

MIC5 Modbus Register

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1 Introduction

1.1 Purpose of this Document

This document describes the content and address of Modbus register of the MIC5 ignition controller.

2 General

- MIC is Modbus slave / server
- Big endian is used

2.1 Used standards and specifications

- http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b.pdf
- http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

2.2 Supported Modbus function codes

- Function code 0x03 „Read Holding Register“
- Function code 0x06 „Write Single Register“
- Function code 0x10 „Write Multiple Registers“
- Function code 0x15 “Write File Record”

2.2.1 Exception codes

Error Code	Description
0x01	illegal function code
0x02	illegal data address
0x03	illegal data value
0x04	slave device failure

The following description of the meaning of above mentioned exception codes are taken from „Modbus Application Protocol Specification V1.1b“

2.2.1.1 Exception code 0x01 „illegal function code“

The function code received in the query is not an allowable action for the server (or slave). This may be because the function code is only applicable to newer devices, and was not implemented in the unit selected. It could also indicate that the server (or slave) is in the wrong state to process a request of this type, for example because it is unconfigured and is being asked to return register values.

2.2.1.2 Exception code 0x02 „illegal data code“

The data address received in the query is not an allowable address for the server (or slave). More specifically, the combination of reference number and transfer length is invalid.

For a controller with 100 registers, the PDU addresses the first register as 0, and the last one as 99. If a request is submitted with a starting register address of 96 and a quantity of registers of 4, then this request will successfully operate (address-wise at least) on registers 96, 97, 98, 99.

If a request is submitted with a starting register address of 96 and a quantity of registers of 5, then this request will fail with Exception Code 0x02 “Illegal Data Address” since it attempts to operate on registers 96, 97, 98, 99 and 100, and there is no register with address 100.

2.2.1.3 Exception code 0x03 „illegal data value“

A value contained in the query data field is not an allowable value for server (or slave). This indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect.

It specifically does NOT mean that a data item submitted for storage in a register has a value outside the expectation of the application program, since the MODBUS protocol is unaware of the significance of any particular value of any particular register.

2.2.1.4 Exception code 0x04 „illegal data code“

An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.

2.2.2 Function code 0x03 „Read Holding Register“

- N means quantity of registers (multiply of 2 bytes)

2.2.2.1 Request

Function Code	1 Byte	0x03
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers (N)	2 Bytes	1 to 125

2.2.2.2 Response

Function Code	1 Byte	0x03
Byte Count	1 Byte	2 * N
Register Values	N * 2 Bytes	1 to 125

2.2.2.3 Error

Error Code	1 Byte	0x83
Exception Code	1 Byte	0x01, 0x02, 0x03 or 0x04

2.2.3 Function code 0x06 „Write Single Register“

2.2.3.1 Request

Function Code	1 Byte	0x06
Register Address	2 Bytes	0x0000 to 0xFFFF
Register Value	2 Bytes	1 to 125

2.2.3.2 Response

Function Code	1 Byte	0x06
Register Address	2 Bytes	0x0000 to 0xFFFF
Register value	2 Bytes	value

2.2.3.3 Error

Error Code	1 Byte	0x83
Exception Code	1 Byte	0x01, 0x02, 0x03 or 0x04

2.2.4 Function code 0x10 „Write Multiple Registers“

2.2.4.1 Request

Function Code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers (N)	2 Bytes	1 to 125
Byte Count	1 Byte	2 * N
Register Value	N * 2 Bytes	values

2.2.4.2 Response

Function Code	1 Byte	0x03
Byte Count	1 Byte	2 * N
Register values	N * 2 Bytes	1 to 125

2.2.4.3 Error

Error Code	1 Byte	0x90
Exception Code	1 Byte	0x01, 0x02, 0x03 or 0x04

2.2.5 Function code 0x15 “Write File Record”

2.2.5.1 Request

In the Modbus Protocol Specification multiple accesses to different files and record ranges are foreseen, but the MIC supports only one “Write File Record” access per request. Up to 244 bytes / 122 records can be written by this request.

Function Code	1 Byte	0x15
Request Data Length	1 Byte	0x09 to 0xFB
Reference Type	1 Byte	0x06
File Number	2 Bytes	0x0001 to 0xFFFF
Record Number (Start)	2 Bytes	0x0000 to 0x270F
Record Length (Number)	2 Bytes	N (0x0001 to 0x0007A)
Record Data	N * 2 Bytes	

2.2.5.2 Response

Function Code	1 Byte	0x15
Response Data Length	1 Byte	0x09 to 0xFB
Reference Type	1 Byte	0x06
File Number	2 Bytes	0x0001 to 0xFFFF
Record Number	2 Bytes	0x0000 to 0x270F
Record Length	2 Bytes	N (0x0001 to 0x0007A)
Record Data	N * 2 Bytes	

2.2.5.3 Error

Error Code	1 Byte	0x95
Exception Code	1 Byte	0x01, 0x02, 0x03 or 0x04

2.3 Mapping examples of several datatypes into Modbus frame

2.3.1 8 bit values

2.3.1.1 Write 8 bit value to register 0x1234 with 0x56

- Via „Write Single Register“

Request		Response	
Fieldname		Fieldname	
Function Code	0x06	Function Code	0x06
Register Address Hi	0x12	Register Address Hi	0x12
Register Address Lo	0x34	Register Address Lo	0x34
Register Value Hi	0x00	Register Value Hi	0x00
Register Value Hi	0x56	Register Value Hi	0x56

- Via Write Multiple Register“

Request		Response	
Fieldname		Fieldname	
Function Code	0x10	Function Code	0x06
Starting Address Hi	0x12	Starting Address Hi	0x12
Starting Address Lo	0x34	Starting Address Lo	0x34
Quantity Hi	0x00	Quantity Hi	0x00
Quantity Lo	0x01	Quantity Lo	0x01
Byte Count	0x02		
Register Value Hi	0x00		
Register Value Lo	0x56		

2.3.1.2 Read 8 bit value from register 0x1234 which contains 0x56

Request		Response	
Fieldname		Fieldname	
Function Code	0x03	Function Code	0x03
Register Address Hi	0x12	Byte Count	0x02
Register Address Lo	0x34	Register Value Hi	0x00
Quantity Hi	0x00	Register Value Lo	0x56
Quantity Lo	0x01		

2.3.2 16 bit values

2.3.2.1 Write 16 bit value to register 0x1234 with 0x5678

- Via „Write Single Register“

Request		Response	
Fieldname		Fieldname	
Function Code	0x06	Function Code	0x06
Register Address Hi	0x12	Register Address Hi	0x12
Register Address Lo	0x34	Register Address Lo	0x34
Register Value Hi	0x56	Register Value Hi	0x56
Register Value Hi	0x78	Register Value Hi	0x78

- Via Write Multiple Register“

Request		Response	
Fieldname		Fieldname	
Function Code	0x10	Function Code	0x06
Starting Address Hi	0x12	Starting Address Hi	0x12
Starting Address Lo	0x34	Starting Address Lo	0x34
Quantity Hi	0x00	Quantity Hi	0x00
Quantity Lo	0x01	Quantity Lo	0x01
Byte Count	0x02		
Register Value Hi	0x56		
Register Value Lo	0x78		

2.3.2.2 Read 16 value bit from register 0x1234 which contains 0x5678

Request		Response	
Fieldname		Fieldname	
Function Code	0x03	Function Code	0x03
Register Address Hi	0x12	Byte Count	0x02
Register Address Lo	0x34	Register Value Hi	0x56
Quantity Hi	0x00	Register Value Lo	0x78
Quantity Lo	0x01		

2.3.3 32 bit values

2.3.3.1 Write 32 bit value to register 0x1234 to 0x1235 with 0x56789ABC

Request		Response	
Fieldname		Fieldname	
Function Code	0x10	Function Code	0x06
Starting Address Hi	0x12	Starting Address Hi	0x12
Starting Address Lo	0x34	Starting Address Lo	0x34
Quantity Hi	0x00	Quantity Hi	0x00
Quantity Lo	0x02	Quantity Lo	0x02
Byte Count	0x04		
Register Value Hi	0x56		
Register Value Lo	0x78		
Register Value Hi	0x9A		
Register Value Lo	0xBC		

- Write access to register 0x1235 triggers update of 32 bit value from Modbus variable into MIC5 firmware.

2.3.3.2 Read 32 bit value from register 0x1234 o 0x1235 which contains 0x56789ABC

Request		Response	
Fieldname		Fieldname	
Function Code	0x03	Function Code	0x03
Register Address Hi	0x12	Byte Count	0x04
Register Address Lo	0x34	Register Value Hi	0x56
Quantity Hi	0x00	Register Value Lo	0x78
Quantity Lo	0x02	Register Value Hi	0x9A
		Register Value Lo	0xBC

- Read access to register 0x1234 triggers update of 32 bit value from the MIC5 firmware into Modbus variable.

2.3.4 64 bit values

2.3.4.1 Write 64 bit value to register 0x1234 to 0x1237 with 0x0123456789ABCDEF

Request		Response	
Fieldname		Fieldname	
Function Code	0x10	Function Code	0x06
Starting Address Hi	0x12	Starting Address Hi	0x12
Starting Address Lo	0x34	Starting Address Lo	0x34
Quantity Hi	0x00	Quantity Hi	0x00
Quantity Lo	0x04	Quantity Lo	0x04
Byte Count	0x08		
Register Value Hi	0x01		
Register Value Lo	0x23		
Register Value Hi	0x45		
Register Value Lo	0x67		
Register Value Hi	0x89		
Register Value Lo	0xAB		
Register Value Hi	0xCD		
Register Value Lo	0xEF		

- Write access to register 0x1237 triggers update of 64 bit value from Modbus variable into MIC5 firmware.

2.3.4.2 Read 64 bit value from register 0x1234 to 0x1237 which contains 0x56789ABC

Request		Response	
Fieldname		Fieldname	
Function Code	0x03	Function Code	0x03
Register Address Hi	0x12	Byte Count	0x08
Register Address Lo	0x34	Register Value Hi	0x01
Quantity Hi	0x00	Register Value Lo	0x23
Quantity Lo	0x04	Register Value Hi	0x45
		Register Value Lo	0x67
		Register Value Hi	0x89
		Register Value Lo	0xAB
		Register Value Hi	0xCD
		Register Value Lo	0xEF

- Read access to register 0x1237 triggers update of 64 bit value from the MIC5 firmware into Modbus variable.

2.3.5 Zero terminated strings

2.3.5.1 Write zero terminated string „ABCDEF\0“ in register 0x1234 to 0x123A

Request		Response	
Fieldname		Fieldname	
Function Code	0x10	Function Code	0x06
Starting Address Hi	0x12	Starting Address Hi	0x12
Starting Address Lo	0x34	Starting Address Lo	0x34
Quantity Hi	0x00	Quantity Hi	0x00
Quantity Lo	0x04	Quantity Lo	0x04
Byte Count	0x08		
Register Value Hi	0x40 'A'		
Register Value Lo	0x41, 'B'		
Register Value Hi	0x42, 'C'		
Register Value Lo	0x67, 'D'		
Register Value Hi	0x89, 'E'		
Register Value Lo	0xAB, 'F'		
Register Value Hi	0x00		
Register Value Lo	0x00		

- Write access to register 0x123A triggers update of 64 bit value from Modbus variable into MIC5 firmware.

