THE WORLD IS ALREADY COMPLEX ENOUGH

Developing high efficiency engine components with the aim of improving the life time of spare parts as well as the overall engine performance is our daily business. For the benefit of the customer we reduce maintenance costs and improve the efficiency and reliability of all kinds of gas engines. By optimizing existing technologies and developing new concepts, we maximize generation output with least emissions. In cooperation with our partners, we are capable of refurbishing and upgrading engines.

AVAT – OUR ENGINEERING PARTNER FOR ENGINE CONTROL SYSTEMS

EDI is based on the open and flexible engine control system, known as “open ECS”, by AVAT. The company has more than 25 years of experience and the expertise of more than 14,500 management systems for large gas, dual fuel and CHP engines. Among other things, as the developer and supplier of the 1000-times built TEM-Evo controls and single technology components.

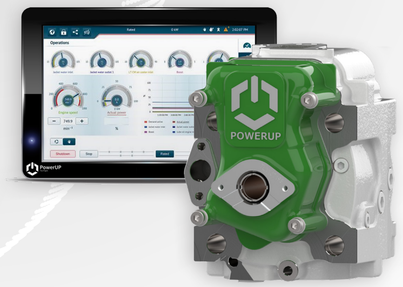
AVAT offers a wide spectrum of Energy Automation Solutions

- Technology leader in control systems and technology modules for large gas engines and cogeneration plants with more than 8,500 engine controllers in operation worldwide and extensive experience gained from projects with a total exceeding 12,500 MW installed electric power.
- AVAT also serves public- and private-sector utilities and cogeneration-plant manufacturers, developing smart solutions for the automation and control of decentralized energy systems.
- AVAT’s solutions include multi-purpose control technology for heat, gas, water and electricity; energy management; and aggregation of decentralized energy sources to create virtual power plants.

EDI & EVE – A PERFECT COUPLE

The EVE3 Efficiency Upgrade Package in combination with our control system EDI yields a future-proof system plus a significant increase in performance.

- PowerUP-EVE3 4 valve cylinder head – efficiency increase up to 2,5% electrical, resulting in up to 6 % less gas consumption (@1 MW, biogas calorific value 5 kWh/m3 series 3 gas engines)
- PowerUP piston and piston ring
- PowerUP liner and scraper ring
- PowerUP-JER/EVE3 pre-chamber spark plug



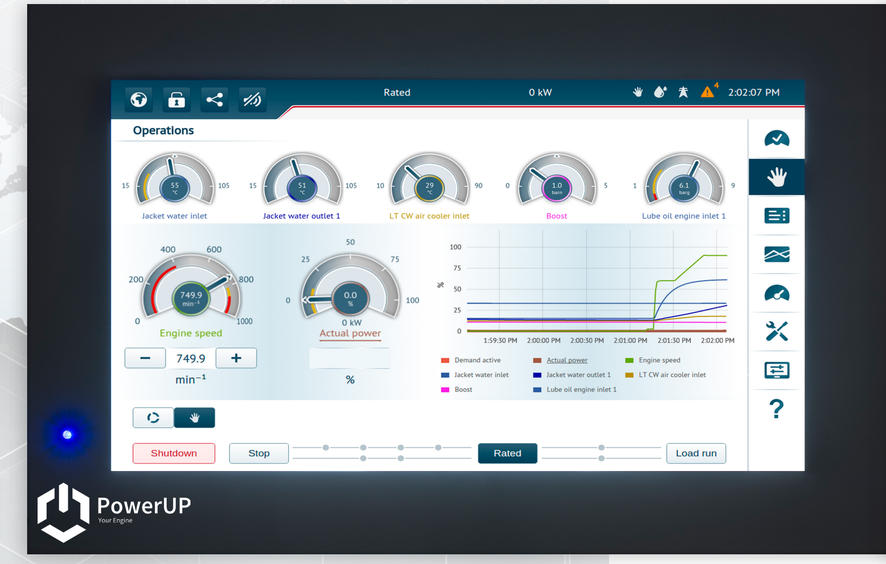
PowerUP GmbH
Sportplatzweg 2
6135 Stans, Tirol
Austria

+43 5242 64 666 - 0

office@powerup.at

www.powerup.at

JENBACHER GAS ENGINE
Controller (EDI)



Driven by efficiency

EDI – our tailor-made control system for Jenbacher gas engines was developed with our customers and specialists needs and wishes in mind and is open for all types of expansion. Functions, modules and subsystems harmonize with a high-performance user interface to form a single, intuitive unit. Our EDI-system grants full access to all parameters with no strings attached and is available for retrofit on all Jenbacher gas engines series 3, 4 and 6.

PowerUP
Your Engine

EDI – engine control system

Description

Our engine control system will aid you in maximizing your Jenbacher gas engine's uptime and performance by enabling remote control, predictive maintenance and real-time monitoring of all parameters you desire amongst a vast range of other benefits that will have your Jenbacher gas engine running like never before.

