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EJGO - CONTROLLER FOR VACUUM PUMPS

EDWARDS THE PARTNER OF CHOICE

Edwards is a world leader in the design, technology and manufacture of vacuum pumps for industrial applications with over 100 years' history.

We believe in delivering results that bring value to our customers. Using our breadth of industry experience, we identify and apply effective solutions. Using the most innovative and up-to-date modelling techniques, we can optimise the pumping configuration for customers to provide a system design that gives the maximum performance in the most reliable and cost-effective way.

OUTSTANDING EDGE ON VACUUM CONTROL

EJGO, the new generation controller, takes vacuum connectivity to the next level. EJGO intelligently manages, commands, directs, and regulates the operation of your Edwards vacuum pumps and systems. Be ready for Industry 4.0 with EJGO that offers full connectivity, flexible accessibility, and outstanding control functionality.

EJGO INTELLIGENT CONTROLLER

Get an edge by selecting the user interface that relies on a robust controller module and adds greatly to your convenience.

User-friendly interface

The EJGO controller allows you to access the pump via the front panel, or the HMI along with the web browser. All the relevant parameters can be adjusted and monitored to match multiple pump processes.

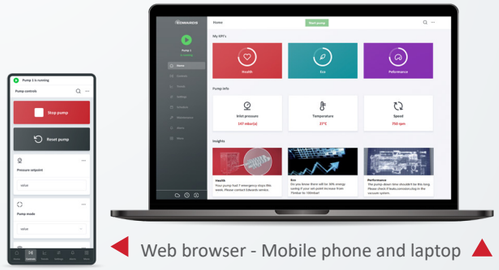
- **Front panel**
  - Icon buttons to control pump operation
  - LED indicators display pump information
  - Easy to use
- **7" HMI**
  - Configurable homepage with Graphic UI
  - Complete onboard control

Please note that some products feature either a front panel or HMI

- **Web browser** (Computer, laptop or mobile)
  - Monitor and control the pump from any connected device
  - Remote control is possible if pump is connected to the network or cloud

Front panel

HMI panel



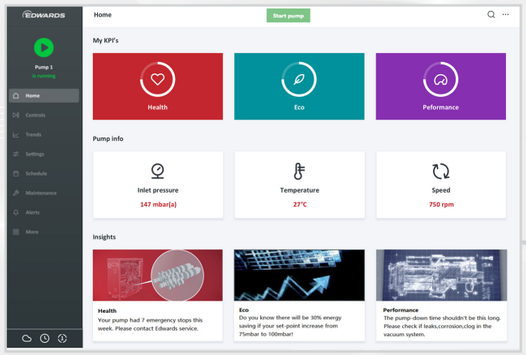
Web browser - Mobile phone and laptop

Controller module

- **Dual CPUs:** Split between low level and high level CPUs to achieve both industry reliability and intelligence
- Uses open-source and modular software to enable customisation

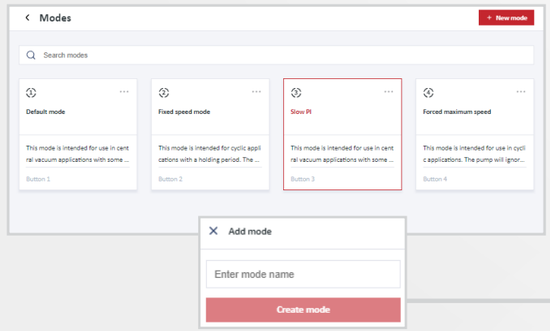
Controller module

ALL-IN-ONE SOLUTION WITH A FOCUS ON USER EXPERIENCE



KPI insights and management

- Assess pump health, vacuum performance and operating economy
- KPI score and insight cards give deep understanding of the systems beyond on/off and setpoint

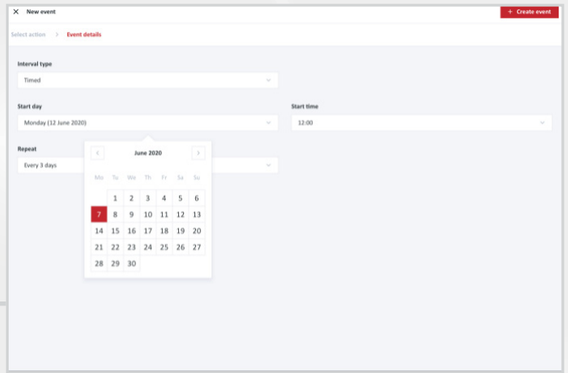


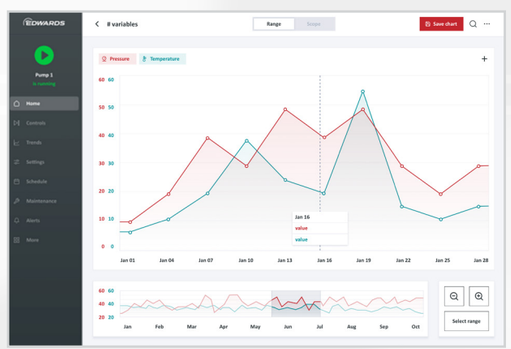
Operating mode management

- Default and optional pre-set modes to fit different applications
- Plan when and how to run or switch modes in your calendar
- Specify customised mode settings for ease of operation

Intelligent scheduling

- Plan a series of events into the calendar, not limited to pump start/stop routines, purge cycles and auto cleaning
- Convenience of setting up a repeat action as per individual process requirements





Trend map

- Monitor pump operation continuously for a real-time curve
- View trends and compare multiple metrics/cycles depending on pump type
- Examples include motor speed, power consumption, outlet temperature and more!

