

MIC5 CANopen Object Dictionary

Product: P920690 - MIC5

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Distribution and release list (alphabetical)

Name	Company and Department	Rel.	Signature

History of changes

Revision	Date	Changes	Author	Status
19646	2014-04-02	Removed range values from Runtime Adjustments.Secondary Short Sensitivity, Secondary Voltage Estimation Calibration Bank A and Secondary Voltage Estimation Calibration Bank B. These ranges depend on the configured coil.	CK	Draft
18893	2014-01-15	Added Configuration General.Secondary Diagnostics Enabled and Configuration General.Coil Data Version.	CK	Draft
18526	2013-11-25	Added missing description of runtime adjustments secondary short enable voltage and secondary short sensitivity.	CK	Draft
18295	2013-11-08	Added Configuration General.Max Power-On Speed.	CK	Draft
18289	2013-11-08	Added trigger disc type "6 = N+1 extended index range".	CK	Draft
17677	2013-09-09	Added configuration and runtime adjustments of secondary voltage estimation calibration,	CK	Draft

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		secondary short enable voltage and secondary short sensitivity. Added Configuration General.Configuration Signature. Corrected trigger disc types.		
16918	2013-06-06	Corrected device id, sub-index range of Configuration Cylinder Names	CK	Draft
16758	2013-05-21	Initial version.	CK	Draft

Document Management

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Tools used for the creation of this document

Tool	Description	Version
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1 Introduction

1.1 Purpose of this Document

This document lists the objects of the MIC5's preliminary CANopen object dictionary.

1.2 Further applicable documents

1.3 Glossary

1.4 Notation notes

Scale “boolean” means 0 = false/no and non-zero (preferably 1) = true/yes.

Hexadecimal numbers are prefixed by 0x (i.e. 0x20 hexadecimal is 32 decimal).

Entries written in **gray** are obsolete and may be changed/removed in future versions.

2 Object Dictionary

2.1 Object List

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2000		RECORD	Command								see section Commands
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Command Type	UNSIGNED32	wo	no			list		
	2		Command Code	UNSIGNED32	wo	no			list		
	3		Status	UNSIGNED32	ro	no			list		
	4		Parameter 0	UNSIGNED32	rw	no					depends on command
	5		Parameter 1	UNSIGNED32	rw	no					depends on command
	6		Parameter 2	UNSIGNED32	rw	no					depends on command
	7		Parameter 3	UNSIGNED32	rw	no					depends on command
0x2200		RECORD	Configuration General								
	0		Highest sub-index supported	UNSIGNED8	const	no		32			
	1		Engine Type Id	INTEGER64	ro	no		0			0 = UNKNOWN, will automatically be reset to UNKNOWN on write access to Engine Class, Four Stroke, Number of Cylinder, Number of Coils per Cylinder, Number of Outputs, Firing Angle. Output, Bank, Angle or Cylinder
	2		Four Stroke	UNSIGNED8	rw	no	0 .. 1	1			0 = 2-stroke; 1 = 4-stroke
	3		Coil Type Id	INTEGER64	ro	no		1			1 = 06.50.100
	4		Coil Name	VISIBLE_STRING	ro	no					max 20 characters + trailing 0 (currently, version 0.14.x, not available. Always "n/a")
	5		Reset Position	INTEGER16	rw	no	-359,9 .. 359,9	-60	0,02°		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	6		Ignition Release Speed	UNSIGNED16	rw	no	1 .. 6000	150			
	7		Security Speed	UNSIGNED16	rw	no	1 .. 6000	250			
	8		Nominal Speed	UNSIGNED16	rw	no	10 .. 6000	150 0			
	9		Overspeed	UNSIGNED16	rw	no	11 .. 6000	200 0			
	10		Analog Current Input Upper Limit	UNSIGNED16	rw	no	0 .. 20	20	0,01 mA		
	11		Analog Current Input Lower Limit	UNSIGNED16	rw	no	0 .. 20	4	0,01 mA		
	12		Analog Current Input Failure Threshold	UNSIGNED16	rw	no	0 .. 20	3,2	0,01 mA		
	13		Analog Voltage Input Upper Limit	UNSIGNED16	rw	no	0 .. 10	5	0,01 V		
	14		Analog Voltage Input Lower Limit	UNSIGNED16	rw	no	0 .. 10	0	0,01 V		
	15		Analog Voltage Input Failure Threshold	UNSIGNED16	rw	no	0 .. 10	0	0,01 V		
	16		Aux Pickup Supply Voltage	UNSIGNED8	rw	no	5 .. 24	5	0,1 V		
	17		Aux Analog Input Supply Voltage	UNSIGNED8	rw	no	5 .. 24	5	0,1 V		
	18		Max Adv Firing Angle Change per Cycle	UNSIGNED16	rw	no	0 .. 25	0,5	0,02°		
	19		Max Ret Firing Angle Change per Cycle	UNSIGNED16	rw	no	0 .. 25	0,5	0,02°		
	20		Number of Coils per Cylinder	UNSIGNED8	rw	no	1 .. 1				
	21		Cylinder Names Enabled	UNSIGNED8	rw	no	0 .. 1	0			
	22		Engine Class	UNSIGNED8	rw	no	0 .. 1				0 = inline; 1 = v engine
	23		Number of Cylinders	UNSIGNED8	rw	no	0 .. Number of Outputs Available				
	24		Show Banks in Reverse Order	UNSIGNED8	rw	no	0 .. 1				
	25		Configuration Timestamp	UNSIGNED64	ro	no					
	26		Coil Data	DOMAIN	wo	no					binary coil data as provided by MOTORTECH
	27		Secondary Short Enable Voltage	UNSIGNED16	rw	no	0 .. 65535	0	1 V		65535 to disable secondary short detection
	28		Secondary Short Sensitivity	UNSIGNED16	rw	no	0.9800 .. 1.0200	1	0.0001		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	29		Configuration Signature	UNSIGNED32	rw	no		0			automatically reset to 0 if the configuration is changed without writing a new configuration signature. Always reset to 0 if the device is configured using the MICT.
	30		Max Power-On Speed	UNSIGNED16	rw	no	0 .. 6000	6000			
	31		Secondary Diagnostics Enabled	UNSIGNED8	rw	no	0 .. 1	1			Enable secondary diagnostics if supported by the selected coil and with the current configuration.
	32		Coil Data Version	UNSIGNED32	ro	no					
0x2201		RECORD	Configuration Misc Information								
	0		Highest sub-index supported	UNSIGNED8	const	no		9			
	1		Site Description	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	2		Site Location	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	3		Module Description	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	4		Engine Type Description	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	5		Service Contact Line 1	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	6		Service Contact Line 2	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	7		Service Contact Line 3	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	8		Service Contact Line 4	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
	9		Service Contact Line 5	VISIBLE_STRING	rw	no					max 40 characters + trailing 0
0x2202		ARRAY	Configuration Number of Outputs								
	0		Highest sub-index supported	UNSIGNED8	const	no		2			
	1..2		Number of Outputs on Output Bank i	UNSIGNED8	rw	no	0..Number of Outputs Available per Bank				

