CANopen
Vehicle Gateway
Software Specifications

rev 2.01

Revision	Description	Date
0.1A	Initial Specification	10/21/2003
0.1B	Added MTU Emergency and MTU Fault codes	5/25/2004
0.1C	Added MTU Communication Emergency and MUX PDU Desc.	09/23/2004
1.01	Updated MTU Objects	09/15/08
2.01	Corrected J1587 and J1939 Objects	09/22/09

Table of Contents

Revision....2
Table of Contents....3
Overview:....7
Physical....8
Network Switch Settings:....8
Bit Timing Settings....8
LED Indicators:....9
Supported SDO abort codes....11
Supported Emergency Error Codes....12
Emergency Object Data....13
Pre-defined connection set....14
Identifier allocation scheme for the pre-defined connection set....14
Broadcast Objects of the Pre-defined Connection Set....14
Peer-to-Peer Objects of the Pre-defined Connection Set....14
Assigning COB-IDS....14
Object Dictionary Data Types....15
Object Dictionary Structure....16
Object Dictionary Overview....17
Object Dictionary Entries for Communication....17
Standard Objects....17
Server SDO Parameter....17
Client SDO Parameter....17
Receive PDO Communication Parameter....18
Receive PDO Mapping Parameter....18
Transmit PDO Communication Parameter....18
Transmit PDO Mapping Parameter....18
Detailed Specification of Communication Profile Specific Objects....20
Object 1000h: Device Type....20
Object 1001h: Error Register....21
Object 1002h: Manufacturer Status Register....22
Object 1003h: Pre-defined Error Field....23
Object 1005h: COB-ID SYNC message....24
Object 1008h: Manufacturer Device Name....25
Object 1009h: Manufacturer Hardware Version....26
Object 100Ah: Manufacturer Software Version....27
Object 100Ch: Guard Time....28
Object 100Dh: Life Time Factor....29
Object 1010h: Store parameters....30
Object 1011h: Restore default parameters....33
Object 1012h: COB-ID Time Stamp Object....35
Object 1014h: COB-ID Emergency Object....36
Object 1015h: Inhibit Time EMCY....37
Object 1016h: Consumer Heartbeat Time....38
Object 1017h: Producer Heartbeat Time....39
Object 1018h: Identity Object....40
Object 1020h: Verify Configuration....42
Object 1029: Error behavior object....43
Object 1200h-1201h: Server SDO Parameter....44
Object 1400h – 141Eh: Receive PDO Communication Parameter....46
Object 1600h – 161Eh: Receive PDO Mapping Parameter....50
Object 1800h – 181Fh: Transmit PDO Communication Parameter....52

Object 1A00h – 1A1Fh: Transmit PDO Mapping Parameter....54
Object 1FA0h : Object Scanner List....55
Multiplexed PDOs....56
MPDO Protocol....56
Destination Address Mode (DAM)....56
Source Address Mode (SAM)....56
Object dictionary entries....57
PDO Mapping Record....57
Additional error code meanings....58
Predefinitions....58
Introduction....58
PDO Mapping....59
1st RPDO mapping....59
1st TPDO mapping....59
2nd RPDO mapping....59
2nd TPDO mapping....59
3rd RPDO mapping....59
3rd TPDO mapping....59
4th RPDO mapping....59
4th TPDO mapping....59
Manufacturer Specific Objects....60
Overview:....60
Vehicle DataIn Objects....60
Vehicle DataIn Status Objects....60
J1939 Objects....60
DINBUS Objects....61
MTU Bus Objects....61
J1587 Bus Objects....62
Vehicle Data Mapping/Conversion Objects....62
Manufacturer Specific Object Details:....63
Vehicle DataIn Objects....63
Object 2000h: Vehicle DataIn_UNSIGNED8....63
Object 2001h: Vehicle DataIn_UNSIGNED16....64
Object 2002h: Vehicle DataIn_UNSIGNED32....65
Object 2003h: Vehicle DataIn_SIGNED8....66
Object 2004h: Vehicle DataIn_SIGNED16....67
Object 2005h: Vehicle DataIn_SIGNED32....68
Object 2006h: Vehicle DataIn_REAL32....69
Vehicle DataIn Status Objects....70
Object 2100h: Vehicle DataIn_UNSIGNED8 Status....70
Object 2101h: Vehicle DataIn_UNSIGNED16 Status....71
Object 2102h: Vehicle DataIn_UNSIGNED32 Status....72
Object 2103h: Vehicle DataIn_SIGNED8 Status....73
Object 2104h: Vehicle DataIn_SIGNED16 Status....74
Object 2105h: Vehicle DataIn_SIGNED32 Status....75
Object 2106h: Vehicle DataIn_REAL32 Status....76
J1939 Objects....77
Object 3000h: J1939 Bus Configuration....77
Object 3100h-31FFh: J1939 PDU Configuration....78
Object 3200h-32FFh: J1939 PDU Data....80
DINBUS OBJECTS....81
Object 3500h: DINBUS Bus Configuration....81
Object 3501h: DINBUS Data In....83
MTU Objects....84
Object 4000h: MTU Bus Configuration....84
Object 4100h: MTU Failure Code Configuration....85

Object 4101h-41FFh: MTU PDU Configuration....86
Object 4200h: MTU PDU Data....88
Object 4201h: MTU Fault Codes 0-253....89
Object 4202h: MTU Fault Codes 254-400....90
Object 4203h: MTU Fault Codes 1-400....91
J1587 Objects....92
Object 4500h: J1587 Baud Rate....93
Object 4501h: J1587 RXP Receive Polarity....94
Object 4502h: J1587 TXP Transmit Polarity....95
Object 4600h: J1587 TX MID....96
Object 4601h: J1587 Message Rx MIDS....97
Object 4700h: J1587 Data 1 Byte Page 1 MID A....99
Object 4701h: J1587 Data 1 Byte Page 2 MID A....100
Object 4702h: J1587 Data 2 Byte Page 1 MID A....101
Object 4703h: J1587 Data 2 Byte Page 2 MID A....102
Object 4704h: J1587 Data 4 Byte Page 1 MID A....103
Object 4705h: J1587 Data 4 Byte Page 2 MID A....104
Object 4706h: J1587 Data 8 Byte Page 1 MID A....105
Object 4707h: J1587 Data 8 Byte Page 2 MID A....106
Object 4710h: J1587 Data 1 Byte Page 1 MID B....107
Object 4711h: J1587 Data 1 Byte Page 2 MID B....108
Object 4712h: J1587 Data 2 Byte Page 1 MID B....109
Object 4713h: J1587 Data 2 Byte Page 2 MID B....110
Object 4714h: J1587 Data 4 Byte Page 1 MID B....111
Object 4715h: J1587 Data 4 Byte Page 2 MID B....112
Object 4716h: J1587 Data 8 Byte Page 1 MID B....113
Object 4717h: J1587 Data 8 Byte Page 2 MID B....114
Object 4720h: J1587 Data 1 Byte Page 1 MID C....115
Object 4721h: J1587 Data 1 Byte Page 2 MID C....116
Object 4722h: J1587 Data 2 Byte Page 1 MID C....117
Object 4723h: J1587 Data 2 Byte Page 2 MID C....118
Object 4724h: J1587 Data 4 Byte Page 1 MID C....119
Object 4725h: J1587 Data 4 Byte Page 2 MID C....120
Object 4726h: J1587 Data 8 Byte Page 1 MID C....121
Object 4727h: J1587 Data 8 Byte Page 2 MID C....122
Object 4730h: J1587 Data 1 Byte Page 1 MID D....123
Object 4731h: J1587 Data 1 Byte Page 2 MID D....124
Object 4732h: J1587 Data 2 Byte Page 1 MID D....125
Object 4733h: J1587 Data 2 Byte Page 2 MID D....126
Object 4734h: J1587 Data 4 Byte Page 1 MID D....127
Object 4735h: J1587 Data 4 Byte Page 2 MID D....128
Object 4736h: J1587 Data 8 Byte Page 1 MID D....129
Object 4737h: J1587 Data 8 Byte Page 2 MID D....130
Object 4800h: J1587 Failure Mode Identifiers....131
Vehicle Mapping/Conversion Objects....132
Object 5000h-50FFh: Vehicle Data Mapping/Conversion....132
Examples: 134
RPM....134
DINBUS....134
J1939....134
J1587....134
MTU....134
Data Conversion:....135
DINBUS....135
J1939....135
J1587....135

MTU.....135
Multiplexed PDO Implementation:.....136

Overview:

The INC CANopen Vehicle Gateway allows the user of a CANopen network to access data from a vehicle that uses standard serial communications including J1587, J1939, DINBUS and MTU protocols. The user must map each message that the user wants to receive. The data can then be read using SDOs or mapped into PDOs. The gateway also has 254 variables of each supported data type (UNSIGNED8, UNSIGNED16, UNSIGNED32, SIGNED8, SIGNED16, SIGNED32, REAL32) available for data input. The input data variables allow the user the option of converting the data from different vehicle network variables and make it accessible on the CANopen network through the same location. This feature of the gateway allows the user to write programs based on the data they need, and the not worry about how the data is received or what type of engine is used. The conversion can change data types as well as change units by using the user's conversion factors.

The gateway includes a Windows based configuration tool that allows all messages to be mapped and tested in a Windows environment. The configuration can then be downloaded to the display using one of several supported CANopen interface cards. The gateway can also be configured using the included EDS file or through SDO commands. The gateway can support up to 8 TxPDOs and 8 RxPDOS. The user must map the data they want into the PDOs.

Physical

Network Switch Settings:

SW1 and SW2

Node ID	Meaning
0x00	Re-Configure Module (Does Not got Online)
0x01-0x7F	Use this Node Address
0x80-0xFF	Use value stored in NV

SW3

Baud Rate	Meaning
0x0	Auto-Baud
0x1	10k bps
0x2	20k bps
0x3	50k bps
0x4	100k bps (Not used)
0x5	125k bps
0x6	250k bps
0x7	500k bps
0x8	800k bps
0x9	1M bps
0xA-0xF	Use value stored in NV

Bit Timing Settings

Bit rate Bus length (1)	Nominal bit time t_b	Number of time quanta per bit	Length of time quantum t_q	Location of sample point
1 Mbit/s 25 m	1 us	8	125 ns	6 t_q(750 ns)
800 kbit/s 50 m	1,25 us	10	125 ns	8 t_q(1 us)
500 kbit/s 100 m	2 us	**16**	125 ns	14 t_q(1,75 us)
250 kbit/s 250 m(2)	4 us	16	250 ns	14 t_q(3,5 us)
125 kbit/s 500 m(2)	8 us	16	500 ns	14 t_q(7 us)
50 kbit/s 1000 m(3)	20 us	16	1,25 us	14 t_q(17,5 us)
20 kbit/s 2500 m(3)	50 us	16	3,125 us	14 t_q(43,75 us)
10 kbit/s 5000 m(3)	100 us	16	6,25 us	14 t_q(87,5 us)

LED Indicators:

The Gateway has a total of 6 bi-color LEDs that indicate the status of the module. Two LEDs are used to indicate the status of the module, these are the CAN and MOD leds. There is an LED for the transmit and for the receive status of each of the on board serial ports.

CAN LED

CAN RUN LED State (GREEN)	**Module State**	**Description**
Single Flash	STOPPED	The Device is in the stopped state.
Blinking	PRE-OPERATIONAL	The Device is in the Pre-Operational State
On	OPERATIONAL	The Device is in the Operational State.

CAN ERROR LED State (RED)	**Module State**	**Description**
Off	no error	The Device is in working condition.
Single Flash	warning limit reached	At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
Double Flash	Error Control Event	A guard event (NMT-Slave or NMT-master) or a heartbeat event (Heartbeat consumer) has occurred.
Triple Flash	Sync Error	The SYNC message has not been received within the configured communication cycle period time out (see Object Dictionary Entry 0x1006).
On	Bus Off	The CAN controller is bus off

Note: The green and red led are independent and can be turned on together causing an orange appearance.

MOD LED

MOD LED State	Module State	Description
OFF	NO POWER	There is no power applied to the module.
Green On	No Module Error	The Device is operating properly.
Red Flashing	Minor Fault	The device has experienced a minor fault. This includes power issues, running out of memory, etc. This usually means that the module must be reset.
Red On	Major Fault	The Device has experienced a major fault. This can include a program checksum error, etc. This usually means module needs to be replaced.

Note: Both Leds CAN and MOD will flash red orange when in the download mode.

