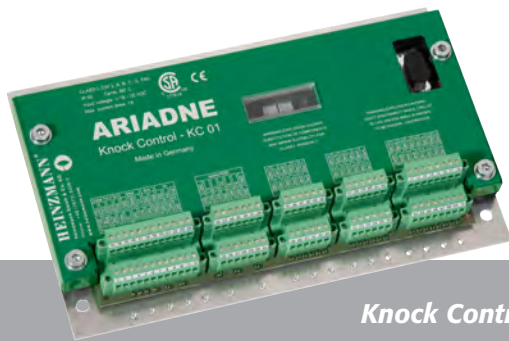
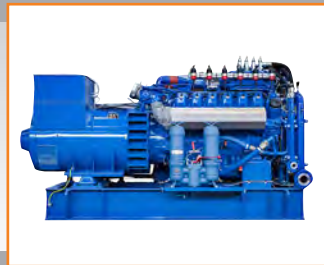
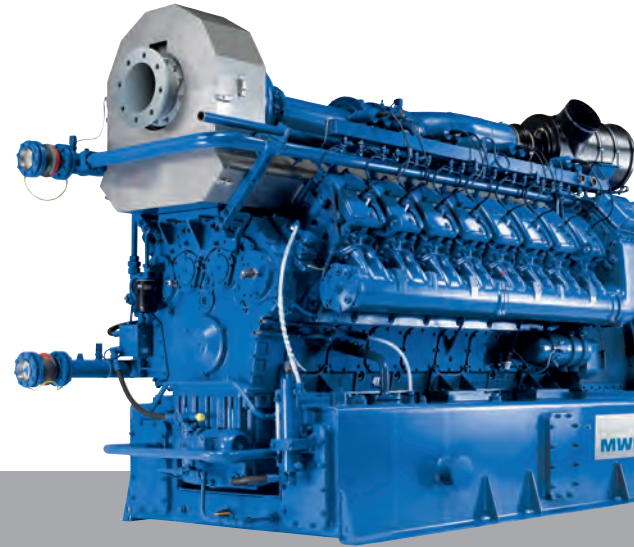


# ARIADNE

## Knock Control KC 01



*Knock Control Unit*



*For Gas Engines in all Designs and Sizes*

- ✓ Protection against engine damage
- ✓ High efficiency
- ✓ Cost effectiveness
- ✓ Monitoring of up to 20 sensors
- ✓ Suitable for all applications

***Gas Engine Management***

## ARIADNE

### *Knock control unit*

Knocking is an uncontrolled combustion process that can occur in gas engines, generating high-frequency pressure vibrations in the combustion chamber. This not only causes reduced engine performance and increased noise, but can also potentially lead to destructive engine damage.

Combustion knock is a major limiting factor on the available compression ratio, and means that the use of low methane number fuel gas must be restricted. Alongside misfiring, this is one of the major obstacles in delivering increased performance and development of improved engine designs.

Knock is a stochastic process, meaning that even under steady operational conditions the knock intensity will change from cycle to cycle and from cylinder to cylinder. This makes it necessary to analyse each cylinder individually to ensure the best performance.

The three factors described above illustrate the key role played by the knock control process in modern spark-ignition engine management systems.

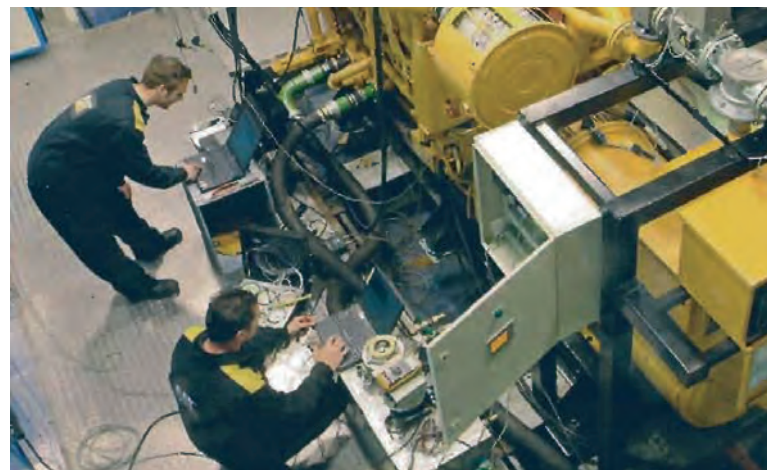
The system must be able to accurately detect knock in each cylinder individually, and must maintain optimal operation under all conditions in order to protect the engine from damage.