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2210		RECORD	Configuration Pickup Input 1								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Pickup Input Type	UNSIGNED8	rw	no	0 .. 2				0 = passive 1 = active low 2 = active high
	2		Trigger Disc Type	UNSIGNED8	rw	no					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
	3		Number of Triggers	UNSIGNED16	rw	no					
	4		Crankshaft Speed	UNSIGNED8	rw	no	0 .. 1				
	5		Pre-Trigger Voltage	UNSIGNED8	rw	no			0,1 V		
0x2211		RECORD	Configuration Pickup Input 2								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Pickup Input Type	UNSIGNED8	rw	no	0 .. 2				0 = passive 1 = active low 2 = active high
	2		Trigger Disc Type	UNSIGNED8	rw	no					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
	3		Number of Triggers	UNSIGNED16	rw	no					
	4		Crankshaft Speed	UNSIGNED8	rw	no	0 .. 1				
	5		Pre-Trigger Voltage	UNSIGNED8	rw	no			0,1 V		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2212		RECORD	Configuration Pickup Input 3								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Pickup Input Type	UNSIGNED8	rw	no	0 .. 2				0 = passive 1 = active low 2 = active high
	2		Trigger Disc Type	UNSIGNED8	rw	no					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
	3		Number of Triggers	UNSIGNED16	rw	no					
	4		Crankshaft Speed	UNSIGNED8	rw	no	0 .. 1				
	5		Pre-Trigger Voltage	UNSIGNED8	rw	no			0,1 V		
0x2220		RECORD	Configuration Cylinder Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		3			
	1		Bank Name	VISIBLE_STRING	rw	no					max 8 characters + trailing 0
	2		Show Cylinders in Reverse Order	UNSIGNED8	rw	no	0 .. 1				
0x2221		RECORD	Configuration Cylinder Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		3			
	1		Bank Name	VISIBLE_STRING	rw	no					max 8 characters + trailing 0
	2		Show Cylinders in Reverse Order	UNSIGNED8	rw	no	0 .. 1				
0x2222			Reserved (Configuration Bank C)								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2223			Reserved (Configuration Bank D)								
0x222F		ARRAY	Configuration Cylinder Names								
	0		Highest sub-index supported	UNSIGNED8	const	no		24			
	1..24		Cylinder Name i	VISIBLE_STRING	rw	no					max 4 chracters + trailing 0
0x2230		RECORD	Configuration Schedule A								
	0		Highest sub-index supported	UNSIGNED8	const	no		29			
	1		Schedule Enabled	UNSIGNED8	rw	no	0 .. 1		boolean		
	2		Schedule Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	3		Timing Limit Min	INTEGER16	rw	no			0,02°		
	4		Timing Limit Max	INTEGER16	rw	no			0,02°		
	5		Cylinder Individual Timing Limit Min	INTEGER16	rw	no			0,02°		
	6		Cylinder Individual Timing Limit Max	INTEGER16	rw	no			0,02°		
	7		Base Timing	INTEGER16	rw	no			0,02°		
	8		Potentiometer Enabled	UNSIGNED8	rw	no					
	9		Potentiometer Timing CW	INTEGER16	rw	no			0,02°		
	10		Potentiometer Timing CCW	INTEGER16	rw	no			0,02°		
	11		Analog Current Input Enabled	UNSIGNED8	rw	no					
	12		Analog Current Input Timing at Lower Limit	INTEGER16	rw	no			0,02°		
	13		Analog Current Input Timing at Upper Limit	INTEGER16	rw	no			0,02°		
	14		Analog Current Input Timing Default	INTEGER16	rw	no			0,02°		
	15		Analog Voltage Input Enabled	UNSIGNED8	rw	no					
	16		Analog Voltage Input Timing at Lower Limit	INTEGER16	rw	no			0,02°		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	17		Analog Voltage Input Timing at Upper Limit	INTEGER16	rw	no			0,02°		
	18		Analog Voltage Input Timing Default	INTEGER16	rw	no			0,02°		
	19		Spark Duration	UNSIGNED16	rw	no			1 µs		
	20		Spark Intensity	UNSIGNED16	rw	no			1 mA		
	21		Max Breakdown Voltage	UNSIGNED8	rw	no			1 kV		
	22		Start Phase Spark Duration	UNSIGNED16	rw	no			1 µs		
	23		Start Phase Spark Intensity	UNSIGNED16	rw	no			1 mA		
	24		Start Phase Max Breakdown Voltage	UNSIGNED8	rw	no			1 kV		
	25		Start Phase Speed Limit	UNSIGNED16	rw	no			1 rpm		
	26		Start Phase Time Limit	UNSIGNED32	rw	no			1 s		
	27		Energy Limit	UNSIGNED16	rw	no			1 mJ		
	28		Speed Curve Enabled	UNSIGNED8	rw	no	0 .. 1		boolean		
	29		Number of Speed Points	UNSIGNED8	rw	no	1 .. 8				
	30		Start Phase Energy Limit	UNSIGNED16	rw	no			1 mJ		
0x2231		ARRAY	Configuration Schedule A Speed Points Speed								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..8		Schedule A Speed Points Speed i	UNSIGNED16					1 rpm		speeds in ascending order, first speed always 0 rpm
0x2232		ARRAY	Configuration Schedule A Speed Points Timing								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..8		Schedule A Speed Points Timing i	INTEGER16					0,02°		
0x2240		RECORD	Configuration Schedule B								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	0		Highest sub-index supported	UNSIGNED8	const	no		29			
	1		Schedule Enabled	UNSIGNED8							
	2		Schedule Description	VISIBLE_STRING							max 20 characters + trailing 0
	3		Timing Limit Min	INTEGER16					0,02°		
	4		Timing Limit Max	INTEGER16					0,02°		