Port 1 and 2 RX LEDs:

COM LED STATE:	INDICATION:
Off	Power Off, No Rx Data
Green	Receiving Data
Green with Flicker	Intermittently Receiving Data
Flashing Red	Communication Error (parity error, bus error)
Solid Red	Communication Error (baud rate etc., BUS OFF)
Flashing Green-Red-Green-Red	Power on Self Test.

Port 1 and 2 TX LEDs:

COM LED STATE:	INDICATION:
Off	Power Off, No
Green	Transmitting Data
Green with Flicker	Intermittently transmitting data
Flashing Red	Communication Error (parity error)
Solid Red	Communication Error(baud rate etc., BUS OFF)
Flashing Green-Red-Green-Red	Power on Self Test.

Supported SDO abort codes

Abort code	Description
0503 0000h	Toggle bit not alternated.
0504 0000h	SDO protocol timed out.
0504 0001h	Client/server command specifier not valid or unknown.
0504 0002h	Invalid block size (block mode only).
0504 0003h	Invalid sequence number (block mode only).
0504 0004h	CRC error (block mode only).
0504 0005h	Out of memory.
0601 0000h	Unsupported access to an object.
0601 0001h	Attempt to read a write only object.
0601 0002h	Attempt to write a read only object.
0602 0000h	Object does not exist in the object dictionary.
0604 0041h	Object cannot be mapped to the PDO.
0604 0042h	The number and length of the objects to be mapped would exceed PDO length.
0604 0043h	General parameter incompatibility reason.
0604 0047h	General internal incompatibility in the device.
0606 0000h	Access failed due to an hardware error.
0607 0010h	Data type does not match, length of service parameter does not match
0607 0012h	Data type does not match, length of service parameter too high
0607 0013h	Data type does not match, length of service parameter too low
0609 0011h	Sub-index does not exist.

The abort codes not listed here are reserved.

Supported Emergency Error Codes

Error Code (hex)	Meaning
00xx	Error Reset or No Error
10xx	Generic Error
81xx	Communication
8110	CAN Overrun (Objects lost)
8120	CAN in Error Passive Mode
8130	Life Guard Error or Heartbeat Error
8140	Recovered from bus off
8150	Transmit COB-ID
82xx	Protocol Error
8210	PDO not processed due to length error
8220	PDO length exceeded
FFxx	Device specific

Emergency Object Data

The Emergency Telegram consists of 8 bytes with the data as shown in

Emergency Object MTU

Byte	0	1	2	3	4	5	6	7
Content	Emergency Error Code (see Table)		Error register (Object 1001H)	Manufacturer Specific Error Field				
				Byte A	Byte B	Byte C	Byte D	Byte E

Error Code (hex)	Meaning	Byte A	Byte B	Byte C	Byte D	Byte E
FF00	MTU Fault	MTU Fault Code LSB	MTU Fault Code MSB	MTU Fault Active		

Error Code (hex)	Meaning	Byte A	Byte B	Byte C	Byte D	Byte E
FF01	MTU Communication	MTU Lost Connection				

Emergency Object J1587

Byte	0	1	2	3	4	5	6	7
Content	Emergency Error Code (see Table)		Error register (Object 1001H)	Manufacturer Specific Error Field				
				Byte A	Byte B	Byte C	Byte D	Byte E

Error Code (hex)	Meaning	Byte A	Byte B	Byte C	Byte D	Byte E
FF10	J1587 Communication	J1587 Lost Communication				

Pre-defined connection set

Bit Number: COB-Identifier

10	9	8	7	6	5	4	3	2	1	0
Function Code				Node-ID						

Identifier allocation scheme for the pre-defined connection set

Broadcast Objects of the Pre-defined Connection Set

Object	function code(binary)	resulting COB-ID	Communication Parameters at Index
NMT	0000	0	-
SYNC	0001	128 (80h)	1005h,1006h,1007h
TIME STAMP	0010	256 (100h)	1012h, 1013h

Peer-to-Peer Objects of the Pre-defined Connection Set

object	function code (binary)	Resulting COB-IDs	Communication Parameters at Index
EMERGENCY	0001	129 (81h) - 255 (FFh)	1014h, 1015h
PDO1 (tx)	0011	385 (181h) - 511 (1FFh)	1800h
PDO1 (rx)	0100	513 (201h) - 639 (27Fh)	1400h
PDO2 (tx)	0101	641 (281h) - 767 (2FFh)	1801h
PDO2 (rx)	0110	769 (301h) - 895 (37Fh)	1401h
PDO3 (tx)	0111	897 (381h) - 1023 (3FFh)	1802h
PDO3 (rx)	1000	1025 (401h) - 1151 (47Fh)	1402h
PDO4 (tx)	1001	1153 (481h) - 1279 (4FFh)	1803h
PDO4 (rx)	1010	1281 (501h) - 1407 (57Fh)	1403h
SDO (tx)	1011	1409 (581h) - 1535 (5FFh)	1200h
SDO (rx)	1100	1537 (601h) - 1663 (67Fh)	1200h
NMT Error Control	1110	1793 (701h) - 1919 (77Fh)	1016h, 1017h

Seen from the device's point of view.
The pre-defined connection set always applies to the standard CAN frame with 11-bit Identifier, even if extended CAN frames are present in the network.

Assigning COB-IDS

When Assigning COB-Ids to SDO and PDO objects, the user should use care. If the user selects a COB-ID for a PDO that is already assigned to the display's SDO by the pre-defined connection set, the gateway will accept the COB-ID, but the module may not function as the user desires. The COB-ID acceptance is done in order to provide greater flexibility for the advanced user.

Object Dictionary Data Types

Index	Object	Name
0001	DEFTYPE	BOOLEAN
0002	DEFTYPE	INTEGER8
0003	DEFTYPE	INTEGER16
0004	DEFTYPE	INTEGER32
0005	DEFTYPE	UNSIGNED8
0006	DEFTYPE	UNSIGNED16
0007	DEFTYPE	UNSIGNED32
0008	DEFTYPE	REAL32
0009	DEFTYPE	VISIBLE_STRING
000A	DEFTYPE	OCTET_STRING
000B	DEFTYPE	UNICODE_STRING
000C	DEFTYPE	TIME_OF_DAY
000D	DEFTYPE	TIME_DIFFERENCE
000E	reserved	-
000F	DEFTYPE	DOMAIN
0010	DEFTYPE	INTEGER24
0011	DEFTYPE	REAL64
0012	DEFTYPE	INTEGER40
0013	DEFTYPE	INTEGER48
0014	DEFTYPE	INTEGER56
0015	DEFTYPE	INTEGER64
0016	DEFTYPE	UNSIGNED24
0017	reserved	-
0018	DEFTYPE	UNSIGNED40
0019	DEFTYPE	UNSIGNED48
001A	DEFTYPE	UNSIGNED56
001B	DEFTYPE	UNSIGNED64
001C-001F	reserved	-
0020	DEFSTRUCT	PDO_COMMUNICATION_PARAMETER
0021	DEFSTRUCT	PDO_MAPPING
0022	DEFSTRUCT	SDO_PARAMETER
0023	DEFSTRUCT	IDENTITY
0024-003F	reserved	-
0040-005F	DEFSTRUCT	Manufacturer Specific Complex Data Types
0060-007F	DEFTYPE	Device Profile (0) Specific Standard Data Types
0080-009F	DEFSTRUCT	Device Profile (0) Specific Complex Data Types
00A0-00BF	DEFTYPE	Device Profile 1 Specific Standard Data Types
00C0-00DF	DEFSTRUCT	Device Profile 1 Specific Complex Data Types
00E0-00FF	DEFTYPE	Device Profile 2 Specific Standard Data Types
0100-011F	DEFSTRUCT	Device Profile 2 Specific Complex Data Types
0120-013F	DEFTYPE	Device Profile 3 Specific Standard Data Types
0140-015F	DEFSTRUCT	Device Profile 3 Specific Complex Data Types
0160-017F	DEFTYPE	Device Profile 4 Specific Standard Data Types
0180-019F	DEFSTRUCT	Device Profile 4 Specific Complex Data Types
01A0-01BF	DEFTYPE	Device Profile 5 Specific Standard Data Types
01C0-01DF	DEFSTRUCT	Device Profile 5 Specific Complex Data Types
01E0-01FF	DEFTYPE	Device Profile 6 Specific Standard Data Types
0200-021F	DEFSTRUCT	Device Profile 6 Specific Complex Data Types
0220-023F	DEFTYPE	Device Profile 7 Specific Standard Data Types
0240-025F	DEFSTRUCT	Device Profile 7 Specific Complex Data Types

Object Dictionary Structure

Index (hex)	Object
0000	not used
0001-001F	Static Data Types
0020-003F	Complex Data Types
0040-005F	Manufacturer Specific Complex Data Types
0060-007F	Device Profile Specific Static Data Types
0080-009F	Device Profile Specific Complex Data Types
00A0-0FFF	Reserved for further use
1000-1FFF	Communication Profile Area
2000-5FFF	Manufacturer Specific Profile Area
6000-9FFF	Standardized Device Profile Area
A000-FFFF	Reserved for further use

Object Dictionary Overview

Object Dictionary Entries for Communication

Standard Objects

Index(hex)	Object (Symbolic Name)	Name	Type	Acc. 1	M/O
1000	VAR	device type	UNSIGNED32	ro	M
1001	VAR	error register	UNSIGNED8	ro	M
1002	VAR	Manufacturer status register	UNSIGNED32	ro	O
1003	VAR	Pre-defined error field	UNSIGNED32	Ro	O
1005	VAR	COB-ID SYNC	UNSIGNED32	rw	O
1008	VAR	Manufacturer device name	Vis-String	const	O
1009	VAR	Manufacturer hardware version	Vis-String	const	O
100A	VAR	Manufacturer software version	Vis-String	const	O
100C	VAR	guard time	UNSIGNED16	rw	O
100D	VAR	life time factor	UNSIGNED8	rw	O
1010	ARRAY	store parameters	UNSIGNED32	rw	O
1011	ARRAY	restore default parameters	UNSIGNED32	rw	O
1012	VAR	COB-ID TIME	UNSIGNED32	rw	O
1014	VAR	COB-ID EMCY	UNSIGNED32	rw	O
1015	VAR	Inhibit Time EMCY	UNSIGNED16	rw	O
1016	ARRAY	Consumer heartbeat time	UNSIGNED32	RW	O
1017	VAR	Producer heartbeat time	UNSIGNED16	rw	O
1018	RECORD	Identity Object	Identity (23h)	ro	M
1020	ARRAY	Verify Configuration	UNSIGNED32	rw	O
1029	ARRAY	Error Behavior	UNSIGNED8	rw	O

Server SDO Parameter

1200	RECORD	1st Server SDO parameter	SDO Parameter (22h)	ro	O
1201	RECORD	2st Server SDO parameter	SDO Parameter (22h)	rw	O

Client SDO Parameter

Not Supported

Receive PDO Communication Parameter

1400	RECORD	1st receive PDO Parameter	PDO CommPar (20h)	rw	M/O*
1401	RECORD	2nd receive PDO Parameter	PDO CommPar (20h)	rw	M/O*
:::::	:::::	:::::	:::::	:::::	:::::
141F	RECORD	32nd receive PDO Parameter	PDO CommPar (20h)	rw	M/O*

Receive PDO Mapping Parameter

1600	RECORD	1st receive PDO mapping	PDO Mapping (21h)	rw	M/O*
1601	RECORD	2nd receive PDO mapping	PDO Mapping (21h)	rw	M/O*
:::::	:::::	:::::	:::::	:::::	:::::
161F	RECORD	32nd receive PDO mapping	PDO Mapping (21h)	rw	M/O*

Transmit PDO Communication Parameter

1800	RECORD	1st transmit PDO Parameter	PDO CommPar (20h)	rw	M/O*
1801	RECORD	2nd transmit PDO Parameter	PDO CommPar (20h)	rw	M/O*
:::::	:::::	:::::	:::::	:::::	::::
181F	RECORD	32nd transmit PDO Parameter	PDO CommPar (20h)	rw	M/O*

Transmit PDO Mapping Parameter

1A00	RECORD	1st transmit PDO mapping	PDO Mapping (21h)	rw	M/O*
1A01	RECORD	2nd transmit PDO mapping	PDO Mapping (21h)	rw	M/O*
:::::	:::::	:::::	:::::	:::::	:::::
1A1F	RECORD	32nd transmit PDO mapping	PDO Mapping (21h)	rw	M/O*

Ranges 1600-161Fh and 1A00-1A1Fh can also used to map multiplexed PDOs. See specification below.

