

MOTORTECH Detonation Control Systems



DetCon Series
reliable • efficient • worldwide

Gas Engine Control Systems

DetCon

MOTORTECH DETONATION CONTROL SYSTEM

The gas engine operators are calling for increased power output from their engines. More load means higher temperatures, pressures and tougher operation. This mostly ends in catastrophic engine damages due to detonation or pre-ignition.

As MOTORTECH has proven for years, detonation can be detected professionally with the DetCon2 or Detcon20 detonation control system. Detonation sensors constantly monitor the sound level of the combustion. If detonation is detected the system will take steps to eliminate detonation immediately.

Upgrade your engine and increase availability of the equipment!



Technical Benefits

- Prevents the engine from damages caused by knocking combustion
- Frequency range detonation sensors: 1-20 kHz
- Easy Installation and configuration via USB interface
- DenEdit software for visualization and adjustment of firing sequences, actual knocking values or knocking history with long-term data
- Available as a built-in device for a control cabinet or in a CSA-certified housing.
- DIN rail mounting
- Supply voltage: 9 – 36 VDC
- Can also be used on dual fuel and bi-fuel engines
- Protection class: IP 20

Individual Characteristics ¹⁾

- DetCon2 is used with one detonation sensor for in-line engines, and with 2 sensors for V-engines (one per bank)
- DetCon20 is used with one sensor per cylinder and can process up to 20 detonation sensors

Environmental Conditions

- Operation: -10° C to 60° C max. (14° F to 140° F)
- Storage: -40° C to 70° C max. (-40° F to 158° F)
- max. 95% humidity without condensation

Interfaces

- USB 1.1 interface
- CAN Bus interface

Scope of Supply

- DetCon detonation control system
- CD-ROM with software for configuring the device
- USB interface cable for connecting the device to a PC/laptop
- Operating manual
- Mounting kit (model with housing)

Recommended Accessories

- AlphaRail wiring rails for easy installation
- PowerView3 for complete visualization of detonation data

¹⁾ Consult factory for deviating configurations

Functional Description

Regular Combustion

Figure 1 shows the desired combustion of the gas/air mixture within the combustion chamber. The gas/ air mixture is ignited by the ignition spark. The flame front spreads out evenly with the gas/air mixture-specific laminar flame speed. During the combustion, the cylinder pressure increases moderately.

Knocking Combustion

A knocking combustion is the result of a self-ignition of the gas/air mixture prior to the actual flame front 2. The main reason the mixture pre-ignites is an uncontrolled increase in pressure and temperature caused by the pressure and temperature fronts, which move faster than the regular flame front. The pressure and temperature fronts caused by the self-ignition can cause further self-ignitions.

Within the combustion chamber high frequency shock waves arise. They are induced by the combustion chamber into the engine structure and given off into the environment as airborne sound. This will make the knocking noticeable 3. Compared with a regular combustion a knocking combustion results in strongly increased peak pressures. Besides a higher thermal load this might damage the engine.