	5		Cylinder Individual Timing Limit Min	INTEGER16					0,02°		
	6		Cylinder Individual Timing Limit Max	INTEGER16					0,02°		
	7		Base Timing	INTEGER16					0,02°		
	8		Potentiometer Enabled	UNSIGNED8							
	9		Potentiometer Timing CW	INTEGER16					0,02°		
	10		Potentiometer Timing CCW	INTEGER16					0,02°		
	11		Analog Current Input Enabled	UNSIGNED8							
	12		Analog Current Input Timing at Lower Limit	INTEGER16					0,02°		
	13		Analog Current Input Timing at Upper Limit	INTEGER16					0,02°		
	14		Analog Current Input Timing Default	INTEGER16					0,02°		
	15		Analog Voltage Input Enabled	UNSIGNED8							
	16		Analog Voltage Input Timing at Lower Limit	INTEGER16					0,02°		
	17		Analog Voltage Input Timing at Upper Limit	INTEGER16					0,02°		
	18		Analog Voltage Input Timing Default	INTEGER16					0,02°		
	19		Spark Duration	UNSIGNED16					1 µs		
	20		Spark Intensity	UNSIGNED16					1 mA		
	21		Max Breakdown Voltage	UNSIGNED8					1 kV		
	22		Start Phase Spark Duration	UNSIGNED16					1 µs		
	23		Start Phase Spark Intensity	UNSIGNED16					1 mA		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	24		Start Phase Max Breakdown Voltage	UNSIGNED8					1 kV		
	25		Start Phase Speed Limit	UNSIGNED16					1 rpm		
	26		Start Phase Time Limit	UNSIGNED32					1 s		
	27		Energy Limit	UNSIGNED16					1 mJ		
	28		Speed Curve Enabled	UNSIGNED8							
	29		Number of Speed Points	UNSIGNED8			1 .. 8				
	30		Start Phase Energy Limit	UNSIGNED16	rw	no			1 mJ		
0x2241		ARRAY	Configuration Schedule B Speed Points Speed								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..8		Schedule B Speed Points Speed i	UNSIGNED16							
0x2242		ARRAY	Configuration Schedule B Speed Points Timing								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..8		Schedule B Speed Points Timing i	UNSIGNED16							
0x2250			Reserved (Schedule C)								
0x2251			Reserved (Schedule C Speed Points Speed)								
0x2252			Reserved (Schedule C Speed Points Timing)								
0x2260			Reserved (Schedule D)								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2261			Reserved (Schedule D Speed Points Speed)								
0x2262			Reserved (Schedule D Speed Points Timing)								
0x2280		RECORD	Configuration Firing Angle 1								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2281		RECORD	Configuration Firing Angle 2								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2282		RECORD	Configuration Firing Angle 3								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2283		RECORD	Configuration Firing Angle 4								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2284		RECORD	Configuration Firing Angle 5								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2285		RECORD	Configuration Firing Angle 6								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2286		RECORD	Configuration Firing Angle 7								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2287		RECORD	Configuration Firing Angle 8								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2288		RECORD	Configuration Firing Angle 9								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2289		RECORD	Configuration Firing Angle 10								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x228A		RECORD	Configuration Firing Angle 11								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x228B		RECORD	Configuration Firing Angle 12								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x228C		RECORD	Configuration Firing Angle 13								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x228D		RECORD	Configuration Firing Angle 14								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x228E		RECORD	Configuration Firing Angle 15								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x228F		RECORD	Configuration Firing Angle 16								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2290		RECORD	Configuration Firing Angle 17								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2291		RECORD	Configuration Firing Angle 18								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2292		RECORD	Configuration Firing Angle 19								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2293		RECORD	Configuration Firing Angle 20								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2294		RECORD	Configuration Firing Angle 21								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2295		RECORD	Configuration Firing Angle 22								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2296		RECORD	Configuration Firing Angle 23								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2297		RECORD	Configuration Firing Angle 24								
	0		Highest sub-index supported	UNSIGNED8	const	no		5			
	1		Output Bank	UNSIGNED8	rw	no					
	2		Output	UNSIGNED8	rw	no					
	3		Firing Angle	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
	4		Output Delay	UNSIGNED16	rw	no	0 .. 0				for future use