Detailed Specification of Communication Profile Specific Objects

Object 1000h: Device Type

Contains information about the device type. The object at index 1000h describes the type of device and its functionality. It is composed of a 16-bit field which describes the device profile that is used and a second 16-bit field which gives additional information about optional functionality of the device. The Additional Information parameter is device profile specific.

OBJECT DESCRIPTION

INDEX	1000h
Name	device type
Object Code	VAR
Data Type	UNSIGNED32
Category	Mandatory

ENTRY DESCRIPTION

Access	Ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

Byte:

MSB	LSB
Additional Information	Device Profile Number
0x0000	0x0000

Object 1001h: Error Register

This object is an error register for the device. The device can map internal errors in this byte. This entry is mandatory for all devices. It is a part of an Emergency object.

OBJECT DESCRIPTION

INDEX	1001h
Name	error register
Object Code	VAR
Data Type	UNSIGNED8
Category	Mandatory

ENTRY DESCRIPTION

Access	ro
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Structure of the Error Register

Bit	M/O	Supported	Meaning
0	M	Yes	generic error
1	O	No	Current
2	O	Yes	Voltage
3	O	No	Temperature
4	O	Yes	communication error (overrun, error state)
5	O	No	device profile specific
6	O	No	Reserved (always 0)
7	O	Yes	manufacturer specific

If a bit is set to 1 the specified error has occurred. The generic error is signaled at any error situation.

Object 1002h: Manufacturer Status Register

This object is a common status register for manufacturer specific purposes. In this document only the size and the location of this object is defined.

OBJECT DESCRIPTION

INDEX	1002h
Name	manufacturer status register
Object Code	VAR
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Access	ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

MSB LSB

Object 1003h: Pre-defined Error Field

The object at index 1003h holds the errors that have occurred on the device and have been signaled via the Emergency Object. In doing so it provides an error history.
1. The entry at sub-index 0 contains the number of actual errors that are recorded in the array starting at sub-index 1.
2. Every new error is stored at sub-index 1, the older ones move down the list.
3. Writing a “0” to sub-index 0 deletes the entire error history (empties the array). Values higher than 0 are not allowed to write. This have to lead to an abort message (error code: 0609 0030h).
4. The error numbers are of type UNSIGNED32 (see Table 7-18) and are composed of a 16 bit error code and a 16 bit additional error information field which is manufacturer specific. The error code is contained in the lower 2 bytes (LSB) and the additional information is included in the upper 2 bytes (MSB). The additional information consists of the information contained in the Error register Object (1001h) The length entry on sub-index 0h and at least one error entry at sub-index 1H.

Byte: MSB LSB

Additional Information	Error code

Structure of the pre-defined error field

OBJECT DESCRIPTION

INDEX	1003h
Name	pre-defined error field
Object Code	ARRAY
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Sub-Index	0h
Description	number of errors
Entry Category	Mandatory
Access	rw
PDO Mapping	No
Value Range	0 - 10
Default Value	0

Sub-Index	1h
Description	standard error field
Entry Category	Optional
Access	ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

Sub-Index	2h – 10
Description	standard error field
Entry Category	Optional
Access	ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

Object 1005h: COB-ID SYNC message

Index 1005h defines the COB-ID of the Synchronization Object (SYNC). Further, it defines whether the device generates the SYNC.

UNSIGNED32
MSB LSB

bits	*31*	*30*	*29*	*28-11*	*10-0*
11-bit-ID	X	0/1	0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	11-bit Identifier
29-bit-ID	X	0/1	1	29 -bit Identifier	

Structure of SYNC COB-ID entry

Description of SYNC COB-ID entry

bit number	value	meaning
31 (MSB)	X	do not care
30	0 1	Device does not generate SYNC message Device generates SYNC message
29	0 1	11-bit ID (CAN 2.0A) 29-bit ID (CAN 2.0B)
28 – 11	0 X	if bit 29=0 if bit 29=1: bits 28-11 of 29-bit-SYNC-COB-ID
10-0 (LSB)	X	bits 10-0 of SYNC-COB-ID

Bits 29, 30 may be static (not changeable). If a device is not able to generate SYNC messages, an attempt to set bit 30 is responded with an abort message (abort code: 0609 0030h). Devices supporting the standard CAN frame type only either ignore attempts to change bit 29 or respond with an abort message (abort code: 0609 0030h). The first transmission of SYNC object starts within 1 sync cycle after setting Bit 30 to 1. It is not allowed to change Bit 0-29, while the objects exist (Bit 30=1).

OBJECT DESCRIPTION

INDEX	1005h
Name	COB-ID SYNC
Object Code	VAR
Data Type	UNSIGNED32
Category	Conditional;Mandatory, if PDO communication on a synchronous base is supported

ENTRY DESCRIPTION

Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	80h or 8000 0080h

Object 1008h: Manufacturer Device Name

Contains the manufacturer device name.

OBJECT DESCRIPTION

INDEX	1008h
Name	manufacturer device name
Object Code	VAR
Data Type	Visible String
Category	Optional

ENTRY DESCRIPTION

Access	const
PDO Mapping	No
Value Range	No
Default Value	Vehicle Gateway

Object 1009h: Manufacturer Hardware Version

Contains the manufacturer hardware version description.

OBJECT DESCRIPTION

INDEX	1009h
Name	manufacturer hardware version
Object Code	VAR
Data Type	Visible String
Category	Optional

ENTRY DESCRIPTION

Access	const
PDO Mapping	No
Value Range	No
Default Value	2.1

Object 100Ah: Manufacturer Software Version

Contains the manufacturer software version description.

OBJECT DESCRIPTION

INDEX	100Ah
Name	Manufacturer software version
Object Code	VAR
Data Type	Visible String
Category	Optional

ENTRY DESCRIPTION

Access	Const
PDO Mapping	No
Value Range	No
Default Value	2.01

Object 100Ch: Guard Time

The objects at index 100Ch and 100Dh include the guard time in milliseconds and the life time factor.
The life time factor multiplied with the guard time gives the life time for the Life Guarding Protocol. It is 0 if not used.

OBJECT DESCRIPTION

INDEX	100Ch
Name	guard time
Object Code	VAR
Data Type	UNSIGNED16
Category	Conditional; Mandatory, if heartbeat is not supported

ENTRY DESCRIPTION

Access	rw
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Object 100Dh: Life Time Factor

The life time factor multiplied with the guard time gives the life time for the node guarding protocol. It is 0 if not used.

OBJECT DESCRIPTION

INDEX	100Dh
Name	life time factor
Object Code	VAR
Data Type	UNSIGNED8
Category	Conditional; Mandatory, if heartbeat is not supported

ENTRY DESCRIPTION

Access	Rw
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Object 1010h: Store parameters

This object supports the saving of parameters in non volatile memory. By read access the device provides information about its saving capabilities. Several parameter groups are distinguished:
Sub-Index 0 contains the largest Sub-Index that is supported.
Sub-Index 1 refers to all parameters that can be stored on the device.
Sub-Index 2 refers to communication related parameters (Index 1000h - 1FFFh manufacturer specific communication parameters).
Sub-Index 3 refers to application related parameters (Index 6000h - 9FFFh manufacturer specific application parameters).
At Sub-Index 4 - 127 manufacturers may store their choice of parameters individually.
Sub-Index 128 - 254 are reserved for future use.
In order to avoid storage of parameters by mistake, storage is only executed when a specific signatureis written to the appropriate Sub-Index. The signature is “save”.

Signature MSB LSB
ISO 8859
(“ASCII”)
hex

E	V	a	s
65h	76h	61h	73h

Storage write access signature

On reception of the correct signature in the appropriate sub-index the device stores the parameter and then confirms the SDO transmission (initiate download response). If the storing failed, the device responds with an Abort SDO Transfer (abort code: 0606 0000h).
If a wrong signature is written, the device refuses to store and responds with Abort SDO Transfer (abort code: 0800 002xh).
On read access to the appropriate Sub-Index the device provides information about its storage functionality with the following format:

UNSIGNED32

MSB		LSB
31-2	*1*	*0*
reserved (=0)	0/1	0/1

Storage read access structure

Structure of read access

bit number	Value	meaning
31-2	0	*reserved (=0)*
1	0	Device does not save parameters autonomously
	1	Device saves parameters autonomously
0	0	Device does not save parameters on command
	1	Device saves parameters on command

Autonomous saving means that a device stores the storable parameters in a non-volatile manner without user request.

OBJECT DESCRIPTION

INDEX	1010h
Name	store parameters
Object Code	ARRAY
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Sub-Index	0h
Description	largest subindex supported
Entry Category	Mandatory
Access	ro
PDO Mapping	No
Value Range	1h - 7Fh
Default Value	4

Sub-Index	1h
Description	Save all parameters
Entry Category	Mandatory
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 55 for write access; Figure 56 for read access)
Default Value	01h

Sub-Index	2h
Description	save communication parameters
Entry Category	Optional
Access	rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 55 for write access; Figure 56 for read access)
Default Value	01h

Sub-Index	3h
Description	Save application parameters
Entry Category	Optional
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 55 for write access; Figure 56 for read access)
Default Value	02h

Sub-Index	4h
Description	Save I/O Configuration and Node Address
Entry Category	Optional
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 55 for write access; Figure 56 for read access)
Default Value	01h

Note Application parameters are stored autonomously. Communication parameters must be manually stored.

Object 1011h: Restore default parameters

With this object the default values of parameters according to the communication or device profile are restored. By read access the device provides information about its capabilities to restore these values.
Several parameter groups are distinguished:
Sub-Index 0 contains the largest Sub-Index that is supported.
Sub-Index 1 refers to all parameters that can be restored.
Sub-Index 2 refers to communication related parameters (Index 1000h - 1FFFh manufacturer specific communication parameters).
Sub-Index 3 refers to application related parameters (Index 6000h - 9FFFh manufacturer specific application parameters).
At Sub-Index 4 - 127 manufacturers may restore their individual choice of parameters.
Sub-Index 128 - 254 are reserved for future use.
In order to avoid the restoring of default parameters by mistake, restoring is only executed when a specific signature is written to the appropriate sub-index. The signature is “load”.

Signature MSB LSB
ASCII
Hex

d	a	o	l
64h	61h	6Fh	6Ch

Figure 57: Restoring write access signature

On reception of the correct signature in the appropriate sub-index the device restores the default parameters and then confirms the SDO transmission (initiate download response). If the restoring failed, the device responds with an Abort SDO Transfer (abort code: 0606 0000h). If a wrong signature is written, the device refuses to restore the defaults and responds with an Abort SDO Transfer (abort code: 0800 002xh).
The default values are set valid after the device is reset (reset node for sub-index 1h - 7Fh, reset communication for sub-index 2h) or power cycled.
On read access to the appropriate sub-index the device provides information about its default parameter restoring capability with the following format:
UNSIGNED32

MSB	LSB
31-1	*0*
Reserved (=0)	0/1

Figure 59: Restoring default values read access structure

Table 50: Structure of restore read access

bit number	value	meaning
31-1	0	*reserved (=0)*
0	0	Device does not restore default parameters
	1	Device restores parameters

OBJECT DESCRIPTION

Index	1011h
Name	restore default parameters
Object Code	ARRAY
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Sub-Index	0h
Description	largest subindex supported
Entry Category	Mandatory
Access	ro
PDO Mapping	No
Value Range	1h- 7Fh
Default Value	4

Sub-Index	1h
Description r	Restore all default parameters
Entry Category	Mandatory
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 57)
Default Value	01h

Sub-Index	2h
Description	Restore communication default parameters
Entry Category	Optional
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 57)
Default Value	01h

Sub-Index	3h
Description	Restore application default parameters
Entry Category	Optional
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 57)
Default Value	01h

Sub-Index	4h
Description	Restore Manufacturer Specific parameters
Entry Category	Optional
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 57)
Default Value	01h

The number and type of physically attached modules control most of the manufacturer specific parameters, therefore Sub-Index 4 is reserved for future use.

Object 1012h: COB-ID Time Stamp Object

Index 1012h defines the COB-ID of the Time-Stamp Object (TIME). Further, it defines whether the device consumes the TIME or whether the device generates the TIME. The structure of this object is shown in Figure 60 and Table 51.

