

Comprehensive Guide to the Atlas Copco Elektronikon II: Technical Specifications, Optimization, and Maintenance

Published: September 19, 2026 | Index ID: #-

In the realm of industrial air compression, the efficiency and reliability of the control system are as critical as the mechanical components of the compressor itself. The **Atlas Copco Elektronikon II** stands as a landmark in the evolution of compressor control systems. Specifically designed for the GA series (ranging from GA 7 to GA 75), this controller is not merely a monitoring tool but the central nervous system of the compressed air installation. Understanding its architecture, technical nuances, and operational parameters is essential for any facility manager or engineer seeking to minimize downtime and maximize energy efficiency.

The Evolution of Compressed Air Control Systems

Before the advent of advanced microprocessing controllers like the **Elektronikon II**, air compressors relied on pneumatic or simple electromechanical controls. These systems were often inefficient, leading to excessive energy consumption during unload periods and lack of precise data for preventative maintenance. The introduction of the Elektronikon series represented a paradigm shift toward digital integration, allowing for real-time monitoring and data-driven decision-making.

The Elektronikon II, in particular, was developed to provide a robust user interface with advanced logic to manage the internal parameters of the compressor. It bridges the gap between basic operational control and the highly complex, cloud-integrated systems seen in the modern MKV or SMARTlink-enabled MKIV versions. Despite being a legacy system in some contexts, its prevalence in the global market—supported by part numbers like **1900071031** and **1900070125**—remains significant due to its proven durability and straightforward logic.

Technical Architecture and Core Components

The Elektronikon II is built upon a modular architecture that integrates sensory inputs with logical outputs to maintain optimal pressure levels while protecting the machine from catastrophic failure. To understand its operation, one must analyze its primary physical and electronic components:

1. The Display and User Interface (LCD)

The visual interface usually consists of a liquid crystal display (LCD) that provides real-time data on pressure, temperature, and status codes. For many operators, the LCD is the first point of diagnostics. Part number **1900071031** (often replaced by **1900071032**) represents the core module that houses this display logic. Over time, these displays can degrade due to heat and vibration, leading to the need for refurbished units or LCD replacements as noted in technical service data from providers like Cips88.

2. Keypad Membrane (1900071281)

Operational commands—such as starting, stopping, or navigating the menu to adjust pressure setpoints—are handled via a tactile **keypad membrane**. The membrane (PN: 1900071281) is a critical wear item. In industrial environments where oil mist and high temperatures are common, these membranes can become brittle or lose conductivity. Replacing the membrane is a common maintenance task that restores the controller's usability without requiring a full module replacement.

3. The Motherboard and I/O Modules

Internal to the unit is the main processing board which handles **analog inputs** (from pressure transducers and temperature sensors) and **digital inputs** (from emergency stops and motor overloads). The controller then processes this data against pre-defined safety limits and operational setpoints to trigger **digital outputs**(activating the load solenoid valve, starting the fan, or tripping the main motor contactor).

Technical Specifications and Comparison

To evaluate the Elektronikon II effectively, it is helpful to compare it with its predecessor and its successor (the MKIV). The following table outlines the technical evolution across these generations:

Feature	Elektronikon I	Elektronikon II	Elektronikon MKIV (MK4)
Display Type	Basic LED / Icons	Monochrome LCD (Text-based)	Graphic Display / Multi-line LCD
Remote Monitoring	Limited / None	RS485 / LAN Options	SMARTlink / Modbus Integrated
Pressure Bands	Single Fixed	Dual Programmable Bands	Multiple / Dynamic Optimization
Part Number Example	N/A	1900071012 / 1900070125	1900071031 (Size II)
Communication Protocol	Hardwired Only	Proprietary / RS485	Modbus / Ethernet / CAN

Advanced Control Logic and Energy Efficiency

The primary goal of the Elektronikon II is to manage the **Load/Unload cycle**. In a standard screw compressor, the motor continues to run even when air is not required, consuming approximately 20-30% of its full-load power while in the "unloaded" state. The Elektronikon II uses sophisticated algorithms to minimize this waste.

The Dual Pressure Band System

Operators can program two distinct pressure bands (Band A and Band B). This is particularly useful for facilities that have varying demand profiles between shifts. By lowering the pressure band during off-peak hours (e.g., night shifts), the compressor consumes significantly less energy, as every 1 bar (14.5 psi) reduction in pressure results in an approximate 7% savings in energy consumption.

Automatic Restart After Voltage Failure (ARAVF)

In regions with unstable power grids, the Elektronikon II's ARAVF function is vital. It allows the compressor to safely restart after a power dip without manual intervention, provided that safety parameters are met. This ensures that critical industrial processes—such as pneumatic assembly lines or chemical cooling—remain operational.

Integration and Remote Monitoring (SMARTlink)

While the Elektronikon II is a legacy unit, Atlas Copco has provided pathways for modern integration. Through the use of **RS485 communication ports**, these controllers can be linked to a **SMARTlink** gateway. This allows the data previously trapped within the machine's local display to be transmitted to the cloud. Key metrics that can be monitored include:

- **Running Hours vs. Load Hours:** A high ratio of running hours to load hours indicates an oversized compressor or system leaks.
- **Element Discharge Temperature:** Vital for predicting oil degradation or cooler clogging.
- **Service Timers:** The Elektronikon II tracks the countdown to the next 2,000-hour or 4,000-hour service interval.