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	5		Cylinder Index	UNSIGNED16	rw	no					0xFFFF = not assigned (invalid values must also be interpreted as not assigned)
0x2298 .. 0x229F			Reserved (Firing Angle 25 .. Firing Angle 32)								
0x2300		RECORD	Configuration ASO1								
	0		Highest sub-index supported	UNSIGNED8	const	no					
	1		Number of Points	UNSIGNED8	rw	no	0 .. Number of Outputs Available				
	2		Global Timing Point Related	UNSIGNED8	rw	no					
0x2301		ARRAY	Configuration ASO1 Angles								
	0		Highest sub-index supported	UNSIGNED8	const	no		16			
	1..24		ASO1 Angle i	UNSIGNED16	rw	no	0 .. 719,9		0,02°		
0x2302		ARRAY	Configuration ASO1 Pulse Widths								
	0		Highest sub-index supported	UNSIGNED8	const	no		16			
	1..24		ASO1 Pulse Width i	UNSIGNED16	rw	no	10 .. 300		1 µs		
0x2308			Reserved (ASO2)								
0x2309			Reserved (ASO2 Angles)								
0x230A			Reserved (ASO2 Pulse Widths)								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2400		RECORD	Configuration Alarm 1								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2401		RECORD	Configuration Alarm 2								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2402		RECORD	Configuration Alarm 3								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2403		RECORD	Configuration Alarm 4								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2404		RECORD	Configuration Alarm 5								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2405		RECORD	Configuration Alarm 6								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2406		RECORD	Configuration Alarm 7								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2407		RECORD	Configuration Alarm 8								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2408		RECORD	Configuration Alarm 9								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2409		RECORD	Configuration Alarm 10								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x240A		RECORD	Configuration Alarm 11								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x240B		RECORD	Configuration Alarm 12								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x240C		RECORD	Configuration Alarm 13								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x240D		RECORD	Configuration Alarm 14								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x240E		RECORD	Configuration Alarm 15								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x240F		RECORD	Configuration Alarm 16								
	0		Highest sub-index supported	UNSIGNED8	const	no		7			
	1		Description	VISIBLE_STRING	rw	no					max 20 characters + trailing 0
	2		Function	UNSIGNED16	rw	no			list		
	3		Threshold	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	4		Hysteresis	INTEGER32	rw	no			0,001 U		actual unit U, resolution and range depending on alarm function
	5		Delay	UNSIGNED32	rw	no			ms		
	6		Flags	UNSIGNED32	rw	no			bit field		
	7		Outputs	UNSIGNED32	rw	no			bit field		
0x2440		ARRAY	GPOs Normally Open								
	0		Highest sub-index supported	UNSIGNED8	const	no		1			
	1		GPO1 Normally Open	UNSIGNED8	rw	no					
0x2500		ARRAY	GPI Modes								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	0		Highest sub-index supported	UNSIGNED8	const	no		1			
	1		GPI1 Mode	UNSIGNED8	rw	no					0 = disabled 1 = CAN reset (1 s pulse), device reset (5 s pulse)
0x2510		ARRAY	Configuration Secondary Voltage Estimation Calibration Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		12			
	1 .. 12		Secondary Voltage Estimation Calibration Ai	INTEGER8	rw	no	-5.0 .. 5.0	0	0.1		
0x2511		ARRAY	Configuration Secondary Voltage Estimation Calibration Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		12			
	1 .. 12		Secondary Voltage Estimation Calibration Bi	INTEGER8	rw	no	-5.0 .. 5.0	0	0.1		
0x2512			Reserved (Configuration Secondary Voltage Estimation Calibration Bank C)								
0x2513			Reserved (Configuration Secondary Voltage Estimation Calibration Bank D)								
0x2700		RECORD	Runtime Data								
	0		Highest sub-index supported	UNSIGNED8	const	no		50			
	1		Active Schedule	UNSIGNED8	ro	yes	0..1		list	10 ms	0 = Schedule A, 1 = Schedule B
	2		Base Timing	INTEGER16	ro	yes			0,02°	10 ms	
	3		Speed Curve Timing	INTEGER16	ro	yes			0,02°	10 ms	
	4		Analog Voltage Input Timing	INTEGER16	ro	yes			0,02°	10 ms	
	5		Analog Current Input Timing	INTEGER16	ro	yes			0,02°	10 ms	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	6		Potentiometer Timing	INTEGER16	ro	yes			0,02°	10 ms	
	7		Global Timing Point	INTEGER16	ro	yes			0,02°	10 ms	
	8		Speed	UNSIGNED16	ro	yes			1 rpm	10 ms	
	9		Analog Voltage Input Value	UNSIGNED16	ro	yes			0,01 V	10 ms	
	10		Analog Current Input Value	UNSIGNED16	ro	yes			0,01 mA	10 ms	
	11		Potentiometer Value	UNSIGNED16	ro	yes			0,01%	10 ms	
	12		PU1 Pre-Trigger Voltage	UNSIGNED8	ro	no			0,1 V	on access	
	13		PU2 Pre-Trigger Voltage	UNSIGNED8	ro	no			0,1 V	on access	
	14		PU3 Pre-Trigger Voltage	UNSIGNED8	ro	no			0,1 V	on access	
	15		Supply Voltage	UNSIGNED16	ro	yes			0,1 V	100 ms	
	16		Aux Pickup Supply Voltage	UNSIGNED8	ro	no			0,1 V	on access	
	17		Aux Analog Input Supply Voltage	UNSIGNED8	ro	no			0,1 V	on access	
	18		Power Output	UNSIGNED16	ro	yes			0,1 W	100 ms	
	19		Reserved	UNSIGNED64	ro	yes					
	20		Reserved	UNSIGNED64	ro	yes					
	21		Max Speed	UNSIGNED16	ro	no			1 rpm	on access	
	22		Max Speed Timestamp	UNSIGNED64	ro	no			1 µs	on access to Max Speed (sub- index 21)	
	23		Operational Time	UNSIGNED32	ro	no			1 s	on access	
	24		Bootup Time	UNSIGNED64	ro	no			1 µs	on access	