UNSIGNED32
MSB LSB

bits	*31*	*30*	*29*	*28-11*	*10-0*
11-bit-ID	0/1	0/1	0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	11-bit Identifier
29-bit-ID	0/1	0/1	1	29 -bit Identifier	

Figure 60: Structure of TIME COB-ID entry

Table 51: Description of TIME COB-ID entry

bit number	value	meaning
31 (MSB)	0	Device does not consume TIME message
	1	Device consumes TIME message
30	0	Device does not produce TIME message
	1	Device produces TIME message
29	0	11-bit ID (CAN 2.0A)
	1	29-bit ID (CAN 2.0B)
28 – 11	0	if bit 29=0
	X	if bit 29=1: bits 28-11 of 29-bit-TIME-COB-ID
10-0 (LSB)	X	bits 10-0 of TIME-COB-ID

Bits 29, 30 may be static (not changeable). If a device is not able to generate TIME messages, an attempt to set bit 30 is responded with an abort message (abort code: 0609 0030h). Devices supporting the standard CAN frame type only, an attempt to set bit 29 is responded with an abort message (abort code: 0609 0030h). It is not allowed to change Bits 0-29, while the object exists (Bit 30=1).

OBJECT DESCRIPTION

INDEX	1012h
Name	COB-ID time stamp message
Object Code	VAR
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Access	rw
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	100h

Object 1014h: COB-ID Emergency Object

Index 1014h defines the COB-ID of the Emergency Object (EMCY). The structure of this object is shown in Figure 61.

UNSIGNED32

MSB LSB

Bits	*31*	*30*	*29*	*28-11*	*10-0*
11-bit-ID	0/1	0	0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	11-bit Identifier
29-bit-ID	0/1	0	1	29 -bit Identifier	

Figure 61: Structure of the EMCY Identifier entry

Table 52: Description of EMCY COB-ID entry

bit number	value	Meaning
31 (MSB)	0	EMCY exists / is valid
	1	EMCY does not exist / is not valid
30	0	reserved (always 0)
29	0	11-bit ID (CAN 2.0A)
	1	29-bit ID (CAN 2.0B)
28 - 11	0	if bit 29=0
	X	if bit 29=1: bits 28-11 of 29-bit-COB-ID
10-0 (LSB)	X	bits 10-0 of COB-ID

Devices supporting the standard CAN frame type only, an attempt to set bit 29 is responded with an abort message (abort code: 0609 0030h). It is not allowed to change Bits 0-29, while the object exists (Bit 31=0).

OBJECT DESCRIPTION

INDEX	1014h
Name	COB-ID Emergency message
Object Code	VAR
Data Type	UNSIGNED32
Category	Conditional;Mandatory, if Emergency is supported

ENTRY DESCRIPTION

Access	ro;optional rw
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	80h + Node-ID

Object 1015h: Inhibit Time EMCY

The inhibit time for the EMCY message can be adjusted via this entry. If this entry exists it must be writeable in the object dictionary. The time has to be a multiple of 100ms.

OBJECT DESCRIPTION

INDEX	1015h
Name	Inhibit Time EMCY
Object Code	VAR
Data Type	UNSIGNED16
Category	Optional

ENTRY DESCRIPTION

Access	rw
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Object 1016h: Consumer Heartbeat Time

The consumer heartbeat time defines the expected heartbeat cycle time and thus has to be higher than the corresponding producer heartbeat time configured on the device producing this heartbeat.
Monitoring starts after the reception of the first heartbeat. If the consumer heartbeat time is 0 the corresponding entry is not used. The time has to be a multiple of 1ms.

UNSIGNED32

MSB			**LSB**
Bits	**31-24**	**23-16**	**15-0**
Value	reserved (value: 00h)	Node-ID	heartbeat time
Encoded as	-	UNSIGNED8	UNSIGNED16

Table 62: Structure of Consumer Heartbeat Time entry

At an attempt to configure several consumer heartbeat times unequal 0 for the same Node-ID the device aborts the SDO download with abort code 0604 0043h

OBJECT DESCRIPTION

INDEX	1016h
Name	Consumer Heartbeat Time
Object Code	ARRAY
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Sub-Index	0h
Description	number entries
Entry Category	Mandatory
Access	ro
PDO Mapping	No
Value Range	1 - 127
Default Value	4

Sub-Index	1h
Description	Consumer Heartbeat Time
Entry Category	Mandatory
Access	rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 62)
Default Value	0

Sub-Index	2h - 4h
Description	Consumer Heartbeat Time
Entry Category	Optional
Access	rw
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 62)
Default Value	No

Object 1017h: Producer Heartbeat Time

The producer heartbeat time defines the cycle time of the heartbeat. The producer heartbeat time is 0 if it not used. The time has to be a multiple of 1ms.

OBJECT DESCRIPTION

INDEX	1017h
Name	Producer Heartbeat Time
Object Code	VAR
Data Type	UNSIGNED16
Category	Conditional; Mandatory if guarding not supported

ENTRY DESCRIPTION

Access	rw
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Object 1018h: Identity Object

The object at index 1018h contains general information about the device.
The Vendor ID (sub-index 1h) contains a unique value allocated to each manufacturer.
The manufacturer-specific Product code (sub-index 2h) identifies a specific device version.
The manufacturer-specific Revision number (sub-index 3h) consists of a major revision number and a minor revision number. The major revision number identifies a specific CANopen behavior. If the CANopen functionality is expanded, the major revision has to be incremented. The minor revision number identifies different versions with the same CANopen behavior.

31 16	15 0
major revision number	minor revision number
MSB	LSB

Structure of Revision number

The manufacturer-specific Serial number (sub-index 4h) identifies a specific device.

OBJECT DESCRIPTION

INDEX	1018h
Name	Identity Object
Object Code	RECORD
Data Type	Identity
Category	Mandatory

ENTRY DESCRIPTION

Sub-Index	0h
Description	number of entries
Entry Category	Mandatory
Access	Ro
PDO Mapping	No
Value Range	1 .. 4
Default Value	4

Sub-Index	1h
Description	Vendor ID
Entry Category	Mandatory
Access	Ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0x00000141

Sub-Index	2h
Description	Product code
Entry Category	Optional
Access	Ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	1101 for MTU Gateway 1102 for J1587 Gateway

Sub-Index	3h
Description	Revision number
Entry Category	Optional
Access	Ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0x00020001

Sub-Index	4h
Description	Serial number
Entry Category	Optional
Access	Ro
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

Object 1020h: Verify Configuration

If a device supports the saving of parameters in non-volatile memory, a network configuration tool or a CANopen manager can use this object to verify the configuration after a devices reset and to check if a reconfiguration is necessary. The configuration tool shall store the date and time in that object and shall store the same values in the DCF. Now the configuration tool lets the device save its configuration by writing to index 1010h Sub-Index 1h the signature "save". After a reset the device shall restore the last configuration and the signature automatically or by request. If any other command changes boot-up configuration values, the device shall reset the object Verify Configuration to 0.
The Configuration Manager compares signature and configuration with the value from the DCF and decides if a reconfiguration is necessary or not.

Index	Object	Name	Type	Attr.	M/O
1020h	ARRAY	Verify Configuration	Unsigned32	rw	O

The sub-objects for the Verify Configuration Object are:

Index	Sub-Index	Field in Configuration Verify	Data Type
1020h	0h	Number of supported entries	Unsigned8
	1h	Configuration date	Unsigned32
	2h	Configuration time	Unsigned32

Configuration date shall contain the number of days since January 1,1984. Configuration time shall be the number of ms after midnight.

Application hint: The usage of this object allows a significant speed-up of the boot-up process. If it is used, the system integrator has to consider that a user may change a configuration value and afterwards activate the command store configuration 1010h without changing the value of 1020h. So the system integrator has to ensure a 100% consequent usage of this feature.

Object 1029: Error behavior object

If a serious device failure is detected in Operational State, the module shall enter by default autonomously the pre-operational state. If object 1028h (Error Behavior) is implemented, the device can be configured to enter alternatively the stopped state or remain in the current state in case of a device failure. Device failures shall include the following communication errors:

- Bus-off conditions of the CAN interface
- Life guarding event with the state ‘occurred’
- Heartbeat event with state ‘occurred’

Serious device errors also can be caused by device internal failures.
The value of the Error Classes is as follows:
0 = pre-operational (only if current state is operational)
1 = no state change
2 = stopped
3 .. 127 = reserved

OBJECT DESCRIPTION

INDEX	1029h
Name	Error Behavior
Object Code	ARRAY
Data Type	UNSIGNED8
Category	Optional

ENTRY DESCRIPTION

Sub-Index	0h
Description	No. of Error Classes
Entry Category	Mandatory
Access	Ro
PDO Mapping	No
Value Range	1h
Default Value	1

Sub-Index	1h
Description	Communication Error
Entry Category	Mandatory
Access	rw
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Object 1200h-1201h: Server SDO Parameter

In order to describe the SDOs used on a device the data type SDO Parameter is introduced. The data type has the index 22h in the Object Dictionary. The structure is described in 9.5.4.
The number of supported entries in the SDO object record is specified at sub-index 0h. The values at 1h and 2h specify the COB-ID for this SDO. Sub-index 3 gives the server of the SDO in case the record describes an SDO for which the device is client and gives the client of the SDO if the record describes an SDO for which the device is server.

UNSIGNED32

MSB					LSB
bits	*31*	*30*	*29*	*28-11*	*10-0*
11-bit-ID	0/1	0	0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	11-bit Identifier
29-bit-ID	0/1	0	1	29-bit Identifier	

Figure 64: Structure of SDO COB-ID entry

Table 53: Description of SDO COB-ID entry

bit number	value	Meaning
31 (MSB)	0	SDO exists / is valid
	1	SDO does not exist / is not valid
30	0	reserved (always 0)
29	0	11-bit ID (CAN 2.0A)
	1	29-bit ID (CAN 2.0B)
28 – 11	0	if bit 29=0
	X	if bit 29=1: bits 28-11 of 29-bit-COB-ID
10-0 (LSB)	X	bits 10-0 of COB-ID

An SDO is only valid if both SDO-valid-bits are 0. Devices supporting the standard CAN frame type only, an attempt to set bit 29 is responded with an abort message (abort code: 0609E0030h).
These objects contain the parameters for the SDOs for which the device is the server. If a device handles more than one server SDO the default SDO must be located at index 1200h as the first server SDO. This entry is read only 2. All additional server SDOs are invalid by default (invalid bit - see Table 53), there description is located at subsequent indicies. It is not allowed to change the COB-ID while the SDO exists.
The description of the Client of the SDO (sub-index 3h) is optional. It is not available for the default SDO (no Sub-index 3h at Index 1200h), as this entry is read only.

OBJECT DESCRIPTION

INDEX	1200-1201h
Name	Server SDO parameter
Object Code	RECORD
Data Type	SDO Parameter
Category	Conditional Index 1200h: Optional Index 1201h - 127Fh: Mandatory for each additionally supported server SDO

ENTRY DESCRIPTION

Sub-Index	0h
Description	number of entries
Entry Category	Mandatory
Access	Ro
PDO Mapping	No
Value Range	Index 1200h: 2 Index 1201h - 127F: 2 – 3
Default Value	No

Sub-Index	1h
Description	COB-ID Client->Server (rx)
Entry Category	Mandatory
Access	Index 1200h: ro, Index 1201h-127Fh: rw
PDO Mapping	No
Value Range	UNSIGNED32 (Table 53)
Default Value	Index 1200h: 600h+Node-ID, Index 1201h-127Fh: No

Sub-Index	2h
Description	COB-ID Server -> Client (tx)
Entry Category	Mandatory
Access	Index 1200h: ro Index 1201-127Fh: rw
PDO Mapping	No
Value Range	UNSIGNED32 (Table 53)
Default Value	Index 1200h: 580h+Node-ID, Index 1201h-127Fh: No

Object 1400h – 141Eh: Receive PDO Communication Parameter

Contains the communication parameters for the PDOs the device is able to receive. The type of the PDO communication parameter (20h) is described in 9.5.4. The sub-index 0h contains the number of valid entries within the communication record. Its value is at least 2. If inhibit time supported the value is 3. At sub-index 1h resides the COB-ID of the PDO. This entry has been defined as UNSIGNED32 in order to cater for 11-bit CAN Identifiers (CAN 2.0A) as well as for 29-bit CAN identifiers (CAN 2.0B).
The entry has to be interpreted as defined in Figure 65 and Table 54.

