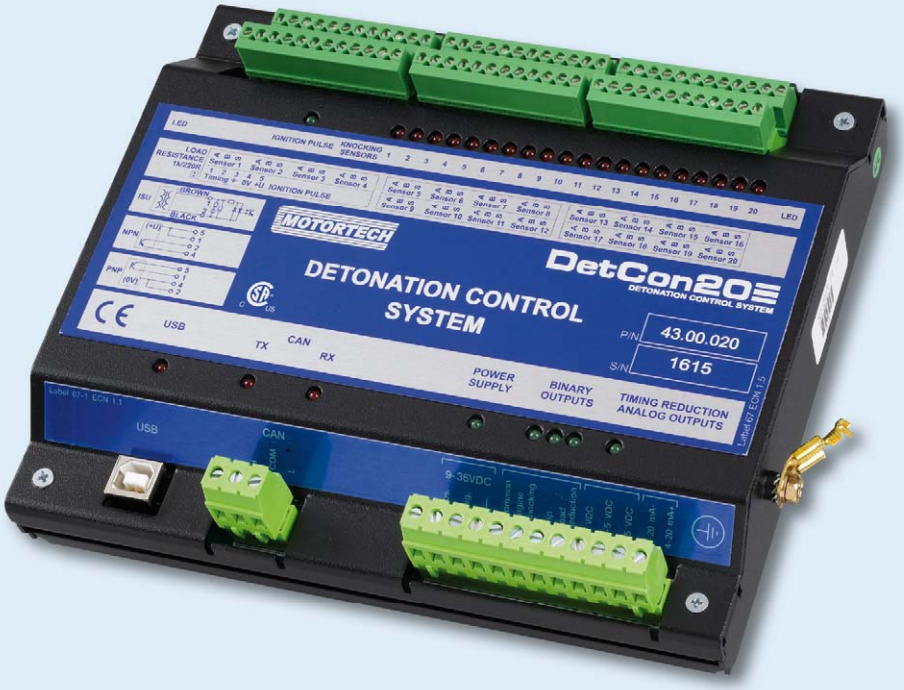
DETCON – DETONATION CONTROLLER

CAN BUS COMMUNICATION



DetCon
MOTORTECH DETONATION CONTROL SYSTEM

MOTORTECH Gas Engine Control Systems
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1 GENERAL INFORMATION

1.1 What Is the Purpose of this Document?

The DetCon detonation controller is a CANopen® device which can be used in a standard CANopen® network. The necessary electronic datasheet file (EDS file) is available on request from MOTORTECH.

Furthermore, the DetCon may be used as a simple CAN device without using the full CANopen® functionality. This document covers the necessary information to do this.

1.2 Who Is this Document Targeted to?

This document is targeted to personnel tasked with the setting up and configuration of a system via CAN. A certain level of technical knowledge with respect to setting up a CAN network is necessary.

1.3 Which Symbols Are Used in the Document?

The following symbol is used in this document and must be observed:

Notice

This symbol indicates important notices for the user. Follow these. In addition, this symbol is used for overviews that give you a summary of the necessary work steps.

1.4 Which Abbreviations/Acronyms Are Used in the Document?

The following abbreviations are used in the document:

Abb.	Term	Description	Explanation
CAN bus	Controller Area Network Bus	Bus for control devices / networks	Asynchronous serial connection system for networking control devices
DetCon	Detonation Controller	Detonation controller	Serves to prevent major engine damage that can be caused by knocking combustion.
DLC	Data Length Code	Data length code	Length of a CAN data field
EDS	Electronic Datasheet	Electronic datasheet	File format that describes the communication behavior and the object dictionary entries of a CANopen® device

Abb.	Term	Description	Explanation
EEPROM	Electrically Erasable Programmable Read-Only Memory	Electrically erasable programmable read-only memory	Non-volatile electronic memory module, whose stored information can be electrically erased.
ISU	Ignition Sensor Unit	Ignition sensor	
LSB	Least Significant Bit	Least significant bit	
MSB	Most Significant Bit	Most significant bit	
PDO	Process Data Object	Process data object	Communication object for processing real-time data

2 INITIALIZATION

Wiring and configuration of DetCon CAN bus

Information on the wiring and configuration of the DetCon CAN bus including information on the configuration tool DenEdit is available in the DetCon Operating Manual.

The device, if configured to CANopen® mode, periodically sends knocking and other status information using so called process data objects (PDOs) on the CAN bus. This periodic sending must be enabled by transmitting a start remote node message on the CAN bus.