	25		Min Relative Firing Angle	INTEGER16	ro	yes			0,02°	10 ms	
	26		Max Relative Firing Angle	INTEGER16	ro	yes			0,02°	10 ms	
	27		Average Relative Firing Angle	INTEGER16	ro	yes			0,02°	10 ms	
	28		Operating Hours	UNSIGNED32	ro	no			1 s	on access	
	29		Engine Operating Hours	UNSIGNED32	rw	no			1 h	on access	
	30		Total Engine Operating Hours	UNSIGNED32	ro	no			1 h	on access	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	31		Spark Plug Operating Hours	UNSIGNED16	rw	no			1 h	on access	
	32		RTC Date and Time	TIME_OF_DAY	rw	no	1984-01-01 00:00 .. 2099-12-31 23:59		n/a	on access	
	33		Active Alarms	UNSIGNED16	ro	yes				10 ms	
	34		Triggered Alarms	UNSIGNED16	ro	yes				10 ms	
	35		Reserved	UNSIGNED64	ro	yes					
	36		Reserved	UNSIGNED64	ro	yes					
	37		Reserved	UNSIGNED32	ro	yes					
	38		Reserved	UNSIGNED32	ro	yes					
	39		Reserved	UNSIGNED32	ro	yes					
	40		Reserved	UNSIGNED32	ro	yes					
	41		Reserved	UNSIGNED32	ro	yes					
	42		Reserved	UNSIGNED32	ro	yes					
	43		Reserved	UNSIGNED32	ro	yes					
	44		Reserved	UNSIGNED32	ro	yes					
	45		Misfire Rate (Primary, Single Output)	UNSIGNED8	ro	yes			%	100 ms	
	46		Misfire Rate (Secondary, Single Output)	UNSIGNED8	ro	yes			%	100 ms	
	47		Misfire Rate (Primary, All Outputs)	UNSIGNED8	ro	yes			%	100 ms	
	48		Misfire Rate (Secondary, All Outputs)	UNSIGNED8	ro	yes			%	100 ms	
	49		Misfires per Second (Primary, All Outputs)	UNSIGNED16	ro	yes			1/s	100 ms	
	50		Misfires per Second (Secondary, All Outputs)	UNSIGNED16	ro	yes			1/s	100 ms	
	51		Condensed Status	UNSIGNED32	ro	yes			bit field	100 ms	
0x2701		RECORD	Status								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	0		Highest sub-index supported	UNSIGNED8	const	no		6			
	1		Status General 1	UNSIGNED32	ro	yes			bit field	100 ms	
	2		Status General 2	UNSIGNED32	ro	yes			bit field	100 ms	
	3		Status Error	UNSIGNED32	ro	yes			bit field	100 ms	
	4		Status Pickup Status 1	UNSIGNED32	ro	yes			bit field	100 ms	
	5		Status Pickup Status 2	UNSIGNED32	ro	yes			bit field	100 ms	
	6		Status Pickup Status 3	UNSIGNED32	ro	yes			bit field	100 ms	
0x2710		ARRAY	Output Status Flags Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Output Status Flags Ai	UNSIGNED8	ro	yes				250 ms	flags at least 1 s active
0x2711		ARRAY	Output Status Flags Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Output Status Flags Bi	UNSIGNED8	ro	yes				250 ms	flags at least 1 s active
0x2712			Reserved (Output Status Flags Bank C)								
0x2713			Reserved (Output Status Flags Bank D)								
0x2714		ARRAY	Primary Open Counters Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Primary Open Counter Ai	UNSIGNED8	ro	no				on access	
0x2715		ARRAY	Primary Open Counters Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	1..12		Primary Open Counter Bi	UNSIGNED8	ro	no				on access	
0x2716			Reserved (Primary Open Counters Bank C)								
0x2717			Reserved (Primary Open Counters Bank D)								
0x2718		ARRAY	Primary Short Counters Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Primary Short Counter Ai	UNSIGNED8	ro	no				on access	
0x2719		ARRAY	Primary Short Counters Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Primary Short Counter Bi	UNSIGNED8	ro	no				on access	
0x271A			Reserved (Primary Short Counters Bank C)								
0x271B			Reserved (Primary Short Counters Bank D)								
0x271C		ARRAY	Secondary Open Counters Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Secondary Open Counter Ai	UNSIGNED8	ro	no				on access	
0x271D		ARRAY	Secondary Open Counters Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	1..12		Secondary Open Counter Bi	UNSIGNED8	ro	no				on access	
0x271E			Reserved (Secondary Open Counters Bank C)								
0x271F			Reserved (Secondary Open Counters Bank D)								
0x2720		ARRAY	Secondary Short Counters Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Secondary Short Counter Ai	UNSIGNED8	ro	no				on access	
0x2721		ARRAY	Secondary Short Counters Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Secondary Short Counter Bi	UNSIGNED8	ro	no				on access	
0x2722			Reserved (Secondary Short Counters Bank C)								
0x2723			Reserved (Secondary Short Counters Bank D)								
0x2724		ARRAY	Min Spark Durations Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Min Spark Duration Ai	UNSIGNED8	ro	yes			5 μ s	100 ms	moving average over 10 ignitions
0x2725		ARRAY	Min Spark Durations Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	1..12		Min Spark Duration Bi	UNSIGNED8	ro	yes			5 µs	100 ms	moving average over 10 ignitions
0x2726			Reserved (Min Spark Durations Bank C)								
0x2727			Reserved (Min Spark Durations Bank D)								
0x2728		ARRAY	Energy Outputs Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Energy Output Ai	UNSIGNED8	ro	yes			2 mJ	100 ms	moving average over 10 ignitions
0x2729		ARRAY	Energy Outputs Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Energy Output Bi	UNSIGNED8	ro	yes			2 mJ	100 ms	moving average over 10 ignitions
0x272A			Reserved (Energy Outputs Bank C)								
0x272B			Reserved (Energy Outputs Bank D)								
0x272C		ARRAY	Estimated Secondary Voltages Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Estimated Secondary Voltage Ai	UNSIGNED8	ro	yes			0,2 kV	100 ms	moving average over 10 ignitions without misfire
0x272D		ARRAY	Estimated Secondary Voltages Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Estimated Secondary Voltage Bi	UNSIGNED8	ro	yes			0,2 kV	100 ms	moving average over 10 ignitions without misfire

