

KRONOS

Gas Engine Control Systems



**KRONOS 20
AFR Control Unit**

**KRONOS 40
Gas Injection
Control Unit**

**Electronically
Controlled
Main
Adjusting
Screw**

**Gas
Mixer**

**Throttle
Valve**

**ELEKTRA
Gas Metering Unit**

**MEGASOL
Gas Injection Valve**

**DcDesk 2000
PC Program**

- ✓ Air fuel ratio control
- ✓ Speed and load control
- ✓ Lower emissions
- ✓ Savings on fuel



THE KRONOS SYSTEMS

The KRONOS product range comprises four systems for Air Fuel Ratio (AFR) control as well as speed/load control systems. You are sure to find a solution to meet your requirements, independent of engine size, specific application, operational demands and emission requirements.

All KRONOS systems are based on proven mechanical and electronic components, with each system specially designed for a specific range of applications. Customer-specific adaptations to the basic systems guarantee optimised, economical solutions for OEMs, packagers and retrofit customers.

Mechanical parts such as throttle valves, gas mixers and gas valves are available in many different sizes and are compatible with products from other manufacturers. This ensures that installations are always as simple as possible.

If required, special customised designs can be provided to meet individual customer requirements.

KRONOS Benefits

- ✓ **High performance**
- ✓ **Outstanding flexibility**
- ✓ **Proven reliability**
- ✓ **Long operating life**

The electronically controlled KRONOS systems are controlled by HEINZMANN digital governors, which are also used to provide the speed governor functionality for diesel, gas and dual fuel engines. Parameterisation and monitoring is provided by the well-known DcDesk 2000 software, guaranteeing a clear and simple commissioning process. CAN communication allows KRONOS to be integrated with other HEINZMANN or third-party systems, providing support for speed control, knock control, misfire detection, ignition control, generator management and customer PLCs.



SYSTEM OVERVIEW

KRONOS 10 - mechanically controlled

KRONOS 10 is a simple mechanical air fuel ratio control system consisting of a throttle valve, a Venturi based gas/air mixer and a mechanical gas main adjusting screw. It is a good solution for all sizes of engines from 25 kW to 3 MW where precise control of emissions is not required. The mixer and gas regulator screw have no moving parts, ensuring high reliability, long service intervals and minimal maintenance.

KRONOS 20 - electronically controlled

Based on the KRONOS 10 solution, the KRONOS 20 is an electronically controlled AFR trim control system that allows speed/load dependent lambda values to be set within a certain range, thereby improving the engine behaviour under all operating conditions. The closed-loop version uses engine output signals to automatically correct variations in gas quality and pressure.

KRONOS 30 M - full authority

The KRONOS 30 M is a full authority system including speed/load control. The modular concept is very flexible and can be extended to accommodate applications with larger variations in gas, engine and ambient parameters. The application-specific independent gas mixer configuration permits operation using a variety of gases, including low calorific gas. The system provides outstanding closed-loop accuracy, enabling systems to meet the latest emission reduction requirements.

KRONOS 40 - injection based

KRONOS 40 is a speed/load control system for gas engines with gas injection valves controlled by solenoid valves. The system can handle cylinder outputs from 100 to 600 kW and up to 20 cylinders. This design features individual cylinder injection and exhaust gas temperature sensing, which makes precise gas metering possible therefore enabling accurate sensing of each cylinder and real-time monitoring of the engine's combustion processes. The basic system is used on injection engines in the lean-burn mode when the gas-air mixture is ignited in a pre-combustion chamber. By integrating additional HEINZMANN components the system can be built into a complete engine management system.