Alerts and notification

- Get alert notification on the mounted panel, in web UI, or via email notification

Automatic software updates

- Automatic or manual update configurable by you
- Automatic software updates do not interrupt pump operation, enabling continued uptime
- New software releases may be required for increased functionality, added features, patches and bug fixes

Remote service

- Support available for online diagnostics and debugging

Security

- ECC P256 certificate and TPM2.0 chip used
- Operation system and software is encrypted and password protected
- Identity management: different user access levels available for customised access control

EJGO MC - CENTRAL CONTROLLER

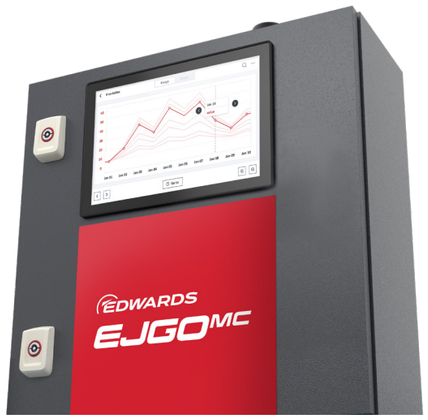
The central view of everything

EJGO MC is Edwards' revolutionary multi-pump controller. It is an industry Internet of Things (IoT) and gives an integrated control solution for optimised vacuum system management.

As an advanced central controller, EJGO MC can range to large industrial control systems which are used for controlling processes or machines.

Product variants

▲ **Without screen** - Web access supported



▲ **With 10" touch HMI** - Onboard control

Software control capability for EJGO MC - Central Controller

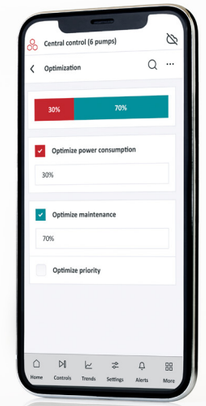
■ Standard version

Differs from a traditional sequencer, where one leader VSD will adapt and others will act as fixed speed on/off. EJGO MC standard sets leader VSD pump as a base, follower VSD pumps run at 60% ~100% of the maximum speed, while the follower fixed speed (FS) pumps act as on/off.

- Up to 8 pumps
- Can be VSD or fixed speed pumps (Edwards or non-Edwards)
- Squence pumps with virtual machine control
- ~10% energy saving vs traditional sequencer!
- Includes pressure sensor

■ Premium version

- Differs from a traditional multi-pump controller, only controlling the combination pumping speed to achieve flow demand, without taking into account the power consumption. EJGO MC Premium optimises at any operation point, gets the best combination that ensures minimum power consumption so that each pump has the lowest SER
- Up to 20 pumps
- Can be VSD or fixed speed pumps (Edwards or non-Edwards)
- Innovative algorithm to maximise energy saving
- ~20% energy saving vs traditional sequencer
- Includes pressure sensor



Features

Accessibility
- Simple commissioning and support onboard touch panel or web access

Intelligent scheduling
- Schedule multiple tasks of the centralised installation

Diagnostic and notification function
- Report locally or via email, including control status, error, or other information

Automatic updates
- Automatic or manual update configurable by customer

Energy optimisation and cost reduction
- New algorithm optimises SER of system and increases energy efficiency

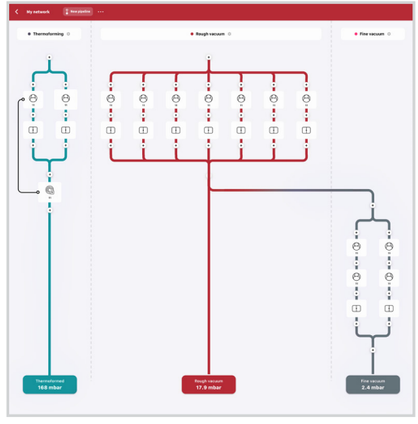
Equal wear control
- Balance the running hours to ensure similar service life of each pump

Central setpoint
- Maintain a stable inlet pressure

Dual network control
- EJGO MC Premium can offer two pressure levels control, including valves control

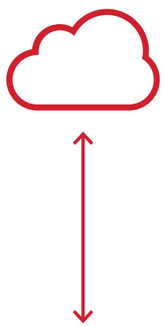
Easy expandability
- On network (via LAN/WiFi) or local cable connection
- Support all Ethernet-based protocols and connect directly

CVS visualisation
- Visualise all individual units and those of the CVS on the 10"HMI or any device!