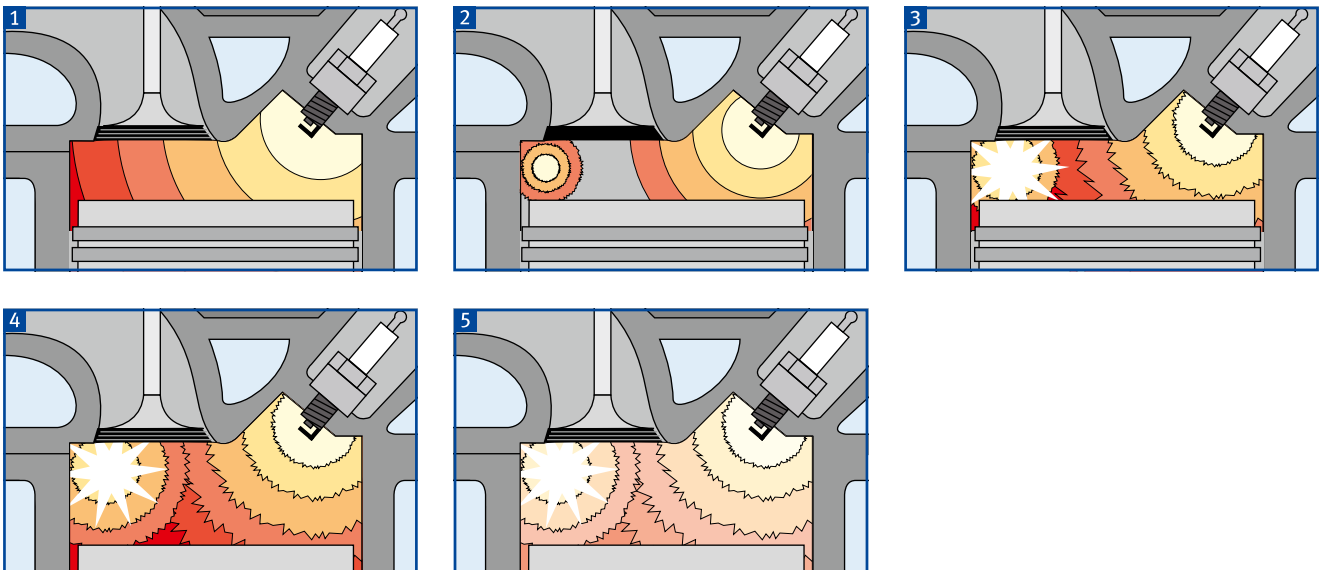
Detonation Control System

Due to the geometry of the combustion chamber, a knocking combustion arises in engine specific spectral signals. The DetCon detonation control system measures the frequency spectrum for each work cycle with structure-borne sound sensors and compares it with engine specific parameters.