Mechanical adjusting screw



Throttle valve



*KRONOS 20
AFR control unit*



*ELEKTRA
Gas metering unit*



*MEGASOL
Gas injection valves*



*KRONOS 40
Gas injection control unit*

KRONOS 10

MANUALLY ADJUSTABLE AIR FUEL RATIO SYSTEM



Mechanical main adjusting screw



Gas mixer with Venturi insert

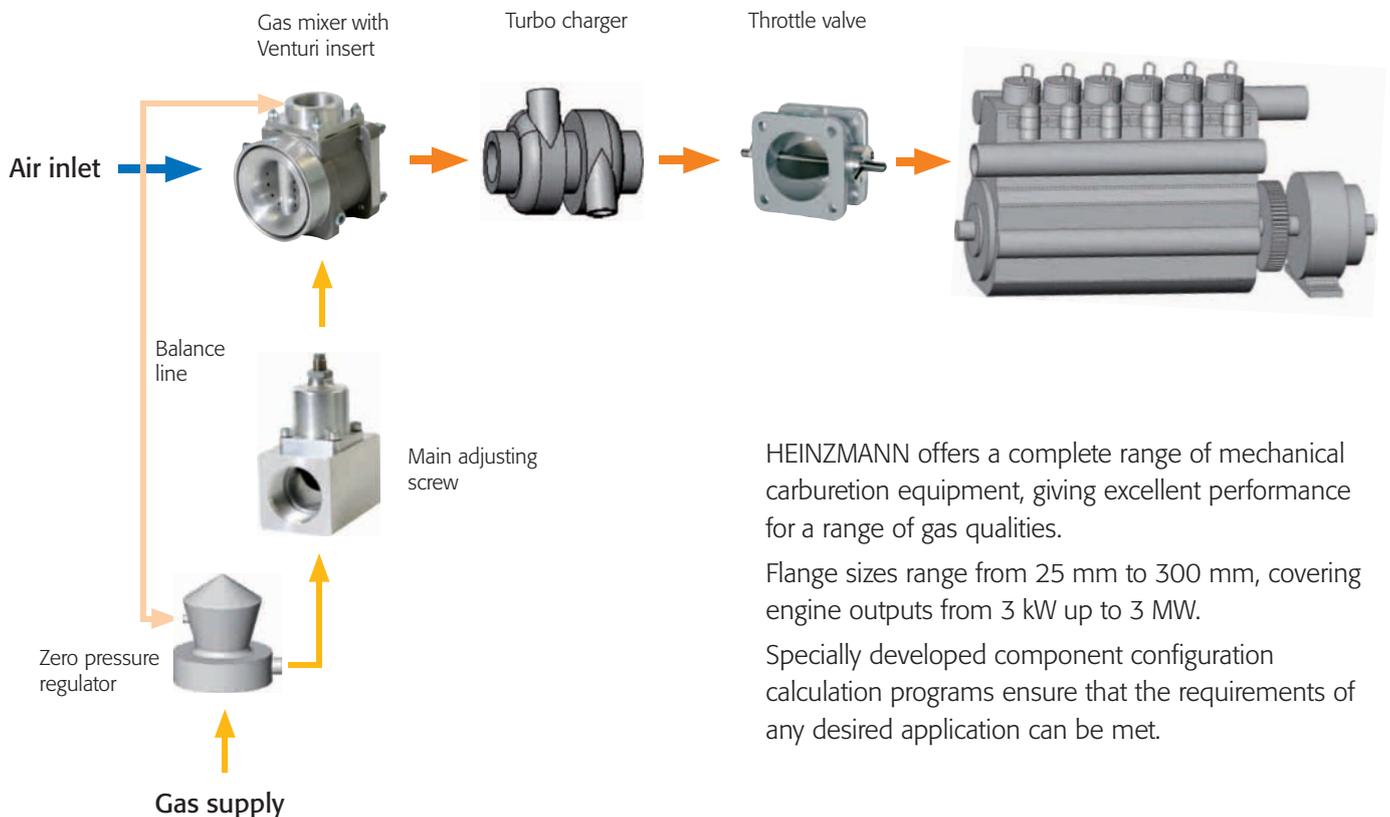


Throttle valve



System features

- System can be used for all low-pressure and some high-pressure applications
- Reliable gas mixer operation based on physical principles
- Pressure drop across the gas mixer is very low due to the optimally shaped Venturi insert
- Gas mixer can work at gas supply pressures as low as 20 mbar
- Gas mixer contains no moving parts
- Different Venturi inserts and configurations available, for a wide range of gas qualities
- Highly homogeneous mixture quality ensures even distribution across cylinder
- Main adjusting screws available for all applications
- Low-torque butterfly-type throttle valve
- Air fuel ratio components are available in anti-corrosive versions for use with corrosive gases



HEINZMANN offers a complete range of mechanical carburetion equipment, giving excellent performance for a range of gas qualities.