Performance and protection: these concepts are at the heart of the ARIADNE design, HEINZMANN's knock control system. With ARIADNE on board you can be sure that you have the best tools available in your quest for improved engine performance and avoidance of the threat of knock.

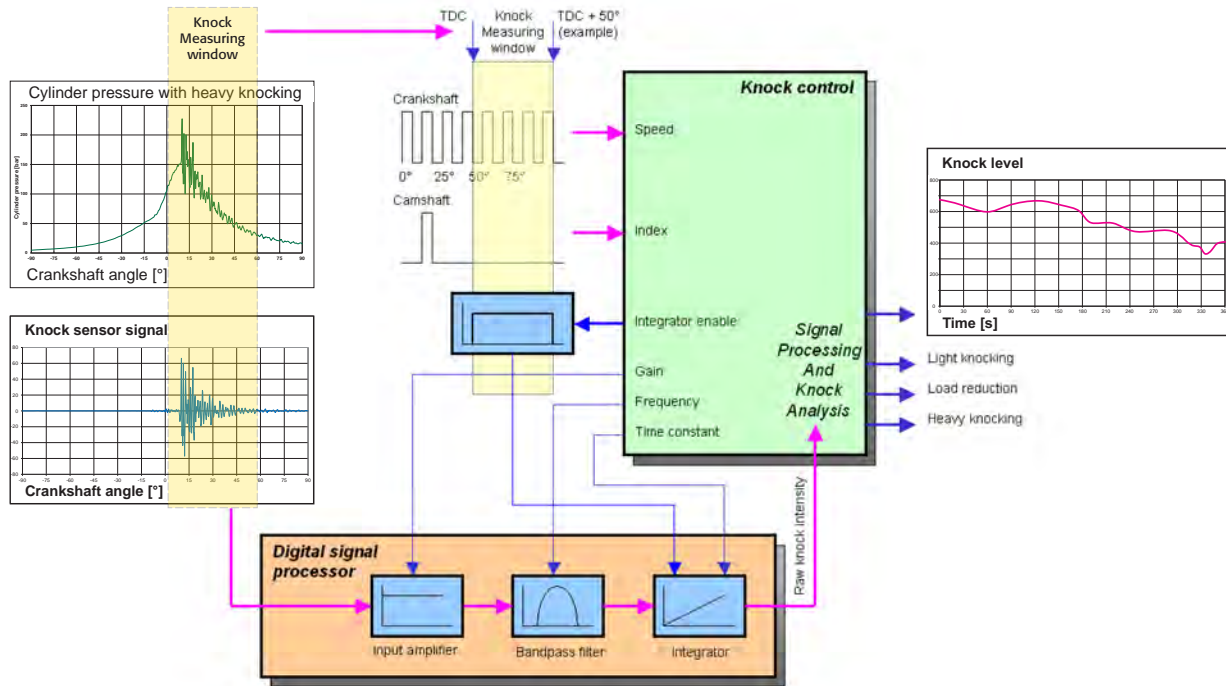
## ARIADNE Benefits

Used as part of a gas engine management system, ARIADNE offers advantages in terms of engine protection, performance and cost.