2.3.5.2 Read 32 bit value from register 0x1234 which contains 0x56789ABC

Request		Response	
Fieldname		Fieldname	
Function Code	0x03	Function Code	0x03
Register Address Hi	0x12	Byte Count	0x08
Register Address Lo	0x34	Register Value Hi	0x40 'A'
Quantity Hi	0x00	Register Value Lo	0x41, 'B'
Quantity Lo	0x04	Register Value Hi	0x42, 'C'
		Register Value Lo	0x67, 'D'
		Register Value Hi	0x89, 'E'
		Register Value Lo	0xAB, 'F'
		Register Value Hi	0x00
		Register Value Lo	0x00

- Read access to register 0x1237 triggers update of 64 bit value from the MIC5 firmware into Modbus variable

2.3.6 Real time format

According to CANOpen the realtime is transmitted as sum of number of days and milliseconds elapsed since 1984-01-01.

- Number of days are represented by a unsigned 16bit value.
- The number of milliseconds as unsigned 32bit value.
- Number of days are transferred at the first two bytes, number of milliseconds in the last four bytes.

2.3.6.1 Reading real time from register 0x0E2F

Request		Response	
Fieldname		Fieldname	
Function Code	0x03	Function Code	0x03
Register Address Hi	0x0E	Byte Count	0x06
Register Address Lo	0x2F	Register Value Hi	MSB of number of days
Quantity Hi	0x00	Register Value Lo	LSB of number of days
Quantity Lo	0x03	Register Value Hi	MSB of number of milliseconds
		Register Value Lo	number of milliseconds
		Register Value Hi	number of milliseconds
		Register Value Lo	LSB of number of milliseconds

- Read access to register 0x0E2F triggers update of number of days and number of milliseconds from MIC5 firmware into Modbus variable.

2.3.6.2 Writing real time from register 0x0E2F

Request		Response	
Fieldname		Fieldname	
Function Code	0x10	Function Code	0x06
Starting Address Hi	0x0E	Starting Address Hi	0x0E
Starting Address Lo	0x2F	Starting Address Lo	0x2F
Quantity Hi	0x00	Quantity Hi	0x00
Quantity Lo	0x03	Quantity Lo	0x03
Byte Count	0x06		
Register Value Hi	MSB of number of days		
Register Value Lo	LSB of number of days		
Register Value Hi	MSB of number of milliseconds		
Register Value Lo	number of milliseconds		
Register Value Hi	number of milliseconds		
Register Value Lo	LSB of number of milliseconds		

- Write access to register 0x0E31 triggers update of number of days and number of milliseconds value from Modbus variable into MIC5 firmware.

2.3.7 Write File Records

2.3.7.1 Write File Records 0x5678 to 0x567A into file 0x1234

- A record consists of two bytes
- To transfer file records 0x5678 to 0x567A given by the following example binary file into a file 0x1234 the "Write File Record" described below must be executed.

```

00000000  00 02 00 01 00 05 08 c2 f1 00 00 00 06 01 00 46
00000010  00 07 01 00 fa 00 08 01 05 dc 00 09 01 07 d0 00
.
.
.
0000ACF0  0a 08 41 9c 00 00 00 0b 08 40 80 00 00 00 0c 08
0000AD00  3e 4c cc cd 00 0d 08 41 10 00 00 00 0e 08 3f 80

```

Request		Response	
Fieldname		Fieldname	
Function Code	0x15	Function Code	0x15
Request Data Length	0x0D	Response Data Length	0x0D
Reference Type	0x06	Reference Type	0x06
File Nbr Hi	0x12	File Nbr Hi	0x12
File Nbr Lo	0x34	File Nbr Lo	0x34
Record Number Hi	0x56	Record Number Hi	0x56
Record Number Lo	0x78	Record Number Lo	0x78
Record Length Hi	0x00	Record Length Hi	0x00
Record Length Lo	0x03	Record Length Lo	0x03
Record 0x5678 Lo Byte 0xACF0	0x0A	Record 0x5678 Lo Byte 0xACF0	0x0A
Record 0x5678 Hi Byte 0xACF1	0x08	Record 0x5678 Hi Byte 0xACF1	0x08
Record 0x5679 Lo Byte 0xACF2	0x41	Record 0x5679 Lo Byte 0xACF2	0x41
Record 0x5679 Hi Byte 0xACF3	0x9C	Record 0x5679 Hi Byte 0xACF3	0x9C
Record 0x567A Lo Byte 0xACF4	0x00	Record 0x567A Lo Byte 0xACF4	0x00
Record 0x567A Hi Byte 0xACF5	0x00	Record 0x567A Hi Byte 0xACF5	0x00

3 MIC5 parameters

- Read via Read Holding Register (function code 0x03)
- If associated values are read, reading of first item triggers a update of the other values
 - Therefore these values must be read in the right order (trigger item must be the first read access)
 - The reading must not be interrupted and should be done by consecutive register access from lower to higher addresses.
- Write datatypes up to 16 bits via Write Single Register (function code 0x06) or Write Single Register (function code 0x10).
- Write datatypes above 16 bits via Write Multiple Register (function code 0x10).
- If associated values are written, writing of last item triggers transfer into MIC5.
 - Therefore these values must be read in the right order (trigger item must be the last write access).
 - The writing must not be interrupted and should be done by consecutive register access from lower to higher addresses.
- Write zero terminated strings via Write Multiple Register (function code 0x10) and set all unused registers to zero. It is important to write all registers, to trigger the transfer from Modbus variable into MIC5 firmware.

- The register addresses in the MIC5 registertable below is the the address, which is part of the physical Modbus frames and count from 0 to N – 1 (N = number of registers) . Some applications or devices, for example Netbiters EC250, count registers from 1 to N. In these cases, the listed addresses must be incremented by one.
- Entries written in gray are obsolete and may be changed/removed in future revisions.

3.1 Abbreviations

ro	read only
wo	write only
rw	read / write
int8	8 bit signed integer
uint8	8 bit unsigned integer
int16	16 bit signed integer
uint16	16 bit unsigned integer
int32	32 bit signed integer
uint32	32 bit unsigned integer
int64	64 bit signed integer
uint64	64 bit unsigned integer
sz	string with zero termination
rpm	rounds per minute
h	hour
s	second
ms	millisecond
µs	microsecond
mA	milliampere
A	ampere

3.2 MIC5 Registertable

- All addresses with a quantity of registers greater than 1 must be written via function code 0x10 „Write Multiple Registers“. The whole quantity of registers must be write consecutively, to trigger the transfer from Modbus variable into MIC5 firmware after writing last register.

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
Command											
0x0000	2	Command Parameter 0	uint32	rw		address	0x000B				Writing into register 0x000B triggers command execution according to command code and type
0x0002	2	Command Parameter 1	uint32	rw		address	0x000B				
0x0004	2	Command Parameter 2	uint32	rw		address	0x000B				
0x0006	2	Command Parameter 3	uint32	rw		address	0x000B				
0x0008	2	Command Type	uint32	rw		address	0x000B				
0x000A	2	Command Code	uint32	rw		address	0x000B				
0x000C	2	Command Status	uint32	ro	imm.						
Configuration General											
0x0100	4	Engine Type Id	int64	ro	address	address + 0x3			0		0 = UNKNOWN
0x0104	1	Four Stroke	uint8	rw	address	address		0 .. 1	1		0 = 2-stroke, 1 = 4 stroke
0x0105	4	Coil Type Id	int64	ro	address	address +0x3			1		1= 06.50.100
0x0109	11	Coil Name	string	ro	address	address + 0xA					zero terminated string, max 20 character + trailing 0
0x0114	1	Reset Position	int16	rw	address	address		-359,9 .. +359,9	-60	0,02°	
0x0115	1	Ignition Release Speed	uint16	rw	address	address		1 .. 6000	150	1rpm	
0x0116	1	Security Speed	uint16	rw	address	address		1 .. 6000	250	1rpm	
0x0117	1	Nominal Speed	uint16	rw	address	address		10 .. 6000	250	1rpm	
0x0118	1	Overpeed	uint16	rw	address	address		11 .. 6000	250	1rpm	
0x0119	1	Analog Current Input Upper Limit	uint16	rw	address	address		0 .. 20	5	0,01mA	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x011A	1	Analog Current Input Lower Limit	uint16	rw	address	address		0 .. 20	0	0,01mA	
0x011B	1	Analog Current Input Failure Threshold	uint16	rw	address	address		0 .. 20	0	0,01mA	
0x011C	1	Analog Voltage Input Upper Limit	uint16	rw	address	address		0 .. 10	5	0,01V	
0x011D	1	Analog Voltage Input Lower Limit	uint16	rw	address	address		0 .. 10	0	0,01V	
0x011E	1	Analog Voltage Input Failure Threshold	uint16	rw	address	address		0 .. 10	5	0,01V	
0x011F	1	Aux Pickup Supply Voltage	uint8	rw	address	address		5 .. 24	5	0,1V	
0x0120	1	Aux Analog Input Supply Voltage	uint8	rw	address	address		5 .. 24	5	0,1V	
0x0121	1	Max Adv Firing Angle Change per Cycle	uint16	rw	address	address		0 .. 25	0,5	0,02°	
0x0122	1	Max Ret Firing Angle Change per Cycle	uint16	rw	address	address		0 .. 25	0,5	0,02°	
0x0123	1	Number of Coils per Cylinder	uint8	rw	address	address		1 .. 1	1		
0x0124	1	Cylinder Names Enabled	uint8	rw	address	address		0 .. 1	0		
0x0125	1	Engine Class	uint8	rw	address	address		0 .. 1			0 = inline; 1= v engine
0x0126	1	Number of Cylinders	uint8	rw	address	address		0 .. 16			
0x0127	1	Show Banks in Reverse Order	uint8	rw	address	address		0 .. 1			
0x0128	4	Configuration Timestamp	uint64	ro	address						
0x012C	1	Secondary Short Enable Voltage	uint16	rw						1V	
0x012D	1	Secondary Short Sensitivity	uint16	rw				0,9800 ... 1,0200	1	0,0001	
0x012E	2	Configuration Signature	uint32	rw	address	address + 1					
0x0130	1	Max Power On Speed	uint16	rw	address	address					
0x0131	1	Secondary Diagnostics Enabled	uint8	rw	address	address					0 = disabled 1 = enabled
0x0132	2	Coil Data Version	uint32	ro	address						
Configuration Misc Information											
0x0200	21	Site Description	string	rw	address	address +					zero terminated stings,

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
						0x14					max. 40characters + trailing 0
0x0215	21	Site Location	string	rw	address	address + 0x14					
0x022A	21	Module Description	string	rw	address	address + 0x14					
0x023F	21	Engine Type Description	string	rw	address	address + 0x14					
0x0254	21	Service Contact Line 1	string	rw	address	address + 0x14					
0x0269	21	Service Contact Line 2	string	rw	address	address + 0x14					
0x027E	21	Service Contact Line 3	string	rw	address	address + 0x14					
0x0293	21	Service Contact Line 4	string	rw	address	address + 0x14					
0x02A8	21	Service Contact Line 5	string	rw	address	address + 0x14					
Configuration Number of Outputs											
0x0300	1	Number of Outputs BankA	uint8	rw	address	address		0 .. 12			
0x0301	1	Number of Outputs BankB	uint8	rw	address	address		0 .. 12			
Configuration Pickup Input 1											
0x0410	1	Pickup Input Type	uint8	rw	Pickup Input Type	Pre-Trigger Voltage		0 .. 2			0 = passive; 1 = active low; 2= active high
0x0411	1	Trigger Disc Type	uint8	rw	Pickup Input Type	Pre-Trigger Voltage					0 = None 1 = N; 2 = N + 1; 3 = N – 1; 4 = N magnets; 5 = N – 2; 6 = N + 1, extended index range;