Flange sizes range from 25 mm to 300 mm, covering engine outputs from 3 kW up to 3 MW.

Specially developed component configuration calculation programs ensure that the requirements of any desired application can be met.

Provided that a zero pressure regulator is used, the Venturi principle ensures that the desired air fuel ratio remains stable over differing speed and load conditions.

The main advantage of this system is the ability to use different settings for the main adjusting screw and the zero pressure regulator offset, combined with variation of the Venturi insert. It provides improved starting and synchronisation behaviour, whilst still maintaining the desired air fuel ratio.

The air fuel ratio can be adjusted manually in order to achieve low emissions at various engine loads for a given gas quality.

Both the gas mixer and the throttle valve are manufactured from precision cast aluminium. The low friction bearings and seals in the throttle valve allow easy movement of the butterfly valve under all load conditions and guarantee a long operating life.

KRONOS 20 ELECTRONIC AIR FUEL RATIO CONTROL SYSTEM

System features

- Enhanced carburetion based system with electronic trim functionality
- Improved engine starting and speed stability
- Adjustable air fuel ratio tracking map
- Automatic enrichment for cold starting and temperature dependent leaning function
- Applicable on a wide range of engine models without parameter-set changes
- Basic fuel system remains operational even if power fails
- Optional: closed-loop control based on gas quality sensor, oxygen sensor or load-input
- Optional: misfire detection
- CAN communication
- DcDesk 2000 menu driven programming