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x272E			Reserved (Estimated Secondary Voltages Bank C)								
0x272F			Reserved (Estimated Secondary Voltages Bank D)								
0x2730		ARRAY	Actual Firing Angles Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Actual Firing Angle Ai	UNSIGNED16	ro	yes			0,02°	10 ms	
0x2731		ARRAY	Actual Firing Angles Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Actual Firing Angle Bi	UNSIGNED16	ro	yes			0,02°	10 ms	
0x2732			Reserved (Actual Firing Angles Bank C)								
0x2733			Reserved (Actual Firing Angles Bank D)								
0x2734		ARRAY	Relative Firing Angles Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Relative Firing Angle Ai	INTEGER16	ro	yes			0,02°	10 ms	
0x2735		ARRAY	Relative Firing Angles Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Relative Firing Angle Bi	INTEGER16	ro	yes			0,02°	10 ms	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2736			Reserved (Actual Firing Angles Bank C)								
0x2737			Reserved (Actual Firing Angles Bank D)								
0x2738		ARRAY	Cylinder Individual Offsets Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Cylinder Individual Offset Ai	INTEGER8	rww	yes			0,1°	100 ms, immediate on write	
0x2739		ARRAY	Cylinder Individual Offsets Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Cylinder Individual Offset Bi	INTEGER8	rww	yes			0,1°	100 ms, immediate on write	
0x273A			Reserved (Cylinder Individual Offsets Bank C)								
0x273B			Reserved (Cylinder Individual Offsets Bank D)								
0x273C		ARRAY	Output Statistics Fires Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Output Statistics Fires Ai	UNSIGNED64	ro	no				on access	
0x273D		ARRAY	Output Statistics Fires Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Output Statistics Fires Bi	UNSIGNED64	ro	no				on access	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x273E			Reserved (Output Statistics Fires Bank C)								
0x273F			Reserved (Output Statistics Fires Bank D)								
0x2740		ARRAY	Output Statistics Misfires Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Output Statistics Misfires Ai	UNSIGNED64	ro	no				on access	
0x2741		ARRAY	Output Statistics Misfires Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1..12		Output Statistics Misfires Bi	UNSIGNED64	ro	no				on access	
0x2742			Reserved (Output Statistics Misfires Bank C)								
0x2743			Reserved (Output Statistics Misfires Bank D)								
0x2744		ARRAY	Secondary Voltage Estimation Calibration Bank A								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1 .. 12		Secondary Voltage Estimation Calibration Ai	INTEGER8	rww	yes		0	0.1	1 s, immediate on write	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
0x2745		ARRAY	Secondary Voltage Estimation Calibration Bank B								
	0		Highest sub-index supported	UNSIGNED8	const	no		8			
	1 .. 12		Secondary Voltage Estimation Calibration Bi	INTEGER8	rww	yes		0	0.1	1 s, immediate on write	
0x2746			Reserved (Secondary Voltage Estimation Calibration Bank C)								
0x2747			Reserved (Secondary Voltage Estimation Calibration Bank D)								
0x2800		RECORD	Runtime Adjustments								
	0		Highest sub-index supported	UNSIGNED8	const	no		9			
	1		Timing Correction	INTEGER16	rww	yes			0,02°	100 ms, immediate on write	
	2		Self-Test Period	UNSIGNED32	rw	no			1 µs	on access	
	3		Spark Duration Adjustment Schedule A	INTEGER16	rww	yes			1 µs	100 ms, immediate on write	
	4		Spark Intensity Adjustment Schedule A	INTEGER16	rww	yes			1 mA	100 ms, immediate on write	
	5		Spark Duration Adjustment Schedule B	INTEGER16	rww	yes			1 µs	100 ms, immediate on write	
	6		Spark Intensity Adjustment Schedule B	INTEGER16	rww	yes			1 mA	100 ms, immediate on write	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	7		Reset Adjustment	INTEGER16	rww	yes			0,02°	100 ms, immediate on write	The reset adjustment is automatically reset to 0 if a new reset position is written during configuration.
	8		Secondary Short Enable Voltage	UNSIGNED16	rww	yes	0 .. 65535	0	1 V	100 ms, immediate on write	65535 to disable secondary short detection
	9		Secondary Short Sensitivity	UNSIGNED16	rww	yes		1	0.0001	100 ms, immediate on write	
0x2F00		RECORD	Temperatures								
	0		Highest sub-index supported	UNSIGNED8	const	no		14			
	1		Current Controller Board Temperature	INTEGER16	ro	yes			0,1 °C	1 s	
	2		Min Controller Board Temperature	INTEGER16	ro	no			0,1 °C	on access	
	3		Max Controller Board Temperature	INTEGER16	ro	no			0,1 °C	on access	
	4		Min Controller Board Temperature Extreme	INTEGER16	ro	no			0,1 °C	on access	
	5		Min Controller Board Temperature Extreme Timestamp	UNSIGNED64	ro	no			1 µs	on access to Min Controller Board Temperature Extreme (sub-index 4)	
	6		Max Controller Board Temperature Extreme	INTEGER16	ro	no			0,1 °C	on access	
	7		Max Controller Board Temperature Extreme Timestamp	UNSIGNED64	ro	no			1 µs	on access to Max Controller Board Temperature Extreme (sub-index 6)	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	8		Current Output Board Temperature	INTEGER16	ro	yes			0,1 °C	1 s	
	9		Min Output Board Temperature	INTEGER16	ro	no			0,1 °C	on access	
	10		Max Output Board Temperature	INTEGER16	ro	no			0,1 °C	on access	
	11		Min Output Board Temperature Extreme	INTEGER16	ro	no			0,1 °C	on access	
	12		Min Output Board Temperature Extreme Timestamp	UNSIGNED64	ro	no			1 µs	on access to Min Output Board Temperature Extreme (sub-index 11)	
	13		Max Output Board Temperature Extreme	INTEGER16	ro	no			0,1 °C	on access	
	14		Max Output Board Temperature Extreme Timestamp	UNSIGNED64	ro	no			1 µs	on access to Max Output Board Temperature Extreme (sub-index 13)	
0x2F80		RECORD	Message Log								
	0		Highest sub-index supported	UNSIGNED8	const	no		4			
	1		Message Id Range Tail	UNSIGNED16	ro	yes				250 ms	Id of oldest available message
	2		Message Id Range Head	UNSIGNED16	ro	yes				250 ms	Id the next new message will get
	3		Message Id 1	UNSIGNED16	rw	no					
	4		Message 1	DOMAIN	ro	no				on access	Reads message log item selected by Message Id 1. If the selected message id is invalid a single 0 byte will be read.
0x2F90		RECORD	Status Messages								