CONNECTIVITY

Today, Internet of Things (IoT) can provide us with more visibility, insights and efficiencies by capturing data from connected devices. In Smart Manufacturing, connectivity of devices is crucial. EJGO and EJGO MC offer a whole range of connection possibilities.



FULLY CONNECTED

Pump is connected to local site network (via ethernet cable or WiFi bolt) and permitted to connect to Edwards security cloud service.

Enhanced accessibility

- Full remote access to the pump by any device (computer or smartphone) on the network or global access with VPN
- Cloud connection allows automatic software updates for the pump controller every new release
- Remote support from Edwards service

LOCAL NETWORK CONNECTED

Pump is connected to Local Area Network - LAN (via ethernet cable or WiFi bolt), but not given permission to access Edwards secure cloud service.

Enhanced accessibility

- Full remote access to the pump by any device (computer or smartphone) on the network or global access with VPN
- Manual software update. User authentication will be required to download the software package from Edwards cloud service

STAND ALONE

Pump has no connection to the network in any way.

Enhanced accessibility

- Remote access is impossible. But the local device can physically or wirelessly connect to the pump with ethernet cable or optional WiFi bolt
- Manual software update. User authentication will be required to download the software package from Edwards cloud service

Ethernet cable

- Enables direct link to customer network or cloud
- Terminal devices can locally access the pump via ethernet cable

WiFi bolt

- Pump can wirelessly connect to the customer network or cloud (WiFi bolt in Client mode)
- Wireless devices on the network can also access the pump
- Wireless devices in proximity can connect directly to the pump (WiFi bolt in AP mode)

GENIUS box

- Activated SIM card installed
- Pump can wirelessly connect to cloud
- Can share medium-sized data files with the cloud

Communication protocols

EJGO and EJGO MC support a wide range of fieldbus communication and network protocols, thereby allowing for pump and central vacuum integration into a variety of industry control systems.

- Support all Ethernet-based protocols and connect directly even without gateway
- Gateway as options to enable communication with the other protocols

Modbus TCP · EtherNet/IP · PROFINET · PROFIBUS · Modbus · OPC UA · EtherCAT

	FULLY CONNECTED	LOCAL NETWORK CONNECTED	STAND ALONE
Local access/control By front panel, HMI or local connected device	✓	✓	✓
Remote access/control via LAN/WiFi By any device in the network or global access with VPN	✓	✓	×
Integration and fieldbus communication	✓	✓	✓
Automatic online software update*	✓	× (Manual offline)	× (Manual offline)
Remote service*	✓	×	×
Email notification	✓	×	×

** Note: Not applicable for GENIUS box connection*

SECURITY

Safeguard customers' vacuum system

Cyber security for an industrial environment has been neglected for a long time. Edwards no longer assumes industrial networks as a secure environment. Lack of security and poor encryption is a risk to our customers and their businesses. EJGO and EJGO MC secure our products to ensure reliable functionality and ensure that they avoid being the entry point for attacks on customer networks.

Encryption method

- **Ellipse Curve Cryptography (ECC)**
  - Certificates use ECC P256 which is a higher security standard and more secure than other encryption methods, such as RSA
  - It's considered robust enough to withstand attacks based on projected computing power availability for years to come

- **Trusted Platform Module (TPM)**
  - Newer generation of storage chip-TPM2 used on the controller hardware
  - Encryption keys related to communication both to and from the controller are safely stored
  - Tamper proof – It will become inoperable if removed or physically accessed

Identity management

- **General user**
  - Log in with default password which is randomly created during production
  - Each pump has its unique password instead of a generic one
  - Randomised passwords can be changed by the user

- **Admin user - Able to change setting**
  - Access with Json Web Token (JWT) with short validity
  - JWT token specific to a given pump can be acquired from Edwards secure cloud portal
  - User authentication needs to happen regularly, no passwords that could leak

Operation system and software

- **Operating system - Secure boot**
  - Operating system is verified upon booting sequence
  - Controller recognises hacker attack and prevents boot up
  - Ensures no manipulated operating system can run on the controller

- **Application software - Signed and encrypted**
  - Software package itself is encrypted and application is also signed
  - Controller can verify that only the correct software can be run
  - Prevents 3rd party software packages from being used

- **Encrypted partition - Secure sensitive data**
  - Partitioned memory within the controller
  - Important and sensitive data is kept behind a secured barrier which is signed and encrypted
  - Hinders unauthorised access to important data and ensures its integrity

- **IP tables - Limiting the access to the bare minimum**
  - Unlike other devices that leave many data ports open even when not being used, our controllers allow only the required ports to stay open for communication
  - Prevents unwanted entry from unlocked windows

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