KRONOS 20
AFR control unit



Electronically controlled
main adjusting screw



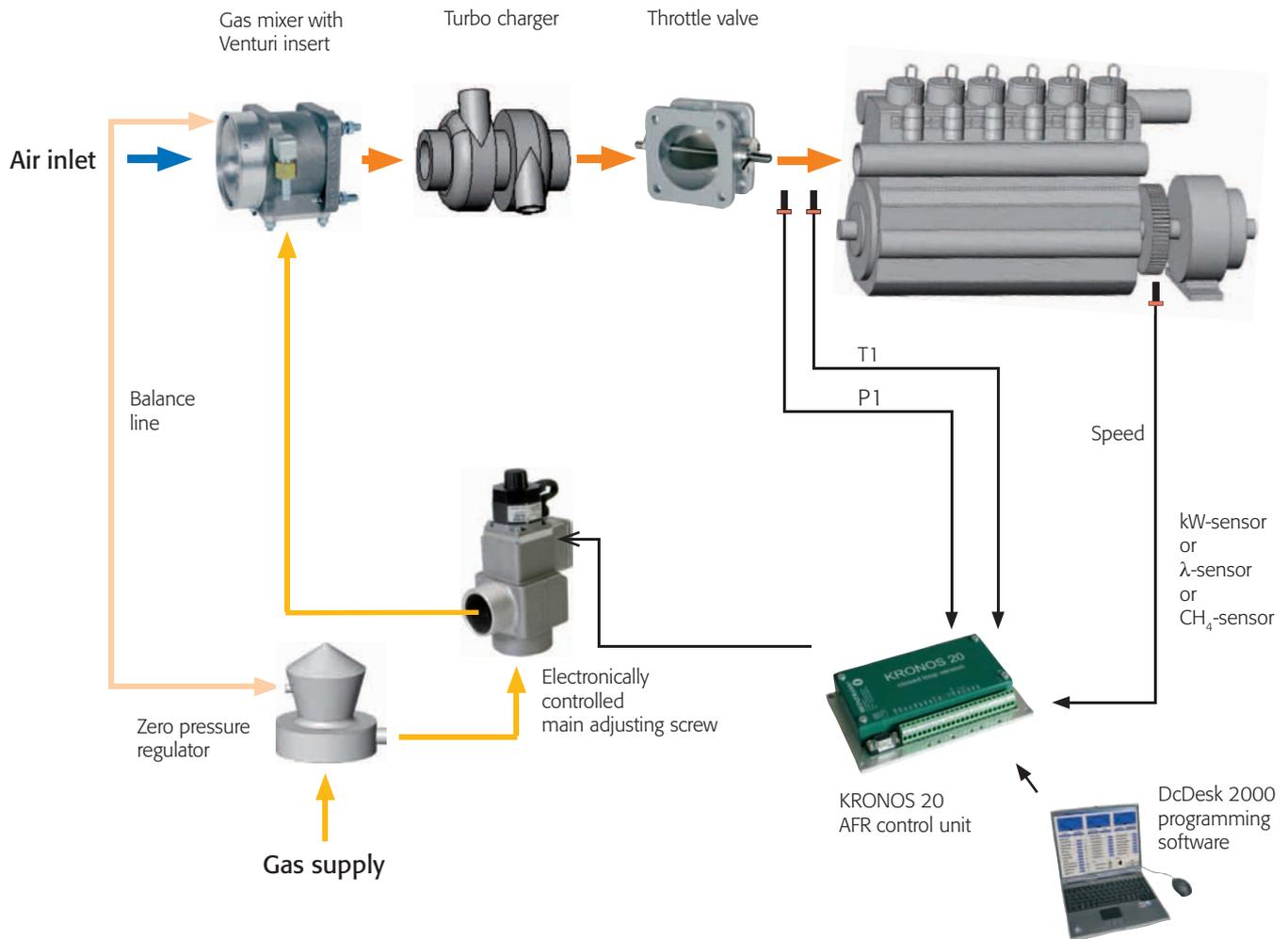
Gas mixer with
Venturi insert



Throttle valve



kW-sensor
or
 λ -sensor
or
CH₄-sensor



Based on the same Venturi principle as the KRONOS 10, the KRONOS 20 provides an electronically controlled main adjusting screw, a digital control system and all necessary sensors.