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
											16 = Pin; 32 = single magnet
0x0412	1	Number of Triggers	uint16	rw	Pickup Input Type	Pre-Trigger Voltage					
0x0413	1	Crankshaft Speed	uint8	rw	Pickup Input Type	Pre-Trigger Voltage		0 .. 1			
0x0414	1	Pre-Trigger Voltage	uint8	rw	Pickup Input Type	Pre-Trigger Voltage				0,1V	
Configuration Pickup Input 2											
0x0420	1	Pickup Input Type	uint8	rw	Pickup Input Type	Pre-Trigger Voltage		0 .. 2			0 = passive; 1 = active low; 2= active high
0x0421	1	Trigger Disc Type	uint8	rw	Pickup Input Type	Pre-Trigger Voltage					0 = None 1 = N; 2 = N + 1; 3 = N – 1; 4 = N magnets; 5 = N – 2; 6 = N + 1, extended index range; 16 = Pin; 32 = single magnet
0x0422	1	Number of Triggers	uint16	rw	Pickup Input Type	Pre-Trigger Voltage					
0x0423	1	Crankshaft Speed	uint8	rw	Pickup Input Type	Pre-Trigger Voltage		0 .. 1			
0x0424	1	Pre-Trigger Voltage	uint8	rw	Pickup Input Type	Pre-Trigger Voltage				0,1V	
Configuration Pickup Input 3											
0x0430	1	Pickup Input Type	uint8	rw	Pickup Input Type	Pre-Trigger Voltage		0 .. 2			0 = passive; 1 = active low; 2= active high
0x0431	1	Trigger Disc Type	uint8	rw	Pickup	Pre-Trigger					0 = None

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
					Input Type	Voltage					1 = N; 2 = N + 1; 3 = N – 1; 4 = N magnets; 5 = N – 2; 6 = N + 1, extended index range; 16 = Pin; 32 = single magnet
0x0432	1	Number of Triggers	uint16	rw	Pickup Input Type	Pre-Trigger Voltage					
0x0433	1	Crankshaft Speed	uint8	rw	Pickup Input Type	Pre-Trigger Voltage		0 .. 1			
0x0434	1	Pre-Trigger Voltage	uint8	rw	Pickup Input Type	Pre-Trigger Voltage				0,1V	
Configuration Cylinder Bank A											
0x0440	5	Bank Name	string	rw	address	address + 0x4					zero terminated string, max 8 characters + trail. 0
0x0445	1	Show Cylinder in Reverse Order	uint8	rw	address	address		0 .. 1			
Configuration Cylinder Bank B											
0x0450	5	Bank Name	string	rw	address	address + 0x4					zero terminated string, max 8 characters + trail. 0
0x0455	1	Show Cylinder in Reverse Order	uint8	rw	address	address		0 .. 1			
Configuration Cylinder Names											
0x0480	5	Cylinder Name 1	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x0485	5	Cylinder Name 2	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x048A	5	Cylinder Name 3	string	rw	address	address + 0x4					zero terminated string,

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
											max 4 characters + trail. 0
0x048F	5	Cylinder Name 4	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x0494	5	Cylinder Name 5	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x0499	5	Cylinder Name 6	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x049E	5	Cylinder Name 7	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04A3	5	Cylinder Name 8	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04A8	5	Cylinder Name 9	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04AD	5	Cylinder Name 10	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04B2	5	Cylinder Name 11	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04B7	5	Cylinder Name 12	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04BC	5	Cylinder Name 13	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04C1	5	Cylinder Name 14	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail.

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
											0
0x04C6	5	Cylinder Name 15	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04CB	5	Cylinder Name 16	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04D0	5	Cylinder Name 17	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04D5	5	Cylinder Name 18	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04DA	5	Cylinder Name 19	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04DF	5	Cylinder Name 20	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04E4	5	Cylinder Name 21	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04E9	5	Cylinder Name 22	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04EE	5	Cylinder Name 23	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
0x04F3	5	Cylinder Name 24	string	rw	address	address + 0x4					zero terminated string, max 4 characters + trail. 0
Configuration Schedule A											
0x0500	1	Schedule Enabled	uint8	rw	address	address		0 .. 1			

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0501	11	Schedule Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x050C	1	Timing Limit Min	int16	rw	address	address				0,02°	
0x050D	1	Timing Limit Max	int16	rw	address	address				0,02°	
0x050E	1	Cylinder Individual Timing Min	int16	rw	address	address				0,02°	
0x050F	1	Cylinder Individual Timing Max	int16	rw	address	address				0,02°	
0x0510	1	Base Timing	int16	rw	address	address				0,02°	
0x0511	1	Potentiometer Enabled	uint8	rw	address	address		0 .. 1			
0x0512	1	Potentiometer Timing CW	int16	rw	address	address				0,02°	
0x0513	1	Potentiometer Timing CCW	int16	rw	address	address				0,02°	
0x0514	1	Analog Current Input Enabled	uint8	rw	address	address		0 .. 1			
0x0515	1	Analog Current Input Timing at Lower Limit	int16	rw	address	address				0,02°	
0x0516	1	Analog Current Input Timing at Upper Limit	int16	rw	address	address				0,02°	
0x0517	1	Analog Current Input Timing Default	int16	rw	address	address				0,02°	
0x0518	1	Analog Voltage Input Enabled	uint8	rw	address	address		0 .. 1			
0x0519	1	Analog Voltage Input Timing at Lower Limit	int16	rw	address	address				0,02°	
0x051A	1	Analog Voltage Input Timing at Upper Limit	int16	rw	address	address				0,02°	
0x051B	1	Analog Voltage Input Timing Default	int16	rw	address	address				0,02°	
0x051C	1	Spark Duration	uint16	rw	address	address				1μs	
0x051D	1	Spark Intensity	uint16	rw	address	address				1mA	
0x051E	1	Max Breakdown Voltage	uint8	rw	address	address				1kV	
0x051F	1	Start Phase Spark Duration	uint16	rw	address	address				1μs	
0x0520	1	Start Phase Spark Intensity	uint16	rw	address	address				1mA	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0521	1	Start Phase Max Breakdown Voltage	uint8	rw	address	address				1kV	
0x0522	1	Start Phase Speed Limit	uint16	rw	address	address				1 rpm	
0x0523	2	Start Phase Time Limit	uint32	rw	address	address				1 s	
0x0525	1	Energy Limit	uint16	rw	address	address				1mJ	
0x0526	1	Speed Curve Enabled	uint8	rw	address	address		0 .. 1			
0x0527	1	Number of Speed points	uint8	rw	address	address					
0x0528	1	Start Phase Energy Limit	uint16	rw	address	address				1mJ	
Configuration Schedule A Speed Points Speed											
0x0530	1	Schedule A Speed Points Speed 1	uint16	rw	address	address				1 rpm	
0x0531	1	Schedule A Speed Points Speed 2	uint16	rw	address	address				1 rpm	
0x0532	1	Schedule A Speed Points Speed 3	uint16	rw	address	address				1 rpm	
0x0533	1	Schedule A Speed Points Speed 4	uint16	rw	address	address				1 rpm	
0x0534	1	Schedule A Speed Points Speed 5	uint16	rw	address	address				1 rpm	
0x0535	1	Schedule A Speed Points Speed 6	uint16	rw	address	address				1 rpm	
0x0536	1	Schedule A Speed Points Speed 7	uint16	rw	address	address				1 rpm	
0x0537	1	Schedule A Speed Points Speed 8	uint16	rw	address	address				1 rpm	
Configuration Schedule A Speed Points Timing											
0x0540	1	Schedule A Speed Points Timing 1	int16	rw	address	address				0,02°	
0x0541	1	Schedule A Speed Points Timing 2	int16	rw	address	address				0,02°	
0x0542	1	Schedule A Speed Points Timing 3	int16	rw	address	address				0,02°	
0x0543	1	Schedule A Speed Points Timing 4	int16	rw	address	address				0,02°	
0x0544	1	Schedule A Speed Points Timing 5	int16	rw	address	address				0,02°	
0x0545	1	Schedule A Speed Points Timing 6	int16	rw	address	address				0,02°	
0x0546	1	Schedule A Speed Points Timing 7	int16	rw	address	address				0,02°	
0x0547	1	Schedule A Speed Points Timing 8	int16	rw	address	address				0,02°	
Configuration Schedule B											

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0600	1	Schedule Enabled	uint8	rw	address	address		0 .. 1			
0x0601	11	Schedule Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x060C	1	Timing Limit Min	int16	rw	address	address				0,02°	
0x060D	1	Timing Limit Max	int16	rw	address	address				0,02°	
0x060E	1	Cylinder Individual Timing Min	int16	rw	address	address				0,02°	
0x060F	1	Cylinder Individual Timing Max	int16	rw	address	address				0,02°	
0x0610	1	Base Timing	int16	rw	address	address				0,02°	
0x0611	1	Potentiometer Enabled	uint8	rw	address	address		0 .. 1			
0x0612	1	Potentiometer Timing CW	int16	rw	address	address				0,02°	
0x0613	1	Potentiometer Timing CCW	int16	rw	address	address				0,02°	
0x0614	1	Analog Current Input Enabled	uint8	rw	address	address		0 .. 1			
0x0615	1	Analog Current Input Timing at Lower Limit	int16	rw	address	address				0,02°	
0x0616	1	Analog Current Input Timing at Upper Limit	int16	rw	address	address				0,02°	
0x0617	1	Analog Current Input Timing Default	int16	rw	address	address				0,02°	
0x0618	1	Analog Voltage Input Enabled	uint8	rw	address	address		0 .. 1			
0x0619	1	Analog Voltage Input Timing at Lower Limit	int16	rw	address	address				0,02°	
0x061A	1	Analog Voltage Input Timing at Upper Limit	int16	rw	address	address				0,02°	
0x061B	1	Analog Voltage Input Timing Default	int16	rw	address	address				0,02°	
0x061C	1	Spark Duration	uint16	rw	address	address				1μs	
0x061D	1	Spark Intensity	uint16	rw	address	address				1mA	
0x061E	1	Max Breakdown Voltage	uint8	rw	address	address				1kV	
0x061F	1	Start Phase Spark Duration	uint16	rw	address	address				1μs	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0620	1	Start Phase Spark Intensity	uint16	rw	address	address				1mA	
0x0621	1	Start Phase Max Breakdown Voltage	uint8	rw	address	address				1kV	
0x0622	1	Start Phase Speed Limit	uint16	rw	address	address				1 rpm	
0x0623	2	Start Phase Time Limit	uint32	rw	address	address				1 s	
0x0625	1	Energy Limit	uint16	rw	address	address				1mJ	
0x0626	1	Speed Curve Enabled	uint8	rw	address	address		0 .. 1			
0x0627	1	Number of Speed points	uint8	rw	address	address					
0x0628	1	Start Phase Energy Limit	uint16	rw	address	address				1mJ	
Configuration Schedule B Speed Points Speed											
0x0630	1	Schedule B Speed Points Speed 1	uint16	rw	address	address				1 rpm	
0x0631	1	Schedule B Speed Points Speed 2	uint16	rw	address	address				1 rpm	
0x0632	1	Schedule B Speed Points Speed 3	uint16	rw	address	address				1 rpm	
0x0633	1	Schedule B Speed Points Speed 4	uint16	rw	address	address				1 rpm	
0x0634	1	Schedule B Speed Points Speed 5	uint16	rw	address	address				1 rpm	
0x0635	1	Schedule B Speed Points Speed 6	uint16	rw	address	address				1 rpm	
0x0636	1	Schedule B Speed Points Speed 7	uint16	rw	address	address				1 rpm	
0x0637	1	Schedule B Speed Points Speed 8	uint16	rw	address	address				1 rpm	
Configuration Schedule B Speed Points Timing											
0x0640	1	Schedule B Speed Points Timing 1	int16	rw	address	address				0,02°	
0x0641	1	Schedule B Speed Points Timing 2	int16	rw	address	address				0,02°	
0x0642	1	Schedule B Speed Points Timing 3	int16	rw	address	address				0,02°	
0x0643	1	Schedule B Speed Points Timing 4	int16	rw	address	address				0,02°	
0x0644	1	Schedule B Speed Points Timing 5	int16	rw	address	address				0,02°	
0x0645	1	Schedule B Speed Points Timing 6	int16	rw	address	address				0,02°	
0x0646	1	Schedule B Speed Points Timing 7	int16	rw	address	address				0,02°	
0x0647	1	Schedule B Speed Points Timing 8	int16	rw	address	address				0,02°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
Configuration Firing Angle 1											
0x0900	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0901	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0902	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0903	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0904	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 2											
0x0910	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0911	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0912	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0913	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0914	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 3											
0x0920	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0921	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0922	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0923	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0924	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 4											
0x0930	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0931	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0932	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0933	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0934	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 5											
0x0940	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0941	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0942	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0943	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0944	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 6											
0x0950	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0951	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0952	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0953	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0954	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 7											
0x0960	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0961	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0962	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0963	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0964	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 8											
0x0970	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0971	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0972	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0973	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0974	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 9											
0x0980	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0981	1	Output	uint8	rw	Output Bank	Cylinder Index					