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	0		Highest sub-index supported	UNSIGNED8	const	no		2			
	1		Status Message Selection 1	UNSIGNED16	rw	no					upper 8 bit: status group, lower 8 bit: status index within this group
	2		Status Message 1	DOMAIN	ro	no				on access	Reads status message selected by Status Message Selection 1. If there is no such status message, a single 0 byte will be read.
0x2F91		RECORD	Available Status Messages								
	0		Highest sub-index supported	UNSIGNED8	const	no		6			
	1		Status Messages General 1	UNSIGNED32	ro	yes			bit field	100 ms	
	2		Status Messages General 2	UNSIGNED32	ro	yes			bit field	100 ms	
	3		Status Messages Error	UNSIGNED32	ro	yes			bit field	100 ms	
	4		Status Messages Pickup Status 1	UNSIGNED32	ro	yes			bit field	100 ms	
	5		Status Messages Pickup Status 2	UNSIGNED32	ro	yes			bit field	100 ms	
	6		Status Messages Pickup Status 3	UNSIGNED32	ro	yes			bit field	100 ms	
0x2FFF		RECORD	Device Info								
	0		Highest sub-index supported	UNSIGNED8	const	no		20			
	1		Device Id	UNSIGNED32	ro	no				on start	0x01000901 for standard MIC5
	2		Extended Device Id	UNSIGNED32	ro	no				on start	
	3		Firmware Version	UNSIGNED64	ro	no				on start	
	4		Hardware Version	UNSIGNED64	ro	no				on start	
	5		Bootloader Version	UNSIGNED64	ro	no				on start	
	6		Controller Board Serial Number	VISIBLE_STRING	ro	no				on start	max 28 characters + trailing 0
	7		Device Serial Number	VISIBLE_STRING	ro	no				on start	max 28 characters + trailing 0
	8		Arrangement Number	VISIBLE_STRING	ro	no				on start	max 28 characters + trailing 0
	9		Output Board Serial Number	VISIBLE_STRING	ro	no				on start	max 28 characters + trailing 0
	10		Output Board Hardware Version	UNSIGNED64	ro	no				on start	