- ✓ **Gas engines are protected against damage caused by knocking combustion.**
- ✓ **With ARIADNE on board, engines can safely be run close to the knock limit, leading to high efficiency and low emissions.**
- ✓ **Variable gas quality can be used.**
- ✓ **Less electronics on the engine: a single ARIADNE unit can monitor up to 20 knock sensors i.e. sufficient for a complete engine in most cases.**
- ✓ **Each cylinder is monitored on a cycle-by-cycle basis. This makes it possible to fine-tune individual cylinders, thereby improving engine performance and reducing emissions.**
- ✓ **Low cost application options are supported with monitoring of several cylinders using a single sensor.**
- ✓ **ARIADNE is fully compatible with other HEINZMANN systems and the HEINZMANN advanced user interface DcDesk.**
- ✓ **ARIADNE is available in 2 designs (IP00 and IP55) and can be mounted either on or off the engine.**
- ✓ **An integrated diagnostic display allows quick servicing.**
- ✓ **ARIADNE provides a wide range of I/O options, making it suitable for all types of application, from use as a stand-alone unit to use as a highly integrated part of engine management system.**



# FUNCTIONAL OVERVIEW



## APPLICATION

ARIADNE can monitor up to 20 vibration sensors placed on the engine structure. Depending on the configuration, a single sensor may be assigned to one or more cylinders.

Combustion knock produces high-frequency pressure oscillations that cause increased vibration within the engine structure. The knock sensor is able to detect this vibration and will output a higher signal level at certain frequencies of oscillation.

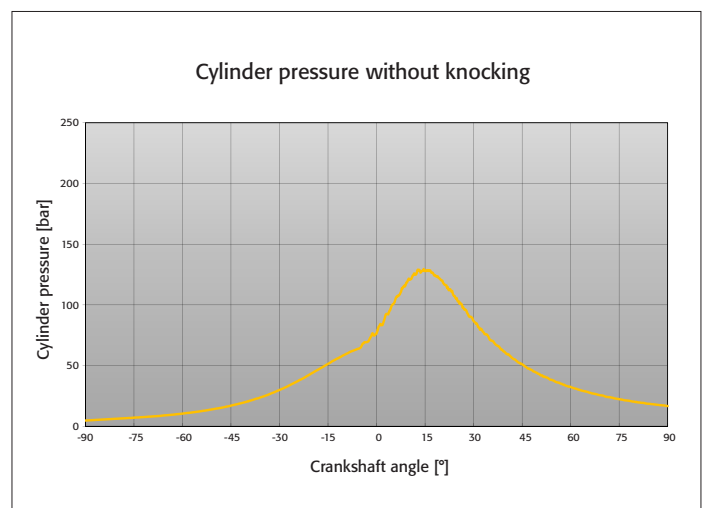
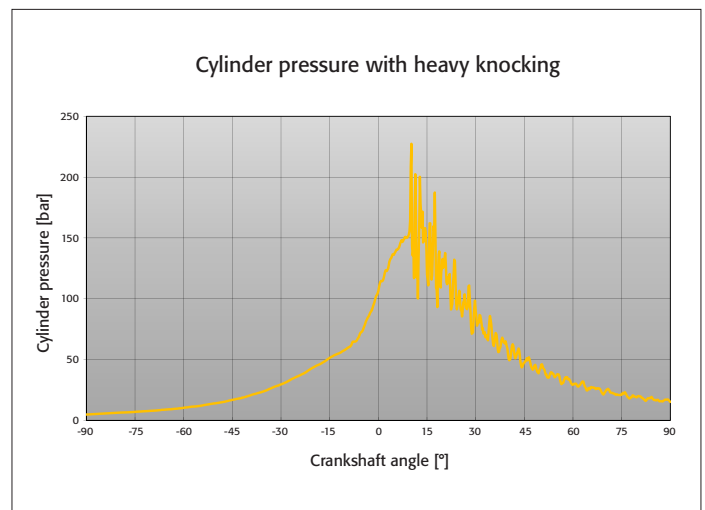
By using a configurable bandpass filter, ARIADNE is able to monitor just this specific knock frequency, suppressing all normal engine vibration that is not related to knock.