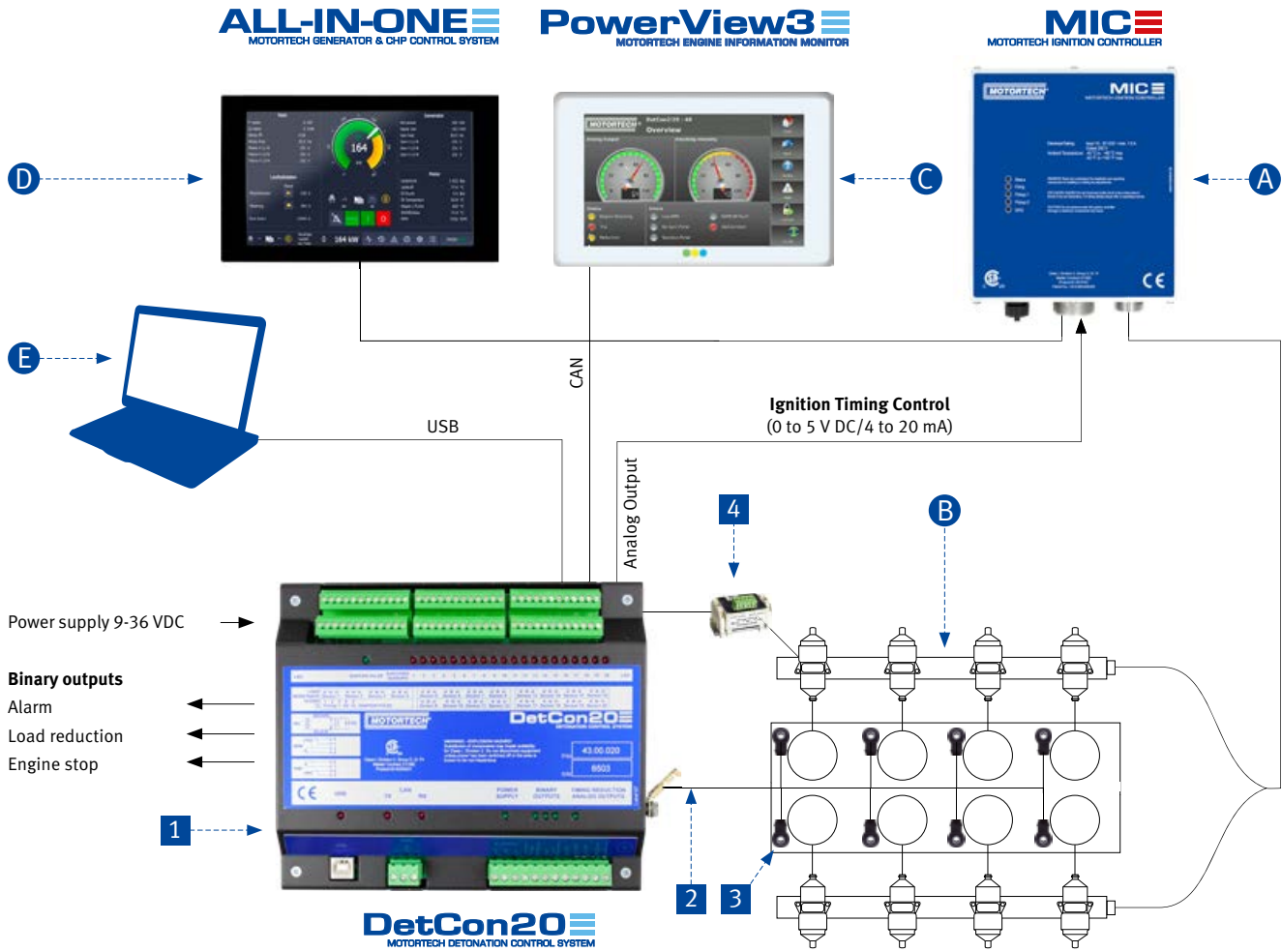
If knocking is detected in a work cycle of a cylinder, the DetCon detonation control system attempts to stop knocking by adjusting a later ignition timing 4. If knocking is no longer detected, the ignition is adjusted to an early timing. If stronger knocking is detected or the retarded timing is without any effect, the signal for load reduction is sent to a superior engine controller 5.

The signal for engine shutdown will be sent to the superior engine controller when the load reduction isn't able to stop the knocking.

All in all that way the engine is protected against knocking damages.



System Overview



Required components

- 1 DetCon – detonation control system
- 2 Detonation sensor wiring
- 3 Detonation sensor
- 4 ISU ignition sensor unit
not required with MIC3/3+, MIC4, MIC5, MIC6, MIC850

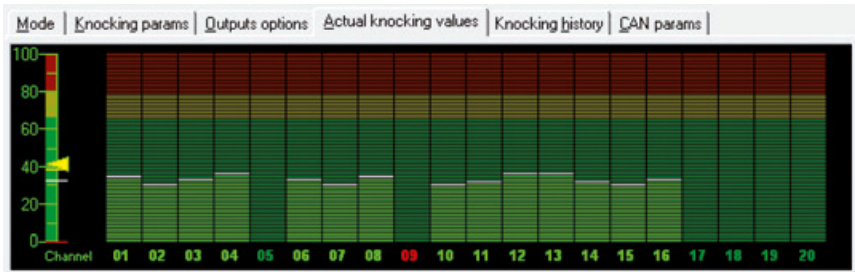
Description

- A Ignition controller
- B Wiring rail (ignition)
- C PowerView3 ¹⁾
- D ALL-IN-ONE ¹⁾
- E Laptop

¹⁾ Visualization via MOTORTECH PowerView3, alternatively with MOTORTECH ALL-IN-ONE