Index	Sub	Object	Name	Type	Access	PDO	Range	Def	Scale/Unit	Update	Comments
	11		Firmware Version Hi	UNSIGNED32	ro	no				on start	
	12		Firmware Version Lo	UNSIGNED32	ro	no				on start	
	13		Hardware Version Hi	UNSIGNED32	ro	no				on start	
	14		Hardware Version Lo	UNSIGNED32	ro	no				on start	
	15		Bootloader Version Hi	UNSIGNED32	ro	no				on start	
	16		Bootloader Version Lo	UNSIGNED32	ro	no				on start	
	17		Output Board Hardware Version Hi	UNSIGNED32	ro	no				on start	
	18		Output Board Hardware Version Lo	UNSIGNED32	ro	no				on start	
	19		OEM Register 1	UNSIGNED8	ro	no				on start	17 th position of arrangement number
	20		OEM Register 2	UNSIGNED8	ro	no				on start	18 th position of arrangement number

2.2 Bit Field Output Status Flags

Output Status Flag	Value
Primary Open	0x01
Primary Short	0x02
Secondary Open	0x04
Secondary Short	0x08
Reserved	0x10

2.3 Commands

Commands can be executed by writing the command type and the command code in this order.

2.3.1 Standard Commands

Parameter 0..3 are not used by standard commands.

Command Type = 0

Command Code	Name	Comments
0	Configuration	switch from Ready/Idle to Configuration
1	End Configuration	switch from Configuration to Ready/Idle, the changed configuration will be used if it is valid
30	End Configuration With Discard	switch from Configuration to Ready/Idle and discard any configuration changes
2	Ack Operational Error	
8	Self Test	
9	End Self Test	
12	Reset Misfire Counters	Reset all misfire counters to 0
13	Reset Small Step Adv	change reset position 0.1° adv, should not be used curing Configuration state, max change +/- 5° from original configuration
14	Reset Large Step Adv	change reset position 0.5° adv, should not be used curing Configuration state, max change +/- 5° from original configuration
15	Reset Small Step Ret	change reset position 0.1° ret, should not be used curing Configuration state, max change +/- 5° from original configuration
16	Reset Large Step Ret	change reset position 0.5° ret, should not be used curing Configuration state, max change +/- 5° from original configuration
21	Acknowledge Alarms	

2.3.2 Extended Commands

Command Type = 1

Command Code	Name	Comments	Parameter			
			0	1	2	3
0	Change Cylinder Offset	unused	output bank 0..1	output 0..11	change 0.1°	n/a
16	Spark Duration Adjustment Step	unused	schedule 0..1	0 = small step (1 µs), >0 = large step (10 µs)	0 = decrease, >0 = increase	n/a
17	Spark Intensity Adjustment Step	unused	schedule 0..1	0 = small step (1 mA), >0 = large step (10 mA)	0 = decrease, >0 = increase	n/a
2	Self Test	see Self Test (section 2.3.2.1)	IN			
			<i>command</i> stop = 0, start = 1, state = 2, set cycles = 3, set outputs = 4	<i>output bank</i> single bank = 0..1, all banks = 0x000000FF	<i>output</i> single output = 0..11, all outputs = 0x000000FF	<i>number of cycles</i> specified = 0..(2 ³² -2), unlimited = 0xFFFFFFFF
			OUT			
			<i>parameter contents</i> state = 2	<i>output bank setting</i> single bank = 0..1, all banks = 0x000000FF	<i>output setting</i> single output = 0..11, all outputs = 0x000000FF	<i>number of cycles</i> <i>setting</i> specified = 0..(2 ³² -2), unlimited = 0xFFFFFFFF

2.3.2.1 Self Test

Parameter					
0			1	2	3
Command Code	Name	Description	output bank	output	cycles
0	stop	Stops the self test	ignored	ignored	ignored
1	start	Starts the self test using the values given by parameter 1..3	0..1, 0x000000FF	0..7, 0x000000FF	0..(2 ³² -2), 0xFFFFFFFF
2	state	Get current parameter	ignored	ignored	ignored
3	set cycles	Sets the number of self test cycles	ignored	ignored	0..(2 ³² -2), 0xFFFFFFFF
4	set outputs	Select output	0..1	0..7	ignored
		Select all configured outputs	0x000000FF	0x000000FF	ignored
		For future use (not implemented yet)	0..1	0x000000FF	ignored
		For future use (not implemented yet)	0x000000FF	0..7	ignored

For other objects taking effect on the self test see also:

Name	Reference
Self Test Period	section ??, p.41, object index 0x2800, sub index 2
Self Test	section ??, p.46, standard command code 8
End Self Test	section ??, p.46, standard command code 9

2.3.3 Command Status

Value	Status
0	OK
1	FAILED
2	UNKNOWN COMMAND TYPE
3	COMMAND TYPE SET
4	UNKNOWN COMMAND CODE
5	BUSY

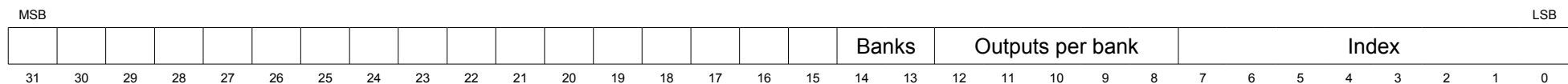
2.4 Device Id and Extended Device Id

The device id of standard MIC5 devices is 0x01000901.

The extended device id of MIC5 devices is split into different fields. The lower 8 bits always contain an index field. The meaning of the remaining bits depends on the value of the index field.

For index values 1 and 2 the number of output banks and the number of outputs per bank can be derived from the extended device id. Index values from 3 to 254 are currently not defined and index values 0 and 255 are not used in the field.

Extended device id for index values 1 and 2:



Bits 15 to 31 should be ignored.

2.5 OEM Register 1/2

The OEM registers 1 and 2 contain the 17th and 18th position of the arrangement number as ISO 8859-1 (Latin-1) characters or 0 (decimal 0) if these positions are not present.

Example: Part number 66.00.510-20 MIC5 – Light Duty
Arrangement number: 522.20.H000-000-AA-0

OEM Register 1 A (decimal 65)
OEM Register 2 A (decimal 65)

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