In order to determine the time window where combustion knock is likely to occur on a cylinder-by-cylinder basis, ARIADNE also needs information relating to engine speed and phase (knock is usually measured just after cylinder top dead centre, for example between TDC and TDC+50° crank).

ARIADNE is particularly well suited to engines with the following characteristics:

- V-type or inline gas engines
- Rated speed of 600 to 1800 rpm
- Rated load from 100 to 8000 kW
- Number of cylinders 4 up to 20

ARIADNE has been designed to suit all gas engine control system applications. In order to illustrate the range of possible applications, 2 typical configurations are described below in more detail.



## STAND-ALONE KNOCK CONTROL UNIT

When used as stand-alone unit, ARIADNE's analogue output can be wired directly to the ignition system, transmitting the knock severity measured on the engine (maximum knock level on all cylinders).

This 4-20 mA or 0-5 V signal is used to provide an offset to the nominal spark angle. When particularly heavy knocking is detected an engine stop signal will be sent using a digital output to the speed/load controller.

For more precise knock control, a load signal can also be connected to ARIADNE (for example an electrical load measurement or the output from a boost pressure sensor).

ARIADNE can also provide an optional load reduction signal using a digital output or the CAN bus.

## FULLY INTEGRATED KNOCK CONTROL UNIT

ARIADNE can also be configured as part of a highly integrated gas engine management system. This can be particularly useful in providing the means to fine-tune each cylinder individually on systems that allow combustion and load to be controlled on a per cylinder basis.

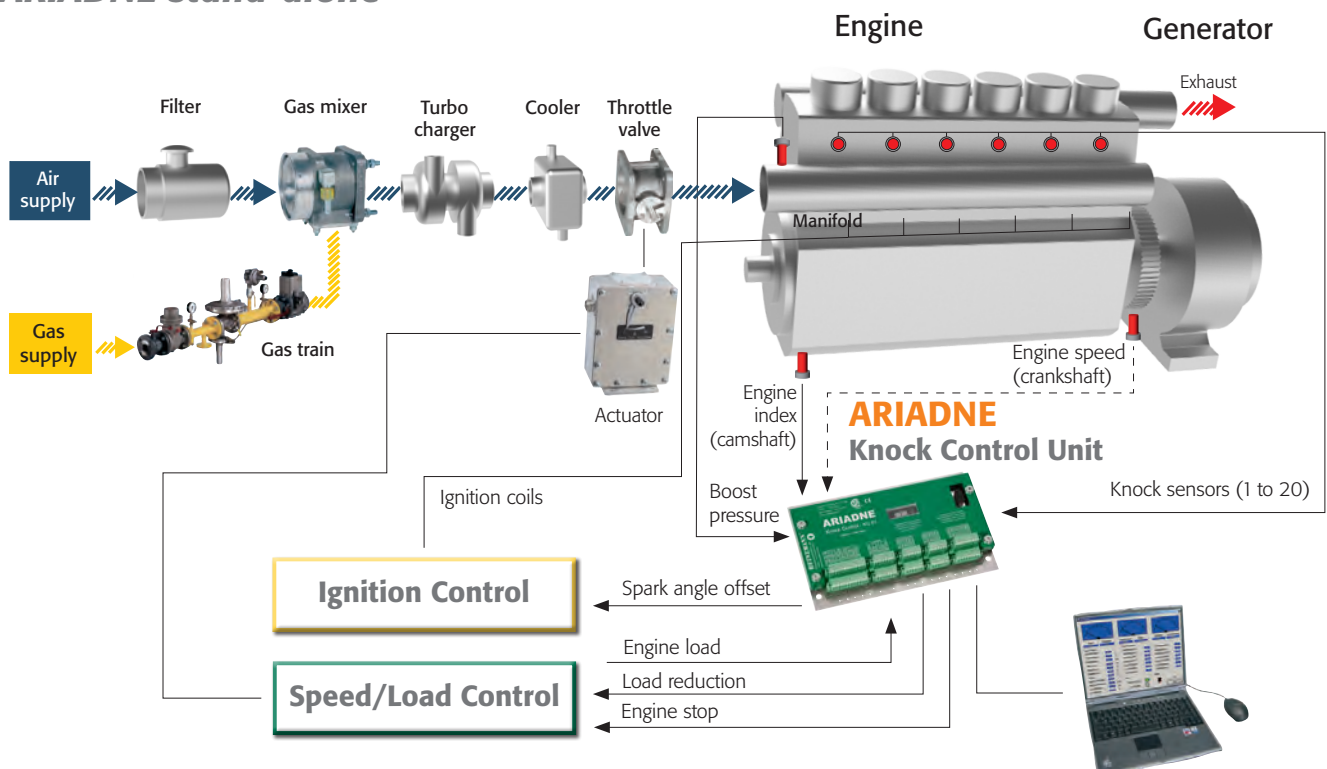
In this type of application ARIADNE transmits and receives all necessary information using the CAN bus (cylinder knock levels and load measurements).

