MOTORTECH

Detonation Control Systems

DetCon Series
reliable • efficient • worldwide
Gas Engine Control Systems

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 MOTORETECH 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 actually 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 arises. 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**

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

**Description**

- Ignition controller
- Wiring rail (ignition)
- PowerView3
- ALL-IN-ONE
- Laptop

---

\(^i\) 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 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.
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!

For further Information about the MOTORTECH products get our product guide online.

Scan QR-Code to get to the download page

Once a month the latest news!

Subscription also at www.motortech.de/subscribe.html or send a short request via email: direkt@motortech.de

MOTORTECH GmbH
Hogrevestr. 21-23
29223 Celle
Germany
Phone: +49 (5141) 93 99 0
Fax: +49 (5141) 93 99 99
www.motortech.de
sales@motortech.de

MOTORTECH Americas, LLC
1400 Dealers Avenue, Suite A
New Orleans, LA 70123
USA
Phone: +1 (504) 355 4212
Fax: +1 (504) 355 4217
www.motortechamericas.com
info@motortechamericas.com

MOTORTECH Shanghai Co. Ltd.
Room 1018 Enterprise Square,
No. 228 Meiyuan Road,
Zhabei District, 200070 Shanghai
China
Phone: +86 (21) 6380 7338
www.motortechshanghai.com
info@motortechshanghai.com

Copyright
The copyright for all materials used in this MOTORTECH publication is reserved. Any kind of duplication or use of objects such as pictures or texts in other electronic or printed publications without approval by MOTORTECH is not permitted.

Trademark Information
MOTORTECH products and the MOTORTECH logo are registered and/or common law trademarks of MOTORTECH GmbH.
All OEM names and part numbers shown are for reference purposes only. All trademarks, logos and symbols used or shown in this MOTORTECH publication are exclusive objects to the right of their owners and are used for reference purposes only.