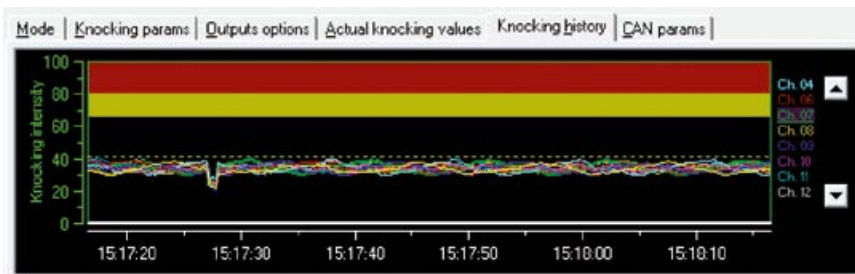
DenEdit – DetCon Software

You can configure the DetCon device to display the current knocking values of the engine and determine the values off-line using the DenEdit software application.



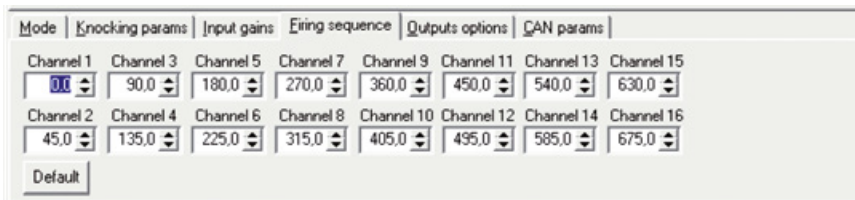
Actual knocking value

In this example the current knocking values for every cylinder are shown. The background color indicates the set limits (yellow area – ignition timing adjustment -> load reduction, red area – engine shut-down).



Knocking history

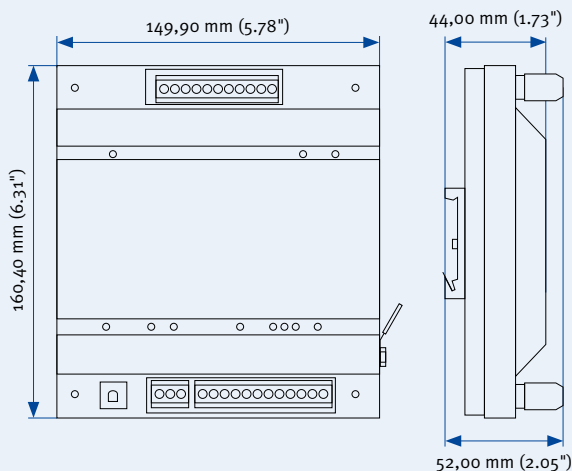
This screen gives an overview of all sensor activity during the last minute. It is possible to display individual cylinders or, as seen in the diagram, all cylinders. This makes it easy to analyze deviations.



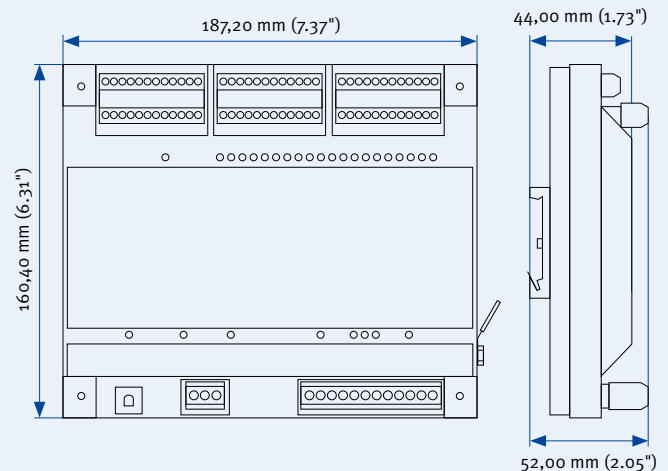
Timing sequences

This menu provides the option to enter a freely definable firing sequence.