KRONOS 20 is a very powerful air fuel ratio control system at an affordable price.

Two versions of KRONOS 20 are available:

- Open-loop system configured for fuel and engine characteristics
- Extended closed-loop system with compensation for gas quality variation

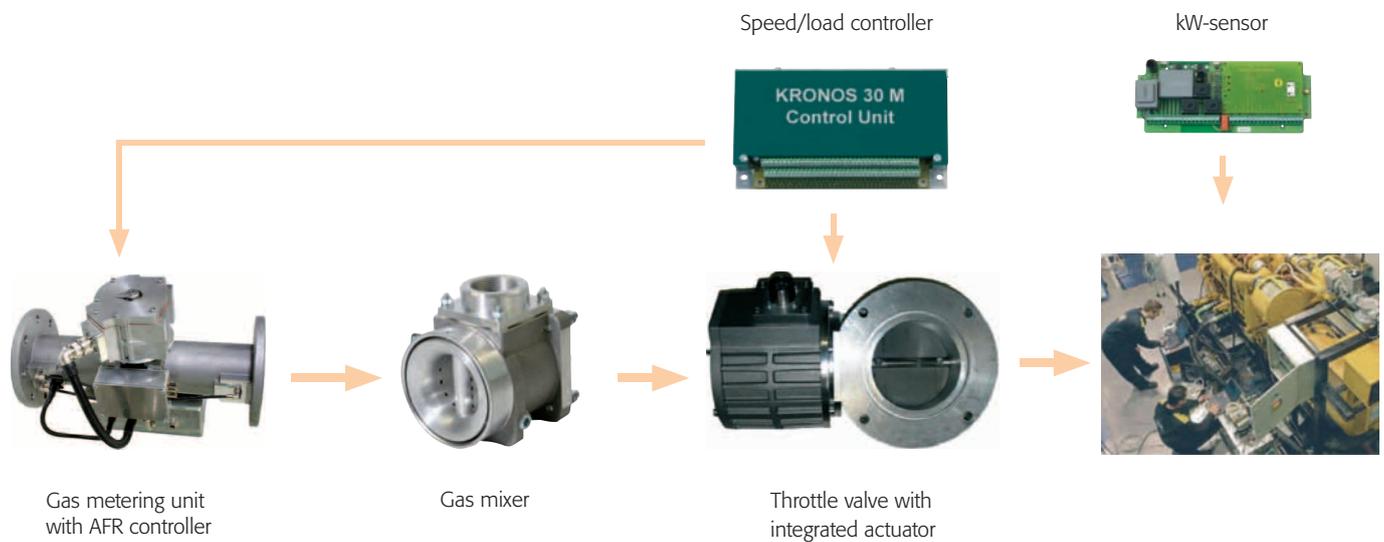
The KRONOS 20 system is equipped with highly sophisticated user-friendly software that allows simple and quick calibration and commissioning by the customer.