Start remote node:

- CAN ID = 0x000
- DLC = 2
- Data Byte 0 = 1
- Data Byte 1 = node ID

The node ID can be configured using the computer based configuration tool DenEdit and has to be unique for all CANopen® devices on the same bus. If a node ID with the value 0 is send, all connected CANopen® nodes will be started. Communication may be stopped at any time by sending a stop remote node message on the bus.

Stop remote node:

- CAN ID = 0x000
- DLC = 2
- Data Byte 0 = 2
- Data Byte 1 = node ID

3 NODE GUARDING

It is possible to monitor the DetCon's state using the so called node guarding protocol. For this, send a remote request message to the device.

Node guarding request:

– CAN ID = 0x700 + node ID

– DLC = 1

The device will send a reply with one data byte. The most significant bit is toggled by each request. The lower 7 bits report the device's current state.

State	Name
0	Boot-up
4	Stopped
5	Operational
127	Pre-Operational

After a power-on reset, the device sends a message in the reply format indicating state 0 (Boot-up). When initialization is done, the device switches to state 127 (Pre-Operational). By sending start remote node and stop remote node commands, the device switches between state 5 (Operational) and 4 (Stopped).

4 PROCESS DATA OBJECTS

The process data objects described in this section are transmitted as normal CAN messages.

All *Knocking Intensity* fields, *Analog Output*, *Ignition Reduction Limit* and *Immediate Stop Limit* are encoded as 0 = 0 % to 255 = 100 %.

4.1 Transmit PDO 1

Transmit PDO 1 has the following properties:

- CAN ID = 0x180 + node ID
- DLC = 8

Knocking Intensity 1	Knocking Intensity 2	Knocking Intensity 3	Knocking Intensity 4	Knocking Intensity 5	Knocking Intensity 6	Knocking Intensity 7	Knocking Intensity 8
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7

It is sent every 500 ms and during knocking on any channel from 1 to 20 every 100 ms.

4.2 Transmit PDO 2

Transmit PDO 2 has the following properties:

- CAN ID = 0x280 + node ID
- DLC = 8

Knocking Intensity 9	Knocking Intensity 10	Knocking Intensity 11	Knocking Intensity 12	Knocking Intensity 13	Knocking intensity 14	Knocking Intensity 15	Knocking Intensity 16
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7

It is sent every 500 ms and during knocking on any channel from 1 to 20 every 100 ms.

4.3 Transmit PDO 3

Transmit PDO 3 has the following properties:

- CAN ID = 0x380 + node ID
- DLC = 8

Binary Outputs and Status	Analog Output	Used Sensors 1 – 16		Bad Inputs 1 – 16		Ign. Reduction Limit	Immediate Stop Limit
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7

The bit fields *Used Sensors 1 – 16* and *Bad Inputs 1 – 16* contain one bit for each channel from 1 to 16. The first channel is stored in the least significant bit (LSB) and channel 16 is stored in the most significant bit (MSB).

Transmit PDO 3 is sent every 500 ms and any time *Binary Outputs and Status* or *Analog Output* changes, but at most every 100 ms.

4.3.1 Binary Outputs and Status

Bit	Description
0 LSB	Engine Knocking
1	Trip
2	Load Reduction
3	LOW RPM
4	NO ISU PULSES
5	SPURIOUS PULSE
6	EEPROM FAULT
7 MSB	Reserved

4.4 Transmit PDO 4

Transmit PDO 4 has the following properties:

- CAN ID = 0x480 + node ID
- DLC = 6

Knocking Intensity 17	Knocking Intensity 18	Knocking Intensity 19	Knocking Intensity 20	Used Sensors 17 – 20	Bad Inputs 17 – 20
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5

It is sent every 500 ms and during knocking on any channel from 1 to 20 every 100 ms.

4.4.1 Used Sensors 17 – 20

Bit	Description
0 LSB	Used Sensor 17
1	Used Sensor 18
2	Used Sensor 19
3	Used Sensor 20
4	Reserved
5	Reserved
6	Reserved
7 MSB	Reserved

4.4.2 Bad Inputs 17 – 20

Bit	Description
0 LSB	Bad Input 17
1	Bad Input 18
2	Bad Input 19
3	Bad Input 20
4	Reserved
5	Reserved
6	Reserved
7 MSB	Reserved

5 CUSTOMER SERVICE INFORMATION

You can reach our customer service during business hours at the following phone and fax number, or by email:

Phone: +49 5141 93 99 0

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Email: service@motortech.de

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