Dimensions DetCon2



Dimensions DetCon20



Accessories

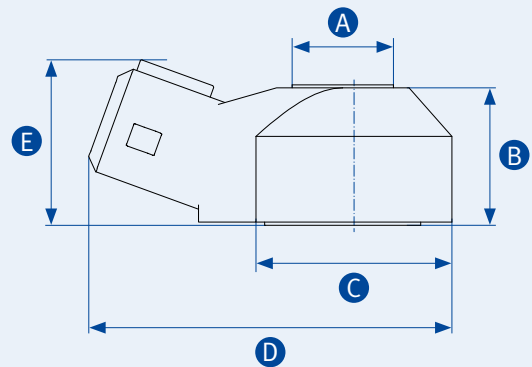
Detonation Sensors

Can be installed on any cylinder head bolt or stud. Measures the combustion signal and transfers it to the controller.



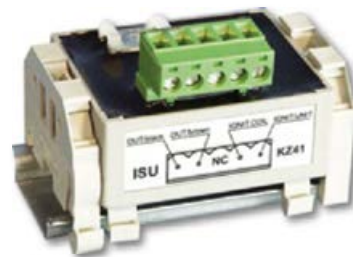
Dimensions

- A** Ø 0.30 in (8,4 mm)
- B** 0.69 in (17,6 mm)
- C** Ø 0.79 in (20 mm)
- D** 1.77 in (45 mm)
- E** 0.83 in (21 mm)



ISU – Ignition Sensor Unit

When used with ignition controllers that are **NOT** part of the MIC3/3+, MIC4, MIC5, MIC6, MIC850 series, an additional ignition impulse sensor is required.



AlphaRail

MOTORTECH WIRING RAIL SYSTEM

MOTORTECH AlphaRail – Wiring Rail System for Detonation Control

MOTORTECH Stainless Steel, vibration resistant rail assembly will withstand any harsh environment commonly found in oil & gas industry. Our proven design is made for engine manufacturers and the global aftermarket. Do not go low-tech and take the risk of engine down time because of equipment being under repair. Eliminate the need for constant rewiring, connector exchanges or straightening out weak and bent aluminum wiring rails.



PowerView3 MOTORTECH ENGINE INFORMATION MONITOR

The operating data of the DetCon Detonation Control system will be completely visualized via HMI module (Human Machine Interface). The overview screen shows the relevant information as engine knocking, knock intensity and status for activated load reduction or emergency shutdown of engine.

The control keys guarantee simple navigation through the different display pages and menus. All in all the PowerView3 HMI module is also able to provide error diagnostics on-site without requiring a laptop!

The PowerView3 is also available for data visualization of:

- MIC Ignition Control (MIC3/3+, MIC4 and MIC5 series)
- TempScan20 Temperature Module



Technical benefits

- Visualization of ignition, detonation and temperature control via CAN bus
- Access control
- Display of CAN connection status
- Several display configurations (languages, date, display calibration, etc.)
- For assembly in control panels
- Day and night mode
- CSA® certified (Class I, Div. 2, Group C, D; T4)

Detonation Control

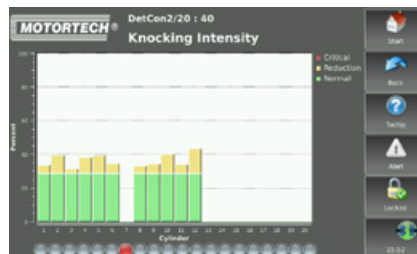
- Overview with status indication for
 - Analog output signal
 - Knocking intensity
 - State of reduction
- Fault message for
 - Low speed
 - Synchronizing pulse
 - Defective detonation sensor
- Display of trend data
 - Knocking intensity
 - Output signal
- Display of knocking intensity

Sample Screens



Overview

Screen shows the most important operating data of the connected DetCon control unit.



Knocking Intensity

Visualization of knocking intensity of each monitored cylinder. Different colors inform about the system status (Normal – Reduction – Critical).



Trending Knocking Intensity

Visualization of knocking intensity trend data for each individual cylinder.

Download now!



All Products at a Glance!

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