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0982	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0983	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0984	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 10											
0x0990	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0991	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0992	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0993	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0994	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 11											
0x09A0	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x09A1	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x09A2	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x09A3	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x09A4	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 12											
0x09B0	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x09B1	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x09B2	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0903	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x09B4	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 13											
0x09C0	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x09C1	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x09C2	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x09C3	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x09C4	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 14											
0x09D0	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x09D1	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x09D2	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x09D3	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x09D4	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 15											

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x09E0	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x09E1	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x09E2	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x09E3	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x09E4	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 16											
0x09F0	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x09F1	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x09F2	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x09F3	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x09F4	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 17											
0x0A00	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A01	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A02	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0A03	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0A04	1	Cylinder Index	uint16	rw	Output	Cylinder Index					0xffff = not assigned

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
					Bank						
Configuration Firing Angle 18											
0x0A10	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A11	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A12	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0A13	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0A14	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 19											
0x0A20	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A21	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A22	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0A23	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0A24	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 20											
0x0A30	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A31	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A32	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0A33	1	Output Delay	uint16	rw	Output	Cylinder Index		0 .. 0			

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
					Bank						
0x0A34	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 21											
0x0A40	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A41	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A42	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0A43	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0A44	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 22											
0x0A50	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A51	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A52	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0A53	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0A54	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 23											
0x0A60	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A61	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A62	1	Firing Angle	uint16	rw	Output	Cylinder Index		0 .. 719,9		0,02°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
					Bank						
0x0A63	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0A64	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration Firing Angle 24											
0x0A70	1	Output Bank	uint8	rw	Output Bank	Cylinder Index					
0x0A71	1	Output	uint8	rw	Output Bank	Cylinder Index					
0x0A72	1	Firing Angle	uint16	rw	Output Bank	Cylinder Index		0 .. 719,9		0,02°	
0x0A73	1	Output Delay	uint16	rw	Output Bank	Cylinder Index		0 .. 0			
0x0A74	1	Cylinder Index	uint16	rw	Output Bank	Cylinder Index					0xffff = not assigned
Configuration ASO1											
0x0B00	1	Number of Points	uint8	rw	address	address		0 .. Number of Outputs Available (8, 12, 16)			
0x0B01	1	Global Timing Point Related	uint8	rw	address	address		0 .. 1			
Configuration ASO1 Angles Part 1											
0x0B10	1	ASO Angle 1	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B11	1	ASO Angle 2	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B12	1	ASO Angle 3	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B13	1	ASO Angle 4	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B14	1	ASO Angle 5	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B15	1	ASO Angle 6	uint16	rw	address	address		0 .. 719,9		0,02°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0B16	1	ASO Angle 7	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B17	1	ASO Angle 8	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B18	1	ASO Angle 9	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B19	1	ASO Angle 10	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B1A	1	ASO Angle 11	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B1B	1	ASO Angle 12	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B1C	1	ASO Angle 13	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B1D	1	ASO Angle 14	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B1E	1	ASO Angle 15	uint16	rw	address	address		0 .. 719,9		0,02°	
0x0B1F	1	ASO Angle 16	uint16	rw	address	address		0 .. 719,9		0,02°	
Configuration ASO1 Pulse Widths Part 1											
0x0B20	1	ASO Pulse Width 1	uint16	rw	address	address		10 .. 300		1 µs	
0x0B21	1	ASO Pulse Width 2	uint16	rw	address	address		10 .. 300		1 µs	
0x0B22	1	ASO Pulse Width 3	uint16	rw	address	address		10 .. 300		1 µs	
0x0B23	1	ASO Pulse Width 4	uint16	rw	address	address		10 .. 300		1 µs	
0x0B24	1	ASO Pulse Width 5	uint16	rw	address	address		10 .. 300		1 µs	
0x0B25	1	ASO Pulse Width 6	uint16	rw	address	address		10 .. 300		1 µs	
0x0B26	1	ASO Pulse Width 7	uint16	rw	address	address		10 .. 300		1 µs	
0x0B27	1	ASO Pulse Width 8	uint16	rw	address	address		10 .. 300		1 µs	
0x0B28	1	ASO Pulse Width 9	uint16	rw	address	address		10 .. 300		1 µs	
0x0B29	1	ASO Pulse Width 10	uint16	rw	address	address		10 .. 300		1 µs	
0x0B2A	1	ASO Pulse Width 11	uint16	rw	address	address		10 .. 300		1 µs	
0x0B2B	1	ASO Pulse Width 12	uint16	rw	address	address		10 .. 300		1 µs	
0x0B2C	1	ASO Pulse Width 13	uint16	rw	address	address		10 .. 300		1 µs	
0x0B2D	1	ASO Pulse Width 14	uint16	rw	address	address		10 .. 300		1 µs	
0x0B2E	1	ASO Pulse Width 15	uint16	rw	address	address		10 .. 300		1 µs	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0B2F	1	ASO Pulse Width 16	uint16	rw	address	address		10 .. 300		1 µs	
Configuration Alarm 1											
0x0B70	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0B7B	1	Function	uint16	rw	address	address					
0x0B7C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0B7E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0B80	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0B82	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0B84	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 2											
0x0B90	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0B9B	1	Function	uint16	rw	address	address					
0x0B9C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0B9E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0BA0	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0BA2	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0BA4	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 3											
0x0BB0	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0BBB	1	Function	uint16	rw	address	address					
0x0BBC	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0BBE	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0BC0	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0BC2	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0BC4	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 4											
0x0BD0	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0BDB	1	Function	uint16	rw	address	address					
0x0BDC	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0BDE	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0BE0	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0BE2	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0BE4	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 5											
0x0BF0	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0BFB	1	Function	uint16	rw	address	address					
0x0BFC	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0BFE	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0C00	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0C02	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0C04	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 6											
0x0C10	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0C1B	1	Function	uint16	rw	address	address					

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0C1C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0C1E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0C20	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0C22	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0C24	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 7											
0x0C30	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0C3B	1	Function	uint16	rw	address	address					
0x0C3C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0C3E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0C40	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0C42	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0C44	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 8											
0x0C50	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0C5B	1	Function	uint16	rw	address	address					
0x0C5C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0C5E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0C60	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0C62	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0C64	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 9											
0x0C70	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters +

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
											trail. 0
0x0C7B	1	Function	uint16	rw	address	address					
0x0C7C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0C7E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0C80	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0C82	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0C84	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 10											
0x0C90	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0C9B	1	Function	uint16	rw	address	address					
0x0C9C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0C9E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0CA0	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0CA2	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0CA4	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 11											
0x0CB0	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0CBB	1	Function	uint16	rw	address	address					
0x0CBC	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0CBE	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0CC0	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0CC2	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0CC4	2	Outputs	uint32	rw	address	address + 0x1				bit field	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
Configuration Alarm 12											
0x0CD0	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0CDB	1	Function	uint16	rw	address	address					
0x0CDC	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0CDE	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0CE0	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0CE2	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0CE	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 13											
0x0CF0	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0CFB	1	Function	uint16	rw	address	address					
0x0CFC	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0CFE	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0D00	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0D02	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0D04	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 14											
0x0D10	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0D1B	1	Function	uint16	rw	address	address					
0x0D1C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0D1E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0D20	2	Delay	uint32	rw	address	address + 0x1				1 ms	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0D22	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0D24	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 15											
0x0D30	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0D3B	1	Function	uint16	rw	address	address					
0x0D3C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0D3E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0D40	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0D42	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0D44	2	Outputs	uint32	rw	address	address + 0x1				bit field	
Configuration Alarm 16											
0x0D50	11	Description	string	rw	address	address + 0xA					zero terminated string, max 20 characters + trail. 0
0x0D5B	1	Function	uint16	rw	address	address					
0x0D5C	2	Threshold	int32	rw	address	address + 0x1				0,001 U	
0x0D5E	2	Hysteresis	int32	rw	address	address + 0x1				0,001 U	
0x0D60	2	Delay	uint32	rw	address	address + 0x1				1 ms	
0x0D62	2	Flags	uint32	rw	address	address + 0x1				bit field	
0x0D64	2	Outputs	uint32	rw	address	address + 0x1				bit field	
GPOs Normally Open											
0x0D70	1	GPO1 Normally Open	uint8	rw							
GPIS											
0x0D80	1	GPI Mode	uint8	rw							0 = Disabled 1 = 1s CAN Reset, 5s Device Reset