The main feature of KRONOS 20 is the option to set precise values for the air fuel ratio over the entire load and speed range. This provides clear advantages such as:

- Excellent starting and synchronisation of the engine
- Compliance with emission regulations over the entire load and speed range

KRONOS 30 M

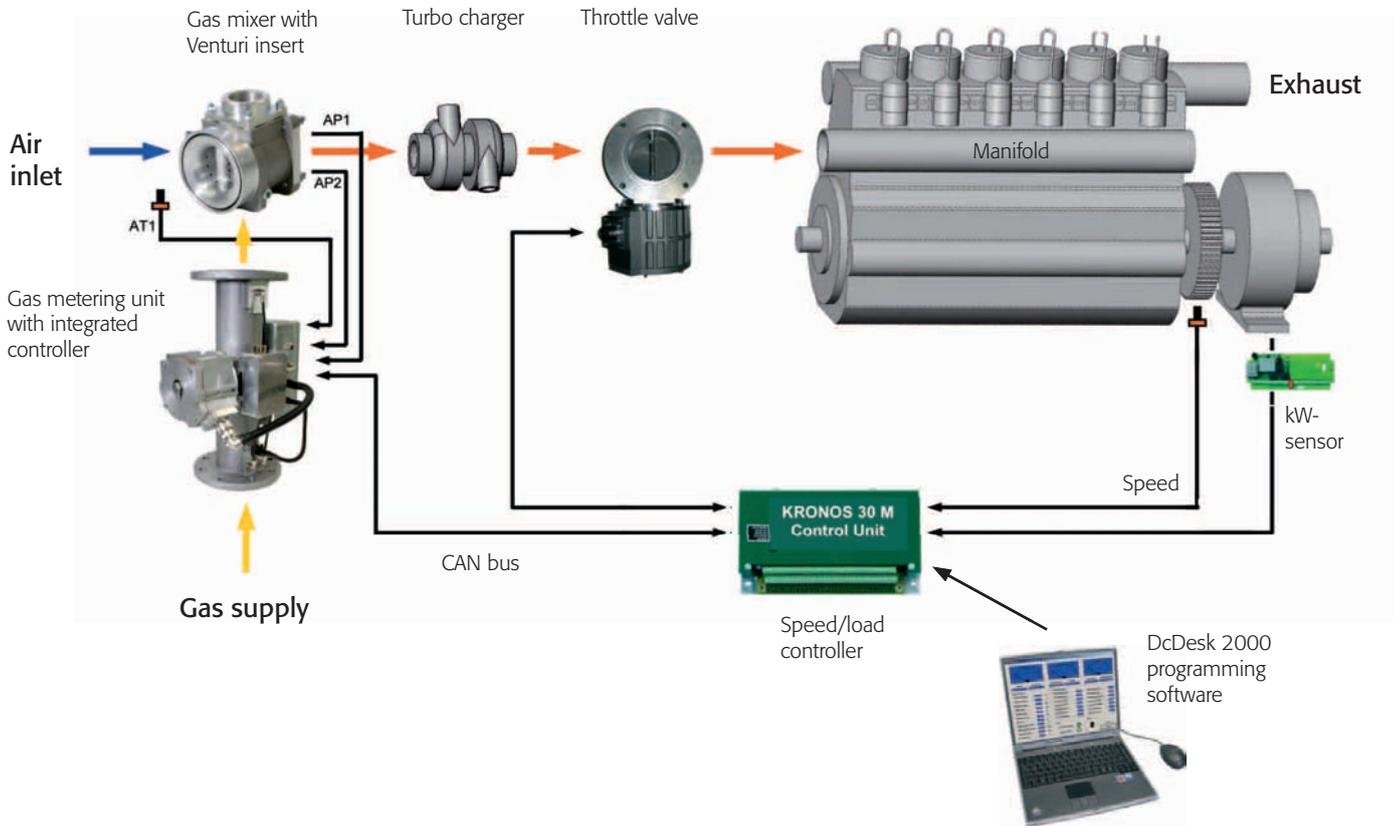
FULL AUTHORITY AIR FUEL RATIO CONTROL SYSTEM WITH INTEGRATED SPEED GOVERNOR



System features

- Module-based gas engine control system including gas flow control, full authority lambda control and speed/load control
- Accurate air fuel ratio control providing compensation for changes in engine and fuel gas characteristics
- Compatible with auxiliary load management devices
- Tolerant to wet biogases and corrosive contaminants
- Acceptance of large load changes during generator operation in island mode
- Ideal for retrofitting and large engine OEM applications
- All electric actuators for gas metering and throttle control
- CAN communication
- Optional: gateway unit for standard CAN protocols (CANopen, DeviceNet, J1939)
- Optional: misfire detection
- DcDesk 2000 menu driven programming

Suitable for all applications, including the flexibility to adapt to changes in engine and fuel characteristics. The KRONOS 30 M Modular Control System is a flexible, full-authority AFR control system with an integrated speed governor that can accommodate variable operational parameters.



The KRONOS 30 M does not require a zero pressure regulator and includes a gas metering unit able to handle pressure changes up to a ratio of 2:1 and a pressure range 30 – 200 mbar. It is also tolerant to wet biogas and other corrosive contaminants.

The stand-alone capability of the gas metering unit allows independent operation of the gas metering and lambda control features, allowing all application requirements to be met.

The integrated speed governor provides good speed and load control and is compatible with HEINZMANN devices such as the digital THESEUS Generator Management System.