UNSIGNED32

MSB LSB

bits	*31*	*30*	*29*	*28-11*	*10-0*
11-bit-ID	0/1	0/1	0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	11-bit Identifier
29-bit-ID	0/1	0/1	1	29-bit Identifier	

Figure 65: Structure of PDO COB-ID entry

Table 54: Description of PDO COB-ID entry

bit number	value	Meaning
31 (MSB)	0	PDO exists / is valid
	1	PDO does not exist / is not valid
30	0	RTR allowed on this PDO
	1	no RTR allowed on this PDO
29	0	11-bit ID (CAN 2.0A)
	1	29-bit ID (CAN 2.0B)
28 – 11	0	if bit 29=0
	X	if bit 29=1: bits 28-11 of 29-bit-COB-ID
10-0 (LSB)	X	bits 10-0 of COB-ID

The PDO valid/not valid allows to select which PDOs are used in the operational state. There may be PDOs fully configured (e.g. by default) but not used, and therefore set to "not valid" (deleted). The feature is necessary for devices supporting more than 4 RPDOs or 4 TPDOs, because each device has only default identifiers for the first four RPDOs/TPDOs. Devices supporting the standard CAN frame type only or do not support Remote Frames, an attempt to set bit 29 to 1 or bit 30 to 0 is responded with an abort message (abort code: 0609Ê0030h).
It is not allowed to change bit 0-29 while the PDO exists (Bit 31=0).
The transmission type (sub-index 2) defines the transmission/reception character of the PDO (see 9.2.1.1). Table 55 describes the usage of this entry. On an attempt to change the value of the transmission type to a value that is not supported by the device an abort message (abort code: 0609E0030h) is generated.

transmission type PDO transmission

-	Cyclic	acyclic	synchronous	asynchronous	RTR only
0	-	X	X	-	-
1-240	X	-	X	-	-
241-251	-reserved -				
252	-	-	X	-	X
253	-	-	-	X	X
254	-	-	-	X	-
255	-	-	-	X	-

Synchronous (transmission types 0-240 and 252) means that the transmission of the PDO shall be related to the SYNC object as described in 9.3. Preferably the devices use the SYNC as a trigger to output or actuate based on the previous synchronous Receive PDO respectively to

update the data transmitted at the following synchronous Transmit PDO. Details of this mechanism depend on the device type and are defined in the device profile if applicable.
Asynchronous means that the transmission of the PDO is not related to the SYNC object.
A transmission type of zero means that the message shall be transmitted synchronously with the SYNC object but not periodically.
A value between 1 and 240 means that the PDO is transferred synchronously and cyclically. The transmission type indicating the number of SYNC which are necessary to trigger PDO transmissions.
Receive PDOs are always triggered by the following SYNC upon receiption of data independent of the transmission types 0 - 240.
The transmission types 252 and 253 mean that the PDO is only transmitted on remote transmission request. At transmission type 252, the data is updated (but not sent) immediately after reception of the SYNC object. At transmission type 253 the data is updated at the reception of the remote transmission request (hardware and software restrictions may apply). These value are only possible for TPDOs.
For TPDOs transmission type 254 means, the application event is manufacturer specific (manufacturer specific part of the Object Dictionary), transmission type 255 means, the application event is defined in the device profile. RPDOs with that type trigger the update of the mapped data with the reception.
Sub-index 3h contains the inhibit time. This time is a minimum interval for PDO transmission. The value is defined as multiple of 100ms. It is not allowed to change the value while the PDO exists (Bit 31 of sub-index 1 is 0).
Sub-index 4h is reserved. It does not have to be implemented, in this case read or write access leads to Abort SDO Transfer (abort code: 0609 0011h).
In mode 254/255 additionally an event time can be used for TPDO. If an event timer exists for a TPDO (value not equal to 0) the elapsed timer is considered to be an event. The event timer elapses as multiple of 1 ms of the entry in sub-index 5h of the TPDO. This event will cause the transmission of this TPDO in addition to otherwise defined events. The occurence of the events set the timer. Independent of the transmission type the RPDO event timer is used recognize the expiration of the RPDO.

OBJECT DESCRIPTION

INDEX	1400h – 141Fh
Name	receive PDO parameter
Object Code	RECORD
Data Type	PDO CommPar
Category	Conditional; Mandatory for each supported PDO

ENTRY DESCRIPTION

Sub-Index	0h
Description	largest sub-index supported
Entry Category	Mandatory
Access	ro
PDO Mapping	No
Value Range	2 – 5

Sub-Index	1h
Description	COB-ID used by PDO
Entry Category	Mandatory
Access	ro; rw if variable COB-ID is supported
PDO Mapping	No
Value Range	UNSIGNED32 (Table 54)
Default Value	Index 1400h: 200h + Node-ID, Index 1401h: 300h + Node-ID, Index 1402h: 400h + Node-ID, Index 1403h: 500h + Node-ID, Index 1404h Ð 15FFh: disabled

Sub-Index	2h
Description	transmission type
Entry Category	Mandatory
Access	ro;rw if variable transmission type is supported
PDO Mapping	No
Value Range	UNSIGNED8 (Table 55)
Default Value	(Device Profile dependent)

Sub-Index	3h
Description	inhibit time (not used for RPDO)
Entry Category	Optional
Access	rw
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	No

Sub-Index	4h
Description	compatibility entry
Entry Category	Optional
Access	rw
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	No

Sub-Index	5h
Description	event timer

Entry Category	Optional (not used for RPDO)
Access	rw
PDO Mapping	No
Value Range	0 = not used UNSIGNED16
Default Value	No

Object 1600h – 161Eh: Receive PDO Mapping Parameter

Contains the mapping for the PDOs the device is able to receive. The type of the PDO mapping parameter (21h) is described in 9.5.4. The sub-index 0h contains the number of valid entries within the mapping record. This number of entries is also the number of the application variables which shall be transmitted/received with the corresponding PDO. The sub-indices from 1h to number of entries contain the information about the mapped application variables. These entries describe the PDO contents by their index, sub-index and length (Figure 66). All three values are hexadecimal coded. The length entry contains the length of the object in bit (1..40h). This parameter can be used to verify the overall mapping length. It is mandatory.

The structure of the entries from sub-index 1h - 40h is as follows:

Byte: MSB LSB

index (16 bit)	sub-index (8 bit)	object length (8 bit)

Figure 66: Structure of PDO Mapping Entry

If the change of the PDO mapping cannot be executed (e.g. the PDO length is exceeded or the SDO client attempts to map an object that cannot be mapped) the device responds with an Abort SDO Transfer Service.
Subindex 0 determines the valid number of objects that have been mapped. For changing the PDO mapping first the PDO has to be deleted, the sub-index 0 must be set to 0 (mapping is deactivated). Then the objects can be remapped. When a new object is mapped by writing a subindex between 1 and 64, the device may check whether the object specified by index / sub-index exists. If the object does not exist or the object cannot be mapped, the SDO transfer must be aborted with the Abort SDO Transfer Service with one of the abort codes 0602 0000h or 0604 0041h. After all objects are mapped subindex 0 is set to the valid number of mapped objects. Finally the PDO will be created by writing to its communication parameter COB-ID. When subindex 0 is set to a value >0 the device may validate the new PDO mapping before transmitting the response of the SDO service. If an error is detected the device has to transmit the Abort SDO Transfer Service with one of the abort codes 0602 0000h, 0604 0041h or 0604 0042h.
When subindex 0 is read the actual number of valid mapped objects is returned.
If data types (Index 1h-7h) are mapped they serve as “dummy entries”. The corresponding data in the PDO is not evaluated by the device. This optional feature is useful e.g. to transmit data to several devices using one PDO, each device only utilizing a part of the PDO. It is not possible to create a dummy mapping for a TPDO.

OBJECT DESCRIPTION

INDEX	1600h – 161Fh
Name	receive PDO mapping
Object Code	RECORD
Data Type	PDO Mapping
Category	Conditional; Mandatory for each supported PDO

ENTRY DESCRIPTION

Sub-Index	0h
Description	number of mapped application objects in PDO
Entry Category	Mandatory
Access	ro; rw if dynamic mapping is supported
PDO Mapping	No
Value Range	0: deactivated 1 - 64: activated
Default Value	(device profile dependent)

Sub-Index	1h - 40h
Description	PDO mapping for the nth application object to be mapped
Entry Category	Conditional depends on number and size of object be mapped
Access	rw
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	(device profile dependent)

Object 1800h – 181Fh: Transmit PDO Communication Parameter

Contains the communication parameters for the PDOs the device is able to transmit. The type of the PDO communication parameter (20h) is described in 9.5.4. A detailed description of the entries is done in the section for the Receive PDO Communication Parameter (1400h – 141Fh).

OBJECT DESCRIPTION

INDEX	1800h – 181Fh
Name	transmit PDO parameter
Object Code	RECORD
Data Type	PDO CommPar
Category	Conditional; Mandatory for each supported PDO

ENTRY DESCRIPTION

Sub-Index	0h
Description	largest sub-index supported
Entry Category	Mandatory
Access	ro
PDO Mapping	No
Value Range	2 – 5

Sub-Index	1h
Description	COB-ID used by PDO
Entry Category	Mandatory
Access	ro; rw if COB-ID can be configured
PDO Mapping	No
Value Range	UNSIGNED32 (Figure 65)
Default Value	Index 1800h: 180h + Node-ID, Index 1801h: 280h + Node-ID, Index 1802h: 380h + Node-ID, Index 1803h: 480h + Node-ID, Index 1804h - 18FFh: disabled

Sub-Index	2h
Description	transmission type
Entry Category	Mandatory
Access	ro; rw if transmission type can be changed
PDO Mapping	No
Value Range	UNSIGNED8 (Table 54)
Default Value	(device profile dependent)

Sub-Index	3h
Description	inhibit time
Entry Category	Optional
Access	rw
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	No

Sub-Index	4h

Description	reserved
Entry Category	Optional
Access	rw
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	No

Sub-Index	5h
Description	event timer
Entry Category	Optional
Access	rw
PDO Mapping	No
Value Range	0 = not used UNSIGNED16
Default Value	No

Object 1A00h – 1A1Fh: Transmit PDO Mapping Parameter

Contains the mapping for the PDOs the device is able to transmit. The type of the PDO mapping parameter (21h) is described in 9.5.4. A detailed description of the entries is done in the section for the Receive PDO Mapping Parameter (1600h – 161Fh).

OBJECT DESCRIPTION

INDEX	1A00h – 1A1Fh
Name	transmit PDO mapping
Object Code	RECORD
Data Type	PDO Mapping
Category	Conditional; Mandatory for each supported PDO

ENTRY DESCRIPTION

Sub-Index	0h
Description	number of mapped application objects in PDO
Entry Category	Mandatory
Access	ro; rw if dynamic mapping is supported
PDO Mapping	No
Value Range	0: deactivated 1 - 64: activated
Default Value	(device profile dependent)

Sub-Index	1h - 40h
Description	PDO mapping for the n-th application object to be mapped
Entry Category	Conditional; depends on number and size of objects to be mapped
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	(device profile dependent)

Object 1FA0h : Object Scanner List

The Object Scanner list is used to configure which objects are transmitted in the Multiplexed TPDO.

OBJECT DESCRIPTION

INDEX	1FA0h – 1FA0h
Name	Object Scanner List
Object Code	ARRAY
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Sub-Index	0h
Description	number of entries
Entry Category	Mandatory
Access	ro
PDO Mapping	No
Value Range	32
Default Value	32

Sub-Index	1h – 20h
Description	Scan_1 – Scan 20h
Entry Category	Optional
Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	no

Multiplexed PDOs

MPDO Protocol

This protocol is used to implement MPDO services. The MPDO producer sends data and the multiplexor indicating the source or destination address.

MPDO ----------→ PDO
Producer Consumer

Byte	0		1-3	4-8
Meaning	f	Addr	m	D

'd' shall contain the data to be transferred. The value always shall be filled up to 32 bit. 3
'm' shall contain the multiplexor (Index and Sub-Index) of the variable in the object dictionary.
The MSB 'f' of the first byte shall be a format flag, and 'addr' shall be an address field, which may be used in the following combinations:

f	addr	Usage
0	0	Reserved
0	1-127	Source addressing. addr is a single producer's Node ID. Multiplexor is index and sub-index of the object dictionary of the producer.
1	0	Destination addressing. The consumer is a group.
1	1-127	Destination addressing. addr is a single consumer's Node ID. Multiplexor is index and sub-index of the object dictionary of the consumer.

Destination Address Mode (DAM)

The *addr* and the *m* field of the MPDO refers to the consumer. This allows access to the consumer's Object Dictionary in an SDO-like manner. With *addr = 0* , it allows multicasting and broadcasting, to write into the Object Dictionaries of more than one node simultaneously, without having a PDO for each single object.
Initiating a DAM-MPDO is application-dependent, like it is for SDOs.

