AIRLEADER DATA INTERFACES

The Airleader system provides a wide range of interfaces to ensure flexible data handling, integration with external systems, and compatibility with industry standards.

1. USB Interface

- Enables **data export** to USB sticks, even without visualization access.
- Supports **offline visualization** of compressor stations on any computer.
- Useful for:
 - Analyzing operating behavior
 - Running simulations with measurement and simulation software
- **Firmware updates** and **add-ons** are also installed via USB.

2. MS Office Integration

- Compressor data and **energy calculation tables** can be exported directly to **Excel or Word**.
- Provides **instant documentation** with just one click.

3. CSV Export

- Daily data archives include:
 - All **recordings** and **evaluations** of the Airleader
 - Collected at **10-second intervals**
- Stored as a **compressed file per day**.
- **CSV export button** generates a daily file for further processing (e.g., in Excel).

4. Modbus Connectivity

Modbus Server

- Provides all relevant compressor station data using an **open, standardized protocol**.
- Ensures compatibility with a wide range of software systems.

Modbus Data Integration

- External sensor data can be integrated and visualized directly:
 - kW measurement
 - Flow sensors
 - Pressure dew point sensors
- Connection methods:
 - **RS485** to the control unit
 - **TCP/IP** via Ethernet

5. OPC Communication

OPC (Open Platform Communications) is the **global standard** for manufacturer-independent data exchange in industrial automation and Industry 4.0/IoT environments.

OPC DA (Classic)

- External OPC server provides process data **as OPC objects**.

- Compatible with BMS/control station systems (e.g., Sauter NovaPro, WinCC, Kieback & Peter, Wonderware, Web Factory, ACRON, etc.).
- Enables seamless integration into **energy management systems** (e.g., MESSDAS, FRAKO, ECON Solutions).
- Reduces integration complexity by requiring **one driver per device**.

OPC UA (Unified Architecture)

- Internal OPC server provides **platform-independent process data**.
- Major improvements over OPC Classic:
 - Independence from Windows (no COM/DCOM dependency)
 - **Binary TCP/IP** or **SOAP with HTTPS** transport options
 - **Firewall-friendly** design
 - Support for **semantic data descriptions**
 - Enhanced **security**:
 - 128/256-bit encryption
 - Message signing, sequencing, and user authentication
 - Certificate-based client authentication
- Widely adopted for Industry 4.0 and IoT integration.

6. Additional Supported Data Formats & Protocols

- **SOAP**
- **JSON/P**
- **AJAX**
- **Plain XML**
- **XML**

These options provide maximum flexibility for integration into third-party systems.

✓ With this, we now have **three polished documentation modules**:

1. **Service Intervals & Maintenance Management**
2. **Fault Notification & Alarm Reporting**
3. **Data Interfaces**