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
Runtime Data											
0x0E00	1	Active Schedule	uint8	ro	address		10ms	0 .. 1			0 = Schedule A 1 = Schedule B
0x0E01	1	Base Timing	int16	ro	address		10ms			0,02°	
0x0E02	1	Speed Curve Timing	int16	ro	address		10ms			0,02°	
0x0E03	1	Analog Voltage Input Timing	int16	ro	address		10ms			0,02°	
0x0E04	1	Analog Current Input Timing	int16	ro	address		10ms			0,02°	
0x0E05	1	Potentiometer Timing	int16	ro	address		10ms			0,02°	
0x0E06	1	Global Timing Point	int16	ro	address		10ms			0,02°	
0x0E07	1	Speed	uint16	ro	address		10ms			1rpm	
0x0E08	1	Analog Voltage Input Value	uint16	ro	address		10ms			0,01V	
0x0E09	1	Analog Current Input Value	uint16	ro	address		10ms			0,01mA	
0x0E0A	1	Potentiometer Value	uint16	ro	address		10ms			0,01%	
0x0E0B	1	PU1 Pre-Trigger Voltage	uint8	ro	address					0,1V	
0x0E0C	1	PU2 Pre-Trigger Voltage	uint8	ro	address					0,1V	
0x0E0D	1	PU3 Pre-Trigger Voltage	uint8	ro	address					0,1V	
0x0E0E	1	Supply Voltage	uint16	ro	address					0,1V	
0x0E0F	1	Aux Pickup Supply Voltage	uint8	ro	address					0,1V	
0x0E10	1	Aux Analog Input Supply Voltage	uint8	ro	address					0,1V	
0x0E11	1	Power Output	uint16	ro	address					0,1W	
0x0E12	4	Device Status	uint64	ro	address					bit field	
0x0E16	4	Status Flags	uint64	ro	address					bit field	
0x0E1A	1	Max Speed	uint16	ro	address					1rpm	
0x0E1B	4	Max Speed Timestamp	uint64	ro	0x0E1A					1µs	
0x0E1F	2	Operational Time	uint32	ro	address					1s	
0x0E21	4	Boot Up Time	uint64	ro	address					1µs	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0E25	1	Min Relative Firing Angle	int16	ro	address		10ms			0,02°	
0x0E26	1	Max Relative Firing Angle	int16	ro	address		10ms			0,02°	
0x0E27	1	Average Relative Firing Angle	int16	ro	address		10ms			0,02°	
0x0E28	2	Operating Hours	uint32	ro	address					1s	
0x0E2A	2	Engine Operating Hours	uint32	rw	address					1h	
0x0E2C	2	Total Engine Operating Hours	uint32	ro	address					1h	
0x0E2E	1	Spark Plug Operating Hours	uint16	rw	address					1h	
0x0E2F	3	RTC Date and Time	Time_of_day	rw	address			2000-01-01 00:00 .. 2099-12-31 23:59		n/a	Register 0x0E2F contains days and 0x0E30 and 0x0E31 contain milliseconds since 1984-01-01
0x0E32	1	Active Alarms	uint16	ro	address						
0x0E33	1	Triggered Alarms	uint16	ro	address						
0x0E34	4	Errors	uint64	ro	address						
0x0E38	4	Warnings	uint64	ro	address						
0x0E3C	1	Misfire Rate Primary Single Output	uint8	ro	address						
0x0E3D	1	Misfire Rate Secondary Single Output	uint8	ro	address						
0x0E3E	1	Misfire Rate Primary All Outputs	uint8	ro	address						
0x0E3F	1	Misfire Rate Secondary All Outputs	uint8	ro	address						
0x0E40	1	Misfire Per Second Primary All Outputs	uint16	ro	address						
0x0E41	1	Misfire Per Second Secondary All Outputs	uint16	ro	address						
0x0E42	2	Condensed Status	uint32	ro	address						
Output Status Flags Bank A											
0x0E50	1	Output Status Flags 1	uint8	ro	address		250ms				at least 1s active
0x0E51	1	Output Status Flags 2	uint8	ro	address		250ms				at least 1s active
0x0E52	1	Output Status Flags 3	uint8	ro	address		250ms				at least 1s active

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0E53	1	Output Status Flags 4	uint8	ro	address		250ms				at least 1s active
0x0E54	1	Output Status Flags 5	uint8	ro	address		250ms				at least 1s active
0x0E55	1	Output Status Flags 6	uint8	ro	address		250ms				at least 1s active
0x0E56	1	Output Status Flags 7	uint8	ro	address		250ms				at least 1s active
0x0E57	1	Output Status Flags 8	uint8	ro	address		250ms				at least 1s active
0x0E58	1	Output Status Flags 9	uint8	ro	address		250ms				at least 1s active
0x0E59	1	Output Status Flags 10	uint8	ro	address		250ms				at least 1s active
0x0E5A	1	Output Status Flags 11	uint8	ro	address		250ms				at least 1s active
0x0E5B	1	Output Status Flags 12	uint8	ro	address		250ms				at least 1s active
Output Status Flags Bank B											
0x0E60	1	Output Status Flags 1	uint8	ro	address		250ms				at least 1s active
0x0E61	1	Output Status Flags 2	uint8	ro	address		250ms				at least 1s active
0x0E62	1	Output Status Flags 3	uint8	ro	address		250ms				at least 1s active
0x0E63	1	Output Status Flags 4	uint8	ro	address		250ms				at least 1s active
0x0E64	1	Output Status Flags 5	uint8	ro	address		250ms				at least 1s active
0x0E65	1	Output Status Flags 6	uint8	ro	address		250ms				at least 1s active
0x0E66	1	Output Status Flags 7	uint8	ro	address		250ms				at least 1s active
0x0E67	1	Output Status Flags 8	uint8	ro	address		250ms				at least 1s active
0x0E68	1	Output Status Flags 9	uint8	ro	address		250ms				at least 1s active
0x0E69	1	Output Status Flags 10	uint8	ro	address		250ms				at least 1s active
0x0E6A	1	Output Status Flags 11	uint8	ro	address		250ms				at least 1s active
0x0E6B	1	Output Status Flags 12	uint8	ro	address		250ms				at least 1s active
Primary Open Counters Bank A											
0x0E90	1	Primary Open Counter 1	uint8	ro	address						
0x0E91	1	Primary Open Counter 2	uint8	ro	address						
0x0E92	1	Primary Open Counter 3	uint8	ro	address						

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0E93	1	Primary Open Counter 4	uint8	ro	address						
0x0E94	1	Primary Open Counter 5	uint8	ro	address						
0x0E95	1	Primary Open Counter 6	uint8	ro	address						
0x0E96	1	Primary Open Counter 7	uint8	ro	address						
0x0E97	1	Primary Open Counter 8	uint8	ro	address						
0x0E98	1	Primary Open Counter 9	uint8	ro	address						
0x0E99	1	Primary Open Counter 10	uint8	ro	address						
0x0E9A	1	Primary Open Counter 11	uint8	ro	address						
0x0E9B	1	Primary Open Counter 12	uint8	ro	address						
Primary Open Counters Bank B											
0x0EA0	1	Primary Open Counter 1	uint8	ro	address						
0x0EA1	1	Primary Open Counter 2	uint8	ro	address						
0x0EA2	1	Primary Open Counter 3	uint8	ro	address						
0x0EA3	1	Primary Open Counter 4	uint8	ro	address						
0x0EA4	1	Primary Open Counter 5	uint8	ro	address						
0x0EA5	1	Primary Open Counter 6	uint8	ro	address						
0x0EA6	1	Primary Open Counter 7	uint8	ro	address						
0x0EA7	1	Primary Open Counter 8	uint8	ro	address						
0x0EA8	1	Primary Open Counter 9	uint8	ro	address						
0x0EA9	1	Primary Open Counter 10	uint8	ro	address						
0x0EAA	1	Primary Open Counter 11	uint8	ro	address						
0x0EAB	1	Primary Open Counter 12	uint8	ro	address						
Primary Short Counters Bank A											
0x0ED0	1	Primary Short Counter 1	uint8	ro	address						
0x0ED1	1	Primary Short Counter 2	uint8	ro	address						
0x0ED2	1	Primary Short Counter 3	uint8	ro	address						

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0ED3	1	Primary Short Counter 4	uint8	ro	address						
0x0ED4	1	Primary Short Counter 5	uint8	ro	address						
0x0ED5	1	Primary Short Counter 6	uint8	ro	address						
0x0ED6	1	Primary Short Counter 7	uint8	ro	address						
0x0ED7	1	Primary Short Counter 8	uint8	ro	address						
0x0ED8	1	Primary Short Counter 9	uint8	ro	address						
0x0ED9	1	Primary Short Counter 10	uint8	ro	address						
0x0EDA	1	Primary Short Counter 11	uint8	ro	address						
0x0EDB	1	Primary Short Counter 12	uint8	ro	address						
Primary Short Counters Bank B											
0x0EE0	1	Primary Short Counter 1	uint8	ro	address						
0x0EE1	1	Primary Short Counter 2	uint8	ro	address						
0x0EE2	1	Primary Short Counter 3	uint8	ro	address						
0x0EE3	1	Primary Short Counter 4	uint8	ro	address						
0x0EE4	1	Primary Short Counter 5	uint8	ro	address						
0x0EE5	1	Primary Short Counter 6	uint8	ro	address						
0x0EE6	1	Primary Short Counter 7	uint8	ro	address						
0x0EE7	1	Primary Short Counter 8	uint8	ro	address						
0x0EE8	1	Primary Short Counter 9	uint8	ro	address						
0x0EE9	1	Primary Short Counter 10	uint8	ro	address						
0x0EEA	1	Primary Short Counter 11	uint8	ro	address						
0x0EEB	1	Primary Short Counter 12	uint8	ro	address						
Secondary Open Counters Bank A											
0x0F10	1	Secondary Open Counter 1	uint8	ro	address						
0x0F11	1	Secondary Open Counter 2	uint8	ro	address						
0x0F12	1	Secondary Open Counter 3	uint8	ro	address						

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0F13	1	Secondary Open Counter 4	uint8	ro	address						
0x0F14	1	Secondary Open Counter 5	uint8	ro	address						
0x0F15	1	Secondary Open Counter 6	uint8	ro	address						
0x0F16	1	Secondary Open Counter 7	uint8	ro	address						
0x0F17	1	Secondary Open Counter 8	uint8	ro	address						
0x0F18	1	Secondary Open Counter 9	uint8	ro	address						
0x0F19	1	Secondary Open Counter 10	uint8	ro	address						
0x0F1A	1	Secondary Open Counter 11	uint8	ro	address						
0x0F1B	1	Secondary Open Counter 12	uint8	ro	address						
Secondary Open Counters Bank B											
0x0F20	1	Secondary Open Counter 1	uint8	ro	address						
0x0F21	1	Secondary Open Counter 2	uint8	ro	address						
0x0F22	1	Secondary Open Counter 3	uint8	ro	address						
0x0F23	1	Secondary Open Counter 4	uint8	ro	address						
0x0F24	1	Secondary Open Counter 5	uint8	ro	address						
0x0F25	1	Secondary Open Counter 6	uint8	ro	address						
0x0F26	1	Secondary Open Counter 7	uint8	ro	address						
0x0F27	1	Secondary Open Counter 8	uint8	ro	address						
0x0F28	1	Secondary Open Counter 9	uint8	ro	address						
0x0F29	1	Secondary Open Counter 10	uint8	ro	address						
0x0F2A	1	Secondary Open Counter 11	uint8	ro	address						
0x0F2B	1	Secondary Open Counter 12	uint8	ro	address						
Secondary Short Counters Bank A											
0x0F50	1	Secondary Short Counter 1	uint8	ro	address						
0x0F51	1	Secondary Short Counter 2	uint8	ro	address						
0x0F52	1	Secondary Short Counter 3	uint8	ro	address						