The knock levels can be used by other units, in combination with other information such as cylinder exhaust gas temperatures, to provide functionality such as control of ignition angle and gas injection time for individual cylinders (to have optimal cylinder balancing). The knock levels can also be used as inputs to derating algorithms for use when over temperature or combustion knock are detected.

It is also possible to provide communication links to customer units or PLCs using the CAN bus (CANopen, DeviceNet, J1939, etc.) or Modbus interface.

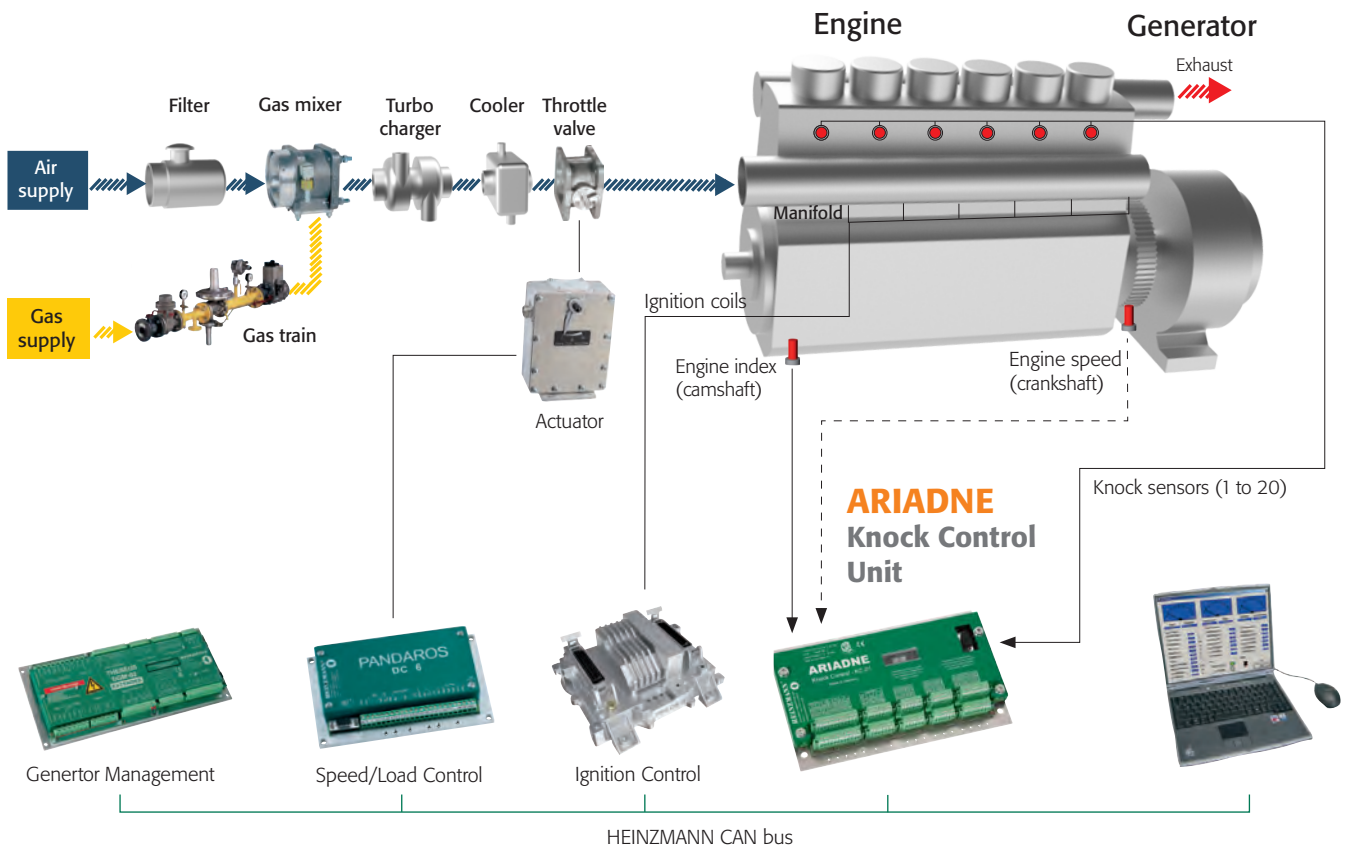
HEINZMANN's optional advanced user interface, DcDesk, can also be used to communicate with all HEINZMANN devices over the CAN bus, making it possible to monitor all HEINZMANN gas engine control units simultaneously from the same PC.