Source Address Mode (SAM)

The *addr* and the *m* field of the MPDO refers to the producer. Only one producer MPDO of this type is allowed for each node.
Transmission type has to be 254 or 255.
The producer uses an Object Scanner List in order to know, which objects are to send. The consumer uses an Object Dispatcher List as a 'cross reference'. 3 The restriction about using 32-bit transfers only will not present problems in practice since all of the participating devices know the data types (and sizes) of their related objects.

Object dictionary entries

PDO Mapping Record

The meaning of Sub-Index 0 (number of mapped objects is extended. The valid range for non-multiplexed PDOs is 0 to 64. A value of 255 indicates a DAM-MPDO, a value of 254 indicates an SAM-MPDO.

For SAM, the further entries in the MR are don't care.

For DAM the first object describes the local object (there can be mapped only one object into an MPDO).

Index	Object	Name	Type
16XXh-1AXXh	0h	Number of mapped objects in the PDO: 0 .. 64: Valid range for number of mapped objects 254: formatted as SAM- MPDO 255: formatted as DAM- MPDO	Unsigned 8

This leaves open the possibility for further alternative PDO formats.

Additional error code meanings

Error Code Meaning
TBD

Predefinitions

Introduction

All TPDOs with transmission type 255 shall be transmitted when entering the OPERATIONAL state.

PDO Mapping

1st RPDO mapping

There are no default mappings for the Rx PDO

1st TPDO mapping

There are no default mappings for TPDO 1.

2nd RPDO mapping

There are no default mappings for RPDO 1.

2nd TPDO mapping

There are no default mappings for TPDO 2.

3rd RPDO mapping

There are no default mappings for RPDO 3.

3rd TPDO mapping

There are no default mappings for TPDO 3.

4th RPDO mapping

There are no default mappings for RPDO 4.

4th TPDO mapping

There are no default mappings for TPDO 4.

Manufacturer Specific Objects

Overview:

Vehicle DataIn Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Access	I/O MAP	NV
2000	ARRAY	DataIn_UNSIGNED8	UNSIGNED8	Ro	Y	V
2001	ARRAY	DataIn_UNSIGNED16	UNSIGNED16	Ro	Y	V
2002	ARRAY	DataIn_UNSIGNED32	UNSIGNED32	Ro	Y	V
2003	ARRAY	DataIn_SIGNED8	SIGNED8	Ro	Y	V
2004	ARRAY	DataIn_SIGNED16	SIGNED16	Ro	Y	V
2005	ARRAY	DataIn_SIGNED32	SIGNED32	Ro	Y	V
2006	ARRAY	DataIn_REAL32	REAL32	Ro	Y	V

Vehicle DataIn Status Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Access	I/O MAP	NV
2100	ARRAY	DataIn_UNSIGNED8 Status	UNSIGNED8	Rwr	Y	V
2101	ARRAY	DataIn_UNSIGNED16 Status	UNSIGNED8	Rwr	Y	V
2102	ARRAY	DataIn_UNSIGNED32 Status	UNSIGNED8	Rwr	Y	V
2103	ARRAY	DataIn_SIGNED8 Status	UNSIGNED8	Rwr	Y	V
2104	ARRAY	DataIn_SIGNED16 Status	UNSIGNED8	Rwr	Y	V
2105	ARRAY	DataIn_SIGNED32 Status	UNSIGNED8	Rwr	Y	V
2106	ARRAY	DataIn_REAL32 Status	UNSIGNED8	Rwr	Y	V

J1939 Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Access	I/O MAP	NV
3000	RECORD	J1939 Bus Configuration	J1939_CONFIG	Rw	N	NV
3100-31FF	ARRAY	J1939 PDU Configuration	J1939_PDU_CONFIG	Rw	N	NV
3200-32FF	ARRAY	J1939 PDU Data	UNSIGNED8	Ro	Y	V

DINBUS Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Access	I/O MAP	NV
3500	RECORD	DINBUS Configuration	DINBUS_CONFIG	Rw	N	NV
3501	ARRAY	DINBUS Data	UNSIGNED8	Ro	Y	V

MTU Bus Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Access	I/O MAP	NV
4000	RECORD	MTU BUS Configuration	MTU_BUS_CONFIG	Rw	N	NV
4100	RECORD	Failure Code Configuration	MTU_FC_CONFIG	Rw	N	NV
4101-41FF	RECORD	MTU PDU Configuration	MTU_PDU_CONFIG	Rw	N	NV
4200	ARRAY	MTU PDU Data	UNSIGNED32	Ro	Y	V
4201	ARRAY	MTU Fault Codes (0-253)	UNSIGNED8	Ro	Y	V
4202	ARRAY	MTU Fault Codes (254-400)	UNSIGNED8	Ro	Y	V

J1587 Bus Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Access	I/O MAP	NV
4500	RECORD	J1587 Baud Rate	UNSIGNED32	Rw	N	NV
4501	RECORD	J1587 Rx Polarity	BOOLEAN	Rw	N	NV
4502	RECORD	J1587 Tx Polarity	BOOLEAN	Rw	N	NV
4600	RECORD	J1587 Tx MID	UNSIGNED8	Rw	N	NV
4601	ARRAY	J1587 Rx MIDS	UNSIGNED8	Rw	N	NV
4700	ARRAY	J1587 Data 1 Byte Page 1 MID A	UNSIGNED8	Ro	Y	V
4701	ARRAY	J1587 Data 1 Byte Page 2 MID A	UNSIGNED8	Ro	Y	V
4702	ARRAY	J1587 Data 2 Byte Page 1 MID A	UNSIGNED16	Ro	Y	V
4703	ARRAY	J1587 Data 2 Byte Page 2 MID A	UNSIGNED16	Ro	Y	V
4704	ARRAY	J1587 Data 4 Byte Page 1 MID A	UNSIGNED32	Ro	Y	V
4705	ARRAY	J1587 Data 4 Byte Page 2 MID A	UNSIGNED32	Ro	Y	V
4706	ARRAY	J1587 Data 8 Byte Page 1 MID A	UNSIGNED64	Ro	Y	V
4707	ARRAY	J1587 Data 8 Byte Page 2 MID A	UNSIGNED64	Ro	Y	V
4710	ARRAY	J1587 Data 1 Byte Page 1 MID B	UNSIGNED8	Ro	Y	V
4711	ARRAY	J1587 Data 1 Byte Page 2 MID B	UNSIGNED8	Ro	Y	V
4712	ARRAY	J1587 Data 2 Byte Page 1 MID B	UNSIGNED16	Ro	Y	V
4713	ARRAY	J1587 Data 2 Byte Page 2 MID B	UNSIGNED16	Ro	Y	V
4714	ARRAY	J1587 Data 4 Byte Page 1 MID B	UNSIGNED32	Ro	Y	V
4715	ARRAY	J1587 Data 4 Byte Page 2 MID B	UNSIGNED32	Ro	Y	V
4716	ARRAY	J1587 Data 8 Byte Page 1 MID B	UNSIGNED64	Ro	Y	V
4717	ARRAY	J1587 Data 8 Byte Page 2 MID B	UNSIGNED64	Ro	Y	V
4720	ARRAY	J1587 Data 1 Byte Page 1 MID C	UNSIGNED8	Ro	Y	V
4721	ARRAY	J1587 Data 1 Byte Page 2 MID C	UNSIGNED8	Ro	Y	V
4722	ARRAY	J1587 Data 2 Byte Page 1 MID C	UNSIGNED16	Ro	Y	V
4723	ARRAY	J1587 Data 2 Byte Page 2 MID C	UNSIGNED16	Ro	Y	V
4724	ARRAY	J1587 Data 4 Byte Page 1 MID C	UNSIGNED32	Ro	Y	V
4725	ARRAY	J1587 Data 4 Byte Page 2 MID C	UNSIGNED32	Ro	Y	V
4726	ARRAY	J1587 Data 8 Byte Page 1 MID C	UNSIGNED64	Ro	Y	V
4727	ARRAY	J1587 Data 8 Byte Page 2 MID C	UNSIGNED64	Ro	Y	V
4730	ARRAY	J1587 Data 1 Byte Page 1 MID D	UNSIGNED8	Ro	Y	V
4731	ARRAY	J1587 Data 1 Byte Page 2 MID D	UNSIGNED8	Ro	Y	V
4732	ARRAY	J1587 Data 2 Byte Page 1 MID D	UNSIGNED16	Ro	Y	V
4733	ARRAY	J1587 Data 2 Byte Page 2 MID D	UNSIGNED16	Ro	Y	V
4734	ARRAY	J1587 Data 4 Byte Page 1 MID D	UNSIGNED32	Ro	Y	V
4735	ARRAY	J1587 Data 4 Byte Page 2 MID D	UNSIGNED32	Ro	Y	V
4736	ARRAY	J1587 Data 8 Byte Page 1 MID D	UNSIGNED64	Ro	Y	V
4737	ARRAY	J1587 Data 8 Byte Page 2 MID D	UNSIGNED64	Ro	Y	V

Vehicle Data Mapping/Conversion Objects

Index (hex)	Object (Symbolic Name)	Name	Type	Access	I/O MAP	NV
5000-50FF	RECORD	Vehicle Data Mapping Configuration	VH_MAPP_CONFIG	Rw	N	NV

Manufacturer Specific Object Details:

Vehicle DataIn Objects

Object 2000h: Vehicle DataIn_UNSIGNED8

This object provides a storage area for Vehicle UNSIGNED8 variables.

Object Description

INDEX	2000h
Name	Vehicle DataIn_UNSIGNED8
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_UNSIGNED8s
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_UNSIGNED8 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_UNSIGNED8 FEh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The Vehicle DataIn_UNSIGNED8 objects allow the network to retrieve information from the Vehicle network in the form of an UNSIGNED8.

Object 2001h: Vehicle DataIn_UNSIGNED16

This object provides a storage area for Vehicle UNSIGNED16 variables.

Object Description

INDEX	2001h
Name	Vehicle DataIn_UNSIGNED16
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_UNSIGNED16s
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_UNSIGNED16 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED16
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_UNSIGNED16 FEh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED16
Default value	0

The Vehicle DataIn_UNSIGNED16 objects allow the network to retrieve information from the Vehicle network in the form of an UNSIGNED16.

Object 2002h: Vehicle DataIn_UNSIGNED32

This object provides a storage area for Vehicle UNSIGNED32 variables.

Object Description

INDEX	2002h
Name	Vehicle DataIn_UNSIGNED32
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_UNSIGNED32s
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_UNSIGNED32 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED32
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_UNSIGNED32 FEh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED32
Default value	0

The Vehicle DataIn_UNSIGNED32 objects allow the network to retrieve information from the Vehicle network in the form of an UNSIGNED32.

Object 2003h: Vehicle DataIn_SIGNED8

This object provides a storage area for Vehicle SIGNED8 variables.

Object Description

INDEX	2003h
Name	Vehicle DataIn_SIGNED8
Object Code	Array
Data Type	SIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_SIGNED8s
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_SIGNED8 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	SIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_SIGNED8 FEh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	SIGNED8
Default value	0

The Vehicle DataIn_SIGNED8 objects allow the network to retrieve information from the Vehicle Netowkr in the form of an SIGNED8.

Object 2004h: Vehicle DataIn_SIGNED16

This object provides a storage area for Vehicle SIGNED16 variables.

Object Description

INDEX	2004h
Name	Vehicle DataIn_SIGNED16
Object Code	Array
Data Type	SIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_SIGNED16s
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_SIGNED16 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	SIGNED16
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_SIGNED16 FEh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	SIGNED16
Default value	0

The Vehicle DataIn_SIGNED16 objects allow the network to retrieve information from the Vehicle network in the form of an SIGNED16.

Object 2005h: Vehicle DataIn_SIGNED32

This object provides a storage area for Vehicle SIGNED32 variables.

Object Description

INDEX	2005h
Name	Vehicle DataIn_SIGNED32
Object Code	Array
Data Type	SIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_SIGNED32s
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_SIGNED32 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	SIGNED32
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_SIGNED32 FEh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	SIGNED32
Default value	0

The Vehicle DataIn_SIGNED32 objects allow the network to retrieve information from the Vehicle network in the form of an SIGNED32.

Object 2006h: Vehicle DataIn_REAL32

This object provides a storage area for Vehicle REAL32 variables.

Object Description

INDEX	2006h
Name	Vehicle DataIn_REAL32
Object Code	Array
Data Type	REAL32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_REAL32s
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_REAL32 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	REAL32
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_REAL32 FEh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	REAL32
Default value	0

The Vehicle DataIn_REAL32 objects allow the network to retrieve information from the Vehicle network in the form of an REAL32.