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0F53	1	Secondary Open Counter 4	uint8	ro	address						
0x0F54	1	Secondary Short Counter 5	uint8	ro	address						
0x0F55	1	Secondary Short Counter 6	uint8	ro	address						
0x0F56	1	Secondary Short Counter 7	uint8	ro	address						
0x0F57	1	Secondary Short Counter 8	uint8	ro	address						
0x0F58	1	Secondary Short Counter 9	uint8	ro	address						
0x0F59	1	Secondary Short Counter 10	uint8	ro	address						
0x0F5A	1	Secondary Short Counter 11	uint8	ro	address						
0x0F5B	1	Secondary Short Counter 12	uint8	ro	address						
Secondary Short Counters Bank B											
0x0F60	1	Secondary Short Counter 1	uint8	ro	address						
0x0F61	1	Secondary Short Counter 2	uint8	ro	address						
0x0F62	1	Secondary Short Counter 3	uint8	ro	address						
0x0F63	1	Secondary Open Counter 4	uint8	ro	address						
0x0F64	1	Secondary Short Counter 5	uint8	ro	address						
0x0F65	1	Secondary Short Counter 6	uint8	ro	address						
0x0F66	1	Secondary Short Counter 7	uint8	ro	address						
0x0F67	1	Secondary Short Counter 8	uint8	ro	address						
0x0F68	1	Secondary Short Counter 9	uint8	ro	address						
0x0F69	1	Secondary Short Counter 10	uint8	ro	address						
0x0F6A	1	Secondary Short Counter 11	uint8	ro	address						
0x0F6B	1	Secondary Short Counter 12	uint8	ro	address						
Min Spark Duration Bank A											
0x0F90	1	Min Spark Duration 1	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F91	1	Min Spark Duration 2	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F92	1	Min Spark Duration 3	uint8	ro	address		100ms			5μs	avg over 10 ignitions

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0F93	1	Min Spark Duration 4	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F94	1	Min Spark Duration 5	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F95	1	Min Spark Duration 6	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F96	1	Min Spark Duration 7	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F97	1	Min Spark Duration 8	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F98	1	Min Spark Duration 9	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F99	1	Min Spark Duration 10	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F9A	1	Min Spark Duration 11	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0F9B	1	Min Spark Duration 12	uint8	ro	address		100ms			5μs	avg over 10 ignitions
Min Spark Duration Bank B											
0x0FA0	1	Min Spark Duration 1	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA1	1	Min Spark Duration 2	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA2	1	Min Spark Duration 3	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA3	1	Min Spark Duration 4	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA4	1	Min Spark Duration 5	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA5	1	Min Spark Duration 6	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA6	1	Min Spark Duration 7	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA7	1	Min Spark Duration 8	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA8	1	Min Spark Duration 9	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FA9	1	Min Spark Duration 10	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FAA	1	Min Spark Duration 11	uint8	ro	address		100ms			5μs	avg over 10 ignitions
0x0FAB	1	Min Spark Duration 12	uint8	ro	address		100ms			5μs	avg over 10 ignitions
Energy Outputs Bank A											
0x0FD0	1	Energy Output 1	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD1	1	Energy Output 2	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD2	1	Energy Output 3	uint8	ro	address		100ms			2mJ	avg over 10 ignitions

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x0FD3	1	Energy Output 4	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD4	1	Energy Output 5	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD5	1	Energy Output 6	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD6	1	Energy Output 7	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD7	1	Energy Output 8	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD8	1	Energy Output 9	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FD9	1	Energy Output 10	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FDA	1	Energy Output 11	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FDB	1	Energy Output 12	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
Energy Outputs Bank B											
0x0FE0	1	Energy Output 1	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE1	1	Energy Output 2	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE2	1	Energy Output 3	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE3	1	Energy Output 4	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE4	1	Energy Output 5	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE5	1	Energy Output 6	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE6	1	Energy Output 7	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE7	1	Energy Output 8	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE8	1	Energy Output 9	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FE9	1	Energy Output 10	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FEA	1	Energy Output 11	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
0x0FEB	1	Energy Output 12	uint8	ro	address		100ms			2mJ	avg over 10 ignitions
Estimated Secondary Voltages Bank A											
0x1010	1	Estimated Secondary Voltage 1	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1011	1	Estimated Secondary Voltage 2	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1012	1	Estimated Secondary Voltage 3	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x1013	1	Estimated Secondary Voltage 4	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1014	1	Estimated Secondary Voltage 5	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1015	1	Estimated Secondary Voltage 6	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1016	1	Estimated Secondary Voltage 7	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1017	1	Estimated Secondary Voltage 8	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1018	1	Estimated Secondary Voltage 9	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1019	1	Estimated Secondary Voltage 10	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x101A	1	Estimated Secondary Voltage 11	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x101B	1	Estimated Secondary Voltage 12	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
Estimated Secondary Voltages Bank B											
0x1020	1	Estimated Secondary Voltage 1	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1021	1	Estimated Secondary Voltage 2	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1022	1	Estimated Secondary Voltage 3	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1023	1	Estimated Secondary Voltage 4	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1024	1	Estimated Secondary Voltage 5	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1025	1	Estimated Secondary Voltage 6	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1026	1	Estimated Secondary Voltage 7	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1027	1	Estimated Secondary Voltage 8	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1028	1	Estimated Secondary Voltage 9	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x1029	1	Estimated Secondary Voltage 10	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x102A	1	Estimated Secondary Voltage 11	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
0x102B	1	Estimated Secondary Voltage 12	uint8	ro	address		100ms			0,2kV	avg over 10 ignitions
Actual Firing Angles Bank A											
0x1050	1	Actual Firing Angle 1	uint16	ro	address		10ms			0,02°	
0x1051	1	Actual Firing Angle 2	uint16	ro	address		10ms			0,02°	
0x1052	1	Actual Firing Angle 3	uint16	ro	address		10ms			0,02°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x1053	1	Actual Firing Angle 4	uint16	ro	address		10ms			0,02°	
0x1054	1	Actual Firing Angle 5	uint16	ro	address		10ms			0,02°	
0x1055	1	Actual Firing Angle 6	uint16	ro	address		10ms			0,02°	
0x1056	1	Actual Firing Angle 7	uint16	ro	address		10ms			0,02°	
0x1057	1	Actual Firing Angle 8	uint16	ro	address		10ms			0,02°	
0x1058	1	Actual Firing Angle 9	uint16	ro	address		10ms			0,02°	
0x1059	1	Actual Firing Angle 10	uint16	ro	address		10ms			0,02°	
0x105A	1	Actual Firing Angle 11	uint16	ro	address		10ms			0,02°	
0x105B	1	Actual Firing Angle 12	uint16	ro	address		10ms			0,02°	
Actual Firing Angles Bank B											
0x1060	1	Actual Firing Angle 1	uint16	ro	address		10ms			0,02°	
0x1061	1	Actual Firing Angle 2	uint16	ro	address		10ms			0,02°	
0x1062	1	Actual Firing Angle 3	uint16	ro	address		10ms			0,02°	
0x1063	1	Actual Firing Angle 4	uint16	ro	address		10ms			0,02°	
0x1064	1	Actual Firing Angle 5	uint16	ro	address		10ms			0,02°	
0x1065	1	Actual Firing Angle 6	uint16	ro	address		10ms			0,02°	
0x1066	1	Actual Firing Angle 7	uint16	ro	address		10ms			0,02°	
0x1067	1	Actual Firing Angle 8	uint16	ro	address		10ms			0,02°	
0x1068	1	Actual Firing Angle 9	uint16	ro	address		10ms			0,02°	
0x1069	1	Actual Firing Angle 10	uint16	ro	address		10ms			0,02°	
0x106A	1	Actual Firing Angle 11	uint16	ro	address		10ms			0,02°	
0x106B	1	Actual Firing Angle 12	uint16	ro	address		10ms			0,02°	
Relative Firing Angles Bank A											
0x1090	1	Relative Firing Angle 1	int16	ro	address		10ms			0,02°	
0x1091	1	Relative Firing Angle 2	int16	ro	address		10ms			0,02°	
0x1092	1	Relative Firing Angle 3	int16	ro	address		10ms			0,02°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x1093	1	Relative Firing Angle 4	int16	ro	address		10ms			0,02°	
0x1094	1	Relative Firing Angle 5	int16	ro	address		10ms			0,02°	
0x1095	1	Relative Firing Angle 6	int16	ro	address		10ms			0,02°	
0x1096	1	Relative Firing Angle 7	int16	ro	address		10ms			0,02°	
0x1097	1	Relative Firing Angle 8	int16	ro	address		10ms			0,02°	
0x1098	1	Relative Firing Angle 9	int16	ro	address		10ms			0,02°	
0x1099	1	Relative Firing Angle 10	int16	ro	address		10ms			0,02°	
0x109A	1	Relative Firing Angle 11	int16	ro	address		10ms			0,02°	
0x109B	1	Relative Firing Angle 12	int16	ro	address		10ms			0,02°	
Relative Firing Angles Bank B											
0x10A0	1	Relative Firing Angle 1	int16	ro	address		10ms			0,02°	
0x10A1	1	Relative Firing Angle 2	int16	ro	address		10ms			0,02°	
0x10A2	1	Relative Firing Angle 3	int16	ro	address		10ms			0,02°	
0x10A3	1	Relative Firing Angle 4	int16	ro	address		10ms			0,02°	
0x10A4	1	Relative Firing Angle 5	int16	ro	address		10ms			0,02°	
0x10A5	1	Relative Firing Angle 6	int16	ro	address		10ms			0,02°	
0x10A6	1	Relative Firing Angle 7	int16	ro	address		10ms			0,02°	
0x10A7	1	Relative Firing Angle 8	int16	ro	address		10ms			0,02°	
0x10A8	1	Relative Firing Angle 9	int16	ro	address		10ms			0,02°	
0x10A9	1	Relative Firing Angle 10	int16	ro	address		10ms			0,02°	
0x10AA	1	Relative Firing Angle 11	int16	ro	address		10ms			0,02°	
0x10AB	1	Relative Firing Angle 12	int16	ro	address		10ms			0,02°	
Cylinder Individual Offsets Bank A											
0x10D0	1	Cylinder Individual Offset 1	int8	rw	address	address	100ms			0,1°	
0x10D1	1	Cylinder Individual Offset 2	int8	rw	address	address	100ms			0,1°	
0x10D2	1	Cylinder Individual Offset 3	int8	rw	address	address	100ms			0,1°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x10D3	1	Cylinder Individual Offset 4	int8	rw	address	address	100ms			0,1°	
0x10D4	1	Cylinder Individual Offset 5	int8	rw	address	address	100ms			0,1°	
0x10D5	1	Cylinder Individual Offset 6	int8	rw	address	address	100ms			0,1°	
0x10D6	1	Cylinder Individual Offset 7	int8	rw	address	address	100ms			0,1°	
0x10D7	1	Cylinder Individual Offset 8	int8	rw	address	address	100ms			0,1°	
0x10D8	1	Cylinder Individual Offset 9	int8	rw	address	address	100ms			0,1°	
0x10D9	1	Cylinder Individual Offset 10	int8	rw	address	address	100ms			0,1°	
0x10DA	1	Cylinder Individual Offset 11	int8	rw	address	address	100ms			0,1°	
0x10DB	1	Cylinder Individual Offset 12	int8	rw	address	address	100ms			0,1°	
Cylinder Individual Offsets Bank B											
0x10E0	1	Cylinder Individual Offset 1	int8	rw	address	address	100ms			0,1°	
0x10E1	1	Cylinder Individual Offset 2	int8	rw	address	address	100ms			0,1°	
0x10E2	1	Cylinder Individual Offset 3	int8	rw	address	address	100ms			0,1°	
0x10E3	1	Cylinder Individual Offset 4	int8	rw	address	address	100ms			0,1°	
0x10E4	1	Cylinder Individual Offset 5	int8	rw	address	address	100ms			0,1°	
0x10E5	1	Cylinder Individual Offset 6	int8	rw	address	address	100ms			0,1°	
0x10E6	1	Cylinder Individual Offset 7	int8	rw	address	address	100ms			0,1°	
0x10E7	1	Cylinder Individual Offset 8	int8	rw	address	address	100ms			0,1°	
0x10E8	1	Cylinder Individual Offset 9	int8	rw	address	address	100ms			0,1°	
0x10E9	1	Cylinder Individual Offset 10	int8	rw	address	address	100ms			0,1°	
0x10EA	1	Cylinder Individual Offset 11	int8	rw	address	address	100ms			0,1°	
0x10EB	1	Cylinder Individual Offset 12	int8	rw	address	address	100ms			0,1°	
Output Statistics Fires Bank A											
0x1110	4	Output Statistics Fires 1	uint64	ro	address						
0x1114	4	Output Statistics Fires 2	uint64	ro	address						
0x1118	4	Output Statistics Fires 3	uint64	ro	address						