### ARIADNE stand-alone





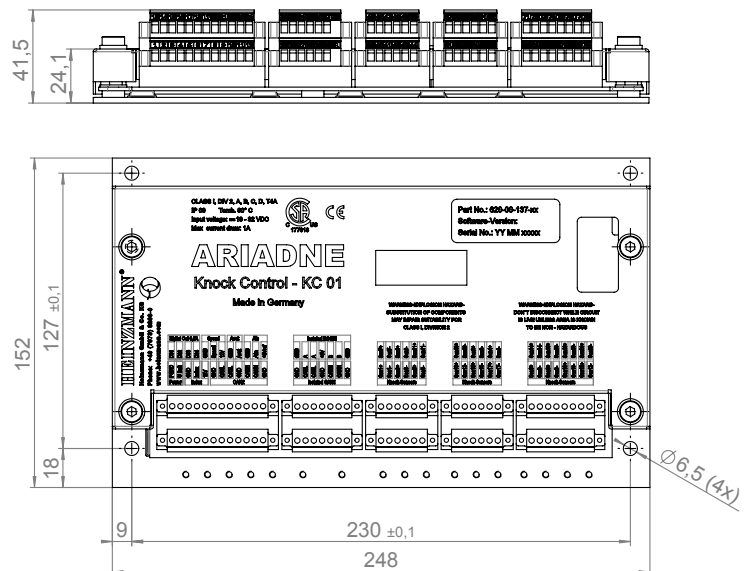
## ARIADNE integrated control unit



## Technical information

Supply voltage	18 ... 32 VDC
Nominal voltage	24 VDC
Residual ripple	max. 10 % with 100 Hz
Current consumption	max. 1 A
External fuse protection	2 A
Protection grade	IP00 or IP55
Weight	approx. 1 kg
Inputs	1 × speed sensor 1 × phase sensor 1 × analogue input
Outputs	20 × knock sensor input 1 × analogue output 4 × digital output
Communication	2 × CAN bus 1 × Modbus 1 × serial interface

## Dimensions



For further technical information please refer to the ARIADNE Manual DG\_06\_001\_e\_07\_13.

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since 1897

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