Vehicle DataIn Status Objects

Object 2100h: Vehicle DataIn_UNSIGNED8 Status

This object provides a status indication for Vehicle UNSIGNED8 input variables.

Object Description

INDEX	2100h
Name	Vehicle DataIn_UNSIGNED8 Status
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_UNSIGNED8 Status Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_UNSIGNED8 Status 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_UNSIGNED8 Status Feh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The DataIn_UNSIGNED8 Status objects allow the network to monitor the status of the corresponding DataIn_UNSIGNED8 input variable. The typical application would be where the input variable is mapped to a Vehicle Network data object.

Object 2101h: Vehicle DataIn_UNSIGNED16 Status

This object provides a status indication for Vehicle UNSIGNED16 input variables.

Object Description

INDEX	2101h
Name	Vehicle DataIn_UNSIGNED16 Status
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Vehicle Number of DataIn_UNSIGNED16 Status Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_UNSIGNED16 Status 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_UNSIGNED16 Status Feh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The Vehicle DataIn_UNSIGNED16 Status objects allow the network to monitor the status of the corresponding Vehicle DataIn_UNSIGNED16 input variable. The typical application would be where the input variable is mapped to a Vehicle Network data object.

Object 2102h: Vehicle DataIn_UNSIGNED32 Status

This object provides a status indication for Vehicle UNSIGNED32 input variables.

Object Description

INDEX	2102h
Name	Vehicle DataIn_UNSIGNED32 Status
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_UNSIGNED32 Status Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_UNSIGNED32 Status 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_UNSIGNED32 Status Feh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The Vehicle DataIn_UNSIGNED32 Status objects allow the network to monitor the status of the corresponding Vehicle DataIn_UNSIGNED32 input variable. The typical application would be where the input variable is mapped to a Vehicle Network data object.

Object 2103h: Vehicle DataIn_SIGNED8 Status

This object provides a status indication for Vehicle SIGNED8 input variables.

Object Description

INDEX	2103h
Name	Vehicle DataIn_SIGNED8 Status
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_SIGNED8 Status Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_SIGNED8 Status 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_SIGNED8 Status Feh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The Vehicle DataIn_SIGNED8 Status objects allow the network to monitor the status of the corresponding Vehicle DataIn_SIGNED8 input variable. The typical application would be where the input variable is mapped to a Vehicle Network data object.

Object 2104h: Vehicle DataIn_SIGNED16 Status

This object provides a status indication for Vehicle SIGNED16 input variables.

Object Description

INDEX	2104h
Name	Vehicle DataIn_SIGNED16 Status
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_SIGNED16 Status Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_SIGNED16 Status 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_SIGNED16 Status Feh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The Vehicle DataIn_SIGNED16 Status objects allow the network to monitor the status of the corresponding Vehicle DataIn_SIGNED16 input variable. The typical application would be where the input variable is mapped to a Vehicle Network data object.

Object 2105h: Vehicle DataIn_SIGNED32 Status

This object provides a status indication for Vehicle SIGNED32 input variables.

Object Description

INDEX	2105h
Name	Vehicle DataIn_SIGNED32 Status
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_SIGNED32 Status Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_SIGNED32 Status 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_SIGNED32 Status Feh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The Vehicle DataIn_SIGNED32 Status objects allow the network to monitor the status of the corresponding Vehicle DataIn_SIGNED32 input variable. The typical application would be where the input variable is mapped to a Vehicle network data object.

Object 2106h: Vehicle DataIn_REAL32 Status

This object provides a status indication for Vehicle REAL32 input variables.

Object Description

INDEX	2106h
Name	Vehicle DataIn_REAL32 Status
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Vehicle DataIn_REAL32 Status Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Vehicle DataIn_REAL32 Status 1
Access	Rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	UNSIGNED8
Default Value	0

To

Sub-Index	Feh
Description	Vehicle DataIn_REAL32 Status Feh
Access	Rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default value	0

The Vehicle DataIn_REAL32 Status objects allow the network to monitor the status of the corresponding DataIn_REAL32 input variable. The typical application would be where the input variable is mapped to a Vehicle Network Data object.

J1939 Objects

Object 3000h: J1939 Bus Configuration

This object provides a way for the user to configure the J1939 Bus Interface on the Vehicle Gateway.

Object Description

INDEX	3000h
Name	J1939 Bus Configuration
Object Code	RECORD
Data Type	J1939 Bus Configuration
Category Conditional	Optional

Entry Description

Sub-Index	1h
Description	CAN Baud Rate
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	125000

Object 3100h-31FFh: J1939 PDU Configuration

This object provides a way for the user to configure J1939 PDUs on the Vehicle Gateway. Object 3100h accesses PDU 0, 3101h accesses PDU 1, etc.

Object Description

INDEX	3100h-31FFh
Name	J1939 PDU (Y) Configuration
Object Code	RECORD
Data Type	J1939 PDU Configuration
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1939 PDU Configuration Objects
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	8

Sub-Index	1h
Description	J1939 PGN
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	No

Sub-Index	2
Description	J1939 Data Page
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	No

Sub-Index	3
Description	J1939 Source Address
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Sub-Index	4
Description	J1939 Length
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	8

Sub-Index	5
Description	Mode
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Mode/Description
0=Cyclicly transmitted by J1939 Device
1=Cyclicly requested by Gateway
2=Request By Trigger

Sub-Index	6
Description	Timeout
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Sub-Index	7
Description	Request Interval
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Sub-Index	8
Description	Request Trigger
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Example:
User wants to read Engine RPM using PGN 61444 and PDU 0. The user should configure PDU 0 for PGN 61444 and for 8 data bytes. The RPM can then be read from PDU Data PDU 0 Subindex 4 and 5.

Object 3200h-32FFh: J1939 PDU Data

This object provides a way for the user to access the J1939 data on the Vehicle Gateway. 3200h accesses PDU 0, 3201h accesses PDU 1, etc.

Object Description

INDEX	3200h
Name	J1939 PDU Data (PDU 0-255)
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1939 Data Bytes PDU Y
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	(see J1939 PDU Configuration Object)

Sub-Index	1h
Description	J1939 In Byte 1 PDU Y
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	X = Number of J1939 Data Bytes PDU Y
Description	J1939 Data Byte(x) PDU Y
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Example:
User wants to read Engine RPM using PGN 61444 and PDU 0. The user should configure a packet 0 for PGN 61444 8 data bytes. The RPM can then be read from PDU Data PDU 0 Subindex 4 and 5.

DINBUS OBJECTS

Object 3500h: DINBUS Bus Configuration

This object provides a way for the user to configure the DINBUS interface on the Vehicle Gateway.

Object Description

INDEX	3500h
Name	DINBUS Bus Configuration
Object Code	RECORD
Data Type	DINBUS BUS Configuration
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of DINBUS Configuration Objects
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	5

Sub-Index	1h
Description	Baud Rate
Access	Rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	4800

Sub-Index	2h
Description	Data Format
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8 (See below)
Default value	4

Data Format:
0=8 Data, No Parity
1= 7 Data, Even Parity
2= 7 Data, Odd Parity
3= 8 Data, Even Parity
4= 8 Data, Odd Parity

Sub-Index	3h
Description	Number of DataIn Bytes
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default value	24

Sub-Index	4h
Description	Number of DataOut Bytes (reserved for future)
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default value	0

Sub-Index	5h
Description	Timeout (msec)
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED16
Default value	1000

Object 3501h: DINBUS Data In

This object provides a way for the user to access the DINBUS data on the Vehicle Gateway.

Object Description

INDEX	3501h
Name	DINBUS Data
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of DINBUS Data In Bytes
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	36

Sub-Index	1h
Description	DINBUS Data In Byte 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	X = Number of DINBUS Data In Bytes
Description	DINBUS Data Byte(x)
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Example:
To read the Engine RPM, the user should read the DINBUS DataIn Object, Subindex 2

MTU Objects

Object 4000h: MTU Bus Configuration

This object provides a way for the user to configure the MTU Bus Interface on the Vehicle Gateway.

Object Description

INDEX	4000h
Name	MTU Bus Configuration
Object Code	RECORD
Data Type	MTU Bus Configuration
Category Conditional	Optional

Entry Description

Sub-Index	1h
Description	CAN Baud Rate
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	125000

Object 4100h: MTU Failure Code Configuration

This object provides a way for the user to configure the MTU Fault Code PDUs on the Vehicle Gateway.

Object Description

INDEX	4100h
Name	MTU Failure Code PDU Configuration
Object Code	RECORD
Data Type	MTU Failure Code PDU Configuration
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of MTU PDU Configuration Objects
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	8

Sub-Index	1h
Description	MTU COB ID
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	1006

Sub-Index	2
Description	MUX
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	24

Sub-Index	3
Description	Data Type
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	2

0=Binary
1=Analog
2=Fault Code

Sub-Index	4
Description	Timeout
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8

Default Value	0

Object 4101h-41FFh: MTU PDU Configuration

This object provides a way for the user to configure MTU Measuring Point PDUs on the Vehicle Gateway. Object 4101h accesses PDU 1, 4102h accesses PDU 2, etc.

Object Description

INDEX	4101h-41FFh
Name	MTU PDU (Y) Configuration
Object Code	RECORD
Data Type	MTU PDU Configuration
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of MTU PDU Configuration Objects
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	4

Sub-Index	1h
Description	MTU COB ID
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	No

Sub-Index	2
Description	MUX
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	No

Sub-Index	3
Description	Data Type
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Sub-Index	4
Description	Timeout
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8

Default Value	0

Object 4200h: MTU PDU Data

This object provides a way for the user to access the MTU data on the Vehicle Gateway. Subindex 1 accesses PDU 1, subindex 2 accesses PDU 2, etc.

Object Description

INDEX	4200h
Name	MTU PDU Data
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of MTU PDUs
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	MTU Data PDU 1
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	254
Description	MTU Data PDU 254
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4201h: MTU Fault Codes 0-253

This object provides a way for the user to access the MTU Fault Codes on the Vehicle Gateway. Subindex 1 indicates fault code 0, Subindex 2 indicates fault code 2, etc.

Object Description

INDEX	4201h
Name	MTU Fault Code (0-253)
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of MTU Fault Codes
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	MTU Fault Code 0
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	254
Description	MTU Fault Code 253
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Example:
A value of 0 indicates failure code is not preset. A value of 1 indicates the fault code is present.

Object 4202h: MTU Fault Codes 254-400

This object provides a way for the user to access the MTU Fault Codes on the Vehicle Gateway. Subindex 1 indicates fault code 254, subindex 2=fault code 255, etc.

Object Description

INDEX	4202h
Name	MTU Fault Code (254-400)
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of MTU Fault Codes
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	147

Sub-Index	1h
Description	MTU Fault Code 254
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	147
Description	MTU Fault Code 400
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Example:
A value of 0 indicates failure code is not preset. A value of 1 indicates the fault code is present.

Object 4203h: MTU Fault Codes 1-400

This object provides a way for the user to access all of the MTU Fault Codes on the Vehicle Gateway at one time.

Object Description

INDEX	4203h
Name	MTU Fault Codes
Object Code	VAR
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of MTU Fault Codes
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	50

Sub-Index	1h
Description	MTU Fault Code 0-7
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	50
Description	MTU Fault Code 392-399
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

The fault codes are bitmapped so that all 400 fault codes will fit into an array of 50 bytes. A value of 0 indicates failure code is not preset. A value of 1 indicates the fault code is present.

J1587 Objects

The Vehicle gateway allows the user to configure the module to receive J1587 Data from up to four J1587 devices. This is done by setting the J1587 Message RX MIDs to match the MID that the connected device is using. The J1587 Data can then be read from the appropriate J1587 Data Index and SubIndex. The J1587 specification defines the PID that the particular data type corresponds to. For example parameters with one byte of data use PIDs 0-127 and PIDs 256-383. Parameters with two bytes are assigned PIDs 128-191 and PIDs 384-447. Parameters with more than two bytes of data are assigned to PIDs 192-253 and PIDs 448-509. On the vehicle gateway the user must read from the correct Index and Subindex to receive the J1587 data. The data larger than 2 bytes can be accessed using the 4 bytes or 8 bytes J1587 Objects even if there is more or less data in the actual parameter data. To read the data from a PDO, the user can map the corresponding J1587 Data object into the PDO.

Object 4500h: J1587 Baud Rate

This object provides a way for the user to configure the J1587 Bus Interface on the Vehicle Gateway.

OBJECT DESCRIPTION

INDEX	4500h
Name	J1587 Baud Rate
Object Code	VAR
Data Type	UNSIGNED32
Category	Optional

ENTRY DESCRIPTION

Access	Rw
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	9600

Object 4501h: J1587 RXP Receive Polarity

This object provides a way for the user to configure the J1587 Bus polarity on the Vehicle Gateway.