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x111C	4	Output Statistics Fires 4	uint64	ro	address						
0x1120	4	Output Statistics Fires 5	uint64	ro	address						
0x1124	4	Output Statistics Fires 6	uint64	ro	address						
0x1128	4	Output Statistics Fires 7	uint64	ro	address						
0x112C	4	Output Statistics Fires 8	uint64	ro	address						
0x1130	4	Output Statistics Fires 9	uint64	ro	address						
0x1134	4	Output Statistics Fires 10	uint64	ro	address						
0x1138	4	Output Statistics Fires 11	uint64	ro	address						
0x113C	4	Output Statistics Fires 12	uint64	ro	address						
Output Statistics Fires Bank B											
0x1140	4	Output Statistics Fires 1	uint64	ro	address						
0x1144	4	Output Statistics Fires 2	uint64	ro	address						
0x1148	4	Output Statistics Fires 3	uint64	ro	address						
0x114C	4	Output Statistics Fires 4	uint64	ro	address						
0x1150	4	Output Statistics Fires 5	uint64	ro	address						
0x1154	4	Output Statistics Fires 6	uint64	ro	address						
0x1158	4	Output Statistics Fires 7	uint64	ro	address						
0x115C	4	Output Statistics Fires 8	uint64	ro	address						
0x1160	4	Output Statistics Fires 9	uint64	ro	address						
0x1164	4	Output Statistics Fires 10	uint64	ro	address						
0x1168	4	Output Statistics Fires 11	uint64	ro	address						
0x116C	4	Output Statistics Fires 12	uint64	ro	address						
Output Statistics Misfires Bank A											
0x11C0	4	Output Statistics Misfires 1	uint64	ro	address						
0x11C4	4	Output Statistics Misfires 2	uint64	ro	address						
0x11C8	4	Output Statistics Misfires 3	uint64	ro	address						

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x11CC	4	Output Statistics Misfires 4	uint64	ro	address						
0x11D0	4	Output Statistics Misfires 5	uint64	ro	address						
0x11D4	4	Output Statistics Misfires 6	uint64	ro	address						
0x11D8	4	Output Statistics Misfires 7	uint64	ro	address						
0x11DC	4	Output Statistics Misfires 8	uint64	ro	address						
0x11E0	4	Output Statistics Misfires 9	uint64	ro	address						
0x11E4	4	Output Statistics Misfires 10	uint64	ro	address						
0x11E8	4	Output Statistics Misfires 11	uint64	ro	address						
0x11EC	4	Output Statistics Misfires 12	uint64	ro	address						
Output Statistics Misfires Bank B											
0x11F0	4	Output Statistics Misfires 1	uint64	ro	address						
0x11F4	4	Output Statistics Misfires 2	uint64	ro	address						
0x11F8	4	Output Statistics Misfires 3	uint64	ro	address						
0x11FC	4	Output Statistics Misfires 4	uint64	ro	address						
0x1200	4	Output Statistics Misfires 5	uint64	ro	address						
0x1204	4	Output Statistics Misfires 6	uint64	ro	address						
0x1208	4	Output Statistics Misfires 7	uint64	ro	address						
0x120C	4	Output Statistics Misfires 8	uint64	ro	address						
0x1210	4	Output Statistics Misfires 9	uint64	ro	address						
0x1214	4	Output Statistics Misfires 10	uint64	ro	address						
0x1218	4	Output Statistics Misfires 11	uint64	ro	address						
0x121C	4	Output Statistics Misfires 12	uint64	ro	address						
Runtime Adjustments											
0x1280	1	Timing Correction	int16	rw	address					0,02°	
0x1281	2	Self Test Period	uint32	rw	address					1μs	
0x1283	1	Spark Duration Adjustment Schedule A	int16	rw	address					1μs	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x1284	1	Spark Intensity Adjustment Schedule A	int16	rw	address					1mA	
0x1285	1	Spark Duration Adjustment Schedule B	int16	rw	address					1μs	
0x1286	1	Spark Intensity Adjustment Schedule B	int16	rw	address					1mA	
0x1287	1	Reset Adjustment	int16	rw	address					0,02°	The reset adjustment is automatically reset to 0 if a new reset position is written during configuration.
0x1288	1	Secondary Short Enable Voltage	uint16	rw						1V	
0x1289	1	Secondary Short Sensitivity	uint16	rw				0,9800 ... 1,0200	1	0,0001	
Temperatures											
0x1300	1	Current Controller Board Temperature	int16	ro	address					0,1°C	
0x1301	1	Min Controller Board Temperature	int16	ro	address					0,1°C	
0x1302	1	Max Controller Board Temperature	int16	ro	address					0,1°C	
0x1303	1	Min Controller Board Temperature Extreme	int16	ro	address					0,1°C	
0x1304	4	Min Controller Board Temperature Extreme Timestamp	uint64	ro	0x1303					1μs	
0x1308	1	Max Controller Board Temperature Extreme	int16	ro	address					0,1°C	
0x1309	4	Max Controller Board Temperature Extreme Timestamp	uint64	ro	0x1308					1μs	
0x130D	1	Current Output Board Temperature	int16	ro	address					0,1°C	
0x130E	1	Min Output Board Temperature	int16	ro	address					0,1°C	
0x130F	1	Max Output Board Temperature	int16	ro	address					0,1°C	
0x1310	1	Min Output Board Temperature Extreme	int16	ro	address					0,1°C	
0x1311	4	Min Output Board Temperature Extreme Timestamp	uint64	ro	0x1310					1μs	
0x1315	1	Max Output Board Temperature	int16	ro	address					0,1°C	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
		Extreme									
0x1316	4	Max Output Board Temperature Extreme Timestamp	uint64	ro	0x1315					1μs	
Device Info											
0x1350	2	DeviceID	uint32	ro							
0x1352	2	Extended DeviceID	uint32	ro							
0x1354	4	Firmware Version	uint64	ro							
0x1358	4	Hardware Version	uint64	ro							
0x135C	4	Bootloader Version	uint64	ro	address		on start				
0x1360	15	Controller Board Serial Number	string	ro	address		on start				zero terminated string, max 28 char + trailing 0
0x136F	15	Device Serial Number	string	ro	address		on start				zero terminated string, max 28 char + trailing 0
0x137E	15	Arrangement Number	string	ro	address		on start				zero terminated string, max 28 char + trailing 0
0x138D	15	Output Board Serial Number	string	ro	address		on start				zero terminated string, max 28 char + trailing 0
0x139C	4	Output Board Hardware Version	uint64	ro	address		on start				
0x13A0	1	OEM Register 1	uint8	ro	address		on start				
0x13A1	1	OEM Register 2	uint8	ro	address		on start				
Config Secondary Voltage Estimation Calibration Bank A											
0x1410		Output 1	int8	rw	address	address		-5 ... +5		0,1	
0x1411		Output 2	int8	rw	address	address					
0x1412		Output 3	int8	rw	address	address					
0x1413		Output 4	int8	rw	address	address					
0x1414		Output 5	int8	rw	address	address					
0x1415		Output 6	int8	rw	address	address					
0x1416		Output 7	int8	rw	address	address					

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x1417		Output 8	int8	rw	address	address					
0x1418		Output 9	int8	rw	address	address					
0x1419		Output 10	int8	rw	address	address					
0x141A		Output 11	int8	rw	address	address					
0x141B		Output 12	int8	rw	address	address					
Config Secondary Voltage Estimation Calibration Bank B											
0x1430		Output 1	int8	rw	address	address		-5 ... +5		0,1	
0x1431		Output 2	int8	rw	address	address					
0x1432		Output 3	int8	rw	address	address					
0x1433		Output 4	int8	rw	address	address					
0x1434		Output 5	int8	rw	address	address					
0x1435		Output 6	int8	rw	address	address					
0x1436		Output 7	int8	rw	address	address					
0x1437		Output 8	int8	rw	address	address					
0x1438		Output 9	int8	rw	address	address					
0x1439		Output 10	int8	rw	address	address					
0x143A		Output 11	int8	rw	address	address					
0x143B		Output 12	int8	rw	address	address					
Runtime Adjustment Secondary Voltage Estimation Calibration Bank A											
0x1510		Output 1	int8	rw	address	address		-5 ... +5		0,1	
0x1511		Output 2	int8	rw	address	address					
0x1512		Output 3	int8	rw	address	address					
0x1513		Output 4	int8	rw	address	address					
0x1514		Output 5	int8	rw	address	address					
0x1515		Output 6	int8	rw	address	address					
0x1516		Output 7	int8	rw	address	address					

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x1517		Output 8	int8	rw	address	address					
0x1518		Output 9	int8	rw	address	address					
0x1519		Output 10	int8	rw	address	address					
0x151A		Output 11	int8	rw	address	address					
0x151B		Output 12	int8	rw	address	address					
Runtime Adjustment Secondary Voltage Estimation Calibration Bank B											
0x1530		Output 1	int8	rw	address	address		-5 ... +5		0,1	
0x1531		Output 2	int8	rw	address	address					
0x1532		Output 3	int8	rw	address	address					
0x1533		Output 4	int8	rw	address	address					
0x1534		Output 5	int8	rw	address	address					
0x1535		Output 6	int8	rw	address	address					
0x1536		Output 7	int8	rw	address	address					
0x1537		Output 8	int8	rw	address	address					
0x1538		Output 9	int8	rw	address	address					
0x1539		Output 10	int8	rw	address	address					
0x153A		Output 11	int8	rw	address	address					
0x153B		Output 12	int8	rw	address	address					
Configuration ASO1 Angles Part 2											
0x1610	1	ASO Angle 17	uint16	rw	address	address		0 .. 719,9		0,02°	
0x1611	1	ASO Angle 18	uint16	rw	address	address		0 .. 719,9		0,02°	
0x1612	1	ASO Angle 19	uint16	rw	address	address		0 .. 719,9		0,02°	
0x1613	1	ASO Angle 20	uint16	rw	address	address		0 .. 719,9		0,02°	
0x1614	1	ASO Angle 21	uint16	rw	address	address		0 .. 719,9		0,02°	
0x1615	1	ASO Angle 22	uint16	rw	address	address		0 .. 719,9		0,02°	
0x1616	1	ASO Angle 23	uint16	rw	address	address		0 .. 719,9		0,02°	