Practical Implementation: Programming and Calibration

For technical personnel, interacting with the Elektronikon II requires a structured approach. Below is a simplified workflow for adjusting the pressure setpoints, which is the most common field modification.

Step-by-Step Pressure Adjustment Procedure

1. Access the Menu: Use the arrow keys on the keypad (often PN 1900071281) to navigate to the 'Parameters' menu.
 2. Enter the Code: Most technical parameters are protected by a four-digit passkey to prevent unauthorized changes that could damage the machine or the air network.
 3. Select 'Pressure Band': Navigate to 'Band 1' or 'Band 2'.
 4. Adjust 'Unload Pressure': This is the maximum pressure at which the compressor stops producing air.
 5. Adjust 'Load Pressure': This is the minimum pressure at which the compressor starts producing air again.
- Note: The differential (delta) should typically be at least 0.6 bar to prevent "short-cycling."
6. Save and Test: Press the 'Enter' key to commit changes and observe a full cycle to ensure the machine responds correctly.

Troubleshooting Common Failure Modes

The Elektronikon II provides specific error codes that help technicians pinpoint issues quickly. Below is a troubleshooting matrix based on common field reports.

Error Display / Symptom	Potential Root Cause	Recommended Action
High Discharge Temp	Low oil level, dirty oil cooler, or ambient temp >40°C.	Check oil levels; clean cooler fins with compressed air or chemical wash.
Sensor Error (Probe)	Faulty pressure transducer or PT1000 temperature sensor.	Inspect wiring harness for the 1900070125 module; replace sensor if resistance is out of spec.
Emergency Stop Active	E-stop button depressed or wiring open circuit.	Reset physical button; check continuity of the E-stop loop.
Blank Screen	Internal fuse failure or 24V power supply issue.	Check the transformer output; inspect module PN 1900071012 for burnt components.
Keypad Non-Responsive	Worn membrane circuit or loose ribbon cable.	Replace keypad membrane 1900071281 and ensure the connector is seated properly.

Mathematical Modeling for Pressure Control

Engineers often use the following formula to calculate the necessary receiver tank volume based on the Elektronikon's cycle settings:

$$V = (Q * (P_{\text{atm}})) / (6 * f * \Delta P)$$

Where: - **V** = Volume of the air receiver (m3)- **Q** = Compressor free air delivery (m3/min)- **P_{atm}** = Absolute atmospheric pressure (bar)- **f** = Maximum allowed cycles per hour (typically 10-15 for GA series)- **ΔP**= Pressure differential between Load and Unload (bar)

The Elektronikon II helps maintain the **f** (frequency of cycles) within safe limits by allowing the operator to define a wide **ΔP**, thereby protecting the motor and the intake valve from excessive wear.

Maintenance and Refurbishment Strategies

As these units age, the question of whether to replace or repair arises. With the **Atlas Copco Elektronikon II**, refurbishment is often a viable and cost-effective option. Many technical services, particularly in industrial hubs like Sidoarjo or Jakarta, specialize in repairing the **1900071031** or **1900071032** modules.

Refurbishment Process

- **Component Testing:** Testing all capacitors and resistors on the PCB for heat-induced degradation.
- **LCD Replacement:** Replacing the original monochrome screen with a high-contrast equivalent to improve visibility.
- **Firmware Reloading:** Ensuring the logic chip is not corrupted and is updated to the latest version compatible with the specific GA model.
- **Environmental Sealing:** Applying conformal coating to the PCB to protect against the humid and oily environments common in compressor rooms.

Choosing a refurbished unit from a reputable supplier like PT. Quinratu Karya Prisma can offer significant cost savings compared to purchasing a new-generation controller, which might also require expensive modifications to the compressor's wiring loom.

Strategic Value of the Elektronikon System

The long-term value of the Elektronikon II lies in its ability to transform a mechanical asset into a managed utility. By providing clear visibility into operational data, it empowers maintenance teams to move from **reactive maintenance** (fixing things when they break) to **proactive maintenance** (fixing things before they break). The data provided by the monitor—such as oil temperature trends—can signal an impending cooler failure weeks before a shutdown occurs.

Furthermore, in the context of global sustainability, the role of such controllers in reducing carbon footprints cannot be overstated. Since compressed air accounts for a significant portion of total industrial energy use, the precise control offered by the Elektronikon II is a direct contributor to a facility's ESG (Environmental, Social, and Governance) goals.

Whether you are dealing with a used unit (REF.NO: AC819/1.500) or a new installation, the fundamental principles of the Elektronikon II remain a cornerstone of efficient air management. Its blend of rugged hardware and intelligent software ensures that even as the industry moves toward Industry 4.0, the GA 7 through GA 75 machines equipped with these controllers will continue to provide reliable service for years to come. Understanding the intricacies of its modules, from the keypad to the RS485 communication interface, is the key to unlocking the full potential of your Atlas Copco compressed air system.

Baca Juga (Artikel Terkait)

- [Mastering Process Control Loop Optimization: A Technical Guide to Modern Tuning and EnTech Methodologies](http://123caramba.com/modern-process-control-loop-tuning-entech-guide.pdf)

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- [Comprehensive Guide to Atlas Copco Elektronikon Systems and Rotary Screw Compressor Optimization](http://123caramba.com/comprehensive-guide-atlas-copco-elektronikon-systems-rotary-screw-compressor-optimization.pdf)

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- [Mastering Atlas Copco Elektronikon Control Systems: A Technical Guide to Installation, Programming, and Optimization](http://123caramba.com/atlas-copco-elektronikon-technical-guide.pdf)

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