OBJECT DESCRIPTION

INDEX	4501h
Name	J1587 Rx Polarity
Object Code	VAR
Data Type	BOOLEAN
Category	Optional

ENTRY DESCRIPTION

Access	Rw
PDO Mapping	No
Value Range	0-1
Default Value	0

A value of zero will use that standard pinout for the receive data. A value of 1 will swap the A-B on the JJ1708/1587 lines.

Object 4502h: J1587 TXP Transmit Polarity

This object provides a way for the user to configure the J1587 Bus polarity on the Vehicle Gateway.

OBJECT DESCRIPTION

INDEX	4501h
Name	J1587 Tx Polarity
Object Code	VAR
Data Type	BOOLEAN
Category	Optional

ENTRY DESCRIPTION

Access	Rw
PDO Mapping	No
Value Range	0-1
Default Value	0

A value of zero will use that standard pinout for the transmit data. A value of 1 will swap the A-B on the JJ1708/1587 lines.

Object 4600h: J1587 TX MID

This object provides a way for the user to configure J1587 MID used for transmissions on the Vehicle Gateway.

Object Description

INDEX	4600h
Name	J1587 Tx MID
Object Code	VAR
Data Type	UNSIGNED8
Category Conditional	Optional

ENTRY DESCRIPTION

Access	Rw
PDO Mapping	No
Value Range	0-255
Default Value	255

This value is used when the Vehicle Gateway transmits messages on the J1587 bus.

Object 4601h: J1587 Message Rx MIDS

This object provides a way for the user to configure J1587 RX Message MID on the Vehicle Gateway.

Object Description

INDEX	4601h
Name	J1587 Rx Message MID Configuration
Object Code	RECORD
Data Type	USNGINED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Rx MIDS
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	4

Sub-Index	1h
Description	J1587 RX MID A
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0x80(decimal 128)(Engine #1)

Sub-Index	2h
Description	J1587 RX MID B
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0xFF (decimal 255)

Sub-Index	3
Description	J1587 RX MID C
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0xFF (decimal 255)

Sub-Index	4
Description	J1587 RX MID D
Access	Rw
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0xFF (decimal 255)

Example:
User wants to read Engine #1 RPM using Message 1 PID 190. The user should configure Message 1 for MID 0x80. The RPM can then be read from Message 1 Data Subindex 0 and 1. The status can be read from the FMI Object SubIndex 1.

Object 4700h: J1587 Data 1 Byte Page 1 MID A

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4700h
Name	J1587 Message Data 1 byte page 1
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 0 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 127 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4701h: J1587 Data 1 Byte Page 2 MID A

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4701h
Name	J1587 Message Data 1 byte page 2
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 256 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 383 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4702h: J1587 Data 2 Byte Page 1 MID A

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4702h
Name	J1587 Message Data 2 byte page 1
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 128 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 191 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4703h: J1587 Data 2 Byte Page 2 MID A

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4703h
Name	J1587 Message Data 2 byte page 2
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 384 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 447 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4704h: J1587 Data 4 Byte Page 1 MID A

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4704h
Name	J1587 Message Data 4 byte page 1
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4705h: J1587 Data 4 Byte Page 2 MID A

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4705h
Name	J1587 Message Data 4 byte page 2
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4706h: J1587 Data 8 Byte Page 1 MID A

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4706h
Name	J1587 Message Data 8 byte page 1
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4707h: J1587 Data 8 Byte Page 2 MID A

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4707h
Name	J1587 Message Data 8 byte page 2
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 8 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4710h: J1587 Data 1 Byte Page 1 MID B

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4710h
Name	J1587 Message Data 1 byte page 1
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 0 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 127 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4711h: J1587 Data 1 Byte Page 2 MID B

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4711h
Name	J1587 Message Data 1 byte page 2
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 256 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 383 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4712h: J1587 Data 2 Byte Page 1 MID B

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4712h
Name	J1587 Message Data 2 byte page 1
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 128 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 191 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4713h: J1587 Data 2 Byte Page 2 MID B

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4713h
Name	J1587 Message Data 2 byte page 2
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 384 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 447 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4714h: J1587 Data 4 Byte Page 1 MID B

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4714h
Name	J1587 Message Data 4 byte page 1
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4715h: J1587 Data 4 Byte Page 2 MID B

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4715h
Name	J1587 Message Data 4 byte page 2
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4716h: J1587 Data 8 Byte Page 1 MID B

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4716h
Name	J1587 Message Data 8 byte page 1
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4717h: J1587 Data 8 Byte Page 2 MID B

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4717h
Name	J1587 Message Data 8 byte page 2
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 8 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4720h: J1587 Data 1 Byte Page 1 MID C

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4720h
Name	J1587 Message Data 1 byte page 1
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 0 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 127 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4721h: J1587 Data 1 Byte Page 2 MID C

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4721h
Name	J1587 Message Data 1 byte page 2
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 256 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 383 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4722h: J1587 Data 2 Byte Page 1 MID C

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4722h
Name	J1587 Message Data 2 byte page 1
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 128 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 191 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4723h: J1587 Data 2 Byte Page 2 MID C

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4723h
Name	J1587 Message Data 2 byte page 2
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 384 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 447 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4724h: J1587 Data 4 Byte Page 1 MID C

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4724h
Name	J1587 Message Data 4 byte page 1
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4725h: J1587 Data 4 Byte Page 2 MID C

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4725h
Name	J1587 Message Data 4 byte page 2
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4726h: J1587 Data 8 Byte Page 1 MID C

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4726h
Name	J1587 Message Data 8 byte page 1
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4727h: J1587 Data 8 Byte Page 2 MID C

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4727h
Name	J1587 Message Data 8 byte page 2
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 8 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4730h: J1587 Data 1 Byte Page 1 MID D

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4730h
Name	J1587 Message Data 1 byte page 1
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 0 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 127 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4731h: J1587 Data 1 Byte Page 2 MID D

This object provides a way for the user to access the J1587 1 byte data on the Vehicle Gateway.

Object Description

INDEX	4731h
Name	J1587 Message Data 1 byte page 2
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 1 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	128

Sub-Index	1h
Description	J1587 PID 256 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	128
Description	J1587 PID 383 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Object 4732h: J1587 Data 2 Byte Page 1 MID D

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4732h
Name	J1587 Message Data 2 byte page 1
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 128 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 191 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4733h: J1587 Data 2 Byte Page 2 MID D

This object provides a way for the user to access the J1587 2 byte data on the Vehicle Gateway.

Object Description

INDEX	4733h
Name	J1587 Message Data 2 byte page 2
Object Code	Array
Data Type	UNSIGNED16
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 2 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 384 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

to

Sub-Index	64
Description	J1587 PID 447 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED16
Default Value	No

Object 4734h: J1587 Data 4 Byte Page 1 MID D

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4734h
Name	J1587 Message Data 4 byte page 1
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4735h: J1587 Data 4 Byte Page 2 MID D

This object provides a way for the user to access the J1587 4 byte data on the Vehicle Gateway.

Object Description

INDEX	4735h
Name	J1587 Message Data 4 byte page 2
Object Code	Array
Data Type	UNSIGNED32
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED32
Default Value	No

Object 4736h: J1587 Data 8 Byte Page 1 MID D

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4736h
Name	J1587 Message Data 8 byte page 1
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 4 Byte Page 1
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 192 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 253 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4737h: J1587 Data 8 Byte Page 2 MID D

This object provides a way for the user to access the J1587 8 byte data on the Vehicle Gateway.

Object Description

INDEX	4737h
Name	J1587 Message Data 8 byte page 2
Object Code	Array
Data Type	UNSIGNED64
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 Data 8 Byte Page 2
Access	Ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	64

Sub-Index	1h
Description	J1587 PID 448 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

to

Sub-Index	64
Description	J1587 PID 509 Data
Access	Ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	UNSIGNED64
Default Value	No

Object 4800h: J1587 Failure Mode Identifiers

This object provides a way for the user to access the MTU Failure Mode Identifiers for Messages mapped in the Vehicle Gateway. Subindex 1 indicates fault code for Message 1, Subindex 2 indicates fault code for Message 2, etc.

Object Description

INDEX	4800h
Name	J1587 Failure Mode Identifiers
Object Code	Array
Data Type	UNSIGNED8
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of J1587 FMIs
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	J1587 FMI Message 0
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

to

Sub-Index	254
Description	J1587 FMI Message 245
Access	Ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	UNSIGNED8
Default Value	No

Example:
The value read is the diagnostic code present in the device. This includes the FMI. (See J1587 spec PID 194)

Vehicle Mapping/Conversion Objects

Object 5000h-50FFh: Vehicle Data Mapping/Conversion

This object provides a way for the user to map the data from various network objects to fixed data objects. This allows the data to be used independent of the vehicle network type.

Object Description

INDEX	5000h-50FFh
Name	Vehicle Data Mapping/Conversion
Object Code	RECORD
Data Type	VH_MAP_CONFIG
Category Conditional	Optional

Entry Description

Sub-Index	0h
Description	Number of Mapping objects
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	254

Sub-Index	1h
Description	Source
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

Sub-Index	2
Description	Destination
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	No

Sub-Index	3
Description	Adder A
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	REAL
Default Value	0.0

Sub-Index	4
Description	Multiplier B
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	REAL
Default Value	1.0

Sub-Index	5
Description	Adder C
Access	Ro
Entry Category	Optional
PDO Mapping	No
Value Range	REAL
Default Value	0.0

Value in Destination = ((Value in Source + A) * B) + C
Example:
To convert Celsius to Fahrenheit Set A to 0 B to 1.8(9/5) and C to 32.

Examples:

RPM

DINBUS

1) Read DINBUS DataIn Object, Subindex 2

The value will be the actual RPM divided by 10.

J1939

1) Set J1939 PDU 1 PGN to 61444.
2) Set J1939 PDU length to 8 data bytes.
3) The RPM can then be read from J1939 PDU Data PDU 0 Subindex 4 and 5.

The value will be the actual RPM divided by 32.

J1587

1) Configure J1587 MID A to a value of 0x80 (decimal 128)
2) The RPM can then be read from J1587 Message Data 2 Byte Page 1 MID A (Index 0x4702) Subindex 63.
3) The status can be read from the FMI Object SubIndex 1.

The value will be the actual RPM/4.

MTU

1) Set MTU PDU Configuration COB ID to 1000
2) Set MTU PDU Configuration Mux to 1
3) The RPM can be read from the MTU PDU Data 1

The value will be the actual RPM/10

Data Conversion:

If the user wants to standardize the values, the user can use the conversion objects. First, configure the gateway using examples on previous page.

DINBUS

1) Set Vehicle Data Conversion object Source to DINBUS DataIn Object, Subindex 2
2) Set Vehicle Data Conversion object Destination to DataIn Unsigned 16
3) Set Vehicle Data Conversion object Adder A to 0
4) Set Vehicle Data Conversion object Multiplier B to 10
5) Set Vehicle Data Conversion object Adder C to 0

The value can be read from DataIn Unsigned 16 object. It will be the actual RPM.

J1939

1) Set Vehicle Data Conversion object Source to J1939 PDU Data PDU 0 Subindex 4
2) Set Vehicle Data Conversion object Destination to DataIn Unsigned 16
3) Set Vehicle Data Conversion object Adder A to 0
4) Set Vehicle Data Conversion object Multiplier B to 32
5) Set Vehicle Data Conversion object Adder C to 0

The value can be read from DataIn Unsigned 16 object. It will be the actual RPM.

J1587

1) Set Vehicle Data Conversion object Source to J1587 Message Data 2 Byte Page 1 MID A (Index 0x4702) Subindex 63
2) Set Vehicle Data Conversion object Destination to DataIn Unsigned 16
3) Set Vehicle Data Conversion object Adder A to 0
4) Set Vehicle Data Conversion object Multiplier B to 4
5) Set Vehicle Data Conversion object Adder C to 0

The value can be read from DataIn Unsigned 16 object. It will be the actual RPM.

MTU

1) Set Vehicle Data Conversion object Source to MTU PDU Data 1
2) Set Vehicle Data Conversion object Destination to DataIn Unsigned 16
3) Set Vehicle Data Conversion object Adder A to 0
4) Set Vehicle Data Conversion object Multiplier B to 10
5) Set Vehicle Data Conversion object Adder C to 0

The value can be read from DataIn Unsigned 16 object. It will be the actual RPM.

Multiplexed PDO Implementation:

The