KRONOS 40 ELECTRONIC GAS FUEL INJECTION SYSTEM FOR SPEED/LOAD CONTROL



KRONOS 40
gas injection control unit



MEGASOL

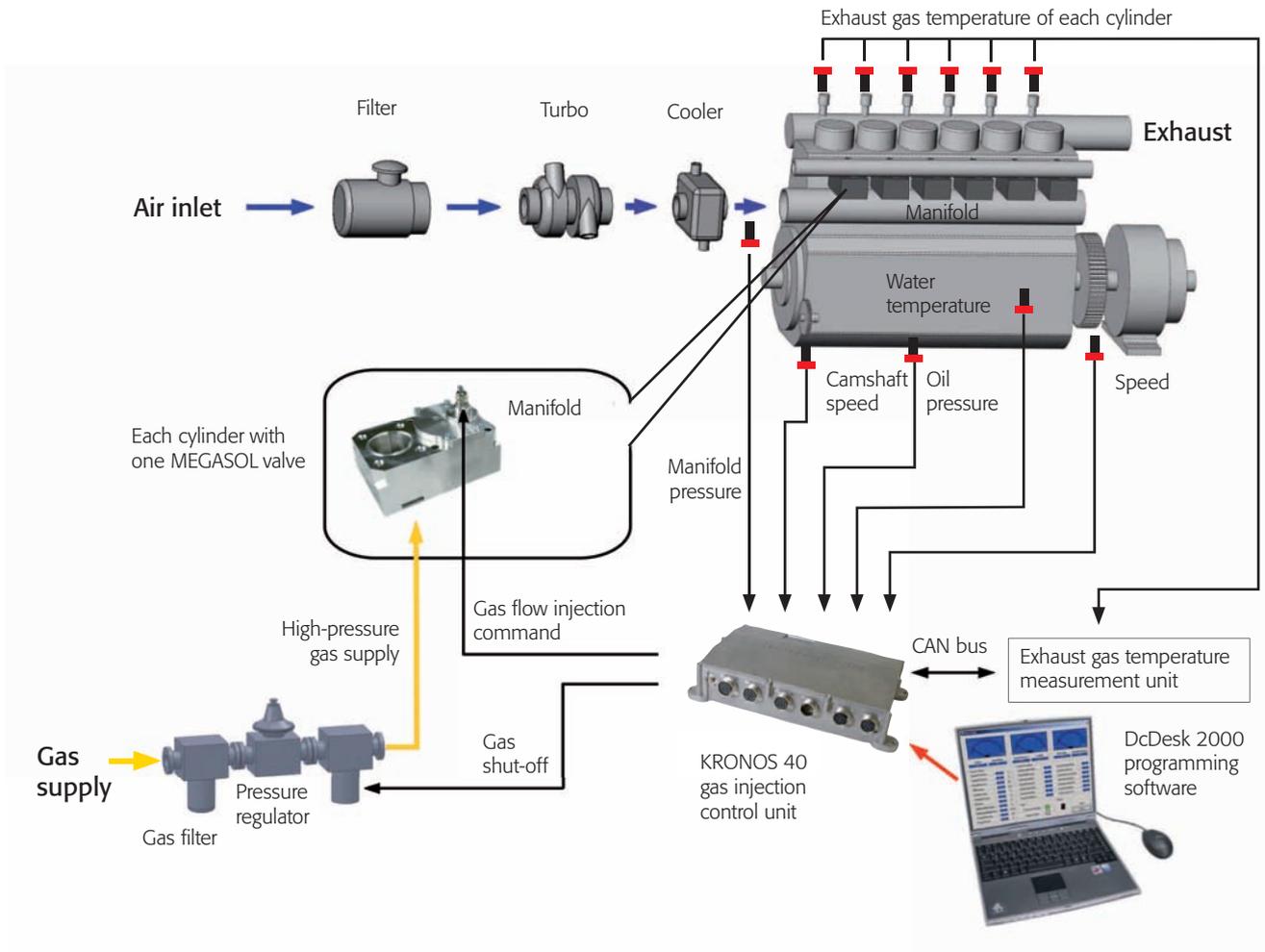


kW-sensor

System features

- High-precision gas metering and accurate tuning
- For new engines and retrofit applications
- For low- and high-speed engines
- Very good engine response thanks to valve position close to cylinders
- Precise control times for efficient operation
- Optimised fuel efficiency
- Minimal backfire risk
- Long valve life
- Compact valve dimensions
- Can be expanded to complete engine management system (e.g. mixture adjustment, ignition timing, wastegate, generator management)
- CAN communication including standard CAN protocols (CANopen, DeviceNet, J1939)
- Optional: Misfire detection
- DcDesk 2000 menu driven programming

The cylinder-individual adjustment of the system allows an optimal engine tuning combined with an extensive monitoring of the operating condition. Thus a high fuel economy is reached with low emissions. A diesel-like operating performance ensures an outstanding control quality also under considerable varying load.



The KRONOS 40 system can be fitted to the speed/load control system in pre-chamber gas engines. KRONOS 40 is based on the MEGASOL gas injection valve and the proven DARDANOS solenoid valve control, which performs speed/load control and also gas valve control. The range of valve and control device types means that the system is highly flexible and can be adapted to suit different engine sizes, cylinder configurations and functions. Integrated sensing of exhaust gas temperature enables accurate timing of all cylinders and also their monitoring. This means optimal engine functioning with high efficiency, low emissions and protection of engine components. Additional sensor technology can further enhance these features.

The gas injection valves are located directly on the cylinder inlet, this requires a gas supply pressure of 3 – 4 bar which is manifold pressure dependent. For this reason the gas pressure is set to 0.5 – 1 bar above the current manifold pressure.

With large engines the use of gas injection valves prevents unburnt fuel being released into the air. This makes optimal fuel use possible and lowers harmful emissions.

A long life cycle and easy replacement of worn parts ensures low servicing costs.



COMMUNICATION SOFTWARE DCDESK 2000

The HEINZMANN PC program DcDesk 2000 can be used with any of the digital HEINZMANN systems, such as speed governors, magnetic valve systems and generator set controls, to adjust and view operational data. Thanks to its design as a Windows®* program, it offers all numerical and graphical features required for testing, configuration, commissioning and servicing.



INTEGRATED GAS ENGINE MANAGEMENT

All KRONOS systems can be extended to form part of integrated engine management solution. The HEINZMANN modular system PANTHEON offers a comprehensive product range from one supplier. All digital HEINZMANN controls communicate via CAN bus. HEINZMANN also supplies interfaces for external CAN communication such as CANopen.