THE EDI PRINCIPLE

- Extensively tested and proven across a variety of Jenbacher series 3,4 and 6 engines with different applications our EDI-system is providing expert data analysis tools, simplified for best user-experience and backed with our extensive knowledge of Jenbacher gas engines.
- Gain new insights on your engine with custom trending, real-time data of engine performance- and output-parameters, component-individual test-mode and details for parts such as turbo-bypass & throttle-valve. EDI also comes with huge internal storage to provide an overview of historical operational data on a daily, weekly and monthly basis.
- Experience a simple and intuitive user interface on a generously sized touch-display and feel safe with frequent and customer-specific updates besides additional 24/7 help-desk-service and experts on-demand.
- A wide range of interfaces makes it the ideal control centre for integration of a variety of different components.
  To optimize gas engines in cogeneration plants, sensors and actuators are needed which can not be integrated into a classic PLC-based system – this is where the AVAT-technology software and hardware modules come into use e.g. for our cylinder-selective knock-control and misfire-detection.
- Your EDI engine control system is delivered with all wiring-diagrams, user's manual, description of functional characteristics and is installed, commissioned and adapted to your specific needs and requirements by our experienced experts.
- The EDI retrofit is available for all stationary cogeneration plants and containerized systems as well as island- and grid-parallel operation modes, furthermore for customer-specific applications on-demand.

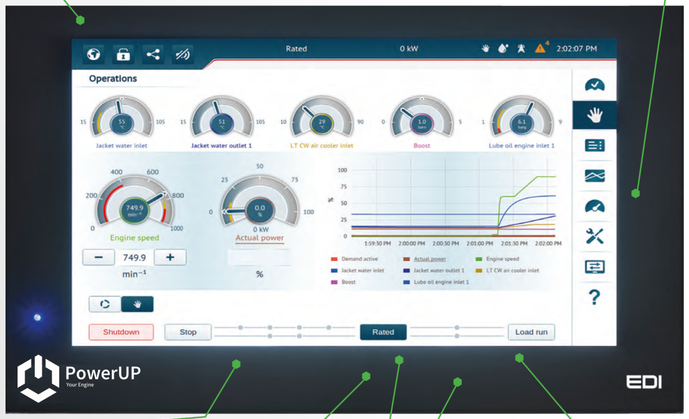
COMPLETE CONTROL SYSTEM FOR COGENERATION PLANTS:
CONSTANTLY FLEXIBLE, ALWAYS EXPANDABLE

Advantages

- A more flexible control system for performance-enhanced gas engines in the context of plant modernization
- More possibilities to change your engine settings
- Reliable knocking and misfire detection included
- Grid and generator protection on board
- Powerful built-in diagnostic and service tools
- One system for the engine and the auxiliaries
- Flexibly expandable and adaptable at all times
- Update availability over many years
- Independent and fast service
- Professional support and consulting for plant optimization
- Proven technologies from the large engine field
- Technicians with many years of gas engine experience

Plants

- Stationary cogeneration plants
- Containerized system or installation in permanent structures
- Synchronous AC generator, low or medium voltage
- Island mode and grid-parallel operation
- Grid code compliance



E²PILOT
User terminal with 15" capacitive touchscreen, adapted to the plant operator's needs. Rapid overview of engine and peripherals. Interactive operating log and configurable trending function.

GRID PROTECTION
Grid and generator monitoring, synchronizing and generator protection. Measurement of U, I, f, P and phase angle. Integral grid protection functions fulfill active and reactive power demands and synchronization criteria.

E²KNOCKCON-c20
Reliably detects combustion knock of any individual cylinder from the signals of established piezo knock sensors.

CPU
Robust industrial controller as the control system's basis. Ethernet interface for visualization, SCADA system and virtual power plants technology.

REMOTE SERVICES
AVAT VPN ROUTER guaranties fast and secure remote access via Internet. ECI-Distribution offers remote assistance, reporting and smartphone based alarm management on request.

SERVICE TOOL
The software for ambitious service technicians. Task orientated graphical user interface for commissioning, controller adjustment, troubleshooting and maintenance, etc.

CONTROL CABINET
All control system modules will be integrated in the existing control cabinet in short time. In most cases, I/O modules and engine cabling can be reused.

Functions

- Full access, no password-limitations
- Cylinder-individual knock-control with performance optimization
- Cylinder-individual misfire-detection with automatic power reduction down to engine shutdown
- Monitoring and individual trending of all sensors and measured values
- Control and monitoring of all cooling and heating circuits
- Integration of cogeneration-plant controls (peripherals)
- Start/Stop sequences for island and grid-parallel operation
- Compatibility with TecJet applications
- Control of engine speed, power and air/gas mixture
- Turbo-bypass control and ignition management
- CAN connection to the ignition system
- Fan control for dry and hybrid coolers
- Control of flow-side temperature even in part-load operation

AVAT
THE ENERGY ENGINEERING COMPANY