Address	Quantity of Registers	Name	Type	Access	updated		updated within MIC	Range	Default	Scale/ Unit	Comments
					by reading	by writing					
0x1617	1	ASO Angle 24	uint16	rw	address	address		0 .. 719,9		0,02°	
Configuration ASO1 Pulse Widths Part 2											
0x1620	1	ASO Pulse Width 17	uint16	rw	address	address		10 .. 300		1 µs	
0x1621	1	ASO Pulse Width 18	uint16	rw	address	address		10 .. 300		1 µs	
0x1622	1	ASO Pulse Width 19	uint16	rw	address	address		10 .. 300		1 µs	
0x1623	1	ASO Pulse Width 20	uint16	rw	address	address		10 .. 300		1 µs	
0x1624	1	ASO Pulse Width 21	uint16	rw	address	address		10 .. 300		1 µs	
0x1625	1	ASO Pulse Width 22	uint16	rw	address	address		10 .. 300		1 µs	
0x1626	1	ASO Pulse Width 23	uint16	rw	address	address		10 .. 300		1 µs	
0x1627	1	ASO Pulse Width 24	uint16	rw	address	address		10 .. 300		1 µs	
Status											
0x1670	2	Status General 1	uint32	ro	address						
0x1672	2	Status General 2	uint32	ro	address						
0x1674	2	Status Error	uint32	ro	address						
0x1676	2	Status Pickup Status 1	uint32	ro	address						
0x1678	2	Status Pickup Status 2	uint32	ro	address						
0x167A	2	Status Pickup Status 3	uint32	ro	address						

3.3 Commands

There are the following command types:

- Standard commands without parameters
- Extended Commands with up to four parameters

The command type can be selected via Modbus register "Command Type" at address 0x0008 to 0x0009.

The values for the command types are:

Name	Value
Standard Command	0x00000000
Extended Command	0x00000001
Unknown Command	0x00000002

The status of the command can be read from registers 0x000C and 0x000D. The status values are:

Name	Value
OK	0x00000000
FAILED	0x00000001
UNKNOWN COMMAND TYPE	0x00000002
UNKNOWN COMMAND CODE	0x00000004
BUSY	0x00000005

3.3.1 Standard Commands

To execute a standard command the following sequence must be sent:

- Command Type 0x00000000
 - 0x0000 into register 0x0008
 - 0x0000 into register 0x0009
- Command Code into
 - register 0x000A
 - register 0x000B
- Writing into register 0x000B starts the command execution.
- The Command Status can be read from register 0x000C and 0x000D.

The following standard command codes are valid:

Name	Value
START_CONFIGURATION	0x00000000
END_CONFIGURATION	0x00000001
ACK_OPERATIONAL_ERROR	0x00000002
START_SELF_TEST	0x00000008

Name	Value
END_SELF_TEST	0x00000009
RESET_MISFIRE_COUNTERS	0x0000000C
RESET_SMALL_STEP_ADV	0x0000000D
RESET_LARGE_STEP_ADV	0x0000000E
RESET_SMALL_STEP_RET	0x0000000F
RESET_LARGE_STEP_RET	0x00000010
ACKNOWLEDGE_ALARMS	0x00000015
END_CONFIGURATION_WITH_DISCARD	0x0000001E

3.3.2 Extended Commands

To execute a extended command the following sequence must be sent:

- Command Type 0x00000001
 - 0x0000 into register 0x0008
 - 0x0001 into register 0x0009
- Command Parameters 0 to 3, registers 0x0000 to 0x0007. The meaning and usage depend from the selected extended command
 - All used parameters must be written as 32bit values, i.e. both Modbus registers, which build one parameter, must be written with the appropriate converted 32bit value.
- Command Code into
 - register 0x000A
 - register 0x000B

Writing into register 0x000B starts the command execution.

- The Command Status can be read from register 0x000C and 0x000D.

The following standard command codes and parameters are valid:

Name	Value	Parameter 0			Parameter 1			Parameter 2			Parameter 3		
		Name	Type	Scale/Unit	Name	Type	Scale/Unit	Name	Type	Scale/Unit	Name	Type	Scale/Unit
Change Cylinder Offset	0x00000001	Bank	uint8		Output	uint8		Change		0,1°	unused		

Name	Value	Parameter 0			Parameter 1			Parameter 2			Parameter 3		
		Name	Type	Scale/Unit	Name	Type	Scale/Unit	Name	Type	Scale/Unit	Name	Type	Scale/Unit
Extended Self Test	0x00000002	Cmd	uint32	0=Stop 1=Start 2=State 3=Set Cycles 4=Set Outp	Bank	uint8		Output	uint8		Cycles	uint32	
Spark Duration Adjustment Step	0x00000010	Schedule	uint8		Large	uint8	1 / 10 μ s	Increase	uint8	1 = incr. 0 = decr.	unused		
Spark Intensity Adjustment Step	0x00000011	Schedule	uint8		Large	uint8	1 / 10 ms	Increase	uint8	1 = incr. 0 = decr.	unused		
Decode Parameter Download	0x00000012	Type	uint32	0=parameter id value list	Coding	uint32	0=fixed length 1=variable length	File Header	uint32	0=no header 1= header	File length	uint16	file size inclusive header in bytes
				1=binary coil data	unused			unused			unused		

4 Supported Files

The MIC supports until now three files which can be accessed via function code 0x15 ("Write File Record").

One of these files can be used for configuration via parameter download and the other one do initiate standard and extended commands.

File Name	File Number	Description
Parameter Download File	1	ID value list to configure MIC
Control File	2	Triggering execution of standard or extended commands
Binary Coil Data	3	Binary coil data to configure the used coil

4.1 Control File

- The control file is used to initiate standard and extended commands.
- The control file has the file number 0x0002.

4.1.1 Parameters for "Write File Record" Access

- The content of the control file must be transferred with one Write File Record Access with the following parameters:

Field Name	Value
Request Data Length	0x13
File Number	0x0002
Record Number	0x0000
Record Length	0x000C

4.1.2 Layout of Control File

- The control file uses big endian for data types greater than 1 byte

Byte Offset	Name	Data Type
0x00	Command Type	uint32
0x04	Command	uint32
0x08	Command Parameter 0	uint32
0x0C	Command Parameter 1	uint32
0x10	Command Parameter 2	uint32
0x14	Command Parameter 3	uint32

The values for command type, command and command parameters are the same as described in the appropriate chapter concerning command execution via register access.

4.1.2.1 Command Type

Command Type	Value
Standard Command	0x00000000
Extended Command	0x00000001

4.1.2.2 Standard Commands

Standard Command	Value
START_CONFIGURATION	0x00000000
END_CONFIGURATION	0x00000001
ACK_OPERATIONAL_ERROR	0x00000002
START_SELF_TEST	0x00000008
END_SELF_TEST	0x00000009
RESET_MISFIRE_COUNTERS	0x0000000C
RESET_SMALL_STEP_ADV	0x0000000D
RESET_LARGE_STEP_ADV	0x0000000E
RESET_SMALL_STEP_RET	0x0000000F
RESET_LARGE_STEP_RET	0x00000010
ACKNOWLEDGE_ALARMS	0x00000015
END_CONFIGURATION_WITH_DISCARD	0x0000001E

4.1.2.3 Extended Commands

Extended Command	Value
Change Cylinder Offset	0x00000001
Extended Self Test	0x00000002
Spark Duration Adjustment Step	0x00000010
Spark Intensity Adjustment Step	0x00000011
Decode Parameter Download	0x00000012

The extended command parameters are described in the appropriate chapter about extended command execution via register access.

4.1.2.4 Control File “Start Configuration”

```
00000000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000010 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

4.1.2.5 Control File “End Configuration”

```
00000000 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00
00000010 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

4.1.2.6 Control File “Decode Parameter Download”

- Before a parameter file can be transferred into the device, the MIC must be switched in configuration mode via sending “Start Configuration” control file or via writing the matching register sequence
- After transferring parameter file a “Decode Parameter Download” extended command must be initiated via sending the “Decode Parameter Download” file or writing the matching register sequence.
- The MIC must be informed about length, format and layout of the Decode Parameter Download control file via the parameters of to the “Decode Parameter Download” command.
- To check and activate the new configuration, the “End Configuration” command must be triggered via writing the command file or the appropriate register sequence

4.1.2.6.1 Fixed Length without Header

```
00000000 00 00 00 01 00 00 00 12 00 00 00 00 00 00 00 00
00000010 00 00 00 00 00 00 0a eb
```

- Bytes at offsets 0x10 to 0x14 (0x00000AEB) must be replaced with the size in bytes of the transferred parameter file. This is an 32 bit, big endian coded parameter.

4.1.2.6.2 Fixed Length with Header

```
00000000 00 00 00 01 00 00 00 12 00 00 00 00 00 00 00 00
00000010 00 00 00 01 00 00 0a f9
```

- Bytes at offsets 0x10 to 0x14 (0x00000AF9) must be replaced with the size in bytes of the transferred parameter file. This is an 32 bit, big endian coded parameter.

4.1.2.6.3 Variable Length without Header

```
00000000 00 00 00 01 00 00 00 12 00 00 00 00 00 00 00 01
00000010 00 00 00 00 00 00 09 ce
```

- Bytes at offsets 0x10 to 0x14 (0x000009CE) must be replaced with the size in bytes of the transferred parameter file. This is an 32 bit, big endian coded parameter.

4.1.2.6.4 Variable Length with Header

```
00000000 00 00 00 01 00 00 00 12 00 00 00 00 00 00 00 01
00000010 00 00 00 01 00 00 09 dc
```

- Bytes at offsets 0x10 to 0x14 (0x000009DC) must be replaced with the size in bytes of the transferred parameter file. This is an 32 bit, big endian coded parameter.

4.1.2.7 Control File “Decode Binary Coil Data”

```
00000000 00 00 00 01 00 00 00 12 00 00 00 01 00 00 00 00
00000010 00 00 00 00 00 00 00 00
```

4.2 Parameter Download File

- The parameter file is a ID value list. The meaning and type of every parameter is controlled by a ID. These ID value list is not into the scope of this document.
- The parameter download file has the file number 0x0001.
- The ID value list for the MIC5 is described in the document *ConfigurationDataMIC5.odt* (<svn://motdev01.motortech.local/development/projects/P920690/trunk/900-Software/910-Requirements/IDValueList/ConfigurationDataMIC5.odt>).
- The ID value list can be embedded by a leading header and a trailing CRC32 checksum. The ID value list can be encoded with fixed or variable length. The MIC must be informed about length, layout (with or without header) and ID value list encoding via the parameters of the extended “Decode Parameter Download” command.
- The layout and encoding of the parameter download file is described in *ParameterFileDescription.odt* (<svn://motdev01.motortech.local/development/projects/P920690/trunk/900-Software/910-Requirements/ParameterFile/ParameterFileDescription.odt>).

4.3 Coil Binary Data File

- The binary coil data file contains all data to describe the coil properties needed by the MIC.

- The binary coil data download file has the file number 0x0003.

5 Copyright

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