For further information please refer to the PANTHEON leaflet.

Selection of PANTHEON features

- Monitoring
- Integrated HMI
- Data logging
- Remote access by SATURN system
- Ignition control
- Knock control
- Misfire control
- Generator management

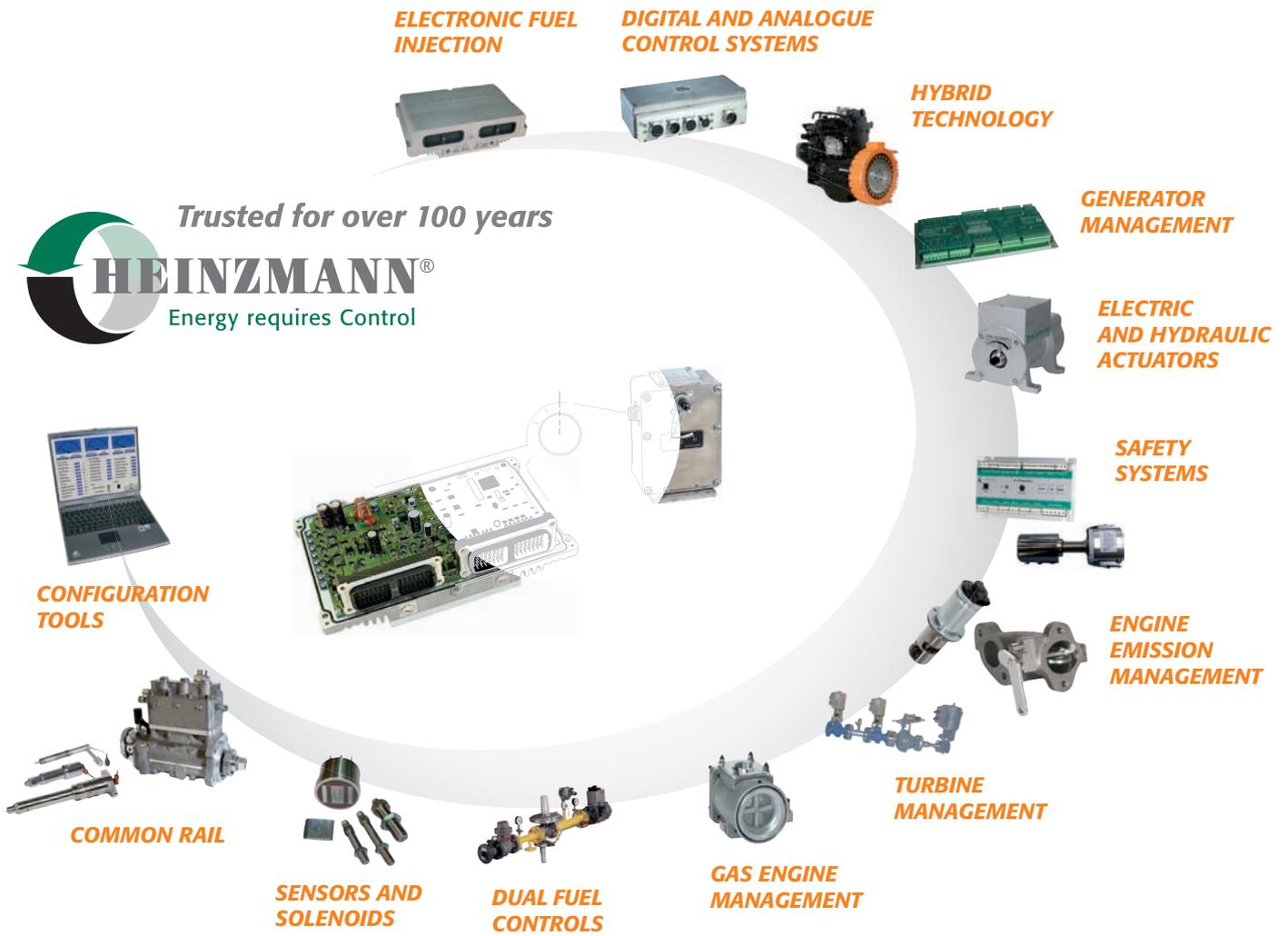
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